Phase I Archaeological Survey and Phase II Evaluation of Sites 21CR161 and 21CR162 for TH 101 Up the Bluff, CSAH 61 to TH 14, Carver County, MN

CSAH

S.P. Number 1009-26
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Authorized and Sponsored by:
Minnesota Department of Transportation
and the Federal Highway Administration

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MANAGEMENT SUMMARY

The Minnesota Department of Transportation (MnDOT) plans to reconstruct a one-mile segment of Trunk Highway 101 (TH 101) from CSAH 61 to TH 14, designated as the TH 101 Up the Bluff Project (State Project 1009-26). Florin Cultural Resources Services, LLC was retained by MnDOT to conduct a Phase I archaeological survey for the project and Phase II evaluation of sites 21CR161 and 21CR162, which were identified during the survey. MnDOT is the lead agency, and the MnDOT Cultural Resources Unit is the delegated review agent.

The project area is located at the intersection of Archaeological Regions 2e – Prairie Lake East, 2n – Prairie Lake North, and 4s – Central Lakes Deciduous South in T116N, R23W, Sections 25 and 36, Carver County. The archaeological survey corridor along TH 101 was variable in width. The archaeological survey area included approximately 31 acres. The landscape in the project area is mostly a rolling upland with steep ravines. The south end of the project extends to the Minnesota River valley bottom.

Fieldwork was conducted from May 11 to July 20, 2015. Frank Florin was the principal investigator. The Phase I archaeological field methods included pedestrian survey, shovel tests, and deep auger tests. Close-interval tests in five-meter intervals were dug at all archaeological sites.

Five new sites were identified (21CR159, 21CR160, 21CR161, 21CR162, and 21CR163). Sites 21CR159 and 21CR163 are sparse lithic scatters, and site 21CR160 is a lithic isolate. No diagnostic artifacts were recovered from these sites, and their cultural contexts and ages are unknown. Under Criterion D, these sites lack the potential to provide important information on the precontact period because they have sparse and limited artifact assemblages, and they are recommended not eligible for listing on the National Register of Historic Places (NRHP).

Site 21CR161 is a multicomponent site that includes a ca. 1857 to mid-1900s historic farmstead artifact scatter and a large, precontact period sparse lithic scatter. One of the precontact occupations included a Middle Archaic earthen oven/fire hearth feature that dates to ca. 4400 RCYBP (cal. 5000 BP). Phase II evaluation included eleven (1-x-1 meter) excavation units and close-interval shovel tests. Historic artifacts include a small amount of fragmentary architectural and domestic items. The historic component is not directly associated with historically significant persons or events, nor does it embody the distinctive farmstead characteristics of the agricultural period from the mid-1800s to middle 1900s. The historic research potential of the site is low because of the limited artifact assemblage and lack of features. The precontact component lacks diagnostic artifacts and consists primarily of lithic debris, with a small amount of fire-cracked rocks, stone tools, and cores. Given the large size of the site, there were probably multiple ephemeral precontact occupations, perhaps extending over thousands of years. The precontact component overall has a sparse and limited artifact assemblage. The site area is in agricultural fields or former fields. Nearly all of the artifacts are contained in the plow zone, and the site lacks integrity. Except for a small earthen oven/fire hearth feature that was fully excavated, no significant cultural deposits were present below the plow zone. The site is recommended not eligible for listing on the NRHP because it lacks integrity and research potential. The site does not meet National Register Criteria A, B, C, or D.

Site 21CR162 is an Archaic campsite in a wetland at the bluff base along the northern margin of the Minnesota River valley. A radiocarbon date of ca. 5000 RCYBP (cal. 5800 BP) was obtained from a bison tooth in the earliest component. Phase II evaluation included six (1-x-1 meter) excavation units and close-interval shovel tests. A total of 24 auger tests contained artifacts from between 0 and 235 cm below surface. Artifacts primarily include lithic debris and faunal material, with smaller amounts of stone tools and fire-cracked rocks. The extensive vertical distribution of artifacts indicates multiple ephemeral site occupations, perhaps also including Woodland period occupations. The density of artifacts is very low for each component. Site 21CR162 lacks the potential to provide important information on the precontact period under Criterion D because it has a sparse and limited artifact assemblage that is not capable of answering important research question related to the Archaic tradition. The site is recommended not eligible for listing on the NRHP.

The Phase I archaeological survey and Phase II evaluations for the project are complete. It is the opinion of FCRS that no historic properties eligible for or listed on the NRHP will be affected by this project.

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1.1 Overview

The Minnesota Department of Transportation (MnDOT) plans to reconstruct a one-mile segment of Trunk Highway 101 (TH 101) from CSAH 61 to TH 14, designated as the TH 101 Up the Bluff Project (State Project 1009-26). Florin Cultural Resources Services, LLC was retained by MnDOT to conduct a Phase I archaeological survey for the project and Phase II evaluation of sites 21CR161 and 21CR162, which were identified during the survey. MnDOT is the lead agency, and the MnDOT Cultural Resources Unit is the delegated review agent. Fieldwork was conducted from May 11 to July 20, 2015.

1.2 Project Setting

The project is located along TH 101 in a mixed suburban and rural area, approximately one mile north of Shakopee and two miles south of Chanhassen, Minnesota. The landscape in the project area is mostly a rolling upland incised by a few steep ravines, with the south end extending to the Minnesota River valley bottom. The area is a mixture of agricultural fields, woods, lawns, wetland, and a golf course.

1.3 Project Area and Area of Potential Effect

The project area is located in T116N, R23W, Sections 25 and 36, Carver County (Figures 1 and 2). The archaeological survey corridor along TH 101 (Great Plains Boulevard) was approximately one-mile long, with a variable width, which included adjoining roadways adjacent to Creekwood Drive. The archaeological survey included 31 acres, encompassing the final construction limits. In a few locations, a slightly larger area was surveyed prior to finalizing the project design. The Area of Potential Effect (APE) for the project is the final construction limits and extends one meter below surface on the uplands and three meters below the surface in the Minnesota River valley bottom. The construction excavation will be deeper than one meter in some upland areas, but there is no archaeological potential below one meter in the glacial-age upland soils. The UTM coordinates along TH 101 for the survey area are the following: E457600 N4963780 for the north end and E457370 N4962280 for the south end (1983 Datum, UTM Zone 15). The survey area is bordered on the north by TH 14 and on the south by CSAH 61. Land ownership included state owned right-of-way and privately owned lands adjacent to the ROW.

1.4 Curation

Copies of project documentation are on file at the FCRS office in Boyceville, Wisconsin. FCRS is in the process of contacting private landowners about donating the artifacts to the Minnesota Historical Society (MHS).

1.5 Permit and License

The Phase I archaeological survey was conducted under Minnesota Office of State Archaeologist (OSA) permit 15-009. Phase II evaluation at 21CR161 was conducted under permit 15-058. A copy of the permits is in Appendix A.

1.6 Dating Format

Dates in this report are presented in two formats: 1) by their conventional radiocarbon age (uncalibrated) and 2) as calibrated to actual calendar years. The conventional radiocarbon age (measured radiocarbon age corrected for isotopic fractionation) is presented in the format of "RCYBP" (radiocarbon years before present; with "present" by convention being AD 1950). The use of "RCYBP" dates allows for the consistent comparison of dates from sites in previous reports, as this format has been the standard. Radiocarbon dates from older reports may not have been corrected for isotopic fractionation, but this correction is typically small.

Dates calibrated to actual calendar years use the convention "cal BP" (for example 8000 cal BP) to distinguish them from uncalibrated dates (RCYBP).

For various technical reasons, radiocarbon years are not equal to calendar years, and therefore calibration is necessary to assess the actual age of a sample. Radiocarbon years are converted to calendar years by a process called calibration. This process is based on dating samples with a precisely known age, such as wood that can be dated to a calendar year by tree-ring counts. These dates reveal systematic variations between radiocarbon years and calendar years, and allow the statistical estimation of actual calendar age for any given radiocarbon date. Generally speaking, dates back to about 3000 RCYBP will be close to the actual calendar (calibrated) age, while beyond that the calendar age becomes progressively older than the radiocarbon age. A date of 2000 RCYBP, for example, indicates an age of close to 2,000 calendar years ago, while a date of 10,000 RCYBP indicates a calendar age (calibrated date) of closer to 12,000 years ago.

1.7 Personnel for Lab and Report Tasks

Frank Florin authored all sections of this report, except where noted otherwise. He was also the lab supervisor and conducted the lithic artifact analysis. Beth Wergin was the lab manager, and she cataloged artifacts, prepared data tables, and drafted the wall profile illustrations for the report. James Lindbeck conducted background research, edited the report, and authored the Culture History section and portions of the Environmental Background and Literature Search sections of the report. Kent Bakken conducted the lithic raw material identifications, historic artifact analysis, and farmstead research for site 21CR161. Zooarchaeologist Steven Kuehn was retained to conduct the faunal analysis.

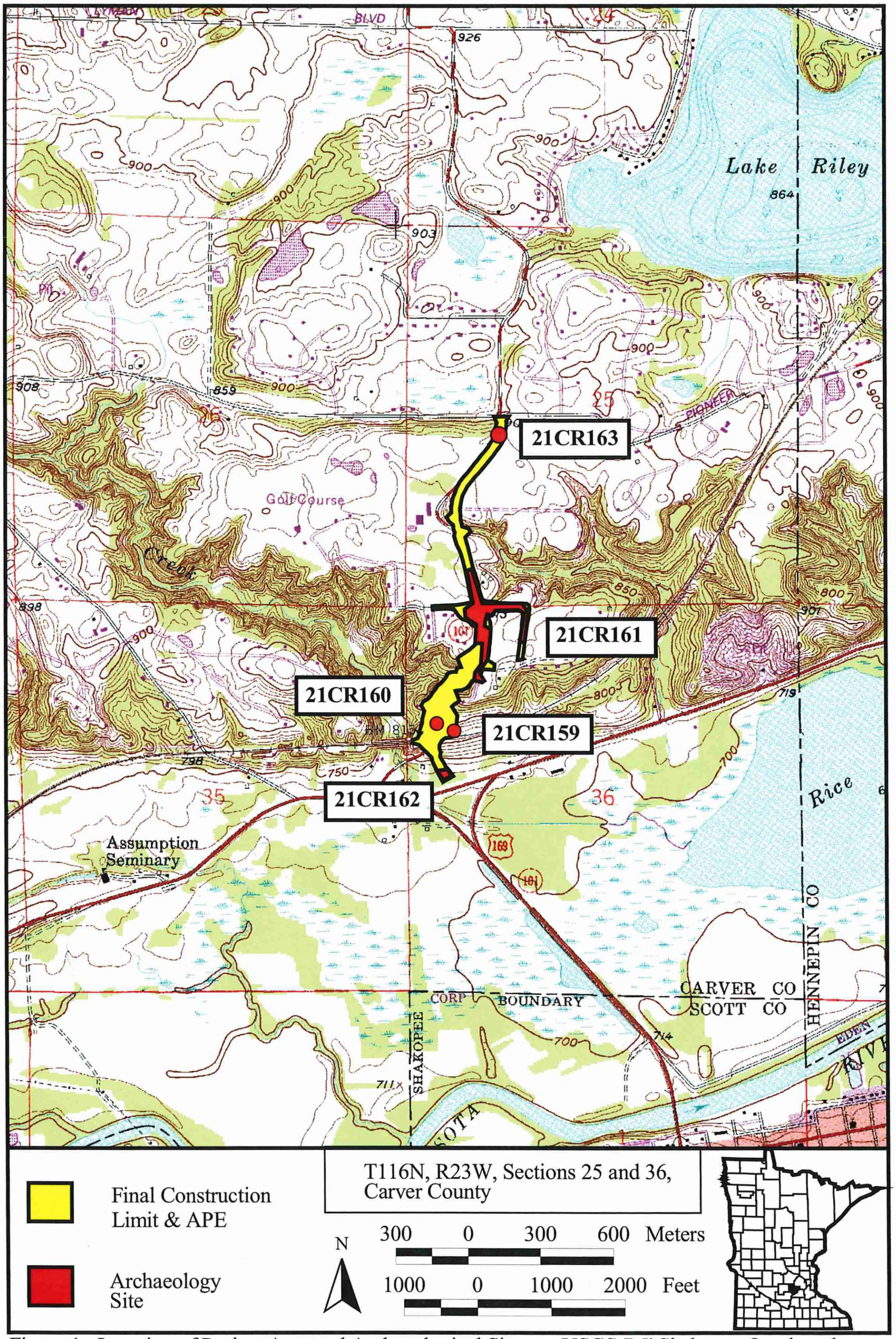


Figure 1. Location of Project Area and Archaeological Sites on USGS 7.5' Shakopee Quadrangle.

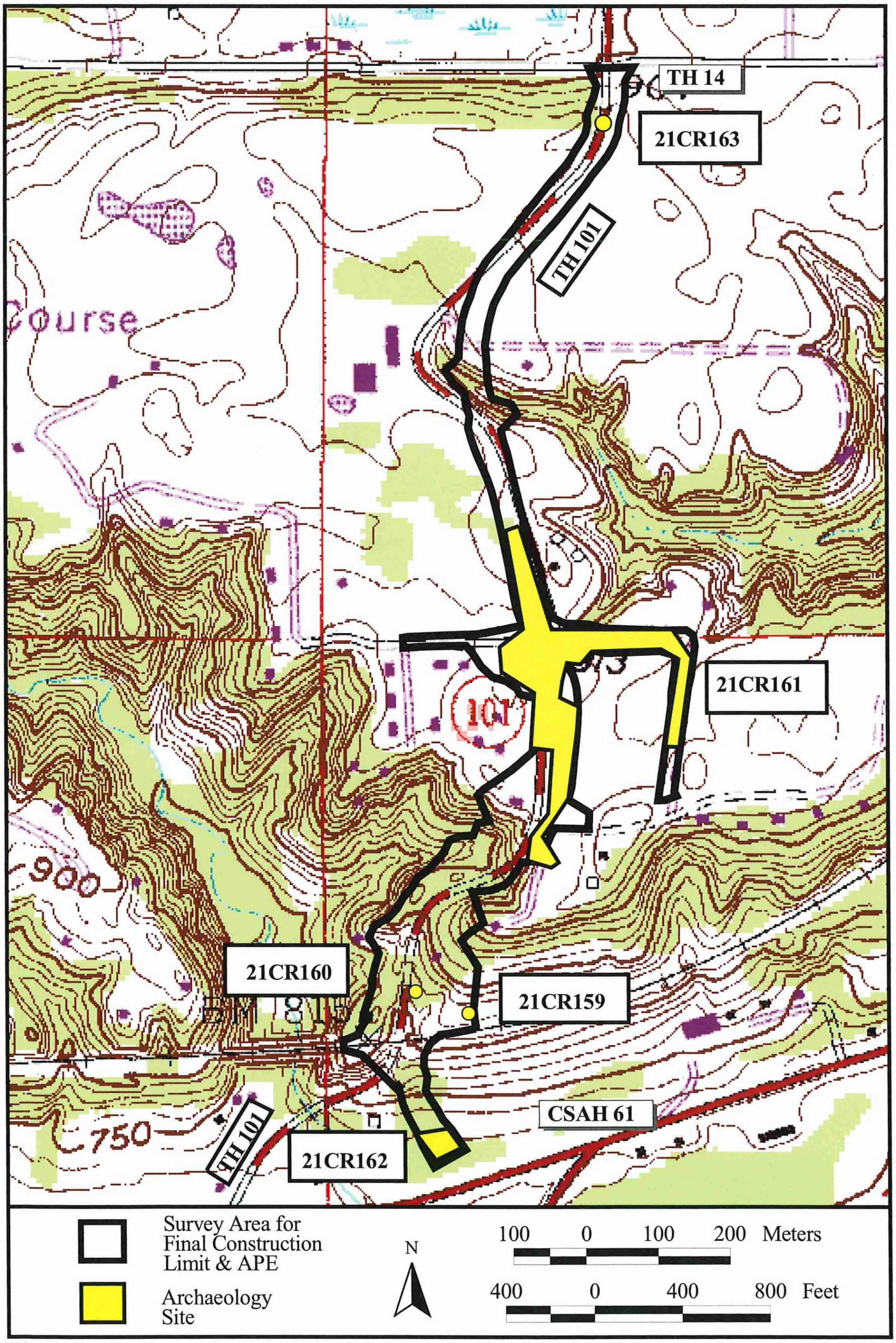


Figure 2. Location of Survey Area and Archaeology Sites on Enlarged USGS 7.5' Shakopee Quadrangle.

2. Research Design

2.1 Objectives

There are several objectives of the Phase I archaeological survey and Phase II site evaluations: 1) to aid project sponsors in complying with Section 106 of the National Historic Preservation Act and 36 CFR 800: Protection of Historic Properties; 2) to identify archaeological sites and assess their eligibility for listing on the National Register of Historic Places (NRHP); 3) to aid in project planning; and 4) to produce a report documenting the archaeological investigations.

2.2 Aspects of the Research Design

The research design was developed to meet project objectives, and it adhered to the research and field method guidelines established by the Minnesota State Historic Preservation Office (MnSHPO), OSA, and MnDOT. These methods, which included a literature search, fieldwork, analysis of data, and production of a technical report, are summarized below and discussed in greater detail in the following sections.

The literature search provided information on previous investigations, previously recorded sites, potential cultural resources depicted on historic maps, and the environmental setting.

Archaeological fieldwork included pedestrian survey, shovel tests, deep auger tests, and excavation units (XUs). Pedestrian survey was used to identify artifacts or archaeological remains that were present on the ground surface. Shovel tests and deep auger tests were used to identify artifacts that were present below the ground surface, characterize soils at the survey areas and archaeological sites, and provide information on the horizontal and vertical provenience of artifacts. XUs were used to recover artifacts, provide detailed information on artifact provenience and cultural stratigraphy, identify cultural features, assess site integrity, and provide exposures of soil profiles at the sites. Specific details of the field methods are presented in Section 3.

The analysis of artifacts was conducted using current methods appropriate to each artifact class. The analysis was oriented towards identifying specific attributes that would provide useful information for interpreting the function and historic context of the site. Specific analytical methods for each artifact class are discussed in detail in Section 4.

The report documents the results of research, fieldwork, and artifact analysis and provides interpretations of the data and recommendations for the sites and project.

2.3 Eligibility Criteria and Historic Contexts

Recommendations for the NRHP eligibility of sites identified for this project are based on the National Register Criteria in 36 CFR Part 60.1 guidelines established by the National Park Service (1991) and Minnesota contexts for the Archaic period, historic farm period, and lithic scatters (Anfinson 1994; Dobbs 1988; Gibbon and Anfinson 2008; Granger and Kelly 2005; Terrell 2006). Archaeological sites that retain integrity may be eligible for the National Register under the following criterion:

A. if they are associated with events that have made a significant contribution to the broad patterns of our history; or

B. if they are associated with the lives of persons significant in our past; or

C. if they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. if they have yielded, or may be likely to yield, information important in prehistory or history.

Integrity is comprised of seven aspects that include: location, design, setting, materials, workmanship, feeling, and association. Several of these aspects must be possessed for a property to retain sufficient integrity for listing on the NRHP. The three aspects of integrity that are specifically relevant to archaeological sites are location, materials, and association. NRHP Criteria A, B, and C do not apply to the precontact sites identified for this project but were considered for the historic component at site 21CR161. The precontact components and sites were evaluated for their NRHP eligibility under Criterion D.

Specific historic contexts for the precontact period in Minnesota have been developed to summarize the extent of knowledge for each context and provide a framework to aid in determining whether a site has the potential to yield information that is considered important to local and regional prehistory. These contexts propose specific research questions and themes relevant to each context. In order for the sites to be eligible for the NRHP under Criterion D, they must retain integrity and contain the potential to provide information on relevant research questions and themes that are applicable to the specific historic contexts present at the sites. These historic contexts are discussed in more detail below.

2.3.1 Archaic Contexts

Site 21CR161 yielded a radiocarbon date of ca. 4400 RCYBP (cal. 5000 BP) and site 21CR162 yielded a radiocarbon date of ca. 5000 RCYBP (cal. 5800 BP), placing the sites in the Middle Archaic period. Historic contexts and basic research questions for the Archaic Period have been developed and are presented together here because of the overlapping and similar research themes (Anfinson 1997; Dobbs 1988; Gibbon and Anfinson 2008). The very sparse and limited knowledge of this period requires addressing basic research questions about this culturally and environmentally dynamic period. Based on a review of Archaic contexts, several basic research questions are proposed for the sites.

Basic Research Themes and Questions

- What are the ages of the components at the site, and how do they fit within the established chronology of the region?
- What specific complexes are present at the site, and how do these complexes relate to previously defined complexes in the region?
- What are the functions of the various components at the site and what activities occurred at the site?

- What are the diagnostic artifact types (especially spear and dart points) from the components at the site, and are they similar to named types elsewhere or are there unique types in Minnesota or regional variants of named types in the state?

- What are the contents of the artifact assemblages from the components? Are specific kinds of artifacts, features, and site types associated with these assemblages?

- What were the lifeways, subsistence strategies, and settlement patterns during the Archaic period in the region? How did they change through time? To what extent were they similar or dissimilar to contemporary lifeways in adjacent areas?

- What internal developments, changes, and adaptations occurred during the Archaic period and how do these relate to environmental changes occurring at that time?

- What types of lithic technology were employed?

- What is the pattern of lithic material use and is there evidence for interaction and trade with other cultural groups from the Plains or Woodlands? How were exotic raw materials (e.g., stone) procured?

- What is the geomorphic context of the components, and what site-specific environmental changes have occurred with respect to alluviation, soil formation, and site formation processes?

2.3.2 Lithic Scatter Thematic Context

Specific precontact period contexts could not be defined for sites 21CR159, 21CR160, 21CR163, and for some components at 21CR161 and 21CR162 because of the absence of diagnostic artifacts. Therefore, the sites were evaluated under the Lithic Scatter Thematic Context. In order for a lithic scatter site to be eligible for the NRHP, it must retain integrity and exhibit one or more of the following characteristics (Anfinson 1994):

- The site must have a demonstrated historic context association.
- The site must contain unusual raw materials.
- The site must be in an unusual regional location.
- The site must suggest an exceptional special use.
- The site must be of an exceptional size (greater than 100,000 square meters).
- The site must have an exceptional density of material (one artifact per square meter or more on the surface; 100 artifacts or more per square meter in formal units).

2.3.3 General Precontact Period Research Themes

General research themes related to nearly all precontact periods in Minnesota are outlined below (Arzigian 2008; Dobbs ca. 1988) and are useful for sites 21CR159, 21CR160, and 21CR163 that lack specific historic contexts, which are not always definable from limited Phase I survey data. Sites 21CR161 and 21CR162 are included in this category because they included undefined components. These general research themes provide a framework to aid in determining if a site has the potential to yield important historical information. They are of a general nature, given the lack of knowledge for most precontact periods throughout the state. The research themes include the following:

- Site setting, type, and function
- Chronology and temporal relationships
- Site distributions and settlement patterns
- Subsistence and seasonality
- Human ecology and environment
- Lithic raw material procurement
- Lithic technology
- Trade and regional interaction
- Site formation processes
- Internal site structure and behavior

2.3.4 Historic Contexts for Minnesota Farmsteads

A detailed overview of farmsteads is presented in *Historic Context Study of Minnesota Farmsteads, 1820-1960* (Granger and Kelly 2005), including the history of agricultural development in the state; farm types and farm practices by geographic region; the design and building of farm structures; and the variety of physical elements present on farms. The overview delineates historic periods associated with changes in agricultural practices in Minnesota and addresses major influences that led to these changes. The defined historic farm periods are:

- Period 1: Early Settlement, 1820-1870
- Period 2: Development of a Wheat Monoculture, 1860-1885
- Period 3: Diversification and the Rise of Dairying, 1875-1900
- Period 4: Industrialization and Prosperity, 1900-1920
- Period 5: Developing the Cutover, 1900-1940
- Period 6: Development of Livestock Industries, 1900-1940
- Period 7: Depression and the Interwar Period, 1920-1940
- Period 8: World War II and the Postwar Period, 1940-1960

Site 21CR161 contains historic artifacts that are probably associated with a historic farmstead dating to ca. 1857 to mid-1900s, which falls within Periods 1 to 8. Specific research questions and themes have been developed for each of these periods (Terrell 2006), including general overarching research themes. Terrell (2006) also provides a comprehensive plan for appropriate research and field methods at farmstead sites, as well as guidelines for assessing site integrity and research potential. Because 21CR161 is not eligible for listing on the NRHP, specific research questions and themes relating to historic farmsteads period are not discussed.

3. ARCHAEOLOGICAL FIELD METHODS

3.1 Archaeological Field Methods

The Phase I archaeological survey methods adhered to the MnSHPO and OSA guidelines for archaeological fieldwork. Specific field methods were discussed with MnDOT prior to conducting fieldwork. The survey design included an archaeological survey for the entire project APE.

3.1.1 Pedestrian Survey

The goal of the pedestrian survey was to identify and record archaeological sites that could be observed on the ground surface. Pedestrian survey was conducted within the entire survey area by walking transects parallel to the roadway in intervals not exceeding five meters. The only areas excluded from pedestrian survey were areas of very steeply sloping terrain (more than 40 degrees) within intermittent and perennial drainages. The pedestrian survey was a practical method for identifying certain types of potential archaeological resources that could be observed on the surface such as artifacts scatters, pits, earthworks, or historical foundations. One piece of lithic debris was identified by pedestrian survey at site 21CR161.

3.1.2 Shovel Tests and Deep Auger Tests

Shovel/auger testing was used to identify artifacts and features not visible on the ground surface, characterize soils at survey areas and sites, and provide information on the horizontal and vertical provenience of artifacts at the sites.

Because the survey area has high archaeological site potential, Phase I shovel testing was conducted at 10 and 15-meter intervals in all areas without excessive ground slope. Shovel test transects were typically placed parallel to the roadway. At the archaeological sites, close-interval shovel testing was mostly conducted at five-meter intervals in cardinal directions adjacent to positive shovel tests in order to assess site integrity, limits, and artifact density. Shovel test data was used to guide the placement of excavation units within portions of the site that have the highest potential to yield data for answering important research questions and evaluating the site.

Shovel tests were 35 to 40 cm in diameter and generally dug to 85 cmbs. Soils were typically dug and screened in 20 to 30 cm increments to provide vertical control of artifact provenience. In current or former agricultural fields, the plow zone was dug and screened separately whenever possible. Because of the potential for deeply buried sites in the wetland at the south end of the project, a Seymour auger with a 20.3-cm (8-inch) diameter bucket was used for deep auger testing below 85 cmbs in each shovel test hole. Following the MnDOT protocol for deep-site testing, two deep auger tests were dug at each test location to recover a volume of soil equivalent to a standard shovel test. The goal was to auger to culturally sterile soils, which were encountered in the C horizon at various depths, depending on landscape position. Maximum auger test depth was 310 cmbs, with most tests between 150 and 250 cmbs. For the sake of brevity, auger tests will be referred to as shovel tests in this report. All soil was screened through 1/4-inch hardware mesh. The field crew returned all excavated soil to each shovel/auger test upon completion. All shovel test locations were recorded with a GPS unit.

3.1.3 Excavation Units (XUs)

XUs were 1-x-1 meter in size. XUs were dug and recorded in 10-cm levels below a datum, whose relative elevation was established in relation to the adjacent ground surface. In current and former agricultural fields, the plow zone (Ap horizon) was dug and recorded as one level whenever it was possible to clearly delineate it. Below the plow zone, excavation was conducted in 10-cm levels by shovel skimming in one to two-cm increments. In some units the transition from the plow zone (Ap horizon) to the B horizon was not clear or abrupt because of plow scars or soil conditions, and the soil from the base of the plow zone could not be accurately separated from the B horizon soil. In this circumstance, artifacts recovered from the base of plow zone and top of the B horizon were noted to be from a transitional zone at the interface of these horizons. Excavation depths were measured below an arbitrary datum that was established near the ground surface at the edge of the excavation unit and is referenced as cm below datum (cmbd). Excavation extended through the artifact bearing soils to a depth of at least 20 cm into the B horizon or at least 20 cm below the plow zone (typically about 50 cm below surface).

The extent and types of soil disturbance were recorded for each level to aid in assessing site integrity. All soil was screened through ¼-inch hardware mesh. The units were backfilled after excavation was complete.

3.1.4 GPS Data Collection and Site Mapping in ArcView

GPS data was collected with a Trimble GeoExplorer 6000 for find spots, shovel tests, and XU corners. The data has a positional accuracy of 10 to 15 cm after post-processing. This data was then exported as northing and easting UTM coordinates to create maps on topographic and aerial imagery.

3.1.5 Field Documentation

A record of daily activities was recorded in a log that documented fieldwork and relevant information on the survey areas and sites. Project design maps provided by MnDOT were used as a base maps for recording project information. Photographs were taken of archaeological sites, survey areas, and wall profiles of the XUs. A record of the photographs was maintained in a project photo log.

Excavation level forms were maintained for each level of an XU and were filled out after the completion of each level. These forms contained information on excavation methods, soils, artifact counts, disturbances, and other relevant observations.

A soil profile was drawn for representative shovel tests and for each positive shovel test and XU. Soil colors, textures, horizons, and disturbances were recorded on the profile. Soil colors were described using the Munsell system, and the soils were moistened prior to determining color.

4. Archaeological Lab Methods

4.1 Artifact Processing

Artifacts were analyzed and cataloged at the FCRS laboratory in Boyceville, Wisconsin. The precontact period assemblage consisted of lithic debris, stone tools, faunal remains, and fire-cracked rock (FCR). The historic artifacts included primarily architectural and household items, such as glass, ceramics, fauna, and nails.

Artifact catalog numbers are comprised of a provenience bag number and a specimen number, following the MHS system. The provenience bag number is represented in the catalog database by the column titled "Prov.", and the specimen number is represented by the column titled "Specimen #". The artifact catalogs for the sites are contained in Appendix B.

Provenience bag numbers were established by FCRS in the lab and consisted of a unique number assigned to each specific provenience by find spot (FS), shovel test (ST), or excavation unit (XU) by depth ("cmbs" for cm below surface). For example, Prov # 1 would represent Shovel Test 1 (ST 1), 0-20 cmbs, and Prov # 2 would represent ST 1, 20-40 cmbs. The specimen portion of the artifact catalog number is a unique sequential number or number range assigned to artifacts within a specific provenience bag number. Individual artifacts were assigned a single number (e.g., 1.1), while artifacts with similar attributes and size grades were grouped together and assigned a sequential specimen number range based on their count (e.g., 1.2-10). Beginning and ending numbers in the range were recorded in one row of the database with attribute data for related artifacts.

Attribute data recorded in the catalog for each artifact, or group of artifacts, included: site number; provenience bag number; specimen number(s); provenience information; artifact class; artifact descriptions; weight (g); and size grade (in). Additional artifact information was entered in the "Notes" field of the catalog. The descriptive categories that apply to each artifact class are summarized in Table 1. Specific descriptive attributes recorded for each artifact class are discussed in detail in the following artifact sections. All data was entered in a Microsoft® Access 2010 database. Fields left blank in the database indicate that the attribute does not apply or that the attribute is absent.

Gilson standard-testing metal sieves were used for size grading. The following size grades (SG) were used to sort artifacts: ≥4.0 inch (SG00); <4.0 to ≥2 inch (SG0); <2 to ≥1.0 inch (SG1); <1.0 inch to ≥0.5 inch (SG2); <0.5 inch to ≥0.233 inch (SG3); and <0.233 inch (SG4). The light fraction of flotation samples from Feature 1 was recovered in a 0.0165-inch (#40) mesh screen. The heavy fraction was recovered in a 1/16" mesh screen. Weight was measured to the tenth of a gram with an electronic scale. Artifacts weighing less than 0.05g were given a weight of "0".

Table 1. Descriptive Categories for Artifact Classes in the Catalog.

Class	Description 1	Description 2	Description 3	Description 4	Description 5	Description 6	Description 7
Lithic	Debris	Flake type	N/A	N/A	Lithic material	Cortex amount	Heat treatment
Lithic	Tool	Tool category	Tool type	Tool flake type	Lithic material	Cortex amount	Heat treatment
Lithic	Core	Technology	Flake removals	Platform modification	Lithic material	Cortex amount	Heat treatment
Lithic	Fire-cracked rock	FCR type	N/A	N/A	Lithic material	N/A	N/A
Faunal	Class	Element/ Side	Portion	Thermal alteration	Modified	N/A	N/A
Botanical	Material	Type	Portion	N/A	N/A	N/A	N/A
Historic	Material	Type	Morphology	Condition	Decoration, Name, or Treatment	N/A	N/A

4.2 The Lithic Raw Material Resource Base

Bakken (2011) has defined several lithic raw material resource regions in Minnesota. The project area is located at the approximate border of the Hollandale Resource Region and the Shetek subregion of the South Agassiz Resource Region (Figure 3; Bakken 2011). While the regional resource map indicates which raw materials might be available as a local resource based on their occurrence in till, outwash, or bedrock (Table 2), it is possible to refine the picture by looking more closely at local geology. The general landscape of Carver County is dominated by Des Moines lobe till that overlies older till from the Superior Lobe (northeastern source material) (Hobbs and Goebel 1982). Thus Swan River Chert, Red River Chert, and associated South Agassiz materials would be available in the area. A recent raw material survey in Steele County, which is a short distance south of Carver County, indicated that in this area the Des Moines lobe incorporated Knife Lake Siltstone, Fat Rock Quartz, and other West Superior raw materials. Knife Lake Siltstone and Fat Rock Quartz were even found to occur as large cobbles. Therefore, West Superior raw materials could also have been derived from local sources near the project area. Local sources for raw materials likely would have included areas where stones were exposed on erosional surfaces such as ravines, stream bottoms, lakeshores, and bluff or terrace scarps.

Fluvial sediments in the river valley may have served as another raw material source. Glacial River Warren would have eroded a variety of tills, from the surficial Des Moines lobe to deeply-buried and poorly-known early tills, and deposited rock fragments (clasts) from these along the valley. This could be a potentially very diverse set of raw materials, but it is hard to speculate on the range of materials it might include. It seems that most of the raw materials available in the northern two-thirds of Minnesota could potentially be found in local sources and that only the materials with sources south of the site or outside of the greater region would truly be nonlocal in origin.

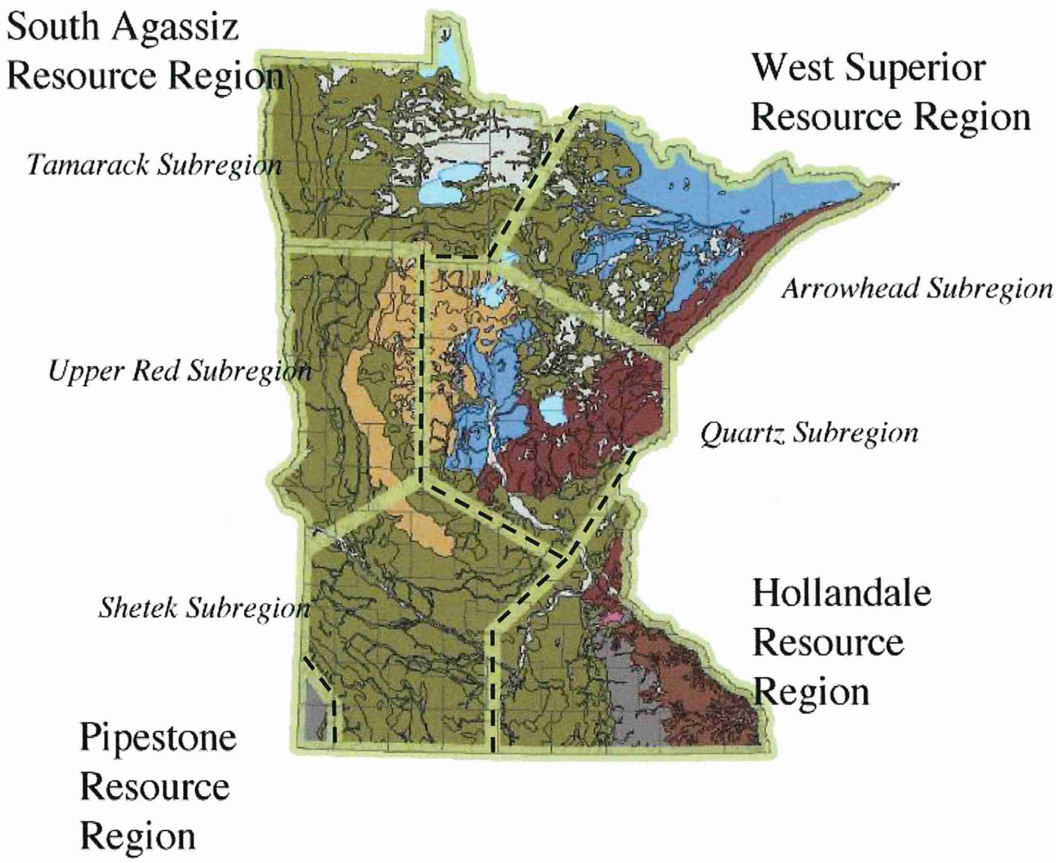


Figure 3. Lithic Resource Regions of Minnesota (adapted from Bakken 2011).

Table 2. Estimated Primary, Secondary, and Minor Lithic Raw Material Status by Region and Subregion (Bakken 2011).

Regions	Primary Raw Materials	Secondary Raw Materials	Minor Raw Materials	Main Exotic Raw Materials
South Agassiz Resource Region				
Tamarack Subregion	Swan River Chert Red River Chert	Border Lakes Greenstone Group	Quartz Tongue River Silica Western River Gravels Group ?	Knife River Flint
Upper Red Subregion	Swan River Chert	Red River Chert Tongue River Silica Quartz	Border Lakes Greenstone Group Western River Gravels Group Knife River Flint	Knife River Flint
Shetek Subregion	Swan River Chert	Tongue River Silica Red River Chert Quartz	Border Lakes Greenstone Group Western River Gravels Group Knife River Flint Fat Rock Quartz Other West Superior materials	Knife River Flint Burlington Chert
West Superior Resource Region				
Arrowhead Subregion	Gunflint Silica Knife Lake Siltstone	Quartz Hudson Bay Lowland Chert Jasper Taconite	Border Lakes Greenstone Group	Knife River Flint
Quartz Subregion	Knife Lake Siltstone Tongue River Silica Quartz *(Fat Rock and other)*	Swan River Chert	Lake of the Woods Rhyolite Biwabik Silica Gunflint Silica Jasper Taconite Kakabeka Chert Hudson Bay Lowland Chert Lake Superior Agate	Knife River Flint Hixton Group Burlington Chert
Pipestone Resource Region				
	Tongue River Silica Gulseth Silica ?	Sioux Quartzite Swan River Chert ? Red River Chert ?	Quartz	Knife River Flint
Hollandale Resource Region				
	Cedar Valley Chert Galena Chert Grand Meadow Chert Prairie du Chien Chert	Shell Rock Chert ?	Quartz Tongue River Silica Swan River Chert Red River Chert	Hixton Group

The surficial geology map of the Shakopee area and Scott County on the south side of the Minnesota River depicts the Prairie du Chien Group within three meters of the surface on the lowest outwash terrace that borders the Minnesota River (Lusardi 1997). There are many places where the Prairie du Chien Group is exposed on the surface about 50 feet above the Minnesota River around the city of Shakopee, and outcroppings occur along the bluffs of the valley margin in Scott County (Roberts 1993:81-84). There is no verification of Prairie du Chien Chert being available from bedrock or secondary deposits in the Shakopee area. However, abundant sources of Prairie du Chien Chert are known to exist, mostly in residual deposits, near the Mankato area, 80 km (50 miles) upstream (Jason Reichel, personal communication 2014). On the north side of the Minnesota River in Carver County, the Prairie du Chien Group is buried below 200 to 300 feet of quaternary sediments (glacial till, outwash, etc), and it appears from the quaternary stratigraphy maps that it was likely not exposed even in the deepest river valleys (Lusardi 2009a and 2009b).

The abundance of Prairie du Chien Chert at nearby sites along the Minnesota River, which includes initial stage reduction, indicates that this material was procured from local sources (Florin et al. 2015). At nearby site 21CR155, the Prairie du Chien Chert cortex is smooth and mechanically weathered, lacking any trace of host rock, which indicates it was not procured directly from bedrock sources. This suggests that the material was procured from local secondary deposits where the stone was concentrated, such as lag or other residual deposits where source stone was transported and possibly moved some distance from the original primary context. In the Mankato area, Prairie du Chien Chert concentrations have been observed in lag deposits and residual deposits in river bottoms and washes, which presumably derived from nearby bedrock sources (Jason Reichel, personal communication 2014). The abundance of Prairie du Chien Chert at 21CR155 and other nearby sites suggests that most of it was not procured from glacial till, which would likely contain only small amounts of Prairie du Chien Chert.

4.3 Lithic Analysis Methods

The analysis of lithics focused primarily on the identification of raw materials, lithic technologies, and specific types of flakes, tools, and cores. Information on site function, lithic economy, lithic technologies, settlement patterns, and regional interaction may be inferred from this data. Raw material, weight, size grade, and presence/absence of cortex were recorded for all lithics. Lithic debris was examined for macroscopic evidence of modification, such as use-wear or retouch. All lithics were examined using a 10x magnification hand lens, which was useful for identifying micro-flaking, lithic material, and other features not visible without the aid of magnification.

Frank Florin and Kent Bakken conducted the lithic raw material identifications. They have extensive experience in the raw materials of the region and utilized MHS sample collections as needed. Published guides to lithic resources of Wisconsin, Minnesota, and the Upper Midwest were also consulted (Bakken 1997, 2011; Gonsior 1992; Morrow 1984, 1994; Morrow and Behm 1986).

4.3.1 Thermal Alteration

Thermal alteration, commonly known as heat treatment, is the intentional alteration of a lithic material to improve its flakability. Heat treatment produces an increase in surface luster, intensifies ripple marks on flake scars, and creates reddish to orangish color in many cherts and other light-colored materials. In some materials, such as Tongue River Silica, Swan River Chert, and Prairie du Chien Chert, the effects of heat treatment are fairly well-documented and can be discerned with a good degree of accuracy. In the current analysis, materials were classified as heat treated if there was significant and noticeable reddish to orangish color and an increase in luster. If these color and texture traits were subdued, then the piece was coded as "probably heat treated". The effects of heat treatment on some materials are not well known.

In contrast to heat treatment, burning is defined by excessive heating that often compromises the stone's flakability. Traits of burning include potlid spalls, crazing, and cracks on the artifact's surface, and a notable darker color. Burning is interpreted to be unintentional, being caused either by accidental over-heating during the heat treatment process or by discard into a cooking facility.

4.3.2 Lithic Debris

Lithic debris includes flakes, flake fragments, and pieces of shatter that were produced from cobble testing, core reduction, stone tool manufacturing, and stone tool maintenance. The analytical methods used in this report are based on the results of previous lithic studies and experimental replications (Bradbury and Carr 1995; Callahan 1979; Cotterell and Kamminga 1987; Flenniken 1981; Hayden and Hutchings 1989; Inizan et al. 1999; Magne 1985, 1989; Odell 1989; Root 1992, 1997, 2004; Tomka 1989; Yerkes and Kardulias 1993). These studies indicate that lithic-reduction stages and technologies can be inferred from diagnostic flake attributes.

The most promising results are derived from studies that consider a combination of several flake attributes from a large sample of lithic debris. The work of Mathew Root (2004) provides the basis for much of the current analysis because of his extensive lithic replicative studies and their relevance to the current project with regards to cultural context, regional location, comparable raw materials, and lithic technologies. The basis of this analytical framework has been used for several large data recovery projects in North Dakota, including Lake Ilo 32DU955A (Ahler et al. 1994), 32RI785 (Root 2001), and Beacon Island 32MN234 (Mitchell and Johnston 2012). Root's methodology and results are supported by the lithic studies referenced above, which tend to focus on more specific aspects of technology and flake attributes. Similar technological approaches based on flake attributes from replicative studies have been developed in other lithic studies (Callahan 1979; Ozbun 1987; Fleniken 1981; Flenniken et al. 1990; Magne 1985). While Root's work is primarily oriented to bifacial technologies of Knife River Flint, other studies consulted for this analysis provided information on bipolar and nonbifacial technologies.

The lithic analysis assessed multiple flake attributes that were identified as technologically diagnostic in numerous studies. These attributes define the specific flake types used in this study, which are summarized and described in Table 3. The lithic analysis was accomplished by 1) identifying specific flake attributes; 2) comparing the attributes with those defined for specific flake types; and 3) making a determination as to flake type. The lithic analyst, Frank Florin, has moderate experience in lithic replication and has a comparative collection of flake types comparable to the ones used in this study.

Flake attributes examined in this analysis include the following morphological and technological characteristics: presence/absence of cortex; presence/absence of percussion bulb; presence/absence of bulbar scar; extent of platform modifications and preparations (grinding, battering, and faceting); platform size; platform angle; number of dorsal flake scars; flake morphology; flake thickness; and size grade. These attributes have been determined to be diagnostic of specific lithic-reduction technologies and stages.

Decortication flakes are indicative of cobble testing and early-stage core reduction, and in this study are linked to nonbifacial technology. Bifacial technology is indicated by bifacial thinning flakes and shaping flakes, alternate flakes, bifacial cores, and bifacial tools. Bipolar flakes and bipolar cores are indicative of bipolar reduction. Nonbifacial technology is indicated by nonbifacial flakes, decortication flakes, tools made on nonbifacial flakes, and nonbifacial cores.

Shatter is most strongly associated with cobble testing, core reduction, and the earlier stages of reduction. Types of lithic debris that are not indicative of specific technologies or reduction-stages include "other size-grade 4" (other SG4) flakes, broken flakes, and unidentified flakes. Some materials, like quartz, which do not have conchoidal fracture properties, are likely to result in greater amounts of nondiagnostic flake types than other materials.

Table 3. Definitions of Technological Flake Types (primarily adapted from Root 2004).

Technological Flake Type	Definition
Decortication Flakes	Decortication flakes have most (>50%) of their dorsal surface covered with cortex. They are associated with raw material testing and the early stages of core and tool reduction (Root 2004). These flakes have a large striking platform and a bulb and bulb scars that are nearly always quite pronounced as a result of direct percussion with a hard hammer (Inizan et al. 1999). Other traits of these flakes include: a large flake platform angle (60-90 degree range); whole flakes are typically are SG1 or SG2; typically two or less flake scars on the dorsal surface; and a relatively thick cross-section.
Alternate Flakes	Alternate flakes are produced when beveled edges are created from: 1) squared-off or thick edges, such as those on tabular cobbles; 2) the thick margins of flake blanks (especially at the proximal end); 3) margins with stacked-step terminations; and 4) broken flakes or bifaces. The result is the creation of a bifacial (beveled) edge that prepares it for bifacial thinning or shaping by producing edge angles appropriate for use as platforms (Flenniken et al. 1990; Root 2004). They are thick in relation to their length and width, are triangular in cross section, have a squared edge (often cortical) adjacent to the platform (this is part of the squared edge of the object piece), have single-faceted platforms, and have a skewed orientation in relation to the axis of percussion.
Bifacial Thinning Flakes – (early to middle-stage)	These flakes are strongly associated with percussion bifacial thinning (Root 2004). Bifacial thinning flakes without platforms exhibit the following attributes: 1) thin curved long sections; 2) extremely acute lateral and distal edge angles; 3) at least three dorsal flake scars (usually more) that originate from different directions, especially other than the flake itself; 4) 20% or less cortex; and 5) an expanding shape in planview. Flakes with platforms exhibit attributes 1-5 along with 6) a bending initiation and 7) a narrow and faceted striking platform without cortex. Proximal flake fragments that consist mainly of a platform are classified as bifacial thinning flakes if they have the above attributes. Flakes with platforms often have a lip at the intersection of the striking platform and the flake ventral surface (caused by a bending flake initiation), and flakes with distal ends usually have feathered terminations. Soft-hammer percussion with a billet is typically used in the removal of these flakes. The flaking angle is acute, the bulb is diffuse, and there is often abrasion on the overhang (platform) (Inizan et al. 1999).

Table 3. Continued.

Technological Flake Type	Definition
Shatter	Shatter includes angular, cubical, and irregularly shaped chunks that lack the following: bulbs of force, systematic alignment of fracture scars on faces, striking platforms, and points of flake initiation. Interior (ventral) and exterior (dorsal) surfaces and proximal and distal ends cannot be determined on these pieces (Root 2004). Shatter may be the result of poor-quality stone with fractures along bedding planes or other material flaws. Shatter is created by most production technologies but is most strongly associated with cobble testing, core reduction, and earlier stages of reduction.
Bipolar Flakes	These exhibit the following attributes: 1) shattered or pointed platforms with little or no surface area; 2) wedging flake initiations; 3) evidence that force has been applied to both ends of the flake, such as crushing on opposite ends; 4) no bulbs of force (due to wedging initiations); 5) pronounced compression rings from compression-controlled flake propagation; and 6) a generally parallel-sided plan form (Root 2004; see also Flenniken 1981). Flakes classified as bipolar must exhibit most but not all of these attributes. Bipolar flakes do not exhibit positive bulbs of force on opposite ends of the same flake interior surface.
Bifacial Shaping Flakes by pressure or percussion – (late-stage)	These flakes are usually small, less than < 1/4 inch (SG4), but can be larger (Root 2004). Only flakes SG3 or smaller are classified as bifacial pressure flakes. These are relatively thin with multifaceted and ground platforms. Flakes must retain a platform to be placed in this class. Flakes produced early in the pressure flaking process have multiple scars on their dorsal surfaces and are curved in long section and slightly expanding, or petaloid, in planview. Flakes produced during final bifacial pressure flaking have parallel sides and a single dorsal arris that runs from platform to distal tip. These flakes are generally produced during bifacial pressure flaking. Occasionally, small flakes produced by late-stage percussion bifacial shaping possess the defining attributes of pressure flakes. Whether produced by pressure or percussion, these flakes are associated with final bifacial shaping (stage 5 as defined by Callahan [1979]) and bifacial tool maintenance.
Nonbifacial Flakes	Nonbifacial flakes are size-grade SG1 to SG3 and do not have the defining attributes of bifacial or decortication flakes. Diagnostic traits include 1) simple platforms with minimal platform modifications (often with no facets but up to one or two facets); 2) large platform angles (60-90 degree range); 3) generally less than three dorsal flakes scars that are likely to be unpatterned; and 4) may have bulbar scar on ventral side (Andrefsky 2005; Magne 1985, 1989; Odell 1989, 2003:126; Tomka 1989; Yohe 1998). Platform areas may be partially or wholly obliterated from hard hammer percussion. This flake type is comparable to Root's (2004) "simple flakes". In general, these flakes have relatively thick cross sections, steep lateral edge angles, and straight or slightly curving profiles. The amount of dorsal surface cortex typically ranges from 0 to 50%. This class contains conchoidal flakes that have a bulb of percussion and bending flakes. Included in this type are flakes classified as "interior flakes", which are removed from the interior of the core or cobble, with no cortex on their surface (Fleniken et al. 1990; and Yerkes and Kardulias 1993). While these flakes are produced in biface reduction, particularly the earliest stages, they are most strongly associated with cobble testing, unprepared nonbifacial cores for flake blank production, and the early stages of nonbifacial tool reduction.

Table 3. Continued.

Technological Flake Type	Definition
Edge Preparation Flakes	A flake removed from the edge of a flake blank or core to change the angle of the edge to facilitate flaking in order to prepare the blank or core for further reduction (Flenniken et al. 1990). Bifacial edge preparation flakes usually have thick and wide platforms and are short in length.
Blade Flakes	These are specialized flakes defined by the presence of 1) parallel or subparallel lateral margins; 2) dorsal flake ridges that are parallel or subparallel with the lateral margins; 3) at least two flake-removal scars evident on the dorsal surface; 4) an axis of applied force that is approximately parallel with flake's margins; 5) a length-to-width ratio of at least 2:1; and 6) plano-convex ,triangular, rectangular, or trapezoidal cross sections (Crabtree 1972:42-43; Root 2004; Whittaker 1994:33).
Potlid Flakes	A flake expelled from the surface of a lithic artifact by heat-induced differential expansion when overheated in a fire, as opposed removal by the flintknapping process (Flenniken et al. 1990). The flake has a flat dorsal surface and a convex ventral surface and is shaped somewhat like the inverted lid of a pot.
Unidentified Flakes	These flakes do not fit any of the previously described types.
Other Size-Grade 4 (SG4) Flakes	Other size-grade 4 (SG4) flakes (< 1/4 inch in size) are either too small to be reliably identified using the diagnostic attributes of the other defined flake types or they simply lack diagnostic attributes (Root 2004). These are produced in all reduction technologies, including cobble testing. These flakes are likely to be underrepresented in lithic assemblages because their small size makes them less likely to be recovered.
Broken Flakes	Broken flakes are flake fragments that lack a bulb of percussion, platform, or other diagnostic features that would enable a determination of flake type. Such flakes are typically distal or medial flake fragments. Broken flakes occur in all technologies and are produced during all stages of lithic reduction.

Aggregate analysis based on size grades (e.g., mass analysis) was deemed not useful for determining lithic technology and reduction stages because soils were screened through 1/4-inch mesh, and therefore SG4 artifacts were typically not recovered. In addition, aggregate analysis draws its inferences from experimental replicative data sets that do not exist for the raw materials at the sites identified in the project area. There are other weaknesses of this method related to the accuracy of separating mixed reduction stages and mixed technologies (Andrefsky 2001:5). The recovery of SG4 debris and large samples is imperative for conducting mass analysis (Ahler 1989).

4.2.3 Lithic Tools

Overview

Stone tools were vital to prehistoric lifeways, and they were used for a variety of tasks: cutting, sawing, scraping, boring or drilling, graving, whittling or slicing, perforating, chopping, pounding, and abrading.

Tool categories were defined by technological attributes (bifacial, unifacial, or pecked/groundstone) and by whether the tool was patterned or unpatterned. Patterned or formal tools include types in which the original shape of the flake blank or raw material has been substantially modified through a systematic sequence of reduction or retouch to produce a specific form that exceeds minimal functional requirements. In patterned tools, the shape of the tool reflects a distinctive style or cultural template. Projectile points, end scrapers, and bifaces are examples of patterned tools. Unpatterned or informal tools include types that were not substantially modified and still largely reflect the original shape of the flake blank or raw material. They lack the complex manufacturing methods of patterned tools and reflect an expedient technology. Flaking is typically restricted to the margin of the artifact. Utilized flakes and retouched flakes are examples of unpatterned tools.

Tool types and their inferred functions (e.g., projectile points, scrapers, cutting tools, etc.) were defined by technological attributes in conjunction with morphological attributes (form), general edge angle, size, and results from micro-wear studies that provide supporting evidence for general tool function (Root 2001; Kooyman 2000:164; Vaughan 1985; Yerkes 1987).

The use-life of a tool is an assessment of its estimated stage of manufacture and reason for discard. Use-life categories include the following: 1) unfinished tools that were not broken; 2) tools that are finished and in working condition; and 3) broken or worn out tools. This information was entered in the "notes" column of the catalog.

Numerous studies indicate that microwear analysis, which uses high-powered magnification to examine the edge of a tool in an attempt to identify the type of material that was worked by the tool and the type of motion with which the tool was used, is necessary to determine a tool's specific function (Keeley 1980; Odell 2003; Semenov 1976; Vaughan 1985; Yerkes 1987). Microwear studies clearly indicate that there can be a low correlation between tool form and specific function, as tools from different form classes were used for the same task, and a single tool form was often used for multiple functions (Yerkes 1987:128). These studies reveal that there is much more functional variation than is typically assumed from the traditional form-based tool classification.

Microwear studies also indicate that there is some viability to inferring general tool function from the form-based classification, especially for certain tool types. For example, scrapers defined morphologically by a steep working edge often correlate with micro-wear studies that show tools with steep working edges were used for scraping bone, wood, and hide (Kooyman 2000:164; Root 2001; Vaughan 1985; Yerkes 1987).

Of course, without microscopic examination of the edge wear, there is no way to tell what material was scraped. Also, microwear analysis often reveals greater functional variation than can be inferred from typological and technological classification alone (Odell 1996; Vaughan 1985). For example, some "scrapers" were also used for tasks such as cutting, engraving, wedging, shaving, chopping, and shredding. In some cases "scrapers" bear no evidence of use as scrapers. Many projectile points were also used for cutting, shaving, engraving, scraping, and drilling. Other bifacial tools were used to saw bone, antler, or wood as often as they were used for cutting meat (Yerkes 1987:186).

Thin, sharp-edged flake and blade tools (such as utilized and retouched flakes) generally correlate with microwear studies confirming their use as cutting implements (Kooyman 2000:164; Odell 1996; Root 2001; Yerkes 1987). Again, the specific material worked or specific use cannot be determined without microscopic examination of wear patterns. Some studies that tested the accuracy of identifying utilized flakes without magnification indicated a low success rate, as the multiple processes (besides use as a tool) that can produce edge wear are not discernible without microscopic analysis (Young and Bamfrorth 1990; Shen 1999). These processes include wear caused by flake production, artifact trampling, excavation damage, and artifact movement in the soil. The studies show two primary causes of incorrect identification. First, utilized flakes that exhibit no macroscopic wear go unrecognized as tools. Second, usewear is incorrectly attributed to use as a tool when it is actually created by some other cause.

Despite the benefits of microwear analysis, there are several limitations that hinder its usefulness and practicality. The time and money needed for such analysis is often not available in contract work, few individuals have the necessary training and expertise, and microscopic equipment is not available in most labs. Further, experimental studies have not been conducted on many of the lithic materials that occur in the artifact assemblages in Minnesota. It has also been found that microwear analysis does not necessarily produce conclusive results. Blind tests revealed the accuracy of tool function to be 76 percent for high-power technique and 68 percent for the low-power technique (Yerkes 1987:115). The accuracy of identifying the material worked was 62 percent for high-power technique and 32 percent for low-power technique. Finally, micro-wear analysis may not clearly identify functions of a single tool edge that was used for different tasks, nor may it identify the function use of a tool used for a short time or on very soft materials that do not cause observable wear.

Stone Tool Techno-Morphological Categories and Descriptions

Tool types recovered from sites in the project area are discussed below.

Utilized and retouched flakes are unpatterned flake tools that have a sharp, narrow-angled working edge, which is not beveled. Utilized flakes have no intentional modification but do have a series of micro-flakes (use-wear) that were removed along the working edge during use. Retouched flakes are minimally modified by pressure flaking along the working edge, presumably to shape the edge for optimal use. The micro-flakes on utilized flakes are distinguished from retouch flakes by their smaller size. Use-wear and experimental studies indicate that these are typically light-duty cutting, slicing, scraping, and sawing tools that were used on soft materials (meat, hides, and plant material) or moderately resistant materials (wood and bone). These tools suggest that the following activities may have occurred at the site: butchering, animal/plant processing, hide working, and bone and woodworking.

