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***The Northern Chaco Outliers Project***  
***Annual Report, 2019 Field Season***



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### Preface

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The *Northern Chaco Outliers Project* focuses on the Haynie site, a multi-component ancestral Pueblo village with two Pueblo II period (AD 950–1150) great houses located northeast of Cortez, Colorado. The great and small houses at the Haynie site were part of the larger Lakeview community, a 1 km<sup>2</sup> area comprised of the densest concentration of great houses found north of the San Juan River. Previous research in the Lakeview group and an initial assessment of the Haynie site during the 2016 field season suggests that the great houses were constructed above earlier architecture dating to the Basketmaker III and Pueblo I periods (AD 500–950). Excavation at the Haynie site will seek to determine precisely when the site was initially occupied, when it was subsequently depopulated, and how this related to other great houses located in the Lakeview community and the larger region. Data collected during the Northern Chaco Outliers Project will also allow contribute to a greater understanding of resource sustainability, the natural and cultural impacts of environmental downturns, ancient communities and regional systems, migration, and human/environment relationships.

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## *Introduction*

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In the summer of 2016, the Crow Canyon Archaeological Center (Crow Canyon) initiated the Northern Chaco Outliers Project (NCOP), a multi-year excavation and laboratory analysis project focused on the Lakeview Group in southwestern Colorado. This report describes the project background and research objectives and summarizes excavation, analyses, and outreach conducted by Crow Canyon during the 2019 field season.

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### **1.1 The Northern Chaco Outliers Project**

Chacoan society flourished between A.D. 840 and 1140 and was centered in Chaco Canyon, New Mexico (Judge 1979; Judge and Cordell 2006; Lekson, ed. 2006, Lekson 2015; Plog and Heitman 2010; Reed 2004; Saitta 1997; Sebastian 1992; Van Dyke 2007; Vivian 1990; Ware 2014). Chacoan culture was characterized by the construction of monumental masonry great houses, great kivas, earthworks, road segments, non-local exchange networks, significant social inequality, a suite of ritual practices, and a recognizable stylistic canon. Between A.D. 1050 and 1140 Chaco-style architecture, landscapes, and settlement patterns expanded across the northern Southwest, appearing in what is now northeastern Arizona, southeastern Utah, and southwestern Colorado (Brown et al. 2013; Cameron 2008; Kantner and Mahoney, eds. 2000; Lipe 2006; Ryan 2008; Reed, ed. 2008; Van Dyke 1999). Scholars debate precisely what kind of social, cultural, or political phenomenon this expansion represents. The NCOP seeks to understand the impact of Chacoan influence in the northern San Juan region of southwestern Colorado during the Chacoan and post-Chacoan peri-

ods by addressing four interrelated research domains: the role of community centers with public architecture, social stratification, identity formation, and human-environment interaction (Ryan 2016).

The NCOP uses data from a multi-great house community known as the Lakeview Group. The Lakeview Group includes four great houses and a great kiva within a 1-km radius of each other. Multi-great house communities are an important but poorly understood facet of the Chacoan and post-Chacoan periods in the northern San Juan region; archaeologists identify multi-great house communities at Aztec Ruins (Brown and Paddock 2011; Lekson 2015; Turner 2015, 2019; Van Dyke 2007), Mitchell Springs (Dove 2014; Smith 2009), Lowry Pueblo (Kendrick and Judge 2000), and at the Lakeview Group. The Haynie site contains two great house structures within a 5-acre area. Wallace Ruin, or Site 5MT6970 (Bradley 1988, 1992, 1993) is located 335 m south of Haynie and contains one great house. An additional great house and an associated great kiva are found at the Ida Jean site (5MT4126) (Brisbin and Brisbin 1973), located 859 m west of the Haynie site.

Archaeologists have little explored the relationships between monumental structures within multi-great house communities, and it is not clear how these clusters functioned within the adjacent domestic community. Furthermore, the role of the northern multi-great house communities within the Chacoan regional system is uncertain. To address these issues, Crow Canyon archaeologists have developed a series of guiding research questions, situated within four research domains (summarized from Ryan 2016):

- How did the Lakeview Group first arise, and how did it develop over time? How did each great house function and what kinds of relationships existed between great houses?
- How was inequality expressed within the Lakeview community?
- Drawing on the communities of practice concept (Lave and Wenger 1991), how did identities unfold within the Lakeview Group during the Chacoan period (ca. A.D. 1080-1140), and did they change during the post-Chacoan period (ca. A.D. 1140-1225)?
- What conditions of possibility (or impossibility) arose during pe-

riods of significant environmental change, for example the great drought of A.D. 1130-1180? How was environmental change intertwined with community formation, inequality, and identity?

Crow Canyon researchers designed the NCOP fieldwork and laboratory analyses to produce environmental and material culture data that can address these questions. This research will contribute to regional archaeological issues—such as the degree of political centralization present within Chacoan society—and anthropological questions concerning culture and environment more broadly.

The NCOP has fieldwork and laboratory components. Crow Canyon's archaeological fieldwork in the Lakeview Group focuses on the Haynie site (5MT1905), a 5-acre preserve owned by the Archaeological Conservancy. Staff and participants have conducted excavation, remote sensing, architectural documentation, and artifact analysis at the site since 2016. Laboratory analyses of material excavated from the Haynie site is underway. In addition, laboratory staff, volunteers, and participants are processing and analyzing ceramic artifacts from Wallace (including Greenstone Pueblo) and Ida Jean site. Bruce Bradley has conducted excavation at Wallace for over 50 years (Bradley 1988, 1992, 1993). Although much of the Ida Jean site has been disturbed, the great kiva is partially intact and some information on the site is available from work conducted in the 1970s (Brisbin and Brisbin 1973). Collections from Ida Jean are curated by the Canyons of the Ancients Visitor Center and Museum and are on loan to Crow Canyon. Finally, notes, maps, and artifact data exist from previous, non-professional excavation at the Haynie site. Crow Canyon is integrating these data into a research database to augment the data newly collected through excavation at Haynie.

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## 1.2 Project Area Location and Ownership

The Lakeview Group is located in Montezuma County, Colorado, east-northeast of the modern-day town of Cortez (Figure 1). The sites in this group are in the heart of the Mesa Verde archaeological region, north

of the Mesa Verde escarpment and near the confluence of Simon Draw and McElmo Creek; Stinking Springs is located southeast of the Lakeview Group. The majority of the Haynie site is located on a 5-acre property recently acquired by The Archaeological Conservancy from the Haynie Ranch, LLC (Figure 2). The easternmost portion of the Haynie site is on private land not accessible to Crow Canyon. Bruce Bradly owns Wallace Ruin and Greenstone Pueblo, a small domestic habitation adjacent to Wallace. The Ida Jean site, including the great kiva, is on private land not accessible to Crow Canyon.[]{}#\_Toc28268335 .anchor}

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### 1.3 Environmental Setting

The NCOP study area includes an environment defined by the surrounding drainages and by current agricultural use of the land. Figure 3 shows the locations of sites in the Lakeview Group. The Haynie site is located at 1,911 m (6,270 ft.) and sits on a small knoll to the north of, and just above, a shallow, broad valley within Simon Draw. The head of Simon Draw is located about 6 km north of the Haynie site. Simon Draw empties into McElmo Creek 4 km southwest of the Haynie site.

The soils of the valley bottom south of the Haynie and Ida Jean sites, and upon which Wallace Ruin sits, are predominantly Gladel-Pulpit complex (an eolian loess), and Ramper clay loam (a well-drained eolian loess). These soils are among those with the greatest agricultural potential in the entire region (Van West 1994:162–167). Today the valley bottom is plowed and irrigated and produces primarily alfalfa/grass hay. Small, undisturbed areas are present in the valley, and these are covered in sagebrush, lesser amounts of greasewood and saltbush, and some riparian vegetation that includes cottonwood, willow, cattails, and sedges. The Chaco-style great houses and the midden deposits at the Haynie site are covered mostly with sagebrush, saltbush, and grasses. Sandstone ridges flank and rise above the valley floor, and these ridges support pinyon-juniper wo[]{}#\_Toc28268336 .anchor}odland.

#### **1.4 Previous Archaeological Investigation at the Lakeview Group**

Native Americans (Ute, *Diné* (Navajo), and Pueblo) who lived in the region prior to Euro-American colonization in the 1860s–1890s undoubtedly knew about the great houses of the Lakeview Group. Archaeologists first became aware of the great houses within the Lakeview Group in the 1960s when the larger sites in the community were recorded during a cultural resource management survey.

In the 1970s, Ralph Haynie purchased the property on which the site is located for a homesite and small business. Haynie and others conducted extensive non-scientific excavations on the property to recover complete vessels and other artifacts that they subsequently sold to private collectors. During this process, they excavated whole rooms and kivas with heavy machinery, and portions of both great houses at the site were demolished. Fortunately, Claudia Haynie, Ralph's spouse, kept a journal noting excavation activities and the types of artifacts that they recovered from specific locations on the site. Following the Haynies' non-professional work at the site, Joel Brisbin—an archaeologist and retired National Park Service employee—conducted excavations and stabilization work between 2008 and 2014. Brisbin's work occurred in both the East and West Great Houses as well as in extra-mural areas between the great houses.

Modern research projects conducted at the site have been limited in scope and include a basic temporal assessment centered on diagnostic artifacts analyzed from the modern ground surface as part of the Village Ecodynamics Community Center Survey, which was sponsored by Crow Canyon and Washington State University and funded by the National Science Foundation (Glowacki and Ortman 2012; Kohler and Varien 2012). Dr. Susan Ryan completed a mapping project at the site, collected tree-ring samples from the great houses, and documented exposed architecture and features in the great houses (Ryan 2013). The limited extent of this research renders current interpretations of the site tentative at best. An initial assessment of the Haynie site led Crow Canyon archaeologists to infer that the two great houses were constructed on top of earlier cultural deposits dating from the Basket-

maker III (A.D. 500–750) and Pueblo I (A.D. 750–900) periods. Test excavations have confirmed an extensive Pueblo I period occupation of the site, but have also revealed a large early Pueblo II period (A.D. 900–1050) component. Moreover, we speculate that both great houses continued to be occupied during the post-Chaco period.

Bruce Bradley began work at Wallace in the late 1960s, with work continuing intermittently until the present day (Bradley 2019). Early excavation work focused on the west wing of the Chacoan building. Currently, Bruce and Cynthia Bradley are focusing on the west-central portion of the structure, which they term “Old Wallace,” and which may date as early as the A.D. 1040s. People remodeled Wallace and significantly expanded the structure during the A.D. 1120s, and continued to inhabit or use portions of the site throughout the Pueblo III period. Adjacent to Wallace is a small house known as Greenstone Pueblo. Charles Reher (University of Wyoming) conducted excavations at this small site with field school students during the 1970s.

The Ida Jean site has been largely destroyed, although Joel Brisbin conducted limited excavations that recovered a number of artifacts, which are housed at the Canyon of the Ancients Visitor Center and Museum (Brisbin and Brisbin 1973). Wooden beams from the pilasters of two blocked-in kivas produced dates of A.D. 1124. Stratigraphic evidence suggests there are earlier deposits at the site, while pottery indicates continued inhabitation beyond the Pueblo II period. The Ida Jean site includes a great kiva, the only one known within the Lakeview Group.

The current project seeks to synthesize professional and non-professional work within the Lakeview Group. Crow Canyon is compiling legacy data from work conducted at the Haynie site in the 1980s and 1990s, incorporating data from test excavations and stabilization work completed there between 2008 and 2014, and continuing a research program initiated by Crow Canyon staff in the early 2010s. Crow Canyon has completed two-and-a-half years of excavations at the Haynie site. Fladd et al. (2018) and Simon et al. (2017) provide summaries of excavation work during the first two seasons at the Haynie site. Crow Canyon is also analyzing sherds and

other artifacts obtained during excavation work conducted at Wallace and at the Ida Jean site.

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## 1.5 Permits and Permissions

During the 2019 field season, excavation, testing, and survey at the Haynie site were conducted under State of Colorado archaeological permit No. 73671 and with the permission of the Haynie Ranch, LLC and The Archaeological Conservancy. We developed a loan agreement with the Canyons of the Ancients Visitor Center and Museum in Dolores, Colorado, to examine documents and artifacts from the work conducted at the Ida Jean site. Materials from the Ida Jean site are currently curated in that facility, which is managed by the Bureau of Land Management.

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## 1.6 The 2019 Annual Report

This report describes Crow Canyon's field and laboratory work conducted during 2019. In addition, it provides information on a few aspects of the 2018 field season that were not analyzed or reported on until early 2019, such as geoarchaeological fieldwork and radiocarbon sample analyses.

First, we describe the fieldwork that was conducted in 2019, which consisted of excavations at the Haynie site. We also summarize the geoarchaeological fieldwork from 2018 (reported in early 2019) that sought to understand the hydrology of the Haynie and Wallace sites. After discussing fieldwork, we describe artifact analyses, such as in-house artifact cataloging and analyses. We report on radiocarbon dating results obtained in early 2019, and summarize results of an in-situ analysis of a charred bulrush/cattail mat discovered in a pit structure at the Haynie site. Next, we describe our human remains policy and provide a brief overview of osteological analyses conducted in 2019. Finally, we

summarize our research and outreach efforts. Appendix A provides a list of permanent staff, seasonal staff, and interns who assisted with the NCOP during 2019.[\[...\]#\\_Toc28268339](#) .anchor}

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### *Excavations at the Haynie Site*

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All of the NCOP-related excavations conducted by Crow Canyon occurred at the Haynie site (5MT1905), in Montezuma County, southwestern Colorado. For most of 2019, excavation occurred with the permission of the Haynie Ranch, LLC. The Archaeological Conservancy purchased the site in the fall of 2019, and also gave Crow Canyon permission to conduct excavation at Haynie.

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#### **2.1 The Crow Canyon Excavation, Documentation, and Recording System**

In 2009, Dr. Susan Ryan and other Crow Canyon archaeologists established a permanent primary site datum. Based on this datum, they used a total station to lay out a grid across the entire Haynie site. The “o,o” origin point is located southwest of the property’s southwest corner, thus all grid coordinates have a “northing” and “easting” number (e.g. 400N 300E). In 2016, we used a high-resolution TopCon Hifer II High Resolution GPS Geodetic Receiver to obtain more precise coordinates for the primary datum and backsite. The Haynie site is divided into Architectural Blocks—the West Great house and surrounding remains are referred to as “Architectural Block 100.”

Most of Crow Canyon’s excavations at the Haynie site occur within Excavation Units of defined size (e.g. 2-x-4-m, 1-x-1-m) oriented to cardinal directions. We refer to Excavation Units by the size of the unit and the coordinate of the southwest corner (e.g. “3x2 459N 376E”). Field archaeologists choose unit size and orientation based on the archaeological remains under investigation. Table 1 lists all previously excavated and currently active Excavation Units within Architectural Block 100

of the Haynie site. Occasionally, the field crew conducted excavations that were less concretely defined than grid units—these are referred to as “Segments” and assigned a number (e.g. Segment 5). We typically use segments to expose partially buried walls or to extend a grid unit in order to capture the corner of a room or structure. Figure 5 shows the location of segments excavated within Architectural Block 100 of the Haynie site.

During Haynie site excavations, we often place several grid units and/or segments adjacent to one another. Contiguous grid units and segments are generally used for exploring structural remains. Crow Canyon also excavates random 1-x-1-m sample units in suspected midden deposits. Finally, we often use smaller 1-x-2-m or 2-x-2-m test units to target specific archaeological features identified through remote sensing, pedestrian survey, or archival work (for example, units of this size were used to seek remains of mechanically-disturbed areas). We refer to clusters of Excavation Units as “Excavation Areas” and we assign each Excavation Area a letter (e.g. Area A, Area B). Figure 4 shows the location of Excavation Areas within Architectural Block 100 of the Haynie site.

Within Excavation Units, we excavate strata by natural layers, subdividing strata into 10 cm levels. Archaeological contexts that represent distinct natural and cultural deposits or construction events are designated a “Study Unit” or “SU.” The Study Unit is the key unit of analysis within the Crow Canyon documentation and recording system. There are three kinds of Study Units: Arbitrary, Structure, and Nonstructure. Arbitrary units tend to be deposits with edges that are either difficult to define or are a result of natural processes, e.g. fallen wall debris, or wind and water-laid post-occupational sediments. Structures include both surface structures and subterranean pit structures and kivas. We give each room within a multi-room surface habitation an individual structure number. Nonstructures typically include “constructed” deposits that are not structures, such as middens and use surfaces. We give each newly defined Study Unit one of these three designations depending on its origin and assign it a number. Table 2 provides brief descriptions of all Study Units created or used during the 2019 field season.

The following descriptions of Crow Canyon's 2019 excavation efforts are organized by Excavation Area and Study Unit. Each excavation area includes several Study Units. Some Study Units are found within multiple excavation areas or Excavation Units. For example, Arbitrary 179 is mechanically redeposited architectural and cultural material from the West Great House that a previous landowner used as fill to create a level yard west of the 1980s-era manufactured home. It is the upper stratum of several Excavation Units in Architectural Block 100. Study Units are described in stratigraphic order from upper-most to lower-most (though the SU numbers may not necessarily run consecutively).

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## 2.2 Area A

In 2017, Crow Canyon began work on a group of Excavation Units in Area A (Figure 4, Table 1) west of the modern house (Simon et al. 2017). Remote sensing identified anomalies thought to be surface rooms in that area (Charles 2017). Excavation revealed several superimposed rooms, including Structure 186 and Structure 193 (Figure 6), and work on these two structures continued through 2017-2018 (Simon et al. 2017; Fladd et al. 2018). An additional cluster of anomalies to the north of these two structures led Crow Canyon to begin work on a 4-x-8-m excavation in 2018 (Table 1). During the 2019 field season, work continued on 4x8 424N 378E and we discovered Structure 1047 (Figure 6). We created a 2-x-1-m unit (Table 1) to clarify the relationship between the south end of Structure 1047 and deposits west of Structures 186 and 193. The only additional work conducted on Structure 186 and Structure 193 was the excavation of Segment 10, a shallow trench that followed the south wall of Structure 186 and sought to define the boundaries of the room (Figure 5).

### 2.2.1 Arbitrary 179

This Study Unit refers to deposits resulting from the mechanical excavation of the West Great House in the 1970s–1980s. When previous

landowners built the current residence on the property, they used the rubble from the West Great House as fill to create a level platform for the house and for a yard (Claudia Haynie, personal communication 2017). Arbitrary 179 forms a layer ranging from 20 cm to over 100 cm thick south, west, and southwest of the current house. It lies immediately below the thin (1-5 cm) layer of topsoil and contains blocks of architectural sandstone, hard chunks of clay and unburned adobe, many artifacts, and modern/recent items such as broken glass, beverage cans, electrical wire, and miscellaneous metal objects. Arbitrary 179 is thickest at the west end of 4x8 424N 378E. The original ground surface sloped steadily downhill to the west, and the previous landowners added 100–120 cm of rubble fill to level out this area, deeply burying intact cultural deposits. Arbitrary 179 is thinner at the east end of 4x8 424N 378E, measuring perhaps 35–50 cm thick.

### **2.2.2 Arbitrary 176**

Arbitrary 176 lies beneath Arbitrary 179 and above Structure 1047. Lenses of silts and clays containing charcoal, occasional chunks of adobe, and artifacts characterize Arbitrary 176. Arbitrary 176 was deepest near the middle of 4x8 424N 378E and we believe this Study Unit is a natural deposit resulting from material washing downslope from the east and pooling in the depression created by Structure 1047.

### **2.2.3 Arbitrary 1029**

This Study Unit occurs in the eastern third of 4x8 424N 378E and continues southward into 1x1 423N 384E and 1x1 424N 385E where it was included with Arbitrary 176. It consists of mottled clumps of green-gray and reddish-orange clay containing occasional angular chunks of sandstone. In places, the reddish-orange clay occurred in discontinuous linear segments and we explored the possibility that these were the remains of wall foundations. We could not confirm that any of the segments were architectural. However, we do believe that Arbitrary 1029 is wall fall from an early surface structure that had walls composed of equal parts stone and adobe. If there was an early structure in this area, it may be better preserved to the east outside of the excavation area. We did not remove Arbitrary 1029 during the 2019 field season,

but exposed its extent within the Excavation Unit. We think that construction of Structure 1047 truncated the western portion of Arbitrary 1029.

#### 2.2.4 Structure 1047

We uncovered the outline of this structure after removing Arbitrary 176 in 4x8 424N 378E (Figure 6). It initially appeared as a discontinuous, arcing alignment of sandstone cobbles, but soon the difference in fill between the inside and the outside of the structure became apparent. The structure is a rough circle with flattened sides (or a rectangle with very round corners). We have exposed approximately 60–75 percent of the structure, with the remainder extending northward outside the excavation area. The appearance of the stone cobble alignment suggested it was a lower course or foundation of a wall and we expected the floor of the structure to be shallow. After excavating a small test window along the structure's west wall, we discovered that the wall continues downward for at least 60 cm. We did not identify a floor surface. The wall consists of large blocks of sandstone set within copious amounts of reddish and gray-green adobe. The east wall of the structure is less distinct and appears to be set directly against Arbitrary 1029. Currently, our interpretation is that this is a pit structure excavated through Arbitrary 1029. Because the original ground surface slopes downward to the west, the builders of Structure 1047 relied on native sediment (and Arbitrary 1029) for the eastern walls but had to construct a coursed masonry wall on the western, downslope side. Preliminary evaluation of sherds above Structure 1047 suggest it probably dates to the Pueblo II period.

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### 2.3 Area B

To identify and test midden deposits potentially associated with the West Great House, the field staff placed 1-x-1-m sample units to the west and southwest of the modern house in Area B (Figure 4, Table 1). Excavation of these units began in 2017 (Simon et al. 2017) and contin-

ued through the 2018 season (Fladd et al. 2018). We continued work in the 1-x-1-m sample units in 2019 (Table 1). In addition, we added two 1-x-2-m test units in 2019 (Table 1). We placed unit 2x1 413N 386E to try to define a wall segment that we identified near the base of an adjacent 1-x-1-m unit, and we placed 1x2 401N 360E to test for cultural deposits at the southwest edge of the site. The sample units and test units in this excavation area have been helpful for identifying the original ground surface at the southwest edge of the site.

### **2.3.1 Arbitrary 170, 195, 1001**

Arbitrary 170, 195, and 1001 refer to the thin (1–5 cm), recent topsoil layer in Area B. It is a loose, loamy sediment with many small rootlets and modern debris. It is probably a combination of small quantities of eolian deposits and the slow alteration of Arbitrary 179 (redeposited debris from the West Great House) by roots and bioturbation.

### **2.3.2 Arbitrary 179 and 1021**

Arbitrary 179 and 1021 are localized occurrences of the debris from the West Great House that a previous landowner mechanically redeposited to create a level yard west, southwest, and south of the current house. It lies immediately below the thin layer of topsoil and contains blocks of architectural sandstone, hard chunks of clay and unburned adobe, many artifacts, and modern/recent items such as broken glass, beverage cans, electrical wire, and miscellaneous metal objects. Among the 1-x-1-m test units, Arbitrary 179, 1001, and 1021 are between 40 and 100+ cm thick. In many places, these Study Units rest directly on bedrock, while in a few units a thin layer of intact original sediment (Arbitrary 181, Arbitrary 1009) remains below the redeposited material and above bedrock.

### **2.3.3 Nonstructure 1040**

Nonstructure 1040 refers to a thin layer of potentially intact midden below Arbitrary 179 and above Arbitrary 181 and 182. We defined this Study Unit in the profile of 1-x-1-m units 408N 379E, 408N 380E, and 408N 381E. We suspect that this midden deposit is discontinuous—it

was either small to begin with, or has been significantly truncated by mechanical activity in the 1970s–1980s.

#### **2.3.4 Arbitrary 181, 1009**

These two Study Units are thought to be intact original sediment that remains below the mechanically redeposited debris from the West Great House. They contain charcoal flecking, a few artifacts, and sandstone chunks. Considering the kind of earthmoving that occurred during the 1970s and 1980s, we suspect that the upper portions of these Study Units are truncated. We identified two features within Arbitrary 181 in the north profile face of 1x1 410N 381E. They each appeared to be postholes (POS 1 and POS 2).

#### **2.3.5 Nonstructure 1038**

This is an extra-mural activity surface designated in 1x1 410N 381E. There are two postholes (POS 1 and POS 2) that originate at this surface. We think it likely that mechanical activity in the 1970s–1980s may have removed the original surface associated with these features, though it is possible that Nonstructure 1038 represents the ancient ground surface in this area.

#### **2.3.6 Arbitrary 182**

Arbitrary 182 refers to the bedrock that underlies Arbitrary 181, 1009 in Area B. In several units, there was no intact original sediment and Arbitrary 182 directly underlay the debris from the West Great House. Based on exposures of bedrock in some areas, we suspect that bedrock was shallow across most of Area B.

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#### **2.4 *Area C***

This excavation area comprises four clusters of units (Figure 4, Table 1) that we placed to investigate a prominent mound that extends westward from the West Great House. Two (C1 and C2) are north-south

trenches that pass through surface room suites and associated pit structures to the south of the surface rooms (Structures 1002, 1003, 1010, 1018, 1026, 1036, 1042, and 1052). The third (C3) is a large excavation area within surface architecture northeast of a previously excavated surface structure (Structure 197). Finally, Area C4 is a large broadside excavation immediately west of the northwest corner of the West Great House.