Scrapers are patterned flake tools that have been pressure flaked along a distal or lateral end to form a steeply beveled (wide-angled) edge that is optimum for scraping. End scrapers have a distal working edge that is generally shorter or the same length as the lateral side and may have been hafted. Side scrapers have the working edge along the longest side of a flake and were likely not hafted. Scrapers are typically associated with scraping tasks on a variety of soft materials (meat, hides, and plant material) or moderately resistant materials (wood and bone).

Hammerstones are generally rounded stones that have pitting on one or more surface, which resulted from striking a hard material. They were used for flint knapping, processing foods such as acorns, or marrow extraction from animal bones.

Bifaces are classified into five stages after Callahan (1979), although Callahan's final stages are condensed in this scheme (cf. Odell 2003; Root 1999). The unfinished bifaces could have been used as tools in an unfinished state, although it is likely that their intended final form would have been projectile points. The bifaces from the current project include broken and whole specimens.

A Stage 1 Biface is a flake blank, a tabular piece of material, or a cobble that was obtained for reduction. Stage 1 bifaces were not identified in the assemblage, as flake blanks are generally classified as primary flakes, and there were no unworked cobbles.

A Stage 2 Biface has initial edging that is characterized by the following: bifacially flaked edges in which relatively widely-spaced scars produce a sinuous outline in lateral view; conchoidal flake scars with cones of force from hard-hammer percussion; minimal shaping; flakes often do not extend to the midline; irregular outline and cross section; and width to thickness ratio ranges from 2:1 to 3:1.

A Stage 3 Biface has primary thinning that is characterized by the following: major projections and irregularities removed edges straightened so they are less sinuous; ridges and humps removed by thinning; production of flakes with bending initiation from billet percussion; lack of cones of force; flakes that often extend to or past artifact midline; edge angles in the 40-60 degree range; and width to thickness ratios of 3:1 to 4:1.

A Stage 4 Biface has secondary thinning and shaping that is characterized by the following: a thin, flat to biconvex cross section; regular edge shape; edges with beveling and grinding; little to no cortex; production of flakes with bending initiation from billet percussion; lack of cones of force; flakes often extend to or past artifact midline; edge angles in the 25-40 degree range; and width to thickness ratios that range from 4:1 to 5:1.

A Stage 5 Biface has undergone final shaping and hafting preparation and is characterized by the following: pressure flaking or light percussion flaking to form a specific shape, especially along margins; edge beveling or grinding; removal of percussion platforms; pressure flaking of notches and stem shape; and basal grinding.

4.4 Faunal Analysis

The faunal analysis was conducted by zooarchaeologist Steven Kuehn. After separation by provenience, the following information was recorded for each specimen: element, side of the body (when applicable), section or portion of the element, weight in grams, and taxonomic classification. Relative age (e.g., adult or juvenile/sub-adult) was recorded when it could be reliably determined, based on the degree of epiphyseal fusion, tooth eruption, and occlusal wear. Refitting of bone fragments was restricted to specimens recovered from within the same shovel test or XU. Each specimen was examined for exposure to heat in the form of burned, charred, and calcined bone. Evidence of butchering (e.g., cut and chop marks, fractures) was recorded when observed. Bone tools and worked bone fragments are described in detail separately. Modifications resulting from taphonomic agents (e.g., carnivore and rodent gnawing, water abrasion, weathering, trampling) were noted when present.

Due to specimen fragmentation, otherwise unidentifiable pieces of mammal and bird bone are categorized as large-sized, medium-sized, or small-sized based on the relative size and thickness of each specimen. The approximate live weight of large-sized mammals is considered to be greater than 50 lbs (23 kg), 11 to 50 lbs (5 to 23 kg) for medium-sized mammals, and less than 10 lbs for small-sized mammals. Indeterminate bird remains were treated in a similar fashion, divided into large-sized (e.g., turkey, Canada goose, or larger), medium-sized (e.g., large duck, cormorant), and small-sized (e.g., teal-sized duck or smaller). When it was not possible to reliably categorize a specimen based on size, it is listed simply as mammal or bird of indeterminate size. Minimum number of individuals per taxon (MNI) determinations are based on comparison of repeating or multiple elements, relative age, and overall size, and calculated for the assemblage as a whole. In general, MNI estimates are made only for specimens minimally identifiable to the genus or species level (following Reitz and Wing 1999:198-199). An osteological comparative collection facilitated specimen identification.

4.5 FCR Analysis Methods

4.5.1 Definition of FCR

Stones used for cooking or heating, referred to here as fire-cracked rocks (FCR), are artifacts with distinctive characteristics caused by heating to high temperatures in a fire (House and Smith 1975; Jackson 1998; Lovick 1983; Latas 1992; McParland 1977; Taggart 1981; Thoms 2009). FCR includes both fractured and unfractured rocks that have been thermally-altered and lack other forms of cultural modification, such as flaking, pecking, polishing, or use wear.

Stones used for cooking or heating are generally cobbles of locally available materials that were chosen for their accessibility and predictable thermal qualities. These cobbles, which become FCR after heating, were generally larger than 8 cm in diameter (Wentworth 1922). The types of cobbles chosen for heating or cooking were usually coarser than stones used for flintknapping (Lovick 1983) and commonly include quartzite, granite, basalt, sandstone, and limestone. Experimental studies show that igneous rocks are better able to withstand thermal stresses than metamorphic or sedimentary rocks, which explains the predominance of basaltic and granitic rocks in the archaeological record. Quartzite is also common as it one of the metamorphic rocks that can withstand a high degree of thermal stress.

FCR cortical surfaces are often discolored toward pink, red, gray, and/or black hues (Latas 1992; Schalk and Meatte 1988; Taggart 1981). Many pieces retain a high percentage of cortex because of the way FCR fractures. Heating in a fire causes FCR to become more friable (particularly non-basaltic rocks) than unheated stones (House and Smith 1975; McParland 1977). A variety of FCR shapes have been described from experimental studies and archaeological sites, although a correlation between shapes and function is unclear.

FCR is generally recovered either as part of a feature, which is the physical remains of a cooking or heating facility, or in a secondary refuse context where they are no longer in their location of original use. Context is important for the understanding and interpreting FCR and associated subsistence activities at a site.

4.5.2 FCR Background and Previous Studies

The use of heated rocks for cooking, extending back at least 10,000 years, is well-documented ethnographically and archaeologically in North America (Thoms 2009). Cooking stones (FCR) and their associated features have valuable research potential, as is made clear by recent studies that illustrate their significance for interpreting site function and settlement and subsistence patterns (Jackson 1998; Thoms 2007, 2008a, 2009). Ethnographic research has shown that specific cooking and heating facilities were related to specific types of food resources and the seasonality of those resources. Thus, the identification of cooking facilities may indicate the type of food being processed and the seasonality of the site.

Thoms (2008a) notes three important qualities in cooking stones that explain their widespread use. First, the relative non-combustibility and high density of rocks (i.e., heavy per unit volume) enable them to capture and hold heat for longer periods of time than hot coals, allowing extended cooking of foods (particularly roots) to render them readily digestible and nutritious. Second, cooking stones hold heat generated by fire, thus reducing the amount of fuel needed to cook, which is important in areas where wood and other fuels are sparse. Third, cooking stones can be used to boil water and produce greater amounts of steam for longer than would be possible with hot coals alone. Compared to other cooking methods, boiling probably yields a greater proportion of potentially available calories/nutrients from a given piece of food (Wandsnider, 1997), especially when the liquid medium is consumed. The heating benefits from rocks are also apparent in their widespread use for sweatbaths and keeping campsites and habitation shelters warm. Crumbled pieces of FCR were also used for temper in pottery.

Cooking-stone facilities and their archaeological byproducts, FCR features, have considerable functional and morphological variation, as they were used to cook a wide array of animal and plant foods (Driver and Massey 1957; Ellis 1997; Thoms 1989, 2007, 2008a; Wandsnider, 1997). However, four primary cooking methods are consistently noted (Thoms 2008a): 1) **baking** in an earth oven with stone heating elements in closed pits and mounds where cook stones may be heated in situ (i.e., in the pit) or on an adjacent surface fire and, once heated, placed in the pit; 2) **steaming** with stone heating elements in closed pits and mounds where water is added, using cook stones heated in or outside the pit; 3) **roasting** (stone griddles) on open-air hearths built on an unprepared surface or in shallow pits using stone heating elements; and 4) **boiling** in open pits and non-ceramic vessels with stones heated on nearby surface hearths/fires. In general, steam cooking takes place over several hours whereas baking often spans several days, but distinctions between hot-rock baking and steaming are often blurred. Hot-rock roasting refers to the use of cook-stone griddles in open-air hearths built on an unprepared surface or in shallow pits.

Jackson (1998; citing Driver and Massey 1957) provides additional details on the types of cooking facilities that were widespread across North America, which created much of the cooking-related FCR recovered from archaeological contexts:

> As this and other ethnographic records indicate, a typical **earth oven** was usually between 1-3 m in diameter and 30-40 cm deep. The hole was filled with fuel (usually wood) and rocks, and then set ablaze. Once the fire was largely burned down, hot rocks were maneuvered into a flat heating element and then vegetal materials, food packages, more vegetal packing materials, and finally an earth seal were successively added. After sufficient time had passed, usually between twelve and 48 hours, the oven was opened and food was removed; this left a concave basin filled with FCR. Both plant and animal foods were cooked in earth ovens, however, plants were cooked more often (Driver and Massey 1957:233).
>
> The second major type of cooking facility was the **rock griddle**. It was a type of hearth, used for short-duration cooking, that usually lasted no more than a few hours. It was akin to broiling over a fire or roasting on hot coals (cf. Driver and Massey 1957:233) because it used dry, open-air convection heat to cook food. As such, this cooking facility would have been used most often with animal foods and less often with plants (Driver and Massey 1957:233). In a generic rock griddle, rocks were placed directly in a fire to take on heat; they would release that heat after the fire died down. The fire was usually on a flat surface, enclosed with rocks, or in a shallow basin. A rock griddle was usually about 1 m in diameter. When the fire was mostly burned down, the hot-rocks were spread into a flat or slightly concave platform. Food was placed directly on the platform or placed on skewers directly over the rocks. Rocks would cool in place after the food had been removed, and would not be disturbed as a result of food removal.
>
> Stone **boiling**, the third cooking facility, occurred when hot stones were immersed in a container of liquid (Driver and Massey 1957:229). It was a common cooking technique across North America, although it was seldom used among groups that had access to pottery.

Ethnographic accounts indicate that a variety of plants, large and small game, fish, and shellfish were cooked using hot-rock facilities. Plant foods, however, predominate in hot-rock cookery, especially those requiring inulin or fructan hydrolysis (Thoms 1989; Wandsnider 1997), with earth ovens being used most commonly for prolonged cooking of root foods (Thoms 2008b). High-lipid and collagen-rich meats that require substantial hydrolysis, which entails prolonged, high-temperature baking, are also well represented in hot-rock cookery (Wandsnider, 1997).

The distinguishing characteristics of primary cooking facilities types on archaeological sites are summarized in Table 4 (Thoms 2008a).

Table 4. Cooking Facilities and Expected Characteristics of FCR Features and Scatters (from Thoms 2008a).

Hot-rock Cooking Facility	**Expected archaeological characteristics of resulting FCR feature**	**Expected archaeological characteristics of non-feature FCR**
Earth oven (baking), rocks heated therein	Basin-shaped pit, 1–3 m in dia. and 0.1–0.3 m deep, sometimes with rock lining and always with a lens of FCR (i.e., heating element) underlain by and intermixed with thermally-altered (oxidized, carbon-stained) sediments; FCR (small to large *), typically carbon stained and mostly fragments, varies considerably in size, whole rocks often found along edges of heating elements; burned bone (possibly from fuel residue), flakes and tools expected therein as discard from routine clean-up activities	Scattered FCR in the immediate vicinity of remains of earth ovens, representing discard and scavenging activities, and perhaps rocks used with oven-top fire; also other scattered camp debris, furniture rocks, and unused cook stones
Surface oven (roasting), rocks heated therein	Large to medium, presumably flattish, rock(s) on or just below the occupation surface, underlain and encompassed by thermally-altered sediment (oxidized, perhaps some carbon stained); burned bone (possibly from fuel residue), flakes and tools expected therein as discard from routine clean-up activities	Scattered FCR in the immediate vicinity of remains of surface ''ovens'' (i.e., open-air griddles) representing discard and scavenging activities; also other scattered camp debris, furniture rock and unused cook stones
Steaming pits; rocks heated nearby	Basin-shaped pit (ca. 1 m dia. and 0.3 m deep) partially filled or lined with medium and large FCR (typically not carbon stained), or occasionally a large flat rock, underlain by thermally-unaltered sediment; nearby surface hearths (ca. 1 m dia.) where rocks were heated, represented by ash, charcoal, oxidized sediments, and a few pieces of FCR	Scattered FCR in the immediate vicinity of remains of steaming pits, representing discard and scavenging activities; also other scattered camp debris, furniture, and unused cook stones
Stone boiling in a pit; rocks heated nearby	Bucket-like (i.e., near-vertical side walls) pits, 0.3–0.45 m in dia. and 0.15–0.45 m deep, partially filled with small, possibly medium-sized, FCR, not typically carbon stained, underlain by thermally-unmodified sediment; nearby surface hearths where rocks were heated, represented by ash, charcoal, oxidized sediments, and a few pieces of FCR, burned bone (possibly from fuel residue), burned flakes and tools discarded in the fire pit	Comparatively dense, scattered FCR in the immediate vicinity of remains of stone-boiling pits or concentrations representing discard and scavenging activities; also other scattered camp debris, furniture, and unused cook stones

Table 4. Continued.

Hot-rock Cooking Facility	Expected archaeological characteristics of resulting FCR feature	Expected archaeological characteristics of non-feature FCR
Stone boiling in a container; rocks heated nearby	Surface hearths where rocks were heated, represented by ash, charcoal, oxidized sediments, and FCR (not typically carbon stained); concentrations of discarded small- and possibly medium-sized FCR, burned bone (possibly from fuel residue), burned flakes and tools, possibly discarded in fire pit	Comparatively dense, scattered FCR in the immediate stone boiling area, representing discard and scavenging activities; also other scattered camp debris, furniture rock, and unused cook stones
Open-pit drying ovens, rocks heated elsewhere	Basin-shaped pit (ca. 1 m dia. and 0.3 m deep) with FCR lens, mostly medium-size large rocks, underlain by thermally-unmodified sediment; nearby surface hearths (ca., 1 m dia.) where rocks were heated, represented by ash, oxidized sediments, and a few pieces of FCR, burned bone (possibly from fuel residue), flakes and tools expected therein as discard from routine clean-up activities	Scattered FCR in the immediate vicinity of remains of open pits, representing discard and scavenging activities; also other scattered camp debris, furniture rock, and unused cook stones

* Original rock sizes: large rocks, >25 cm in diameter; medium rocks, 10–25 cm in diameter; small rocks, <than 10 cm in diameter.

Thoms (2008a) notes that a better understanding of the relationship between cooking methods and cooking requirements allows for a better understanding of the nature of archaeological FCR features. By considering FCR feature characteristics, it should be possible to assess whether FCR represents stone-boiling or oven-baking, estimate the magnitude of activities, suggest what foods may have been cooked there, and fine-tune the search for confirming evidence.

Jackson (1998:45) summarizes the types of information that can be gleaned from collecting basic FCR data:

> FCR weights and counts give rough estimates of cooking methods (Taggart 1981: 149). In general, large heating elements (i.e. earth ovens) required kilograms of rock to sustain high temperatures for days. While there is considerable overlap between large rock griddles and small earth ovens, rock griddles generally used fewer rocks because they did not need to remain hot for as long as earth ovens. Still fewer rocks were needed for stone boiling in generally small, pot-sized containers.
>
> Rock size is also related to feature function. Large rocks (larger than 10-cm diameter) were preferred in earth ovens and rock griddles (Schalk and Meatte 1988:8.9; Taggart 1981:148-149) because they stored heat for long periods of time. Small rocks (less than 10-cm diameter) were not preferred in earth ovens because they had a higher ratio of surface area to mass, which caused them to lose heat more rapidly than large rocks (Schalk and Meatte 1988:8.9). This is a bad quality where extended cooking is required. Large rocks should have been preferred for structure heating, be it a sweatlodge or habitation, because of the same heat retention quality. Small rocks were preferred for stone boiling because of better resistance to thermal shock and because they were easier to handle (Schalk and Meatte 1988:8.8; Taggart 1981:148-149).

Ethnographic accounts and archaeological excavations attest to the differential use (preference) of smaller rocks in stone-boiling features and larger rocks in earth ovens. Small rocks <10 cm diameter are good for stone boiling because they have a high surface-to-mass ratio which allows them to store and release heat energy quickly; they are also easy to handle.

Raw material is a critical factor. Certain rock types can be good for certain cooking methods and poor for others (McDowell-Loudan 1983-26; Zurel 1979:5). For example, sandstone reacts well in a rock griddle because it is generally coarse-grained and porous, which makes it elastic and able to deform in response to heating and cooling. It is not very good for stone boiling because it loses individual grains and adds grit to water (Brink et al. 1986:290-292; Jackson 1996); it also absorbs a lot of water because of its high porosity, which requires longer drying periods than fine-grained rock types (Brink et al. 1986:296). Fine-grained rocks were generally preferred for boiling, while coarse grained rocks were preferred for griddle roasting and earth-oven baking. However, some materials like quartzite were preferred whenever available. Homogeneity in mineralogy, grain size, and grain shape, as well as a strong bond make quartzite an all-purpose rock.

Size grade analysis can be used to address these questions. Every time a cooking/heating facility is used, some of the rocks will fracture and/or crack. As the number of times the facility is used increases, the resultant rock sizes become smaller as rocks continue to fracture; the number of fractured rocks increases at the same time. Therefore, size grade analysis can be used to discriminate this thermal weathering process. A relatively small number of large FCR pieces would indicate relatively less use of the rocks than a similar feature containing relatively more FCR that are smaller in size.

New lines of research are extending the range of information that can be recovered from FCR through more complex techniques such as analyzing fatty-acid residues to identify remnants of animal fat on FCR, paleo-magnetic testing to reveal whether stones were moved after heating, AMS dating of FCR samples, and examining starch grains, phytoliths, and calcium oxalate crystals on FCR and in features to provide information about plants that were cooked using FCR (Thoms 2008a and 2009).

4.5.3 FCR Analytical Methods

Several criteria were established to provide a consistent method of identifying FCR. The lack of naturally occurring cobble-size rocks aided in the identification of FCR. Data collected for FCR included count, weight, and size grade. In order for a rock to be classified as FCR, it had to meet at least one of the following criteria:

1) The rock is associated with a cooking feature such as fire hearth or cooking pit. Such features may have carbon-stained (blackish) or oxidized (reddish) soil and may be other associated with other materials such as charcoal, ash, and thermally-altered fauna.

2) The rock has distinctive shapes that have been observed at archaeological sites and in ethnographic and experimental studies, such as angular blocky fragments, crenulated or jagged edges, spalls (potlids), or a variety of intermediary shapes. FCR cobbles contain the negative impression where an angular or spall piece detached.

3) The rock's fracture surfaces are fresh, unweathered, and have fairly sharp edges. The rock also lacks the characteristics of cores and lithic debris from stone knapping, such as bulbs of force, ripple marks, hinge or step terminations, and crushing.

4) The rock is unfractured and whole but has other distinctive thermal stress features such as crazing (surface cracks) or a friable and crumbly surface, especially with granitic rocks and sandstone.

5) Rocks have a reddish, pinkish, or blackish discoloration, particularly the cortical surface.

6) The rock's grain size is generally too coarse for flaking. Common rock types include granite, basalt and quartzite that originally occur in the local area as rounded cobbles with their source in glacial or outwash deposits.

Some experimental studies appear to have demonstrated that the shape of individual pieces of FCR (spall or angular) results from specific rates and methods of heating and cooling (Homsey 2009: House and Smith 1975; McDowell-Loudan 1983; McParland 1977; Wendt 1988; Zurel 1999). Angular pieces were thought to result from FCR being quickly cooled by immersion in water for stone boiling, while spalls were thought to result from slower cooling around a fire hearth. However, the results of these studies have not produced consistent results. Jackson's (1998) experimental study suggests that FCR shapes are <u>not</u> related to specific rates and methods of cooling but to rock size and duration of heating. Similar rock shapes can be produced by various types of cooking facilities.

Jackson (1998) conducted microscopic analysis of rock thin-sections subjected to various cooking facilities to examine the mechanical aspects of thermal weathering of rock. The results show that thermal weathering was highest for all rock types in the earth oven and rock griddle plates, while it was lowest in the stone boil and sweatbath plates. The thermal weathering variation is attributed to the length of heat exposure, rather than the rate of cooling. His results indicate that there is valuable research potential for the microscopic study of FCR for understanding cooking facilities and subsistence. In conclusion, additional microscopic and experimental studies need to be conducted before more reliable interpretations can be made.

4.5.4 FCR Morphology

Observations of FCR from archaeological sites and experimental studies led to the delineation of three basic FCR shape types (Jackson 1997, 1998; McParland 1977; Schalk and Meatte 1988; Thoms 1986: Zurel 1979, 1982), which are defined as follows: 1) spall types are expansion-fractures that, according to Jackson (1998), "occur because of an internal thermal gradient, where the exterior of a rock becomes hotter and expands more quickly than the interior. When stress becomes too high, a rock releases it by sloughing off curvilinear spalls or convex potlid"; 2) angular types are blocky contraction-fractures that, according to Jackson (1998), "occur because of tension stress where the exterior of a rock cools rapidly and causes cracks to form perpendicular to the surface and at evenly spaced intervals"; and 3) spall/angular types include FCR that is intermediary between the spall and angular types (Jackson 1997; Thoms 1986; Zurel 1979), which represent opposite ends of the typology continuum (McParland 1976, 1977; Thoms 1986).

Despite evidence that cooking methods (rate/methods of heating and cooling) cannot be inferred directly from FCR shapes (Jackson 1998), these shapes are recorded for this analysis because they provide a fair description of the basic shapes and properties of the FCR, are currently in use in the archaeological community, and may someday prove to have more interpretive value. In addition, the FCR analysis for this project also includes other descriptive types that were established to encompass the variety of FCR shapes and conditions that were recovered at the sites. These FCR types are summarized in Table 5.

Table 5. FCR Type Descriptions.

FCR Type	Description
Spall	Expansion-fracture, has straight or curvilinear profile following the natural shape of cobble cortical surface (like a section of orange peel), relatively thin in cross-section in relation to the width and length, also includes interior non-cortical pieces that have thin cross-sections, fracture plains are relatively large, smooth, and lack complexity
Angular	Thick, blocky, and angular pieces with fractures that are generally perpendicular to the exterior surface, sometimes with distinctive serrated or crenulated edges at the exterior surface. The length, width, thickness ratio more approximately equal compared to the relative thinness of spalls.
Spall/Angular	Intermediary pieces between the Spall and Angular types.
Crumb	Crumbs are small pieces, typically less than 1/2" (SG2) that do not fit other categories
Cobble (Nonfriable)	These are whole cobbles that have cortical discoloration and/or cracks on the surface but do not have spall or angular fractures.
Cobble (Friable)	These are whole cobbles that have a crumbly surface or portion of the surface, which is most common on granitic or sandstone FCR. They do not have spalls or angular fractures.
Cobble with Spall	These are mostly whole cobbles that have one or more spall fractures.
Cobble with Angular	These are mostly whole cobbles that have one or more angular fractures.
Friable Rounded Piece	These are round-shaped FCR with a crumbly surface, which is most common on granitic FCR, classified as crumb if smaller than 1/2" (SG2)
Indeterminate	FCR that do not fit any other categories

4.6 Historical Artifacts

The analysis of historic artifacts was conducted using specific manuals designed to aid in interpreting and dating historical materials (Peterson 1995; University of Utah et al. 1992). These manuals were used to establish date ranges for specific artifact types and aid in site interpretation. Historic artifacts at site 21CR161 included items from architectural and household classes. The following attributes were recorded in the catalog for each artifact when applicable: functional class, material, type, portion, morphology, condition, and decoration or type of surface treatment.

5. Literature Search

5.1 Archival and Background Research for Previous Sites

Archival and background research was conducted to determine whether any previously identified archaeological sites or potential historic sites are located within 1.5 miles of the project area. FCRS staff conducted an initial review of sites located near the project area prior to fieldwork. Additional research was conducted in January 2016 at the MnSHPO in St. Paul. Site inventory files, USGS 7.5' quadrangle site location maps, and research reports were reviewed to provide information on previously recorded archaeological sites and previous investigations. Mr. Tom Cinadr, Survey and Information Management Coordinator at MnSHPO, also conducted a search of the site file database and provided a list of sites within 1.5 miles of the project area.

5.1.1 Previous Surveys and Sites

There are 28 previously-recorded archaeological sites within a 1.5-mile radius of the project area (Figure 4). These sites, which are summarized in Table 6 below, include precontact period mounds (earthworks), precontact period lithic scatters and find spots, precontact and historic period artifact scatters, a historic Dakota village (21SC2), and historic sites dating to the founding of Shakopee in the 1840s and 1850s. A number of other sites, including earthworks, have also been recorded on the bluffs overlooking the Minnesota River outside of the 1.5 mile radius.

Table 6. Previously Recorded Sites within 1.5 Miles of the Project Area.

Site Number	Location	Site Type	Comments	Distance to Project (Meters)	Reference
21CR103	T116N, R23W, SE¼ NW¼ SE¼, Sec 27	Precontact period lithic scatter	Two tertiary flakes found during pedestrian survey.	2270	Harrison (1988a)
21CR104	T116N, R23W, SW¼ NE¼ SE¼, Sec 27	Precontact period lithic scatter	Lithic core and flakes found in shovel tests.	2000	Harrison (1988a)
21CR105	T116N, R23W, NW¼ SW¼ NE¼, Sec 24	Precontact period lithic scatter	Three utilized chert flakes, a possible chert core, and two chert flake fragments recovered during surface survey of plowed field.	2020	Harrison (1988a)
21CR109	T116N, R23W, SW1/4 SE1/4 SE1/4, Sec 14	Precontact period lithic scatter	Three "possible mounds" and lithics were identified.	2480	Lothson (1987), Harrison (1989)
21CR110	T116N, R23W, NW¼ SE¼ NE¼, Sec 25	Precontact period lithic find spot	One tertiary flake and one piece of possible shatter found in fallow field along road	990	Harrison (1988a)
21CR140	T116N, R23W, SW¼ NE¼ SE¼, Sec 27	Historical artifact scatter	Structural and domestic debris associated with farmstead	2080	Schoen (2006)
21CR141	T116N, R23W, SE¼ SW¼ NE¼, Sec 34	Precontact period lithic and artifact scatter	Oneota sherds, flakes, and bone were recovered during Phase I and II, including deeply buried the Middle Archaic deposits. Site is on an alluvial fan.	2080	Schoen (2006)
21CR154	T116N, R23W, SW1/4 NW1/4, Section 36,	Precontact period habitation	Site is a sparse precontact period artifact scatter.	70	Florin et al. 2013

Table 6. Continued.

Site Number	Location	Site Type	Comments	Distance to Project (Meters)	Reference
21CR155	T116N R23W, SE1/4 and NE1/4, Section 35	Precontact period habitations	Phase III data recovery was conducted prior to CSAH 61 reconstruction. The site contained multiple occupations, spanning most of the Holocene from ca. 7100 to 500 RCYBP (8000 to 500 cal BP). Site contains Early Archaic, Late Archaic, and Late Woodland components. Site components in some areas were buried 4.1 meters below surface on alluvial fan and lacustrine deposits in valley bottom.	270	Florin et al. 2013, Florin et al. 2015
21CR156	T1116N R23W, N1/2, SE1/4, SE1/4, NW1/4, Section 36	Precontact period habitations	Multicomponent Late Paleoindian, Archaic, and Late Woodland site on an alluvial fan and colluvial toe slope along the bluff base in the Minnesota River valley. Radiocarbon dates of ca. 7000 RCYBP (cal. 7900 BP) and 6700 RCYBP (cal. 7600 BP) were obtained for site components.	460	Florin et al. 2013
21CR157	T116N, R23W, N1/2, SW1/4, SE1/4, NW1/4, Section 36	Precontact period habitation	Lithic debris, FCR, and animal bone buried beneath modern fill. Artifacts were recovered in two backhoe trenches and a deep auger test from 130 to 300 cm below surface.	370	Florin et al. 2013
FCRS 276-3	T116N, R23W, SE1/4, NE1/4, SE1/4, Section 35	Historical artifact scatter	The site is a scatter of artifacts associated with a former farmstead that dates from ca.1880 to the 1960s. No state site number was assigned.	340	Florin et al. 2013
21CRaj	T116N, R23W, SW1/4 SW1/4, Sec 23	Possible precontact period earthworks	Informant report of two possible precontact period mounds in an undisturbed woodlot.	2040	MnSHPO files
21CRak	T116N, R23W, SW1/4 SW1/4, Sec 23	Possible historical burial	Informant report of the possible gravesite of a child dating to ca. 1870.	1510	MnSHPO files
21HE21	T116N, R22W, W½ SE¼ and E½ SW¼, Sec 30	Precontact period earthworks and artifact scatter	Twenty mounds identified by Winchell. Subsequent surveys found many mounds destroyed. Ceramics and Archaic and Woodland projectile points. Numerous soil features that contain charcoal and burned artifacts.	1500	Winchell (1911), Chamberlin (1972), Nystuen (1973), Harrison (1988b, 1997, 1999), Madigan et al. (1998)
21HE200	T116N, R22W, SE¼ NW¼ NW¼, Sec 30	Precontact period lithic scatter	Two flakes identified on surface of plowed field near creek.	1600	Harrison (1988a)
21HE220	T116N, R22W, NW¼ NW¼ SW¼, Sec 19	Precontact period lithic find spot	The site was originally recorded in the state site files as the "Westminster Heights Prehistoric Habitation Site".	1900	Nystuen (1973), Hoisington and Peterson (1993), Vogel (1994)
21HE225	T116N, R22W, S½ SE¼, Sec 31	Historical and precontact period artifact scatters	Lithic debitage and core, catlinite fragments, bone fragments, iron, glass, and ceramic fragments. Possible contact period site based on artifact styles and landowner report of Native American campsite.	2560	Vogel (1994)
21HE226	T116N, R22W, SE¼ SW¼ SW¼, Sec 31	Historical artifact scatter	Brick, glass, and ceramic debris in a plowed field associated with the location of 19th century meat-packing plant	2260	Vogel (1994)

Table 6. Continued.

Site Number	Location	Site Type	Comments	Distance to Project (Meters)	Reference
21HE264	T116N, R22W, SE¼ SE¼, Sec 30	Precontact period earthworks	Two mounds reported on a bluff top, not formally verified, may be associated with 21HE21.	2350	Chamberlin (1972), Vogel (1994)
21HE361	T116N, R22W, NW¼ SE¼ SE¼, Sec 30	Precontact period lithic find spot	Flake of Prairie du Chien Chert from a shovel test.	2320	Harrison (2005)
21SC2	T115N, R22W, center of NE¼, Sec 6	Precontact period earthworks and Dakota village site	Twenty-eight mounds and the site of "Shakopee Village." Kathio ceramics and human remains were recovered, site area is heavily disturbed. Also contains the location of 21SC40 - "Oliver Faribault Cabin."	2450	Winchell (1911), Wilford (1940), Dobbs (1987), Dobbs and Breakey (1989)
21SC22	T115N, R22W, E½ NE¼ NE¼, Sec 6 & N½ of NW¼ Sec 5	Precontact period earthworks and habitation	Twenty-eight mounds within Veteran's Memorial Park in Shakopee.	3220	Winchell (1911), Goltz (1993), Bakken (2003)
21SC34	T115N, R22W, S½ NW¼ NW¼, Sec 6	Historic site	Location of "Schroeder Brick Yard and Lime Kiln" dating to mid-19th century.	2090	Breakey and Johnson (1989)
21SC40	T115N, R22W, SW¼ NE¼ NE¼, Sec 6	Historic site	Original location of "Oliver Faribault Cabin" dating to the 1840s	3010	Peterson (1985), Dobbs and Breakey (1989)
21SCao	T115N, R23W, NE¼ SW¼ NE¼, Sec 1	Historic site	Site of "Holmes Steamboat Landing" dating to 1851.	1740	Hughes (1905)
21SCap	T115N, R23W, NE¼ SW¼ NE¼, Sec 1	Historic site	Location of "Holmes Trading Post" dating to 1851.	1740	MnSHPO files
21SCo	T115N, R23W, Sec 1	Historic site	Location of "Prairieville," which was the name given by Rev. Samuel Pond ca. 1847 to the Dakota village that was in the location of what later became the platted Village of Shakopee.	900	MnSHPO files

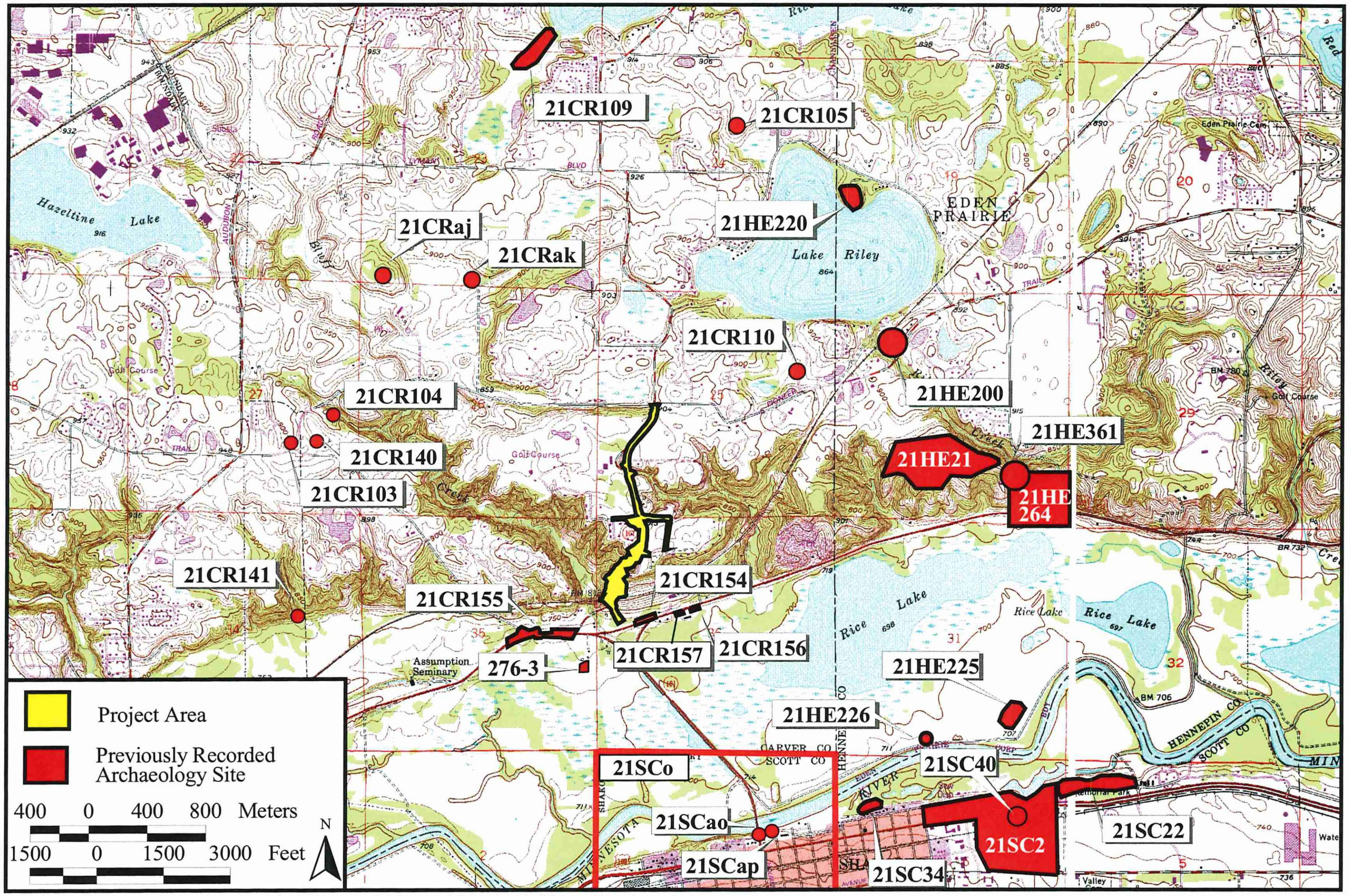


Figure 4. Location of Previously Recorded Sites within 1.5 Miles of Project Area.

5.1.2 Sites and Surveys Within 1.5 Miles of Project Area

The Minnesota River valley and the surrounding bluffs have been the subject of a number of formal archaeological investigations beginning with T.H. Lewis and the Northwestern Archaeological Survey (NWAS), which focused on recording mound groups. Lewis recorded the mounds at sites 21HE21 and 21SC2 during survey in 1882, and he returned to do additional work at 21SC2 in 1884. N.H. Winchell later compiled and published the original survey notes and maps from the NWAS survey (Winchell 1911).

The mounds at 21HE21 were formally investigated again during a 1971 survey by the Minnesota Archaeological Society during their *Hennepin County Mound Site Resurvey* (Chamberlain 1972). The 1972 survey noted that four of the originally-recorded 20 mounds were still extant with the rest destroyed by erosion and cultivation. The Minnesota Trunk Highway Archaeological Reconnaissance Survey (Nystuen 1973) found three mounds remaining during a 1972 survey for an alternate alignment of TH 169. Another round of surveys was initiated in 1997 for a proposed development in the site area. Harrison (1997, 1998b, and 1999) conducted Phase I survey and a partial data recovery adjacent to the mounds and found that portions of the area remained intact, containing Archaic through Woodland components, but no visible mound remnants. The site was recommended eligible for listing on the NRHP. Hemisphere Field Services (Madigan 1998) conducted geomorphological testing, geophysical survey, and archaeological testing at the loci of seven mounds and found no evidence of intact mound remnants. Soil staining and an intact habitation feature dating to the Archaic period were identified at the reported location of one mound. Bruce Koenen (SHPO site files 2001) notes that at least two mounds survived at the site despite the flurry of development in the area and that others of the original group may exist outside of the areas surveyed during the 1990s.

The location of the mounds and Dakota Village site at 21SC2 (along with 21SC40, the "Oliver Faribault Cabin, which is located within the 21SC2 site area) have been revisited during a number of subsequent investigations but the exact location of the village site remains unclear. The location of the (destroyed) mounds is more certain (Bruce Koenen, SHPO files 1998) and the OSA confirmed during a field visit in 1998 that almost the entire area has been disturbed by decades of construction and development. Wilford (1940) describes the location of the village in terms of features that are still extant, such as a ravine, terrace edge, and railroad tracks but little or no archaeological evidence of the village has been recovered. Dobbs (1987) and Dobbs and Breakey (1989) conducted surveys for a sewer corridor in the City of Shakopee that extended through the reported site area and found no evidence of the village or mounds. Site 21SC40, the "Oliver Faribault Cabin" was established following the 1989 survey. Within the property associated with the cabin is the reported location of historic Dakota graves. Koenen reports that the 1936 WPA Burials Survey lists four graves in a fenced cemetery near the cabin. Descendents of Faribault, who still own the property, reported to Dobbs and Breakey (1989) that the burials contained the remains of 10 to 12 individuals who were originally in mounds that were leveled to fill in the cabin yard.

Site 21SC22 is known as the "Pond Mounds" for the original landowner E.J. Pond. It was recorded by Lewis and reported in Winchell (1911). Twenty-eight mounds were mapped 25 feet above the river. Mr. Pond reported that the mounds had been "often dug into" and that they were near Shakopee's Village. The mounds are now located within Veteran's Memorial Park in Shakopee. J.W. Oothoudt from MHS visited the site in 1976 following the unearthing of human remains during landscaping at the park. He reported that two mounds had been dug into. The human remains were subsequently reinterred. The site area was surveyed again in 1993 for the Mn DNR (Goltz 1993). Nine of the mounds were included within the survey area, and four of these were reported as having their fill removed but subsurface burials likely were still intact. In 2003, Summit Envirosolutions conducted an archaeological investigation for the installation of a pad for a decommissioned helicopter in the park (Bakken 2003). A three meter by three meter block was excavated and flaking debris along with a small amount of faunal material was recovered. No diagnostic materials were found.

Sites 21HE225 and 21HE226 were identified by Bear Creek Archaeology (Vogel 1994) during a comprehensive city-wide cultural resources survey for the city of Eden Prairie. The survey included archaeological and historic landscape resources within the city limits. Other sites (21HE200, 21CR103, 21CR104, 21CR105, and 21CR110) within 1.5 miles of the project area were identified during a cultural resources investigation conducted by Archaeological Research Services (Harrison 1988a) as part of an EIS for TH 212. Harrison (1989) recorded lithic scatter site 21CR109 during a survey of Lake Susan Park for the city of Chanhassen. The MnSHPO site file for 21CR109 also cites a survey conducted in 1987 (Lothson 1987) for a private land developer during which three possible "mounds" were identified, just north of Harrison's 1989 survey area. There is no indication that these features were verified or further investigated. Lothson concluded that the features were outside of the proposed development area.

Loucks and Associates (2000) conducted a survey for a 130-acre parcel located three miles south-west of the current project area for a proposed amphitheater. This parcel included portions of the 21SC26 mound group, and although the Loucks survey found no evidence of any mounds in the survey area, they did identify a precontact period lithic scatter (21SC64). These sites do not appear in Figure 4, as they are too far west.

In 2004, the Berger Group conducted a geomorphological and Phase I and Phase II archaeological investigations across a total of 45.8 miles of survey area within a 1000 foot-wide corridor for a number of alternative routes for TH 41 north and south of Chaska, a few miles west of the current project area. Three sites were identified during the Berger survey: 21CR140, 21CR141, and 21CR142 (Schoen 2006). No additional work was recommended for 21CR140 (a small scatter of historical materials) and 21CR142 (lithic debitage and FCR in the plowzone). Site 21CR141 is located on a broad alluvial fan in a steep, narrow drainage in the Minnesota River valley. Shovel and auger testing conducted recovered Oneota sherds from 35 to 40 cmbs and a flake at 165 cmbs. A geomorphological investigation of a cutbank near the head of the alluvial fan in the site area identified a number of buried A horizons, including one at 315 to 340 cmbs, in which lithic debitage, bone fragments, and charcoal were recovered.

A phase II evaluation at 21CR141 included shovel and auger testing (17 tests) and four XUs totaling eight m^2. A small amount of faunal material and one flake were recovered from three of the XUs that contained buried soils on top of the alluvial fan (units 1, 2, and 4). The Oneota sherds recovered during the Phase I testing did not appear to be associated with any of the buried deposits and were considered to be an isolated find. In XU 3, which was positioned at the base of the alluvial fan, faunal material, lithic debitage, and charcoal were recovered. These materials were interpreted to represent an intact midden deposit that follows a buried soil horizon ranging in depth from 316 to 358 cmbs (where the surface is the top of the cutback). Lithic debris included seven flake fragments and a bifacial reduction flake of Prairie du Chien Chert along with one flake of Swan River Chert. A total of 203 pieces of faunal material were recovered. Charcoal samples were dated to ca. cal 7000 BP and cal. 6500 BP, placing the horizon in the Middle Archaic period. While pointing out the lack of recovered diagnostic artifacts and intact features, Berger recommended that the site is eligible for listing on the NRHP based on the discrete deposit of datable materials from the Archaic period, along with the potential for intact features and diagnostic materials from other parts of the site.

Sites 21CR154, 21CR155, 21CR156, and 21CR157 were identified during survey along CSAH 61 at the north end of the Shakopee Bridge during a multi-year survey and evaluation conducted by FCRS from 2012 to 2014 (Florin et al. 2013; Florin et al. 2015).

Site 21CR154 is a precontact period habitation located along CSAH 61. The age and cultural affiliation of the site are unknown because of the absence of diagnostic artifacts. Artifacts recovered include a small amount of lithic debris, animal bone, and FCR. Site activities are inferred to have included lithic reduction, animal processing, and heating/cooking. Portions of the site lack integrity as a result of soil disturbance from previous construction activities. The site was recommended not eligible for listing on the NRHP.

Site 21CR155, which is located in alluvial fan and lacustrine deposits on the floor of the Minnesota River valley across from the city of Shakopee, had cultural deposits that included bison and other terrestrial and aquatic remains buried as deep as four meters. The site contained multiple occupations, spanning most of the Holocene from ca. 7100 to 500 RCYBP (8000 to 500 cal BP). Radiocarbon dating and diagnostic artifacts define two Early Archaic components, a Late Archaic component, and a Late Woodland component. The Early Archaic points include an unnotched "Delong" type and a medium-sized notched type. Other undefined components were also present. The site was determined eligible for listing on the NRHP and a Phase III data recovery was conducted prior to highway construction.

Site 21CR156 is a multicomponent Late Paleoindian, Archaic, and Late Woodland site on an alluvial fan and colluvial toe slope in the Minnesota River valley near the margin of a former shoreline of Rice Lake. A radiocarbon date of ca. 7000 RCYBP (cal. 7900 BP) was obtained from calcined bone associated with two Late Paleoindian point bases and a fire hearth feature. Another portion of the site contained lithic debris in a buried soil that was dated to ca. 6700 RCYBP (cal. 7600 BP). Phase 1 and 2 investigations included deep auger tests and XUs. Artifacts were recovered from 0 to 250 cm below ground surface. Multiple buried soils are present across the site area. Artifacts recovered include faunal remains, ceramics, lithic debris, stone tools, and FCR. Artifact density is moderate. The site has high degree of integrity and moderately well-preserved cultural deposits. The presence of FCR and thermally-altered faunal material suggests that fire heaths or cooking pits were present, and one hearth feature was identified. The site was recommended eligible for listing on the NRHP and the construction plans for the CSAH 61 project that necessitated the archaeological survey were changed to avoid the site area.

Site 21CR157 is a precontact habitation of unknown age and cultural affiliation located along the south side of CSAH 61. The site is buried below modern fill, and artifacts were recovered in two backhoe trenches and a deep auger test from 130 to 300 cm below surface. Artifacts include lithic debris, FCR, and animal bone, indicating that site activities included animal processing, cooking, and lithic reduction. A sparse, modern/historic refuse dump was also found beneath the fill. Integrity of the precontact component is uncertain. The site has the potential to provide important information on the precontact period in the region and a Phase II evaluation was recommended.

5.1.3 Comparative Regional Sites

Additional surveys and evaluations conducted in the region farther from the project area include a project for the Northern Natural Gas Company on both sides of the Minnesota River valley and adjacent uplands near the town of Jordan, a few miles west of the project area (Bailey et al.

1999). Eight precontact sites and six Euro-American historic sites were identified. Precontact sites included earthworks, lithic scatters, lithic isolates, and artifact scatters, representing Woodland and undefined components. A lithic workshop possibly dating to the Late Paleoindian or Early Archaic period is inferred from the geomorphic context of one of these sites, 21SC54. Prairie du Chien Chert was the dominant lithic material at the sites, with a small amount of other local materials and exotic materials such as Knife River Flint and Hixton Group Quartize. The relatively large number of sites attests to the importance of the river valley in the precontact and historic periods.

Sites 21NL63 and 21NL58, located still farther west along the Minnesota River, are similar to 21CR155. These sites are on alluvial-colluvial fans with buried soils and Archaic components. The Fritsche Creek II site (21NL63) is located on an alluvial-colluvial fan in the Minnesota River valley in Nicollet County, just upstream from the city of New Ulm (Roetzel et al. 1994). The site includes evidence of prehistoric occupation that spans from the Archaic to the Woodland periods, with an intact buried component that appears to date to the Early and Middle Archaic, based on carbon dating of bone collagen. The buried component may reflect a short-term occupation associated with a bison kill and processing site. The dates from 21NL63 (Fritsche creek II) are ca. cal. 7500 BP for the upper horizon from 85 to 150 cmbs (Middle Archaic) and ca. cal. 9000 BP for the lower horizon from 140 to 240 cmbs (Early Archaic).

Site 21NL58 is located on a foot slope along the eastern edge of the Minnesota River valley approximately 2.5 miles from 21NL63 (Terrell et al. 2005). Backhoe trenching was conducted at 21NL58 to a depth of approximately 1.9 meters, and faunal material, including bison, was recovered from the alluvial fan deposits. The dates from 21NL58 are from six collagen samples that were averaged and calibrated, with a final range of ca. cal. 6000 BP (Middle Archaic) from 120 to 185 cmbs. The researchers concluded that:

> Comparison of the faunal remains, tool kit, and geological setting of 21NL58 with site 21NL63 (Fritsche Creek II) indicate that small alluvial/colluvial fans within the Minnesota River valley were being occupied during the Archaic period. These fans were likely formed within the Minnesota River valley walls in response to the destabilization of sediments at the base of tributary ravines by outbursts of flood waters from Lake Agassiz through the River Warren channel. By the Archaic period these landforms had apparently become stable and dry enough for habitation. The use of both of these fans as procurement and processing sites indicates that these landforms were attractive locations for such activities (Terrell et al. 2005:81-82).

Site 21BE271 is an Archaic period lithic procurement site located on a terrace west of Minneopa Creek, approximately 60 miles from the current project area near the city of Mankato (Withrow 2003). The site is within the boundaries of the NRHP-listed "Historic Minneopa Park District". Other than remnants of a nineteenth-century railroad grade near the site, the area is otherwise undisturbed. The site was identified during survey for a proposed bicycle trail when lithic debris and burned rock, designated as Feature 1, were recovered from a single shovel test. The survey area was expanded into a grid, and as a result of additional shovel testing, the site was delineated to include an area of approximately 2.5 acres.

The Phase II evaluation at 21BE271 included additional shovel tests and excavation units, all of which were placed to investigate Feature 1. The only diagnostic artifact recovered was the base of Table Rock Cluster projectile point, dating from ca. 5,000 to 3,000 BP that was recovered in association with Feature 1. All of the other artifacts were pieces of lithic debris or shatter, except for two flake tools, three cores, and six unfinished bifaces. More than 98 percent of the lithics were of Shakopee Formation chert, and the site was interpreted to be a lithic procurement site. The site was recommended eligible for listing on the NRHP as a short-term resource procurement camp from the Mountain Lake phase that has the potential to yield significant information about lithic resource procurement and stone tool processing in the Prairie Lake region during the Archaic period.

5.2 Mn/Model Study of the Big Woods Subsection

The Mn/Model is a statewide GIS-based predictive model for pre-1837 archaeological site locations. The project area is located within Mn/Model's Minnesota Big Woods subsection, which is characterized by a presettlement vegetation of mesic deciduous forest comprised of oak woodland and maple-basswood (Big Woods) and a loamy end moraine associated with the Des Moines Lobe of Late Wisconsin Glaciation (Hudak et al. 2002). The Minnesota River flows southwest to northeast through the subsection. The Mn/Model depicts areas of high site potential along the Minnesota River, which flows through the center of the region. The high site potential area along the river coincides primarily with alluvium and to a lesser degree with terrace landforms (Hudak et al. 2002, Chapter 8.10; Figure 8.10.3 and 8.10.8). The site potential within the valley is variable and dependent on topography, alluvial history, and geomorphic processes.

5.3 Historic Map and Air Imagery Review

Several historic maps were examined to aid in identifying potential historic period archaeological resources within the project area. The earliest map examined was the General Land Office (GLO) survey maps of 1855, which was available online (http://www.mngeo.state. mn.us/glo/). Copies of historic plat maps in Carver County for 1874, 1880, 1898, 1916, and 1926 were also reviewed (Andreas 1874; Warner & Foote 1880; North West Publishing Company 1898; Hixson and Company 1916; Hudson Map Company 1926). A 1905 USGS topographic map (1:62,500 scale) was also reviewed. The 1898 plat map and all other maps after 1905 do not depict private dwellings.

Aerial photos from 1937, 1947, and 1951 were obtained online from the Borchert Map Library at the University of Minnesota (http://map.lib.umn.edu/mhapo/) and the Minnesota Department of Natural Resources online air photos (http://www.dnr.state.mn.us/maps/landview/ index.html). The photos reveal landuse changes in the project area and also changing landscape conditions.

An historic farmstead (CR-CHC-7), referred to as the Vogel Farmstead in this report, is depicted on the 1880 and all subsequent maps and air imagery, is located in the central portion of the project area on the east side of TH 101 in T116N, R23W, SW¼ SW¼ of Section 25. The farmstead buildings are outside the archeological APE, as the APE is on the west side of the road across from the farmstead. The farmstead is extant and used as residential housing. This farmstead is discussed more fully with site 21CR161 in Sections 10.13 and 10.14.

A historic farmstead, which is depicted on the 1880 (location obscured by text on the 1905 map) and on all the air imagery, is located at the south end of the project on the east side of TH 101 in the APE in T116N, R23W, SW¼ NW¼ of Section 36. This area has been extensively disturbed by demolition activities and construction of the Paw, Claws, and Hooves animal boarding business. The farmstead is not extant. All buildings have been razed, and no farm remnants remain. Evidence of demolition and blading were observed in soil profiles in the vicinity of the farmstead house during the Phase I shovel testing.

A historic farmstead, which is depicted on the 1880 and 1905 maps and on all the air imagery, is located at the south end of the project on the west side of TH 101 and about 130 meters west of the APE in T116N, R23W, SE¼ NE¼ of Section 35. This farmstead is not extant. All buildings have been razed, and no farm remnants remain. The area has been extensively disturbed by demolition activities and construction of the current Paw, Claws, and Hooves animal boarding business.

Another historic resource near the project area is the M&St.L rail station, which is depicted on the 1898 plat map in T116N, R23W, NE¼ of Section 35. It is depicted on the east side of Bluff Creek, west side of the road going up the bluff (currently TH 101), and north side of the railroad tracks. However, this location may be in error as that location consists of either extremely sloping terrain in the Bluff Creek valley or the Bluff Creek valley bottom, which likely would have been prone to seasonal flooding. It is more likely that the station was on the south side of the tracks at the bluff base where a later farmstead occurs on the plat maps, or it may have been located on the east side of the road going up the bluff (currently TH 101) in T116N, R23W, NE¼ NW¼ of Section 36 where a later farmstead occurs on the plat maps. No evidence of this resource was identified during survey.

Information on this station was found online at the Minnesota Railroad Stations Past & Present website (http://www.west2k.com/mnstations/carver.shtml), which states:

> This was the M&St.L station located across the line in Carver County. It was on the east side of the intersection of MN-101 and M&St.L line about one mile north of Shakopee. It was a small station built circa 1880-1885 to connect Shakopee traffic with Minneapolis directly over the M&St.L route. Shakopee was on the St. Paul & Sioux City RR which ran directly to St. Paul. So prior to the introduction of the M&StL north of Shakopee, the rail route to Minneapolis from Shakopee went first to St. Paul, and then back west to Minneapolis. The station was taken out of service a long time ago, possibly during the M&StL line relocation of 1901-02. However, the station building is said to have been incorporated into a farmhouse very nearby, and that house was intact up to about 1990.

6. CULTURE HISTORY
by James Lindbeck

The following culture history of the precontact period in the project area is derived primarily from *Archaeology of Minnesota: Prehistory of the Upper Mississippi Region* (Gibbon 2012); *Minnesota Archaeology: The First 13,000 Years* (Gibbon and Anfinson 2008); the *Minnesota Statewide Multiple Property Documentation Form for the Woodland Tradition* (Arzigian 2008); and *Outline of Historic Contexts for the Prehistoric Period (ca. 12,000 B.P. - A.D. 1700)* (Dobbs 1988). The discussion follows the organization of cultural periods used by Gibbon (2012) and uses calibrated dates that are 10 to 20 percent older than conventional dates often used in archaeological literature.

The culture history of the project area is complex for three reasons: 1) there is a lack of detailed information about most of the precontact period in the state; 2) the project area is located near the boundary of three different ecological zones (prairie, big woods, and oak savanna vegetation), which shifted during the Holocene in response to climate changes; and 3) the project area is located near the boundary of distinct physiographic settings (Late Wisconsin glacial deposits and loess plains). These complexities are reflected in the multiple MnSHPO Archaeological Regions that border the project area and in the archaeological record of the region.

The project area is located in south-central Minnesota at the intersection of MnSHPO Archaeological Regions 2e – Prairie Lake East, 2n – Prairie Lake North, and 4s – Central Lakes Deciduous South. The Prairie Lake regions extend across southwestern and south-central Minnesota and are characterized by 1) prairie vegetation with a mixture of oak savannah in the eastern portion, and 2) numerous lakes, wetlands, and rivers resulting from the Late Wisconsin glaciation.

The Central Lakes Deciduous South region occurs in central Minnesota and is characterized by 1) glacial moraines, till plains, and outwash plains, 2) hardwood and mixed deciduous-coniferous forests, and 3) numerous lakes, streams, and wetlands.

Archaeological Region 3w – Southeast Riverine West is located a short distance southeast of the project area and is also relevant to the culture history of the area because of its proximity. The Southeast Riverine West region is a loess-covered plain that covers the southeastern corner of Minnesota and borders the Mississippi River valley. The region is characterized by 1) vegetation communities with a mixture of oak savannah, Big Woods, and prairie, and 2) a landscape that consists of a loess plain overlying Kansan till. Lakes and wetlands are largely absent in this region, and the landscape consists of rolling terrain in the west and more extensively-dissected and steeply-incised river valleys in the east.

6.1 Paleoindian Period (13,200 to 9500 BP)

The Paleoindian period was a time of rapid environmental change as the glaciers retreated from Minnesota (Wright 1974). Substantial changes in vegetation, wildlife, waterways, and the landscape occurred as a result of the ameliorating climate, and Paleoindian lifeways reflect adaptations to these rapidly changing landscapes. The first Paleoindian peoples in the southern Minnesota encountered a subarctic environment with no direct parallel in the modern world. It is not known what animals lived in the area at this time, but it can be assumed that mammoths, giant bison, and other now-extinct megafauna were present. Fish would have been present in the newly-formed lakes and rivers soon after the establishment of open water (e.g. Pielou 1991), and plants became established on the ice-free landscape.

It is presumed that Paleoindians were highly mobile and traveled in small bands. However, the lack of Paleoindian sites in Minnesota makes it difficult to identify settlement patterns, subsistence, or site types. Only one burial of this period is known, the Browns Valley site (21TR5) in the west-central part of the state. The known sites appear oriented toward current bodies of water, but these locations are also areas that have had a greater amount of archaeological survey. The locations of known sites therefore do not necessarily represent the actual settlement patterns. It is not clear whether the paucity of sites demonstrates that there was a small Paleoindian population in Minnesota, or whether the population was more numerous but the sites have not been identified because they have been destroyed, are deeply-buried, or lack diagnostic artifacts. It is likely that some of the lithic scatter sites that are scattered throughout the state belong to this period, but without the recovery of diagnostic artifacts or datable material, it is not possible to determine the cultural affiliation of these sites. Research in other parts of the country, where Paleoindian sites are more common, suggests that the margins of lakes and swamps were preferred habitation locations, and these landscapes were prevalent in the late-glacial and early Holocene periods of central Minnesota.