As of 2019, we believe that Excavation Areas C1, C2, and C3 pass through individual surface structure/pit structure suites within one large building that people probably first erected in the Pueblo I period and continued to remodel throughout the Pueblo II period. Area C4 clips the edge of this building and includes extra-mural midden deposits. We discuss Area C1, followed by Area C2 and C4. We completed excavation in Area C3 in 2018 (Fladd et al. 2018) and do not discuss it further.

#### **2.4.1 Excavations in Area C1**

Crow Canyon began excavations in Excavation Area C1 in 2017 to explore an anomaly identified during a remote sensing survey and to determine whether a prominent mound at the west end of the site contained intact architecture (Charles 2017; Simon et al. 2017). Initially, we laid out a 1 m-wide trench (Table 1). These units contained deposits consistent with a midden-filled pit structure. In 2018 we added an additional 1 m-wide Excavation Unit (Table 1) on the north end of this trench to identify any surface architecture associated with the suspected pit structure. By the end of 2018, we had confirmed that the 1 m-wide trench had encountered a pit structure (Structure 1003) and an associated surface room suite to the north (Structure 1010) (Figure 6, Fladd et al. 2018). We added Segment 4 to explore the eastern extent of the back wall of Structure 1010 (Figure 5).

During the 2018–2019 winter, portions of the 1 m-wide trench collapsed due to erosion. We used a backhoe to excavate Segment 5 along the west edge of the original trench (Figure 5), which served the dual purpose of removing the slumping trench wall and stepping back the trench for safety reasons. After excavating Segment 5, we added a 1.5-x-1-m Excavation Unit to explore a portion Structure 1003. We also

created a 2.75-x-0.65-m Excavation Unit (Table 1) after backhoe excavation revealed part of the ventilator shaft of Structure 1003. Finally, we added Segment 9 to remove a small baulk of sediment outside of 4x1 461N 370E which was clinging to the west wall of Structure 1010 (Figure 5). Taken together, the Excavation Units within Area C1 expose portions of a surface structure/pit structure suite. Based on sherds observed during excavation and through in-field washing of selected artifacts, we believe that the structures in Area C1 date to the Pueblo II period, although we suspect that earlier contexts exist beneath those that we have currently exposed.

#### **2.4.1.1 Nonstructure 192**

This Study Unit is a midden deposit filling the depression created by Structure 1003. Numerous lenses and layers of dark, ashy, charcoal and faunal-rich sediment characterize this midden deposit. Preliminary laboratory analysis has identified several miniature “basket effigy” objects (see Jolie and Webster 2015) within Nonstructure 192, and the deposits contain a disproportionately high quantity of ladle fragments and ladle handles. Preliminary evaluation of the sherds from Nonstructure 192 suggest that it dates to the Pueblo II period.

#### **2.4.1.2 Structure 1003**

This is a masonry-lined pit structure with a ventilator shaft located to the south. Nonstructure 192 fills the upper portion of Structure 1003. Our excavations are currently within the roof-fall deposits of this structure. Roof deposits are thick, indicating that the structure had a substantial roof. So far, we have not identified a bench, and the masonry lining extends from our current excavation level to the top of the structure. However, there are subtle differences in the masonry used in the lower and upper courses of the north pit structure wall, and we suspect that further investigation will reveal that this pit structure went through multiple construction phases.

In 2018 we submitted two maize samples from Structure 1003 to Beta Analytic for AMS radiocarbon dating. Both samples were charred cobs that originated in midden deposits overlying the collapsed roof. We obtained the results in early 2019. One sample produced a result of

980 +/- 30 B.P. (Beta-516073; burned maize;  $\delta^{13}\text{C}$  -11.8 o/oo) with a calibrated date of A.D. 993-1058 (46.0%) or 1070-1154 (49.4%); the other 910 +/- 30 B.P. (Beta-516072; burned maize;  $\delta^{13}\text{C}$  -11.8 o/oo) with a calibrated date of A.D. 1033-1190 (94.0%). See Table 3 in the “Chronometric Sample Analysis” section for more details on radiocarbon results. Both dates are consistent with Structure 1003 falling out of use during the middle or late Pueblo II period.

#### 2.4.1.3 Structure 1010

Structure 1010 is a surface room located north of and immediately adjacent to Structure 1003. Its position suggests that it is a “front” room or “habitation” room, although we have not yet determined whether there are corresponding “back” rooms. We have identified the south, west, and north walls of Structure 1010—they are constructed of tabular sandstone masonry held together by courses of adobe mortar. Several courses of the west and north walls are well preserved. Excavators identified a thin, prepared floor surface associated with the three walls consisting of a layer of caliche and clay-rich sediment. We did not immediately recognize the floor surface and excavators inadvertently removed portions.

The north wall continues westward past the northwest corner of Structure 1010, indicating that there is probably an additional room to the west. We conducted further work in Segment 4, a trench intended to follow the north wall of Structure 1010 to the east. We found few intact stones and believe that structure’s inhabitants may have dismantled this wall and recycled the stone elsewhere. The west wall sits on fill and is located above what appears to be a thermal feature that has not yet been assigned a feature number; we therefore think that the west wall is a later addition subdividing a previously larger room and corresponding to the creation of the floor surface. Our excavation below the prepared floor surface also identified an alignment of sandstone blocks, mortar, and plaster that is almost certainly a room corner within an earlier structure. We plan to investigate the architectural features lying below Structure 1010 during the 2020 field season. Based on sherds observed during excavation, Structure 1010 probably dates to the Pueblo II period.

#### 2.4.2 Excavations in Area C2

Crow Canyon commenced excavation of the Area C2 in 2017 to explore a series of anomalies revealed by electrical resistance survey (Simon et al. 2017:7). The excavation area was originally conceived as a 1 m-wide, 6 m-long trench, and work on this trench continued through the 2018 season (Table 1). Excavation revealed the south wall of an earthen pit structure (Structure 1002—Figure 6) that was filled with deep, stratified midden deposits (Fladd et al. 2018).

Like Excavation Area C1, the trench wall collapsed during the winter of 2018–2019 due to erosion, and in early 2019, we used a backhoe to excavate Segment 6 (Figure 5, Table 1) on the east side of the original trench with the intent of removing collapsed debris and making the trench safe for further excavation work. We removed upper fill and deposits that the adjacent trench had already sampled, but quickly ceased backhoe operations after encountering the masonry lining of an additional, slightly later pit structure (Structure 1018—Figure 6). The field crew created a 3.5-x-1-m Excavation Unit (Table 1) within the trench created by Segment 6 to explore Structure 1018. Continued excavation within Structure 1002 during 2019 revealed the existence of a third earthen-walled pit structure (Structure 1036) excavated into the fill of Structure 1002 and cut into by Structure 1018 (Figure 6).

In the spring of 2019, Crow Canyon began excavation to the north of this trench in order to identify associated surface rooms (Table 1). In addition, excavation sought to understand how these rooms related to visible walls in Area C3 to the east, and to structures identified to the west in Area C1. Excavation commenced first in 3x2 459N 376E and identified the masonry walls of a surface room designated Structure 1026. Below Structure 1026 was a second, earlier room with slightly different masonry wall alignments which we designated Structure 1042. It was not clear how these two rooms related to one another, so we created Segment 11 to locate their southeast corner (Table 1, Figure 5). We added a second unit to the north (Figure 4, Table 1) to search for presumed back “storage” rooms of the structure, and identified Structure 1052, a masonry surface room (Figure 6).

Taken as a whole, these seven units reveal a north-south slice through a

surface structure/pit structure suite. Preliminary evaluation of sherds and diagnostic artifacts observed during excavation suggest that people inhabited and used these structures between the Pueblo I and late Pueblo II periods. We will first discuss excavation efforts in the trench that exposes Structures 1002, 1018, and 1036, and then the excavations within the surface rooms (Structures 1026, 1042, and 1052).

#### **2.4.2.1 Structure 1018**

We encountered Structure 1018 during the excavation of Segment 6. The masonry lining appeared as an arc of stones, leading us to cease backhoe operations. We created a grid unit (3.5x1 452N 375.5E) atop the visible portion of the structure. The majority of Structure 1018 lies outside the Excavation Units—our investigations have exposed, at most, the western 15–20 percent of the structure. Excavation revealed layers of post-occupation midden deposits and roof fall before encountering a prepared surface that we initially interpreted as the structure's bench. A slab-lined feature (BNS 2) lies in/on the surface and extends out of the excavation area.

After further investigation of the eastern profile face of Segment 6 and 3.5x1 452N 375.5E we realized that backhoe operations removed parts of an upper, earthen lining wall and that what we had initially considered the bench was actually a floor surface. Our current interpretation is that Structure 1018 is a pit structure with architectural features transitional between earthen-walled pit structures and later masonry-lined kivas. The structure has a high bench. Upright slabs cover the lowest portion of the bench face; stacked tabular masonry rests on these upright slabs and covers the upper half of the bench. The bench surface is mostly earthen as are the upper structure walls. Visible in the unit profile are two roof supports that are set on the earthen bench. They consist of rotted, upright wooden posts, set within an adobe collar and encased in a small box of tabular masonry. The posts are set back slightly from the bench face. Comparison with pit structure architecture at the Stix and Leaves site (Bradley 2010) suggests that this structure could be early-to-mid Pueblo II in age. Crow Canyon will continue excavation and documentation of this structure in 2020.

#### **2.4.2.2 Nonstructure 1017**

This is a deep, stratified midden deposit located within Structures 1002 and 1036. Lenses of dark, ashy sediment rich with faunal remains and charcoal characterize Nonstructure 1017, and many sherds and flakes have been recovered from this stratum. Stratigraphy suggests that the deposition of Nonstructure 1017 post-dates the use of Structure 1036. The protected location of Nonstructure 1017 (in a pit) has contributed to excellent preservation of faunal remains. Excavation in Nonstructure 1017 occurred during both 2017 and 2018. The laboratory staff recovered a piece of charred maize cob while processing flotation samples from the 2018 season. We submitted this charred maize fragment to Beta Analytic for AMS dating in late 2018. The cob produced a date of 1120 +/- 30 B.P. (Beta-516071; burned maize;  $\delta^{13}\text{C}$  - 11.7 ‰), with a calibrated date of A.D. 862-994 (91.8%). See Table 3 and the “Chronometric Sample Analysis” section for further details on radiocarbon dates. This AMS date is consistent with sherds observed during excavation, which suggest a late Pueblo I and early Pueblo II period date for the lower portion of Nonstructure 1017.

#### **2.4.2.3 Structure 1036**

Structure 1036 is a rectangular, earthen-walled pit structure excavated into the fill of Structure 1002 (Figure 6). Structure 1018 has partially cut into the east side of Structure 1036 (Figure 6). Nonstructure 1017 is situated above the roof/wall fall of Structure 1036 and fills the portions of Structure 1002 not removed by the construction of Structure 1036. Excavations during 2018 probably removed portions of the upper walls of Structure 1036; we noticed the pit structure in 2019 in the profiles of the Excavation Unit. The northeast corner of Structure 1036 became visible after we shovel-scraped the base of Segment 6 north of Structure 1018. Currently excavations are within presumed roof/wall fall strata below Nonstructure 1017, and as of the end of the 2019 field season we have not identified a floor surface within Structure 1036. Based on the AMS date (see Table 3) from Nonstructure 1017 (a midden deposited after Structure 1036 was no longer in use) we think that this pit structure dates to the late Pueblo I period or possibly the early Pueblo II period.

#### 2.4.2.4 Arbitrary 1011

This is a deposit of natural wind-and-water-laid sediments within Structure 1002. It is most visible at the north end of 3x1 454N 374E. Arbitrary 1011 filled in Structure 1002 after it was no longer in use. After an undetermined interval of time, inhabitants of the site built Structure 1036 within the fill of Structure 1002, cutting through Arbitrary 1011. It is possible, though not yet confirmed, that Arbitrary 1011 correlates with Nonstructure 1060 in Area C4—both natural deposits are situated near the transition between Pueblo I and Pueblo II deposits.

#### 2.4.2.5 Structure 1002

Structure 1002 is a large, earthen-walled pit structure (Figure 6). We have identified the southern wall of Structure 1002 about 50–100 cm north of the southern profile face of 3x1 451N 374E. The northern wall of the pit structure seems to be located beyond the north edge of 3x1 454N 374E, suggesting that the structure measures at least 5–6 m across. The visible portions of the southern wall are oxidized and covered in soot, which leads us to believe that Structure 1002 may have burned. As of 2019 we have not identified a floor surface associated with Structure 1002. After people no longer lived in Structure 1002, it filled with naturally deposited sediments (Arbitrary 1011). Following an undetermined interval of time, site inhabitants built Structure 1036 within the partially filled pit of Structure 1002. We do not yet know to what extent Structure 1036 has affected the preservation of deposits or floor features within Structure 1002. Structure 1018 may have affected the preservation of the eastern edge of Structure 1002, as well. Midden deposits (Nonstructure 1017) fill both Structure 1002 and Structure 1036. Based on the dates from Nonstructure 1017 and the superpositioning of Structure 1036 and Structure 1018, we currently suspect that Structure 1002 dates to the Pueblo I period.

#### 2.4.2.6 Arbitrary 171, 1023

These Study Units are the upper fill covering Structures 1026, 1042, and 1052. Arbitrary 171 is the modern surface and uppermost topsoil near Excavation Area C. It is mostly wind-blown, post-occupational sediments and a thin veneer of soil. Recent (1970s–present) activity has undoubtedly affected this Study Unit, as there is evidence for brush

clearing/burning and some trash dumping. However, it has not been bladed or graded, nor is it redeposited debris from the West Great House. Arbitrary 1023 is the collapsed walls from Structures 1026, 1042, and 1052. It consists of jumbled sandstone masonry mixed with some artifacts and post-occupational wind-and-water laid sediments.

#### 2.4.2.7 Nonstructure 1048

This Study Unit refers to an ephemeral, extra-mural use surface identified in the wall fall (Arbitrary 1023) within Structure 1052. There are two features associated with Nonstructure 1048—a deposit of broken ground stone fragments within a shallow pit (OTH 1) and a small patch of burned sediment (BSP 2) that may be the remains of a small fire. In addition, we documented several unusual artifacts on Nonstructure 1048, such as a hafted knife fragment, biface fragments, and gaming pieces. Several stones from the collapsed wall stratum (Arbitrary 1023) seemed to be displaced from their original location, though we could not determine if they comprised a constructed cultural feature. Nonstructure 1048 and its associated artifacts and features may represent votive deposits introduced into the fill of Structure 1052 after the structure had partially collapsed. Artifacts observed during excavation suggest that this activity probably dates to the middle Pueblo II period or later.

#### 2.4.2.8 Structure 1052

This Study Unit is a surface room located north of Structure 1026/1042 in Excavation Unit 3x2 462N 376E (Figure 6). Its south wall is the north wall of Structure 1026, and its position suggests it was a “back” room or “storage” room that formed part of a suite with Structure 1026. Our work has exposed the western portion of the room; it is not yet clear how much extends eastward out of the Excavation Unit. The walls of Structure 1052 are medium-to-large sandstone cobbles held together with clay-rich mortar. We have exposed at most about three courses of stone. The northwest corner of Structure 1052 is well preserved, but we have not yet fully defined the southeast corner. The lack of intact stones in the southeast corner and the relatively thin deposit of wall fall (Arbitrary 1023) within Structure 1052 suggest that the inhabitants of the site may have removed stones from the structure for use elsewhere

on the site. Our excavations in 2019 encountered a thin layer of roof deposits or post-occupation sediments and identified the upper portion of a slab-lined feature (not yet given a feature designation/number), but we did not encounter the floor of Structure 1052.

#### 2.4.2.9 Structure 1026

This is a surface room located north of Structures 1002, 1036, and 1018 and south of Structure 1052 (Figure 6). The position of Structure 1026 suggests it is a “front” room or “habitation” room. The elevation of Structure 1026 suggests it is probably part of a suite with Structure 1052 to the north. Structure 1026 is located above Structure 1042 and utilized the same south and east walls. The north wall of Structure 1026 is the south wall of Structure 1052. The upper courses of the south and east walls consist of medium-large sandstone cobbles held together with clay-rich mortar, while the lower courses are made of smaller, tabular sandstone and greater quantities of mortar. We think it is possible that the lower courses are the original wall fabric associated with earlier Structure 1042 and the change in style exhibited by the upper courses is the result of people rebuilding the walls when they constructed Structure 1026. The north wall is entirely medium-large sandstone cobbles and rests on fill within Structure 1042, reinforcing our interpretation that Structure 1026 represents a significant remodel that changed the size and layout of an earlier structure. The floor of Structure 1026 was prepared and consisted of a thin (~1–2 cm) layer of grey, loamy clay spread atop an underlying midden deposit (Nonstructure 1035). This prepared surface was best preserved in the north half of the room. We excavated four features within Structure 1026—a mealing bin (MEB 1), an ephemeral fire pit (BSP 2), and two slab-lined postholes (POS 3 and POS 4). One of the postholes was in the southeast corner of the room, while the other was located close to the south wall about 1.25 m to the northwest. Rodent burrows badly affected the preservation of deposits in the southern half of the room, including the mealing bin and the ephemeral fire pit. Sherds observed during excavation suggest that Structure 1026 dates to the Pueblo II period.

**2.4.2.10 Nonstructure 1035**

This is a midden deposit located above the roof-fall deposit within Structure 1042 and below the prepared floor of Structure 1026. People briefly used Structure 1042 for trash deposition after they no longer used it for habitation and before they remodeled the structure to create Structure 1026. Nonstructure 1035 was best preserved in the northern and western parts of 3x2 459N 376E. The rodent burrows that affected the floor of Structure 1026 also affected Nonstructure 1035. In addition, we think that when people constructed the mealng bin on the floor of Structure 1026 they cut into deposits below the floor, including Nonstructure 1035 and some of the fill of Structure 1042. Based on sherds observed during excavation, Nonstructure 1035 probably dates to the Pueblo II period.

**2.4.2.11 Structure 1042**

Structure 1042 is a surface room that is below Structure 1026 (Figure 6). It is located north of Structures 1002, 1036, and 1018, and south of Structure 1052. Structure 1042 is probably a “front” or “habitation” room, but we have not yet confirmed whether Structure 1052 is temporally associated with Structure 1042, or if there is an earlier “back” room beneath Structure 1052. Structure 1042 utilizes the same south and east walls as Structure 1026, though it is possible that people significantly remodeled the upper courses of these walls when constructing Structure 1026. We encountered two strata within Structure 1042. The upper stratum was a thin midden deposit (Nonstructure 1035), indicating that people used the room for trash deposition when it was no longer inhabited. The lower stratum was a thin layer of caliche-flecked sediment that was probably roof fall. The remains of the roof lay directly atop an ephemeral, use-compacted floor surface. There were dozens of artifacts laying on the floor (Figure 8). We identified two features associated with the floor in Structure 1042, both of which are only partially within the Excavation Unit (3x2 459N 376E). One was an ephemeral fire pit (BSP 1) bisected by the west profile. The other is a pit feature (PNS 2) bisected by the north profile which we only partially excavated by the end of the 2019 field season. Our preliminary evaluation of artifacts from the floor assemblage suggest that Structure 1042 dates to the early Pueblo II period. We excavated a test window

beneath the floor surface and it revealed that there are additional cultural deposits below Structure 1042.

#### **2.4.3 Excavations in Area C4**

This excavation area is located due west of the northwestern corner of the remnant standing walls of the West Great House (Figure 4). Crow Canyon began excavation here in 2017 to expose the exterior masonry of the West Great House and to search for low-visibility architectural traits, such as a Chaco-style footer trench (Simon et al. 2017). Investigations continued in 2018 (Fladd et al. 2018). Work originally began in two 2-x-4-m Excavation Units (Table 1). During 2019, we confirmed the existence of a foundation trench associated with the West Great House, and revealed that the great house is constructed above earlier, deeply stratified midden deposits (Nonstructure 196 and Nonstructure 1020). Below these middens were two use surfaces probably associated with a wall segment in the far southwest corner of 2x4 452.4N 390.5E. This wall segment is probably an exterior wall to a room, possibly a room in the same building that we have encountered in Areas C1, C2, and C3. Two additional wall segments encountered in the northwest corner of the same unit proved to be a corner belonging to Structure 1016.

In 2019, we placed a third 2-x-4-m Excavation Unit (Table 1) to explore Structure 1016, thought to be roughly contemporaneous with the West Great House. We also created Segment 12 to define the northwest corner of Structure 1016 so we could estimate the floor area of the room (Figure 5). Our interpretations of the deposits within this excavation area became more complex as excavation proceeded in 2019, so we include descriptions of a few Study Units that we previously excavated in 2017–2018. These units have exposed a stratigraphic sequence extending from the early Pueblo I period to the Chaco-era occupation of the Haynie site during the late Pueblo II period.

##### **2.4.3.1 Arbitrary 184, 174, 1033**

These Study Units comprise the upper fill of this excavation area. Arbitrary 184 is composed of masonry, mortar, and other debris from the collapsed western wall of the West Great House. It lies deepest against

the remnant standing west wall of the great house, and patterned wall fall extends for nearly four meters to the east. The wall fall debris is truncated within 2x4 452.4N 390.5E by an area of disturbed deposits possibly related to mechanical excavation during the 1970s and 1980s. Arbitrary 174 is a deposit of sandstone rubble, adobe and mortar fragments, and artifacts that were probably disturbed and/or redeposited by mechanical activities in the 1970s–1980s. Arbitrary 1033 is the post-occupational debris overlying Structure 1016 in 2x4 454.4N 389E. Wall fall from the West Great House does not extend as far northwest as Structure 1016, and mechanical disturbance of the area appeared limited, so we gave the post-occupational fill above Structure 1016 its own Study Unit.

#### **2.4.3.2 Nonstructure 1054**

This Study Unit refers to a thin layer of reddish, wind-and-water-lain, silty sediment immediately below wall-fall (Arbitrary 184) adjacent to the west wall of the West Great House. Nonstructure 1054 is a natural post-occupational deposit composed of a combination of “melted” exterior wall plaster, crumbling mortar, and naturally deposited silts. It probably formed shortly after people ceased to maintain the architectural fabric of the West Great House, but prior to wall collapse.

#### **2.4.3.3 Nonstructure 1055**

This deposit is a relatively thin, tapering midden deposit adjacent to the west wall of the West Great House. It sits atop Nonstructure 1057 and Nonstructure 1056, but below Nonstructure 1054. Based on its stratigraphic position, we believe this midden deposit is associated with the habitation of the West Great House during the late Pueblo II period.

#### **2.4.3.4 Nonstructure 1056**

Nonstructure 1056 is an extra-mural use surface defined by the presence of a pit feature identified in the south profile face of 2x4 452.4N 394.5E and 2x4 452.5N 390.5E. The pit feature was not given a feature number in 2019. Nonstructure 1056 is associated with the construction and habitation of the great house.

#### **2.4.3.5 Nonstructure 1057**

This is a deposit of clay-rich sediment placed atop Nonstructure 196 (a midden). Its placement created Nonstructure 1056. We interpret this to be a purposeful deposition event associated with the initial construction of the West Great House. The placement of Nonstructure 1057 capped existing midden deposits (Nonstructure 196) and created a firmer, level surface off the west side of the West Great House. Nonstructure 1057 extended at least four meters from the great house, but it is truncated by the disturbance encompassed by Arbitrary 174.

#### **2.4.3.6 Nonstructure 196**

Investigation of Nonstructure 196 began in 2017 and continued throughout 2018 and 2019. Nonstructure 196 is a midden deposit below the West Great House foundation. It extends to the west beyond the edge of 2x4 452.4N 394.5E. We suspect that the bulk of this midden deposit is located northeast of the excavation area. The northwest corner of the West Great House sits atop Nonstructure 196. Nonstructure 196 is separated from Nonstructure 1020 (a midden) by a thin layer of construction debris designated Nonstructure 1058. We excavated portions of Nonstructure 196 in 2017 and 2018. After processing a flotation sample from this Study Unit, the laboratory staff recovered a piece of a charred maize cob, which we sent to Beta Analytic for AMS dating. This fragment produced a date of 1140 +/- 30 B.P. (Beta-516763; burned maize;  $\delta^{13}\text{C}$  -10.4 o/oo), or a calibrated date of A.D. 854-981 (78.6%) and A.D. 802-848 (11.3%). For further details on radiocarbon dating, see Table 3 and the “Chronometric Sample Analysis” section.

#### **2.4.3.7 Nonstructure 1058**

This is a thin layer of construction debris that lies above Nonstructure 1020 and below Nonstructure 196. It is truncated in the west by the disturbance we designated Arbitrary 174. The western portion of Nonstructure 1058 is clay rich, while the eastern portion dives downslope towards the east and northeast, and is siltier. We interpret Nonstructure 1058 as a layer of construction debris (possibly a result of people remodeling a nearby structure) deposited atop Nonstructure 1020. Nonstructure 1058 appears to be roughly contemporary with Structure 1016.