The Paleoindian period is divided into Early (13,200 to 12,500 BP) and Late (12,500 to 9500 BP) periods, as defined by the use of fluted (Early Period) or plano (Late Period) projectile points (spear points) for hunting and also possibly butchering. During the Early Paleoindian period, artifact typologies in Minnesota suggest that the culture was mostly related to the eastern Midwest. During the Late Paleoindian period, the cultural affiliation is clearly more related to the Plains, except in the Mississippi Valley region of southeastern Minnesota.

6.1.1 Early Paleoindian (13,200 to 12,500 BP)

The glaciers were gone from the southern half of the state by approximately 14,000 BP, and the Late Glacial and Early Holocene environments that followed were very dynamic, with rapidly-evolving climate, vegetation, animals, surface hydrology, and landforms. Within the project area, the most dramatic of these evolving landscapes was the cutting of the Minnesota River valley by the Glacial River Warren. Glacial Lake Agassiz, which covered all of northwestern Minnesota, was the source of Glacial River Warren. The current Minnesota River valley was formed by the catastrophic discharge of glacial meltwater that drained from the lake until approximately 12,700 BP, when eastern outlets to Lake Agassiz opened and the lake retreated to the northern Red River valley. The southern outlet of the Glacial River Warren was abandoned for a period at this time, and the landscape of the valley began to stabilize and fill in (Matsch 1983). Vegetation in this post-glacial environment included boreal forest species, with a mix of deciduous tree such as larch and ash, reflecting a wetter and cooler climate than is seen today.

Fluted point types such as Clovis, Folsom, and Gainey of the Early Paleoindian period are rare in Minnesota, and little archaeological evidence of Early Paleoindian people has been documented thus far. Isolated finds, primarily recovered from the surface of agricultural fields, have been recorded at scattered locations across Minnesota (Anfinson 1997:28-30; Buhta et al. 2011; Higginbottom 1996). In Wisconsin most fluted points occur in the southern portion of the state south of the most recent glacial ice margins (Mason 1997:87). These isolated finds are in themselves important contributions to the archaeology of the Early Paleoindians, but it is unfortunate that no other site data are available.

Early Paleoindian people are traditionally thought to have been nomadic big-game hunters, an interpretation derived from the dramatic and defining finds of lanceolate points at megafauna kill sites in the American southwest. These now-famous discoveries at places such as Blackwater

Draw and Folsom in New Mexico initially established the antiquity of the Paleoindian tradition and the association of Clovis and Folsom points with mammoths and other extinct megafauna. Mason (1981:97) points out, however, that, "as eastern fluted point sites were found and investigated, and dramatic kill sites eluded discovery… enthusiasm for this idea waned. Because most Paleo-Indian sites east of the Mississippi are unaccompanied by preserved bones, it is now a popular notion that big-game hunting was a western specialization not indulged in by the easterners. But just as it is difficult to argue one way in the absence of evidence, so is it difficult to argue the other way."

While paleontological finds of extinct megafauna have been made in Minnesota, only the Itasca Bison Kill site (Shay 1971), which contained the extinct bison type *Bison occidentalis*, also contained cultural materials. The closest known megafauna kill (or possibly scavenging) sites are in Wisconsin, including several on beach ridges of Glacial Lake Michigan. The Boaz Mammoth site in southwestern Wisconsin is the nearest site. The site, which was discovered in the late nineteenth century, contains the remains of a mammoth in apparent association with a Hixton orthoquartzite fluted point (e.g., Overstreet 1993, 1996; Mason 1981, 1997). Anfinson (1997) suggests that Early Paleoindians in the Prairie Lake Region relied on a much wider variety of resources in their boreal environment, such as smaller animals, fish, and vegetal foods, than did the Paleoindians of the southwestern United States.

6.1.2 Late Paleoindian (12,500 to 9500 BP)

The transition from the Early Paleoindian to the Late Paleoindian period is indicated by the appearance of some groundstone tools, such as the adze, and by a variety of large, finely-crafted stemmed and lanceolate projectile point types that lack the distinctive fluted points of the early period. Some of the Late Paleoindian points in Minnesota and the Midwest are smaller and less-finely crafted than those from the Plains, which is perhaps a result of raw material quality and cultural changes through time (Florin 1996). Many of the points from Minnesota are extensively resharpened and reworked so that their original condition is no longer apparent. Another unique feature on points from the Midwest is the presence of basal ears on some specimens, particularly the stemmed forms. Gibbon (2012:73) suggests the Late Paleoindian may have persisted in northern Minnesota until 8000 to 7000 BP and similar late dates have been suggested for northern Wisconsin (Mason 1997). Two projectile point bases that resemble Agate Basin and an Eden stemmed type were recovered at site 21CR156 in the Minnesota River valley bottom near the current project. A radiocarbon date from calcined bone associated with these points was ca. 7000 RCYBP (cal. 7900 BP), indicating that the Late Paleoindian period overlaps Archaic period, as Gibbon (2012) has suggested. Late Paleoindian points have recovered in association with Archaic points at several sites in Wisconsin and adjacent areas in the Great Lakes region, confirming they are contemporaneous (Mason 1997; Pleger and Stoltman 2009). Hixton quartzite was used as a raw material throughout the eastern Midwest at this time.

Faunal assemblages from five Late Paleoindian sites in Wisconsin contain a variety of terrestrial and aquatic animal resources, including deer, bear, beaver, muskrat, porcupine, birds, turtle, and fish, indicating a generalized foraging subsistence base (Kuehn 2010). This data contrasts with the out- dated concept of Paleoindians being primarily hunters of a few select species of large game animals such as bison, moose, and caribou. The prevalence of wetland and aquatic animals is particularly noteworthy. Faunal material recovered from the Late Paleoindian component at site 21CR156, near the current project area, conforms to this generalized foraging pattern and the reliance on wetland and aquatic resources.

Glacial River Warren began to flow briefly again around 11,000 BP, following a refilling of the southern end of Glacial Lake Agassiz. This was a time of rapid environmental change, and deciduous tree species moved rapidly into the area from the south. Presumably, Late Paleoindians consisted of small, highly mobile groups that foraged widely and occupied territories only briefly.

Late Paleoindian points are found more frequently than Early Paleoindian points, probably reflecting increasing population levels in the post-glacial era. Numerous points have been recorded from private collections and also identified during archaeological investigations across the state (Florin 1996). Five points were reported in Carver County during a statewide survey of Plano points. The point types from Minnesota resemble the stemmed and lanceolate types defined from type sites on the Plains. Point types most commonly found in the Prairie Lake Region include the lanceolate Agate Basin and Browns Valley types and the subsequent stemmed Scottsbluff and Eden types.

One of the best-documented Late Paleoindian sites in the Prairie Lake Region is the Browns Valley Site (21TR5) at the southwestern edge of Lake Traverse in western Minnesota. The site contained human remains, which date to approximately 10,000 BP, and several possibly associated lanceolate bifaces (Browns Valley type) that discovered from a gravel pit. Browns Valley points have also been recovered from site 21CP35 near Montevideo and from the Hildahl #3 site (21YM35) on a terrace of the Minnesota River valley near Granite Falls, which also contained Early Archaic, Middle Woodland, and Late Woodland components. Scottsbluff points were recovered from the Goodrich site (21FA36) in Faribault County; Eden points from 21DL8 and 21DL54 in Douglas County; and a Dalton point from Lac qui Parle County is in the Minnesota Historical Society collection. Late Paleoindian points are also reported from the Pedersen site (21LN2).

Another important Late Paleoindian site is Bradbury Brook (21ML42) located in Mille Lacs County about 100 miles north of the project area. The site is a siltstone lithic procurement and initial reduction site associated with the Alberta Complex (Malik and Bakken 1993, 1999). A Phase III data recover was conducted at the site. One feature was identified, which produced the base of an Alberta point and an associated radiocarbon date of approximately 10,500 BP. The site is the oldest radiometrically dated site in Minnesota, and provides a unique perspective on the Late Paleoindian period in central Minnesota.

The East Terrace site (21BN6) on the Mississippi River near St. Cloud, about 70 miles north of the project area, is described as a Plano site that represents an intermittently-occupied location (BRW, Inc. 1994). Diagnostic points recovered included Hell Gap, Alberta, and Scottsbluff, which were extensively reworked.

The Reservoir Lakes Complex of northeastern Minnesota is one of the best professionally documented sites. The complex consists of a cluster of surface collections along a chain of reservoir lakes near Duluth that contain a variety of stemmed and lanceolate points (Harrison et al. 1995; Steinbring 1974). Some of these points have basal ears, suggesting an eastern influence. A variety of stone tools also occur, including choppers, bifaces, crescentric blades, adzes, long heavy picks, retouched flakes, scrapers, drills, and asymmetrical knives. The sites are located along lake shores that have been eroded by fluctuating water levels. Because of the deflated nature of the sites, it is not possible to confidently characterize the site components, and some of the assemblages are mixed with later Archaic components.

The Cherokee Sewer site (13CK405) in northwestern Iowa provides some of the best information on the Late Paleodindian and Early to Middle Archaic period in the northeastern plains and adjacent prairie region. The site contained three distinct cultural horizons dating from 8400 to 6400 BP. The earliest component contained points resembling the Hell Gap type that were recovered with bison and other animal bone.

6.2 Archaic Period (12,500 to 2500 BP)

The Archaic period is generally characterized by the following: 1) a subsistence base that relied on a variety of game animals and wild plant food resources; 2) the absence of agriculture, ceramics, and burial mounds except at the end of the period; and 3) an increasing variety of notched and stemmed projectile points (e.g., Raddatz, Little Sioux, Durst) and stone tools that included pecked and groundstone implements (adzes, axes, and mauls), native copper artifacts, and some exotic materials such as marine shell. As with Paleoindian sites, most recorded Archaic sites are small, short-term camps and activity areas. Most of the information from this period comes from sites in the southeastern part of the state or in neighboring Wisconsin and Iowa. A few significant Archaic sites have been recorded in the Prairie Lake Region. Geological processes resulting from the climatic changes of the Altithermal may have buried or eroded many Archaic sites, and there has been no comprehensive study of the Archaic on a statewide scale. For these reasons, our knowledge of Archaic period lifeways is still very limited.

The Archaic period spanned the time when the post-glacial environment of Minnesota continued to moderate, and ecosystems similar to those of modern times evolved. During this time, the northern hemisphere experienced an episode of warm and dry weather that is variously referred to as the Altithermal, the Middle Holocene Climatic Optimum, and the Prairie period. The peak of this warming period was reached around 7800 BP, by which time most of southern Minnesota, except the southeast corner, was dominated by a prairie landscape. The hot and dry conditions persisted at their maximum for about 1000 years before gradually giving way to a cooler and wetter climate that led to the evolution of ecological communities similar to those of the modern era by about 5000 BP. The dramatic environmental changes of the Altithermal would have caused major shifts in the lifeways of the people, as post-glacial animal species of the forest such as moose, caribou, and deer were replaced by prairie species such as bison. Plant communities also would have changed with the spread of the prairie, and wild rice may have been gathered during this time. Surface water significantly decreased during the Altithermal, as shallow lakes and wetlands dried up or were greatly reduced in size.

It is likely that Archaic period populations engaged in seasonal rounds of resource gathering as the climate stabilized following the retreat of the glaciers. Small bands would have returned to seasonal campsites, and territories may have been relatively limited. With the onset of prairie conditions, however, resources would have become less predictable, and populations would have been pushed into shrinking areas surrounding the larger lakes and streams. The appearance of groundstone milling tools suggests that there was a greater use of seeds and other plant foods. Domesticated dogs, used for transport, suggest that longer-distance travel was required to keep up with migratory bison herds. Group sizes appear to have remained small throughout the Archaic, and known site locations indicate that a high value was placed on a proximity to game, water, and supplies of wood.

The Archaic has traditionally been divided into Early, Middle, and Late periods, and Gibbon (2012) argues that the Early Archaic period in Minnesota overlapped the Late Paleoindian period for perhaps thousands of years. He emphasizes that this was not necessarily a time of transition from Paleoindian into Archaic, but that the two cultures were contemporaneous and may have interacted in various ways. When this overlapping period is included, the Archaic Period in Minnesota may be understood to extend back as far as 12,500 BP and the Paleoindian Period to as late as 8000 BP. There are a few sites in Wisconsin that have yielded Late Paleoindian points in association with Archaic notched points (Pleger and Stoltman 2009). The transition from Paleoindian to Archaic appears to have been more abrupt and of shorter duration in the eastern and southwestern United States than it was in Minnesota. Gibbon (2012) adds the modifier "Eastern" to his discussion of the Early Archaic in Minnesota for complexes presumed to be derived from the East, which distinguishes it from the "Prairie" Archaic period that is centered on the northeastern plains, including southwestern Minnesota. Anfinson (1997:35) points out that the Prairie Archaic of the northeastern plains region began about 7500 years ago, and Archaic of the eastern Midwest may have begun as early as 10,000 years ago.

6.2.1 Early Eastern Archaic

Most of the information we have about the Early Eastern Archaic period in the upper Midwest (ca. 12,500 to 9500 BP) comes from sites in the mid-south and central Mississippi valley region. The chronology of the various Archaic periods is not firmly established, and dates from adjacent areas are later than those proposed by Gibbon (2012). The Early Archaic period in Iowa extends from 10,000 to 8500 BP (Benn and Thompson 2009) and from 10,500 to 7500 BP (Alex 2000). In Wisconsin the period extends from 11,500 to 7500 BP (Pleger and Stoltman 2009). There has been no comprehensive study of Early Eastern Archaic sites and site distributions in Minnesota, and therefore Gibbon and Anfinson (2008: Chapter 5) state that there is "… little useful to say about that tradition's sites and their distributions in the state." Most Early Eastern Archaic projectile points recovered in Minnesota have come from the southeastern part of the state, although a St. Charles point was found in Martin County in the west.

Classic Early Eastern Archaic point types that have been recognized in Minnesota include Thebes, St. Charles, Kirk Serrated, Graham Cave, and Hardin. Except for the stemmed Hardin type, the Early Eastern Archaic points are generally medium to large size, side- or corner-notched points that lack the parallel flaking characteristic of Late Paleoindian points. The Kirk type is generally smaller than the other types. Gibbon and Anfinson (2008) state that Hardin is considered a likely Late Paleoindian/Early Archaic transitional point form that may have developed in the mid-continent.

Early Eastern Archaic points are often associated with thin scatters of non-diagnostic artifacts such as scrapers, blades, and point blanks. Other materials likely used by Early Eastern Archaic people such as wooden tools, textiles, and bone implements have not survived in the archaeological record.

6.2.2 Middle Archaic

The Middle Archaic in Minnesota spans the period of roughly 9500 to 5000 BP, although dates from adjacent areas are later than those proposed by Gibbon (2012). The Middle Archaic period in Iowa extends from 8500 to 4500 BP (Benn and Thompson 2009) and from 7500 to 5000 BP (Alex 2000). In Wisconsin the period extends from 7000 to 3700 BP (Pleger and Stoltman 2009). This period includes the peak of the Altithermal episode, and the climatological and ecological changes of that time had profound impacts on subsistence and settlement patterns. Warming and drying during the period would have been dramatic, with prairie spreading across northwestern and southern Minnesota, except for the southeastern corner. Eventually, deciduous forests would have been restricted to river valleys and lake edges in most of the southern part of the state. As the post-glacial landscape continued to stabilize, water flows through the Minnesota River valley were reduced and water temperatures warmed. This allowed aquatic species to migrate up the river valley from the south, and waterfowl likely became abundant. Few Middle Archaic sites have been discovered in Minnesota compared to more southerly portions of the Midwest.

Gibbon (2012:73) summarizes a challenge in describing the Middle Archaic period in Minnesota:

> "Middle Archaic artifacts and sites are sparse or remain unrecognized at the moment, even though this time period ... is well represented by sites and by growing populations farther south. In fact, there is some confusion in Minnesota archaeology about how non-Paleoindian artifact assemblages dating to this period should be classified. The problem in part is the presence of an early Archaic time gradient, with the earlier appearance of Early Eastern Archaic assemblages to the south correlated with the earlier appearance of deciduous forests in that area."

The Prairie landscape and accompanying bison herds begin to enter Minnesota around 10,500 BP at a time when Lake Agassiz still covered the northwestern corner of the state and the glacial River Warren was flowing through the Minnesota River valley. Late Paleoindian people living on the plains likely followed bison herds with the advance of the prairie into Minnesota. By approximately 7800 BP at the peak of the warming and drying, prairie covered most of western and southern Minnesota, and the Archaic-period bison hunters who used medium-sized, side-notched points spread across the prairie regions of the state.

Middle Archaic projectile points are small to medium-sized and generally smaller and less well-made than the points from the Paleoindian period, and there is an increased use of local cherts. These points were most likely attached to atlatl darts rather than spears and were thrown with an atlatl. Diagnostic Middle Archaic point types common to Minnesota are divided into two broad categories (Eastern Woodlands and Plains), based on their presumed region of origin outside of Minnesota, and by the dates (*Early Phase* and *Late Phase*) of their presence in those regions (Gibbon 2012). *Early Phase* points from the Eastern Woodlands include the Raddatz, Fox Valley, and Osceola types. *Late Phase* Eastern Woodland types include Matanzas, Benton, and Elk River. Point types of the *Early Phase* in the Plains include Simonsen, Little Sioux, and Oxbow. *Late Phase* point types from the plains include McKean and Table Rock. Many of the Middle Archaic point types continued into the Late Archaic. Other artifacts that were developed in the later portion of this period, and more fully in the Late Archaic, include ground stone tools, such as grooved axes and mauls, manos, metates, and apparatus for the atlatl, including bannerstones, gorgets, and boat stones.

The most significant Middle Archaic site recorded in the state is the Itasca Bison Kill site (21CE1) near Lake Itasca in Clearwater County (Shay 1971). At this site a number of now-extinct *Bison occidentalis* were killed in a boggy area, and a campsite associated with the processing of the bison was on a hill overlooking the bog. Projectile points from the site include small to medium-size, side-notched types, which have been referred to as Little Sioux or Simonsen points, and also occur at the Cherokee Sewer (13CK405) and Simonsen (13CK61) sites in northwest Iowa and the Soldow (13HB1), Ocheyeda (13OA401), and Arthur (13DK27) sites north-central Iowa (Alex 2000; Morrow 1984). The date for these points at the Cherokee Sewer site is 8200 to 7900 BP. Similar points have been found at the following sites in southwestern Minnesota: Granite Falls Bison Kill (21YM47), Goodrich (21FA36), Pederson (21LN2), and Hildahl #3 (21YM35) (Anfinson 1997; Christiansen 1990) and the Rustad Quarry site (32RI775) in southeastern North Dakota (Michlovic and Schmitz 1996). The Granite Falls Bison Kill site had four small, side-notched points (3.7 cm long by 2 cm wide, 4.5 cm long by 2 cm wide, and two bases that are similar in sizes to the others) and dates to between 8000 to 7000 BP from two radiocarbon dates (Lewis and Heikes 1990).

The Jackpot Junction site (21RW53) in the Minnesota River valley near Redwood Falls contained bison, turtle, small mammal, and fish bone from depths of 1.5 to three meters along with stone flakes. No projectile points were recovered, but radiocarbon dates of about 5600 BP place the site in the Middle Archaic period. Closer to the project area, site 21NL63 (Fritsche Creek II), located on an alluvial-colluvial fan along the northern margin of the Minnesota River in Nicollet County, contains an intact buried component that dates to the Middle Archaic (ca. 7000 BP), or even earlier, based on dating of bone collagen (Roetzel et al. 1994). The buried component may reflect a short-term occupation associated with a bison kill and processing. Site 21NL58, located near 21NL63 and in a similar landscape setting, also contains a buried component with bison bone and other materials dating to about 7000 BP (Terrell et al. 2005). The dates from 21NL58 and 21NL63 are similar to the dates obtained from sites 21CR155 and 21CR156 which are located in the Minnesota River valley bottom near the current project.

The Archaic component at site 21CR155 had cultural deposits that included bison and other terrestrial and aquatic remains buried as deep as four meters. The site contained multiple occupations, spanning most of the Holocene from ca. 7100 to 500 RCYBP (8000 to 500 cal BP. The Archaic points include an unnotched "Delong" type and a medium-sized notched type. The site was determined eligible for listing on the NRHP and a Phase III data recovery was conducted prior to highway construction.

The Archaic component at site 21CR156 contained lithic debris in a buried soil that was dated to ca. 6700 RCYBP (cal. 7600 BP). Multiple buried soils and archaeological components are present across the site area. The site was recommended eligible for listing on the NRHP and the construction plans for the CSAH 61 project that necessitated the archaeological survey were changed to avoid the site area.

A Middle Archaic component, dating to about 8000 to 7500 BP, was identified from a buried component on top of an alluvial fan at site 21CR141, which is approximately one mile north of the current project area (Schoen 2006). Faunal material (n=203), lithic debitage, and charcoal that were interpreted to represent an intact midden deposit from a buried soil, ranging in depth from 316 to 358 cmbs. The site was recommended as eligible for listing on the NRHP based on the discrete deposit of datable materials from the Archaic period, along with the potential for intact features and diagnostic materials from other parts of the site.

Anfinson (1997) proposed that an "Itasca Phase" be designated to describe the Middle Archaic (Prairie Archaic) adaptation to the widespread prairie landscape in the Prairie Lake region. The social organization during the period is poorly understood, but it is likely that the need to adapt to changing environments and the hunting of bison may have led, at least seasonally, to small family bands merging into larger groups that could more efficiently track and hunt the migratory animals. Burials from the period found in northwestern Iowa reveal that people were interred individually in pits with red ochre and ritual items.

6.2.3 Late Archaic

The Late Archaic in Minnesota begins around 5000 BP, as a cooler and moister climate ushered in the beginnings of today's environmental conditions and biomes; a sequence that was completed by around 2500 BP. Late Archaic dates from adjacent regions are generally similar to those proposed by Gibbon (2012). In Iowa the period extends from 4500 to 2500 BP (Benn and Thompson 2009) and from 5000 to 2800 BP (Alex 2000). In Wisconsin the period extends from 3700 to 2400 BP (Pleger and Stoltman 2009). During this time, smaller lakes that had dried up during the Altithermal once again filled in. Forests in the northern and southeastern part of the state expanded as the prairie retreated west and south. These climatic and environmental changes led to the decrease of bison as the main game animal in reforested areas and the arrival of forest animals into their historical ranges. Bison continued to be a primary species across most of southern Minnesota, except in the southeast.

The Late Archaic is defined by diagnostic side-notched and stemmed projectile point types along with groundstone tools (such as manos, matates, mauls, and axes), the use of communal burial sites without mounds (until the period of transition between Late Archaic and Early Woodland), and the increased presence of exotic raw materials (such as native copper and marine shell). Diagnostic Late Archaic point types are divided into regional clusters (Gibbon 2012:79). The *Upper Mississippi River Valley Region* includes the Large Side-Notched Cluster, the Durst Cluster, and the Late Archaic Stemmed Cluster among others. The *Central Mississippi River Valley Region* includes the Table Rock Cluster, the Etley Cluster, the Nebo Hill Cluster, and the Wadlow Cluster. The *Northern Plains region* includes the McKean and Oxbow Clusters. The *Southeast Region* includes the Eva Cluster, the Benton Cluster, the Ledbetter Cluster, and the Dickson Contracting Stem Cluster. As Gibbon notes, however, some Late Archaic point types overlap with the earlier Middle Archaic and later Initial Woodland occupations, and therefore the dating of Late Archaic occupations based solely on point typology is problematic.

The lifeways of the people during this period in Minnesota were marked by adaptations to the changing environmental conditions and to increasing influences from people and cultures in surrounding regions. It was a time of increasing population numbers and more diverse artifact assemblages, which together with the advent of communal burials and expanded exchange of exotic materials, indicate increased social complexity and changes in subsistence patterns.
In southern and central Minnesota, the people likely adapted to two distinct biomes: the prairies of the west and south and the forests of the north and southeast. To the west, the hunting of migratory bison continued, and sites such as Canning (21NR9) may represent seasonal habitations of people who moved east to the woodlands during the cold months. In the north and east, the people of the period became more adept at exploiting stabilized resources such as fish, forest animals, and wild rice. Woodworking tools and fishhooks begin to appear in the archaeological record during the Late Archaic.

Gibbon and Anfinson (2008) use the term Proto-Horticulturalist to describe the addition of garden produce into the resource base of the Late Archaic period, suggesting that this indicates the beginning of a fundamental social transition, although not a heavy reliance on cultivated foods. Fragments of squash (Cucurbit pepo) recovered from a probable Late Archaic context at the King Coulee site near Winona on the Mississippi River is an example of this type of early horticulture from Minnesota (Perkl 1998).

The people during this period likely inhabited a series of relatively stable "base camps" that shifted during the year to access seasonal resources. A variety of smaller special activity areas, such as quarries, butchering, and extraction sites, radiated from these base camps. Communal burials that appear during the Late Archaic period may indicate increasing territoriality associated with greater settlement permanence. Highly ornamented grave goods have been interpreted as an indication of increasing religious complexity; and the appearance of burial mounds at the transition of the Archaic-Woodland periods is perhaps an indication that it had become more important to make these territorial indicators more visible to outside populations.

As with the preceding Early and Middle Archaic periods, the Late Archaic period has been studied much more thoroughly in the central Mississippi Valley and eastern woodlands than in Minnesota, and a great deal of information about the period in Minnesota is still lacking. Artifact assemblages from the period in Minnesota are not as diverse or abundant as those found in other regions, where plant-processing tools are commonly found and exotic materials such as conch shell were widely-traded. Fiber-tempered pottery was present during the Late Archaic in the southeastern states but no such materials have been found in Minnesota.

Sites in the Prairie Lake region with confirmed or possible Late Archaic components include Pedersen (21LN2), Fox Lake (21MR2), and Mountain Lake (21CO2). Anfinson (1997) has proposed a Mountain Lake phase dating from 5800 to 2200 BP, with 21CO2 as the type-site. Excavations at the site recovered small lanceolate points that more closely resemble forms to the east rather than to the west, and none of the distinctly northern-plains point types such as those of the McKean cluster were found at the site. In the prairies of southwestern Minnesota, the bison-centered lifeway continued until around AD 1000 with the advent of the Plains Village culture. The Pedersen site contained bison bone in all occupation levels, along with remains of other mammals, fish, and bird species. Bison bone is also the main component of the Archaic faunal assemblage at the Mountain Lake site.

There is little information about the Late Archaic period in the southeastern deciduous forest zone of Minnesota, but Gibbon (2012) suggests that it may be associated with the Durst phase in southwestern Wisconsin, suggesting that populations were moving into the state from the south and east during this time.

6.3 Woodland Period (2500 to 350 BP)

While the Woodland period has traditionally been defined by the first appearance of pottery, burial mounds, and agriculture, Gibbon (2012:93) proposes that:

> Information gathered within the last twenty years has clearly demonstrated [that these traits] had already made their first appearance in areas of the Eastern Woodlands in the earlier Late and even Middle Archaic.... The result of these discoveries has been a redefinition of the Woodland tradition, a redefinition that now depends more on new socioeconomic adaptations than on shared diagnostic material traits. Still, the first associations of these three traits in about 700 BC in some areas of the Midwest do seem to mark the inception of these new adaptations. Misleading reconstructions of the culture history of other areas of the Midwest have resulted, however, from the assumption that the presence of pottery, burial mounds, or cultigens, or some combination of the three, necessarily means that similar socioeconomic adaptations were present in those areas, too.

The Woodland period in the Midwest has been divided into Early, Middle, and Late periods based on cultural developments that have been documented primarily in the lower Mississippi Valley region. Gibbon points out that these cultural developments occurred in Minnesota and other parts of the northern Midwest and plains much later or not at all. Furthermore, he argues (2012:93) that "...unique adaptations and artifacts appear in the prairies, Northwoods, and boreal forest of Minnesota that have no specific counterparts in the traditional lower tier zone to the south." To accommodate this distinction, Gibbon divides the Woodland Period into *Initial* and *Terminal* periods rather than Early, Middle, and Late in all but the southeastern corner of the state. He concludes that ... "Although awkward at times, these concepts stress the unique accomplishments of Native Americans in our region rather than their marginality to events and processes that occurred in different environments to the south."

During the late Holocene, from the end of the Archaic period through the Initial Woodland period, the climate and landscape continued to evolve. These changes are well-documented through an extensive series of a series of pollen core studies from across the state and by correlation with other research on vegetation and climate change across the continent. Arzigian (2008:8) summarizes the climate and landscape developments of the Woodland period in Minnesota:

> Of greatest significance to the Woodland tradition is a period of cooler temperatures, the Sub-Boreal, that extended through the Early and Middle Woodland periods and was followed by the warmer Neo-Atlantic and Pacific periods, and then the cooler, moister Little Ice Age from about AD 1550 until 1915. During these broader climatic shifts and more local changes, the most noticeable changes would have been the local expansion or contraction of the prairie-forest ecotone and the prairie bison herds. Changes in local lake levels would have affected settlement patterns adjacent to the lakes, with some lakes drying up completely. Fires would have caused changes in the composition and distribution of forests as well as expansion of shrublands and savannas. Fire frequency would have been affected by local and regional climatic conditions, and possibly also by the human population. Starting about AD 1550, the Big Woods expanded at the expense of prairies as a result of changes in fire frequency in the cooler, moister Little Ice Age climate.

6.3.1 Initial Woodland

The Initial Woodland Period in Minnesota dates from approximately 2500 to 1300 BP. This period begins around 2500 BP in the southeastern corner of the state. In the rest of southern Minnesota, the Initial Woodland begins around 2200 BP. In the Prairie Lake Region, the Initial Woodland is marked by the widespread appearance of Fox Lake Ceramics. The following discussion covers these various the different Woodland manifestations in these regions.

6.3.2 Initial Woodland in Southeastern Minnesota

Gibbon (2012) differentiates the Initial Woodland period in the southeastern part of the state (Southeast Riverine region) from the rest of the state by separating the period into *Early Woodland* (2500 to 2200 BP), the *Havana-Related Middle Woodland* (2200 to 1800 BP), and the *Late Middle* (1800 to 1500 BP) sub-periods. These sub-periods reflect the Woodland period culture history of regions to the east and south, with which the people in southeast Minnesota appear to have been more closely associated than they were with cultures to the west. Outside of the Mississippi River Valley, the Initial Woodland period in southeastern Minnesota is not well known. Few sites have been excavated, and there has been little systemic research. Therefore, Gibbon cautions that the dates and content of the period remain tentative.

<u>Early Woodland</u>

The Early Woodland period is recognized by diagnostic La Moille Thick pottery, which resembles Marion Thick and other very early pottery types in the southern Midwest, and possibly with a somewhat later pottery type that is similar to Black Sand ware. La Moille Thick pottery is cordmarked and has distinct vertical to oblique exterior surface marking and horizontal to oblique cordmarking on the interior. A variety of straight-stemmed projectile points, most commonly the

Kramer type, are associated with La Moille occupations. The later Black-Sand type wares are associated with Waubesa Stemmed points that have rounded, contracting stems. Arzigian (2008:30) states that it is unclear whether mounds are associated with the Early Woodland, and that the lack of data on the period in southeastern Minnesota "might reflect the gradual nature of the transition between Archaic and Woodland in this region, and the probable persistence of Archaic lifeways with the addition of ceramics that reflect intermittent contacts with other regional cultures."

Only a few sites have been recorded in Minnesota with La Moille pottery and these include the type-site La Moille Rockshelter (21WI1) in Winona County. The site, located in the bluffs along the Mississippi River, was a deeply-stratified rockshelter excavated by Wilford in 1939. The site was described as a "fishing camp" and in addition to ceramics it contained fish, turtle, and mammal bones along with charcoal and clam shell but few other artifacts. Other Early Woodland sites include Schilling (21WA1), Kunz (21WW8), Enno Schaeffer (21FA104), and NSP II (21GD59). Arzigian (2008) concludes that there is not enough information to speculate on Early Woodland lifeways or settlement patterns in southeastern Minnesota, although it is likely that the people followed as seasonal resource-gathering pattern similar to that of the Archaic period.

Havana-Related Middle Woodland

Gibbon (2012) describes two Havana-Related Middle Woodland period phases in Minnesota, *Howard Lake* and *Sorg*, although Arzigian (2008) adds a *Malmo* phase to the period. *Howard Lake*, with sites concentrated in the Anoka Sand Plain, is considered to be the northernmost regional variant of the Havana Hopewell culture from the Central Illinois River Valley. Significant sites include the type-site 21AN1 (Howard lake), Anderson (21AN8), and Long Lake (21HE100). Sites from the *Sorg Phase* are found mainly in the northern portion of southeast Minnesota, with a concentration along the shores of Spring Lake near St. Paul. Significant sites include the type-site 21DK1 (Sorg), Lee Mill Cave (21DK2), and Hamm (21DK3). Malmo phase sites are the most common of the Havana-Related period and they are found across much of central and eastern Minnesota, with concentrations around the Mille Lacs area and from there to the west into Ottertail County and the plains. Arzigian (2008:37) suggests that there may be a significant underestimation of the distribution of Havana-Related occupations in Minnesota as the statewide database of archaeological sites lists many "Middle Woodland" sites that might be included following a careful examination of ceramic assemblages.

Havana-related ceramics are wide-mouthed jars with thick walls, straight rims, slightly constricted necks, and sub-conoidal bases. They are grit-tempered and are decorated with punctates, bosses, incised lines, slashes, cordwrapped-stick impressions, and dentate stamping. Lithics from the period include small notched and stemmed Manker and Snyders-like points. Most lithic raw materials are local but exotic raw materials such as obsidian, Hixton silicified sandstone, and Knife River Flint were also used. Burial Mounds are present at some *Howard Lake Phase* sites and some of these mounds are quite large and complex, with primary and secondary burials. The Indian Mounds Park site (21RA10) in St Paul contained burials with limestone crypts and exotic artifacts that included a perforated bear canine and hammered copper. Although subsistence and settlement patterns are little-understood, Arzigian (2008) suggests that the populations engaged in a pattern of seasonal mobility, with larger summer villages and dispersed winter camps. Havana-related cultures in Illinois were focused on riverine settings, while in Minnesota, sites are located in mixed habitats around wet prairies and oak openings, often bordered by mixed deciduous forest.

Late Middle Woodland

The Late Middle Woodland period in Minnesota is largely unknown and Arzigian (2008) does not cover it as a separate complex. Gibbon (2012) states that the period involved a gradual process of transition from the Havana-Related to the Late Woodland in southeastern Minnesota and the Upper Mississippi valley. He uses the closely-related Millville and Allamakee phases of northeastern Iowa and southwestern Wisconsin as surrogates for the period in Minnesota. The primary distinction of the Late Middle Woodland period is the appearance of thin-walled Linn ware ceramics in a series of seemingly more spatially-restricted occupations, as opposed the relatively widespread presence of Havana wares. Lithic assemblages are defined by the side-notched Steuben point and smaller Ansell points from later in the period. Scrapers, drills, knives, and groundstone tools are also present in assemblages. Some burials of the period continued to be in mounds, although they tend to be smaller and less complex than those of the Havana-Related period. Other burials have been found in pits. Gibbon (2012) suggests that the period represents a process of cultural differentiation or regionalization that occurred in a series of steps. Overall, it appears to have been a less materially-elaborate time than was the earlier Havana-Related period.

6.3.3 Initial Woodland in Southwestern Minnesota

The Initial Woodland period in southwestern Minnesota is marked by first presence in the prairies of a small amount of ceramic ware similar to La Moille thick. Such artifacts have also been found at sites in eastern South Dakota and north-central Iowa. The period becomes more well-defined with the appearance Fox Lake ceramics and the spread of the *Fox Lake Complex* throughout the Prairie Lake Region. Gibbon (2012) cautions that the dates for the Initial Woodland period in southwest Minnesota are based on relatively few secure radiocarbon dates and may be subject to revision.

Fox Lake

The Fox Lake Phase (2200 to 1300 BP) is differentiated from the Late Archaic Mountain Lake Phase in the Prairie Lake region by the introduction of ceramics and the change to side-notched, corner-notched, and triangular points that may be associated with the bow and arrow. Fox Lake sites are generally situated along the margins of lakes, rivers, and streams and they appear to be part of a stable bison-hunting lifeway that began during the Archaic period. Fox Lake components have also been found at sites in eastern South Dakota and north-central Iowa. There is no evidence of mound burials during this phase in the region. Fox Lake (21MR2), Pedersen (21LN2), and Big Slough (21MU1) are examples of Fox Lake Phase sites in the region.

Fox Lake ceramic ware consists of moderate to small-sized conoidal to subconoidal vessels with thick-walls (Anfinson 1997). They are similar in appearance to Dane Incised and Black Sand vessels from Wisconsin and Illinois the east and southeast. Fox Lake ceramic temper varies from sand to sandy grit. Surface treatment consists of well defined exterior cordmarking that is usually vertically oriented but may be horizontal or oblique. Horizontally cordmarked vessels are often partially-smoothed with some rims being completely smoothed. Lip shape is round or flat, and rims may be everted or slightly inverted. Exterior rim decoration is common and includes, in order of frequency, trailing, bossing, punctating, and dentate or cord-wrapped stick stamping. Interior and lip decoration is not common, but includes tool and cord-wrapped stick impressions. Five Fox Lake types have been defined in a recent study of the Fox Lake Phase (Anfinson 1997). General trends that occur through time during the Fox Lake Phase include slight thinning of vessel walls, increase in surface smoothing, increase in use of narrow-trailed lines, appearance of horizontal cordmarking, decrease in use of bosses, and appearance of cord-wrapped stick impressions below the lip on vessel exteriors.

Four types of projectile points are associated with the Fox Lake Phase, including stemmed, side-notched, corner-notched, and isosceles triangular. The stemmed types occur early in the phase and are replaced by the notched and unnotched triangular. Stemmed types are primarily the expanding stem type similar to the Stueben and Durst types and have more eastern affinities. The side-notched types are quite variable resembling a variety of Plains types such as Avonlea, Besant, and Hanna, and Oxbow. The corner-notched types are similar to the Pelican Lake type from the Plains. Conspicuously absent are side-notched and corner-notched types from the east. The variety of point types may be the result of the change from using the atlatl to bow and arrow during this period.

Other artifacts recovered from Fox Lake sites include ground stone tools (mauls, celts, hammerstones, grinding stones, and abraders) although few examples of these tool types have been recovered. Bone awls and beads are also possibly associated with Fox Lake components. Lithic raw materials are dominated by local cherts with lesser amounts of quartzite, chalcedony, silicified sediment, and Knife River Flint. Gibbon (2012) points out that except for the distinctive ceramics, Fox Lake artifact assemblages have been difficult to isolate because of extensive component mixing at sites that usually also contain Archaic and later Woodland artifacts.

6.3.4 Terminal Woodland

The Terminal Woodland period in southern Minnesota dates from ca. 1500 to 350 BP, the time of first European contact. The period is marked in the archaeological record by changes in the design and manufacture of ceramic vessels and projectile points. Throughout the period, population sizes continued to increase and dependence on domesticated plants was becoming more widespread. In southeastern Minnesota and nearby parts of Wisconsin, Iowa, and Illinois, the people of the Terminal Woodland also developed new forms of social organization, as evidenced by the disappearance of burials in large mounds that contained non-utilitarian items made of exotic materials. In southwestern Minnesota, the Terminal Woodland period evolved differently than in the southeast, as Gibbon (2012:137) explains:

> Many but not all of these cultural innovations and elaborations [of the southeast] reached southwestern Minnesota by at least A.D. 900. More dramatic changes occurred throughout the southern part of the state between A.D. 900 and 1100, when agricultural societies with large, often defended villages and new material equipment appeared. Later forms of these "Mississippian" cultures still occupied parts of southern Minnesota when European missionaries and adventurers first paddled the Mississippi and Minnesota rivers.

<u>Terminal Woodland in Southeastern Minnesota</u>

The period of change from Initial to Terminal Woodland in the southeastern part of the state remains poorly understood, but the main material features found in the archaeological record include the development of the bow and arrow, effigy mounds and elaborate mortuary rituals, increasing long-distance trade networks and the acquisition of exotic materials, an elaborate smoking-pipe complex, and possibly the development of socially-ranked societies (Gibbon 2012). Population sizes were increasing and appear to have begun to develop into more localized cultures with year-round settlements. Domesticated plant foods became an important part of the subsistence base and ceramic vessels developed thinner walls and a finer temper. Given the general lack of data from the period in Minnesota, Gibbon (2012) relies on information from sites in neighboring states and adopts the terminology used for the period in the driftless area, dividing the period into *Initial, Mature,* and *Final* Late Woodland sub-periods.

The Initial Late Woodland spans the period of 1500 to 1300 BP and includes the Mill phase and Lane Farm phases in Wisconsin and Iowa. The ceramic type, Lane Farm, is a cord-impressed ware with a somewhat rounded base and constricted neck. Decoration includes cord impressions on the rim and rocker stamping on the body. The walls are thin and use a fine grit temper. Small corner-notched projectile points (Steuben Stemmed and Manker Corner-Notched types), which may have been the first true "arrowheads" in the region, are associated with the early part of the phase. Other possible points from later in the phase include Scallorn, Klunk Side-Notched, and Koster Corner-Notched. The forms of these points vary greatly and can range for broad to slender, corner-notched to barbed, and straight to convex blade edges. Elongated linear mounds with a limited number of grave goods (including copper beads and clay pipe parts) were developed during the period.

The Mature Late Woodland, from 1300 to 1000 BP, is best known by the Effigy Mound Complex of Southern Wisconsin, with a smaller number of sites in Iowa, Minnesota, and Illinois. A primary ceramic component of the complex, Madison Cord-Impressed, extends throughout southeastern Minnesota to the vicinity of the Blue Earth River. Madison ware vessels are thin-walled and use a fine grit temper. The vessels are globular in shape with constricted necks and out-flaring rims. They have cord-impressed decorations on the exterior and most vessels found are similar in their design treatment, featuring geometrical patterns. Another ceramic type associated with the period is the Angelo Punctated, which is also thin-walled and cord-marked, but is decorated with punctates and fine trailing lines in complex patterns. Gibbon (2012) suggests that the Angelo ware shares traits with Great Oasis ceramics.

Arzigian (2008:105) discusses some considerations regarding the use of Madison Ware in evaluating the Mature Late Woodland period:

> Ceramics with single cords used as decoration over a cord-roughened surface are found across central and southern Minnesota, but the ceramics are not coded as such in the SHPO database and cannot be readily separated except by examination of the ceramics themselves. Detailed ceramic studies are needed for [Mature] Late Woodland sites in Minnesota. The full range of ceramic types in southern Minnesota [Mature] Late Woodland sites should be evaluated, along with a consideration of how they compare to series defined elsewhere in the Midwest. Because of the presence of a geographic reference in the complex name, archaeologists are likely to have identified this complex for the SHPO/OSA database only for sites in southeastern Minnesota, although the ceramics and other aspects of the complex might be found further west and north.

Other ceramic types that Arzigian suggests might be identified within the *Mature Late Woodland* period in Minnesota include Lane Farm, Madison, and Minott Cord-Impressed wares. Projectile points from the period are small, stemmed and side-notched or unnotched in form. Diagnostic types from early in the period include Scallorn, Klunk Side-Notched, and Koster Corner-Notched (the same as in the *Initial Late Woodland* period). The later part of the period (ca. 1200 BP) is marked by the widespread adoption of the simple unnotched triangular Madison Point throughout the eastern United States. Other lithic tools found in association with the Effigy Mound Complex include scrapers and utilized flakes along with a variety of groundstone tools (adzes, axes, celts, grinding stones, pounding stones). Bone awls, needles, punches, and harpoons have also been recovered, along with exotic or ritual goods such as cooper knives and points, clay pipe elbows, obsidian blades, cut mica, effigy pipes, ear spools, and worked shell. Gibbon (2012) points out that Havana-related artifacts are conspicuously absent from *Mature Late Woodland* assemblages.

Two significant *Mature Late Woodland* sites are Sorg (21DK1) at Spring Lake in Dakota County and the Prior Lake Mounds (21SC16) in Scott County, which is the only excavated effigy mound site in Minnesota. Middle and Late Woodland deposits were excavated at Sorg and a variety of Madison ware was recovered, including Cord-Impressed, Punctated, and Plain. The Prior Lake Mounds site is in an upland setting adjacent to the driftless area and is the only know Effigy Mound complex site in Minnesota not adjacent to the Mississippi River. It consisted of five bird effigies and four linear mounds when mapped in 1883. Madison Cord-Impressed and Madison Plain ceramics were recovered from 21NL140 (Falls habitation site), which is on a terrace overlooking the Minnesota River valley west of Mankato, and from 21BE24, just south of the Minnesota River. These are the westernmost sites in Minnesota known to have *Mature Late Woodland* components. Site 21CR156 near the current project appears to have Madison ware ceramics.

The *Final Late Woodland* spans the period of 1000 to 800 BP and is defined by significant changes in the archaeological record of southeastern Minnesota and the Upper Mississippi valley. Effigy mounds are no longer found, and stockaded sites with Mississippian traits become more common as it appears that large portions of the driftless area were abandoned. Corn horticulture and distinctive grit-tempered collared ceramics belonging to the Grant series are found throughout the area of western Wisconsin, southeastern Minnesota, northern Iowa, and northern Illinois. Grant series ceramics are cord-roughened globular vessels with prominent rims that feature collars castellations, and squared orifices. The rims are higher than those of Madison ware vessels and they flare out more. They have a broader shoulder, thicker cord-impressions, and less complex decoration. When present, exterior-surface decoration is generally a single-cord impression in a chevron or zigzag form. It has been suggested (Gibbon 2012:146) that the shape and size of Grant series vessels was designed for simmering large quantities of grain, which requires longer and more gradual heating than does the cooking of seeds and other foods from the time before corn horticulture. Projectile points common to the period include the Madison Triangular type along with Cahokia, Reed, Harrell, and Des Moines types of the Cahokia Side-Notched cluster. Bryan, King Coulee, and Mero I are significant sites from the *Final Late Woodland* in southeastern Minnesota and western Wisconsin.

Following the end of the *Final Late Woodland* period in the Upper Mississippi Valley, Oneota peoples seem to be the only cultural group that remained into the period of Euro-American contact in the seventeenth century. Gibbon and Anfinson (2008) discuss two hypotheses to explain the development of the Oneota culture. Under the first hypothesis (credited to Stoltman and Christiansen 2000), the Effigy Mound Culture of southern Wisconsin, which had established cultivation as a major form of subsistence while continuing a mobile lifestyle that involved regular gatherings at important ritual sites where social bonds were reinforced and territories were demarcated, was gradually influenced by the Middle Mississippian culture centered at Cahokia. As these influences continued to expand, the Effigy Mound peoples were drawn to central locations such as the Red Wing locality to facilitate contact with Cahokia. These newly-emerging Oneota peoples adopted an increasingly sedentary lifestyle focused on maize horticulture and along with it, new social and ceremonial behaviors associated with planting and harvesting.

A second hypothesis from Gibbon and Anfinson (2008) suggests that the cultural developments in the middle Mississippi Valley between 1200 and 1000 BP, which led to the emergence of Cahokia, also reached into the upper Mississippi and Missouri River Valleys and led to the development of maize-growing Oneota and of Plains Village cultures. Under this hypothesis, the widespread Oneota cultural influences found throughout the northern section of the Prairie Peninsula by 800 BP represent a transformation rather than a displacement of Late Woodland peoples through the integration of Middle Mississippian influences and the migration of Oneota peoples from southern Wisconsin, where the culture had already emerged.

Terminal Woodland in Southwestern Minnesota – Lake Benton Phase

The transition from Initial to Terminal Woodland in southwestern Minnesota and the Prairie Lake Region occurred later and more gradually than in southeastern Minnesota. By the end of the Fox Lake Phase around 1300 BP, ceramic types in the region change significantly, projectile point technology reflects the onset of the bow and arrow, and burial mounds become more widespread. These shifts mark the beginning of the Lake Benton Phase.

The Lake Benton Phase (1300 to 800 BP) burial mounds are low, moderate-sized conical mounds that contained multiple secondary burials with few grave goods. Subsistence and settlement patterns show little change and are similar to the Fox Lake Phase. Pedersen (21LN2) is the type site for this phase. The Boy Scout Hill (21LN10), Gullickson (21YM2), and Big Sough (21MU1) sites are other examples of Lake Benton Phase sites within the region. Most of the sites from this period are located south of the Minnesota River and east of the Blue Earth River, though a few sites are north and east of these rivers and extend into eastern South Dakota and north-central Iowa.

Lake Benton ceramic ware is grit-tempered and the subconoidal vessels are moderately-sized with fairly thin walls. Surface treatment consists of exterior vertical cordmarking in the mid-body. Rims and upper shoulder are smoothed, with a small percentage of body sherds also being smoothed. Cord-wrapped stick impressions are common decorative elements on the rim and shoulder while bosses are rare and trailed lines do not occur. Dentates and punctates are less common but are also used as decorative elements. Cordmarking is present on nearly half of the lips. Lip shape is round or flat, and rims are slightly outflaring to slightly inflaring and have a slight curve in profile. Four Lake Benton types have been defined in a study of the Lake Benton Phase (Anfinson 1997). General trends that occur through time during the Lake Benton Phase include thinning of vessel walls, a more globular shape, a decrease in decorative on the exterior shoulder and rim, and an increase in decoration on the lip. Gibbon (2012:147) points out that Lake Benton ceramics are more difficult to identify than Fox Lake ceramics because of their strong similarity to the St. Croix/Onamia series of central Minnesota, and this association suggests that populations of the Lake Benton Phase (at least in the realm of ceramic technology) had a closer relationship with the hunters and gatherers of central and northern Minnesota than with the people to the east, south, and west.

Projectile point types include small, equilateral triangular and corner-notched forms, but the most common type is the small, side-notched style with straight to slightly concave bases. These points are similar to the small side-notched points of the Plains (Kehoe 1966). Stemmed point types are not associated with Lake Benton Phase. The relatively small size of the projectile points reflects their use for the bow and arrow. There are no other known lithic forms diagnostic of the Lake Benton Phase, although toolkits also include drilling and engraving tools.

6.3.5 Mississippian/Plains Village

The Woodland period in southern Minnesota ended between 1100 and 900 BP with the advent of cultures that began to live in larger settlements, which were often fortified. Distinctive ceramics of the period are identified by shell rather than grit temper, handles rather than collars, smoothed rather than cord-marked surfaces, and decoration on the shoulder rather than rim. These cultural complexes been grouped into a number of cultural subdivisions associated with the central Mississippi River Valley, based on material traits that are more similar to that region than to the earlier local Woodland cultures. The Mississippian cultural manifestation in the central Mississippi River Valley is known as the Middle Mississippian. The northern region has traditionally been known as the *Upper* Mississippian and in the prairie region as the *Plains Village* Mississippian, although Gibbon (2012:159) notes that this usage suggests that the peoples of the period inhabited either "fringe" societies or were migrants from the south. Instead, he argues that the processes of change between Terminal Woodland and Mississippian cultures in Minnesota were more complex and subtle than is suggested by a dependency on cultures to the south and east, and he proposes that the terms *Upper* and *Plains Village* be eliminated – although he acknowledges that it is necessary to continue their use in making comparisons to other areas.

Mississippian complexes in Minnesota include Silvernale, Great Oasis, Cambria, Big Stone, and Blue Earth phases. Archaeological sites from these phases are concentrated along the Minnesota River trench from Mankato to the Red River and at the confluence of the Cannon and Mississippi Rivers near Red Wing.

Silvernale Phase

The Silvernale Phase (950 to 800 BP) is the clearest example of the Middle Mississippian in Minnesota, Illinois, and southern Wisconsin, and it is strongly related to the cultural center at Cahokia, Illinois. The complex is characterized by large fortified villages that were often surrounded by conical burial mounds. Corn horticulture and subterranean storage pits were used. Ceramic vessels are shell-tempered and have rolled rimes and Ramey-scroll designs. Ceremonial objects made of exotic materials such as copper and marine shell from the southeast are found, along with ceramic mask carvings that resemble objects from sites in the southeast. Other artifacts found at Silvernale sites, such as stone tools, and many of the lithic raw material types, appear to be more related to Upper Mississippian cultures. Large Silvernale village sites include Sivlernale, Mero, and Adams.

Great Oasis Phase

Great Oasis (1050 to 900) is considered to be the earliest and most widespread Plains Village phase. Ceramics are grit-tempered, globular vessels with a smooth exterior or cordmarked-smoothed and trailed line decorations and motifs. Decoration consists of bands of incised horizontal and oblique parallel lines along the rims, which are outflared and outcurved. The lips are thickened and beveled. Lithic assemblages include small notched and triangular projectile points; a variety of ground stone tools, (celts, abraders, hammerstones, manos, and mutates). A variety of bone and shell items such as awls, chisels, and beads are also found at Great Oasis sites. Corn horticulture was a component of the complex and settlements were focused along shallow lakes in southwestern and western Minnesota, Iowa, Nebraska, and the Dakotas. The Great Oasis site (21MU2) is the primary Great Oasis phase site in Minnesota. No Great Oasis sites have been identified in the southeastern Minnesota region.

Cambria Phase

The Cambria Phase (900 to 800 BP) includes Woodland, Middle Mississippian, and Plains Village characteristics. The ceramics are grit-tempered, globular vessels with a smooth surface. Lithic assemblages contain small side-notched and triangular projectile points; ground stone tools such as celts, abraders, and hammerstones. Bone and shell items such as scapula hoes, punches, and awls have been recovered. Evidence suggests that this phase was linked to the trade network centered at Cahokia. Settlement patterns include village sites on terraces of the upper Minnesota River and smaller habitation areas by lakes or rivers. Subsistence was based on hunting, fishing, gathering wild plant and aquatic foods, and the cultivation of maize and sunflower. The type site is 21BE2 (the Cambria site), which is located along the Minnesota River in Blue Earth County near Mankato.

6.3.6 Oneota Tradition

Oneota sites occur south of the Minnesota River and in the St. Croix River Valley in prairie and forested areas, dating from 800 to 300 BP. Two main phases have been defined: the Blue Earth Phase and the Orr Phase, which is restricted to far southeastern Minnesota and the adjacent area in Iowa.

<u>Blue Earth Phase</u>

The Blue Earth Phase (800 to 500 BP) occurs across southern Minnesota, with notable sites at Red Wing (Bartron), near Stillwater (Sheffield), and also along the Blue Earth and Upper Minnesota rivers. This phase is characterized by smooth surfaced, shell-tempered ceramics and triangular unnotched arrow points. Agriculture is evident from bison scapula hoes and plant remains of maize, sunflower, squash, and beans. Sites consist of large village farming communities with smaller hunting and gathering camps .

6.4 Contact and Historic Period

Prior to direct contact with Europeans/Euro-Americans and their subsequent settlement of the region, Native American people were indirectly affected by the European presence in the eastern United States as trade goods, diseases, and displaced tribes (such as the Ojibwe) moved westward into the territory that became Minnesota. This period of first contact in the Prairie Lake and southeastern Minnesota regions is not well understood and there is little documentation from the time. It is known that Native groups in the area at the time of French contact included the Dakota, Oto, Ioway, and possibly the Illinois. The Ioway and Oto are believed to have derived from precontact Oneota groups in the region (Gibbon 1994).

In the mid-1600s, the Ioway occupied southern Minnesota along the Mississippi River and the eastern Dakota occupied much of central Minnesota (Dobbs ca. 1988). In the early 1700s, the Ioway were forced out of southern Minnesota as the Dakota began to occupy the area following years of warfare with the Ojibwe, a conflict that lasted to the mid-1800s.

The French began to explore the territory that became Minnesota in the mid-1600s and they engaged in trapping and trading activities with the Ojibwe and Dakota shortly after initial exploration. Although several forts were constructed along the Mississippi and other riverways in southern Minnesota during the French fur-trade era (ca. 1660 to 1763), including one built around 1700 near the confluence of the Blue Earth and Minnesota Rivers near the present day city of Mankato (Blegen 1975), little is known of this time period in south-central Minnesota. In 1762, the French ceded land west of the Mississippi River to Spain, and in 1763 under the Treaty of Paris the French ceded land east of the Mississippi to the British. The fur trade continued as the British gained control of the region (1763 to 1815). The British, ignoring Spain's claim to lands west of the Mississippi River, entered the Prairie Lake Region and established posts along the Minnesota River to aid in their fur trade interests. British trade continued until shortly after the

War of 1812, when the Americans deprived them of licenses to trade within the United States. American fur trade companies replaced the British until the fur trade declined in the mid-1800s. After the war of 1812, the United States gained full control of the area and trading posts began to spread along the major riverways.

One of the most significant Dakota villages on the Minnesota River, and probably the largest, was the Mdewakanton village of Shakopee (21SC2), also known as "Tintowan's", "Shakpa's", "Taoapa's", and "Six's" Village. It is not known how long the village was occupied prior to Euro-American exploration, but it is likely that it was established in the mid-eighteenth century following removal of the Mdewakanton Dakota from the Mille Lacs area (SHPO files).

While the precise location of Shakopee's (Six's) village in its early years is uncertain, notes from the 1823 expedition of Colonel Stephen Long (Keating 1824:330) place the village on the north side of the river. Six's Village is also shown on the north bank of the river on an 1835 map created by Lawrence Taliaferro, the federally-appointed agent for the Indian Agency that included the Minnesota River. Mr. Willoughby Babcock, Curator of the Minnesota Historical Society Museum, found the Taliaferro map in the archives of the Indian Office in Washington D.C. in 1928 and published a study of it in the 1945 edition of *The Minnesota Archaeologist* (Babcock 1945a). Included in the same issue was a second article by Babcock entitled "Sioux Villages in Minnesota Prior to 1837" in which he describes Taoapa's village at the time of the Long expedition as containing 30 lodges, 60 warriors, and 300 souls (1945b:130).

Babcock's analysis of the Taliaferro map and of Keating's narrative confirms that Taopao's Village was initially located on the north bank, across from the location of present-day Shakopee, probably in an area of low ground near a swamp (Rice Lake) that extended from the back of the village to the bluffs (1945b:140). He notes, however (1945a:122), that Taliaferro's map was not rendered very accurately: "It can readily be seen that Agent Taliaferro was not much of an artist…No attempt was made to indicate distances by reduction to scale." Keating's (1824:330) account describes the location of the village as: "In the rear of the village of Taoapa, a swamp extends, and divides it from the bluffs" and "On the right [south] bank Major Long observed numerous ancient tumuli or artificial mounds". The location of these mounds likely corresponds with the location of the mounds reported at sites 21SC2 and 21SC22 on the south bank of the river on the east side of city of Shakopee, which is one mile east of the current project area. Taliaferro's map depicts the village near a prominent bend in the river, which matches this general area, as there is a prominent bend in the river at this location before it straightens for over a mile to the west. Previously recorded site 21HE225, which contains possible contract period artifacts, is located in this general area.

The village remained on the north side of the river until sometime around 1834, when it was moved to the south side in response to ongoing hostilities with Chippewa tribes to the north. The locations described by Long and Taliaferro place the original village on land in what is now Rice Lake, which is southeast of the current project area.