**2.4.3.8 Structure 1016**

Early in the investigation of 2x4 452.4N 390.5E, excavators encountered the corner of a masonry room, which was designated Structure 1016 (Figure 6, Figure 9). In 2019 we began excavation of 2x4 454.4N 389E and Segment 12 to document additional portions of this surface room. Approximately two-thirds of the room lies within our current excavation area. It is a rectangular masonry room with walls composed of single-width sandstone cobbles held together with mortar. Only a few courses of the walls remain intact and there was relatively little wall fall debris within Structure 1016 (and no evidence for melted adobe) suggesting that the ancient inhabitants of the site may have salvaged the stone for use elsewhere nearby. Excavation during 2019 identified the floor surface in the eastern half of the room; the west half remains above the floor surface. We identified two possible floor features based on upright slabs and discolorations of the soil, but we did not excavate these features in 2019 and have not yet assigned a feature number to them. Pottery observed during excavation suggests Structure 1016 dates to the middle or late Pueblo II period.

**2.4.3.9 Nonstructure 1015**

We identified an extra-mural use surface (Nonstructure 1015) outside of Structure 1016. Nonstructure 1015 is best defined northeast, east, and southeast of Structure 1016. It slopes steeply to the north-northeast. A few artifacts occurred upon this extra-mural surface.

**2.4.3.10 Nonstructure 1020**

Nonstructure 1020 is a 40–60 cm thick, well-stratified midden deposit that extends throughout 2x4 452.4N 394.5E and 2x4 452.4N 390.5E. It is below Nonstructure 196, below the foundation of the West Great House, and is probably stratigraphically lower than the foundation of Structure 1016. Many thin, alternating layers of dark ashy sediment and harder, light-colored sediment characterize Nonstructure 1020. We excavated portions of Nonstructure 1020 in 2018, and the laboratory staff recovered a piece of charred maize cob while processing a flotation sample from this Study Unit. We submitted the charred cob fragment to Beta Analytic for AMS dating in late 2018. The cob produced a date of 1090 +/- 30 B.P. (Beta-516761; charred maize;  $\delta^{13}\text{C}$  -12.0

0/00), with a calibrated date of A.D. 892–1014 (95.4%). For further details on radiocarbon dating, see Table 3 and the “Chronometric Sample Analysis” section. Pottery noted during excavation suggest this midden was deposited during the early Pueblo II period, which is consistent with this AMS date.

#### **2.4.3.11 Arbitrary 1032**

This is a reddish-orange deposit of construction debris that is cross-bedded with Nonstructure 1020—there are stratified midden deposits both below and above Arbitrary 1032. Arbitrary 1032 extends eastward from a wall segment at the far southwest corner of 2x4 452.4N 390.5E. We believe that it is a dump of construction debris (roofing?) related to a remodeling event in a nearby structure. The inhabitants of the site deposited Arbitrary 1032 during the same period of time when they were creating Nonstructure 1020.

#### **2.4.3.12 Nonstructure 1060**

Nonstructure 1060 refers to laminated wind-and-water-lain sediments deposited against the east side of a wall segment in 2x4 452.4N 390.5E. We interpret these sediments to have been naturally deposited during a period of minimal cultural activity in this portion of the site. Nonstructure 1060 is below Nonstructure 1020 and above Nonstructure 1031. Based on sherds observed during excavation of strata below and above Nonstructure 1060, it is possible that these naturally laid sediments date to the late Pueblo I or early Pueblo II period.

#### **2.4.3.13 Nonstructure 1031**

This is a midden deposit separated from Nonstructure 1020 by the naturally laid sediments of Nonstructure 1060 and by a construction deposit (Arbitrary 1032). To the east the distinction between Nonstructure 1031 and Nonstructure 1020 was less obvious; we demarcated the difference between the two deposits by a shift from stratified (Nonstructure 1020) to unstratified deposits (Nonstructure 1031), and a thin layer of ashy sediment that appeared to be resting atop Nonstructure 1031 but below Nonstructure 1020. Based on sherds observed during excavation, we believe Nonstructure 1031 dates to the late Pueblo I period.

**2.4.3.14 Nonstructure 1027**

Nonstructure 1027 is an extra-mural use surface associated with four pit features (PNS 1–4) and a wall segment that is probably the exterior wall of a structure located to the west. It extends from the base of the wall segment eastward to the east end of 2x4 452.4N 394.5E and presumably beyond. We believe that Nonstructure 1027 and the four pit features excavated into it are contemporaneous with the wall segment (which may be the eastern, exterior wall of the same building observed within Excavation Areas C1, C2, and C3). The west half of Nonstructure 1027 sits atop a low mound created by Nonstructure 1043 (construction deposit) and Nonstructure 1044 (small midden deposit), while the east half occupies the same planar surface as Nonstructure 1050, an earlier extra-mural use surface that extends below Nonstructure 1043 and Nonstructure 1044. Based on sherds observed during excavation, Nonstructure 1027 probably dates to the late Pueblo I Period.

**2.4.3.15 Nonstructure 1043**

We interpret this Study Unit to be a deposit of harder, clay-rich sediment used to cap a small midden deposit (Nonstructure 1044) and create a firm extra-mural activity surface (Nonstructure 1027) west of the wall segment associated with Nonstructure 1027. Nonstructure 1043 downward to the east across 2x4 452.4N 390.5E but does not extend very far into 2x4 452.4N 394.5E. Two pit features originating on Nonstructure 1027 are cut into Nonstructure 1043. We believe that people deposited Nonstructure 1043 at around the same time they constructed the wall segment, as Nonstructure 1043 abuts the foundation stones at the base of the wall segment.

**2.4.3.16 Nonstructure 1044**

This is a small midden deposit capped by Nonstructure 1043 and above Nonstructure 1050 (extra-mural use surface) and Structure 1051. Nonstructure 1044 seems to extend into 2x4 452.4N 390.5E from the south, and excavations in 2019 may have only uncovered the northern-most tongue of a larger midden deposit. A pit feature that originates on Nonstructure 1027 has partially cut into Nonstructure 1044. Nonstructure 1044 pinches out to the east before reaching two additional pit features that originates on Nonstructure 1027. Based on sherds observed

during excavation, we believe that Nonstructure 1044 probably dates to the Pueblo I period.

#### **2.4.3.17 Nonstructure 1050**

This is an extra-mural use surface that we defined as the origin point for Structure 1051. In 2x4 452.4N 390.5E Nonstructure 1050 is separated from Nonstructure 1027 by a small, eastward-sloping mound created by Nonstructure 1043 and Nonstructure 1044. However, since Nonstructure 1043 and Nonstructure 1044 both pinch out and terminate near the boundary between the two 2x4 Excavation Units, Nonstructure 1050 and Nonstructure 1027 are the same planar surface in 2x4 452.4N 394.5E.

#### **2.4.3.18 Structure 1051**

This probable structure is visible in both plan view and the south profile face of 2x4 452.4N 390.5E (Figure 6). It does not extend all the way to the north profile face of that Excavation Unit. Only a portion of Structure 1051 extends into the excavation area, but what is visible appears to be oval or circular in shape. The eastern edge is well defined, exhibiting a clear boundary with Nonstructure 1059 (an earlier midden deposit). We have not yet fully defined the western edge; in profile, Structure 1051 abuts redeposited sterile sediment (Arbitrary 1061). The upper sediments filling Structure 1051 are laminated silts and loams that slope towards the presumed center of the structure. We currently interpret Structure 1051 to be a shallow pit structure or pit structure antechamber. We did not excavate the lower interior sediments of Structure 1051 during the 2019 field season, but pottery observed in the upper, laminated sediments included Chapin Black-on-white, Abajo Red-on-orange or Bluff Black-on-red, and Moccasin Grey, a combination that suggests an early Pueblo I date for Structure 1051.

#### **2.4.3.19 Nonstructure 1059**

This is a midden deposit that occurs within 2x4 452.4N 394.5E. Nonstructure 1059 extends only a short way west into 2x4 452.4N 390.5E. The site's inhabitants excavated Structure 1051 into Nonstructure 1059, and a pit feature—which originates on Nonstructure 1027 (an extra-mural surface)—also intrudes into Nonstructure 1059. Recent rodent

or large mammal activity has badly affected the integrity of Nonstructure 1059, completely removing portions of the deposit and introducing pieces of shredded plastic bag into the fill. To the extent possible, we have separated out the portions of Nonstructure 1059 affected by bioturbation as Arbitrary 1030.

#### 2.4.3.20 Arbitrary 1061

This is a small deposit observed in the western half of 2x4 452.4N 390.5E. It is nearly sterile reddish silt loam, but does contain numerous small flecks and chunks of charcoal. We believe it may be redeposited sterile sediment, perhaps removed during excavation of a nearby pit structure. Structure 1051 appears to have been excavated into this sediment. We explored only a small portion of this Study Unit during the 2019 field season.

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## 2.5 Area D

Previous mechanical excavation in the 1970s–1980s removed much of the standing architecture of the West Great House. Standing walls delineate portions of four rooms in the northwest corner of the building. A previous landowner made a sketch map of the structure before it was mechanically excavated; by georeferencing this map, we were able to approximate the location of the original footprint of the structure. Area D refers to test excavations seeking intact deposits within the disturbed portion of the structure.

In 2017, we placed a number of test units (Figure 4, Table 1) within the presumed footprint of the original structure to determine whether there are any intact great house deposits, or earlier cultural deposits beneath the great house. We completed one of these in 2017 (1x2 444N 397E) and ceased excavation in another (4x2 438N 404E) because we encountered a leach field associated with the modern house to the south (Simon et al. 2017). We created a 2-x-2-m Excavation Unit in 2017 to search for the southwest corner of the West Great House (Table 1, Figure 4); ultimately, we identified no architectural remains from

the great house but we did discover a pit structure, Structure 1024 (Figure 6); which we fully documented the extent of the structure visible within the 2-x-2-m unit in 2019. We added Segment 7 east of the 2-x-2-m unit to allow easier access into the excavation area (Figure 5). In 2018, we created a 4-x-1-m Excavation Unit to investigate possible intact deposits in Structure 62, a great house room (Figure 4, Table 1). We completed excavation of this unit in 2019 when we discovered undisturbed, sterile native sediment.

### **2.5.1 Arbitrary 183**

This Study Unit is roughly equivalent to Arbitrary 179 identified elsewhere on the site. We gave it a separate designation in Area D because it was not clear whether this material was disturbed in-situ, or was mechanically redeposited. Arbitrary 183 consists of sandstone rubble, artifacts, and other debris from the West Great House, disturbed by mechanical excavation and mixed with recent/modern items such as glass, beverage cans, wire, and miscellaneous metal objects. Most of the deposits within 4x1 448.5N 401.5E proved to be Arbitrary 183.

### **2.5.2 Arbitrary 194**

We gave this Study Unit designation to the sterile sediment beneath the West Great House. Based on our excavations in 4x1 448.5N 401.5E and 2x1 444N 397E, we think that mechanical excavation of the great house in the 1980s removed nearly all deposits down to sterile sediment, at least in the southwestern portion of the structure. In 4x1 448.5N 401.5E, Arbitrary 183 sits directly above Arbitrary 194.

### **2.5.3 Structure 1024**

Structure 1024 is a burned pit structure into which people later deposited midden and construction debris (Figure 6). At the end of 2018 our excavations in 2x2 434N 397E had removed the midden deposits and had revealed roof fall. While processing flotation samples from the 2018 season the laboratory staff recovered a piece of charred maize cob from upper roof fall or secondary structural collapse contexts. We sent this sample to Beta Analytic for AMS dating in late 2018. The sam-

ple produced a date of 1140 +/- 30 B.P. (Beta-516762; burned maize;  $\delta^{13}\text{C}$  -10.9 o/oo), or a calibrated date of A.D. 845-981 (78.6%), suggesting that Structure 1024 dates to the late Pueblo I or early Pueblo II period. See Table 3 and the section “Chronometric Sample Analysis” for more information on radiocarbon samples.

In 2019, we excavated the roof-fall deposit, which included a layer of burned roof beams, and documented the underlying floor surface and floor features. The earthen component of the roof-fall deposits was thick, indicating the structure had a substantial roof. The burned roof beams were well-preserved, and we obtained 34 samples that we will submit for dendrochronological sampling in early 2020 (Figure 10). Below the roof fall we discovered a burned, open-twined bulrush or cattail mat (Figure 12 and Figure 13). The mat was too fragile to remove, but perishables and textiles expert Laurie Webster documented the object in-situ (see the “Perishables Analysis” section for more details), and we took samples of the material for finer-grained species identification and curation. There were many floor features (Figure 11), including: a slab-lined posthole packed with Mancos shale, which we believe was the northwest roof support post; a portion of a complex sipapu; four sand-filled circular pits; and 11 small, cylindrical sand-filled pits surrounding the complex sipapu which we interpreted as paho marks, or small, cylindrical sand-filled pits that may have held prayer sticks. The charred cattail/bulrush matting covered the complex sipapu, which consisted of a large, shallow oval-to-rectangular basin. Within this basin was a deeper, cruciform pit with an upright slab in the center. Based on the morphology of the floor features, Laurie Webster’s evaluation of the charred matting, and preliminary evaluation of sherds from the overlying midden deposit, we think this pit structure dates to the Pueblo I period.