Shakopee's village was formally removed by the federal government in 1853, although Dakota people continued to live there and conflicts with the Chippewa continued until the Battle of Shakopee in 1858 (SHPO files, 21SC2 NRHP Registration). A fur trade post was built at the village site by Oliver Faribault in 1843-44 and he was subsequently appointed as the government farmer to the village. Faribault is considered to be the first permanent settler in what was to become the town of Shakopee and he was visited by the Reverend Samuel Pond, who soon established a mission site next to the village in 1846-47. The precise boundaries and location of Shakopee's Village on the south side of the river are unclear despite a number of archaeological investigations in the area (see Section 4.2 Previous Surveys and Sites). It is presumed that most of the village site has been destroyed by various development activities. The original location of Faribault's cabin is preserved as 21SC40 within the presumed boundaries of Shakopee's Village in NRHP site 21SC2.

6.5 Carver County History

Euro-Americans settlers began to claim land in the Minnesota River valley in the early 1850s after the Dakota were removed under the Treaties of Traverse de Sioux and Mendota. The following discussion of early exploration and settlement is derived primarily from Neill (1882) and Roberts (1993). Small steamboats that were capable of traveling the river even during periods of low water facilitated settlement by providing relatively stable lines of supply for trading posts and individual settlers. Regular steamboat service between St. Paul and Mankato was established in 1853 and the landings for these steamboats were eventually incorporated into the sites of new towns such as Shakopee and Chaska. Steamboat service flourished for about 20 years until railroads became the dominant means of travel along the valley in 1871. The steamboats used large amounts of wood to fire their boilers, and early settlers reported that vast areas were cut-over for many miles on both sides of the river to supply these needs (Neetzel 1969).

The valley was also traversed by a number of trails including the Minnesota Valley Trail along the south side of the river, which was the principle trail to the Red River valley in the 1840s. The trail became a stage route in 1853 with service between St. Paul and Shakopee following the establishment of an inn at Murphy's (steamboat) Landing in Shakopee. Despite the riverboats and stage service, the promoters of towns such as Shakopee along the south side of the river struggled with isolation during periods of low water and during the winters. Early travel was even more challenging on the north side of the river where settlers either had to follow the southern trail and then cross the river by ferry, which was also available at Murphy's Landing, or they had to cut their own roads out of the woods. A stage and mail road on the north side of the river connecting St. Paul to Hutchinson via Chaska was finally developed in 1856.

Early settlements were established nearly simultaneously between 1850 - 1855 along almost the entire length of the Minnesota River and the census of non-Indian inhabitants in the valley grew from less than 5,000 in 1849 to over 170,000 in 1860 (Roberts 1993:75). The towns of Shakopee and Chaska were both platted and promoted by Thomas Holmes, a trader and land speculator who arrived in the area in 1851 established interests in both locations, including a steamboat landing in Shakopee. He sold the rights for Chaska to David Fuller the following year and also made Fuller a partner in the development of Shakopee. Oliver Faribault's brother Davis platted a competing townsite just downriver from Shakopee to compete with Holmes, but his effort failed, as did those of many other speculators who acquired rights to landings and other locations that they hoped would eventually attract settlers to townsites along the river that were never actually developed. Other towns that were successful established during this period of rapid settlement eventually disappeared as the riverboats were replaced by railroads, which bypassed many settlements. Another blow to settlement along the river was the Panic of 1857, when financiers from the east were forced to call in loans during a financial crash. Minnesota was especially hard-hit during the panic because it was on the frontier of western expansion at the time and much of that settlement was financed by debt. Formal establishment of Scott County occurred in 1853 and Carver County in 1855.

Settlement along the Minnesota River resumed following the Panic of 1857 with a continued emphasis on agriculture and associated industries such as milling and food processing. The other major industry in the region was stone-quarrying and brick-making, which took advantage of abundant supplies of high quality clay in the river valley. The limestone that lines the river valley was used directly as a building material and was also burned in kilns to make lime for mortar and whitewashing. The Schroeder Brick Company, which operated in Shakopee from 1876 until after 1940, was the largest brick and lime facility in the area, although numerous other operations that quarried and processed limestone were constructed along the river in Carver and Scott Counties. Demand for brick increased with development from the 1850s on and the locally-produced variety that came to be known as Chaska Brick, made from the cream-colored clay on the north side of the river, can be found all around Chaska and surrounding communities. A farmstead along the current project area is made from these bricks and is discussed in Section 10.14.

Most farmers at the time practiced a form of subsistence agriculture until the late 1860s, when there developed a national demand for spring wheat from the region. Following a brief period of intensive wheat farming to fill this market, and subsequent troubles with blights and insects, most farmers in the area returned to raising a diversity of crops and animals. In the late 1850s a German immigrant farmer named Wendelin Grimm cultivated a strain of alfalfa that was able to endure the northern winters. His strain, which came to be known as Grimm Alfalfa, is credited with supporting a blossoming of dairy in the region and Carver County became a top dairy producer by the early twentieth century. Grimm Alfalfa is considered to have been instrumental in the success of dairy farming throughout the entire northern plains region. Significant agricultural entities in the county have included American Crystal Sugar Beet Company and Bongard's creamery. Although agricultural prices collapsed following the First World War, the intensive development of roads during the 1920s and 1930s allowed for a significant recovery in the 1940s as it became easier and less expensive for farmers to provide their products to outside markets.

The process of clearing the land for agriculture eliminated vegetation, ponds, and marshes in the river valley and on the bluffs above. All of this land modification reduced the storage capacity of the land and dramatically increased the flow of the water into the Minnesota River, which increased the frequency and severity of flooding (Neetzel 1969). Widespread livestock grazing on the hills and bluffs also caused a significant amount of erosion. Although soils in the river valley are very fertile, the severe erosion buried many areas with deep deposits of overburden, and this combined with the fact that many of the fields in the valley are too small to be easily farmed by modern equipment meant that many small farms were abandoned and the buildings removed. The decline of family farms increased rapidly in the 1970's as agriculture was consolidated into large corporate holdings and much of the production in the river valley is now centered on nursery and landscaping operations.

Neetzel (1969) explains that logging in the Minnesota River valley was not as significant economically as it was in the northern parts of the state and, as mentioned earlier, much of the early timber harvest was used to supply riverboats. River valley tree species such as cottonwood were not commercially valuable in the larger regional market, although many of the early buildings in the towns and farms in the valley used locally-produced cottonwood lumber. Logging in the valley intensified during World War II to meet increased demand for wood products of all types in the war effort and following the war, an increasing demand for pallets made of low-grade wood opened a new commercial market for lumber from the valley.

A very significant land-use development in the Minnesota River valley was the establishment of the Minnesota Valley National Wildlife Refuge in 1976. The refuge occupies much of the valley in Scott and Carver counties and has allowed recreational activities to flourish in the area. More recently, a great deal of development in the region has centered on residential development for commuters and businesses in the expanding twin cities metropolitan area.

7. Environmental Background

7.1 Modern Environment

The project area is located along TH 101 on the north side of the Minnesota River valley in east-central Minnesota, approximately one mile north of Shakopee and two miles south of Chanhassen. The landscape in the project area is mostly a rolling upland incised by a few steep ravines, with the south end extending to the Minnesota River valley bottom. The area is a mixture of suburban and rural land, including agricultural fields, private residences, woods, lawns, wetlands, and a golf course.

7.2 Glacial History

The most recent glacial activity in the region occurred during the Late Wisconsin glaciation at the end of the Pleistocene when much of the Upper Midwest was buried beneath glaciers. The Des Moines lobe covered much of western and east-central Minnesota, receding and advancing several times between 13,000 and 9,700 years BC when it finally retreated (Clayton and Moran 1982; Gilbertson 1990). The project area is situated near the eastern extent of the Des Moines lobe. These glacial deposits shaped the surficial features of the landscape that characterize the region today. Meltwater from the glaciers established the drainage system through which many of the modern day streams in the region flow, including the Minnesota River.

7.3 Physiography

The project area is located in the Owatonna Moraine Area physiographic region, which is characterized by a series of moraines that formed along the eastern margin of the Des Moines lobe (Hobbs and Goebel 1982; Wright 1972). The project is on a rolling upland glacial landscape, except the south end, which is on the side slope, toe slope, and valley floor of the Minnesota River valley. The wide and deep river valley was cut into the surrounding till plains and bedrock by the catastrophic discharge of Glacial Lake Agassiz floodwaters, which formed Glacial River Warren, the precursor to the Minnesota River.

7.4 Hydrology

The project is located within the Minnesota River valley, which is the primary drainage for a large portion of southern Minnesota, extending from its headwater near the North and South Dakota border to its outlet at the Mississippi River in St. Paul. The Minnesota River's broad drainage system provided a route for the transmission of people, goods, and ideas across distant areas, connecting the prairie and Plains region of western Minnesota and the Dakotas with the woodlands in the eastern part of the state. Further connections across the country could be maintained via the Mississippi River and its tributaries as well as the Red River.

The Minnesota River flows within a large, steep-walled valley. On the valley floor near the project area is an extensive lake (Rice Lake) and adjacent wetlands. Bluff Creek flows into the Minnesota River valley near the project area at the junction of TH 101 and CSAH 61. The creek has been channelized and flows through an artificial drainage channel that was likely created to stabilize the landscape along the highways in this area.

7.5 Ecology

The project lies within the Big Woods subsection of the Minnesota and Northeastern Iowa Morainal Section of the Eastern Broadleaf Forest Province (Minnesota DNR 1998). The primary characteristics are a loamy end moraine associated with the Des Moines Lobe of Late Wisconsin Glaciation and presettlement vegetation of mesic deciduous forest comprised of oak woodland and maple-basswood forest. The area has rolling terrain with scattered lakes.

Vegetation in the Minnesota River valley bottom near Shakopee at the time of European settlement consisted of river bottom forest (silver maple, elm, ash, cottonwood, and willow) (Marschner 1974). The upland and terraces above the valley bottom consisted primarily of hardwood forest (oak, maple, basswood, and hickory), oak barrens, and smaller areas of prairie.

7.6 Post-Glacial Ecology

Regional vegetation changes during the Holocene are inferred from pollen samples preserved in lake-bottom sediments from several lakes in eastern Minnesota. The following discussion is derived from Gibbon (2012) and Gibbon and Anfinson (2008), citing the research of Wright (1992, 1976a, 1976b); Wright and Watts (1969); Amundson and Wright (1979); Webb et al. (1983); and Webb (1981).

These analyses show that following the retreat of the glaciers in southern Minnesota about 12,000 RCYBP (14,000 cal BP) all of the area was covered with an open boreal forest of grasses and stands of conifer trees mixed with deciduous species such as black ash; a composition that is not seen in modern landscapes. This "spruce parkland" landscape was more open on high ground and was likely swampy or contained open water in the low areas. The parkland evolved into a more uniform spruce forest by 11,000 RCYBP (13,000 cal BP). By approximately 10,500 RCYBP (12,500 cal BP), deciduous forest had developed across southern Minnesota. In the project area and to the south and west, the forest composition was oak and elm, while just east of the project area it comprised birch, alder, and pine. The oak-elm forest continued to advance and covered the entire south central and southeastern parts of the state by 9,000 RCYBP (10,000 cal BP).

Continued warming and drying of the climate provided the conditions for prairie and oak savannah to flourish in the western and southern parts of the state by 8000 RCYBP (8800 cal BP), and the broad vegetation zones of historic times had begun to develop, with prairie in the west, deciduous forest in the southeast, and coniferous forest in the north and northeast. Further warming and drying led to continued eastward expansion of the prairie, which reached its maximum extent and covered all but the northeastern quarter of the state by 7000 RCYBP (7800 cal BP). The climate cooled and grew wetter after 6000 RCYBP (6900 cal BP), causing the prairie to retreat westward and oak woodland to expand. Gibbon (2012) points out that this advancing oak woodland would not have been the same as the historic oak forest but rather would have been a mosaic of prairie and woodland, with the forest gradually becoming denser. The basic vegetation zones present at the time of settlement (1850's) were in place by 3000 RCYBP (3200 cal BP), with oak woodland near the project area. By approximately 400 years ago, the Big Woods (elm, basswood, ironwood, hickory, maple, ash, and butternut) became established in south-central Minnesota in the vicinity of site 21CR155.

A more fine-scale review of the landscape evolution near the project area is provided in a recent research project for Le Sueur County (Schirmer et al. 2014), which is adjacent to and environmentally similar to the project area. Using historic records (e.g., Marschner 1974) and studies of pollen and charcoal specimens from regional lake-bottom sediment cores (e.g. Sugita

1994 and Umbanhowar 2004), the authors looked at major climatic regimes, vegetation changes, and the associated occurrences of large-scale fires. Schirmer et al. (2014) note that the pollen studies used to provide much of the vegetation reconstructions by other researchers are somewhat generalized, in that they rely on information from localized features such as lake and pond basins, which are then extrapolated onto the broader ecosystem. Complex landscapes that occur near the project area, such as the Minnesota River valley, uplands, wetlands, smaller streams, and many lakes and ponds, require a more nuanced review of the paleoenvironmental data. The Minnesota River valley includes many niche environments ranging from the bluffs tops and side slopes to the valley bottom, where numerous springs, lakes, and wetlands occur.

Schirmer et al. (2014:27) define five major climatic regimes that have dominated the landscape of south-central Minnesota and the project area since the retreat of the glaciers: a cool and humid period from 10,200 to 7700 RCYBP (12,000 to 8500 cal BP), a warm and arid period from 7700 to 4000 RCYBP (8500 to 4500 cal BP), a warm and humid period from 4000 to 2900 RCYBP (4500 to 3000 cal BP), a cool and humid period from 2900 to 1000 RCYBP (3000 to 1000 cal BP), and finally a cool and arid period from 1000 to 200 BP. Two comparatively wet episodes of approximately 500 years each, spanning 6500 to 6000 cal BP and 5000 to 4500 cal BP, have been identified during the warm and arid period. These climatic regimes are divided by vegetation trends and the occurrence of fires, as postulated by the abundance of charcoal in sediment samples recovered from lakes and ponds in the south-central Minnesota area (Table 7).

A boreal forest of spruce and pine advanced into southern Minnesota between 10,200 to 10,050 RCYBP (12,000 to 11,500 cal BP). This was followed by oak-elm forest and woodland from 10,050 to 8050 RCYBP (11,500 to 9000 cal BP). Prairie dominated the landscape during the warm and dry climatic regime of the mid-Holocene, which persisted from 8050 to 4000 RCYBP (9000 to 4500 cal BP). Prairie is defined as a fire-maintained ecosystem with a mix of grasses and forbs and less than 10% tree cover, primarily oak. During the later portion of this period from 5750 to 4000 RCYBP (6500 to 4500 cal BP), two wetter episodes allowed the spread of savanna vegetation. *Savanna* is a grassland ecosystem containing oak, elm, and forbs, in which the trees are sufficiently widely-spaced so that the canopy remains open. Woodland vegetation (primarily oak, elm, hickory, basswood, grasses, and forbs with 10-70% total tree cover) with areas of grasslands and sparse brush was the dominant vegetation type from 4000 to 1100 RCYBP (4500 to 1000 cal BP). Forest (primarily maple, oak, elm, basswood, and ironwood with 70% or greater tree cover, closed or nearly closed canopy, and comparatively little shrub growth but significant forb and grass ground cover) occurred in the area from 1100 RCYBP (1000 cal BP) to the present day. Big Woods developed around 400 RCYBP (500 cal BP).

Occupations at sites 21CR161 and 21CR162 were radiocarbon dated at ca. 5000 and 4400 RCYBP, thus occurring primarily during a wet climatic episode with savanna vegetation.

Schirmer et al. (2014) found the same type of relationship between landscape changes and fire prevalence as is discussed in Yansa (2007), noting that there is a counter-intuitive interaction between arid and warm periods and charcoal evidence of large-scale fires. The reason for this is that during the arid times there was less fuel to support large fires, and therefore fires were more common during wetter periods when primary fuels such as grasses and forbs would have been more plentiful.

Table 7. Holocene Climatic Regimes and Ecological Trends near Carver County (from Schirmer et al. 2014 26-27).

ca. Date Range (cal BP)	ca. Date Range (RCYBP)	Climatic Regime	Vegetation Trends	Dominant Species	Fire Regime
12,000–11,500	10,200–10,050	Cool and Humid	Boreal Forest	Spruce, Pine	Low
11,500–11,000	10,050–9550		Deciduous Forest	Oak, Elm, Forbs	
11,000–10,500	9550–9300				
10,500–10,000	9300–8900				
10,000–9500	8900–8500		Woodland		
9500–9000	8500–8050				
9000–8500	8050–7700		Prairie	Grasses, Forbs	Moderate
8500–8000	7700–7200	Warm and Arid			
8000–7500	7200–6600				
7500–7000	6600–6150			Oak, Grasses	
7000–6500	6150–5750				
6500–6000	5750–5300	Wet Episode	Savanna	Oak, Elm, Grasses, Forbs	
6000–5500	5300–4800	Warm and Arid	Prairie	Grasses, Forbs	
5500–5000	4800–4450	Wet Episode	Savanna	Oak, Elm, Grasses, Forbs	
5000–4500	4450–4000	Warm and Arid	Prairie	Oak, Grasses, Forbs	
4500–4000	4000–3700	Warm and Humid	Woodland	Oak, Ironwood, Hickory, Basswood, Forbs	High
4000–3500	3700–3300			Oak, Grasses	
3500–3000	3300–2900				
3000–2500	2900–2500	Cool and Humid		Oak, Elm, Ironwood, Pine, Forbs	Moderate
2500–2000	2500–2050				
2000–1500	2050–1550				
1500–1000	1550–1100				
1000–500	1100–400	Cool and Arid	Forest	Oak, Ironwood, Elm, Basswood	
500–200	400–150			Maple, Basswood, Ironwood, Elm (Big Woods)	Low

Yansa (2007) focused on pollen and diatom samples from the Altithermal period of warming and drying from 7200 to 4000 RCYBP (8000 to 4500 cal BP), which corresponds to the Early and Middle Archaic periods. While these data are from the northern Great Plains, east and north of the project area, they can be extrapolated to provide insights into the landscapes of the project area as well, given that the shifting prairie/forest border meant that there were periods of time in which the general environment of the project area would have shared many similarities with the Great Plains study area as described. The shifts in climate, and subsequently in habitat and vegetation, were more variable in time and space than has been previously understood. The onset of widespread grasslands on the northern Plains does not represent a large-scale biome shift, but rather a series of localized changes in species composition along the edges of lakes and ponds (Yansa 2007:129). She proposes that fine-scale fluctuations during the periods of drought and moisture resulted in the creation of "oasis" landscapes, in which large areas became very dry but other areas closer to water sources (such as the river valley of the project area) would have stayed relatively wet, thereby supporting resources for animals and humans.

Yansa suggests that the proposed oasis landscape model of the Early Archaic means that populations would not have had to abandon the prairie region to the degree that has been assumed, but rather would have been able to thrive in localized upland areas and river valleys, such as the Minnesota River, that did retain moisture.

Another recent study (Williams et al. 2009) supports Yansa and Schirmer in suggesting that the shifting mid-Holocene boundaries of the prairie-forest ecotone in southeastern Minnesota were more asymmetrical than previously believed, with a relatively rapid early Holocene deforestation and more gradual reforestation later in the Holocene. Using fossil pollen records and modern surface analogs, the researchers mapped changes in "woody cover". They argue that the period of rapid deforestation was likely caused by fairly sudden climate changes and the subsequent onset of large fires, which caused a positive feedback loop in which a shift to grasslands increased the frequency of fires, which then accelerated the burning of more forest. The loss of forest cover was also likely exacerbated by climate change-caused outbreaks of pests and pathogens that weakened trees and made forests even more susceptible to fire.

The researchers conclude that the prairie-forest ecotone boundaries in the eastern Dakotas and southern Minnesota generally match earlier mapping efforts (e.g. Webb et al. 1983), with some differences in detail (Williams et al. 2009:201). The general patterns are similar; there is a dramatic regional advance of prairie between 8900 to 7200 RCYBP (10,000 to 8000 cal BP), a maximum advance to the east from 6100 to 5300 RCYBP (7000 to 6000 cal BP), followed by a retreat of the prairie to the west after 5300 RCYBP (6000 cal BP). While the maximum extent of the ecotone boundary in southeastern Minnesota is somewhat ambiguous (Williams et al. 2009:195), they find that the range of movement is smaller than in Webb et al. (1983), and that the boundary of the prairie-forest ecotone did not advance much farther to the east than the current project area. Their reconstructions indicate that the Holocene prairie-forest ecotone in southern Minnesota and Wisconsin was gentler than in northern Minnesota. They conclude that the changes in both the northern and eastern prairie-forest ecotone boundaries were caused by the changing climate, while the causes for differences in the rates of change between the north and east are less certain.

7.7 Plant and Animal Resources

The paleoenvironmental data cited by Schirmer et al. (2014) indicate that, although the landscape and environment around the project area changed through time, from forest and woodland to prairie and savanna and then back to woodland and forest, all of these major vegetation types would have been present during each of the climatic episodes at differing locales and in varying amounts. It appears that there was never a time of complete ecological uniformity in the prairie-forest ecotone. The variety of landscape settings, along with the presence of wetlands, lakes, and streams associated with the broad Minnesota River valley would have created niche environments around the project area in which a wide and changing variety of vegetation and associated plant and animal resources would have been available.

Aquatic habitats such as lakes, streams, and wetlands around the project area would have provided fish, clams, small mammals, turtles, waterfowl, edible tubers, and wild rice. Spector (1993:112) reports that the remains of bottom-dwelling fish, such as drumfish, along with turtles were the most abundant in the archaeological record at the Little Falls site, which is located just upstream of the project area near the town of Jordan. Other aquatic resources recovered during excavation and potentially used by the Dakota people in the Minnesota River valley included catfish, walleye, gar, pike, muskellunge, sucker, teal, mallard, shoveler, wood duck, coot, merganser, grebe, grouse, goose, loon, muskrat, otter, beaver, fisher, mink, ermine, and shellfish

(Spector 1993:144). While these types of aquatic resources would have been more limited during warm and dry periods (when water levels declined), they would have remained viable even during those periods in the Minnesota River valley and the lake basins associated with it, which would have continued to support more diversity of flora and fauna than was found in the upland areas farther from water sources. Faunal material recovered from nearby sites 21CR155 and 21CR156 in the valley bottom included bison, deer, turtle, fish, clam, bird, beaver, and snake remains (Florin et al. 2013; Florin et al. 2015).

The wide variety of plant resources available in the woodland and savanna habitats of the project area are also summarized in Spector (1993:145): legumes, crabapple, cress family, elderberry, grape, seed grasses, hazelnuts, acorns, joe-pye weed, mint, knotweed, pig weed, pin cherry, black cherry, plantain, purslane, raspberry, gooseberry, sorrel, sumac, strawberry, and vervain among others. Faunal remains recovered from the Little Falls site (Spector 1993:144) include deer, coyote, squirrel, rabbit, grouse, elk, raccoon, and pigeon.

Based on early historical accounts, a wide variety of mammalian game species were present in southern Minnesota, including bison, elk, deer, muskrat, rabbit, beaver, bear, and occasionally antelope (Anfinson 1997; Ernst and French 1977; Herrick 1892). Anfinson (1997) explains that plant foods were much less abundant in the prairie landscape, consisting primarily of the prairie turnip and a type of bean called ground plum. Most of the prairie vegetation comprised grasses and forbs that provided excellent forage for prey species, primarily bison, with smaller numbers of elk and both white tail and mule deer. Large prey species such as elk and deer were not as abundant in closed-canopy forests due to limited browse and therefore this type of environment provided a more limited animal resource base.

8. Phase I Fieldwork Summary

8.1 Overview of Fieldwork and Results

Archaeological fieldwork was conducted from May 11 to July 20, 2015. Frank Florin was the principal investigator and field supervisor. The FCRS field crew included Mike Bradford, Gregg Felber, Frank Koep, James Lindbeck, Samantha Olson, Amanda Peterson, Kevin Reider, Jeff Shapiro, Michael Strakowski, and Bob Thompson.

The location of the Phase I archaeological survey area and sites identified during the survey are presented on a USGS 7.5' quadrangle maps in Figures 1 and 2. The locations of survey areas, sites, and shovel tests discussed in the subsequent section are depicted on aerial imagery in Figure 5.

A discussion of the field conditions, physical setting, survey methods, and results of the investigation is presented below and is organized from north to south, beginning on the east side of TH 101 and then the west side. Because of very low surface visibility throughout the survey area, shovel testing was conducted in all areas without excessive slope. The field methods are described in Section 3.1. Five new sites (21CR159, 21CR160, 21CR161, 21CR162, and 21CR163) were identified during the Phase I survey. The sites are discussed in detail in Sections 9 to 12. Phase II evaluations were conducted at sites 21CR161 and 21CR162.

8.2 East Side of TH 101

The northern 440 meters of the survey area is a golf course that extends between TH 14 and a driveway. The terrain is a fairly level upland landscape. Shovel tests were placed parallel to the TH 101 ROW in 15-meter intervals. Site 21CR163 is a lithic artifact recovered from a shovel test at the north end of the golf course. The site is discussed in detail in Section 12.

South of the golf course and driveway is a narrow piece of lawn and wood on the north side of a steep ravine. Shovel tests were placed in 10-meter intervals on the north side of the ravine. None of these tests yielded artifacts. South of the ravine the survey area is located only on the west side of TH 101 until Creekwood Drive.

Between Creekwood Drive and Lakota Lane, the survey area is in a hay field, with 20 percent surface visibility. The terrain is a fairly level upland landscape. Shovel tests were placed parallel to the
TH 101 ROW in 15-meter intervals, with 10-meter interval testing at the south end of the field near the bluff edge. South of Lakota Lane the survey area is on lawns along the bluff edge. Shovel tests were placed parallel to the TH 101 ROW in 10-meter intervals on the lawns near the bluff edge. Site 21CR161 was identified from several positive shovel tests in hay field and lawns. The site is discussed in detail in Section 10.

Most of the valley wall has excessive slope, but there are a series of narrow terrace benches that were shovel tested in 10 and 15-meter intervals, wherever the landscape was not excessively sloping. The upper portion of the valley wall is wooded and the lower portion has a horse pasture. The upper terraces are extensively eroded and consist of highly dissected and sloping terrain. Most of the middle terrace was removed during construction of the railroad tracks. Site 21CR160 was identified from a single positive shovel test on an upper terrace, and site 21CR159 was identified from two positive shovel tests on the middle terrace. The sites are discussed in detail in Section 9.

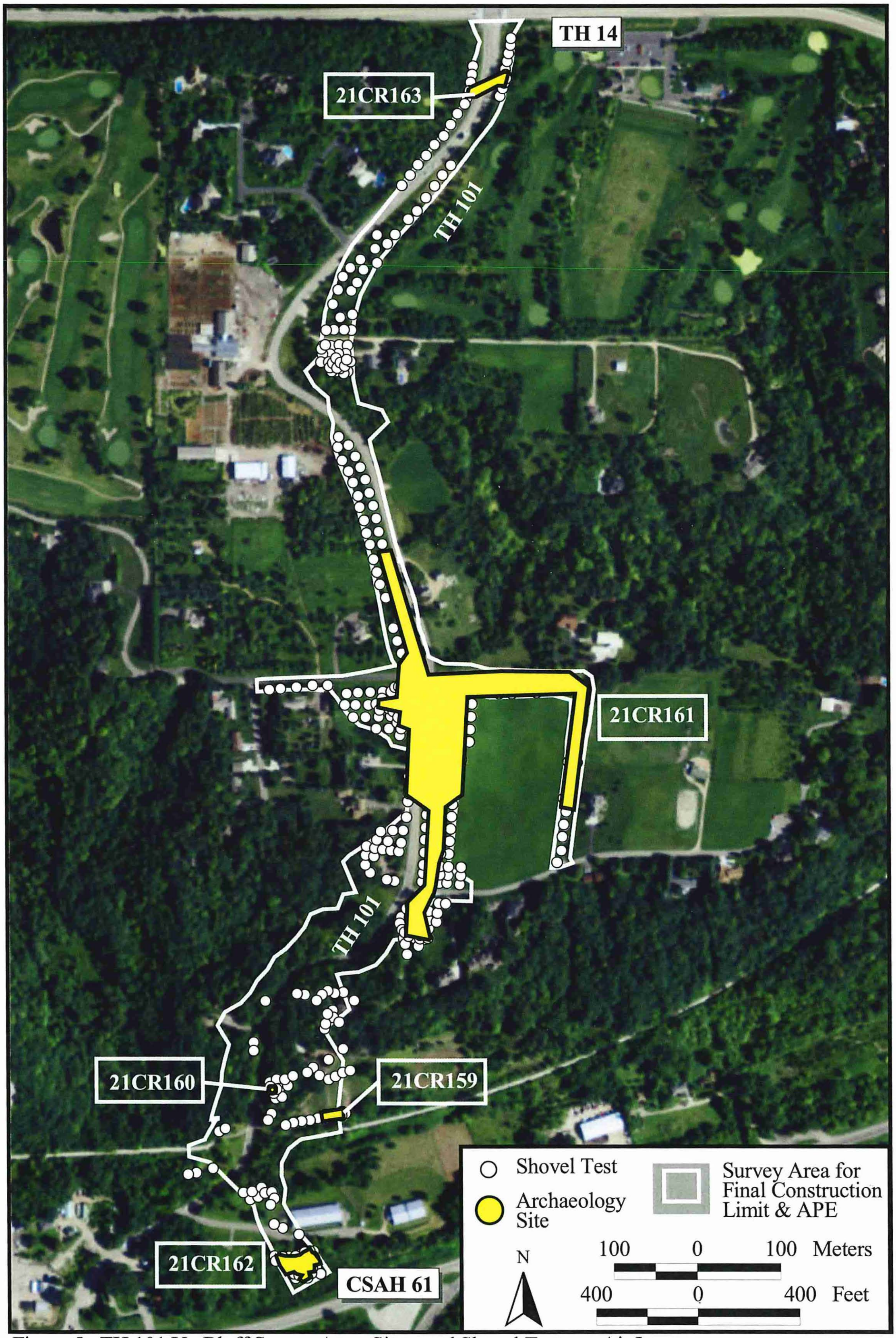


Figure 5. TH 101 Up Bluff Survey Area, Sites, and Shovel Tests on Air Imagery.

On the foot slope of the valley is the Paws, Claws and Hooves animal boarding facility that includes parking lots and lawns. A former farmstead at this location has been razed, and the landscape in this area has been extensively disturbed by heavy equipment during farmstead demolition and construction of the animal boarding facility. There are no features or other surficial evidence of the farmstead. Shovel tests were placed in 10-meter intervals in areas without excessive slope. The soil profiles in this area were bladed, truncated, and disturbed.

At the south end of the project near CSAH 61 (Flying Cloud Drive) is a wetland with cattails and small trees at the bluff base (intersection of the toe slope and valley bottom). This property is owned by Paws, Claws and Hooves but is fenced off from the adjacent parking lots and lawns. Shovel tests were placed in 10-meter intervals. Because of the potential for deeply buried sites, deep auger testing was conducted to a maximum depth of 310 cmbs, with most tests between 150 and 250 cmbs. Site 21CR162 was identified from several positive shovel tests that contained faunal material and lithics. The site is discussed in detail in Section 11.

8.3 West Side of TH 101

The north end of the survey area south of TH 14 consists of a wooded hill overlooking a wetland to the north. The northern portion of survey area on the hill adjacent to TH 14 was contained within the ROW road cut. South of the hill is level upland terrain. Shovel tests were placed parallel to the TH 101 ROW in 10 and 15-meter intervals. Site 21CR163 was identified from lithic artifacts recovered from a shovel test on the south side of the hill. The site is discussed in detail in Section 12. The survey area extends from TH 14 approximately 250 meters south and then crosses over to the east side of TH 101.

The survey area crosses back to the west side of TH 101 south of a ravine at the south end of the Mustard Seed nursery. The area from the south end of the nursery to Creekwood Drive contains woods and grassy areas on fairly level upland terrain. Shovel tests were placed parallel to the TH 101 ROW in 15-meter intervals. South of Creekwood Drive, the survey area extends through a fallow field and then across lawns on fairly level upland terrain to the bluff edge overlooking Bluff Creek valley. Shovel tests were placed parallel to the TH 101 ROW in 10 and 15-meter intervals. Site 21CR161 was identified from precontact and historic artifacts recovered in several positive shovel tests in the woods and field. The site is discussed in Section 10.

South of the bluff edge, the valley wall is steeply sloping (greater than 45 degree slope) to Bluff Creek, except for a few more level areas near Vogelsberg Trail and the railroad, which were shovel tested. No artifacts were recovered from these tests. Soil profiles from the shovel tests on the level terrace bench on the south side of the railroad lacked original topsoil, and this area was apparently bladed in the past. Approximately 50 meters south of the railroad, the survey area crosses over to the east side of TH 101.

9. Site 21CR159 and 21CR160

9.1 Overview

Site 21CR159 is a sparse precontact artifact scatter, and site 21CR160 is a lithic isolate. The ages and cultural affiliations of the sites are unknown because of the absence of diagnostic artifacts. The sites are in T116N, R23W, NW, SW, NW Section 36 (Figures 1 and 2). Site 21CR159 is 30 by 5 meters in size, and site 21CR160 is five by five meters. Each site encompasses less than 0.1 acre. UTM coordinates for 21CR159 are E457400 N4962480 and for 21CR160 are E457330 N4962510 (1983 NAD Zone 15). A map of the sites on aerial imagery is presented in Figure 6. Photos of the sites are in Figures 7 and 8.

9.2 Physical Setting and Soils at 21CR159

Site 21CR159 is located in a horse pasture 80 meters east of TH 101 on a middle terrace in the Minnesota River valley, just north of the railroad (currently a bike trail). The terrace is inset in the valley wall, with steeply sloping terrain above and below it. Construction of the railroad destroyed most of the terrace, and only a six-meter-wide terrace bench remains. Surface visibility was very low (<10%).

Soils at site 21CR159 are mapped as Lester-Kilkenny loams, 18 to 25 percent slopes (Web Soil Survey 2015). Lester soils formed in calcareous, loamy till on convex slopes on moraines and till plains. Kilkenny soils formed in a mantle of clayey glacial till or flow till and underlying loamy glacial till on moraines.

Soil profiles from the positive shovel tests are presented in Tables 8 and 9. Shovel 25E and the adjacent tests had a dark buried soil around 75 cmbs, which may have been the original topsoil (A horizon) prior to deposition of slope wash. Most of the soil profiles in the site area are similar to Shovel Test 25E, indicating the area around Shovel Test 23E may be disturbed or have had different soil formation processes.

Table 8. Site 21CR159 Shovel Test 23E Profile.

Depth Below Surface (cm)	Description
0-50	Dark brown (10YR 3/3) loamy sand
50-100	Light yellowish brown (10YR 6/4) sand

Table 9. Site 21CR159 Shovel Test 25E Profile.

Depth Below Surface (cm)	Description
0-10	Fill
10-75	Very dark grayish brown (10YR 3/2) loamy sand
75-90	**Very dark gray (10YR 3/1) loamy sand; buried A horizon**
90-100	Dark grayish brown (10YR 4/2) loamy sand

9.3 Physical Setting and Soils 21CR160

Site 21CR160 is located in the woods 20 meters east of TH 101 on a gently sloping upper terrace at the junction of Bluff Creek and Minnesota River valleys. Surface visibility was very low (<10%).

Soils at site 21CR160 are mapped as Lester-Kilkenny loams, 25 to 40 percent slopes series (Web Soil Survey 2015). These soils are described above for site 21CR159. Soils in Shovel 34E and the adjacent tests had a dark buried soil that started at various depths between 50 and 100 cmbs, which may have been the original topsoil (A horizon) prior to deposition of slope wash (Table 10). An 8" diameter auger was used to recover soil below 80 cmbs.

Table 10. Site 21CR160 Shovel Test 34E Profile.

Depth Below Surface (cm)	Description
0-14	Very dark brown (10YR 2/2) loamy sand
14-50	Brown (10YR 4/3) loamy sand
50-100	Dark brown (10YR 3/3) sand
100-135	**Very dark grayish brown (10YR 3/2) sand, buried A horizon**
135-172	Brown (10YR 4/3) sand

9.4 Survey Methods and Results

Each site was identified by shovel testing at 10-meter intervals. Radial tests were placed at five-meter intervals around the positive tests, but all radial tests were negative. A summary of artifacts recovered from the sites is presented in Table 11.

Table 11. Sites 21CR159 and 21CR160 Artifact Summary.

Site #	Shovel Test #	Depth (cmbs)	Count	Artifact Description
21CR159	23E	0-10	1	Mammalian, large, fragment, calcined, SG 3
21CR159	25E	25-40	1	Broken flake, Prairie du Chien Chert (oolitic), SG 3
			1	Other G4 flake, Prairie du Chien Chert (oolitic), SG 4
			1	Shatter, Prairie du Chien Chert (oolitic), SG 2
21CR160	34E	160-170	1	Shatter, quartz, SG 3

9.5 Artifact Analysis

The lithic assemblage from each site is very sparse and has limited interpretive potential, indicating only that lithic reduction or stone tool manufacture/maintenance occurred. None of the flake types are diagnostic of a specific lithic reduction stage or technology. However, shatter is typically produced in the early or middle stages of reduction. All of the lithic raw materials from the sites are available in the regional glacial till and were likely procured from local sources (Bakken 2011).

One calcined, large mammal bone was recovered from site 21CR159. If the calcined bone is associated with the other precontact artifacts, then it would indicate that a cooking facility is present and that site activities included cooking or animal butchering. However, the lack of other associated artifacts limits interpretation of the site.

9.6 Conclusions and Recommendations

Site 21CR159 is a sparse precontact artifact scatter of calcined bone and lithic debris, and site 21CR160 is a lithic isolate. No diagnostic artifacts were recovered from these sites, and their cultural contexts and ages are unknown. Site 21CR159 may have been part of a larger habitation site on the middle terrace, which was destroyed by construction of the railroad. Activities at 21CR159 include cooking/heating and lithic reduction or stone tool manufacture. Activities at 21CR160 include lithic reduction or stone tool manufacture. Radial shovel tests placed in five-meter intervals adjacent to the positive tests at the sites were negative.

Under Criterion D, these sites lack the potential to provide important information on the precontact period because they have sparse and limited artifact assemblages. These sites are recommended not eligible for listing on the NRHP. No further archaeological work is recommended at the sites.

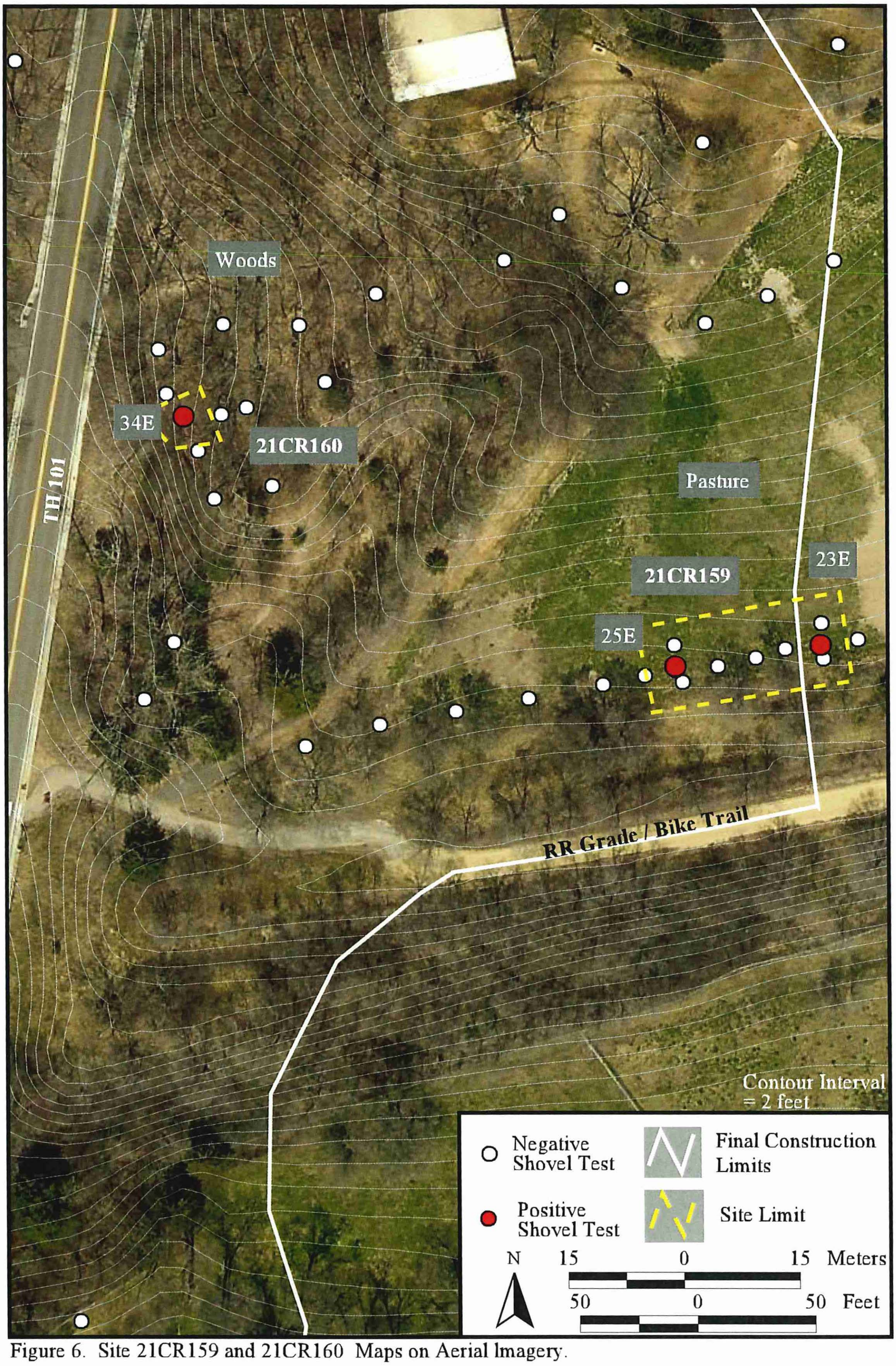


Figure 6. Site 21CR159 and 21CR160 Maps on Aerial Imagery.

Figure 7. Site 21CR159 Photo, Facing East.

Figure 8. Site 21CR160 Photo, Facing East from TH 101.

10. SITE 21CR161

10.1 Overview

Site 21CR161 is a multicomponent site that includes a ca. 1857 to mid-1900s historic farmstead artifact scatter and a large, precontact period sparse lithic scatter. One of the precontact occupations included a Middle Archaic cooking/heating feature that dates to ca. 4400 RCYBP (cal. 5000 BP). The age and cultural affiliation of the other precontact occupations are unknown because of the absence of diagnostic artifacts or dateable materials. The site is in T116N, R23W, SE, SW, SW and SW, SE, SW Section 25 and NW, NE, NW and E1/2, NW, NW Section 36 (Figures 1 and 2) and occupies an area of approximately 470 by 270 meters, encompassing 6.7 acres. The UTM coordinates for the center of the site are E457515 N4962915 (1983 NAD Zone 15). A map of the site on aerial imagery is presented in Figures 9 to 11. Photos of the site area are included in Figures 12 to 15.

10.2 Physical Setting and Soils

The site is along the east and west sides of TH 101, extending from the bluff edge northwards across a gently undulating upland landscape of glacial till. On the east side of TH 101 the site extends, from south to north, across residential lawns and a hay field. On the west side of TH 101 the site extends, from south to north, across residential lawns, a fallow field (south of Creekwood Drive), and woods (north of Creekwood Drive). Surface visibility was poor (less than 20%) in all areas.

Soils at site 21CR161 are mapped as Cordova-Webster complex and Lester-Kilkenny loams, 2 to 6 and 6 to 12 percent slopes (Web Soil Survey 2015). Cordova soils formed mostly in loamy calcareous glacial till on ground moraines and till plains. Webster soils formed in glacial till or local alluvium derived from till on uplands. Lester soils formed in calcareous, loamy till on convex slopes on moraines and till plains. Kilkenny soils formed in a mantle of clayey glacial till or flow till and underlying loamy glacial till on moraines. Representative soil profiles from the lawns and hay field on the east side of TH 101 are presented with the discussion of XUs 1 to 12 in the following sections. Typical soil profiles from shovel tests in the fallow field and woods on the west side of TH 101 are presented in Tables 12 and 13. No excavation units were dug in these areas. Soils in the fallow field and woods have a plow zone.

Table 12. Site 21CR161 Typical Shovel Test Profile on the West Side of TH 101 in the Woods North of Creekwood Drive.

Depth Below Surface (cm)	Description
0-43	Very dark grayish brown (10YR 3/2) clay loam; Ap horizon
43-70	Brown (10YR 4/3) silty clay; Bt horizon

Table 13. Site 21CR161 Typical Shovel Test Profile on the West Side of TH 101 from Fallow Field South of Creekwood Drive.

Depth Below Surface (cm)	Description
0-30	Black (10YR 2/1) clay loam; Ap horizon
30-45	Very dark grayish brown (10YR 3/2) silty clay; Bt1 horizon
45-65	Dark grayish brown (10YR 4/2) silty clay; Bt2 horizon

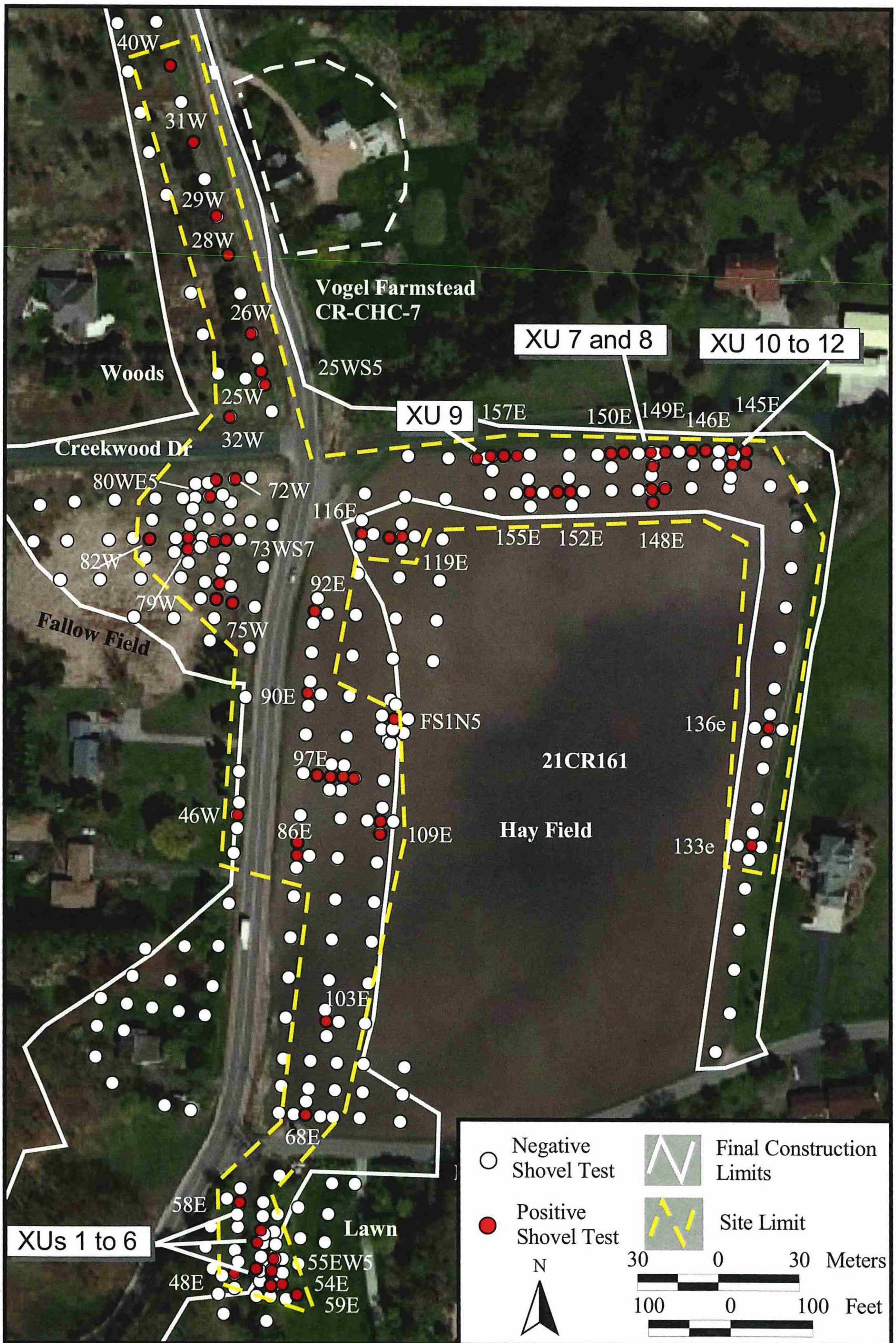


Figure 9. Site 21CR161 Map on Aerial Imagery.

Figure 10. Site 21CR161 Map of XU 1 to 6 Area on Aerial Imagery.

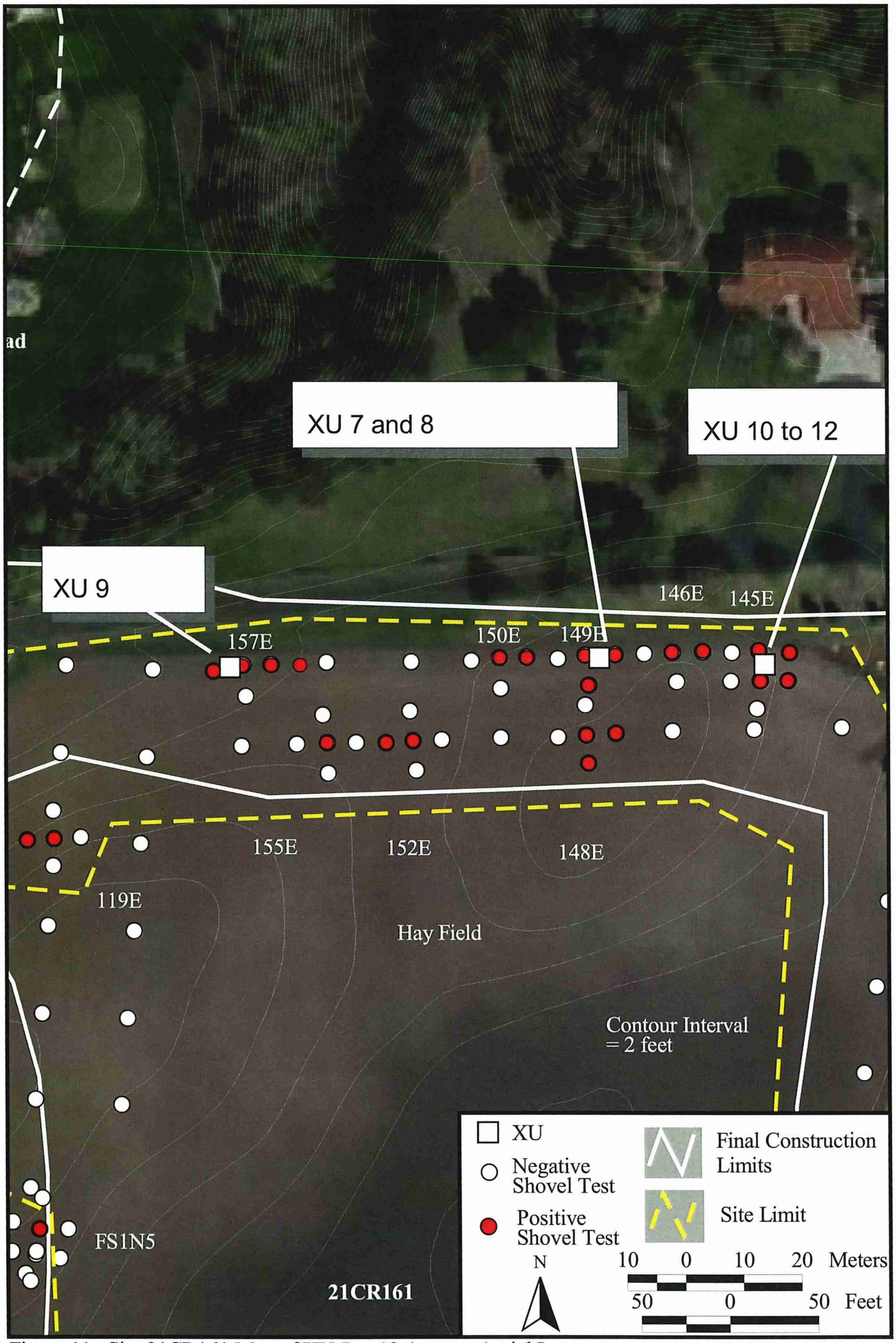


Figure 11. Site 21CR161 Map of XU 7 to 12 Area on Aerial Imagery.

Figure 12. Site 21CR161 Photo of Lawn Area at South End of Site (XUs 1-6) on East Side of TH 101, Facing South.

Figure 13. Site 21CR161 Photo of Hay Field Area on East Side of TH 101, Facing North.

Figure 14. Site 21CR161 Photo of Fallow Field Area on West Side of TH 101 South of Creekwood Drive, Facing South.

Figure 15. Site 21CR161 Photo of Wooded Area on West Side of TH 101 North of Creekwood Drive, Facing West.

10.3 Phase I Survey Methods and Results

The site was identified during pedestrian survey and Phase I shovel testing in 10 and 15-meter intervals. Testing in 10-meter intervals was employed closest to the bluff edge in the residential yards and the south edge of the hay field. A total of 35 Phase I shovel tests contained 56 artifacts, including lithic debris, stone tools, FCR, faunal material, and historic artifacts (Table 14). Artifacts were recovered from 0 to 155 cmbs. A utilized flake of Prairie du Chien Chert (oolitic), designated Find Spot 1 (FS 1), was identified during pedestrian survey in the hay field.

Table 14. Site 21CR161 Summary of Artifacts from Phase I Shovel Tests.

Shovel Test	Depth (cmbs)	Soil Horizon	Count	Artifact Type
25W	55-75	Ap	1	Broken flake, unidentified chert
			1	Historic, nail, square
26W	20-35	Ap	1	Ovis aries/Capra hircus, tooth, molar fragment
28W	20-30	A	2	Historic, iron, unidentified
29W	10-30	Ap	1	Historic, iron, nail, square
			1	Glass, clear, unidentified
31W	0-20	Ap	1	Mammalian, large, rib, left shaft fragment
			1	Historic, aluminum, unidentified
32W	50-70	Fill	1	Glass, clear, unidentified
40W	20-40	Ap	1	Glass, clear, unidentified
46W	0-20	Ap	1	Nonbifacial flake, quartzite
48E	0-30	Ap	1	Bipolar flake, Prairie du Chien Chert (oolitic)
54E	0-20	Ap	1	Bipolar flake, Swan River Chert
58E	30-40	A	1	Shatter, quartzite
			1	Broken flake, Red River Chert
59E	20-35	A/B	1	Bifacial thinning flake, Swan River Chert
68E	0-30	Ap	1	Broken flake, quartzite
72W	0-30	A	1	Historic, iron, nail, square
			1	Glass, clear, unidentified
75W	0-50	Ap	1	Nonbifacial flake, unidentified chert
79W	0-40	Ap	1	Other G4 flake, quartzite
82W	0-50	Ap	1	Glass, clear, unidentified
86E	15-25	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
90E	10-25	Ap	1	Bifacial thinning flake, Swan River Chert
			1	Bifacial thinning flake, Prairie du Chien Chert (oolitic)
92E	0-20	Ap	1	Shatter, quartz
97E	10-20	Ap	1	Nonbifacial flake, Swan River Chert
			1	Broken flake, granitic
103E	0-20	Ap	1	Other G4 flake, Cedar Valley Chert
109E	0-10	Ap	1	Bipolar flake, unidentified material
			1	Fire-cracked rock, angular/spall, granitic
116E	0-30	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
119E	0-20	Ap	1	Decortication flake, Red River Chert

Table 14. Continued.

Shovel Test	Depth (cmbs)	Soil Horizon	Count	Artifact Type
133E	0-20	Ap	1	Other G4 flake, Prairie du Chien Chert
136E	0-20*	Ap	1	Other G4 flake, Prairie du Chien Chert (oolitic)
	0-65*	Ap	1	Broken flake, quartzite
	135-155**	B	1	Bipolar flake, quartz
145E	0-20	Ap	4	Bifacial thinning flake, Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
			1	Other G4 flake, Prairie du Chien Chert (oolitic)
	20-40	Ap/B	1	Broken flake, Prairie du Chien Chert (oolitic)
	40-70	B	1	Edge preparation flake, Prairie du Chien Chert (oolitic)
146E	0-36	Ap	1	Other G4 flake, Prairie du Chien Chert (oolitic)
148E	0-25	Ap	1	Shatter, quartz
			1	Other G4 flake, Prairie du Chien Chert (oolitic)
149E	0-40	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
	50-80	B	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
150E	20-30	Ap	1	Utilized flake, Cedar Valley Chert
152E	10-34	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
155E	0-40	Ap/B	1	Shatter, quartz
157E	60-80	B	1	Other G4 flake, Prairie du Chien Chert (oolitic)
Total	**-**	**-**	**56**	**-**

* in slopewash; ** at base of low hill, probably in original topsoil buried by post-settlement slopwash

10.4 Phase II Shovel Testing

Phase II shovel tests were dug at five (and occasionally 7.5) meter intervals in cardinal directions adjacent to the positive Phase I tests. The Phase II close-interval radial shovel tests were numbered based on the direction and distance from the Phase I test. For example, Shovel Test 25WS5 is located five meters grid south of Shovel Test 25W. A total of 35 Phase II shovel tests contained 53 artifacts, including lithic debris, FCR, a core, faunal material, and historic artifacts (Table 15). Artifacts were recovered from 0 to 100 cmbs.

Table 15. Site 21CR161 Summary of Artifacts from Phase II Shovel Tests.

Shovel Test	Depth (cmbs)	Soil Horizon	Count	Artifact Type
25WS5	80-100	Ap	1	Historic, iron, nail, wire
54ES5	0-15	Ap	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
54EN5	0-25	Ap	1	Broken flake, Swan River Chert
54EW6	10-25	Ap	1	Other G4 flake, Red River Chert
			1	Other G4 flake, Swan River Chert
54ESE6	0-40	Ap	1	Shatter, unidentified chert
55EW5	0-15	Ap	1	Nonbifacial flake, Swan River Chert
	15-30	B	1	Nonbifacial flake, Tongue River Silica
			1	Bipolar flake, Swan River Chert
55EW7	0-30	Ap	2	Fire-cracked rock, spall, granitic
			2	Fire-cracked rock, crumb, granitic
55ENW7	0-10	A	1	Decortication flake, Grand Meadow Chert
72WW7	0-40	Ap	1	Historic, glass, clear, unidentified, molded
73WS7W5	0-30	Ap	1	Shatter, unidentified chert
73WS7	0-20	Ap	1	Historic, glass, clear, window fragment
	0-35	Ap/B	2	Fire-cracked rock, angular, granitic
75WN7	0-30	Ap	1	Bipolar flake, quartz
			1	Broken flake, Prairie du Chien Chert (oolitic)
75WE7	0-20	Ap	1	Historic, iron, bolt
79WS5	0-40	Ap/A	1	Bipolar flake, quartzite
80WE5	0-20	Ap	1	Broken flake, Knife River Flint
86EN5	0-20	Ap	1	Fire-cracked rock, angular, granitic
97EW5	40-50	B	1	Broken flake, Swan River Chert
97EE5	0-25	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
97EW5W5	0-15	Ap	1	Nonbifacial flake, Cedar Valley Chert
109ES5	0-20	Ap	1	Bifacial thinning flake, Prairie du Chien Chert (oolitic)
119EW5	0-15	Ap	1	Nonbifacial flake, Red River Chert
145ES5	30-50	B	1	Core, bipolar (not rotated), Tongue River Silica
145EE5	0-30	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
145ES5E5	0-20	Ap	1	Broken flake, Prairie du Chien Chert (oolitic)
			1	Other G4 flake, Prairie du Chien Chert (oolitic)
146EE5	0-20	Ap	1	Shatter, basaltic
			1	Broken flake, Prairie du Chien Chert (oolitic)
148ES5	0-20	Ap	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
148EE5	0-20	Ap	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
149ES5	20-40	Ap	1	Nonbifacial flake, Swan River Chert
			1	Bifacial thinning flake, Prairie du Chien Chert (oolitic)

Table 15. Continued.