## 2.6 Area E

In 2018 we added a 1-x-2-m test unit (388N 410E) in Area E, the “lawn” south of the modern house (Figure 4, Table 1). The unit is intended to sample redeposited debris from the West Great House and to help

define the original ground surface in this area of the site (Fladd et al. 2018). Work continued on this unit in 2019.

#### **2.6.1 Arbitrary 195**

This Study Unit refers to the thin topsoil overlying mechanically redeposited material from the West Great House. This topsoil is recent, probably a combination of eolian deposits and altered sediments from Arbitrary 179, 1001, 1021, and 1022.

#### **2.6.2 Arbitrary 1022**

This Study Unit refers to the mechanically redeposited debris from the West Great House. A previous landowner used this debris to create a level yard south, southwest, and west of the modern house. It lies immediately below the thin layer of topsoil and contains blocks of architectural sandstone, hard chunks of clay and unburned adobe, many artifacts, and modern/recent items such as broken glass, beverage cans, electrical wire, and miscellaneous metal objects. Arbitrary 1022 is equivalent to Arbitrary 179 and 1021.

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### **2.7 Area F**

During the Spring of 2019 we conducted a series of informal auger tests along the southern edge of the area where portions of the West Great House used to stand. Because of the prevalence of a leach field and unmarked, buried utility lines leading to the modern house we had had limited success with Excavation Units in that area. The auger tests sought to identify buried pit structures. We placed Segment 8 (Table 1, Figure 5) over several auger tests that discovered cultural deposits and burned sediment consistent with pit structure fill. Segment 8 was excavated using a backhoe, but the backhoe quickly revealed a buried, unmarked copper utility line and we immediately terminated the excavation.

**2.7.1 Arbitrary 1019**

This is the loose topsoil in Segment 8. It was dark grey and ashy. While stratigraphically equivalent to other topsoil Study Units on the site (e.g. Arbitrary 170, 195), Arbitrary 1019 is located in a high-traffic area between the modern house and a garage and was more compacted.



## 3

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### *Paleohydrology Fieldwork*

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Cynthia Fadem, Associate Professor of Geology at Earlham College, conducted geoarchaeological fieldwork at the Haynie site and at Wallace in 2018. The final report for this work was completed in early 2019 (Fadem et al. 2019). The geoarchaeological work had several goals: 1) investigate a potential water catchment feature at Wallace; 2) investigate a large channel that cuts through the middle of the Haynie site, immediately east of the West Great House; 3) characterize the soil profile at several locations within the Lakeview Group; and 4) create a model of waterflow in the vicinity of Wallace and Haynie. We summarize the results of that fieldwork here.

The Wallace water control feature is a suspected reservoir located northwest of the Wallace great house (Bradley and Bradley 2019: Figure 1). The feature is diamond-shaped in plan and holds water during wet times of the year, supporting a community of rushes and reeds. The water table is fairly shallow at the site of the suspected reservoir (Fadem et al. 2019:10). Excavation of a soil profile and use of a bucket auger near the center of the feature revealed a developing upper loess soil, a layer of decaying and charred logs probably deposited in standing water about 30 cm below the current ground surface, and additional charred material up to 1.5 m deep near the center of the feature (Fadem et al. 2019).

Morphometric surface modeling and water flow modeling indicates that the channel that cuts through the Haynie site did not form naturally—given the topography of the site, there is no possible way to generate the flows necessary to carve such a channel (Fadem et al. 2019:8). This is consistent with statements from previous landowners indicating that the channel was excavated to accommodate a pipe bringing water from an irrigation ditch located north of the property.

The geoarchaeologists excavated a soil column near the north end of this channel, identifying a thin, poorly developed upper soil and two paleosols. The upper paleosol is “well-mixed soil and cultural material” that is likely spoil dirt from the mechanical excavation of the channel sometime in the 1970s–1980s, while the lower paleosol is an intact mid-den deposit.

Hydrological modeling suggests that modern irrigation has increased local water accumulation. There is currently a spring at the southeast corner of the property, but this has almost certainly been augmented by irrigation water and an inflated water table.

Fadem et al. (2019) suggest that future work could use an expanded digital elevation model that includes a larger portion of surrounding topography to create more accurate flow models. Additional auger testing and excavation of soil profiles could also help characterize changes over time in the wet season water table.

# 4

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## *Artifact Analysis*

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Crow Canyon staff, participants, and volunteers catalog and analyze the flaked stone, ground stone, and ceramic artifacts recovered during excavation. We send out chronometric samples for radiocarbon or dendrochronological dating. Occasionally, we bring in a specialist to examine specific classes of artifacts, such as perishables.

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### **4.1 In-House Artifact Cataloging and Analyses**

In-house cataloging and analysis of artifacts for the NCOP is in progress. Staff, participants, and volunteers have catalogued more than 9,440 bags of artifacts and samples for the project thus far. Of these bags, 6,397 are from the Haynie site (5MT1905), 2,063 are from the Ida Jean site (5MT4126), and 980 are from the Greenstone site (which is part of Wallace Ruin, 5MT6970).

We have analyzed more than 8,121 flaked-lithic artifacts and 63,402 pottery sherds for the project thus far. Of the 8,121 pieces of chipped stone analyzed, 7,310 pieces are from the Haynie site (5MT1905) and 811 pieces are from the Ida Jean site (5MT4126). Of the 63,402 pottery sherds analyzed, 46,468 sherds are from the Haynie site, 16,605 are from the Ida Jean site, and 329 are from Greenstone Pueblo. The pottery types identified at the Haynie site indicate primary use of the site during the Pueblo I and Pueblo II periods, whereas the pottery types from the Ida Jean site indicate primary site use during the Pueblo III period.

A number of detailed analyses are ongoing, including temper identification and design analysis of pottery. Temper identification is ongo-

ing for white ware bowl and gray ware jar rim sherds from both the Haynie and Ida Jean sites. Temper has been identified for more than 624 white ware bowl rims and 312 gray ware jar rims. A Pueblo II period pottery design analysis is ongoing for the NCOP and 250 painted white ware bowl rim sherds have been analyzed thus far, 132 from the Haynie site and 118 from the Ida Jean site.

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## 4.2 Chronometric Sample Analysis

In late 2018, Crow Canyon submitted six samples for radiocarbon accelerator mass spectrometry (AMS) analysis. All of the samples were burned maize cob fragments that we recovered during excavations at the Haynie site. We received the results in early 2019, so we include the results with this year's annual report. Beta Analytic processed all six samples, and they reported the results in a two-sigma, 95-percent-probability range (Table 3). We discuss the samples within their archaeological context in the "Excavations at the Haynie site" section.

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## 4.3 Perishables Analyses

During the excavation of Structure 1024, a pit structure in Area D (Figure 6), we discovered part of a charred mat resting on the floor of the structure below the roof fall (Figure 12). The mat was poorly preserved and we did not think we could remove it intact, thus perishables expert Dr. Laurie Webster analyzed the item *in situ*.

The fragment Dr. Webster analyzed measured 67 x 52 cm and included one intact side edge and one intact end. The remainder of the mat was outside the confines of the Excavation Unit. The following is an excerpt from Dr. Webster's (2019) report:

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The mat is constructed in open simple 2-strand S-twist twining over

parallel single warps, the weft rows spaced at intervals to expose the warps. The twining elements are 2-ply z-spun S-twist (2z-S) yucca (*Yucca sp.*) cordage, 0.2 cm in diameter, and they are tied in an overhand knot between each warp, a technique also known as tie-twining (Cosgrove 1947:113–114; Emery 1966:226). Five twining rows, spaced 11 cm apart, were observed during analysis (Figure 12 and Figure 13). The warps are composed of two or more stacked and flattened bulrush (*Schoenoplectus sp.*) or cattail (*Typha sp.*) stems, approximately 1.0 cm in width. The exposed side edge of the mat probably once had a finished selvage, but its structure could not be determined. At the exposed end, the elements are trimmed flush and lack a formal selvage finish (Figure 14). Based on comparisons with better-preserved twined mats, this was the lower end of the mat.

Open-twined mats were the most common form of matting during the Basketmaker II and Basketmaker III periods (e.g., Morris 1980:122–123; Morris and Burgh 1954:66, Fig. 99b; Nusbaum 1922:98–101, Figs. 13–15, Pls. L, LII). During the Pueblo I period, they were gradually replaced by twill-plaited mats (Webster 2009:Table 4.2, 117–120; 2012:168). Pueblo I examples of open-twined mats from the Four Corners region include a fragmentary carbonized reed mat from Pit-structure 44 at Grass Mesa Village (A.D. 860–880) in the Dolores River valley (Blinman 1986:59; Morris 1988:909), a cattail mat from Antelope House in Canyon del Muerto (Adovasio and Gunn 1980:311–312, Type III; see Webster 2012:168 for another possible twined mat from Canyon del Muerto) (Figure 5), a reed mat from Water Fall Ruin in the lower Chinle Valley (Guernsey 1931:Pl. 58b; see Webster 2012: end-note 6 for problems with the dating), and a bulrush example with a braided side selvage from a female burial at Cave 1, Tsegi Canyon (Guernsey 1931:Pl. 58a). Associated ceramics with this latter mat suggest a date range of A.D. 850–1000 and more likely A.D. 900–1000 (Webster 2012:164).

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Dr. Webster (2019) suggests that Basketmaker and early Pueblo peoples primarily used twined mats as floor coverings and bedding. She further notes that only other open-twined mat from Southwest that post-dates the Basketmaker III period is the example from Pit Structure 44 at Grass Mesa Village, approximately 15 km (9–10 miles) north of the Haynie site. Roof-fall deposits overlay the twined mat from Structure 1024—a charred maize cob from these upper roof-fall de-

posits produced a calibrated AMS date of A.D. 854-981 (78.6%), suggesting the mat dates to the Pueblo I or early Pueblo II period.

## 5

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### *Human Remains and Osteological Analysis*

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Crow Canyon, in consultation with the Native American Advisory Group, has developed a policy for the treatment of human remains and associated funerary artifacts (Crow Canyon Archaeological Center 2014). We define “isolated human remains” as fewer than five disarticulated elements in one location. When isolated remains are discovered, we document the location of the discovery, collect the isolated elements, and store them in a secure location within bags made of natural materials (e.g. unbleached paper bags, not plastic). We then have all isolated remains examined on-site by a bioarchaeologist (Kathy Mowrer). Prior to backfilling a completed Excavation Unit, we replace all the associated human remains and cover them with sediment. When we discover articulated human remains, such as a formal burial, we document the exposed elements but seek to minimize the exposure of additional human remains. Usually, this involves a bioarchaeologist (Kathy Mowrer) completing an in-situ analysis of the visible remains. We discovered isolated remains in 12 units during the 2019 season and identified one formal burial, which we documented in situ and re-covered with sediment.[]{{#\_Toc28268406 .anchor}Curation

Crow Canyon entered into an agreement with the Canyons of the Ancients Visitor Center and Museum (formerly the Anasazi Heritage Center), Dolores, Colorado, for the curation of collected materials from the Haynie site. The Canyons of the Ancients Visitor Center and Museum will take possession of these materials after the completion of fieldwork and analyses as stipulated in the research design for the NCOP (Ryan 2016).[]{{#\_Toc28268407 .anchor}}



# 6

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## *Research and Outreach*

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### **6.1 Research Presentations**

During the summer programming season, Crow Canyon staff give weekly research presentations to on-campus participants on the Northern Chaco Outliers Project. In addition, staff and affiliated researchers presented on the NCOP at several regional and national meetings during 2019 (Table 4).

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### **6.2 Public Involvement and Outreach**

Crow Canyon's mission includes a commitment to public education and outreach. Our 2019 program season included approximately 1,700 participants in school programs, research programs, and professional-development programs. Participants ranging from middle-school students to life-long learners assisted with field and laboratory work. Nearly 1,340 students, teachers, and chaperones from schools around the country participated in Crow Canyon's on-campus programs, and many of these individuals also visited the Haynie site excavations. Approximately 25 educators from around the country participated in excavation at the Haynie site as part of a National Endowment for the Humanities Summer Institute for Teachers. Crow Canyon's teen summer camps involved 73 people—19 students and chaperones in Middle School Archaeology Camp, 38 students and chaperones in High School Archaeology Camp, and 16 students and chaperones in our three-week High School Field School—all of whom excavated at the Haynie site. About 65 people participated in excava-

tion at the Haynie site through the Archaeology Research Program, including two members of the American Veterans Archaeology Recovery Program. An additional 15 participants assisted in laboratory analysis through the Archaeology Research Program. Thirty-two Earthwatch volunteers assisted our efforts in the field. About 90 individuals visited the Haynie site as part of one-day tours, and about 50 people from various local civic organization participated in special tours. Finally, laboratory work on NCOP materials was facilitated by approximately 25 long-term adult volunteers who assist with processing, analyses, and curation of archaeological materials at Crow Canyon.