Shovel Test	Depth (cmbs)	Soil Horizon	Count	Artifact Type
149EE5	0-30	Ap	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
			2	Broken flake, Prairie du Chien Chert (oolitic)
150EE5	0-20	Ap	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
	20-40		1	Gallus gallus (domestic chicken), ulna, left shaft fragment
150EW5	0-20	Ap	1	Bifacial thinning flake, Prairie du Chien Chert (oolitic)
157EW5	50-63	B	1	Nonbifacial flake, Prairie du Chien Chert (oolitic)
157EE5	30-45	B	1	Bifacial thinning flake, Prairie du Chien Chert (oolitic)
157EE5E5	0-30	Ap	1	Shatter, quartz
	20-40	Ap/B	1	Broken flake, Prairie du Chien Chert (oolitic)
FS1N5	20-40	B	1	Nonbifacial flake, quartzite
Total	-	-	**53**	-

10.5 Phase II XUs 1 to 6 – Residential Lawn on Bluff Edge

XUs 1 to 6 were placed on a residential lawn near the bluff edge on the east side of TH 101 (Figure 10). Excavation was conducted in 10-cm levels below a unit datum, whose relative elevation was established in relation to the adjacent ground surface. XUs were placed adjacent to positive shovel tests, specifically tests that appeared to have intact soils without plow zones. Overall, the artifact density was very low in all of the XUs. The primary artifact type recovered was lithic debris, with small amounts of fauna, FCR, a stone tool, and historics.

The soils formed in clay loam till, and the soil profiles in the XUs were generally similar. XUs 1, 4, and 5 had plow zones, either from farming or landscape modifications for the driveway. XUs 2, 3, and 6 appeared to have undisturbed soil profiles. Wall profiles and photographs from the XUs that depict the soil horizons are presented in Figures 16 to 25. The soil profiles in XUs with a plow zone consisted of an Ap horizon above Bt horizons. XUs that lacked a plow zone had a soil sequence of A, AB, B horizons. Disturbance from rodent burrows was minimal. Soil profiles from the shovel tests and XUs indicate that more than half of the site area on the lawn has a plow zone.

<u>XU 1</u>

XU 1 was placed adjacent to ST 54ESE6, which contained a piece of lithic debris (Figure 10). Excavation extended approximately 15 cm below the plow zone and was terminated at a depth of 60 cmbd because of a lack of artifacts. A summary of artifacts recovered from XU 1 is presented in Table 16. The artifacts include eight pieces of lithic debris that were recovered from the plow zone.

Table 16. Site 21CR161 Summary of Artifacts in XU 1.

Depth (cmbd)	Horizon	Lithic Debris	Total	%
0-10	Ap	-	**0**	**0**
10-20	Ap	3	**3**	**38**
20-30	Ap	1	**1**	**13**
30-40	Ap	2	**2**	**25**
40-50	Ap*	2	**2**	**25**
50-60	B	-	**0**	**0**
Total	**-**	**8**	**8**	**-**
%	**-**	**100**	**-**	**100**

*Artifacts recovered from the upper portion of this level (ca. 40-45 cmbd) were in the Ap horizon. The lower portion of this level (ca. 45-50 cmbd) is B horizon and did not contain artifacts.

XUs 2 and 3

XUs 2 and 3 were contiguous units placed at the location of ST 58E, which contained two pieces of lithic debris (Figure 10). The soils at this location appeared undisturbed and did not have a plow zone. Excavation was terminated at a depth of 60 cmbd because of a lack of artifacts. Shovel tests were placed in the base of the units and dug to 100 and 110 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present. A summary of artifacts recovered from XUs 2 and 3 is presented in Table 17. The artifacts include three pieces of lithic debris, a stone tool (utilized flake), a piece of FCR, two faunal fragments, and two historic items (mortar and whiteware fragments).

Table 17. Site 21CR161 Summary of Artifacts in XUs 2 and 3.

Depth (cmbd)	Horizon	Faunal	Lithic Debris	Lithic Tool	FCR	Historic	Total	%
0-20	A	-	-	-	-	-	**0**	**0**
20-30	A	-	1	1	-	-	**2**	**22**
30-40	A	1*	-	-	-	1	**2**	**22**
40-50	A/B	1	-	-	-	1	**2**	**22**
50-60	B	-	2	-	1	-	**3**	**33**
Total	**-**	**2**	**3**	**1**	**1**	**2**	**9**	**-**
%	**-**	**22**	**33**	**11**	**11**	**22**	**-**	**100**

* goat or sheep tooth

XU 4

XU 4 was placed adjacent to ST 54EW6, which contained two pieces of lithic debris (Figure 10). Excavation extended 25 cm below the plow zone and was terminated at a depth of 60 cmbd because of a lack of artifacts. A summary of artifacts recovered from XU 4 is presented in Table 18. The artifacts include seven pieces of lithic debris, a piece of FCR, and two thermally-altered faunal fragments. All artifacts, except one FCR, were recovered from the plow zone.

Table 18. Site 21CR161 Summary of Artifacts in XU 4.

Depth (cmbd)	Horizon	Faunal Thermally Altered	Lithic Debris	FCR	Total	%
0-10	Ap	-	-	-	**0**	**0**
10-20	Ap	1	1	-	**2**	**20**
20-30	Ap	1	3	-	**4**	**10**
30-40	Ap*	-	3	-	**3**	**30**
40-50	B	-	-	1	**1**	**10**
50-60	B	-	-	-	**0**	**0**
Total	**-**	**2**	**7**	**1**	**10**	**-**
%	**-**	**20**	**70**	**10**	**-**	**100**

*Artifacts recovered from the upper portion of this level (ca. 30-35 cmbd) were in the Ap horizon. The lower portion of this level (ca. 35-40 cmbd) is B horizon and did not contain artifacts.

XU 5

XU 5 was placed adjacent to ST 55EW5, which contained three pieces of lithic debris from soil that appeared to be undisturbed (Figure 10). However, a plow zone was found to be present in the XU. Excavation extended a minimum of 20 cm below the plow zone and was terminated at a depth of 55 cmbd because of a lack of artifacts. A summary of artifacts recovered from XU 5 is presented in Table 19. The artifacts include two pieces of lithic debris and a historic item. All artifacts, except one piece of lithic debris, were recovered from the plow zone.

Table 19. Site 21CR161 Summary of Artifacts in XU 5.

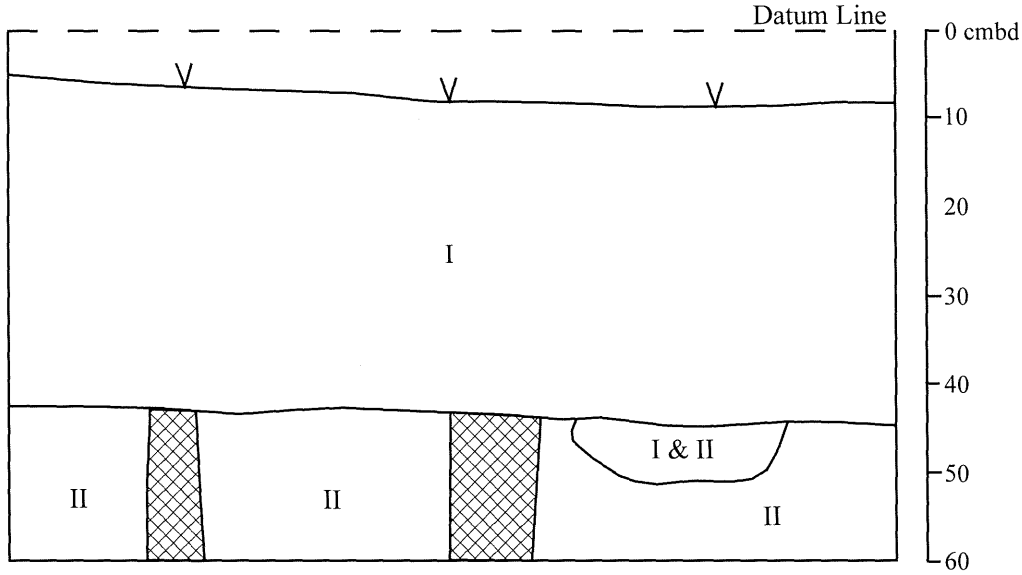
Depth (cmbd)	Horizon	Lithic Debris	Historic	Total	%
0-20	Ap	-	1	**1**	**33**
20-30	Ap/B	1	-	**1**	**33**
30-40	B	1	-	**1**	**33**
40-50	B	-	-	**0**	**0**
50-55	B	-	-	**0**	**0**
Total	**-**	**2**	**1**	**3**	**-**
%	**-**	**67**	**33**	**-**	**100**

XU 6

XU 6 was placed adjacent to ST 55ENW7, which contained a piece of lithic debris (Figure 10). Excavation extended a minimum of 20 cm below the plow zone and was terminated at a depth of 55 cmbd because of a lack of artifacts. A summary of artifacts recovered from XU 6 is presented in Table 20. The artifacts include three pieces of lithic debris and a piece of FCR.

Table 20. Site 21CR161 Summary of Artifacts in XU 6.

Depth (cmbd)	Horizon	Lithic Debris	FCR	Total	%
0-20	A	-	-	**0**	**0**
20-30	A	1	-	**1**	**25**
30-40	AB	1	1	**2**	**50**
40-50	AB/B	1	-	**1**	**25**
50-55	B	-	-	**0**	**0**
Total	**-**	**3**	**1**	**4**	**-**
%	**-**	**75**	**25**	**-**	**100**



Ground Surface
Rodent Run
I Very dark gray (10YR 3/1) silty clay loam 1-3% gravel; Ap horizon, plowzone
II Dark yellowish brown (10YR 4/4) sandy clay loam with 10-15% gravel; B horizon

0 10 20 cm

Figure 16. Site 21CR161 XU 1 East Wall Profile.

Figure 17. Site 21CR161 Photo XU 1 East Wall Profile.

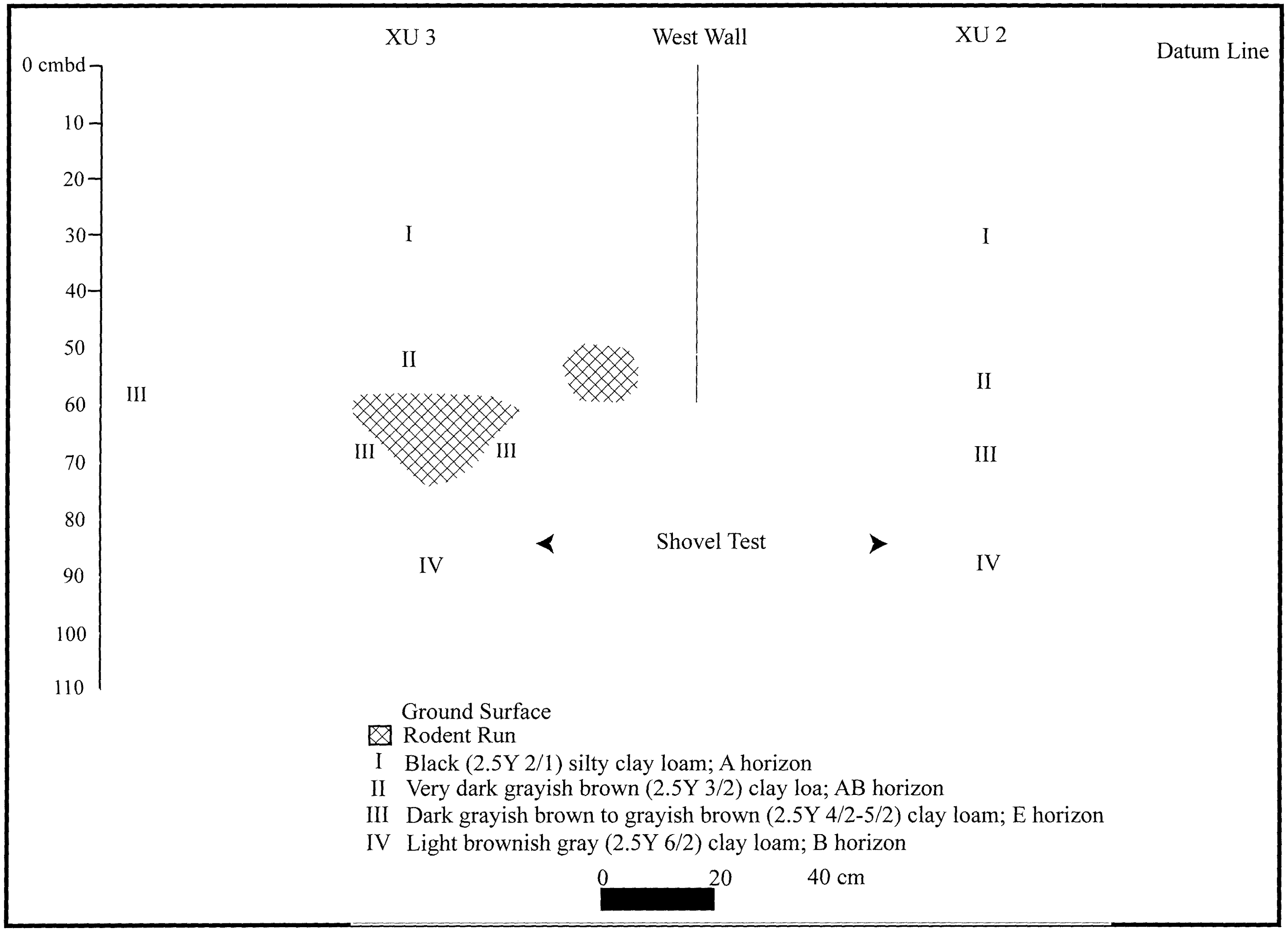
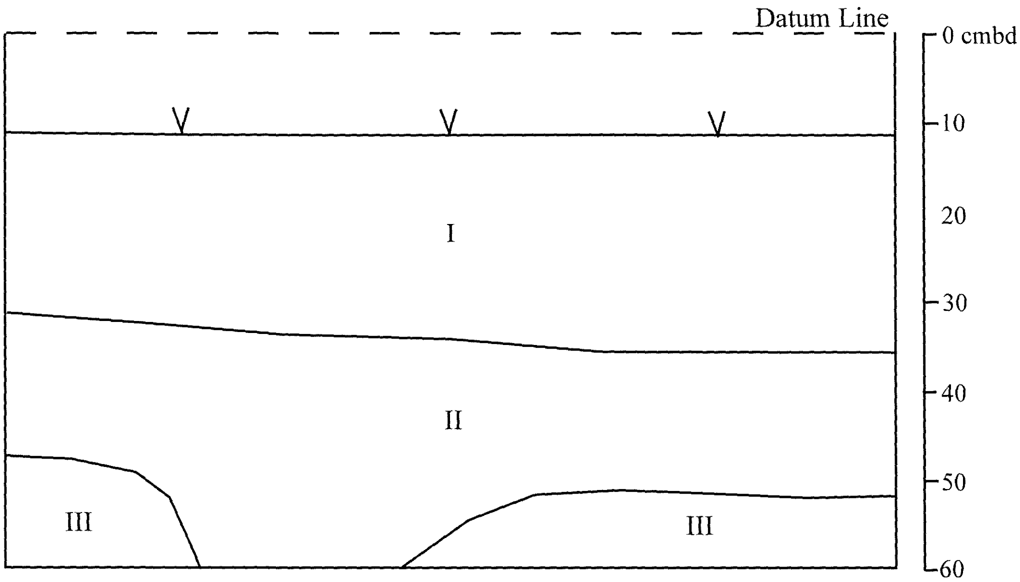


Figure 18. Site 21CR161 XUs 2 and 3 West Wall Profile.

Figure 19. Site 21CR161 Photo XUs 2 and 3 West Wall Profile.



V Ground Surface
I Very dark gray (10YR 3/1) silty clay loam; Ap horizon, plowzone
II Dark brown (10YR 3/3) clay loam; B1 horizon
III Brown (10YR 4/3) clay loam; B2 horizon

0 10 20 cm

Figure 20. Site 21CR161 XU 4 West Wall Profile.

Figure 21. Site 21CR161 Photo XU 4 West Wall Profile.

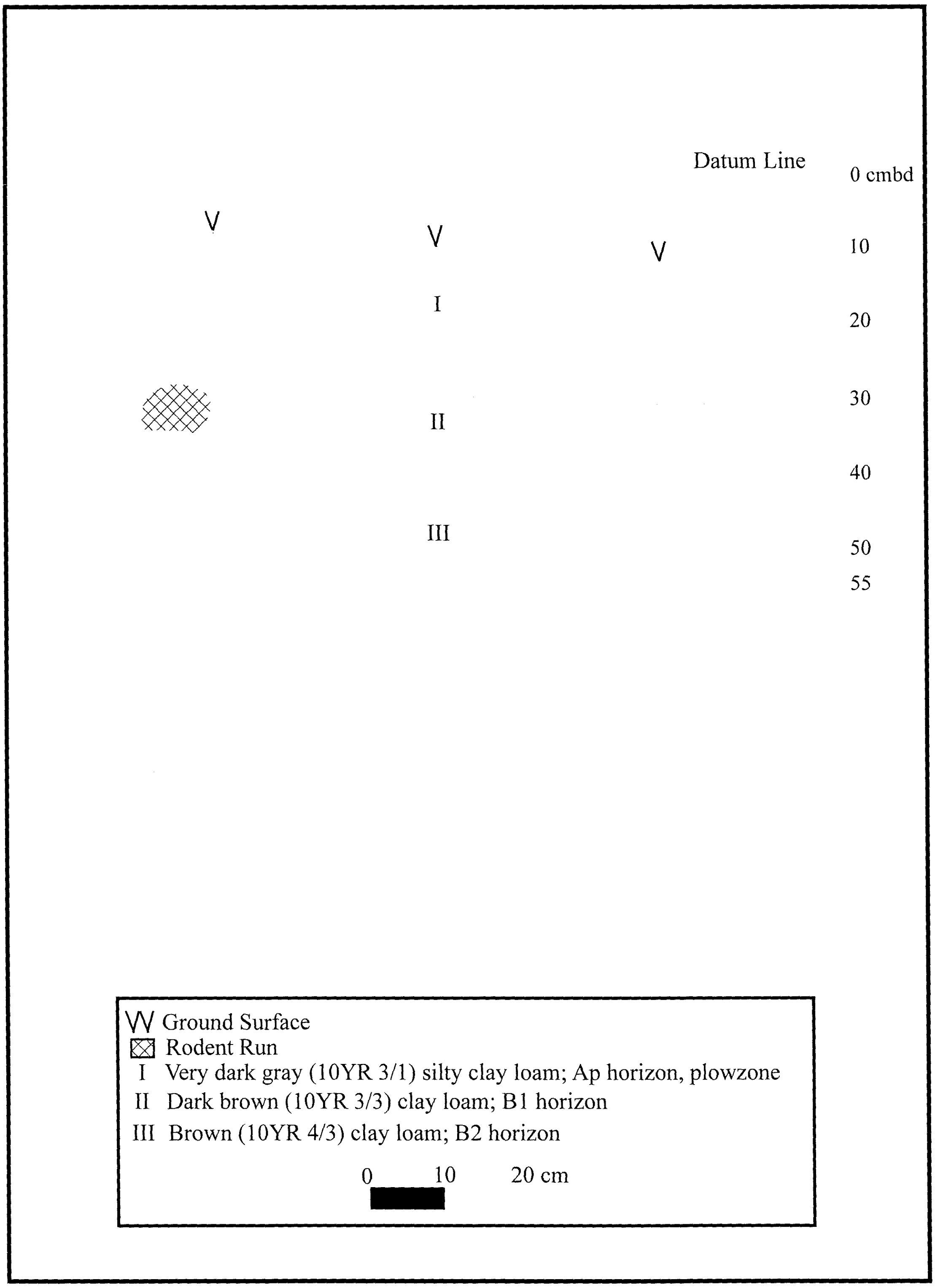


Figure 22. Site 21CR161 XU 5 West Wall Profile.

Figure 23. Site 21CR161 Photo XU 5 West Wall Profile.

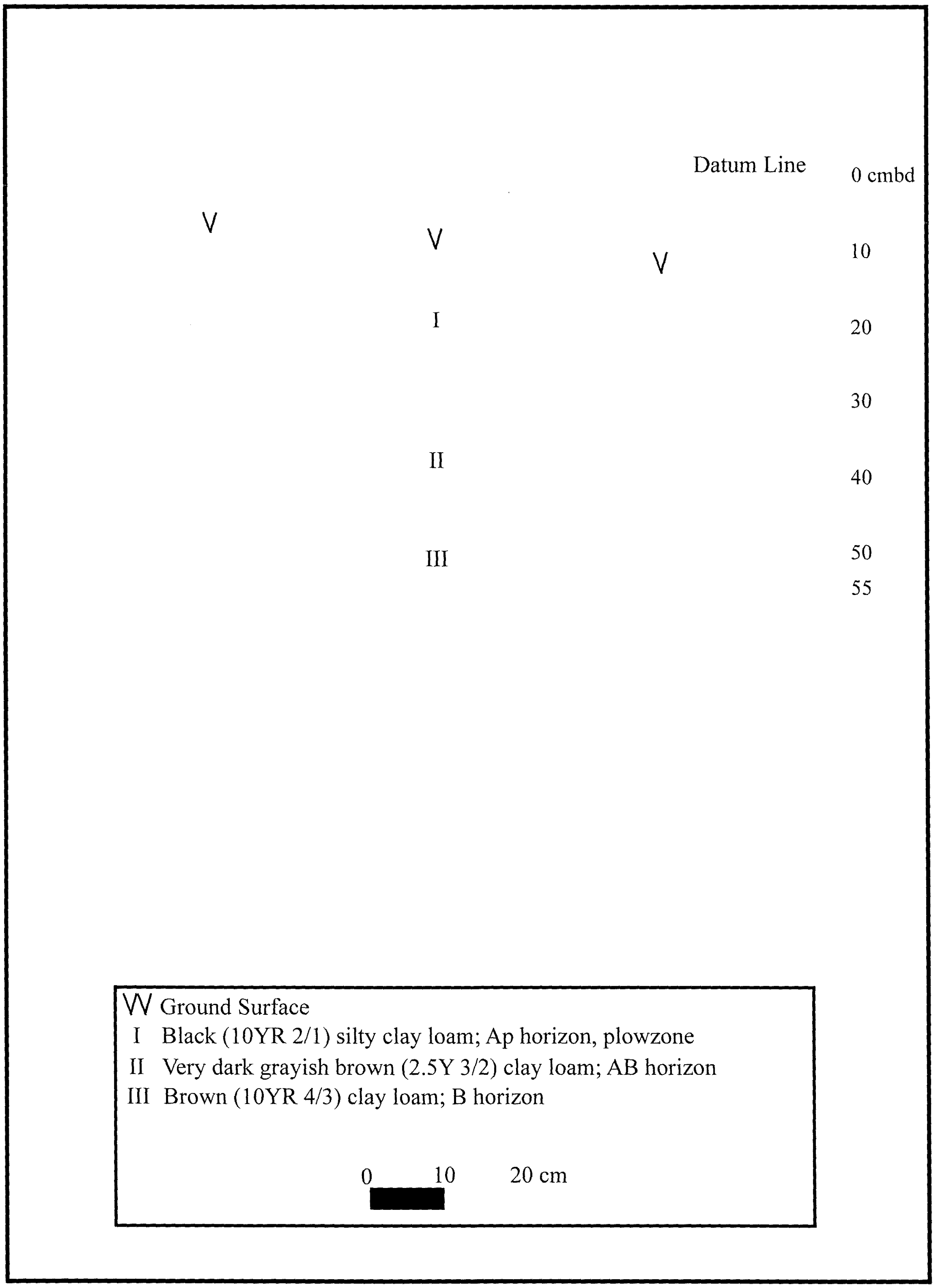


Figure 24. Site 21CR161 XU 6 West Wall Profile.

Figure 25. Site 21CR161 Photo XU 6 West Wall Profile.

10.6 Phase II XUs 7 to 12 – Hay Field on Uplands

XUs 7 to 12 were placed in a hay field on the east side of TH 101 (Figure 11). Excavation was conducted in 10-cm levels below a unit datum, whose relative elevation was established in relation to the adjacent ground surface. XUs were placed adjacent to positive shovel tests that had high artifact counts or tests where artifacts were recovered below the plow zone. The artifact density in the XUs ranged from low to high. However, nearly all of the artifacts were recovered from the plow zone. The primary artifact type recovered was lithic debris, with smaller amounts FCR and historic items.

The soils formed in clay loam till. Soil profiles in the XUs were generally similar, and the soil sequence consisted of Ap, E, and B horizons. Disturbance from rodent burrows was minimal.

XUs 7 and 8

XUs 7 and 8 were placed adjacent to ST 149E, which contained three pieces of lithic debris, with two of the pieces recovered below the plow zone (Figure 11). Excavation extended a minimum of 20 cm below the plow zone and was terminated at a depth of 70 cmbd because of a lack of artifacts. A shovel test was placed in the base of XU 8 and dug to 100 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present.

A summary of artifacts recovered from XUs 7 and 8 is presented in Table 21. A total of 74 artifacts were recovered, including 67 pieces of lithic debris, five pieces of FCR, and two historics (square nail and whiteware). All but four artifacts were recovered from the plow zone. Wall profiles and photographs from the units that depict the soil horizons are presented in Figures 26 and 27.

Table 21. Site 21CR161 Summary of Artifacts in XUs 7 and 8.

Depth (cmbd)	Horizon	Lithic Debris	FCR	Historic	Total	%
0-40	Ap	43	3	2	**48**	**65**
40-50	Ap	24	1	-	**25***	**34**
50-60	E/B	-	1	-	**1**	**1**
60-70	B	-	-	-	**0**	**0**
Total	-	**67**	**5**	**2**	**74**	-
%	-	**91**	**7**	**3**	-	**100**

* A total of 22 artifacts were recovered from the Ap horizon in the upper portion of this level (ca. 40-45 cmbd), and three artifacts were recovered from the E horizon in the lower portion of this level (ca. 45-50 cmbd).

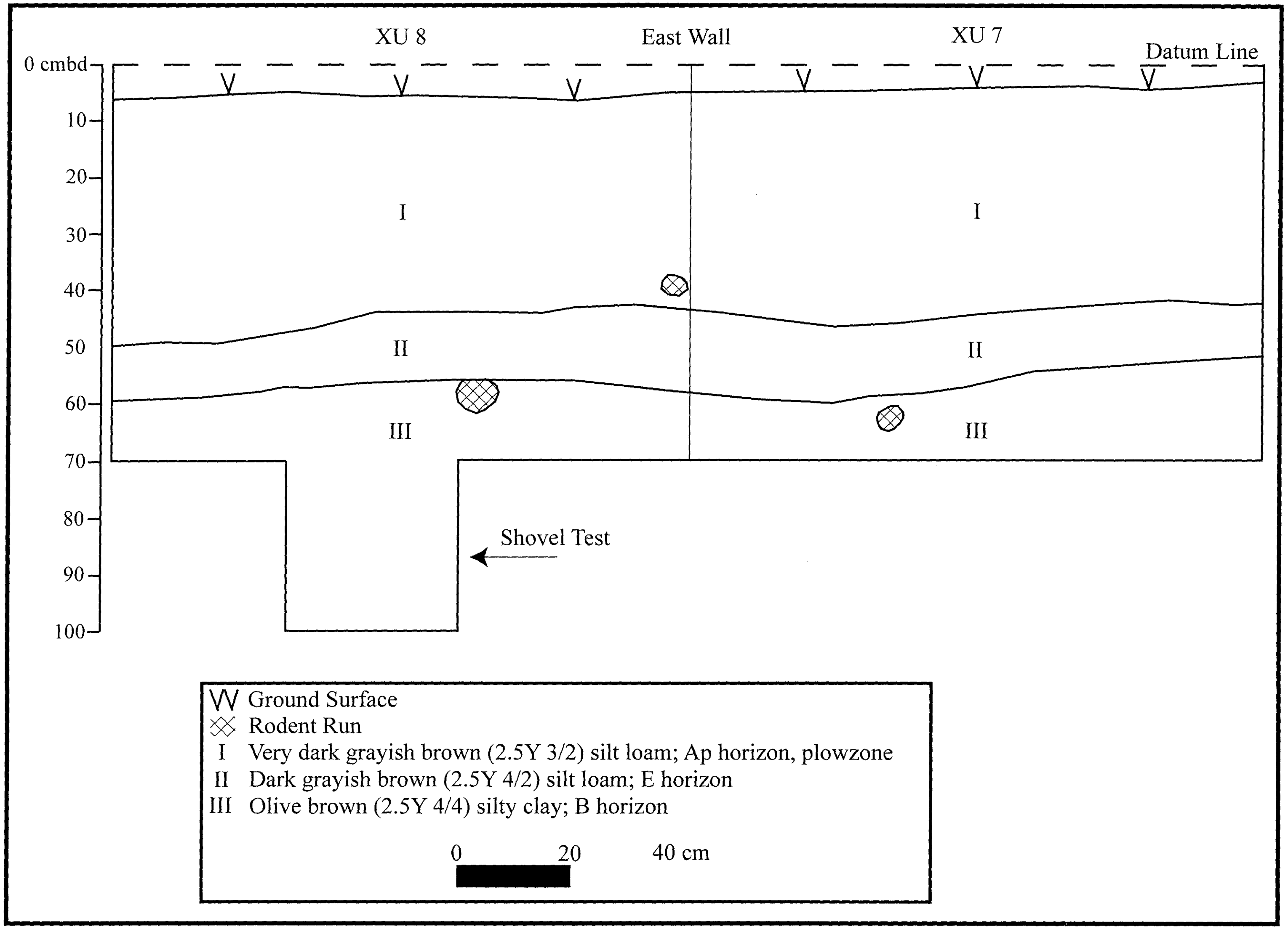


Figure 26. Site 21CR161 XUs 7 and 8 East Wall Profile.

Figure 27. Site 21CR161 Photo XUs 7 and 8 East Wall Profile.

XU 9

XU 9 was placed between ST 157EW5 and ST 157E, which contained two lithics from below the plow zone (Figure 11). Excavation extended 20 cm below the plow zone and was terminated at a depth of 80 cmbd because of a lack of artifacts. A shovel test was placed in the base of the unit and dug to 110 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present. A summary of artifacts recovered from XU 9 is presented in Table 22. The artifacts include six pieces of lithic debris and two historics (whiteware and wire nail). All artifacts were recovered from the plow zone. A wall profile and photograph from the unit that depicts the soil horizons is presented in Figures 28 and 29.

Table 22. Site 21CR161 Summary of Artifacts in XU 9.

Depth (cmbd)	Horizon	Lithic Debris	Historic	Total	%
0-60	Ap	6	2	**8**	**100**
60-70	E	-	-	**0**	**0**
60-80	B	-	-	**0**	**0**
Total	**-**	**6**	**2**	**8**	**-**
%	**-**	**75**	**25**	**-**	**100**

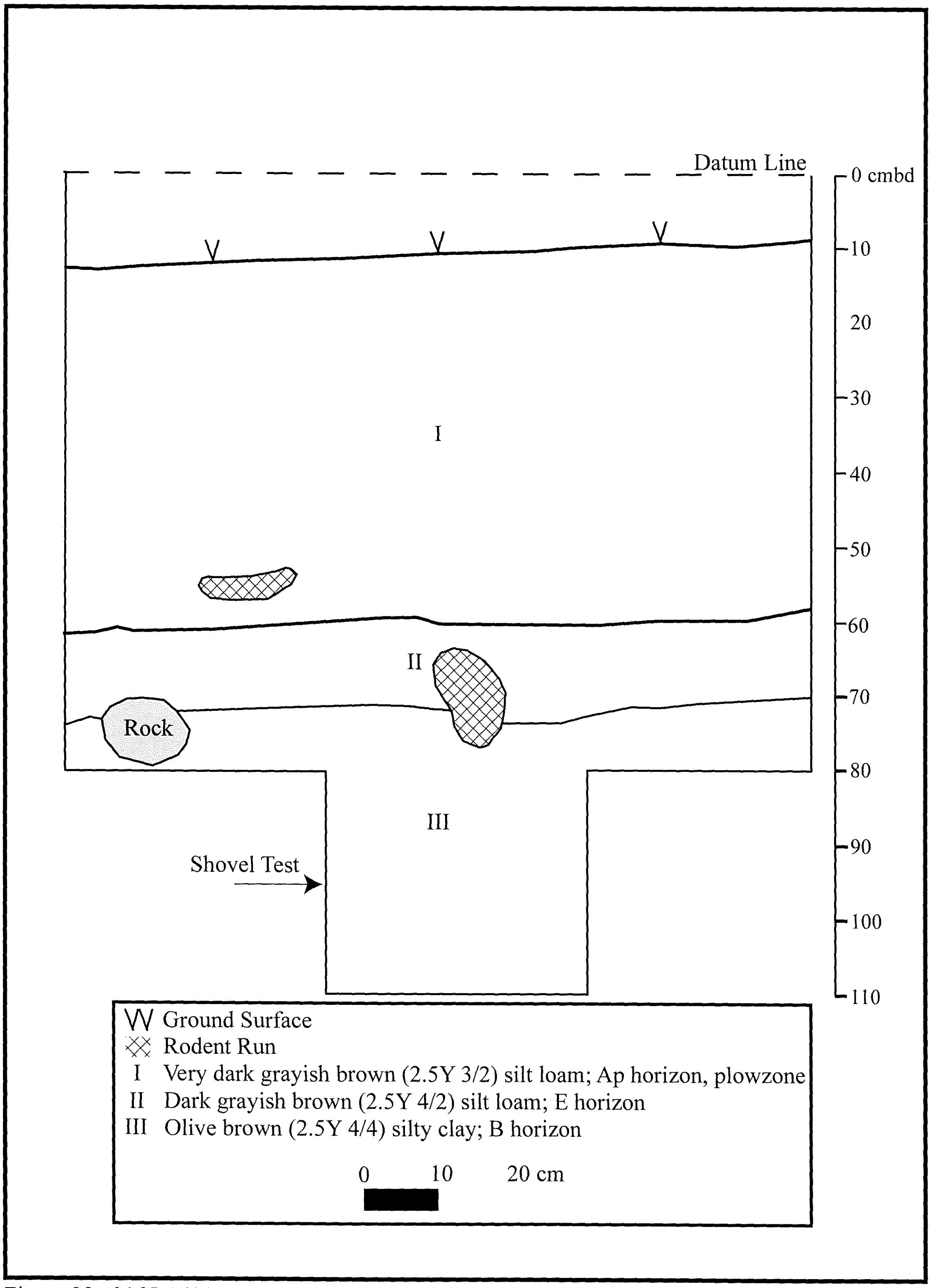


Figure 28. 21CR161 XU 9 East Wall Profile.

Figure 29. Site 21CR161 Photo XU 9 East Wall Profile.

<u>XUs 10 to 12</u>
XUs 10 to 12 were placed between ST 145ES5 and ST 145E, which contained a core and eight pieces of lithic debris, with two artifacts recovered below the plow zone (Figure 11). XUs 11 and 12 are contiguous units that were excavated at the same time and are separated from XU 10 by a 13-cm-wide balk. Excavation extended a minimum of 20 cm below the plow zone and was terminated at a depth of approximately 60 cmbd because of a lack of artifacts. Wall profiles and photographs from the units that depict the soil horizons are presented in Figures 30 to 40.

A summary of artifacts recovered from XU 10 is presented in Table 23. Artifacts from XU 10 include 33 pieces of lithic debris, two stone tools (utilized flake and Stage 4 biface), a tested cobble, and three pieces of FCR. Most of the artifacts (n=24; 62%) were recovered from the plow zone, with a smaller amount (n=10; 26%) from the Ap/B transition, and very sparse amount (n=5; 13%) from the B horizon.

Table 23. Site 21CR161 Summary of Artifacts in XU 10.

Depth (cmbd)	Horizon	Lithic Debris	Lithic Tool/ Core	FCR	Total	%
0-35	Ap	22	2	-	**24**	**62**
35-40	Ap/B*	7	1	2	**10**	**26**
40-50	B	4	-	1	**5**	**13**
Total	-	**33**	**3**	**3**	**39**	-
%	-	**85**	**7**	**7**	-	**100**

* includes soil from the bottom of Ap horizon and top of B horizon that was not possible to separate because of the undulating boundary between the horizons

A summary of artifacts recovered from XUs 11 and 12 is presented in Table 24. Artifacts from XUs 11 and 12 include 88 pieces of lithic debris, four stone tools (two utilized flakes, a scraper, and a Stage 4 biface), a core, and 14 pieces of FCR. Most of the artifacts (n=77; 71%) were recovered from the plow zone, with a sparse amount (n=9; 9%) from the Ap/B transition, and a relatively small amount (n=22; 20%) from the B horizon, which are mostly pieces of FCR that are likely associated with Feature 1, which is an earthen oven or fire hearth.

Table 24. Site 21CR161 Summary of Artifacts in XU 11 and 12.

Depth (cmbd)	Horizon	Lithic Debris	Lithic Tool/ Core	FCR	Charcoal	Total	%
0-40	Ap	70	5	2	-	**77**	**71**
40-42	Ap/B*	7	-	2	-	**9**	**8**
42-50	B	7	-	-	1	**8**	**7**
50-60	B	4	-	10	-	**14**	**13**
Total	-	**88**	**5**	**14****	**1**	**108**	-
%	-	**81**	**5**	**13**	**1**	-	**100**

* includes soil from the bottom of Ap horizon and top of B horizon that was not possible to separate because of the undulating boundary between the horizons; ** small FCR pieces SG 1 (<2") or smaller

Feature 1

Feature 1 was identified in the northeastern corner of XU 10 at 45 cmbd as a dark, round-shaped soil stain and concentration of FCR in the E horizon below the plow zone (Figures 30 and 31). XUs 11 and 12 were placed north of XU 10 in order to map and excavate more of the feature. A 13-cm-wide balk separated XU 10 from XUs 11 and 12. In order to map and excavate the remainder of the feature from the balk and area east of XU 10, the soil above the feature in these areas was discarded, and the feature fill was collected for flotation. The entire feature was excavated.

The planview and profile of Feature 1 were recorded in illustrations and photos during excavation (Figures 30 to 40). Feature 1 was round in planview and 75 cm in diameter. In profile, the feature was a maximum of 18-cm deep and had a shallow, basin shape. All feature fill (84 liters) was troweled and bagged for flotation. Botanicals recovered from the light and heavy fractions were sent to Connie Arzigian (paleoethnobotanist) at Mississippi Valley Archaeology Center for analysis.

FCR occurred from 39 to 55 cmbd in the feature, with most occurring between 40 and 51 cmbd in the upper portion of the feature. Many of the FCR were approximately 10 to 15 cm in diameter, which is consistent with the size used in earth ovens, where large rocks are preferred for sustaining high cooking temperatures. The FCR were granitic rocks, which also were typically preferred for earth ovens. No faunal material was observed or recovered from the feature. Several of the FCR are large and mostly whole cobbles.

The dark color of the feature was likely carbon-stained sediments from charcoal. The presence of charcoal and FCR in the feature indicates that it was probably an earthen oven for cooking or fire hearth for heating, where the FCR were heated in a fire built in a shallow pit. No oxidized (oragnish colored) soil was observed.

A total of 13 botanical samples and 243 artifacts were recovered from Feature 1, including 230 pieces of FCR and 14 pieces of lithic debris (Table 25). The botanical samples include charred wood, charred fungus, and unidentified charred materials. All of the charred materials are very tiny fragments less than 1/16" in size. No charred seeds were identified. Two charcoal samples were submitted to Beta Analytic, Inc for radiocarbon dating, and they dated ca. 4400 RCYBP (cal. 5000 BP) (Table 26). Most of the lithic debris is other G4 flakes. The FCR included a wide variety of shape types, but most notable are nine nearly complete cobbles. FCR materials were nearly all granite, with small amount of basalt and quartzite.

Table 25. Site 21CR161 Feature 1 Artifact Summary by Count and Weight (g).

Location	**Depth (cmbd)**	**Lithic Debris** Count (Weight)	**FCR** Count (Weight)	**Botanical** Count* (Weight)	**Total** Count (Weight)	**%** Count (Weight)
XU 10	42-50	-	8 (98.8)	3 (0.8)	**11 (99.6)**	**4 (1)**
XU 10	50-63	6 (0.2)	24 (131.6)	2 (0.8)	**32 (132.6)**	**12 (1)**
XU 10E	50-60	3 (0.4)	2 (47.6)	3 (2.0)	**8 (50.0)**	**3 (<1)**
Xu 10 & 11 balk	50-60	5 (0.2)	8 (2237.7)	2 (0.6)	**15 (2238.5)**	**6 (22)**
Xu 11 & 12	50-60	-	6 (290.0)	3 (1.4)	**9 (291.4)**	**4 (3)**
Piece Plots (XU 10)	39-52	-	182 (7524.7)	-	**182 (7524.7)**	**71 (73)**
Total	-	**14 (0.8)**	**230 10,330.4**	**13 (5.6)**	**257 (10,336.8)**	-
%	-	**5 (<1)**	**89 (100)**	**5 (<1)**	-	**100**

* Botanicals given a count of "1" per sample, but includes many tiny fragments less than 1/16"

10.7 Radiocarbon Dating

Two charcoal samples from Feature 1 were submitted to Beta Analytic, Inc for AMS dating (Table 26; (Appendix C). The ages of the samples are essentially identical, and they appear to provide accurate dates for the feature.

Table 26. Site 21CR161 Radiocarbon Dates.

Material/ Provenience	**Beta Lab No.**	**$^{13}C/^{12}C$ Ratio (o/oo)**	**Conventional ^{14}C Age B.P.**	**2 Sigma Calibrated Results (95% Probability)**
Charcoal Feature 1 XU10/11 balk 50-60 cmbd	430178	-26.2 o/oo	4440 +/- 30 BP	Cal BC 3325 to 3215 (Cal BP 5275 to 5165) and Cal BC 3175 to 3160 (Cal BP 5125 to 5110) and Cal BC 3120 to 3010 (Cal BP 5070 to 4960) and Cal BC 2975 to 2960 (Cal BP 4925 to 4910) and Cal BC 2950 to 2940 (Cal BP 4900 to 4890)
Charcoal Feature 1 XU 10 50-63 cmbd	430179	-24.1 o/oo	4340 +/- 30 BP	Cal BC 3020 to 2895 (Cal BP 4970 to 4845)

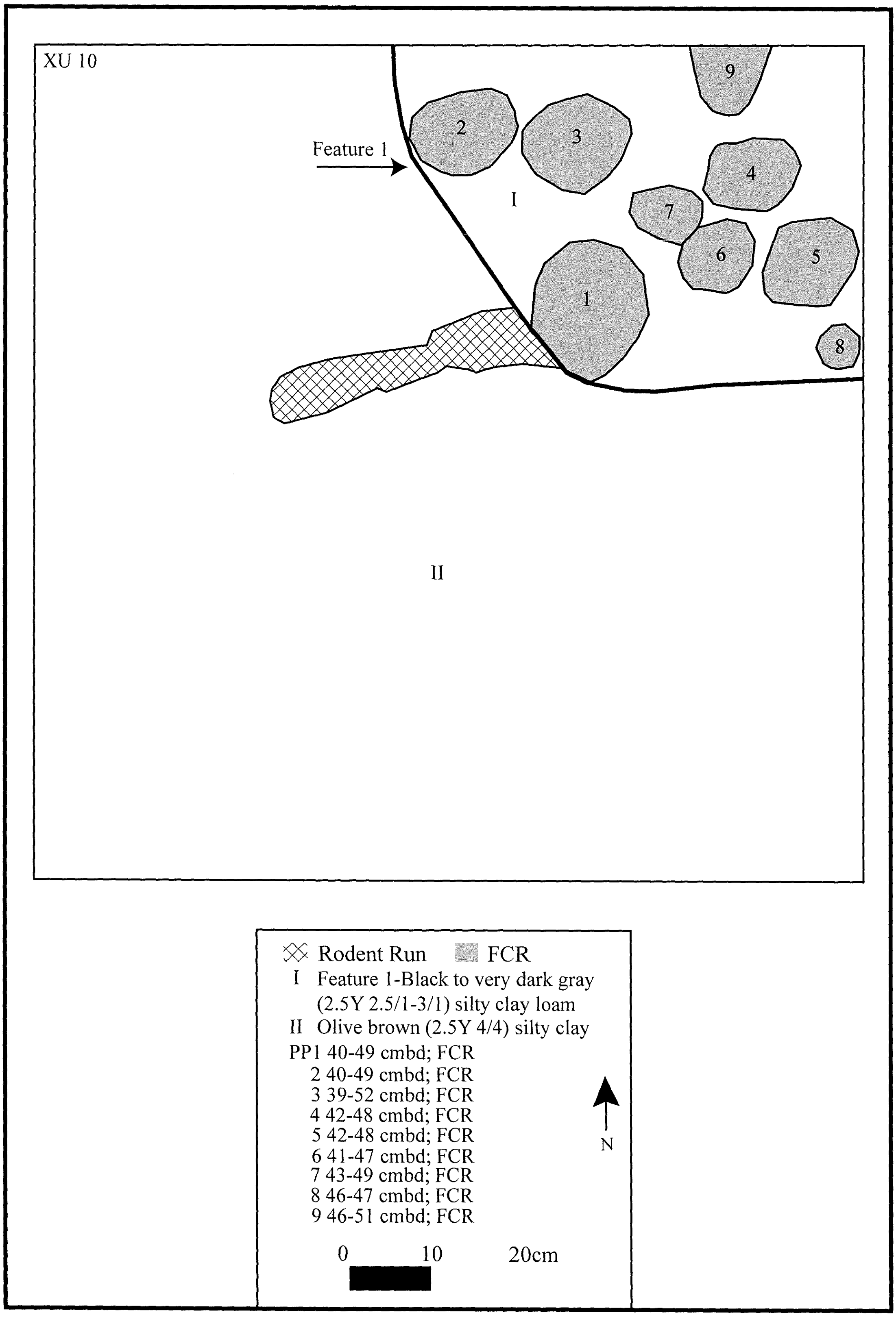


Figure 30. Site 21CR161 Feature 1 Planview in XU 10 at 50 cmbd with FCR.

Figure 31. Site 21CR161 Photo Feature 1 Planview in XU 10 at 50 cmbd with FCR.

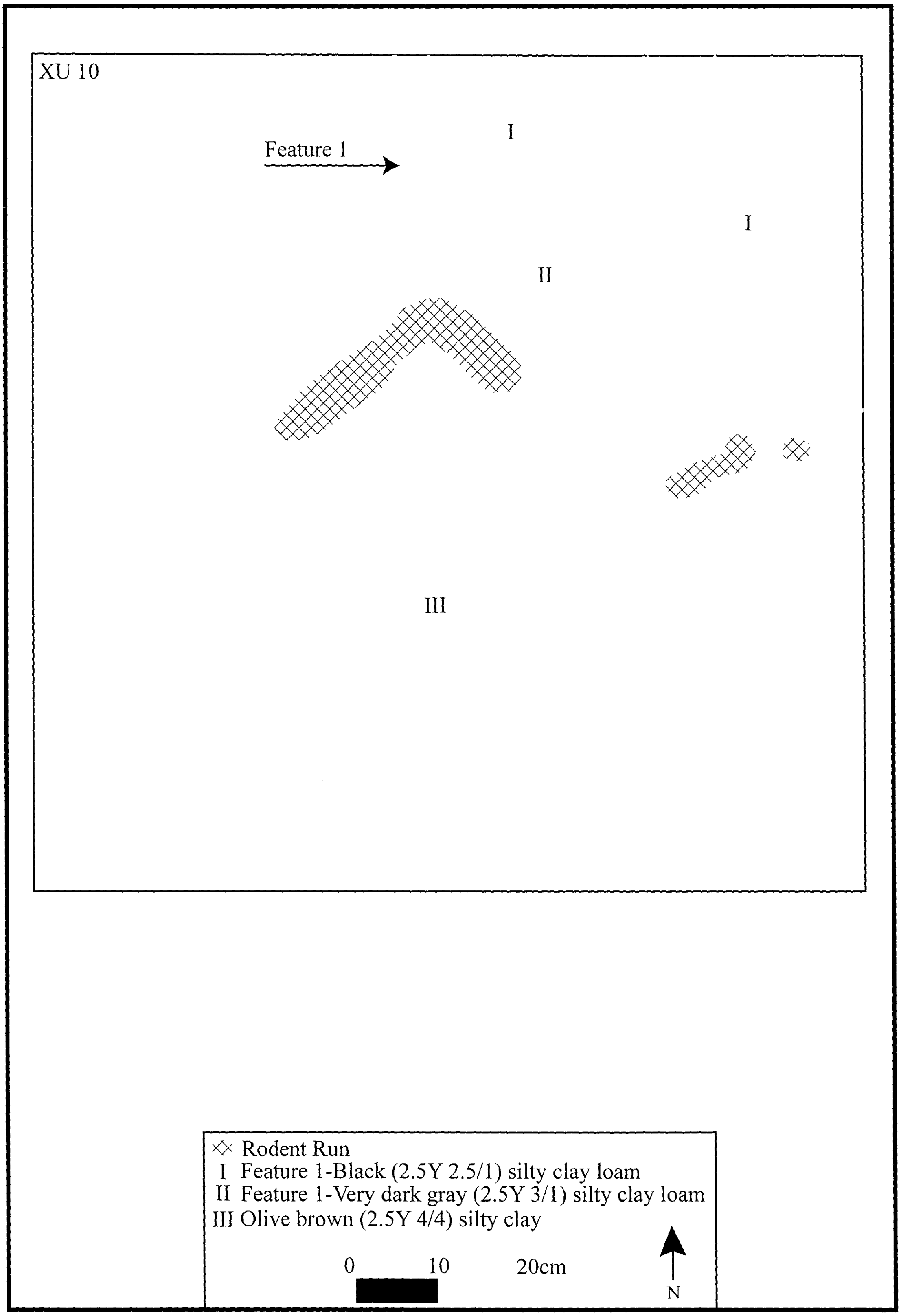


Figure 32. Site 21CR161 Feature 1 Planview in XU 10 at 50 cmbd After Removal of FCR.

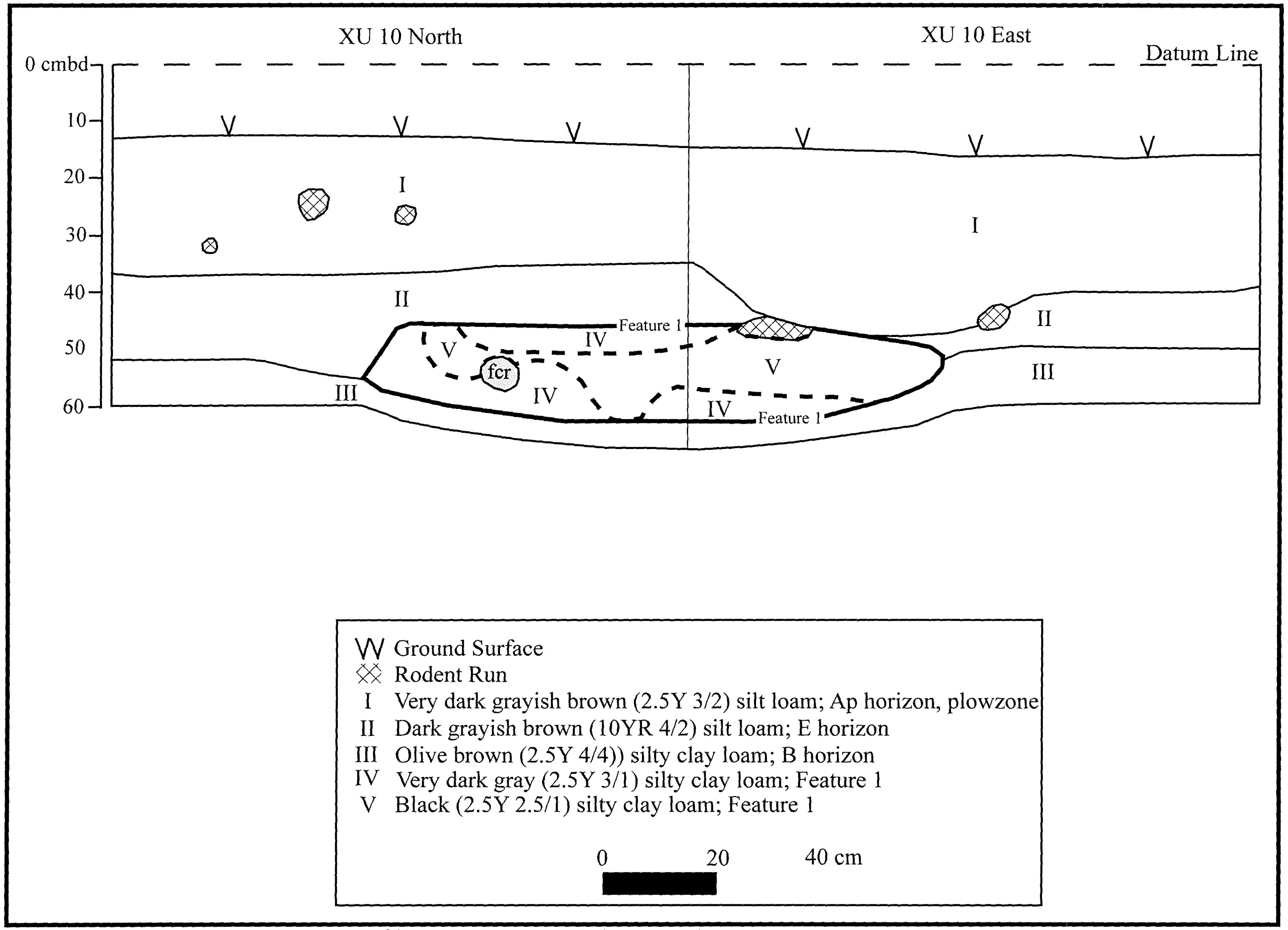


Figure 33. Site 21CR161 Feature 1 Profile in XU 10 North and East Walls.

Figure 34. Site 21CR161 Photo Feature 1 Profile in XU 10 North Wall.

Figure 35. Site 21CR161 Photo Feature 1 Profile in XU 10 East Wall.

Figure 36. Site 21CR161 Photo Feature 1 Profile in XU 10 North and East Walls.

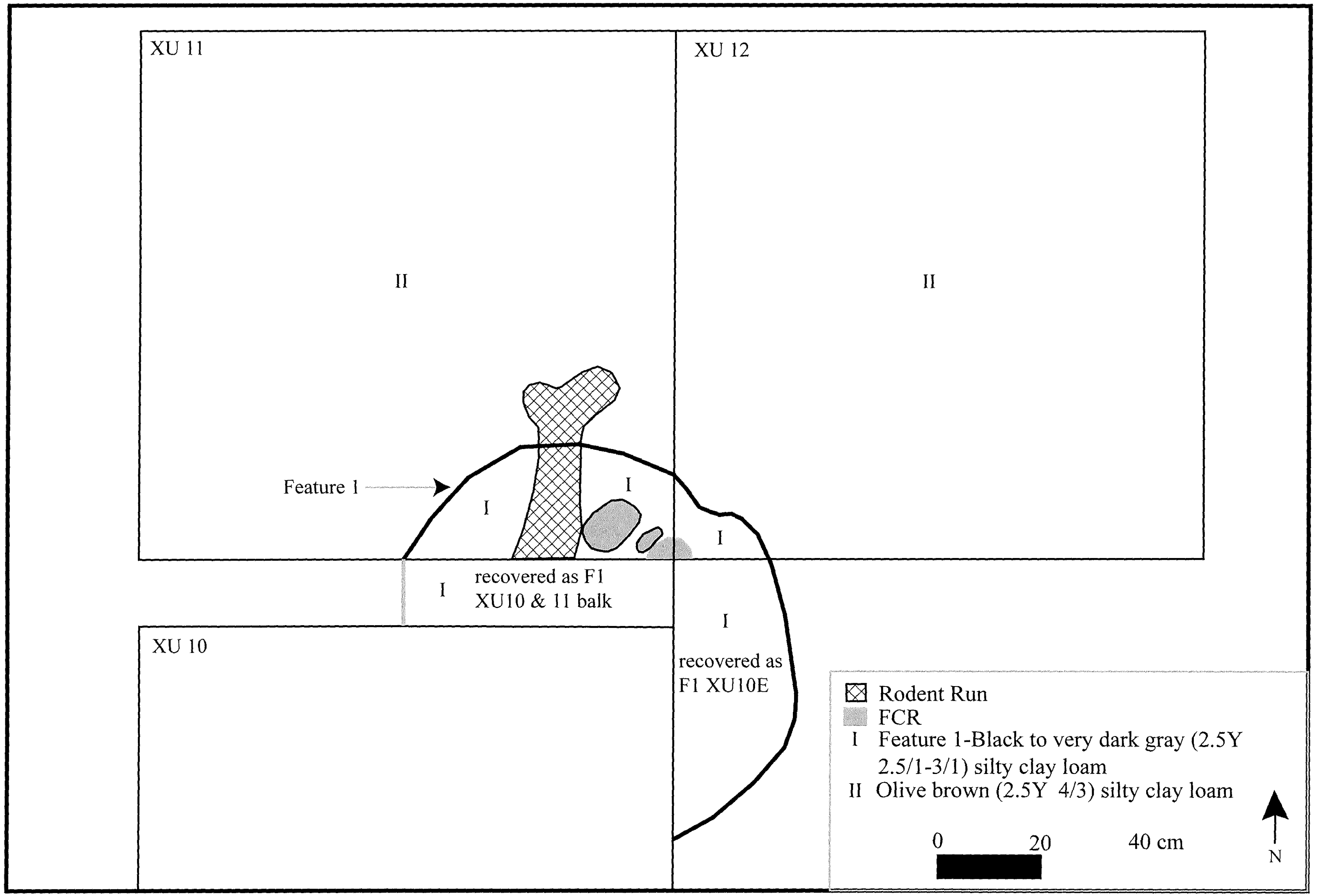


Figure 37. Site 21CR161 Feature 1 Planview in XUs 11 and 12 at 52 cmbd.