The number of non-professionals served in 2019 reflects not only Crow Canyon's commitment to involving the public in its research but also the level of public interest in the ancient past of the Mesa Verde region. In addition to participants enrolling in Crow Canyon's programs, evidence of public interest in the NCOP includes articles in professional newsletters and in mainstream publications such as the *New York Times* (2 September 2017); the *New York Times* piece featured the Haynie site in an article titled, "Ruined 'Apartments' May Hold Clues to Native American History."

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### 6.3 College Field School and Internship Program

Through the college field school and internship program, Crow Canyon staff taught a future generation of archaeological professionals and cultural specialists. This past year witnessed Crow Canyon's fifth college-level field school, which eight students attended. Students learned excavation and documentation methods from a staff of experts at the Haynie site. The internship program had ten interns during 2019. In addition to learning excavation and documentation methods, a staff of expert educators taught interns how to interact with the participant archaeologists, and demonstrated how to present interpretive programming to visitors and members of the public.

#### **6.4 Native American Involvement**

As a way to inform Crow Canyon's research and enrich the experience of participants enrolled in Crow Canyon's education programs, our research and programs support and encourage Native American involvement in a variety of ways. During the 2019 season, many Native American scholars, students, and participants were involved in our programs, and numerous opportunities were supported by scholarships. Approximately 30 percent of the students in our local school district are Native American, and six area schools participated in our on-campus programming. Scholarship funds were disbursed to two Native American students to attend the College Field School. During the 2019 season, Crow Canyon involved Native American scholars in research, education programs, and educational tours. We had four Native American scholars-in-residence: Justin Lund, Jestin Morris, Will Tsosie, and Dee Lomawaima.



## 7

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### *Summary of 2019 Season and Work Plan for 2020*

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During the 2019 season, Crow Canyon made significant progress towards addressing the research questions of the Northern Chaco Outliers Project. Most of our field and laboratory work has focused on the western third of the Haynie site, but we have begun to incorporate data from fieldwork and analysis of artifacts from other parts of the Lakeview Group, particularly the Wallace great house and Greenstone Pueblo. Our work during the 2019 field season has contributed to refining our knowledge of regional culture history, human-environment interaction, and broader themes in archaeology. In addition, Crow Canyon's method continues to build links between the past and the present through our education and outreach efforts.

The past three seasons of excavation at the Haynie site have uncovered evidence of the early history of the community. Analysis of surface pottery indicated a significant Pueblo I period presence across the site (Schleher et al. 2017). During 2019, we began to discern the architectural signature of this phase, uncovering evidence of Pueblo I period structures and deposits in Areas C and D. The emerging picture is that the Haynie site was a significant village during the Pueblo I period. The settlement patterns established during that era had a significant impact on the subsequent development of the site. In 2019, we completed the documentation of Pueblo I contexts in Area D. During the 2020 season, we anticipate completing the excavation and documentation of the Pueblo I contexts currently in progress within Area C. Early Pueblo villages were organized (socially and spatially) in a variety of ways (see Wilshusen et al. 2012; Wilshusen and Ortman 1999); continued analysis of excavation data, samples and artifacts will assist in characterizing the nature of social organization during the Pueblo I period at the Haynie site, and how it fits into the broader regional picture.

Unlike many places in the Mesa Verde region, people continued to live at the Haynie site in the early Pueblo II period. Fieldwork in 2019 revealed much about this poorly known moment in the history of the Mesa Verde region. Excavations in Area C, in particular, revealed architectural details and stratigraphy that will alter our understanding of regional history during this period. The artifacts and samples we recovered will further refine our characterizations of the early Pueblo II period. In the 2020 season, we intend to analyze the data obtained in 2019, allowing us to characterize architectural trends, ceramic technology and production, faunal procurement, and lithic and osseous industries. In particular, the early Pueblo II period remains at the Haynie site will allow us to discuss how communities reformatted in the aftermath of a large-scale, regional depopulation event that occurred about A.D. 890–910 (Varien et al. 2007; Wilshusen and Ortman 1999).

We uncovered fewer deposits dating to the middle and late Pueblo II period during 2019, likely because many of our Excavation Units were in progress and had already excavated through those stratigraphic levels in 2017 and 2018. Nonetheless, excavations in Areas A and C have almost certainly uncovered architecture dating to the middle and late Pueblo II periods; we await results from analysis of artifacts and samples collected from those structures to confirm their chronological position.

Excavations in Areas A, C, and D have revealed a deeply stratified occupational sequence that stretches from the Pueblo I period to the Chacoan and post-Chacoan periods. In the Mesa Verde region, this is an unusual combination of components. Many Chacoan great houses sit atop relatively minor early occupations. The Haynie site appears to have been a significant, possibly aggregated, community center in Pueblo I and Pueblo II prior to the Chacoan construction. As such, our work at the Haynie site will allow us to characterize a community center both prior to and after Chacoan influence or intervention.

Work during 2019 increased our understanding of how the Chacoan component articulates with other parts of Architectural Block 100 of the Haynie site. In Area C4, we identified the foundations of the West Great House, including a small footer trench. People constructed the

West Great House atop earlier, deeply stratified midden deposits. We also gained a firmer understanding of the stratigraphy of these deposits adjacent to and below the West Great House, which will help us interpret its construction and use during the Chacoan and post-Chacoan periods. Artifact analysis and radiocarbon dating results from Area C1 suggest that people may have used that area as a location for trash deposition during the Chacoan period. Continued excavation in Areas A and B produced a sample of artifacts originating from the vicinity of the West Great House, analysis of which will also contribute to our understanding of the Haynie site's Chacoan component.

In 2019, we initiated an environmental sampling procedure to capitalize on the exceptionally well-stratified deposits within several contexts at the Haynie site. We are taking columns of flotation and pollen samples from middens. These data will be instrumental in characterizing long-term change in plant and animal use within the Lakeview Group, and they will allow us to seek contrasts in human-environment interaction in the pre-Chacoan, Chacoan, and post-Chacoan periods.

One of the unique aspects of Crow Canyon's research program is its use of non-professional participants. Education and outreach is an essential and significant part of every project, and participants assisted Crow Canyon staff in nearly every stage of the research process. Throughout 2019, Crow Canyon staff (field, laboratory, and education) interacted with hundreds of students and adults, engaging in conversations that sought to make the past relatable and relevant to the present. We inspire their curiosity and ask them to consider important questions about human societies, and we demonstrate through our programs how archaeological data can address these questions. They observe and assist in the collection of data that will contribute to a deeper understanding of the human condition. Many of our participants are new to the Southwestern U.S. and have little knowledge of Native American cultures in the past or the present. We use archaeology as a method for teaching about these cultures. Staff engage participants in challenging and occasionally uncomfortable conversations about the history of Native North America, the relationship between Native Americans and archaeology, and the relationships between Native Americans and Euro-Americans in the past and the present.

Our work plan for 2020 includes completing excavation and documentation in several “in progress” areas. The general goal is to reduce the number of active large excavation areas from five to three to align more closely with staffing. We anticipate finishing the architectural documentation of numerous structures currently under excavation in Areas C1 and C2, hopefully completing all work in those trenches by the end of 2020. Completing this work will allow us to begin analysis of a depositional sequence stretching from some of the earliest deposits at the Haynie site up to the Chacoan-era component. We anticipate completing work in Area C4, as well. During 2019, our work was confined to only one half of Area A—in 2020 we plan to incorporate the results of that work with excavation data from the rest of Area A, and complete excavation and documentation of those units. If we complete excavation and documentation in each of those areas, we hope to begin work on a 2 m-wide trench in Area D, extending northward through an exposed room of the West Great House. We hope that this trench will allow us to increase our sample of Chacoan and post-Chacoan period cultural material, and that it will afford us a chance to test the depositional sequence we have reconstructed for Area C4 by exposing stratigraphy north of the great house. Finally, we anticipate using 1-x-1-m units to sample the western and northwestern boundaries of the site in order to understand the extent of cultural deposits and to reconstruct what the original landform may have looked like.

With our firmer understanding of the occupational sequence at Haynie, we can target our artifact and sample analysis towards specific contexts, providing data that can address a wider range of the NCOP research questions. Analysis of sherds in 2020 will continue to provide chronological control for many contexts, and lithic analysis will assist in characterizing how people used the surrounding landscape. We plan to select a series of samples to submit for radiocarbon dating in early 2020. As we complete work in Areas C1, C2, and C4 we will continue our environmental sampling columns begun in 2019. As we complete excavation of particular areas of the site in 2020, we will begin internal comparison between structures and components, which will provide preliminary observations to address the NCOP research questions.

As always, in 2020 we will continue in our mission to empower present and future generations by making the human past accessible and relevant through archaeological research, experiential education, and Native American knowledge.

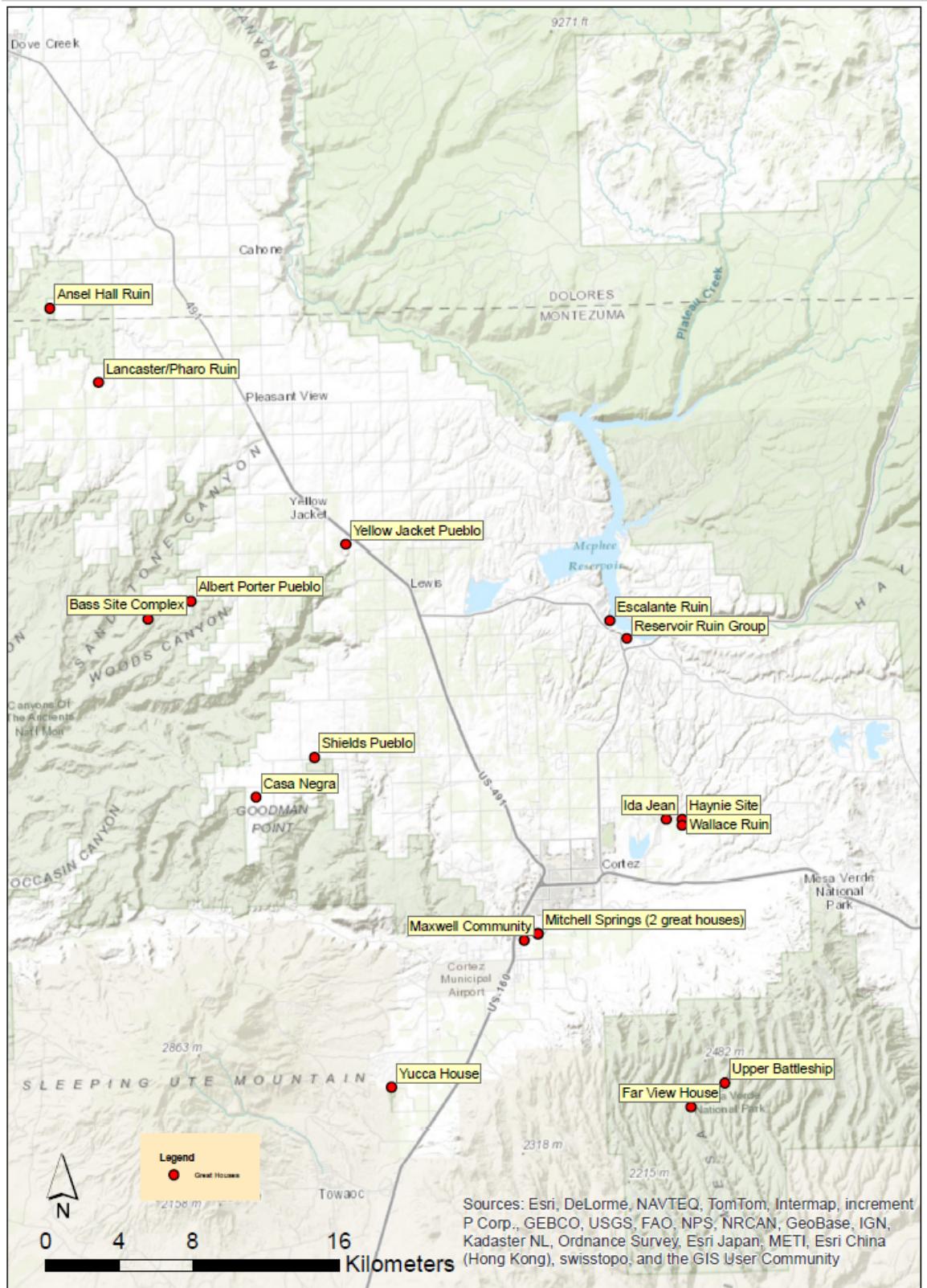


Figure . Map showing location of Haynie site, Ida Jean site, Wallace Ruin, and other Chaco-period great houses within southwestern Colorado.