Figure 38. Site 21CR161 Photo Feature 1 Planview in XUs 11 and 12 at 52 cmbd.

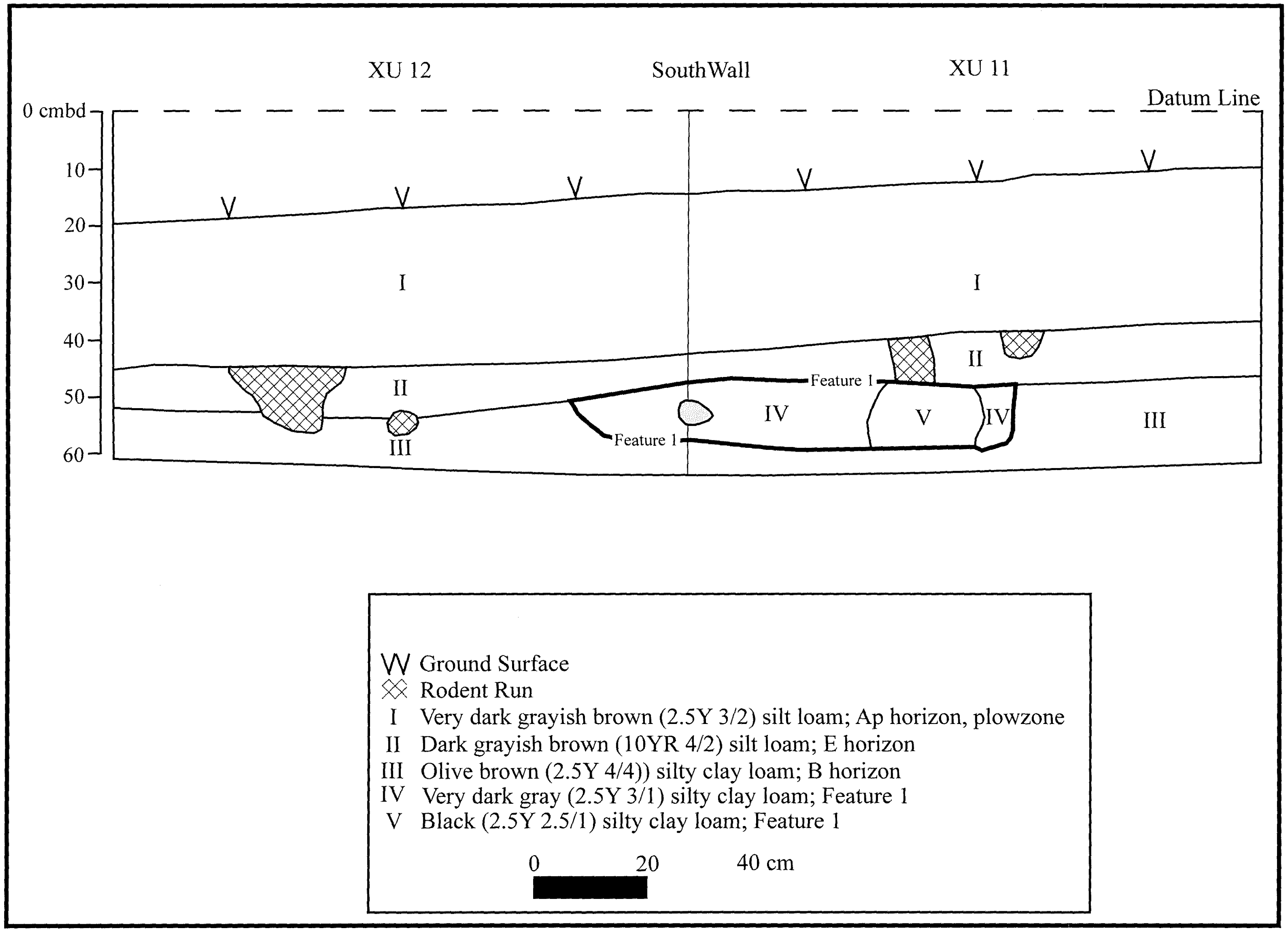


Figure 39. Site 21CR161 Feature 1 Profile in XUs 11 and 12 South Wall.

Figure 40. Site 21CR161 Photo Feature 1 Profile in XUs 11 and 12 South Wall.

10.8 Artifact Summary

A total of 616 artifacts, weighing 11,860.9 grams, were recovered from the site during the Phase I survey and Phase II evaluation (Table 27). By count, lithics and FCR are the most abundant artifacts. FCR was by far the most abundant artifact type by weight. Only very small amounts of historic artifacts and faunal material were recovered from the site. Excluding the FCR recovered from Feature 1 and adjacent XUs, about 80 percent of the artifacts at the site were recovered from the plowzone, with 12 percent recovered below the plowzone and 8 percent from the interface of the plowzone and underlying soil horizon.

Table 27. Site 21CR161 Summary of Artifacts.

Artifact Type	Total by Count (Weight g)	% by Count (Weight)
Lithic	324 (437.0)	51 (4)
FCR	263 (11,295.2)	42 (95)
Historic	22 (114.0)	2 (<1)
Faunal	7 (14.7)	1 (<1)
Total	616 (11,860.9)	-
%	-	**100**

10.9 Faunal Analysis by Steven Kuehn

The faunal assemblage contains seven pieces of bone weighing 14.7 g (Table 28). Faunal material was recovered from shovel tests and XUs. None of the remains display butchery marks, pathologies, or evidence of modification.

Table 28. Site 21CR161 Faunal Material by Count and Weight (g).

Provenience	NISP	Wgt (g)	Taxon	Element
XU 2 30-40 cmbd	1	0.7	sheep/goat (*Ovis/Capra*)	left 3rd mandibular incisor, fragment
XU 2 40-50 cmbd	1	0.6	medium-large mammal	indeterminate, fragment
XU 4 10-20 cmbd	1	0.3	mammal, indeterminate	indeterminate, fragment
XU 4 20-30 cmbd	1	0.1	mammal, indeterminate	indeterminate, fragment
ST 150EE5 20-40 cmbs	1	0.9	chicken (*Gallus gallus*)	left ulna, shaft fragment
ST26W 20-35 cmbs	1	2.7	sheep/goat (*Ovis/Capra*)	mandibular molar, fragment
ST31W 0-20 cmbs	1	9.4	large-sized mammal	left rib, shaft fragment
Total	**7**	**14.7**		

Two teeth are identifiable as either sheep (*Ovis aries*) or goat (*Capra hircus*), with a single adult individual represented. One left rib shaft fragment was categorized as large-sized mammal and compares favorably with a sheep, goat, or deer-sized animal. One left ulna shaft is identifiable as domestic chicken (*Gallus gallus*). The remaining three bone fragments cannot be identified to element and are listed as medium-large and indeterminate mammal. Both indeterminate mammal bones are calcined. None of the other remains in the assemblage are burned or calcined. The combined faunal assemblage is relatively small with few specifically identifiable remains. The identifiable chicken and sheep/goat elements are consistent with a historic-period farmstead.

10.10 Lithic Analysis

The lithic assemblage consists of 324 artifacts, including 312 pieces of lithic debris, nine stone tools, and three cores (Table 29). A variety of flake types, tools, cores, and lithic materials are present in the assemblage, which is discussed below.

Table 29. Site 21CR161 Lithic Artifacts by Material, Flake, and Tool/Core Types.

Material, Resource Region, and Source Distance	Nonbifacial	Decortication	Bifacial Shaping	Bifacial Thinning	Edge Preparation	Alternate	Bipolar Flake	Other Grade 4	Potlid Flake	Shatter	Broken Flake	Tool/Core	Total	%
Prairie du Chien Chert - **Hollandale Region** (local)	24	3	7	54	1	-	2	34	-	4	73	2 utilized flakes; 1 side & end scraper; 1 Stage 4 biface	**206**	**64**
Swan River Chert - **South Agassiz Region** (local)	4	-	3	6	1	1	3	7	-	1	10	1 utilized flake/ side/end scraper; 1 nonbifacial core	**38**	**12**
Unid. chert - **Unknown Region** (local or nonlocal)	1	2	-	-	-	-	-	5	1	2	4	-	**15**	**5**
Quartzite - **Unknown Region** (local or nonlocal)	6	1	-	-	-	-	1	1	-	1	4	-	**14**	**4**
Red River Chert - **South Agassiz Region** (local)	3	1	-	-	-	-	-	3	-	1	4	1 utilized flake	**13**	**4**
Quartz – **Multiple Regions** *(local)*	1	-	-	-	-	-	4	2	-	4	1	-	**12**	**4**
Cedar Valley Chert - **Hollandale Region** (nonlocal)	2	-	-	2	-	-	-	3	1	1	1	1 utilized flake; 1 Stage 4 biface	**10**	**3**
Tongue River Silica - **South Agassiz Region** (local)	1	-	-	-	-	-	-	-	-	-	4	1 bipolar core	**6**	**2**
Knife River Flint - **Western North Dakota** (nonlocal exotic)	-	-	-	-	-	-	-	-	-	-	1	1 utilized flake	**2**	**<1**
Unid. Material - **Unknown Region** (local or nonlocal)	-	-	-	-	-	-	1	1	-	-	-	-	**2**	**<1**
Lake Superior Agate - **West Superior Region** *(local)*	-	-	-	-	-	-	-	-	-	-	-	1 tested cobble	**1**	**<1**
Grand Meadow Chert - **Hollandale Region** (nonlocal)	-	1	-	-	-	-	-	-	-	-	-	-	**1**	**<1**
Granitic - **Multiple Regions** *(local)*	-	-	-	-	-	-	-	-	-	-	1	-	**1**	**<1**
Jasper - **Multiple Regions** *(local)*	-	1	-	-	-	-	-	-	-	-	-	-	**1**	**<1**
Feldspar - **Multiple Regions** *(local)*	-	-	-	-	-	-	1	-	-	-	-	-	**1**	**<1**
Basaltic - **Multiple Regions** *(local)*	-	-	-	-	-	-	-	-	-	1	-	-	**1**	**<1**
Total	**42**	**9**	**10**	**62**	**2**	**1**	**12**	**56**	**1**	**14**	**103**	**12**	**324**	**-**
%	**13**	**3**	**3**	**19**	**<1**	**<1**	**4**	**17**	**<1**	**4**	**32**	**4**	**-**	**100**

* 205 artifacts are oolitic Prairie du Chien Chert and one is non-oolitic Prairie du Chien Chert

Size grade counts for the lithic debris were as follows: SG2 <1.0 inch to ≥0.5 inch (n=35; 11%); SG3 <0.5 inch to ≥0.233 inch (n=213; 68%); and SG4 < 0.233 inch (n=64; 21%). A total of 188 lithic artifacts were heat treated, with most of these artifacts being Prairie du Chien and Swan River cherts. Probable heat treatment was observed on 35 additional lithics, with most of these also being Prairie du Chien and Swan River cherts. Three pieces of chert showed evidence of excessive heating, as indicated by crazing and potlid fractures.

Flake Types

A wide variety of flake types are present in the assemblage, indicating a range of lithic-reduction technologies and stages. Diagnostic flake types, along with their associated technologies and stages of reduction, are summarized in (Table 30). Nonbifacial and bifacial technologies are well represented, with bipolar technology being sparser. The assemblage includes lithics from the early, middle, and late stages of reduction. Additional supporting evidence for the various technologies includes: 1) one bipolar core is indicative of bipolar technology; 2) one nonbifacial core and four stone tools made on nonbifacial and decortication flakes are indicative of nonbifacial technology; and 3) two Stage 4 bifaces are indicative of bifacial technology. Types of lithic debris that are not indicative of specific technologies or reduction-stages comprise the largest portion of the assemblage and include unidentified, other SG4, potlid, and broken flakes. These nondiagnostic flake types are not included in Table 30.

Table 30. Site 21CR161 Summary of Diagnostic Flake Types, Technologies, and Reduction Stages.

Count & Flake Type	Technology	Stage of Reduction
12 - Bipolar flakes	Bipolar	N/A
9 - Decortication flakes	Nonbifacial	Earliest stage of core reduction
42 - Nonbifacial flakes	Nonbifacial	Cobble testing, reducing unprepared nonbifacial cores for flake blank production, and the early stages of nonbifacial tool reduction (early to middle-stages of reduction)
14 - Shatter	N/A	Mostly from cobble testing, core reduction, and earlier stages of reduction
62 - Bifacial thinning flake	Bifacial	Early to middle-stage of reduction
10 - Bifacial shaping flake	Bifacial	Late-stage of reduction (final shaping or tool maintenance)

Lithic Material Types and Use

Lithic materials consisted primarily of Prairie du Chien (oolitic) Chert (64%), with substantially smaller amounts of many other materials, including Swan River Chert (12%), unidentified chert (5%), quartzite (4%), quartz (4%), and Red River Chert (4%). The amounts of other materials are three percent or less. Nearly all of the materials are locally available. The unidentified chert and unidentified materials may be local or exotic.

The assemblage contains a small amount of non-local, high-quality materials that were likely acquired through exchange networks or travel, including: 1) Grand Meadow and Cedar Valley cherts from southeastern Minnesota; and 2) Knife River Flint from western North Dakota.

The lithic data indicates that the raw materials have different debris profiles resulting from differential use, quality of the material, and cobble size. The most notable lithic use characteristics are discussed below for those materials that have adequate sample sizes of diagnostic flakes.

Prairie du Chien Chert occurs in moderate amounts in all diagnostic flake types, including nonbifacial, bifacial thinning, bifacial shaping, and bipolar flakes. It was used for all stages of lithic reduction and tool production in nonbifacial, bifacial, and bipolar technologies. Three flake stone tools and a biface were manufactured from Prairie du Chien Chert.

Swan River Chert occurs in small amounts in a variety of flake types, with the most numerous diagnostic class being bifacial thinning flakes. Although the sample size is low, it appears that this material was used for the middle and later stages of lithic reduction and in nonbifacial, bifacial, and bipolar technologies. One flake stone tool and a core were manufactured from Swan River Chert.

Quartzite and Red River Chert occurs primarily as nonbifacial flakes, probably due to cobble size or flaking qualities. One flake stone tool was made from Red River Chert. *Cedar Valley Chert* occurs in small amounts as nonbifacial and bifacial flakes and also as a bifacial and flake stone tool. *Knife River Flint* occurs as a broken flake and a flake stone tool.

Stone Tools

Nine stone tools were recovered, including five utilized flakes, two Stage 4 bifaces (late-stage), a scraper, and a utilized flake/scraper. These tools were made on nonbifacial flakes, a decortication flake, and a broken flake (Table 31). The flake tools were manufactured from Prairie du Chien Chert (n=3), Cedar Valley Chert (n=1), Swan River Chert (n=4), Red River Chert (n=1), and Knife River Flint (n=1). The Stage 4 bifaces were made on Prairie du Chien and Cedar Valley cherts. The Stage 4 bifaces were broken, and they were probably discarded because the breakage rendered them unworkable.

Table 31. Site 21CR161 Tool Type by Flake Type.

Tool Type	Flake Type			
	Nonbifacial	**Decortication**	**Broken**	**Total**
Utilized Flake	2	1	2	**5**
Utilized Flake/Scraper	-	1	-	**1**
End Scraper	-	-	1	**1**
Total	**2**	**2**	**3**	**7**

Utilized flakes are primarily light-duty cutting and slicing tools used on animal remains, wood, and plants. Scrapers are typically associated with scraping tasks on a variety of soft materials (meat, hides, and plant material) or moderately resistant materials (wood and bone). These tools suggest that site activities included butchering, animal/plant processing, hide working, and bone and woodworking.

Cores

Three cores were recovered, including a freehand nonbifacial core, a bipolar core, and a tested cobble.
The freehand nonbifacial core has unpatterned flaking and unprepared platforms.

10.11 FCR

A total of 263 pieces of FCR were recovered (Table 32), with most of the FCR (247 pieces) from within or near Feature 1 (XUs 10 to 12) in the northeastern portion of the site. Interpretations of the FCR from Feature 1 are discussed in a previous section with XUs 10 to 12. The FCR are mostly mall-sized pieces, with 89 percent being SG2 or less. Twelve are cobbles with various states of heat alteration (e.g., friable, cobble with a spall removal, and cobble with an angular removal). Crumbs (SG3 and smaller) are the most numerous FCR type followed by angular pieces, with much smaller amounts of the other types. Nearly all the FCR is granitic (97%), with much smaller amounts of basalt and quartzite.

Table 32. Site 21CR161 FCR by Material, Size, and Type.

Material	Size Grade (SG)						FCR Type									Total	%
	00	0	1	2	3	4	Angular	Angular/ Spall	Cobble (friable)	Cobble (non-friable)	Cobble with Angular	Cobble with Spall	Crumb	Friable Rounded Piece	Spall		
Granitic	2	7	17	33	196	-	33	3	5	2	1	4	170	11	26	**255**	**97**
Basaltic	-	1	1	1	1	-	1	1	-	-	-	-	-	-	2	**4**	**2**
Quartzite	-	-	2	2	-	-	3	1	-	-	-	-	-	-	-	**4**	**2**
Total	**2**	**8**	**20**	**36**	**197**	**0**	**37**	**5**	**5**	**2**	**1**	**4**	**170**	**11**	**28**	**263**	**-**
%	**1**	**3**	**8**	**14**	**75**	**0**	**14**	**2**	**2**	**1**	**<1**	**2**	**65**	**4**	**11**	**-**	**100**

10.12 Historic Artifact Analysis

The historic assemblage was sparse and includes 22 artifacts, excluding fauna. The assemblage includes a variety of architectural and household items. Undetermined items are likely from one of these classes (Table 33). Based on proximity and age, most of these artifacts are likely associated with the former Vogel farmstead located near the north end of the site, which is discussed in more detail in the following section.

Most of the historic artifacts are small and fragmentary and were not amenable to precise dating, as they had long manufacturing periods or lacked temporally diagnostic attributes, such as maker's marks or datable elements. These items provide only broad dates and are of limited research value. Artifacts that retained temporally diagnostic attributes, which would allow for a narrow date range to be determined, are discussed below with their respective class (Peterson 1995; University of Utah et al. 1992). The general date range for the historic assemblage spans from the mid to late 1800s to the present, based on manufacturing dates of specific artifacts. The artifacts are all less than one inch in size (SG 1 or smaller).

Table 33. Site 21CR161 Summary of Historic Artifacts.

Material Class	Window Glass	Other Glass	Ceramic	Square Nail	Wire Nail	Unid. Copper	Unid..Aluminum	Unid. Other Metal	Bolt	Mortar	Total
Architectural	1	-	-	4	2	-	-	-	1	1	**9**
Architectural/ Household	-	5	-	-	-	-	-	-	-	-	**5**
Undetermined	-	-	-	-	-	1	1	2	-	-	**4**
Household	-	1	3	-	-	-	-	-	-	-	**4**
Total	**1**	**6**	**3**	**4**	**2**	**1**	**1**	**2**	**1**	**1**	**22**

10.12.1 Architectural Class

Architectural items include square nails (n=4), wire (round) nails (n=2), a piece of window glass, a bolt, and a piece of mortar. Square nails were in use from about 1830 to 1890, and were replaced by wire nails around 1890.

10.12.3 Architectural/Household Class

Five small, fragmentary pieces of clear glass are likely from windows or bottles.

10.12.3 Household Class

Household items consist of one clear glass fragment and three ceramic whiteware fragments. Clear glass dates from 1875 to present. Whiteware has a broad date of 1830 to present.

10.12.4 Undetermined Class

The undetermined class includes four small, fragmentary metal items of unknown function.

10.13 Map Review and Ownership History

Historic Carver County plat maps for 1874, 1880, 1898, 1916, and 1926 were reviewed (Andreas 1874; Warner & Foote 1880; North West Publishing Company 1898; Hixson and Company 1916; Hudson Map Company 1926). Plat maps from 1880 and 1926 are presented in Figures 41 and 42. Air photos from 1937, 1947, and 1951 were also reviewed (Borchert Map Library at the University of Minnesota - http://map.lib.umn.edu/mhapo and Minnesota Department of Natural Resources online air photos - http://www.dnr.state.mn.us/ maps/landview/index.html).

An historic farmstead that was previously assigned Minnesota Historic Properties Inventory Number CR-CHC-7 (the Vogel Farmstead) is located across the highway from the northern portion of site 21CR161, and it is discussed in the following section. All of the farmstead buildings are outside the archeological APE. The historical artifacts recovered at 21CR161 are inferred to be associated with the farmstead, based on their proximity. This farmstead is not depicted on the earliest map from 1874, but it is depicted on the 1880 plat map and all subsequent air photos. The farmstead house is currently used a residential dwelling.

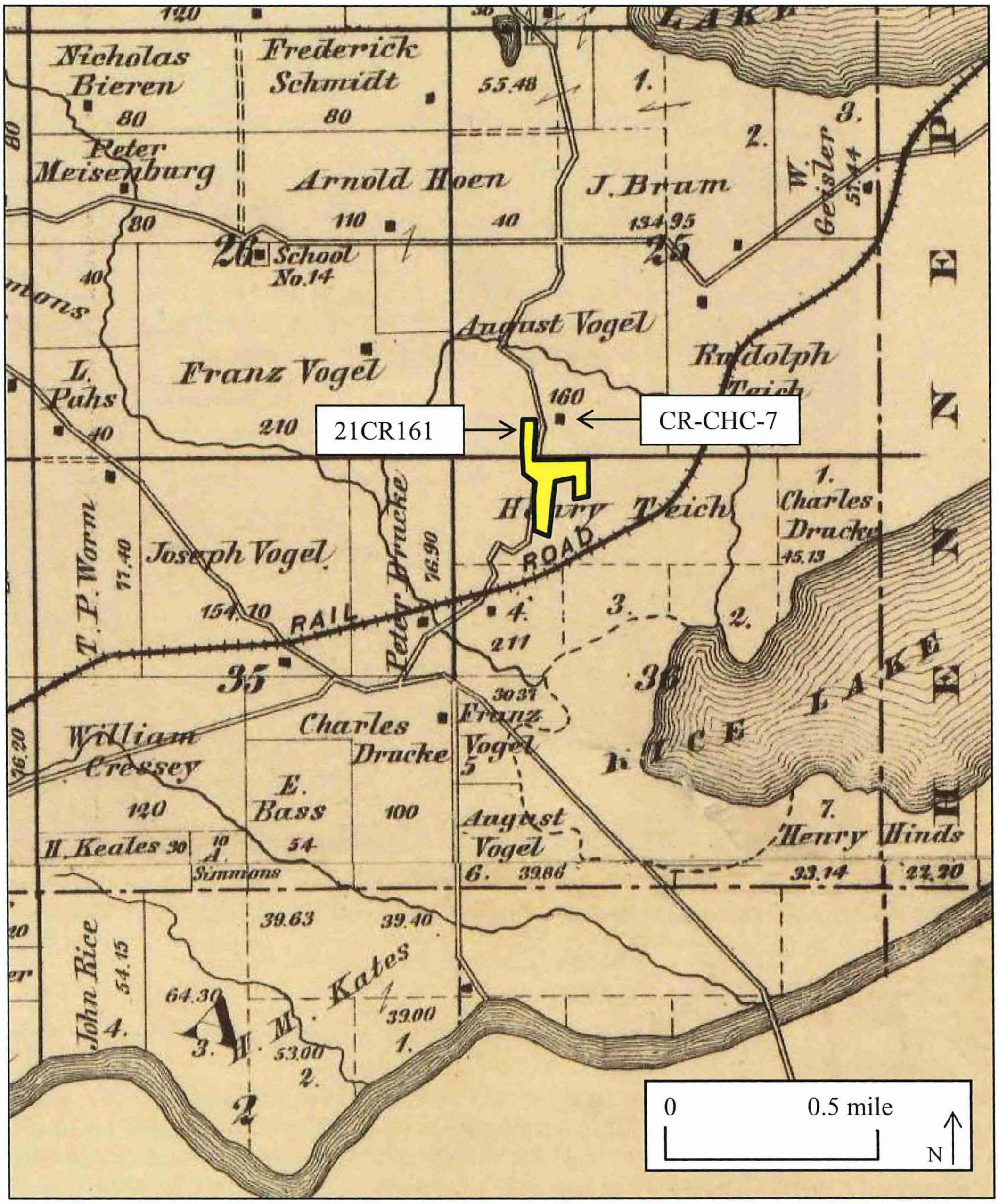


Figure 41. 1880 Plat Map (Warner & Foote 1880) of Farmstead (CR-CHC-7) and Site 21CR161.

contiguous Vogel farms near the bluffs led to that area being named "Vogel hill" (Carver County Sesquicentennial Planning Committee 2005). In 1859 August Vogel married Marie Kronschnabel (b. 1841), also a German immigrant. They had at least one child, a son also named August (1863-1930). In 1874, he married Mathilda Otte (1852-1921), a German immigrant. The couple had at least one child, a son named Arnold (1891-1964).

Granger and Kelly (2013:E-8) note that the house on the August Vogel property was built in about 1857. It is made of limestone, with trim of Chaska brick, and the farmstead includes some contemporaneous brick outbuildings (Minnesota Historic Properties Inventory Form CR-CHC-007). Granger and Kelly note that stone (limestone or granite) houses built by German immigrants, such as Vogel, are rare in Minnesota, and that all are very early. It is worth noting that the house does not appear on the 1874 Andreas map, and first appears on a plat map in 1880. The General Land Office map (ca. 1855) shows the "Road from Chasca to St. Paul" running generally southwest-northeast through the August Vogel property. It appears that parts of modern local roads still follow some of that alignment. Mathilda Vogel remained on the farmstead after her husband's death, undertaking improvements to the property, including erecting a windmill (*Weekly Valley Herald*, 4 October 1900, p. 8) and building a large machine shed (*Weekly Valley Herald*, 11 July 1901, p. 2). It is not clear whether she stayed at the farm until her death in 1921. The 1926 plat indicates that the property was owned by Mary Lentzmeier. Readily available information on ownership was not available after 1926.

This early use of Chaska brick on the farmstead is noteworthy. Brickmaking was undertaken in the Chaska and Carver County area from 1867 to 1961. The earliest production was small-scale, and some of it consisted of hand-made bricks made on farms for the farm's own use, and the brick used on the August Vogel farmstead may fall into this category. Brick production grew in scale, however, and from about 1880 to 1920 the Carver County brickworks were collectively the largest in the state and produced tens of millions of the distinctive "Chaska bricks" per year (Granger and Kelly 2013; Martens 1988). Although many bricks were used in or near Carver County, most were exported to Minneapolis and St. Paul in the period when these cities were experiencing explosive growth.

10.15 Artifact Patterning

The historic artifacts recovered at the north end of the site are likely associated with the Vogel farmstead (CR-CHC-7), which is on the east side of TH 101. The artifacts appear to be a diffuse refuse scatter in areas that were formerly farm fields. There does not appear to be any significant patterning to the artifact distribution. The few historic artifacts recovered at the south end of the site may be associated with a farmstead that appears on the 1951 air imagery along the bluff edge about 150 meters east of TH 101. This farmstead is not depicted on the 1905 topographic map, so it dates post-1905.

The horizontal distribution of the precontact artifact classes is fairly similar across the site and consists primarily of a sparse scatter of lithic debris, suggesting that site activities were similar in many areas across the site. However, more intensive lithic activities occurred in the northeastern portion of the site near XUs 7, 8, and 10 to 12.

None of the faunal material could be confidently associated with the precontact components, although stone tools at the site (utilized flakes and scrapers) suggest that animal processing occurred. Fauna from the precontact period was either not preserved or was not identified during testing. A small amount of FCR occurred in scattered areas, with a concentration of FCR in Feature 1 at XUs 10 to 12.

The vertical distribution of artifacts ranges from 0 to 155 cmbs, with nearly all artifacts recovered from the plow zone between 0 and 40 cm below surface. The deepest artifact was recovered below slopewash at the base of a low hill, but this landscape position is unique and not typical of the site area.

10.16 Site Integrity

Nearly all of the artifacts at the site were recovered from the plow zone, indicating that the cultural deposits lack integrity. There were some isolated locations where a small number of artifacts were recovered below the plow zone. In XUs 10 to 12, an earthen oven or fire hearth feature was identified below the plow zone, and it was completely excavated. Faunal material is very sparse, and diagnostic fauna consist of historic-age domestic animals. In summary, the site lacks integrity because no significant intact cultural deposits were identified below the plow zone.

10.17 Conclusions and Recommendation

Site 21CR161 is a multicomponent site that includes a ca. 1857 to mid-1900s historic farmstead artifact scatter and a large, precontact period sparse lithic scatter. The Phase I and II investigations included 70 positive shovel tests and 12 (1-x-1 meter) XUs. Nearly all of site area was formerly plowed based on soil profiles and air photos. Soil disturbance at the site from farming activities is extensive.

10.17.1 Historic Component

Historic artifacts consisted of architectural and household items sparsely scattered in current and former agricultural fields. Most of these materials are interpreted to be refuse associated with a ca. 1857 to mid-1900s farmstead (CR-CHC-7) that is located on the opposite side of TH 101, outside the project area.

A review of the local and regional history indicates that the historical component at the site is not directly associated with historically significant persons or with events that have made a significant contribution to the broad patterns of our history (NRHP Criteria A and B). The site does not embody the distinctive characteristics of the early settlement and agricultural periods from the mid-1800s to middle 1900s (NRHP Criterion C).

The historic research potential of the site is low because of the limited artifact assemblage, lack of integrity, and absence of features. The historic component is not capable of providing information important to relevant research themes under NRHP Criterion D for the historic period (See Section 2.3.3 Research Themes).

10.17.2 Precontact Component

The precontact component consists of a large, precontact period sparse lithic scatter. One of the precontact occupations included a Middle Archaic cooking/heating feature that dates to ca. 4400 RCYBP (cal. 5000 BP). No diagnostic artifacts were recovered. Given the large size of the site, there were probably multiple precontact occupations, perhaps extending over thousands of years. Artifact density was low, except in a couple locations where higher densities were present.

Artifacts recovered from the site consist nearly exclusively of lithic debris, with a very small amount of stone tools and FCR. Site activities consisted primarily of lithic reduction and stone tool manufacture. Lithic raw materials at the site consist primarily of locally available materials, with Prairie du Chien Chert being by far the most abundant. A wide variety of flake types are present, indicating a wide range of lithic-reduction technologies and stages. Bifacial, nonbifacial, and bipolar technologies are all represented. The assemblage includes lithic debris from the early, middle, and late stages of reduction. Non-local raw materials, which were procured though long-distance trade networks or possibly travel to source areas, included a small amount of Knife River Flint, Grand Meadow Chert, and Cedar Valley Chert. Stone tools include utilized flakes and scrapers, indicating that site activities likely included butchering, animal/plant processing, hide working, and bone and woodworking.

Most of the precontact artifacts were recovered from the plow zone, and aside from one feature, which was completely excavated, there do not appear to be any significant intact cultural deposits below the plow zone.

The research potential of the precontact component is very low because of the lack of integrity and overall sparse and limited artifact assemblage. The precontact component is not capable of providing information important to relevant research themes under NRHP Criterion D for precontact periods (See Section 2.3 Research Themes).

10.18 Recommendation

The site is recommended not eligible for listing on the National Register of Historic Places because it lacks integrity and does not meet National Register Criteria A, B, C, or D. No further archaeological work is recommended at the site.

11. Site 21CR162

11.1 Overview

Site 21CR162 is an Archaic habitation located at the south end of the survey area. The site is in T116N, R23W, SW, SW, NW Section 36 (Figures 1 and 2) and occupies an area of approximately 45 by 65 meters, encompassing 0.3 acre. The UTM coordinates for the center of the site are E457365 N 4962300 (1983 NAD Zone 15). A map of the site on aerial imagery is presented in Figure 43. A photo of the site area is in Figure 44.

11.2 Physical Setting

The site is located in a wetland at the bluff base along the northern margin of the Minnesota River valley, just south of the Paw, Claws and Hooves animal boarding facility. Vegetation includes cattail, small trees, and grasses. Surface visibility was very low (<10%). The site extends from 40 to 65 meters north of CSAH 61 and between 100 and 160 meters southeast of TH 101. The terrain is nearly level with the northern portion of the site being slightly higher than the southern. A one-meter-high earthen berm borders the west half of the northern portion of the site. The terrain north of the site slopes steeply up to the driveway. The water table was at approximately 130 to 150 cmbs.

11.3 Soils and Geomorphology

The site is located along the northern margin of the Minnesota River valley at the intersection of the toe slope and valley floor at the bluff base, an area where there is a transition from colluvial to paludal deposits. Soils are mapped as Terril loam in the northern portion of the site and Minneiska-Kalmarville Complex in the southern portion (Web Soil Survey 2015). The Terril series consists of very deep, well and moderately well drained soils that formed in colluvium on base slopes and foot slopes. Minneiska and Kalmarville series formed in alluvium on floodplains. Soils at the site are similar to the Terril series and not the Minneiska-Kalmarville.

There are two primary stratigraphic units at the site. The upper stratum is a muck or peat (paludal/wetland) deposit of variable thickness (20 to 140 cm). This organic-rich soil formed in the water-saturated conditions of a wetland. The upper stratum is very thin in the northeast portion of the site, but is substantially thicker in the southern and western portions of the site. The lower stratum consists of a mineral soil sequence that formed in poorly sorted sandy clay loam colluvium, which was deposited at the bluff base by rainwash, sheetwash, slow continuous downslope creep, or a variable combination of these processes. No buried soils were present in the lower stratum. Soil profiles from the site are presented with the discussion of XUs 1 to 6.

A small amount of faunal material and artifacts from the historic period was recovered from the upper stratum. The precontact archaeological deposits appear to be contained in the lower stratum. Artifacts were recovered throughout the lower stratum.

A radiocarbon date of approximately 5000 RCYBP (5800 cal BP) was obtained from a bison tooth recovered between 120 and 130 cm below the ground surface in XU 4. At this location, the top of the lower stratum was at 50 cm below surface, indicating that there has been approximately 70 to 80 cm of deposition and soil formation in the lower stratum since 5000 RCYBP (5800 cal BP).

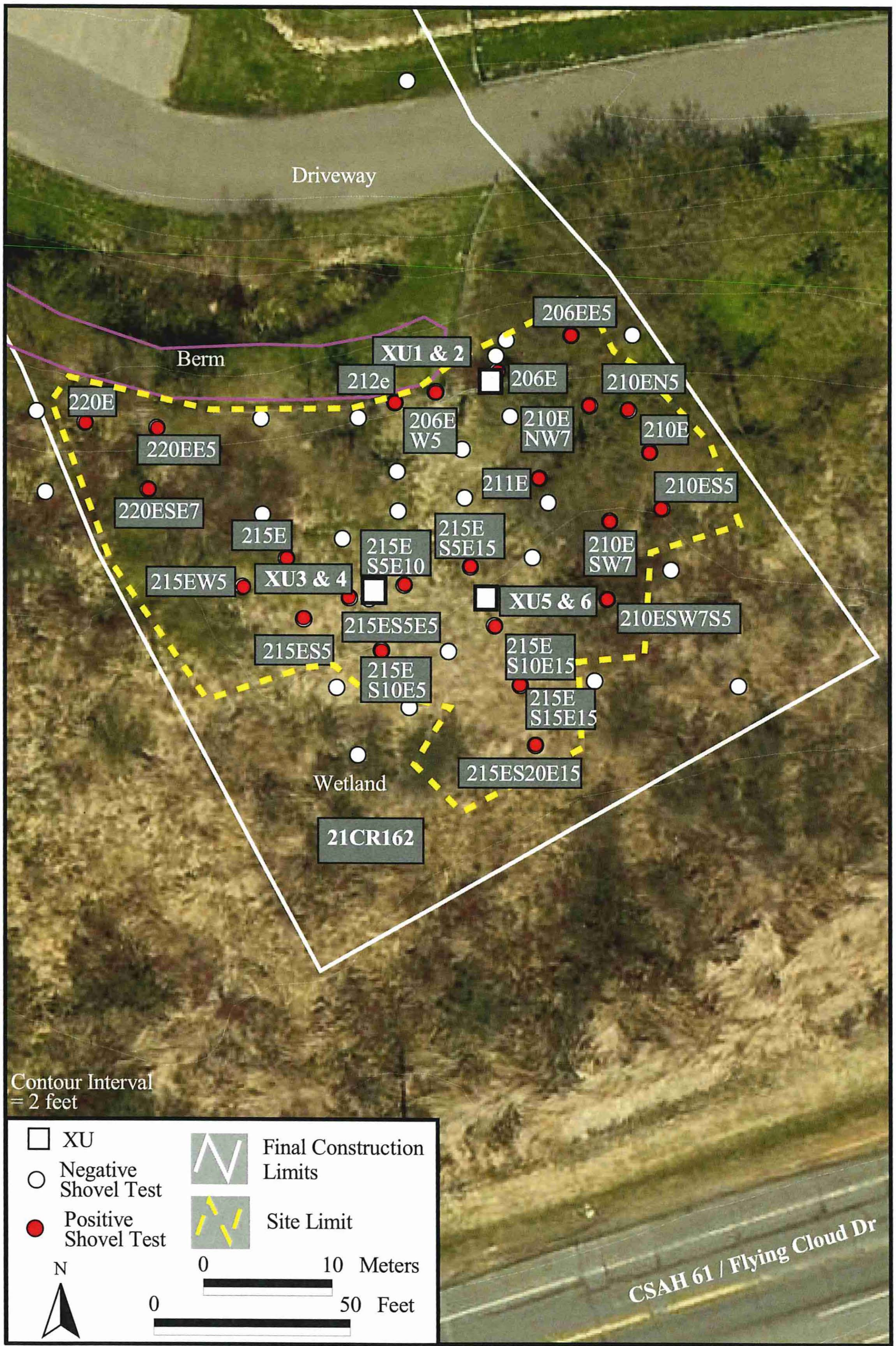


Figure 43. Sites 21CR162 Map on Aerial Imagery.

Figure 44. Site 21CR162 Photo of Location of XUs 5 and 6, Facing Southeast.

The development of wetlands and the paludal soils of upper stratum likely occurred around the same time as the wetlands at nearby site 21CR155, which are in a similar landscape position (Florin et al. 2015). The formation date of the paludal deposits at 21CR155 was determined to have been approximately 400 RCYBP (500 cal BP), based on four radiocarbon dates obtained from bone and plant material recovered from these deposits. The date of the paludal deposits closely matches the development of the Big Wood forest and is undoubtedly linked to regional climatic changes.

At the south end of the site, ten meters south of XUs 5 and 6 at Shovel Test 215ES20E15, the soils change abruptly to an upper stratum of very thick peat to 220 cmbs and muck from 220 to 270 cmbs, overlying lower stratums of sandy clay loam and sand (Table 34). This profile just south of the site area indicates a substantially lower elevation of the lower stratum (mineral soils) than those in the site area to the north. Also, the thick peat deposits indicate a greater amount of water saturation and high water table. The basal sandy stratum correlates with the basal deposits at 21CR155, which were interpreted to be a very early Holocene fluvial deposit.

Table 34. Site 21CR162 Shovel Test 215E S20 E15 Profile South of Site.

Depth Below Surface (cm)	Description
0-220	Black (10YR 2/1) with lenses of dark brown (10YR 3/3) peat
220-270	Black (10YR 2/1) muck
270-280	Very dark gray (10YR 3/1) sandy clay loam
280-290	Light brownish gray (10YR 6/2) sand

11.4 Phase I Survey Methods and Results

The site was identified during Phase I shovel testing in 10-meter intervals. Two deep auger tests were dug at each test location to recover a volume of soil equivalent to a standard shovel test. Six Phase I shovel tests contained artifacts, including lithic debris, faunal material, FCR, and a bullet (Table 35). Artifacts were recovered from 0 to 235 cmbs.

Table 35. Site 21CR162 Summary of Artifacts from Phase I Shovel Tests.

Shovel Test	Depth (cmbs)	Strata	Count	Artifact type
206E	60-70	Lower	2	Large Mammal, longbone fragments
210E	70-90	Lower	1	Decortication flake, Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
211E	0-30	Upper/ Lower	1	Bifacial thinning flake, unidentified chert
	30-50	Lower	1	Decortication flake, Red River Chert
212E	40-60	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
			1	Other G4 flake, unidentified chert
			1	Bullet
215E	70-85	Lower	1	Other G4 flake, Red River Chert
	110-130		2	Vertebrata, unidentifiable fragment, calcined
	140-150		1	Vertebrata, unidentifiable fragment, calcined
	145-160		1	Vertebrata, unidentifiable fragment, calcined
220E	220-235	Lower	1	Nonbifacial flake, quartzite
Total	-		**13**	-

11.5 Phase II Shovel Testing

Phase II shovel tests were dug in five (and occasionally 7.5) meter intervals adjacent to the positive Phase I tests. A total of 18 Phase II shovel tests contained artifacts, including lithic debris, faunal material, and FCR (Table 36). Artifacts were recovered from 0 to 230 cmbs. Two deep auger tests were dug at each test location to recover a volume of soil equivalent to a standard shovel test. The Phase II close-interval radial shovel tests were numbered based on the direction and distance from the Phase I test. For example, Shovel Test 206EE5 is located five meters grid east of Shovel Test 206E.

Table 36. Site 21CR162 Summary of Artifacts from Phase II Shovel Tests.

Shovel Test	Depth (cmbs)	Strata	Count	Artifact type
206EE5	0-20	Upper	4	Mammalian, unidentifiable fragment
			1	Sus scrofa (swine), sternum fragment
	20-45	Lower	1	Mammalian, large, unidentifiable fragment
206EW5	50-70	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
210ES5	50-70	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
210EN5	60-90	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
210ESW7	60-80	Lower	1	Other G4 flake, quartz
	100-110		1	Shatter, quartz
210ESW7S5	130-140	Lower	2	Vertebrata, unidentifiable fragment, calcined
210ENW7	40-50	Lower	1	Edge preparation flake, Prairie du Chien Chert (oolitic)
215EW5	100-115	Lower	1	Vertebrata, unidentifiable fragment, calcined
215ES5	95-110	Lower	1	Mammalian, large, tooth fragment, burned
215ES5E5	30-50	Upper	1	Mammalian, medium/large, unidentifiable fragment
			17	Mammalian, unidentifiable fragment
			1	Bos/Bison sp. (cattle/bison), tooth, molar fragment, charred
	50-60	Upper/ Lower	1	Mammalian, large, tooth fragment, burned
	100-120	Lower	1	Mammalian, unidentifiable fragment, calcined
	115-125	Lower	1	Mammalian, large, unidentifiable fragment, burned
			1	Broken flake, Prairie du Chien Chert (oolitic)
215ES5E10	35-50	Lower	1	Mammalian, medium/large, unidentifiable fragment
	50-60		1	Shatter Prairie du Chien Chert (oolitic)
			1	Broken flake, Prairie du Chien Chert (oolitic)
	60-80	Lower	1	Broken flake, quartz
	80-100		1	Shatter, Prairie du Chien Chert (oolitic)
215ES5E15	60-70	Lower	2	Vertebrata, unidentifiable fragment, calcined
215ES10E5	100-120	Lower	1	Vertebrata, unidentifiable fragment, calcined
215ES10E15	20-40	Upper*	1	Bifacial shaping flake, Prairie du Chien Chert (oolitic)
	90-110	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
	100-120		1	Mammalian, unidentifiable fragment, burned
			1	Utilized flake, nonbifacial, Prairie du Chien Chert (oolitic)
	140-150		1	Broken flake, Prairie du Chien Chert (oolitic)
	150-160		1	Broken flake, Prairie du Chien Chert (oolitic)
	160-170		1	Vertebrata, unidentifiable fragment, calcined
215ES15E15	190-200	Lower	1	Bifacial thinning flake, Gunflint Silica
215ES20E15 **	170-180	Lower	1	Bison bison (bison), calcaneous, right fragment
			1	Mammalian, large, unidentifiable fragment
220ESE7	140-160	Lower	1	Broken flake, Prairie du Chien Chert (oolitic)
220EE5	210-220	Lower	3	Mammalian, unidentifiable fragment, calcined
Total	**-**		**62**	**-**

* It is uncertain if this lithic is in original context, as no other precontact artifacts were recovered from the upper stratum at the site; ** uncertain if these are natural or cultural deposit, as they were recovered from peat

11.6 Phase II XUs 1 and 2

XUs 1 and 2 were contiguous units placed at the location of ST 206E, which contained two large mammal bones from 60 to 70 cmbs. Excavation was terminated at 110 cmbd in XU 1 and 100 cmbd in XU 2 because of the lack of artifacts. A shovel test was placed in the base of the units to 160 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present. A summary of artifacts recovered in the units is presented in Tables 37 and 38.

Table 37. Site 21CR162 Summary of Artifacts by Count in XUs 1 and 2.

Depth (cmbd)	Lithic Debris	Lithic Tool	Total	%
0-30	-	-	-	0
30-40	3	-	3	7
40-50	15	1	16	36
50-60	5	-	5	11
60-70	3	-	3	7
70-80	4	2	6	14
80-90	9	-	9	20
90-100	2	-	2	5
Total	**41**	**3**	**44**	**-**
%	**93**	**7**	**-**	**100**

Table 38. Site 21CR162 Summary of Artifacts by Weight (g) in XUs 1 and 2.

Depth (cmbd)	Lithic Debris	Lithic Tool	Total	%
0-30	-	-	-	0
30-40	2.3	-	2.3	1
40-50	14.5	4.7	19.2	4
50-60	3.6	-	3.6	1
60-70	2.6	-	2.6	1
70-80	5.5	406.9	412.4*	92
80-90	5.0	-	5.0	1
90-100	2.4	-	2.4	1
Total	**35.9**	**411.6**	**447.5**	**-**
%	**8**	**92**	**-**	**100**

* includes hammerstone weighing 399 grams

11.6.1 Artifact Summary and Vertical Distribution

A total of 44 artifacts were recovered from XUs 1 and 2, including 41 pieces of lithic debris and three stone tools including a hammerstone, utilized flake, and a multifunctional utilized flake & side scraper. Artifacts were recovered between 30 and 100 cmbd. The highest artifact counts occurred in two zones: from 40 to 50 cmbd and from 80 to 90 cmbd, with fewer artifacts above and below these depths. By weight, artifact density was greatest in two zones: from 40 to 50 cmbd and from 70 to 90 cmbd, excluding the hammerstone that was disproportionately heavier than the other artifacts.

The vertical distribution of artifacts, which is clustered in two zones, is interpreted to represent two primary occupations. The smaller quantity of artifacts above and below these zones is probably artifacts translocated by natural processes from the two primary zones. Alternatively, some of these artifacts may be from other occupations.

The large mammal bone recovered in Shove Test 206E from 60 to 70 cmbs, along with the stone tools, suggest that animal processing occurred at this location. Lithic reduction is also indicated by the lithics debris.

11.6.2 Soils and Stratigraphy

Wall profiles and photographs from the XUs that depict the soil horizons are presented in Figures 45 and 46. The profiles consist of two strata. The upper stratum is a mucky (paludal) deposit that extends from 0 to 30 cmbd, and the lower stratum below 30 cmbd consists of a soil sequence that formed in poorly sorted sandy loam and sandy clay loam colluvium. The cultural deposits appear to retain integrity, as only a minimal amount of rodent burrows and other disturbances were observed.

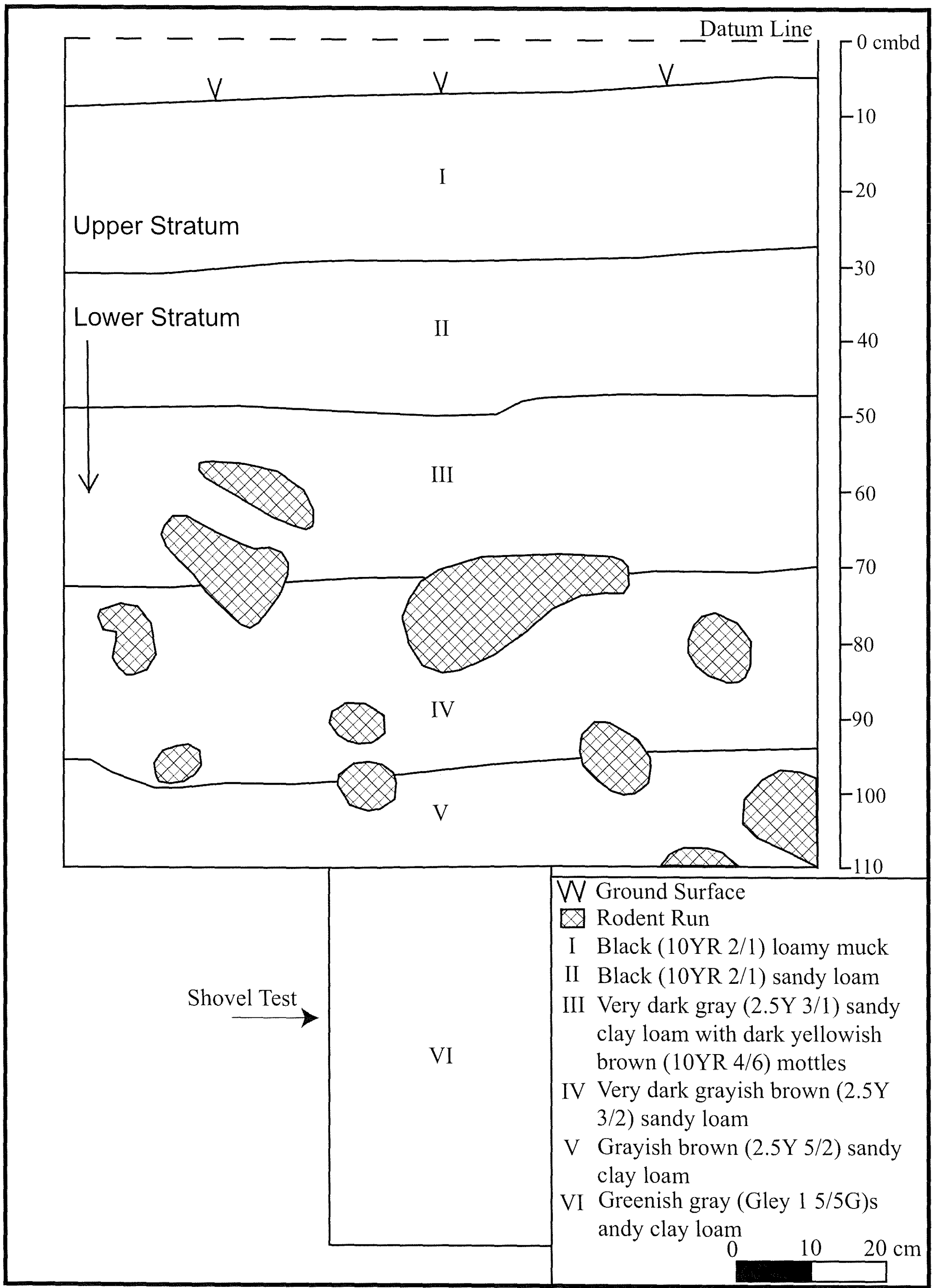


Figure 45. Site 21CR162 XU 1 West Wall Profile.

Figure 46. Site 21CR162 Photo of XU 1 West Wall Profile.

11.7 Phase II XUs 3 and 4

XUs 3 and 4 were contiguous units placed between ST 215ES5E5 and ST 215ES5E10, which contained 23 faunal fragments and of five pieces of lithic debris from 30 to 125 cmbs. Excavation was terminated at 150 cmbd because of the lack of artifacts and water at the base of excavation. A shovel test was placed in the base of units to 180 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present. A summary of artifacts recovered in the units is presented in Tables 39 and 40.

Table 39. Site 21CR162 Artifacts by Count from XUs 3 and 4.

Depth (cmbd)	Strata	Faunal	Faunal Thermally Altered	Lithic Debris	Lithic Tool/ Core	FCR	Historic	Total	%
0-40	Upper	1	-	-	-	-	-	**1**	**1**
40-50	Upper	4*	-	-	-	-	-	**4**	**6**
50-60	Upper	10	-	-	-	-	-	**10**	**14**
60-70	Upper/ Lower	-	-	-	-	-	1	**1**	**1**
70-80	Lower	-	-	-	-	-	-	**0**	**0**
80-90	Lower	-	-	-	-	-	-	**0**	**0**
90-100	Lower	-	-	-	-	-	-	**0**	**0**
100-110	Lower	-	-	2	-	-	-	**2**	**3**
110-120	Lower	-	8	3	-	-	-	**11**	**16**
120-130	Lower	-	3	10	1 core	1	-	**15**	**22**
130-140	Lower	-	11	8	1 tool	1	-	**21**	**30**
140-150	Lower	1	2	1	-	-	-	**4**	**6**
Total		**16**	**24**	**24**	**2**	**2**	**1**	**69**	**-**
%		**23**	**35**	**35**	**3**	**3**	**1**	**-**	**100**

* one large mammal bone with saw cut

Table 40. Site 21CR162 Artifacts by Weight from XUs 3 and 4.

Depth (cmbd)	Strata	Faunal	Faunal Thermally Altered	Lithic Debris	Lithic Tool/ Core	FCR	Historic	Total	%
0-40	Upper	4.5	-	-	-	-	-	**4.5**	**1**
40-50	Upper	10.0*	-	-	-	-	-	**10.0**	**3**
50-60	Upper	61.8	-	-	-	-	-	**61.8**	**18**
60-70	Upper/ Lower	-	-	-	-	-	2.5	**2.5**	**1**
70-80	Lower	-	-	-	-	-	-	**0**	**0**
80-90	Lower	-	-	-	-	-	-	**0**	**0**
90-100	Lower	-	-	-	-	-	-	**0**	**0**
100-110	Lower	-	-	4.2	-	-	-	**4.2**	**1**
110-120	Lower	-	1.1	2.6	-	-	-	**3.7**	**1**
120-130	Lower	-	0.5	49.0	134.0	1.1	-	**184.6**	**54**
130-140	Lower	-	3.4	26.5	1.2	0.4	-	**31.5**	**9**
140-150	Lower	35.5	0.3	5.6	-	-	-	**41.4**	**12**
Total		**111.8**	**5.3**	**87.9**	**135.2**	**1.5**	**2.5**	**344.2**	**-**
%		**32**	**2**	**26**	**39**	**<1**	**1**	**-**	**100**

* one large mammal bone with saw cut

11.7.1 Artifact Summary and Vertical Distribution

A total of 69 artifacts were recovered from XUs 3 and 4, including 40 faunal fragments, 24 pieces of lithic debris, one core, one stone tool (utilized flake), and a piece of wire. Artifacts recovered in the upper stratum (paludal deposits) from 0 to 70 cmbd are historic in age and consist of the wire and faunal material, including one bone with saw marks. Artifacts recovered in the lower stratum (colluvium) consist of faunal material and lithics that are inferred to include at least one Archaic period occupation that is defined from a concentration of artifacts between 110 and 150 cmbd. The Archaic occupation dates to approximately 5000 RCYP (5800 cal BP), based on a radiocarbon date from a bison tooth at 140 to 150 cmbd in XU 4.

The somewhat broad vertical distribution of precontact artifacts, extending from 100 to 150 cmbd is likely caused, in part, by the translocation of artifacts by natural processes, although it is also likely that the distribution may include more than one occupation. Faunal material in the upper stratum is historic and appears to be discarded bones from butchering, probably related to the nearby farmstead (see discussion in Section 5.3). Historic butchered fauna was also recovered from the upper stratum in XUs 5 and 6. The faunal material and stone tool in the lower stratum indicate precontact period animal processing. A small amount of faunal material was thermally-altered, indicating that a cooking or heating facility is nearby. Lithic reduction is indicated by the lithics debris.

11.7.2 Soils and Stratigraphy

Wall profiles and photographs from the XUs that depict the soil horizons are presented in Figures 47 and 48. The profiles consist of two strata. The upper stratum is a mucky (paludal) deposit that extends from 0 to between 65 and 75 cmbd. The lower stratum below the paludal deposits consists of a soil sequence that formed in poorly sorted sandy clay loam colluvium. The cultural deposits appear to retain integrity, as only a minimal amount of rodent burrows and other disturbances were observed.

11.8 Radiocarbon Dating

One bison tooth was submitted to Beta Analytic, Inc for AMS dating (Table 41; Appendix C). The age of the sample appears to provide an accurate date for the earliest site occupation.

Table 41. Site 21CR162 XU 4 Radiocarbon Date.

Material/ Provenience	**Beta Lab No.**	**$^{13}C/^{12}C$ Ratio (o/oo)**	**Conventional ^{14}C Age B.P.**	**2 Sigma Calibrated Results (95% Probability)**
Bone collagen (Bison tooth) XU 4 140-150 cmbd	415923	-14.5 o/oo	5010 +/- 30 BP	Cal BC 3935 to 3860 (Cal BP 5885 to 5810) and Cal BC 3810 to 3705 (Cal BP 5760 to 5655)

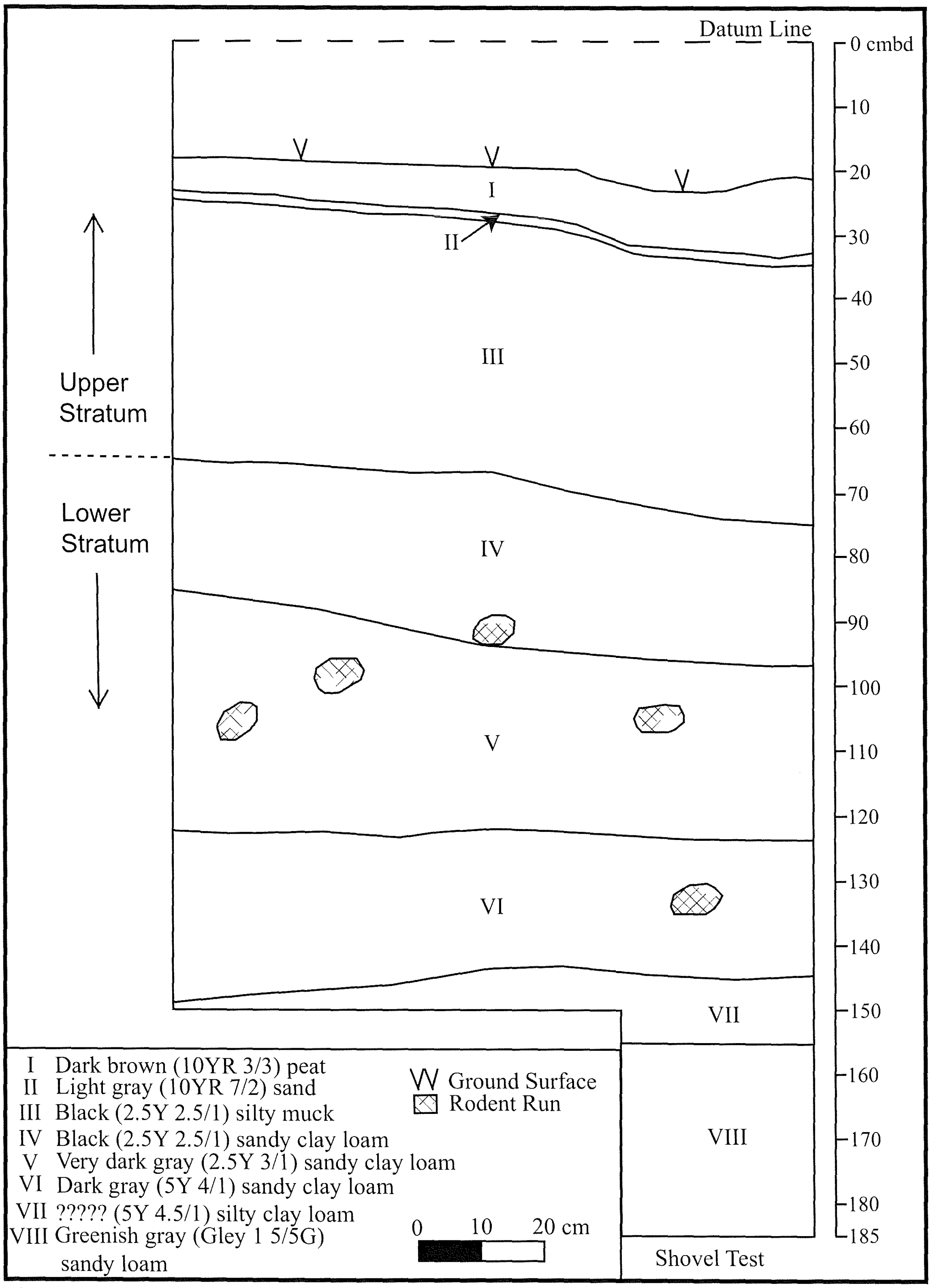


Figure 47. Site 21CR162 XU 4 East Wall Profile.

Figure 48. Site 21CR162 Photo XU 4 East Wall Profile.

11.9 Phase II XUs 5 and 6

XUs 5 and 6 were contiguous units placed between ST 215ES5E15 and ST 215ES10E15, which contained three faunal fragments and five pieces of lithic debris from 20 to 170 cmbs. Excavation was terminated at 190 cmbd in XU 5 and 180 cmbd in XU 6 because of the lack of artifacts and water at the base of excavation. A shovel test was placed in the base of XU 6 to 250 cmbd to examine the soils and ensure that no deeply buried archaeological deposits were present. A summary of artifacts recovered in the units is presented in Tables 42 and 43.

Table 42. Site 21CR162 Summary of Artifacts by Count in XUs 5 and 6.

Depth (cmbd)	Strata	Faunal	Faunal Thermally Altered	Lithic Debris	Lithic Tool/ Core	FCR	Historics	Total	%
0-30	Upper	1	-	-	-	-	-	**1**	**1**
30-40	Upper	1	-	-	-	-	1	**2**	**3**
40-50	Upper	1	-	-	-	-	-	**1**	**1**
50-60	Upper/ Lower	2*	-	1	-	-	-	**3**	**4**
60-70	Lower	-	-	2	-	-	1	**3**	**4**
90-100	Lower	-	1	1	-	-	-	**2**	**3**
100-110	Lower	-	3	3	-	-	-	**6**	**8**
110-120	Lower	-	2	6	-	-	-	**8**	**11**
120-130	Lower	-	1	6	2	2	-	**11**	**15**
130-140	Lower	-	1	8	1	1	-	**11**	**15**
140-150	Lower	2	2	4	2	-	-	**10**	**14**
150-160	Lower	-	3	2	-	-	-	**5**	**7**
160-170	Lower	-	-	1	1	-	-	**2**	**3**
170-180	Lower	-	1	3	1	-	-	**5**	**7**
180-230	Lower	-	1	-	-	-	-	**1**	**1**
Total	**-**	**7**	**15**	**37**	**7**	**3**	**2**	**71**	**-**
%	**-**	**10**	**21**	**52**	**10**	**4**	**3**	**-**	**100**

* one large mammal bone with saw cut

Table 43. Site 21CR162 Summary of Artifacts by Weight (g) in XUs 5 and 6.

Depth (cmbd)	Strata	Faunal	Faunal Thermally Altered	Lithic Debris	Lithic Tool/ Core	FCR	Historics	Total	%
0-30	Upper	1.4	-	-	-	-	-	**1.4**	**>1**
30-40	Upper	24.4	-	-	-	-	11.8	**36.2**	**7**
40-50	Upper	2.2	-	-	-	-	-	**2.2**	**>1**
50-60	Upper/ Lower	5.1*	-	0.1	-	-	-	**5.2**	**1**
60-70	Lower	-	-	2.2	-	-	0.1	**2.3**	**>1**
90-100	Lower	-	0.1	0.8	-	-	-	**0.9**	**>1**
100-110	Lower	-	0.2	4.0	-	-	-	**4.2**	**1**
110-120	Lower	-	0.4	4.9	-	-	-	**5.3**	**1**
120-130	Lower	-	0.1	38.1	332.6	34.1	-	**404.9**	**73**
130-140	Lower	-	0.1	4.7	5.0	12.7	-	**22.5**	**4**
140-150	Lower	0.2	0.6	2.3	38.1	-	-	**41.2**	**7**
150-160	Lower	-	0.7	0.3	-	-	-	**1.0**	**>1**
160-170	Lower	-	-	1.2	12.7	-	-	**13.9**	**3**
170-180	Lower	-	0.2	8.1	1.8	-	-	**10.1**	**2**
180-230	Lower	-	0.2	-	-	-	-	**0.2**	**>1**
Total	**-**	**33.3**	**2.6**	**66.7**	**390.2**	**46.8**	**11.9**	**551.5**	**-**
%	**-**	**6**	**>1**	**12**	**71**	**8**	**2**	**-**	**100**

* one large mammal bone with saw cut

11.9.1 Artifact Summary and Vertical Distribution

A total of 71 artifacts were recovered from XUs 5 and 6, including 22 faunal fragments, 37 pieces of lithic debris, two cores, five stone tools (two utilized flakes, a retouched flake, a scraper, and a Stage 4 biface), three pieces of FCR, and two nails. Artifacts recovered in the upper stratum (paludal deposits) from 0 to 60 cmbd are historic and consist of faunal material, including one with saw marks, and a nail. Another nail was recovered at 60 to 70 cmbd from the top of the lower stratum.

Artifacts recovered in the lower stratum (colluvium) consist of faunal material and lithics that include multiple occupations. The greatest amount of artifacts by count and weight occurs in a zone between 120 and 150 cmbd. Artifact counts in the levels in this zone are approximately equal and range from ten to eleven. Slightly fewer artifacts were recovered above and below this zone, and these artifacts may be from other occupations or they may be translocated by natural processes from the primary artifact zone.

Faunal material in the upper stratum is historic and appears to have been discarded from butchering. Historic butchered fauna was also recovered from the upper stratum in XUs 3 and 4. The faunal material and stone tools in the lower stratum indicate precontact period animal processing. A small amount of faunal material was thermally-altered, indicating that a cooking or heating facility is nearby. Lithic reduction is indicated by the lithics debris.

11.9.2 Soils and Stratigraphy

Wall profiles and photographs from the XUs that depict the soil horizons are presented in Figures 49 and 50. The profiles consist of two strata. The upper stratum is a mucky (paludal) deposit that extends from 0 to 55 cmbd. The lower stratum below the paludal deposits consists of a soil sequence that formed in poorly sorted sandy clay loam colluvium. The cultural deposits appear to retain integrity, as only a minimal amount of rodent burrows and other disturbances were observed.

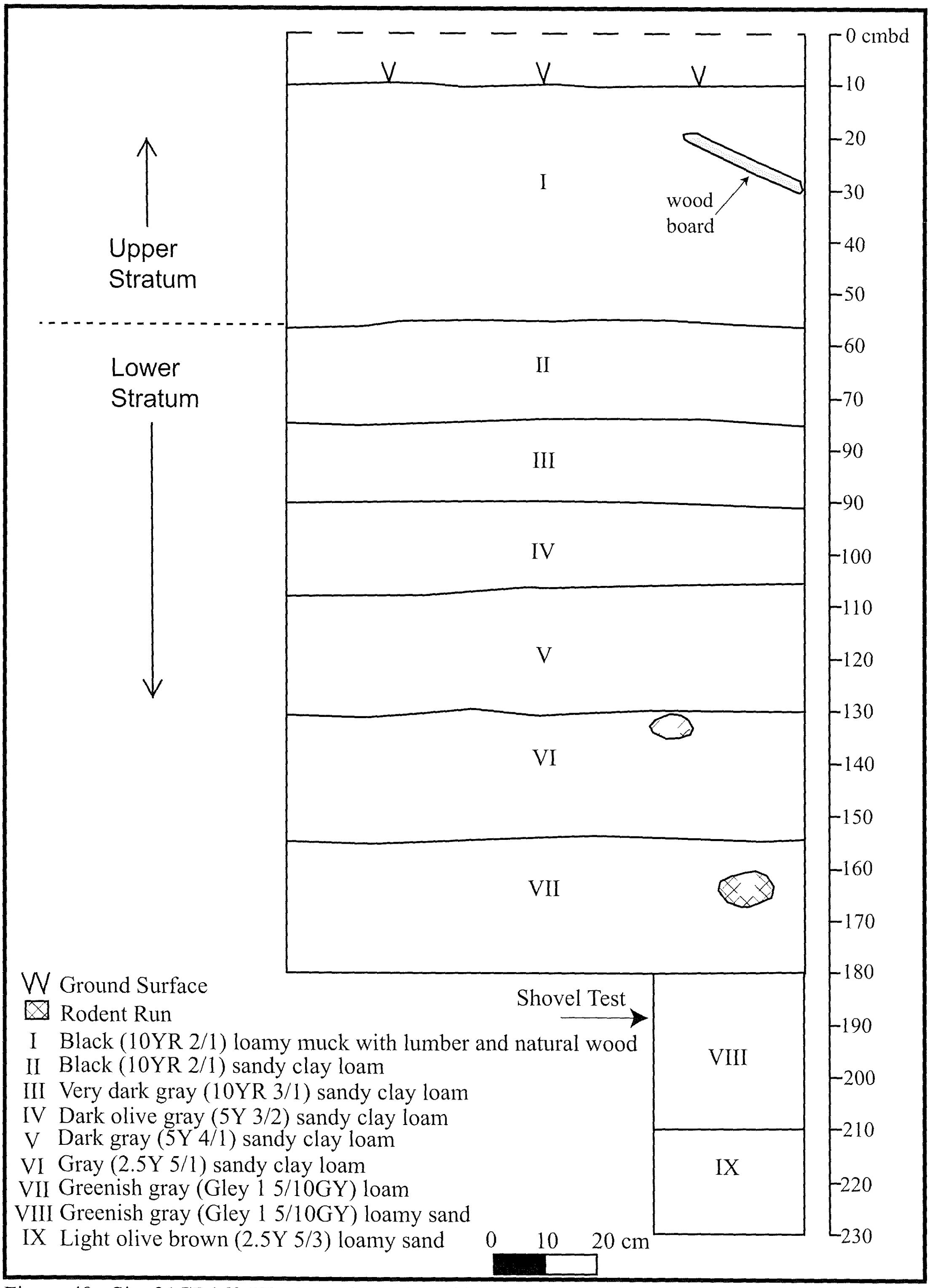


Figure 49. Site 21CR162 XU 6 North Wall Profile.

Figure 50. Site 21CR162 Photo XU 6 North Wall Profile.

11.10 Artifact Summary

A total of 260 artifacts, weighing 1424.1 grams, were recovered from the site during the Phase I survey and Phase II evaluation (Table 44). By count and weight, lithics are the most abundant artifact at the site. Fauna is slightly less numerous but weighs considerably less than the lithics. Only very small amounts of FCR and historic artifacts were recovered from the site.

Table 44. Site 21CR162 Summary of Artifacts.

Artifact Type	Total by Count (Weight g)	% by Count (Weight)
Lithic	140 (1165.7)	54 (82)
Faunal	111 (194.0)	43 (14)
FCR	5 (48.3)	2 (3)
Historic	4 (16.1)	2 (1)
Total	**260 (1424.1)**	**-**
%	**-**	**100**

11.11 Faunal Analysis by Steven Kuehn

The faunal assemblage contains 111 pieces of bone and shell, with a total weight of 194.0 g (Table 45).

Table 45. Site 21CR162 Faunal Material by Count and Weight (g).

Taxon	Count	Weight (g)	MNI	Burned*
Bison (*Bison* sp.)	2	46.2	1	0
Bison/cattle, indet. (*Bison/Bos* sp.)	6	61.1	--	1
White-tailed deer (*Odocoileus virginianus*)	2	18.6	1	0
Swine (*Sus scrofa*)	1	1.5	1	0
Large-sized mammal	18	50.0	--	3
Medium-large mammal	2	1.9	--	0
Mammal, indeterminate	59	12.5	--	34
Taxon indeterminate (Vertebrata)	21	2.2	--	21
Total	**111**	**194.0**	**3**	**59**

* includes burned, charred, and calcined specimens

One right calcaneus, weighing 10.7 g, and one molar fragment, weighing 35.5 g, was identifiable as bison (*Bison* sp.). These bison elements were recovered at a depth of 140 to 150 cmbd in XU 4, and 170 to 180 cmbs in ST215E S20 E15. Bison are found primarily in prairie habitats but also occupy dry marshes and forest edge or border settings (Jackson 1961).

Another six elements with a total weight of 61.1 g are categorized as bison or cattle (*Bos/Bison* sp.), and these consist of three molar fragments, two thoracic vertebra fragments that may be from the same element, and a distal metapodial fragment. The thoracic vertebra and metapodial pieces are from juvenile individuals. None of these bones exhibit butchery marks, and one molar is charred. Bison/cattle remains were recovered between 0 and 60 cmbd in XU4 and XU5, and at 30 to 50 cmbs in ST215ES5E5. Based on their association with saw cut bone and historic items, it is mostly likely these remains are cattle and not bison.

Two white-tailed deer (*Odocoileus virginianus*) bones, a right navicularcuboid and a right calcaneus weighing 18.6 g, were recovered from XU4. Cut marks were observed on both specimens, and they may be from the same individual. Both elements were found at a depth of from 50 to 60 cmbd in XU4, and these are likely historic in age, given their association with saw cut bones. White-tailed deer occur in a variety of habitats but prefer forest-edge settings (Jackson 1961).

One swine (*Sus scrofa*) element, a sternum fragment, was found in the upper 20 cmbs of ST206E. The bone weighs 6.0 g and is from an adult animal. No butchery marks are evident, and the specimen is unburned. The swine bone can be securely associated with the historic occupation of the site.

Eighteen specimens weighing 50.0 g are listed as large-sized mammal. The majority of fragments cannot be identified to element, but one mandible fragment and two teeth are present. Both teeth and one unidentifiable bone are burned black. Two indeterminate fragments display saw cut marks and can be securely associated with the historic occupation of the site. These were recovered between 40 and 60 cmbd in XUs 4 and 5.

Two indeterminate fragments with a total weight of 1.9 g are categorized as medium-large mammal. Neither element is burned and no butchery marks were observed. The remaining 59 specimens, weighing 12.5 g, are classified as indeterminate mammal. One bone is burned black and 33 are calcined. None of the indeterminate mammal remains can be identified to element, and none exhibit butchery marks.

Twenty-one pieces of bone cannot be identified to element or a specific taxon and are listed as taxon indeterminate (Vertebrata). Seventeen Vertebrata remains are calcined, one is calcined and charred, one is partially charred, and two are burned black. None of the Vertebrata remains display butchery marks.

11.12 Lithic Analysis

The lithic assemblage consists of 140 artifacts, including 127 pieces of lithic debris, ten stone tools, and three cores (Table 46). A variety of flake types, tools, cores, and lithic materials are present in the assemblage, which is discussed below.

Table 46. Site 21CR162 Lithic Artifacts by Material, Flake, and Tool/Core Types.

Material, Resource Region, and Source Distance	**Nonbifacial**	**Decortication**	**Bifacial Shaping**	**Bifacial Thinning**	**Edge Preparation**	**Alternate**	**Bipolar Flake**	**Other Grade 4**	**Shatter**	**Broken Flake**	**Tool/Core**	**Total**	**%**
Prairie du Chien Chert - **Hollandale Region** (local)	2	6	2	9	5	1	1	16	7	28	5 utilized flakes; 1 utilized flake/ side scraper; 1 Stage 4 biface	**84***	**60**
Quartzite - **Multiple Regions** *(local)*	2	5	-	-	-	-	1	4	3	1	2 tested cobbles	**18**	**13**
Swan River Chert - **South Agassiz Region** (local)	2	-	1	-	-	-	-	2	1	4	1 side & end scraper	**11**	**8**
Red River Chert - **South Agassiz Region** (local)	-	3	-	-	-	-	1	1	-	1	1 retouched flake	**7**	**5**
Unid. Chert - **Unknown Region** (local or nonlocal)	-	-	1	1	-	-	-	1	1	-	-	**4**	**3**
Quartz - **Multiple Regions** *(local)*	-	-	-	-	-	-	-	1	2	1	-	**4**	**3**
Cedar Valley Chert - **Hollandale Region** (nonlocal)	-	-	-	1	1	-	-	-	1	-	-	**3**	**2**
Chalcedony - **Unidentified Region** (local or nonlocal)	-	-	-	-	-	-	-	-	1	1	-	**2**	**1**
Unidentified Material - **Unknown Region** (local)	-	-	-	-	-	-	-	-	-	-	1 tested cobble	**1**	**<1**
Granitic - **Multiple Regions** *(local)*	-	-	-	-	-	-	1	-	-	-	1 hammerstone	**2**	**1**
Grand Meadow Chert - **Hollandale Region** (nonlocal)	-	-	-	-	-	-	-	-	-	1	-	**1**	**<1**
Gunflint Silica – **West Superor Region** *(local)*	-	-	-	1	-	-	-	-	-	-	-	**1**	**<1**
Tongue River Silica - **South Agassiz Region** (local)	-	-	-	-	-	-	-	-	-	1	-	**1**	**<1**
Basaltic - **Multiple Regions** *(local)*	-	1	-	-	-	-	-	-	-	-	-	**1**	**<1**
Total	**6**	**15**	**4**	**12**	**6**	**1**	**4**	**25**	**16**	**38**	**13**	**140**	**-**
%	**4**	**11**	**3**	**9**	**4**	**1**	**3**	**18**	**11**	**27**	**9**	**-**	**100**

* 80 pieces were oolitic

Size grade counts for the lithic debris were as follows: SG2 <1.0 inch to ≥0.5 inch (n=23; 18%); SG3 <0.5 inch to ≥0.233 inch (n=74; 58%); and SG4 < 0.233 inch (n=30; 24%). Heat treatment was confirmed on 19 lithics, including Prairie du Chien Chert (n=11), Swan River Chert (n=5), Cedar Valley Chert (n=2), and Tongue River Silica (n=1). Probable heat treatment was observed on 19 lithics, including Prairie du Chien Chert (n=14), Swan River Chert (n=3), Red River Chert (n=1), and unidentified chert (n=1).

Flake Types

A wide variety of flake types occur, indicating a range of lithic-reduction technologies and stages. Diagnostic flake types, along with their associated technologies and stages of reduction, are summarized in (Table 47). The data indicates that bipolar, bifacial, and nonbifacial technologies are all represented. The assemblage includes lithics that are primarily from the early and middle stages of reduction, with a small amount of flakes from the late stage of reduction. Additional supporting evidence for the various technologies and reduction stages includes: 1) a Stage 4 biface from bifacial technology; 2) six flake tools made on nonbifacial and decortication flakes are indicative of nonbifacial technology; and 3) three tested cobbles are indicative of early stage reduction. Types of lithic debris that are not indicative of specific technologies or reduction-stages comprise the largest portion of the assemblage and include unidentified, other SG4, and broken flakes.

Table 47. Site 21CR162 Summary of Diagnostic Flake Types, Technologies, and Reduction Stages.

Count & Flake Type	**Technology**	**Stage of Reduction**
4 - Bipolar flakes	Bipolar	N/A
15 - Decortication flakes	Nonbifacial	Earliest stage of core reduction
6 - Nonbifacial flakes	Nonbifacial	Cobble testing, reducing unprepared nonbifacial cores for flake blank production, and the early stages of nonbifacial tool reduction (early to middle-stages of reduction).
16 - Shatter	N/A	Mostly from cobble testing, core reduction, and earlier stages of reduction
12 - Bifacial thinning flake	Bifacial	Early to middle-stage of reduction
4 - Bifacial shaping flake	Bifacial	Late-stage of reduction (final shaping or tool maintenance)

Stone Tools

Ten stone tools were recovered. Flake tools include a Stage 4 biface, five utilized flakes, a scraper, a utilized flake/scraper, and a retouched flake. These tools were made mostly on nonbifacial flakes, but also on decortication, broken, and unidentified flake types (Table 48). Non-flaked stone tools included one hammerstone. Seven of the flake tools were manufactured from Prairie du Chien Chert, with one tool each made from Red River Chert and Swan River Chert. The hammerstone is granite.

Table 48. Site 21CR162 Tool Type by Flake Type.

Tool Type	Flake Type					
	Broken	Nonbifacial	Decortication	Unidentified	Total	%
Utilized Flake	1	3	-	1	**5**	**63**
Retouched Flake	-	-	1	-	**1**	**12**
Utilized flake/ side scraper	-	-	1	-	**1**	**12**
End Scraper	-	1	-	-	**1**	**12**
Total	**1**	**4**	**2**	**1**	**8**	**-**
%	**12**	**50**	**25**	**12**	**-**	**100**

Scrapers are typically associated with scraping tasks on a variety of soft materials (meat, hides, and plant material) or moderately resistant materials (wood and bone). Utilized and retouched flakes are primarily light-duty cutting and slicing tools used on animal remains, wood, and plants. Typical uses of hammerstones are for flint knapping, processing foods such as acorns, or fracturing animal bones to extract the marrow. These tools suggest that site activities included butchering, animal/plant processing, hide working, bone and woodworking, and flintknapping.

Lithic Material Types

A wide variety of lithic materials were recovered from the site. The most abundant material was Prairie du Chien Chert, followed by much smaller amounts of other materials. Most of the identifiable materials were locally available and probably procured in areas where rocks were exposed on erosional surfaces such as ravines, stream bottoms, and lakeshores (See Section 4.2.2 The Raw Material Resource Base). The unidentified chert may be local or nonlocal.

Nonlocal materials include 1) Cedar Valley Chert, which is available in Mower and Fillmore counties in southeastern Minnesota and adjacent areas of west-central Wisconsin (Bakken 2011); and 2) Grand Meadow Chert, which is available in bedrock and secondary sources in southeastern Minnesota. The specific locations of the Grand Meadow Chert sources are not well known, but precontact quarry pits have been identified near the town of Grand Meadow in Mower County, Minnesota about 100 miles southeast of the project area and secondary deposits have also been identified in gravel pits along the south branch of the Root River in Fillmore County (Bakken 2011). Very small amounts of the Grand Meadow Chert are likely present in glacial till in the region.

Because site components are not clearly defined across the site, it is not possible to draw conclusions regarding lithic material use for each component.

Lithic Material Use

The lithic data indicates that the lithic raw materials have different debris profiles resulting from differential use, quality of the material, and cobble size. The most notable lithic use characteristics are discussed below and focus on diagnostic flake types.

Prairie du Chien Chert occurs as a variety of bifacial and nonbifacial flake types from all stages of lithic reduction, indicating it was probably locally procured and also had good flaking properties. Quartzite, Red River Chert, and basalt occur primarily as decortication flakes, with quartzite also occurring as nonbifacial flakes and tested cobbles. The prevalence of decortication flakes from these materials suggests that they were locally procured and utilized primarily for initial reduction. In some materials, such as basalt, the occurrence of primary flakes indicates a poorer quality of stone or small-sized cobbles that would not be conducive for bifacial tool production. Unidentified chert occurs as bifacial shaping and thinning flakes, and Cedar Valley Chert occurs as bifacial shaping and edge preparation flakes. Higher-quality materials that occur only as bifacial flaking debris were likely brought to the site as reduced blanks, bifaces, or tools. This use pattern is consistent with what is expected from lithic materials transported far from their source. Quartz occurs as shatter and nondiagnostic flakes types.

Prairie du Chien Chert was used for all flaked stone tools, with the exception of one tool made from Swan River Chert and one tool from Red River Chert. The hammerstone was made from granite.

11.13 FCR

Only five pieces of FCR were recovered. Four pieces are granite, and one is basalt. FCR was confidently identified because of its distinctive characteristics (angular fractures, spalling, friable condition, etc) and because of the lack of naturally occurring cobbles in most of the soils at the site. Four of the FCR are angular pieces, with one friable rounded piece. Size grade counts for the FCR were as follows: three pieces SG2 <1.0 inch to ≥ 0.5 inch and two pieces SG3 <0.5 inch to ≥ 0.233 inch.

The presence of FCR and thermally-altered faunal material suggests that cooking or heating facilities were present, although none were identified. The cobbles used for heating and/or cooking, which became fire-cracked, were likely procured from local sources where rocks were exposed, such as ravines or streams.

11.14 Precontact Period Artifact Patterning and Geomorphic Context

The horizontal distribution of lithics and fauna is fairly similar across the site, suggesting that site activities were similar in many areas, with perhaps more intensive activities of animal processing and lithic reduction occurring at some locations. One notable pattern is that all FCR and thermally-altered faunal material was recovered from the western half of the site.

Artifact density is relatively low, based on the XU and shovel test data. In shovel tests with multiple artifacts, the artifacts were typically recovered from a broad vertical span, representing multiple ephemeral occupations.

The vertical distribution of precontact artifacts ranges from 20 to 235 cmbs. The depth of artifacts is dependent on two primary factors: landscape position and relative age of the artifact. In general, the landscape is slightly lower to the south, and the depth of the peat becomes thicker to the south. The formation date of the paludal deposit was approximately 400 RCYBP (500 cal BP) at nearby site 21CR155, which occupies a similar landscape, based on four radiocarbon dates obtained from bone and plant material recovered from these deposits (Florin et al. 2015). The date of the paludal deposits closely matches the development of the Big Wood forest and is undoubtedly linked to regional climatic changes. The precontact occupations appear to be confined to the lower stratum, and the top depth of the precontact component becomes increasingly deeper to the south, as the thickness of paludal deposits increases.

Multiple precontact components are clearly represented in some portions of the site, as artifact depths spanned as much as 80 cm in some shovel tests (excluding the lithic debris from Shovel Test 215ES10E15 that is likely out of context), with artifacts being recovered from multiple soil horizons (Table 49).

11.15 Site Integrity

There was no evidence in our tests of modern disturbances affecting the archaeological deposits, and only a small amount of rodent runs and bioturbation was observed in the excavation units. The dense sandy clay loam soil likely inhibits vertical displacement of artifacts. Faunal material is moderately well-preserved. In summary, the site has well-preserved cultural deposits that appear to retain a high degree of integrity.

Table 49. Site 21CR162 Vertical Distribution of Artifacts Across the Site from Shovel Tests and XUs.

Depth (cmbs)	206E	206E E5	206E W5	210E	210E N5	210E NW7	210E S5	210E SW7	210E SW7 S5	211E	212E	215E	215E S5	215E S5 E5	215E S5 E10	215E S5 E15	215E S10 E5	215E S10 E15	215E S15 E15	215E S20 E15	215E W5	220E	220E E5	220E SE7	XUs 1-2 *	XUs 3-4*	XUs 5-6*
0-10		5F																								1F	1F
10-20										1L																	
20-30																		1L**							3L	4F	1F, 1H
30-40		1F								1L				19F	1F										16L	10F	1F
40-50						1L					2L, 1H														5L	1H	1L, 2F
50-60			1L				1L							1F	2L										3L		2L, 1H
60-70	2F							1L							1L	2F									6L		
70-80				2L	1L							1L													9L		
80-90															1L										2L	2L	1L, 1F
90-100													1F													3L, 8F	3L, 3F
100-110								1L										2L, 1F								11L, 3F, 1R	6L, 2F
110-120												2F		2F, 1L			1F				1F					9L, 11F, 1R	8L, 1F, 2R
120-130																										1L, 3F	9L, 1F, 1R
130-140									2F																		6L, 4F
140-150												2F						1L						1L			2L, 3F
150-160																		1L									2L
160-170																		1F									4L, 1F
170-180																				3F							
180-190																											1F
190-200																			1L								
200-210																											
210-220																							3F				
220-230																						1L					
230-240																											

Upper Stratum – Wetland Muck and Peat

Lower Stratum – Colluvium

KEY L= Lithic, F=Faunal Material, R=FCR, H=Historic
* adjusted to cm below surface; ** may not be in original context

11.16 Conclusions and Recommendations

Site 21CR162 is an Archaic campsite located at the bluff base (intersection of the toe slope and valley floor) along the northern margin of the Minnesota River valley. The site is in a wetland, south of an animal boarding facility and is on the north side of CSAH 61 and east side of TH 101. A radiocarbon date of ca. 5000 RCYBP (cal. 5800 BP) was obtained from a bison tooth in the earliest component. The extensive vertical distribution of artifacts indicates multiple ephemeral site occupations, perhaps also including Woodland period occupations. No temporally diagnostic artifacts were recovered.

The Phase I and II investigations included 24 positive shovel tests and six 1-x-1 meter XUs. Precontact artifacts were recovered from 20 to 235 cmbs. Artifact density is fairly low across the site area. Artifacts recovered from the site are primarily faunal remains and lithic debris, with smaller amounts of stone tools and FCR. Site activities consisted primarily of animal butchering, lithic reduction, and stone tool manufacture. The presence of FCR and thermally-altered faunal material in the west half of the site suggests that fire heaths or cooking pits were present, although none were identified. The site has well-preserved cultural deposits that have integrity, and the soils are moderately conducive to faunal preservation. Precontact faunal remains include bison and other unidentified fragments of medium to large-size large mammals. Approximately half of the faunal remains were burned or calcined.

A wide variety of flake types are present, indicating a range of lithic-reduction technologies and stages. Lithic data indicates that bipolar, bifacial, and nonbifacial technologies are all represented. A variety of lithic raw materials occur at the site. Locally available materials are most common, with oolitic Prairie du Chien Chert being the most abundant. High-quality, non-local materials include Cedar Valley and Grand Meadow cherts from southeastern Minnesota. These materials were procured though long-distance trade networks or possibly travel to source areas. Stone tools recovered from the site are indicative of hunting, butchering, animal/plant processing, hide working, and bone and woodworking activities.

Despite well-preserved archaeological deposits, the research potential of the site is low because of the limited artifact assemblage, low artifact density, and lack of features. The precontact component is not capable of providing information important to relevant research themes under NRHP Criterion D (See Section 2.3 Research Themes). The site is recommended not eligible for listing on the National Register of Historic Places because it does not meet National Register Criteria A, B, C, or D. No further archaeological work is recommended at the site.

12. Site 21CR163

12.1 Overview

Site 21CR163 is a sparse lithic scatter at the north end of the survey area. The age and cultural affiliation is unknown because of the absence of diagnostic artifacts. The site is in T116N, R23W, NE, NW, SW Section 25 (Figures 1 and 2). Site 21CR163 is 10 by 60 meters in size, encompassing less than 0.1 acre. The UTM coordinates for is E457590 N4963700 (1983 NAD Zone 15). A map of the site on aerial imagery is presented in Figure 51. Photo of the site area are in Figures 52 and 53.

12.2 Physical Setting and Soils

Site 21CR163 is located along the TH 101 ROW on the east and west sides of TH 101. The portion of the site on the east side of TH 101 is located in a mowed grassy ROW area along the edge of the golf course. The portion of the site on the west side of TH 101 is located south of a hill in a grassy ROW area adjacent to wooded land. The terrain at the site is fairly level upland glacial till. Surface visibility was very low (<10%). Most of the ROW and the area between the positive shovel tests and TH 101 is extensively disturbed from road ditches, buried utilities, and previous construction.

Soils at site 21CR163 are mapped as Lester-Kilkenny loams, 2 to 6 and 6 to 12 percent slopes (Web Soil Survey 2015). Lester soils formed in calcareous, loamy till on convex slopes on moraines and till plains. Kilkenny soils formed in a mantle of clayey glacial till or flow till and underlying loamy glacial till on moraines.

The site consists of two positive shovel tests, and their soil profiles are presented below in Tables 50 and 51. Soils in Shovel 96W appear undisturbed below a fill layer (Table 50). The tests five and ten meters south of Shovel Test 96W had fill and disturbed soil to about 35 cmbs. The topsoil in Shovel Test 199E was also disturbed (Table 51). Soil disturbances were probably from previous road construction.

Table 50. Site 21CR163 Shovel Test 96W Profile - West Side of TH 101.

Depth Below Surface (cm)	Description
0-22	FILL
22-57	Brown (10YR 2/1) clay loam
57-80	Very dark brown (10YR 2/2) clay loam
80-96	Dark brown (10YR 3/3) silty clay

Table 51. Site 21CR163 Shovel Test 199E Profile – East Side of TH 101.

Depth Below Surface (cm)	Description
0-14	Very dark grayish brown (10YR 3/2) clay loam; probably disturbed and bladed
14-29	Brown (10YR 4/4) clay loam mottled with very dark grayish brown (10YR 3/2); probably disturbed
29-50	Brown (10YR 4/4) clay loam

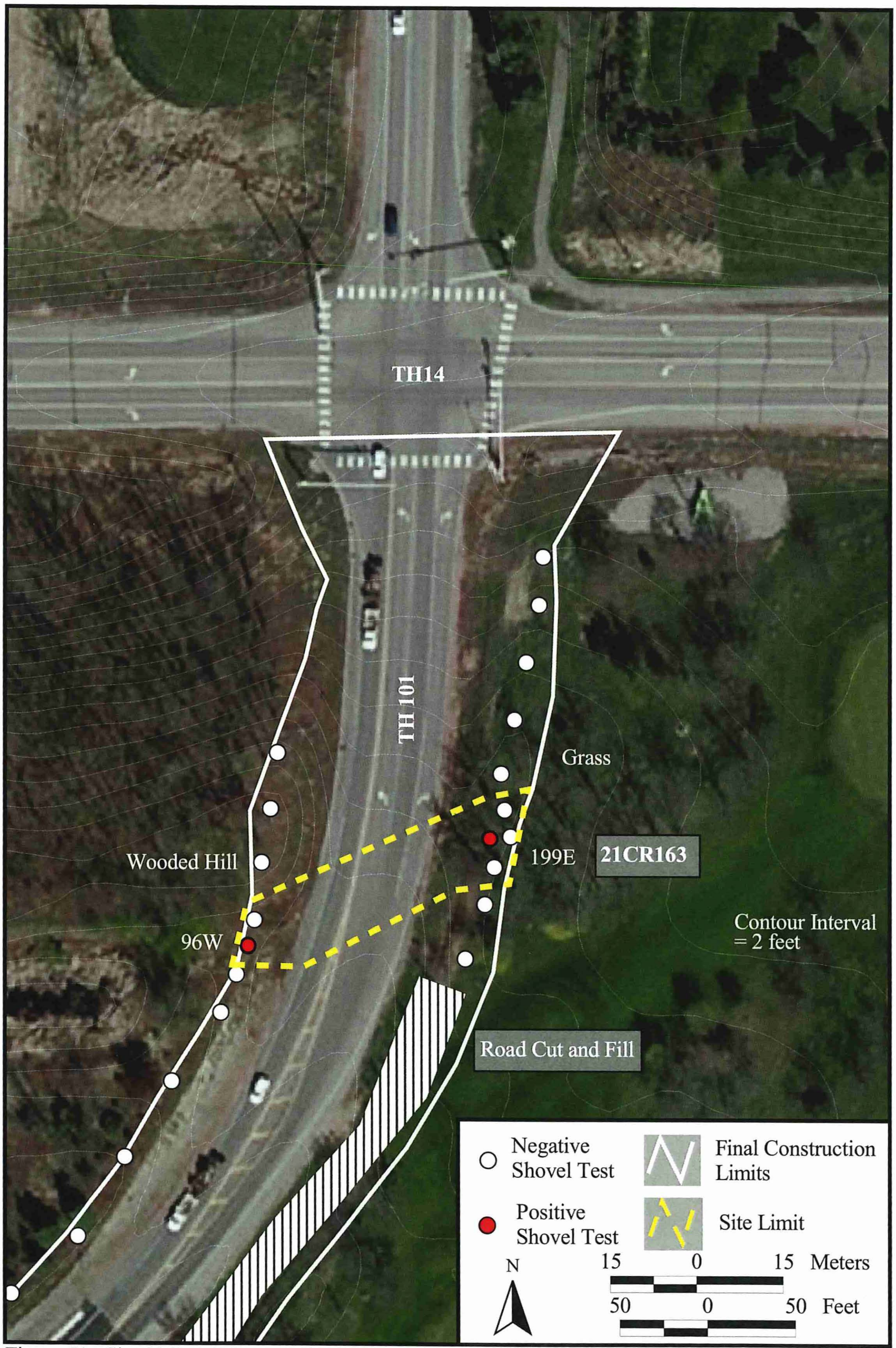


Figure 51. Site 21CR163 Map on Aerial Imagery.

12.3 Survey Methods and Results

The site was identified during shovel testing at 10 and 15-meter intervals. Radial tests were placed at five-meter interval north and south of the positive tests. A radial was also placed east of Shovel Test 199E, but there was not enough room in the survey corridor to place a radial west of Shovel Test 96W. Because of buried utilities and road ditches, radial tests were not placed between the positive tests and TH 101. All radial tests were negative. A summary of artifacts recovered from the sites is presented in Table 52.

Table 52. Sites 21CR163 Artifact Summary.

Shovel Test #	Depth (cmbs)	Count	Artifact Description
96W	70-80	2	Shatter, Prairie du Chien Chert (oolitic), SG 2 and 3
199E	10-30	1	Retouched flake, medial fragment, Prairie du Chien Chert (oolitic), SG 2

12.4 Artifact Analysis

The artifact assemblage is very sparse and has limited interpretive potential. Shatter is not diagnostic of a specific lithic reduction stage or technology; however, it is typically produced in the early or middle stages of lithic reduction. Prairie du Chien Chert is available in the regional glacial till and was likely procured from local sources (Bakken 2011). Retouched flakes are typically light-duty cutting, slicing, scraping, and sawing tools that were used on soft materials (meat, hides, and plant material) or moderately resistant materials (wood and bone). This tool suggests that butchering, animal/plant processing, hide working, and bone and woodworking may have occurred at the site.

12.5 Conclusions and Recommendations

Site 21CR163 is a sparse lithic scatter. No diagnostic artifacts were recovered, and the cultural context and age of the site is unknown. The site activities consist of lithic reduction or stone tool manufacture and some type of animal/plant processing. Radial shovel tests placed in five-meter intervals adjacent to the positive tests were negative. Portions of the site area have been disturbed by buried utilities and previous road construction.

Under Criterion D, the site lacks the potential to provide important information on the precontact period because it has a very sparse and limited artifact assemblage. The site is recommended not eligible for listing on the NRHP. No further archaeological work is recommended at the sites.

Figure 52. Site 21CR163 Photo of Grass and Woods on West Side of TH 101, Facing West.

Figure 53. Site 21CR163 Photo of Golf Course Area on East Side of TH 101, Facing East.

13. Summary and Recommendations

Five sites were identified during survey for the project, including four precontact period sites (21CR159, 21CR160, 21CR162, and 21CR163) and one multicomponent precontact and historic farmstead site (21CR161). Phase II testing was conducted at sites 21CR161 and 21CR162 to determine if they were eligible for listing on the NRHP. A summary of the sites, their NRHP status, and recommendations is presented in Table 53.

Table 53. Site Summary and Recommendations.

Site	Cultural Context, Type, & Function	Eligible for NRHP	Project Affect	Recommendation
21CR159	Indeterminate precontact period, sparse subsurface artifact scatter	No	No effect	No further archaeology work
21CR160	Indeterminate precontact period, subsurface lithic isolate	No	No effect	No further archaeology work
21CR161	Archaic period, subsurface artifact scatter, habitation; and historic farmstead (ca. 1857 to mid-1900s), subsurface artifact scatter	No	No effect	No further archaeology work
21CR162	Archaic period, subsurface artifact scatter, animal butchering and habitation	No	No effect	No further archaeology work
21CR163	Indeterminate precontact period, sparse subsurface lithic scatter	No	No effect	No further archaeology work

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APPENDIX A: OFFICE OF STATE ARCHAEOLOGIST LICENSES

APPLICATION FOR MINNESOTA
ANNUAL ARCHAEOLOGICAL RECONNAISSANCE SURVEY LICENSE

This license only applies to reconnaissance (Phase I) surveys conducted under Minnesota Statutes 138.31-.42 during calendar year _**2015**_. Separate licenses must be obtained for site evaluation (Phase II) surveys, for major site investigations (Phase III), for burial site authentications under Minnesota statutes 307.08, and for survey work that will continue into another calendar year. Only the below listed individual is licensed as a Principal Investigator, not the institution/agency/company or others who work for that entity. The licensed individual is required to comply with all the conditions attached to this license form. Permission to enter land for the purposes of archaeological investigation must be obtained from the landowner or land manager.

Name: Frank Florin

Institution/Agency/Company Affiliation: Florin Cultural Resource Services, LLC

Title/Position: Owner and Principal Investigator

Address: N12902 273rd Street, Boyceville, WI 54725

Work Phone: (715) 643-2918 E-Mail: florin@pressenter.com

Name of Advanced Degree Institution: U of MN, Minneapolis Year: 1996

Name of Department: Interdisciplinary Archaeological Studies Degree: _X_MA __MS __PhD

Purpose: (check all that may apply)
CRM X Academic Research ___ Institutional Field School ___

Type of Land: (check all that may apply)
State Owned _X_ County Owned _X_ Township/City Owned _X_
Other non-federal public ___ List: ____________

MHS Repository Agreement # __674______ Other Approved Curation Facility:____________

Previous License: Year 2014 Type: Annual Number: 14-038

Signed (applicant):_ Frank Florin ________ Date: __1/16/15__________

Required Attachments: *Curriculum Vita* and Documentation of Appropriate Experience ___ for previously unlicensed individuals.

Submit one copy of this form and attachments to:
Office of the State Archaeologist, Ft. Snelling History Center, St. Paul, MN 55111
612-725-2411 612-725-2729 FAX 612-725-2427 email: mnosa@state.mn.us

Minnesota Historical Society Approval: ____________ Date: 1-20-15
State Archaeologist Approval: ____________ Date: 1/20/15
License Number: 15-009 Form Date: 4/9/12

APPLICATION FOR MINNESOTA
EVALUATION/PHASE II SURVEY ARCHAEOLOGICAL LICENSE

This license only applies to evaluation investigations/Phase II surveys conducted under the provisions of Minnesota Statutes 138.31 - .42 at the specific site or locality listed on the application during calendar year 2015. Separate licenses must be obtained for reconnaissance (Phase I) surveys, for major investigation (Phase III) work, for burial site work under Minnesota statutes 307.08, for fieldwork that will continue into another calendar year, for fieldwork conducted at locations other than those listed below, and for fieldwork that significantly exceeds the Phase II specifications of the *SHPO Manual for Archaeological Projects in Minnesota.* Only the listed individual is licensed as a Principal Investigator, not the institution/agency/company or others who work for that entity. The licensed individual and the sponsoring entity are required to comply with all the conditions attached to the license.

Name: Frank Florin

Institution/Agency/Company Affiliation: Florin Cultural Resource Services, LLC

Title/Position: Owner / P.I.

Address: N12902 273rd Street Boyceville, WI 54725

Work Phone: 715 440 4241 E-Mail: florin@pressenter.com

Name of Advanced Degree Institution: U of MN Year: 1996

Name of Department: IAS Degree: X MA __MS __PhD

Site Number: 284-3/4 Project: TH101

Type of Land: (check all that may apply)
State Owned __ County Owned X Township/City Owned __ Manager:________
Other non-federal public__ List: ________

Purpose: (check all that may apply)
CRM X Academic Research ___ Institutional Field School ___

Expected Period Components/Contexts: Precontact X Contact___ Post-Contact___

MHS Repository Agreement # 674 Other Approved Curation Facility:________

Signed (applicant): Frank Florin Date: 5/22/15

Required Attachments: 1) *Curriculum Vita* X 2) Documentation of Appropriate Experience X
3) Research Design X
Previous License: Year 2015 Type Phase I Number 15-009
Submit one copy of this form and attachments to:
Office of the State Archaeologist, Ft. Snelling History Center, St. Paul, MN 55111
612-725-2411 612-725-2729 FAX 612-725-2427 email: mnosa@state.mn.us

Minnesota Historical Society Approval: [signature] Date: 5-26-15
State Archaeologist Approval: [signature] Date: 5/26/15
License Number: 15-058 Form Date: 2/15/11

APPENDIX B: ARTIFACT CATALOGS

21CR159-Phase I

Prov#	Count	Location	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Date
1.1	1	ST 23E	0-10	Faunal	mammalian, large	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	2.1	5/11/2015
2.1-2	2	ST 25E	25-40	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.8	5/11/2015
2.3	1	ST 25E	25-40	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	5/11/2015
2.4	1	ST 25E	25-40	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	4.6	5/11/2015

21CR160-Phase I

Prov#	Count	Location	Depth (cmbs)	Class	Desc1	Desc2	Desc5	Desc6	Size Grade	Weight (g)	ArtifactNotes	Date
1.1	1	ST 34E	160-170	Lithic	debris	shatter	quartz	>0-<50%	3 (<1/2"-1/4")	0.9		5/12/2015

21CR161-Phase I

Prov#	Count	Loc.	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
1.1	1	ST 25W	55-75	Lithic	debris	broken flake			unidentified chert	50-<100%		3 (<1/2"-1/4")	0.5	
1.0	1	ST 25W	55-75	Historic	metal	iron	nail, square					4 (<1/4")	0.7	
2.1	1	ST 26W	20-35	Faunal	Ovis aries/Capra hircus	tooth, molar	fragment					3 (<1/2"-1/4")	2.7	adult
3.1	1	ST 31W	0-20	Faunal	mammalian, large	rib, left	shaft, fragment					3 (<1/2"-1/4")	9.4	adult; cf. Ovis/ Capra/ Odocoileus sized
3.0	1	ST 31W	0-20	Historic	metal	aluminum	unidentified					3 (<1/2"-1/4")	0.1	
4.1	1	ST 46W	0-20	Lithic	debris	nonbifacial			quartzite	>0-<50%		3 (<1/2"-1/4")	1.2	
5.1	1	ST 48E	0-30	Lithic	debris	bipolar flake			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	5.4	
6.1	1	ST 54E	0-20	Lithic	debris	bipolar flake			Swan River Chert	>0-<50%		3 (<1/2"-1/4")	3.4	
7.1	1	ST 58E	30-40	Lithic	debris	shatter			quartzite	50-<100%		2 (<1"-1/2")	12	
7.2	1	ST 58E	30-40	Lithic	debris	broken flake			Red River Chert	>0-<50%		3 (<1/2"-1/4")	0.5	
8.1	1	ST 59E	20-35	Lithic	debris	bifacial thinning			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.7	
9.1	1	ST 68E	0-30	Lithic	debris	broken flake			quartzite	0%		3 (<1/2"-1/4")	0.3	refit
10.1	1	ST 75W	0-50	Lithic	debris	nonbifacial			unidentified chert	>0-<50%	probably heat treated	3 (<1/2"-1/4")	1.1	
11.1	1	ST 79W	0-40	Lithic	debris	other G4 flake			quartzite	0%		4 (<1/4")	0.2	

21CR161-Phase I

Prov#	Count	Loc.	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
12.1	1	ST 86E	15-25	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.7	base of Ap
13.1	1	ST 90E	10-25	Lithic	debris	bifacial thinning			Swan River Chert	0%	probably heat treated	3 (<1/2"-1/4")	1.5	
13.2	1	ST 90E	10-25	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.7	
14.1	1	ST 92E	0-20	Lithic	debris	shatter			quartz	0%		3 (<1/2"-1/4")	3	
15.1	1	ST 97E	10-20	Lithic	debris	nonbifacial			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	1.1	
15.2	1	ST 97E	10-20	Lithic	debris	broken flake			granitic	0%		3 (<1/2"-1/4")	0.4	
16.1	1	ST 103E	0-20	Lithic	debris	other G4 flake			Cedar Valley Chert	0%		4 (<1/4")	0.1	
17.1	1	ST 109E	0-10	Lithic	debris	bipolar flake			unidentified material	0%	probably heat treated	3 (<1/2"-1/4")	1.4	similar to Lake Superior Agate
17.0	1	ST 109E	0-10	Lithic	fire-cracked rock	angular/spall			granitic			3 (<1/2"-1/4")	1.4	
18.1	1	ST 116E	0-30	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.8	
19.1	1	ST 119E	0-20	Lithic	debris	decortication			Red River Chert	100%		3 (<1/2"-1/4")	0.7	
20.1	1	ST 133E	0-20	Lithic	debris	other G4 flake			Prairie du Chien Chert	0%		4 (<1/4")	0.1	
21.1	1	ST 136E	0-20	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	

21CR161-Phase I

Prov#	Count	Loc.	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
22.1	1	ST 136E	0-65	Lithic	debris	broken flake			quartzite	0%		3 (<1/2"-1/4")	1	
23.1	1	ST 136E	135-155	Lithic	debris	bipolar flake			quartz	0%		3 (<1/2"-1/4")	1.2	
24.1-3	3	ST 145E	0-20	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.5	
24.4	1	ST 145E	0-20	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
24.5	1	ST 145E	0-20	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.2	
24.6	1	ST 145E	0-20	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	
25.1	1	ST 145E	20-40	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
26.1	1	ST 145E	40-70	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	1	
27.1	1	ST 146E	0-36	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.3	
28.1	1	ST 148E	0-25	Lithic	debris	shatter			quartz	0%		2 (<1"-1/2")	9.5	
28.2	1	ST 148E	0-25	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	
29.1	1	ST 149E	0-40	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	Ap
30.1	1	ST 149E	50-80	Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	heat treated	2 (<1"-1/2")	3.6	

21CR161-Phase I

Prov#	Count	Loc.	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
30.2	1	ST 149E	50-80	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.7	
31.1	1	ST 150E	20-30	Lithic	tool	unpatterned flake	utilized flake	nonbifacial	Cedar Valley Chert	0%		2 (<1"-1/2")	2.5	Ap; finished, whole
32.1	1	ST 152E	10-34	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	Ap
33.1	1	ST 155E	0-40	Lithic	debris	shatter			quartz	0%		3 (<1/2"-1/4")	0.1	
34.1	1	ST 157E	60-80	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	
35.1	1	FS 1	0-0	Lithic	tool	unpatterned flake	utilized flake	broken	Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.1	broken/ worn out, medial
900.0	2	ST 28W	20-30	Historic	metal	iron	unidentified					3 (<1/2"-1/4")	1.8	
901.0	1	ST 29W	10-30	Historic	metal	iron	nail, square					3 (<1/2"-1/4")	17.9	
901.0	1	ST 29W	10-30	Historic	glass	clear	unidentified					3 (<1/2"-1/4")	0.3	
902.0	1	ST 32W	50-70	Historic	glass	clear	unidentified					3 (<1/2"-1/4")	2.4	
903.0	1	ST 40W	20-40	Historic	glass	clear	unidentified					3 (<1/2"-1/4")	1.3	
904.0	1	ST 72W	0-30	Historic	metal	iron	nail, square					3 (<1/2"-1/4")	8.8	
904.0	1	ST 72W	0-30	Historic	glass	clear	unidentified					4 (<1/4")	0.7	
905.0	1	ST 82W	0-50	Historic	glass	clear	unidentified					3 (<1/2"-1/4")	2.6	

21CR161-Phase II

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
1.1	1	ST 54ES5	0-15	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	probably heat treated	2 (<1"-1/2")	11.1	
2.1	1	ST 54EN5	0-25	cmbs		Lithic	debris	broken flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.1	
3.1	1	ST 54EW6	10-25	cmbs		Lithic	debris	other G4 flake			Red River Chert	0%		4 (<1/4")	0.1	
3.2	1	ST 54EW6	10-25	cmbs		Lithic	debris	other G4 flake			Swan River Chert	0%	probably heat treated	4 (<1/4")	0.2	
4.1	1	ST 54ESE6	0-40	cmbs		Lithic	debris	shatter			unidentified chert	0%		3 (<1/2"-1/4")	2.4	
5.1	1	ST 55EW5	0-15	cmbs		Lithic	debris	nonbifacial			Swan River Chert	>0-<50%	probably heat treated	3 (<1/2"-1/4")	1	
6.1	1	ST 55EW5	15-30	cmbs		Lithic	debris	nonbifacial			Tongue River Silica	>0-<50%		2 (<1"-1/2")	1.2	
6.2	1	ST 55EW5	15-30	cmbs		Lithic	debris	bipolar flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.7	
7.1	1	ST 55ENW7	0-10	cmbs		Lithic	debris	decortication			Grand Meadow Chert	50-<100%	burned	3 (<1/2"-1/4")	2.6	
8.1	1	ST 73WS7W5	0-30	cmbs		Lithic	debris	shatter			unidentified chert	>0-<50%	heat treated	3 (<1/2"-1/4")	1.7	
9.1	1	ST 75WN7	0-30	cmbs		Lithic	debris	bipolar flake			quartz	100%		2 (<1"-1/2")	3	
9.2	1	ST 75WN7	0-30	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.3	

21CR161-Phase II

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
10.1	1	ST 79WS5	0-40	cmbs		Lithic	debris	bipolar flake			quartzite	50-<100%		3 (<1/2"-1/4")	1.8	
11.1	1	ST 80WE5	0-20	cmbs		Lithic	debris	broken flake			Knife River Flint	100%		3 (<1/2"-1/4")	0.3	
12.1	1	ST 97EW5	40-50	cmbs		Lithic	debris	broken flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.2	B horizon
13.1	1	ST 97EE5	0-25	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	
14.1	1	ST 97EW5W5	0-15	cmbs		Lithic	debris	nonbifacial			Cedar Valley Chert	0%	probably heat treated	3 (<1/2"-1/4")	0.9	Ap
15.1	1	ST 109ES5	0-20	cmbs		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.3	
16.1	1	ST 119EW5	0-15	cmbs		Lithic	debris	nonbifacial			Red River Chert	100%		3 (<1/2"-1/4")	0.2	
17.1	1	ST 145ES5	30-50	cmbs		Lithic	core	bipolar (not rotated)			Tongue River Silica	>0-<50%		2 (<1"-1/2")	3.3	
18.1	1	ST 145EE5	0-30	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.1	
19.1	1	ST 145ES5E5	0-20	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	
19.2	1	ST 145ES5E5	0-20	cmbs		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	
20.1	1	ST 146EE5	0-20	cmbs		Lithic	debris	shatter			basaltic	50-<100%		2 (<1"-1/2")	5	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
20.2	1	ST 146EE5	0-20	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.3	
21.1	1	ST 148ES5	0-20	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	50-<100%	heat treated	3 (<1/2"-1/4")	1.4	
21.2	1	ST 148ES5	0-20	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	1.1	
22.1	1	ST 148EE5	0-20	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	2.1	
22.2	1	ST 148EE5	0-20	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.6	
23.1	1	ST 149ES5	20-40	cmbs		Lithic	debris	nonbifacial			Swan River Chert	>0-<50%	heat treated	2 (<1"-1/2")	1.3	
23.1	1	ST 149ES5	20-40	cmbs		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.1	
24.1	1	ST 149EE5	0-30	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	2.1	
24.2-3	2	ST 149EE5	0-30	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.8	
25.1	1	ST 150EE5	0-20	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	50-<100%		3 (<1/2"-1/4")	0.9	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
26.1	1	ST 150EE5	20-40	cmbs		Faunal	Gallus gallus (domestic chicken)	ulna, left	shaft, fragment					3 (<1/2"-1/4")	0.9	
27.1	1	ST 150EW5	0-20	cmbs		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.1	
28.1	1	ST 157EW5	50-63	cmbs		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	probably heat treated	3 (<1/2"-1/4")	1.5	
29.1	1	ST 157EE5E5	0-30	cmbs		Lithic	debris	shatter			quartz	50-<100%		3 (<1/2"-1/4")	2.7	
30.1	1	ST 157EE5	30-45	cmbs		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	
31.1	1	ST 157EE5E5	20-40	cmbs		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	
32.1	1	XU 1	10-20	cmbd		Lithic	debris	nonbifacial			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	1.5	
32.2	1	XU 1	10-20	cmbd		Lithic	debris	broken flake			Red River Chert	>0-<50%		3 (<1/2"-1/4")	0.4	
32.3	1	XU 1	10-20	cmbd		Lithic	debris	broken flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.1	
33.1	1	XU 1	20-30	cmbd		Lithic	debris	bifacial thinning			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.6	
34.1	1	XU 1	30-40	cmbd		Lithic	debris	broken flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.7	
34.2	1	XU 1	30-40	cmbd		Lithic	debris	broken flake			quartzite	0%		3 (<1/2"-1/4")	0.7	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
48.1	1	XU 7	0-40	cmbd		Lithic	debris	bipolar flake			Prairie du Chien Chert (oolitic)	>0-<50%	heat treated	2 (<1"-1/2")	4.1	Ap
48.2	1	XU 7	0-40	cmbd		Lithic	debris	decortication			unidentified chert	100%		3 (<1/2"-1/4")	1.4	Ap
48.3	1	XU 7	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.2	Ap
48.4	1	XU 7	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	Ap
48.5-7	3	XU 7	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	2.3	Ap
48.8	1	XU 7	0-40	cmbd		Lithic	debris	potlid flake			unidentified chert	0%	burned	3 (<1/2"-1/4")	0.2	Ap
48.-	1	XU 7	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.4	Ap
48.10-14	5	XU 7	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.6	Ap
48.15	1	XU 7	0-40	cmbd		Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%	heat treated	3 (<1/2"-1/4")	2	Ap
48.16	1	XU 7	0-40	cmbd		Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.7	Ap
48	1	XU 7	0-40	cmbd		Historic	ceramic	whiteware	fragment					3 (<1/2"-1/4")	1.5	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
48	1	XU 7	0-40	cmbd		Historic	metal	iron	nail, square					2 (<1"-1/2")	4.7	Ap
49.1	1	XU 7	40-50	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	heat treated	2 (<1"-1/2")	2.2	Ap
49.2-5	4	XU 7	40-50	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	2.1	Ap
49.6	1	XU 7	40-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.3	Ap
49.7	1	XU 7	40-50	cmbd		Lithic	debris	broken flake			quartzite	0%		3 (<1/2"-1/4")	0.4	Ap
49.8-9	2	XU 7	40-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	Ap
49.1	1	XU 7	40-50	cmbd		Lithic	debris	shatter			Red River Chert	>0-<50%		2 (<1"-1/2")	1.9	Ap
49	1	XU 7	40-50	cmbd		Lithic	fire-cracked rock	cobble with spall			granitic			1 (<2"-1")	226	Ap
50.1	1	XU 7	40-50	cmbd		Lithic	debris	nonbifacial			Red River Chert	100%		3 (<1/2"-1/4")	0.2	subsoil
50.2	1	XU 7	40-50	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.2	subsoil
51.1	1	XU 8	0-40	cmbd		Lithic	debris	bipolar flake			quartz	50-<100%		2 (<1"-1/2")	10.2	Ap
51.2	1	XU 8	0-40	cmbd		Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	100%		2 (<1"-1/2")	1.7	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
51.3	1	XU 8	0-40	cmbd		Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.2	Ap
51.4-7	4	XU 8	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	3.5	Ap
51.8-9	2	XU 8	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.5	Ap
51.1	1	XU 8	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	50-<100%		3 (<1/2"-1/4")	0.4	Ap
51.11	1	XU 8	0-40	cmbd		Lithic	debris	other G4 flake			unidentified material	0%		4 (<1/4")	0.3	Ap
51.12	1	XU 8	0-40	cmbd		Lithic	debris	broken flake			Red River Chert	0%		3 (<1/2"-1/4")	0.4	Ap
51.13-14	2	XU 8	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	Ap
51.15-25	11	XU 8	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	6.1	Ap
51.26-27	2	XU 8	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	Ap
51	1	XU 8	0-40	cmbd		Lithic	fire-cracked rock	spall			granitic			1 (<2"-1")	37.5	Ap
51	2	XU 8	0-40	cmbd		Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	4.1	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
52.1	1	XU 8	40-50	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	2.7	Ap
52.2	1	XU 8	40-50	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.3	Ap
52.3-4	2	XU 8	40-50	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.6	Ap
52.5	1	XU 8	40-50	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	4 (<1/4")	0.1	Ap
52.6-9	4	XU 8	40-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	2.6	Ap
52.10-11	2	XU 8	40-50	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.4	Ap
53.1	1	XU 8	40-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.2	subsoil
54.1	1	XU 9	0-60	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	Ap
54.2	1	XU 9	0-60	cmbd		Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	Ap
54.3-5	3	XU 9	0-60	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.7	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
54.6	1	XU 9	0-60	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	Ap
54	1	XU 9	0-60	cmbd		Historic	ceramic	whiteware	fragment					3 (<1/2"-1/4")	0.6	Ap
54	1	XU 9	0-60	cmbd		Historic	metal	iron	nail, wire					4 (<1/4")	0.4	Ap
55.1	1	ST FS1N5	20-40	cmbs		Lithic	debris	nonbifacial			quartzite	50-<100%		3 (<1/2"-1/4")	0.4	
56.1	1	XU 10	0-35	cmbd		Lithic	core	tested cobble			Lake Superior Agate	50-<100%		1 (<2"-1")	112	Ap
56.2	1	XU 10	0-35	cmbd		Lithic	tool	patterned bifacial	unfinished biface, stage 4		Cedar Valley Chert	0%	heat treated	2 (<1"-1/2")	3.1	Ap; broken/ worn out, distal
56.3	1	XU 10	0-35	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	probably heat treated	2 (<1"-1/2")	4.7	Ap
56.4-5	2	XU 10	0-35	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	3.7	Ap
56.6	1	XU 10	0-35	cmbd		Lithic	debris	nonbifacial			quartzite	50-<100%		3 (<1/2"-1/4")	1.5	Ap
56.7	1	XU 10	0-35	cmbd		Lithic	debris	nonbifacial			quartzite	>0-<50%		3 (<1/2"-1/4")	0.5	Ap
56.14	1	XU 10	0-35	cmbd		Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	Ap
56.15-16	2	XU 10	0-35	cmbd		Lithic	debris	broken flake			Swan River Chert	0%	probably heat treated	3 (<1/2"-1/4")	1.4	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
56.17-18	2	XU 10	0-35	cmbd		Lithic	debris	other G4 flake			Red River Chert	0%		4 (<1/4")	0.1	Ap
56.19-20	2	XU 10	0-35	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.6	Ap
56.21	1	XU 10	0-35	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.1	Ap
56.22-23	2	XU 10	0-35	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.3	Ap
56.24	1	XU 10	0-35	cmbd		Lithic	debris	broken flake			unidentified chert	0%		3 (<1/2"-1/4")	0.5	Ap
56.8	1	XU 10	0-35	cmbd		Lithic	debris	nonbifacial			quartzite	50-<100%		3 (<1/2"-1/4")	0.8	Ap
56.9-12	4	XU 10	0-35	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	1.9	Ap
56.13	1	XU 10	0-35	cmbd		Lithic	debris	bifacial thinning			Cedar Valley Chert	0%	heat treated	4 (<1/4")	0.1	Ap
57.1	1	XU 10	35-40	cmbd		Lithic	tool	unpatterned flake	utilized flake	decortication	Prairie du Chien Chert (oolitic)	50-<100%	heat treated	3 (<1/2"-1/4")	2.8	Ap transition; finished, whole; intentional backing
57.2	1	XU 10	35-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	Ap transition

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
57.3	1	XU 10	35-40	cmbd		Lithic	debris	edge preparation			Swan River Chert	0%	probably heat treated	3 (<1/2"-1/4")	1.1	Ap transition
57.4	1	XU 10	35-40	cmbd		Lithic	debris	other G4 flake			Swan River Chert	0%	probably heat treated	4 (<1/4")	0.1	Ap transition
57.5	1	XU 10	35-40	cmbd		Lithic	debris	broken flake			Tongue River Silica	>0-<50%	heat treated	3 (<1/2"-1/4")	0.4	Ap transition
57.6-7	2	XU 10	35-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.9	Ap transition
57.8	1	XU 10	35-40	cmbd		Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	5.8	Ap transition
57	1	XU 10	35-40	cmbd		Lithic	fire-cracked rock	angular/spall			quartzite			1 (<2"-1")	62.1	Ap transition
57	1	XU 10	35-40	cmbd		Lithic	fire-cracked rock	angular			quartzite			2 (<1"-1/2")	20.1	Ap transition
58.1	1	XU 10	40-50	cmbd		Lithic	debris	decortication			quartzite	100%		3 (<1/2"-1/4")	2.3	
58.2	1	XU 10	40-50	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.3	
58.3	1	XU 10	40-50	cmbd		Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.2	
58.4	1	XU 10	40-50	cmbd		Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.7	
58	1	XU 10	40-50	cmbd		Lithic	fire-cracked rock	cobble (non-friable)			granitic			1 (<2"-1")	192	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
59.1	1	XU 11	0-40	cmbd		Lithic	tool	unpatterned flake	utilized flake	nonbifacial	Knife River Flint	0%		3 (<1/2"-1/4")	0.5	Ap; finished, whole; intentional backing
59.2	1	XU 11	0-40	cmbd		Lithic	tool	patterned flake	side and end scraper	broken	Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.3	Ap; finished, whole
59.3	1	XU 11	0-40	cmbd		Lithic	tool	patterned bifacial	unfinished biface, stage 4		Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.2	Ap; broken/ worn out, medial
59.4	1	XU 11	0-40	cmbd		Lithic	core	freehand nonbifacial	unpatterned (multi-directional)	unprepared	Swan River Chert	0%	heat treated	2 (<1"-1/2")	7.4	Ap
59.5	1	XU 11	0-40	cmbd		Lithic	debris	bipolar flake			quartz	>0-<50%		3 (<1/2"-1/4")	1.3	Ap
59.6	1	XU 11	0-40	cmbd		Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	100%		2 (<1"-1/2")	2.1	Ap
59.7	1	XU 11	0-40	cmbd		Lithic	debris	nonbifacial			Cedar Valley Chert	0%	heat treated	3 (<1/2"-1/4")	1.1	Ap
59.8	1	XU 11	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	2.9	Ap
59.-9	1	XU 11	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.7	Ap
59.1	1	XU 11	0-40	cmbd		Lithic	debris	nonbifacial			quartz	>0-<50%		2 (<1"-1/2")	6.9	Ap
59.11	1	XU 11	0-40	cmbd		Lithic	debris	bifacial thinning			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.3	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
59.12-16	5	XU 11	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	3	Ap
59.17	1	XU 11	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	2 (<1"-1/2")	1.7	Ap
59.18-23	6	XU 11	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	3.9	Ap
59.24	1	XU 11	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	Ap
59.25	1	XU 11	0-40	cmbd		Lithic	debris	bifacial shaping			Swan River Chert	0%	heat treated	4 (<1/4")	0.1	Ap
59.26	1	XU 11	0-40	cmbd		Lithic	debris	alternate			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.3	Ap
59.27-29	3	XU 11	0-40	cmbd		Lithic	debris	other G4 flake			Swan River Chert	0%	heat treated	4 (<1/4")	0.6	Ap
59.30-36	7	XU 11	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	2.8	Ap
59.37-39	3	XU 11	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.6	Ap
59.40-44	5	XU 11	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.2	Ap
59.45-46	2	XU 11	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.4	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
60.1	1	XU 11	40-42	cmbd		Lithic	debris	broken flake			Tongue River Silica	0%	heat treated	3 (<1/2"-1/4")	0.4	transition
60.2	1	XU 11	40-42	cmbd		Lithic	debris	other G4 flake			Swan River Chert	0%	probably heat treated	4 (<1/4")	0.1	transition
61.1	1	XU 11	42-50	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	
61.2	1	XU 11	42-50	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.7	
61.3	1	XU 11	42-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
62.1	1	XU 11	50-60	cmbd		Lithic	debris	broken flake			Tongue River Silica	0%	heat treated	2 (<1"-1/2")	6.5	
62.2	1	XU 11	50-60	cmbd		Lithic	debris	broken flake			Red River Chert	>0-<50%	burned	3 (<1/2"-1/4")	1.4	
62	1	XU 11	50-60	cmbd		Lithic	fire-cracked rock	spall			granitic			1 (<2"-1")	37.8	
62	1	XU 11	50-60	cmbd		Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	8.4	
62	2	XU 11	50-60	cmbd		Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	100	
62	3	XU 11	50-60	cmbd		Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	23.3	
62	2	XU 11	50-60	cmbd		Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	1.1	
63.1	1	XU 12	0-40	cmbd		Lithic	tool	unpatterned flake	utilized flake	broken	Red River Chert	0%		3 (<1/2"-1/4")	0.2	Ap; broken/ worn out, medial

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
63.2	1	XU 12	0-40	cmbd		Lithic	debris	nonbifacial			quartzite	0%		3 (<1/2"-1/4")	1.1	Ap
63.3	1	XU 12	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	heat treated	3 (<1/2"-1/4")	1.3	Ap
63.4-5	2	XU 12	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	probably heat treated	2 (<1"-1/2")	7.2	Ap
63.6	1	XU 12	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	50-<100%	probably heat treated	2 (<1"-1/2")	2.3	Ap
63.7	1	XU 12	0-40	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	Ap
63.8	1	XU 12	0-40	cmbd		Lithic	debris	bifacial thinning			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.7	Ap
63.9	1	XU 12	0-40	cmbd		Lithic	debris	bifacial thinning			Cedar Valley Chert	0%	heat treated	3 (<1/2"-1/4")	0.5	Ap
63.1	1	XU 12	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.4	Ap
63.11	1	XU 12	0-40	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	4 (<1/4")	0.3	Ap
63.12	1	XU 12	0-40	cmbd		Lithic	debris	bifacial shaping			Swan River Chert	0%	heat treated	4 (<1/4")	0.1	Ap
63.1314	2	XU 12	0-40	cmbd		Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.3	Ap

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
63.15-21	7	XU 12	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.4	Ap
63.22	1	XU 12	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	Ap
63.23-28	6	XU 12	0-40	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	2	Ap
63.29	1	XU 12	0-40	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	Ap
63	2	XU 12	0-40	cmbd		Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	68.3	Ap
64.1	1	XU 12	40-42	cmbd		Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	50-<100%		2 (<1"-1/2")	1.3	transition
64.2	1	XU 12	40-42	cmbd		Lithic	debris	decortication			jasper	100%		3 (<1/2"-1/4")	1.4	transition
64.3	1	XU 12	40-42	cmbd		Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1	transition
64.4	1	XU 12	40-42	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	transition
64.5	1	XU 12	40-42	cmbd		Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	transition
64	1	XU 12	40-42	cmbd		Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	2	transition

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
64	1	XU 12	40-42	cmbd		Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	0.3	transition
65.1	1	XU 12	42-50	cmbd		Lithic	debris	broken flake			Tongue River Silica	0%	heat treated	3 (<1/2"-1/4")	0.4	
65.2	1	XU 12	42-50	cmbd		Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.6	
65.3-4	2	XU 12	42-50	cmbd		Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.3	
65.5	1	XU 12	42-50	cmbd		Botanical	wood charcoal							3 (<1/2"-1/4")	0.1	
66.1	1	XU 12	50-60	cmbd		Lithic	debris	bipolar flake			feldspar	50-<100%		2 (<1"-1/2")	12.5	
66.2	1	XU 12	50-60	cmbd		Lithic	debris	broken flake			Cedar Valley Chert	0%	heat treated	3 (<1/2"-1/4")	0.1	
66	1	XU 12	50-60	cmbd		Lithic	fire-cracked rock	angular			quartzite			1 (<2"-1")	24.8	
67.1	1	XU 10	42-50	cmbd	1	Botanical	wood charcoal							4 (<1/4")	0.3	Light Fraction
68.1	1	XU 10	42-50	cmbd	1	Botanical	wood charcoal							4 (<1/4")	0.3	Heavy Fraction
68.2	1	XU 10	42-50	cmbd	1	Botanical	undetermined			charred				4 (<1/4")	0.2	Heavy Fraction
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	58.9	Heavy Fraction
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	8.5	Heavy Fraction
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	1.7	Heavy Fraction

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	friable rounded piece			granitic			2 (<1"-1/2")	18.8	Heavy Fraction
68	2	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	friable rounded piece			granitic			3 (<1/2"-1/4")	4.2	Heavy Fraction
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	4.7	Heavy Fraction; approx. 10 pieces
68	1	XU 10	42-50	cmbd	1	Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	2	Heavy Fraction
69.1	1	XU 10	50-63	cmbd	1	Lithic	debris	bifacial shaping			Swan River Chert	0%		3 (<1/2"-1/4")	0.1	
69.2	1	XU 10	50-63	cmbd	1	Lithic	debris	other G4 flake			unidentified chert	0%	heat treated	4 (<1/4")	0	
69.3	1	XU 10	50-63	cmbd	1	Lithic	debris	other G4 flake			unidentified chert	>0-<50%	heat treated	4 (<1/4")	0.1	
69.4	1	XU 10	50-63	cmbd	1	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0	
69	2	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	friable rounded piece			granitic			3 (<1/2"-1/4")	4.6	
69	1	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	5.1	
69	1	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	spall			basaltic			3 (<1/2"-1/4")	0.6	
69	1	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	angular/spall			granitic			2 (<1"-1/2")	6	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
69	1	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	0.9	approx. 2 pieces
70.1-2	2	XU 10	50-63	cmbd	1	Lithic	debris	other G4 flake			quartz	0%		4 (<1/4")	0	Heavy Fraction
70.3	1	XU 10	50-63	cmbd	1	Botanical	fungus			charred				4 (<1/4")	0	Heavy Fraction
70.4	1	XU 10	50-63	cmbd	1	Botanical	undetermined			charred				4 (<1/4")	0.8	Heavy Fraction
70	3	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	50.8	Heavy Fraction
70	4	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	spall			granitic			3 (<1/2"-1/4")	4.7	Heavy Fraction
70	4	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	19	Heavy Fraction
70	6	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	friable rounded piece			granitic			3 (<1/2"-1/4")	12.7	Heavy Fraction
70	1	XU 10	50-63	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	27.2	Heavy Fraction; approx. 25 pieces
71.1	1	XU 10E	50-60	cmbd	1	Lithic	debris	other G4 flake			unidentified chert	100%	probably heat treated	4 (<1/4")	0	Heavy Fraction
71.2	1	XU 10E	50-60	cmbd	1	Lithic	debris	other G4 flake			unidentified chert	>0-<50%	heat treated	4 (<1/4")	0.1	Heavy Fraction
71.3	1	XU 10E	50-60	cmbd	1	Lithic	debris	shatter			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.3	Heavy Fraction
71.4	1	XU 10E	50-60	cmbd	1	Botanical	wood charcoal							4 (<1/4")	1.2	Heavy Fraction

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
71.5	1	XU 10E	50-60	cmbd	1	Botanical	fungus			charred				4 (<1/4")	0	Heavy Fraction
71.6	1	XU 10E	50-60	cmbd	1	Botanical	undetermined			charred				4 (<1/4")	0.8	Heavy Fraction
71	1	XU 10E	50-60	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	5.6	Heavy Fraction; approx. 8 pieces
71	1	XU 10E	50-60	cmbd	1	Lithic	fire-cracked rock	angular			basaltic			1 (<2"-1")	42	Heavy Fraction
72.1	1	XU 10 & 11 balk	50-60	cmbd	1	Botanical	wood charcoal							4 (<1/4")	0	Light Fraction
73.1	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	debris	other G4 flake			Swan River Chert	0%		4 (<1/4")	0	Heavy Fraction
73.2-3	2	XU 10 & 11 balk	50-60	cmbd	1	Lithic	debris	other G4 flake			Cedar Valley Chert	0%	heat treated	4 (<1/4")	0.1	Heavy Fraction
73.4	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	debris	other G4 flake			unidentified chert	0%		4 (<1/4")	0	Heavy Fraction
73.5	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	Heavy Fraction
73.6	1	XU 10 & 11 balk	50-60	cmbd	1	Botanical	undetermined			charred				4 (<1/4")	0.6	Heavy Fraction
73	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	cobble with spall			granitic			0 (<4"-2")	1900	Heavy Fraction
73	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	157	Heavy Fraction
73	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	spall			granitic			1 (<2"-1")	152	Heavy Fraction
73	2	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	16.6	Heavy Fraction

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
73	2	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	spall			granitic			3 (<1/2"-1/4")	2.7	Heavy Fraction
73	1	XU 10 & 11 balk	50-60	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	9.4	Heavy Fraction; approx. 25 pieces
74.1	1	XU 11 & 12	50-60	cmbd	1	Botanical	wood charcoal							4 (<1/4")	0.1	Light Fraction
75.1	1	XU 11 & 12	50-60	cmbd	1	Botanical	wood charcoal							4 (<1/4")	0.8	Heavy Fraction
75.2	1	XU 11 & 12	50-60	cmbd	1	Botanical	undetermined			charred				4 (<1/4")	0.5	Heavy Fraction
906	1	ST 25WS5	80100	cmbs		Historic	metal	iron	nail, wire					3 (<1/2"-1/4")	1.9	
907	2	ST 55EW7	0-30	cmbs		Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	16.1	
907	2	ST 55EW7	0-30	cmbs		Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	1.7	
908	1	ST 72WW7	0-40	cmbs		Historic	glass	clear	unidentified		molded			2 (<1"-1/2")	9.9	
909	1	ST 73WS7	0-20	cmbs		Historic	glass	clear	window fragment					3 (<1/2"-1/4")	0.5	
910	2	ST 73WS7	0-35	cmbs		Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	19.4	
911	1	ST 75WE7	0-20	cmbs		Historic	metal	iron	bolt					2 (<1"-1/2")	30.5	
912	1	ST 86EN5	0-20	cmbs		Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	15.7	
913.1	1	XU 3	30-40	cmbd		Historic	nonorganic	mortar	fragment					2 (<1"-1/2")	2.3	

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
914.1	1	XU 3	40-50	cmbd		Historic	ceramic	whiteware	fragment					2 (<1"-1/2")	2.6	dark soil above soil change
915	1	XU 4	40-50	cmbd		Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	64.2	refit
916	1	XU 5	0-20	cmbd		Historic	metal	copper	unidentified					1 (<2"-1")	22.5	in West wall
917	1	XU 8	50-60	cmbd		Lithic	fire-cracked rock	spall			granitic			3 (<1/2"-1/4")	1.9	
918	1	XU 11 & 12	50-60	cmbd	1	Lithic	fire-cracked rock	cobble (friable)			granitic			1 (<2"-1")	256	
918	1	XU 11 & 12	50-60	cmbd	1	Lithic	fire-cracked rock	angular			quartzite			2 (<1"-1/2")	3	
918	1	XU 11 & 12	50-60	cmbd	1	Lithic	fire-cracked rock	angular			granitic			1 (<2"-1")	21.9	
918	2	XU 11 & 12	50-60	cmbd	1	Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	6.1	
918	1	XU 11 & 12	50-60	cmbd	1	Lithic	fire-cracked rock	spall			basaltic			2 (<1"-1/2")	3	
919	1	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	cobble with spall			granitic			0 (<4"-2")	1191	PP 1
919	1	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	cobble (friable)			granitic			0 (<4"-2")	220.3	PP 1
919	4	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	18.2	PP 1
919	1	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	11.1	PP 1
919	95	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	49.6	PP 1
920	1	XU 10	40-49	cmbd	1	Lithic	fire-cracked rock	cobble (friable)			granitic			00 (>4")	1335	PP 2

Prov#	Count	Loc.	Depth	Depth Type	Feat #	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
921	1	XU 10	39-52	cmbd	1	Lithic	fire-cracked rock	cobble (friable)			granitic			00 (>4")	1758	PP 3
921	1	XU 10	39-52	cmbd	1	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	6.5	PP 3
921	18	XU 10	39-52	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	12.5	PP 3
922	1	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	cobble with angular			granitic			0 (<4"-2")	684	PP 4
922	3	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	7.1	PP 4
922	23	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	6.1	PP 4
923	1	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	cobble with spall			granitic			0 (<4"-2")	675	PP 5
923	1	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	spall			granitic			1 (<2"-1")	53.9	PP 5
923	1	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	spall			granitic			2 (<1"-1/2")	5	PP 5
923	24	XU 10	42-48	cmbd	1	Lithic	fire-cracked rock	crumb			granitic			3 (<1/2"-1/4")	11.1	PP 5
924	1	XU 10	41-47	cmbd	1	Lithic	fire-cracked rock	cobble (friable)			granitic			0 (<4"-2")	657	PP 6
925	1	XU 10	43-49	cmbd	1	Lithic	fire-cracked rock	angular/spall			basaltic			0 (<4"-2")	212.4	PP 7
926	1	XU 10	46-47	cmbd	1	Lithic	fire-cracked rock	spall			granitic			1 (<2"-1")	48.3	PP 8
926	1	XU 10	46-47	cmbd	1	Lithic	fire-cracked rock	angular/spall			granitic			2 (<1"-1/2")	18.6	PP 8
927	1	XU 10	46-51	cmbd		Lithic	fire-cracked rock	cobble (non-friable)			granitic			0 (<4"-2")	544	PP 9

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Prov#	Count	Location	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
1.1	1	ST 210E	70-90	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	50-<100%	probably heat treated	2 (<1"-1/2")	11.2	
1.2	1	ST 210E	70-90	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	
2.1	1	ST 211E	0-30	Lithic	debris	bifacial thinning			unidentified chert	0%		3 (<1/2"-1/4")	0.2	
3.1	1	ST 211E	30-50	Lithic	debris	decortication			Red River Chert	100%		3 (<1/2"-1/4")	1.1	
4.1	1	ST 212E	40-60	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
4.2	1	ST 212E	40-60	Lithic	debris	other G4 flake			unidentified chert	100%	probably heat treated	4 (<1/4")	0.2	
4.3	1	ST 212E	40-60	Historic	metal	lead	bullet shell					4 (<1/4")	1.7	
5.1	1	ST 215E	70-85	Lithic	debris	other G4 flake			Red River Chert	>0-<50%		4 (<1/4")	0.2	
6.1-2	2	ST 215E	110-130	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
7.1	1	ST 215E	140-150	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
8.1	1	ST 215E	145-160	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
9.1	1	ST 220E	220-235	Lithic	debris	nonbifacial			quartzite	>0-<50%		2 (<1"-1/2")	10.5	
10.1-2	2	ST 206E	60-70	Faunal	mammalian, large	longbone	fragment					2 (<1"-1/2")	11.9	sent for dating, but was undateable

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Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
1.1	1	ST 206EE5	0-20	cmbs	Faunal	mammalian	unidentifiable	fragment					2 (<1"-1/2")	0.8	
1.2-4	3	ST 206EE5	0-20	cmbs	Faunal	mammalian	unidentifiable	fragment					3 (<1/2"-1/4")	1	
1.5	1	ST 206EE5	0-20	cmbs	Faunal	Sus scrofa (pig)	sternum	fragment					2 (<1"-1/2")	1.5	adult; xiphoid fragment
2.1	1	ST 206EE5	20-45	cmbs	Faunal	mammalian, large	unidentifiable	fragment					2 (<1"-1/2")	0.9	rib shaft or vertebra spine fragment
3.1	1	ST 206EW5	50-70	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.1	
4.1	1	ST 210ES5	50-70	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
5.1	1	ST 210EN5	60-90	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.7	
6.1	1	ST 210ESW7	60-80	cmbs	Lithic	debris	other G4 flake			quartz	0%		4 (<1/4")	0.2	
7.1	1	ST 210ESW7	100-110	cmbs	Lithic	debris	shatter			quartz	0%		3 (<1/2"-1/4")	0.8	
8.1-2	2	ST 210ESW7S5	130-140	cmbs	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
9.1	1	ST 210ENW7	40-50	cmbs	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.7	
10.1	1	ST 215EW5	100-115	cmbs	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.2	
11.1	1	ST 215ES5	95-110	cmbs	Faunal	mammalian, large	tooth	fragment	burned				3 (<1/2"-1/4")	0.4	crown fragment
12.2	1	ST 215ES5E5	30-50	cmbs	Faunal	mammalian, medium/large	unidentifiable	fragment					3 (<1/2"-1/4")	1.3	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
12.3-8	6	ST 215ES5E5	30-50	cmbs	Faunal	mammalian	unidentifiable	fragment					3 (<1/2"-1/4")	0.9	
12.9-19	11	ST 215ES5E5	30-50	cmbs	Faunal	mammalian	unidentifiable	fragment					4 (<1/4")	0.7	
12.1	1	ST 215ES5E5	30-50	cmbs	Faunal	Bos/Bison sp.	tooth, molar	fragment	charred				3 (<1/2"-1/4")	2.9	crown fragment
13.1	1	ST 215ES5E5	50-60	cmbs	Faunal	mammalian, large	tooth	fragment	burned				3 (<1/2"-1/4")	0.2	
14.1	1	ST 215ES5E5	100-120	cmbs	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
15.1	1	ST 215ES5E5	115-125	cmbs	Faunal	mammalian, large	unidentifiable	fragment	burned				4 (<1/4")	0.1	
15.2	1	ST 215ES5E5	115-125	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
16.1	1	ST 215ES5E10	35-50	cmbs	Faunal	mammalian, medium/large	unidentifiable	fragment					3 (<1/2"-1/4")	0.6	
17.1	1	ST 215ES5E10	50-60	cmbs	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	1.7	
17.2	1	ST 215ES5E10	50-60	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
18.1	1	ST 215ES5E10	60-80	cmbs	Lithic	debris	broken flake			quartz	50-<100%		3 (<1/2"-1/4")	0.1	
19.1	1	ST 215ES5E10	80-100	cmbs	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.7	
20.1-2	2	ST 215ES5E15	60-70	cmbs	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
21.1	1	ST 215ES10E5	100-120	cmbs	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
22.1	1	ST 215ES10E15	20-40	cmbs	Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
23.1	1	ST 215ES10E15	90-110	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.6	
24.1	1	ST 215ES10E15	100-120	cmbs	Faunal	mammalian	unidentifiable	fragment	burned				4 (<1/4")	0.2	
24.2	1	ST 215ES10E15	100-120	cmbs	Lithic	tool	unpatterned flake	utilized flake	nonbifacial	Prairie du Chien Chert (oolitic)	>0-<50%		2 (<1"-1/2")	5.1	finished, whole
25.1	1	ST 215ES10E15	140-150	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	
26.1	1	ST 215ES10E15	150-160	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
27.1	1	ST 215ES10E15	160-170	cmbs	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
28.1	1	ST 215ES15E15	190-200	cmbs	Lithic	debris	bifacial thinning			Gunflint Silica	0%		3 (<1/2"-1/4")	0.4	
29.1	1	ST 215ES20E15	170-180	cmbs	Faunal	Bison bison (bison)	calcaneous, right	fragment					2 (<1"-1/2")	10.7	
29.2	1	ST 215ES20E15	170-180	cmbs	Faunal	mammalian, large	unidentifiable	fragment					2 (<1"-1/2")	5.2	
29.3	1	ST 215ES20E15	170-180	cmbs	Faunal	Gastropoda	shell	fragment					3 (<1/2"-1/4")	0.1	
30.1	1	ST 220ESE7	140-160	cmbs	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.6	
31.1-2	2	ST 220EE5	210-220	cmbs	Faunal	mammalian	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	0.6	
31.3	1	ST 220EE5	210-220	cmbs	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
32.1	1	XU 1	30-40	cmbd	Lithic	debris	broken flake			Swan River Chert	0%		3 (<1/2"-1/4")	1.7	
32.2	1	XU 1	30-40	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
32.3	1	XU 1	30-40	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	refit
33.1	1	XU 1	40-50	cmbd	Lithic	debris	nonbifacial			quartzite	0%		3 (<1/2"-1/4")	2.4	
33.2	1	XU 1	40-50	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	2	
33.3	1	XU 1	40-50	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.4	
33.4	1	XU 1	40-50	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	
33.5	1	XU 1	40-50	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert	0%		4 (<1/4")	0.4	
33.6	1	XU 1	40-50	cmbd	Lithic	debris	shatter			Cedar Valley Chert	0%	heat treated	3 (<1/2"-1/4")	1.4	
34.1	1	XU 1	50-60	cmbd	Lithic	debris	edge preparation			Cedar Valley Chert	0%		3 (<1/2"-1/4")	0.5	
34.2	1	XU 1	50-60	cmbd	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	
34.3	1	XU 1	50-60	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.4	
34.4	1	XU 1	50-60	cmbd	Lithic	debris	shatter			quartz	50-<100%		3 (<1/2"-1/4")	1.5	
35.1	1	XU 1	60-70	cmbd	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	1.6	
35.2	1	XU 1	60-70	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.6	
36.1	1	XU 1	70-80	cmbd	Lithic	tool	pecked/ground stone (unpatterned)	hammerstone		granitic	50-<100%		1 (<2"-1")	399	finished, whole

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
36.2	1	XU 1	70-80	cmbd	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	100%		3 (<1/2"-1/4")	1.7	
37.1	1	XU 1	80-90	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert	0%	heat treated	4 (<1/4")	0.1	
38.1	1	XU 1	90-100	cmbd	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	100%		3 (<1/2"-1/4")	1.6	
38.2	1	XU 1	90-100	cmbd	Lithic	debris	bipolar flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.8	
39.1	1	XU 2	40-50	cmbd	Lithic	tool	unpatterned flake	utilized flake	nonbifacial	Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	4.7	finished, whole; intentional backing
39.2	1	XU 2	40-50	cmbd	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	100%		2 (<1"-1/2")	5.4	
39.3	1	XU 2	40-50	cmbd	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
39.4	1	XU 2	40-50	cmbd	Lithic	debris	broken flake			Swan River Chert	0%	probably heat treated	3 (<1/2"-1/4")	0.7	
39.5	1	XU 2	40-50	cmbd	Lithic	debris	other G4 flake			Swan River Chert	0%	heat treated	4 (<1/4")	0.1	
39.6	1	XU 2	40-50	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert	0%	heat treated	4 (<1/4")	0.2	
39.7	1	XU 2	40-50	cmbd	Lithic	debris	other G4 flake			quartzite	0%		4 (<1/4")	0.2	
39.8-9	2	XU 2	40-50	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.9	
39.1	1	XU 2	40-50	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	
40.1	1	XU 2	50-60	cmbd	Lithic	debris	bifacial thinning			Cedar Valley Chert	0%	heat treated	3 (<1/2"-1/4")	1.1	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
41.1	1	XU 2	60-70	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.4	
42.1	1	XU 2	70-80	cmbd	Lithic	tool	unpatterned flake	utilized flake & side scraper	decortication	Prairie du Chien Chert (oolitic)	>0-<50%		3 (<1/2"-1/4")	7.9	finished, whole; intentional backing
42.2	1	XU 2	70-80	cmbd	Lithic	debris	nonbifacial			Swan River Chert	>0-<50%		2 (<1"-1/2")	2.9	
42.3	1	XU 2	70-80	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.6	
42.4	1	XU 2	70-80	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
43.1	1	XU 2	80-90	cmbd	Lithic	debris	nonbifacial			Prairie du Chien Chert (oolitic)	>0-<50%	probably heat treated	3 (<1/2"-1/4")	0.4	
43.2	1	XU 2	80-90	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
43.3	1	XU 2	80-90	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	50-<100%		2 (<1"-1/2")	2.4	
43.4	1	XU 2	80-90	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	heat treated	3 (<1/2"-1/4")	0.5	
43.5	1	XU 2	80-90	cmbd	Lithic	debris	broken flake			Tongue River Silica	0%	heat treated	3 (<1/2"-1/4")	0.7	
43.6	1	XU 2	80-90	cmbd	Lithic	debris	broken flake			quartzite	0%		3 (<1/2"-1/4")	0.3	
43.7	1	XU 2	80-90	cmbd	Lithic	debris	other G4 flake			quartzite	0%		4 (<1/4")	0.2	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
43.8	1	XU 2	80-90	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	4 (<1/4")	0.1	
44.1	1	XU 3	40-50	cmbd	Faunal	mammalian, large	mandible	fragment					2 (<1"-1/2")	2.4	slightly worn
45.1-2	2	XU 3	50-60	cmbd	Faunal	mammalian	unidentifiable	fragment					2 (<1"-1/2")	1.3	
46.1	1	XU 3	60-70	cmbd	Historic	metal	iron	wire fragment					4 (<1/4")	2.5	
47.1	1	XU 3	100-110	cmbd	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	50-<100%	probably heat treated	3 (<1/2"-1/4")	2.9	
48.1-2	2	XU 3	110-120	cmbd	Faunal	Vertebrata	unidentifiable	fragment	burned				4 (<1/4")	0.1	
48.3	1	XU 3	110-120	cmbd	Lithic	debris	bipolar flake			Red River Chert	50-<100%		3 (<1/2"-1/4")	2.3	
48.4	1	XU 3	110-120	cmbd	Lithic	debris	other G4 flake			quartzite	0%		4 (<1/4")	0.2	
48.5	1	XU 3	110-120	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.1	
49.1-3	3	XU 3	120-130	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.5	
49.4	1	XU 3	120-130	cmbd	Lithic	debris	decortication			quartzite	100%		3 (<1/2"-1/4")	2	
49.5	1	XU 3	120-130	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.2	
49.6	1	XU 3	120-130	cmbd	Lithic	debris	other G4 flake			quartzite	0%		4 (<1/4")	0.1	

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Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
49.7	1	XU 3	120-130	cmbd	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	50-<100%		2 (<1"-1/2")	4.9	
49.8	1	XU 3	120-130	cmbd	Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	1.1	
50.1-5	5	XU 3	130-140	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	1.1	
50.6	1	XU 3	130-140	cmbd	Lithic	debris	decortication			Prairie du Chien Chert (oolitic)	50-<100%		2 (<1"-1/2")	21.4	
50.7	1	XU 3	130-140	cmbd	Lithic	debris	bipolar flake			quartzite	>0-<50%		3 (<1/2"-1/4")	1.7	
50.8	1	XU 3	130-140	cmbd	Lithic	fire-cracked rock	angular			granitic			3 (<1/2"-1/4")	0.4	
51.1-2	2	XU 3	140-150	cmbd	Faunal	Vertebrata	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	0.3	
52.1	1	XU 4	0-40	cmbd	Faunal	Bos/Bison sp.	tooth, molar	fragment					2 (<1"-1/2")	4.5	
53.1	1	XU 4	40-50	cmbd	Faunal	Bos/Bison sp.	metapodial	distal fragment					2 (<1"-1/2")	5.2	juvenile
53.2-3	2	XU 4	40-50	cmbd	Faunal	mammalian, large	unidentifiable	fragment		cut marks			3 (<1/2"-1/4")	2.4	1 w/ saw cut
54.1	1	XU 4	50-60	cmbd	Faunal	Bos/Bison sp.	tooth, molar	fragment					2 (<1"-1/2")	21.9	right, 2nd molar, mandibular
54.2	1	XU 4	50-60	cmbd	Faunal	Odocoileus virginianus (white-tailed deer)	navicularcuboid	fragment		cut marks			1 (<2"-1")	10.7	right, cut marks on anterior face

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
54.3	1	XU 4	50-60	cmbd	Faunal	Odocoileus virginianus (white-tailed deer)	calcaneous, right	fragment		cut marks			2 (<1"-1/2")	7.9	
54.4	1	XU 4	50-60	cmbd	Faunal	mammalian, large	unidentifiable	fragment					2 (<1"-1/2")	16.7	
54.5-8	4	XU 4	50-60	cmbd	Faunal	mammalian, large	unidentifiable	fragment					3 (<1/2"-1/4")	3.3	
55.1	1	XU 4	100-110	cmbd	Lithic	debris	nonbifacial			Swan River Chert	50-<100%	heat treated	3 (<1/2"-1/4")	1.3	
56.1-6	6	XU 4	110-120	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	1	
57.1	1	XU 4	120-130	cmbd	Lithic	core	tested cobble			quartzite	50-<100%		1 (<2"-1")	134	piece "A"
57.2-4	3	XU 4	120-130	cmbd	Lithic	debris	decortication			quartzite	50-<100%		2 (<1"-1/2")	21.6	refit with "A"
57.5	1	XU 4	120-130	cmbd	Lithic	debris	decortication			quartzite	50-<100%		3 (<1/2"-1/4")	4.7	refit with "A"
57.6	1	XU 4	120-130	cmbd	Lithic	debris	shatter			quartzite	>0-<50%		2 (<1"-1/2")	15.2	refit with "A"
57.7	1	XU 4	120-130	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
58.1-6	6	XU 4	130-140	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	2.3	
58.7	1	XU 4	130-140	cmbd	Lithic	tool	unpatterned flake	utilized flake	unidentified	Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	1.2	finished, whole; intentional backing

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
58.8	1	XU 4	130-140	cmbd	Lithic	debris	bifacial shaping			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0	
58.9	1	XU 4	130-140	cmbd	Lithic	debris	broken flake			chalcedony	>0-<50%		3 (<1/2"-1/4")	0.6	
58.1	1	XU 4	130-140	cmbd	Lithic	debris	broken flake			Swan River Chert	0%		3 (<1/2"-1/4")	0.2	
58.11	1	XU 4	130-140	cmbd	Lithic	debris	other G4 flake			Swan River Chert	0%	probably heat treated	4 (<1/4")	0.1	
58.12	1	XU 4	130-140	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0	
58.13	1	XU 4	130-140	cmbd	Lithic	debris	shatter			quartzite	50-<100%		2 (<1"-1/2")	2.5	
59.2	1	XU 4	140-150	cmbd	Faunal	Bison bison (bison)	tooth, molar	fragment					1 (<2"-1")	35.5	was complete prior to dating, many fragments refit
59.1	1	XU 4	140-150	cmbd	Lithic	debris	shatter			quartzite	>0-<50%		2 (<1"-1/2")	5.6	
60.1	1	XU 5	0-30	cmbd	Faunal	mammalian, large	unidentifiable	fragment					2 (<1"-1/2")	1.4	
61.1	1	XU 5	30-40	cmbd	Faunal	Bos/Bison sp.	vertebra, thoracic	centrum fragment					1 (<2"-1")	24.4	juvenile
61.2	1	XU 5	30-40	cmbd	Historic	metal	iron	nail, round					3 (<1/2"-1/4")	11.8	
62.1	1	XU 5	40-50	cmbd	Faunal	Bos/Bison sp.	vertebra, thoracic	centrum fragment					2 (<1"-1/2")	2.2	juvenile; might refit to 61.1
63.1-2	2	XU 5	50-60	cmbd	Faunal	mammalian, large	unidentifiable	fragment		cut marks			2 (<1"-1/2")	5.1	1 w/ saw cut

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
63.3	1	XU 5	50-60	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	heat treated	4 (<1/4")	0.1	
64.1	1	XU 5	60-70	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.6	
64.2	1	XU 5	60-70	cmbd	Historic	metal	iron	nail, unidentified					4 (<1/4")	0.1	tip of nail from 61.2
65.1-2	2	XU 5	100-110	cmbd	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
65.3	1	XU 5	100-110	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.2	
65.4	1	XU 5	100-110	cmbd	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%		2 (<1"-1/2")	3.7	
66.1	1	XU 5	110-120	cmbd	Lithic	debris	decortication			basaltic	100%		3 (<1/2"-1/4")	2.5	
66.2	1	XU 5	110-120	cmbd	Lithic	debris	edge preparation			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.7	
66.3	1	XU 5	110-120	cmbd	Lithic	debris	broken flake			Grand Meadow Chert	>0-<50%		3 (<1/2"-1/4")	0.7	
66.4	1	XU 5	110-120	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.3	
67.1	1	XU 5	120-130	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
67.2	1	XU 5	120-130	cmbd	Lithic	debris	decortication			Red River Chert	100%		3 (<1/2"-1/4")	1.3	
67.3	1	XU 5	120-130	cmbd	Lithic	fire-cracked rock	friable rounded piece			granitic			2 (<1"-1/2")	20.9	

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
68.1	1	XU 5	130-140	cmbd	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
68.2	1	XU 5	130-140	cmbd	Lithic	debris	bifacial shaping			Swan River Chert	0%	heat treated	4 (<1/4")	0.1	
68.3	1	XU 5	130-140	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	>0-<50%		3 (<1/2"-1/4")	0.2	
68.4	1	XU 5	130-140	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.2	
68.5	1	XU 5	130-140	cmbd	Lithic	debris	shatter			chalcedony	>0-<50%		3 (<1/2"-1/4")	0.7	
68.6	1	XU 5	130-140	cmbd	Lithic	fire-cracked rock	angular			granitic			2 (<1"-1/2")	12.7	
69.1	1	XU 5	140-150	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.2	
69.2	1	XU 5	140-150	cmbd	Lithic	tool	unpatterned flake	retouched flake	decortication	Red River Chert	50-<100%	probably heat treated	1 (<2"-1")	37.6	finished, whole
69.3	1	XU 5	140-150	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.8	refit
69.4	1	XU 5	140-150	cmbd	Lithic	tool	unpatterned flake	utilized flake	broken	Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	finished, whole
70.1-2	2	XU 5	150-160	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.3	
70.3	1	XU 5	150-160	cmbd	Faunal	Vertebrata	unidentifiable	fragment	calcined & charred				3 (<1/2"-1/4")	0.4	
70.4-5	2	XU 5	150-160	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.3	
71.1	1	XU 5	160-170	cmbd	Lithic	tool	unpatterned flake	utilized flake	nonbifacial	Prairie du Chien Chert (oolitic)	>0-<50%		1 (<2"-1")	12.7	finished, whole

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
72.1	1	XU 5	170-180	cmbd	Faunal	Vertebrata	unidentifiable	fragment	partially charred				3 (<1/2"-1/4")	0.2	
72.2	1	XU 5	170-180	cmbd	Lithic	tool	patterned flake	side and end scraper	nonbifacial	Swan River Chert	>0-<50%	probably heat treated	2 (<1"-1/2")	1.8	finished, whole
72.3	1	XU 5	170-180	cmbd	Lithic	debris	bifacial shaping			unidentified chert	0%		3 (<1/2"-1/4")	0.1	
72.4	1	XU 5	170-180	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	
72.5	1	XU 5	170-180	cmbd	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%	probably heat treated	2 (<1"-1/2")	7.5	
73.1	1	XU 5	180-230	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.2	
74.1	1	XU 6	60-70	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	1.6	
75.1	1	XU 6	90-100	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
75.2	1	XU 6	90-100	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	0.8	
76.1	1	XU 6	100-110	cmbd	Faunal	Vertebrata	unidentifiable	fragment	calcined				4 (<1/4")	0.1	
76.2	1	XU 6	100-110	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%	probably heat treated	4 (<1/4")	0.1	
77.1-2	2	XU 6	110-120	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				4 (<1/4")	0.4	
77.3	1	XU 6	110-120	cmbd	Lithic	debris	broken flake			Swan River Chert	0%	heat treated	3 (<1/2"-1/4")	0.5	

21CR162-Phase II

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
77.4	1	XU 6	110-120	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	
78.1	1	XU 6	120-130	cmbd	Lithic	core	tested cobble			unidentified material	50-<100%		1 (<2"-1")	293	
78.-2	1	XU 6	120-130	cmbd	Lithic	core	tested cobble			quartzite	50-<100%		1 (<2"-1")	39.6	
78.3	1	XU 6	120-130	cmbd	Lithic	debris	bipolar flake			granitic	50-<100%		2 (<1"-1/2")	18.3	
78.4	1	XU 6	120-130	cmbd	Lithic	debris	decortication			Red River Chert	100%		2 (<1"-1/2")	3.4	
78.5	1	XU 6	120-130	cmbd	Lithic	debris	bifacial thinning			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.5	
78.6	1	XU 6	120-130	cmbd	Lithic	debris	shatter			Swan River Chert	>0-<50%	heat treated	2 (<1"-1/2")	2.7	
78.7	1	XU 6	120-130	cmbd	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	0%		2 (<1"-1/2")	11.9	
78.-8	1	XU 6	120-130	cmbd	Lithic	fire-cracked rock	angular			basaltic			2 (<1"-1/2")	13.2	
79.1	1	XU 6	130-140	cmbd	Lithic	tool	patterned bifacial	unfinished biface, stage 4		Prairie du Chien Chert (oolitic)	>0-<50%		2 (<1"-1/2")	5	broken/worn out, proximal
79.2	1	XU 6	130-140	cmbd	Lithic	debris	shatter			unidentified chert	0%		2 (<1"-1/2")	2.8	
79.3	1	XU 6	130-140	cmbd	Lithic	debris	nonbifacial			Prairie du Chien Chert	0%		3 (<1/2"-1/4")	0.5	
79.4-5	2	XU 6	130-140	cmbd	Lithic	debris	other G4 flake			Prairie du Chien Chert (oolitic)	0%		4 (<1/4")	0.2	

21CR162-Phase II

Prov#	Count	Location	Depth	Depth Type	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Desc7	Size Grade	Weight (g)	Artifact Notes
80.1	1	XU 6	140-150	cmbd	Faunal	mammalian	unidentifiable	fragment	calcined				3 (<1/2"-1/4")	0.4	
80.2-3	2	XU 6	140-150	cmbd	Faunal	mammalian	unidentifiable	fragment					4 (<1/4")	0.2	
80.4	1	XU 6	140-150	cmbd	Lithic	debris	broken flake			Prairie du Chien Chert (oolitic)	0%		3 (<1/2"-1/4")	0.3	
80.5	1	XU 6	140-150	cmbd	Lithic	debris	broken flake			Red River Chert	50-<100%		3 (<1/2"-1/4")	0.2	
80.6	1	XU 6	140-150	cmbd	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%		3 (<1/2"-1/4")	1	
81.1	1	XU 6	160-170	cmbd	Lithic	debris	alternate			Prairie du Chien Chert (oolitic)	0%	probably heat treated	3 (<1/2"-1/4")	1.2	

21CR163-Phase I

Prov.	Count	Location	Depth (cmbs)	Class	Desc1	Desc2	Desc3	Desc4	Desc5	Desc6	Size Grade	Weight (g)	Artifact Notes
1.1	1	ST 96W	70-80	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%	2 (<1"-1/2")	2.9	
1.2	1	ST 96W	70-81	Lithic	debris	shatter			Prairie du Chien Chert (oolitic)	>0-<50%	3 (<1/2"-1/4")	1.2	
2.1	1	ST 199E	42673.00	Lithic	tool	unpatterned flake (bifacial retouch)	retouched flake	decortication	Prairie du Chien Chert (oolitic)	>0-<50%	2 (<1"-1/2")	10.2	broken/worn out, medial

APPENDIX C: RADIOCARBON DATING REPORTS FROM BETA ANALYTIC INC.

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4985 SW 74 Court
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www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

February 9, 2016

Mr. Frank Florin
Florin Cultural Resource Services
N12902 273rd Street
Boyceville, WI 54725
USA

RE: Radiocarbon Dating Results For Samples 21CR161 F1 XU10-11balk 50-60cm, 21CR161 F1 XU10 50-63cm

Dear Mr. Florin:

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

The cost of the analysis was charged to the American Express card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA

BETA ANALYTIC INC.

DR. M.A. TAMERS and MR. D.G. HOOD

4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Frank Florin — Report Date: 2/9/2016

Florin Cultural Resource Services — Material Received: 2/1/2016

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 430178	4460 +/- 30 BP	-26.2 o/oo	4440 +/- 30 BP

SAMPLE : 21CR161 F1 XU10-11balk 50-60cm
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 3325 to 3215 (Cal BP 5275 to 5165) and Cal BC 3175 to 3160 (Cal BP 5125 to 5110) and Cal BC 3120 to 3010 (Cal BP 5070 to 4960) and Cal BC 2975 to 2960 (Cal BP 4925 to 4910) and Cal BC 2950 to 2940 (Cal BP 4900 to 4890)

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 430179	4330 +/- 30 BP	-24.1 o/oo	4340 +/- 30 BP

SAMPLE : 21CR161 F1 XU10 50-63cm
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid
2 SIGMA CALIBRATION : Cal BC 3020 to 2895 (Cal BP 4970 to 4845)

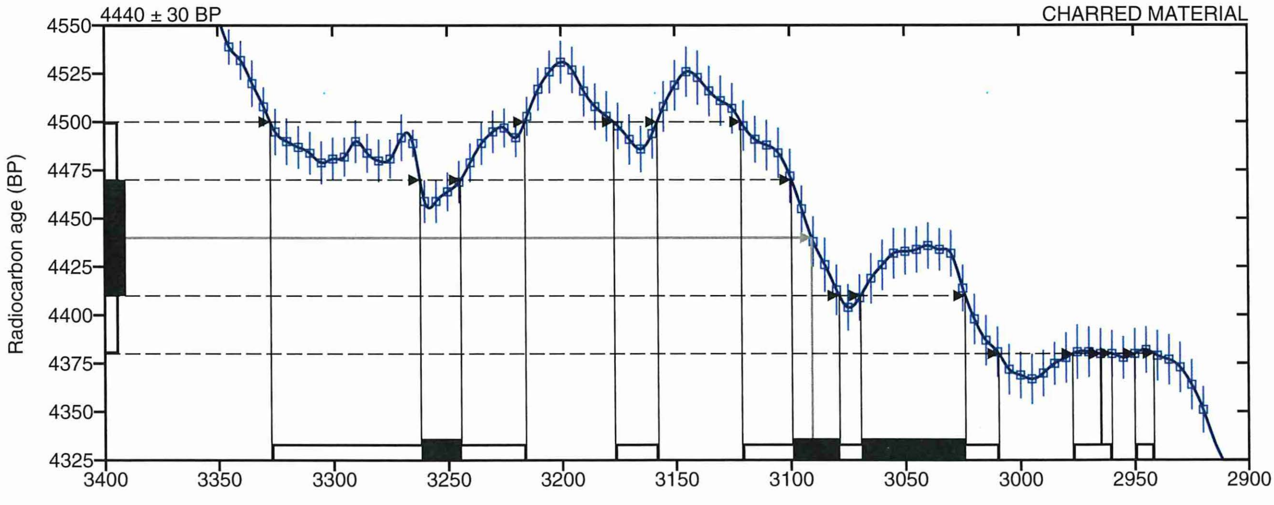
Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -26.2 o/oo : lab. mult = 1)

Laboratory number	**Beta-430178 : 21CR161 F1 XU10-11BALK 50-60CM**
Conventional radiocarbon age	**4440 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 3325 to 3215 (Cal BP 5275 to 5165)** **Cal BC 3175 to 3160 (Cal BP 5125 to 5110)** **Cal BC 3120 to 3010 (Cal BP 5070 to 4960)** **Cal BC 2975 to 2960 (Cal BP 4925 to 4910)** **Cal BC 2950 to 2940 (Cal BP 4900 to 4890)**
Intercept of radiocarbon age with calibration curve	Cal BC 3090 (Cal BP 5040)
Calibrated Result (68% Probability)	Cal BC 3260 to 3245 (Cal BP 5210 to 5195) Cal BC 3100 to 3080 (Cal BP 5050 to 5030) Cal BC 3070 to 3025 (Cal BP 5020 to 4975)



Database used
INTCAL13

References

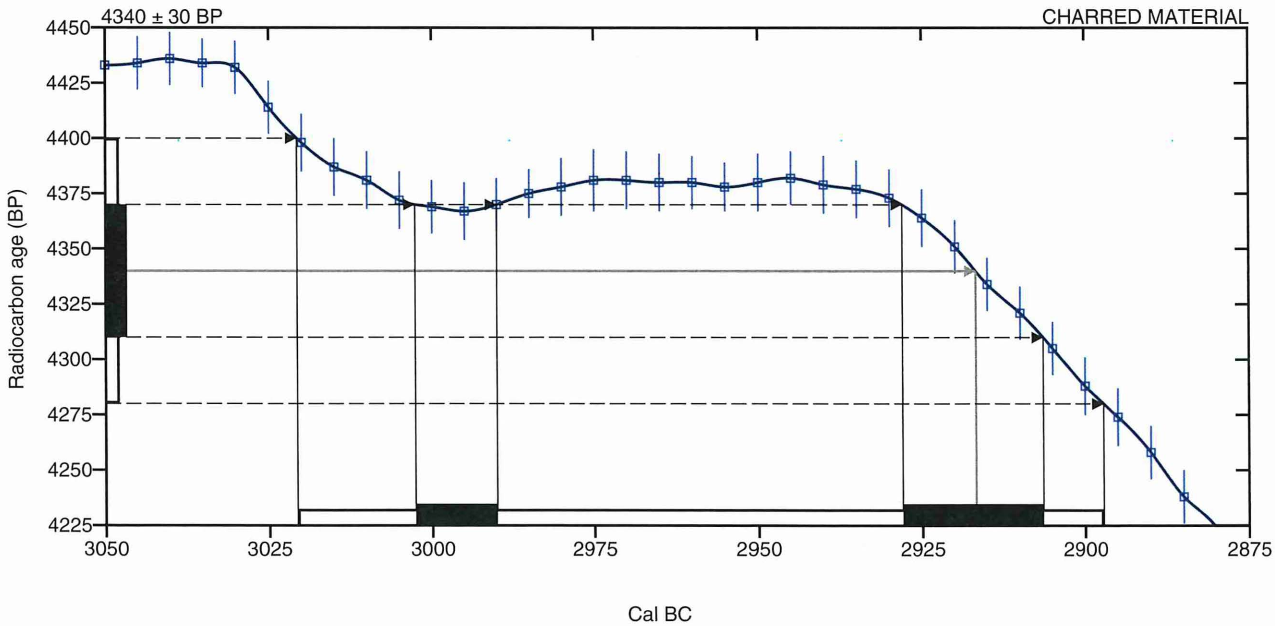
Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322
References to INTCAL13 database
Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -24.1 o/oo : lab. mult = 1)

Laboratory number	**Beta-430179 : 21CR161 F1 XU10 50-63CM**
Conventional radiocarbon age	**4340 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 3020 to 2895 (Cal BP 4970 to 4845)**
Intercept of radiocarbon age with calibration curve	Cal BC 2915 (Cal BP 4865)
Calibrated Result (68% Probability)	Cal BC 3005 to 2990 (Cal BP 4955 to 4940) Cal BC 2930 to 2905 (Cal BP 4880 to 4855)



Database used
INTCAL13

References
Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

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Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

August 12, 2015

Mr. Frank Florin
Florin Cultural Resource Services
N12902 273rd Street
Boyceville, WI 54725
USA

RE: Radiocarbon Dating Result For Sample 284-7 XU4 140-150

Dear Mr. Florin:

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

The cost of the analysis was charged to the American Express card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Frank Florin — Report Date: 8/12/2015

Florin Cultural Resource Services — Material Received: 7/27/2015

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 415923	4840 +/- 30 BP	-14.5 o/oo	5010 +/- 30 BP

SAMPLE : 284-7 XU4 140-150
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali
2 SIGMA CALIBRATION : Cal BC 3935 to 3860 (Cal BP 5885 to 5810) and Cal BC 3810 to 3705 (Cal BP 5760 to 5655)

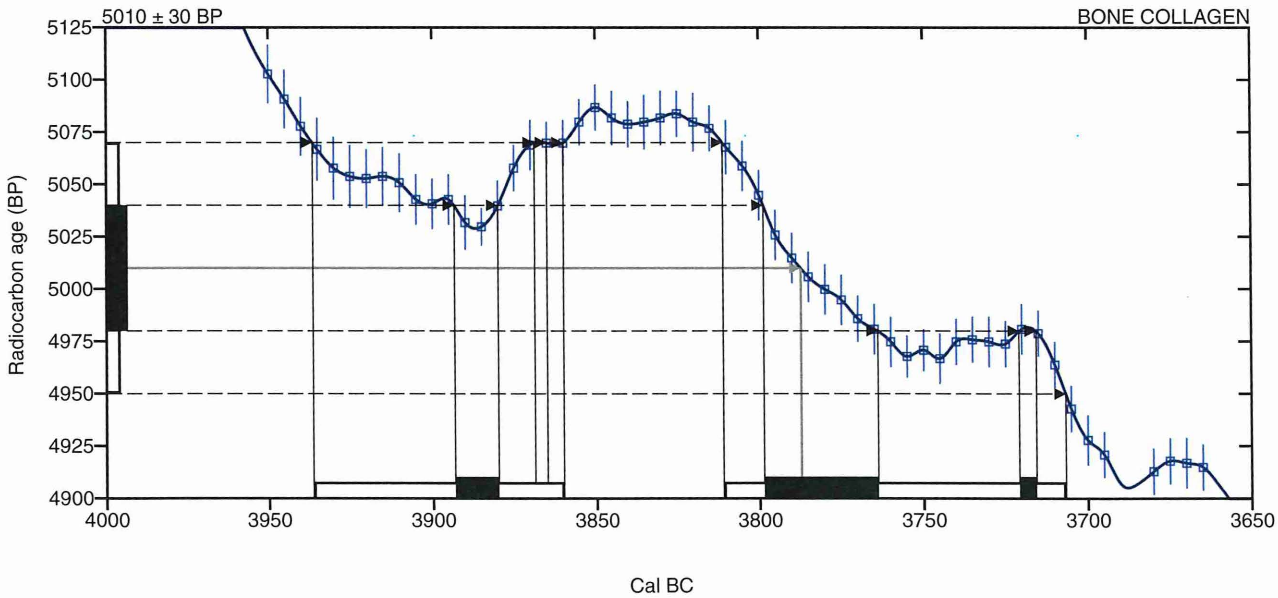
Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -14.5 o/oo : lab. mult = 1)

Laboratory number	**Beta-415923**
Conventional radiocarbon age	**5010 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 3935 to 3860 (Cal BP 5885 to 5810)** **Cal BC 3810 to 3705 (Cal BP 5760 to 5655)**
Intercept of radiocarbon age with calibration curve	Cal BC 3785 (Cal BP 5735)
Calibrated Result (68% Probability)	Cal BC 3895 to 3880 (Cal BP 5845 to 5830) Cal BC 3800 to 3765 (Cal BP 5750 to 5715) Cal BC 3720 to 3715 (Cal BP 5670 to 5665)



Database used
INTCAL13

References
Mathematics used for calibration scenario
A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database
Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.