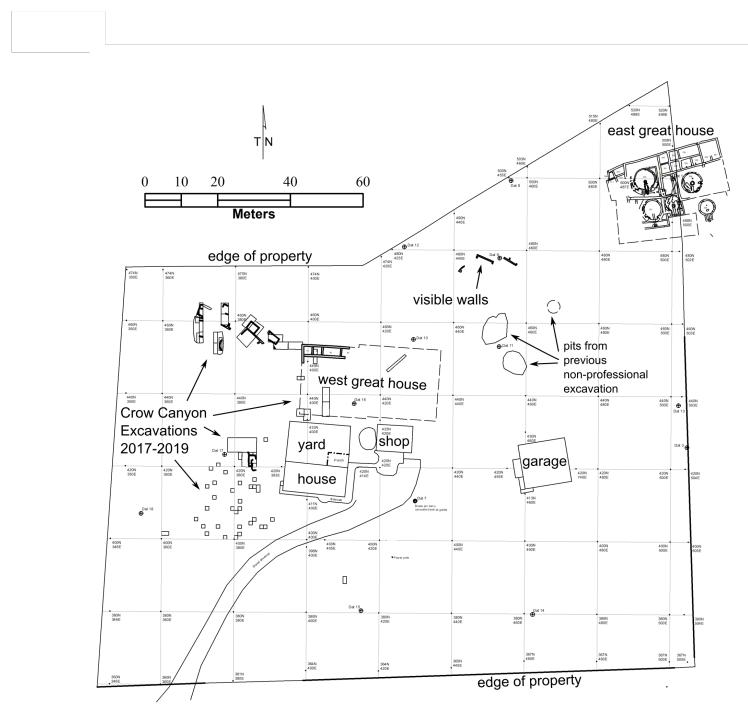
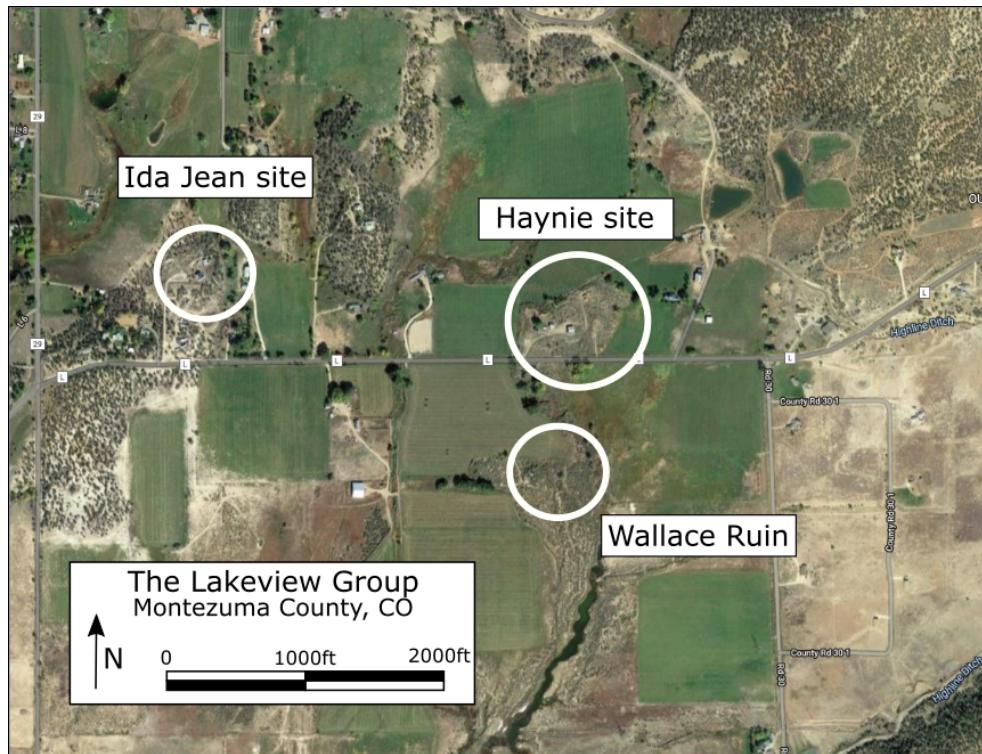


Figure . Map showing the East and West Great Houses at the Haynie site, and the boundary of The Archaeological Conservancy property. Selected archaeological features, exca-

vation areas (including some prior to Crow Canyon involvement in the site), and modern buildings are shown.



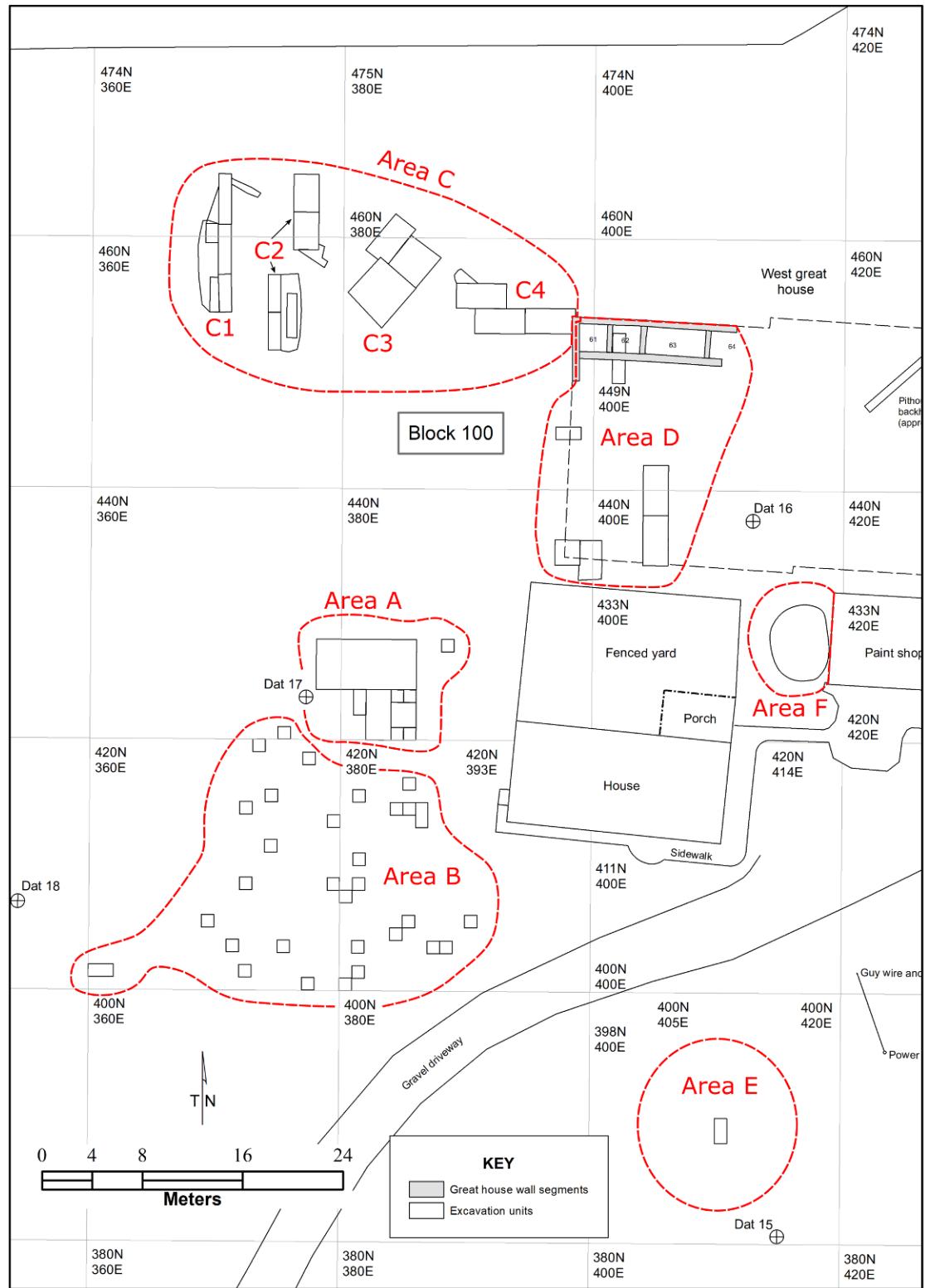
**FIGURE 7.1:** Lakeview Group

Figure . Google Earth satellite image showing landscape of the Lakeview Group, with locations of Haynie site, Wallace Ruin, and Ida Jean site.

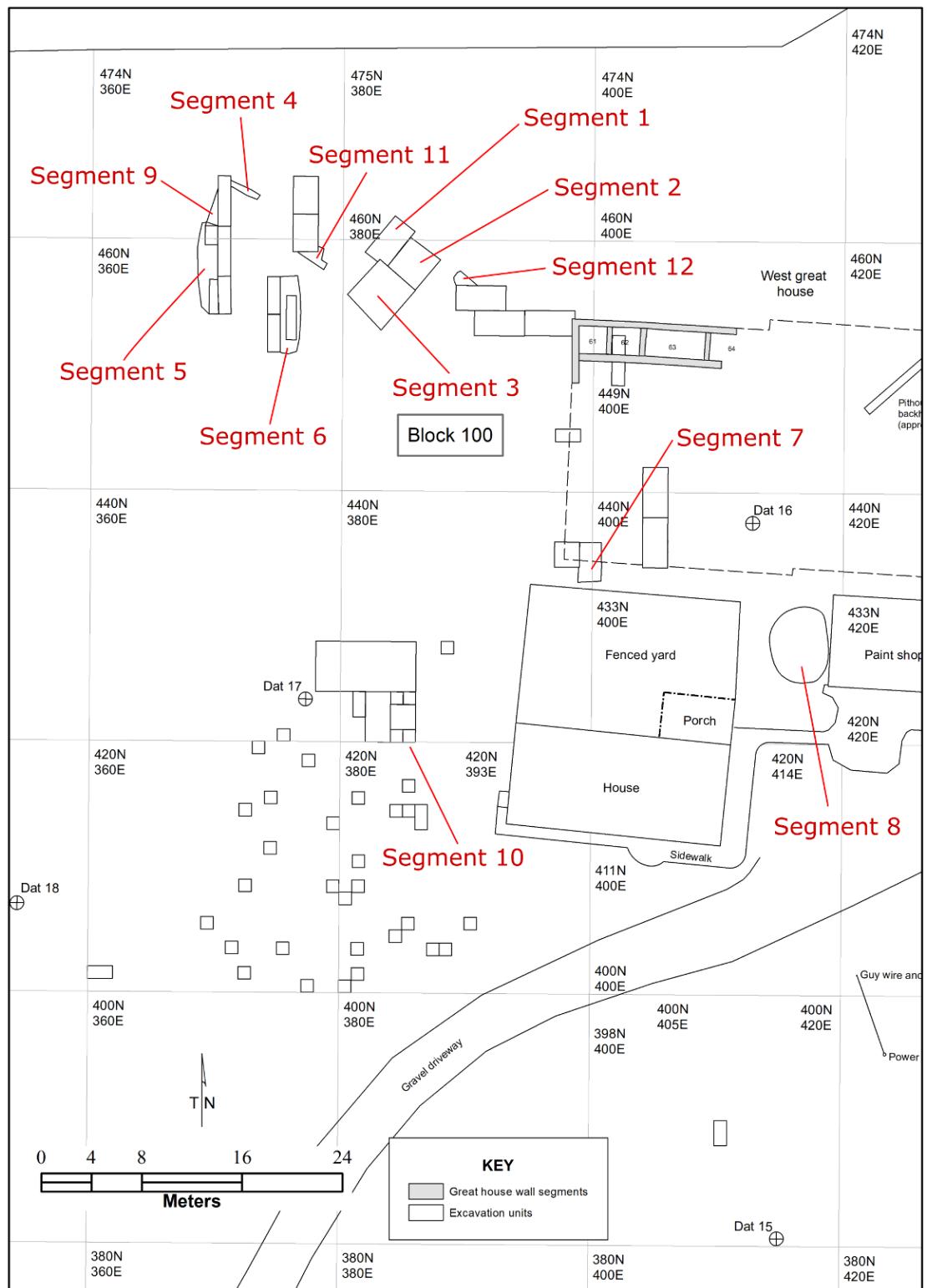
Figure . Map showing the location of Excavation Areas in Architectural Block 100 of the Haynie site.

Figure . Map showing location of segments in Architectural Block 100 of the Haynie site.

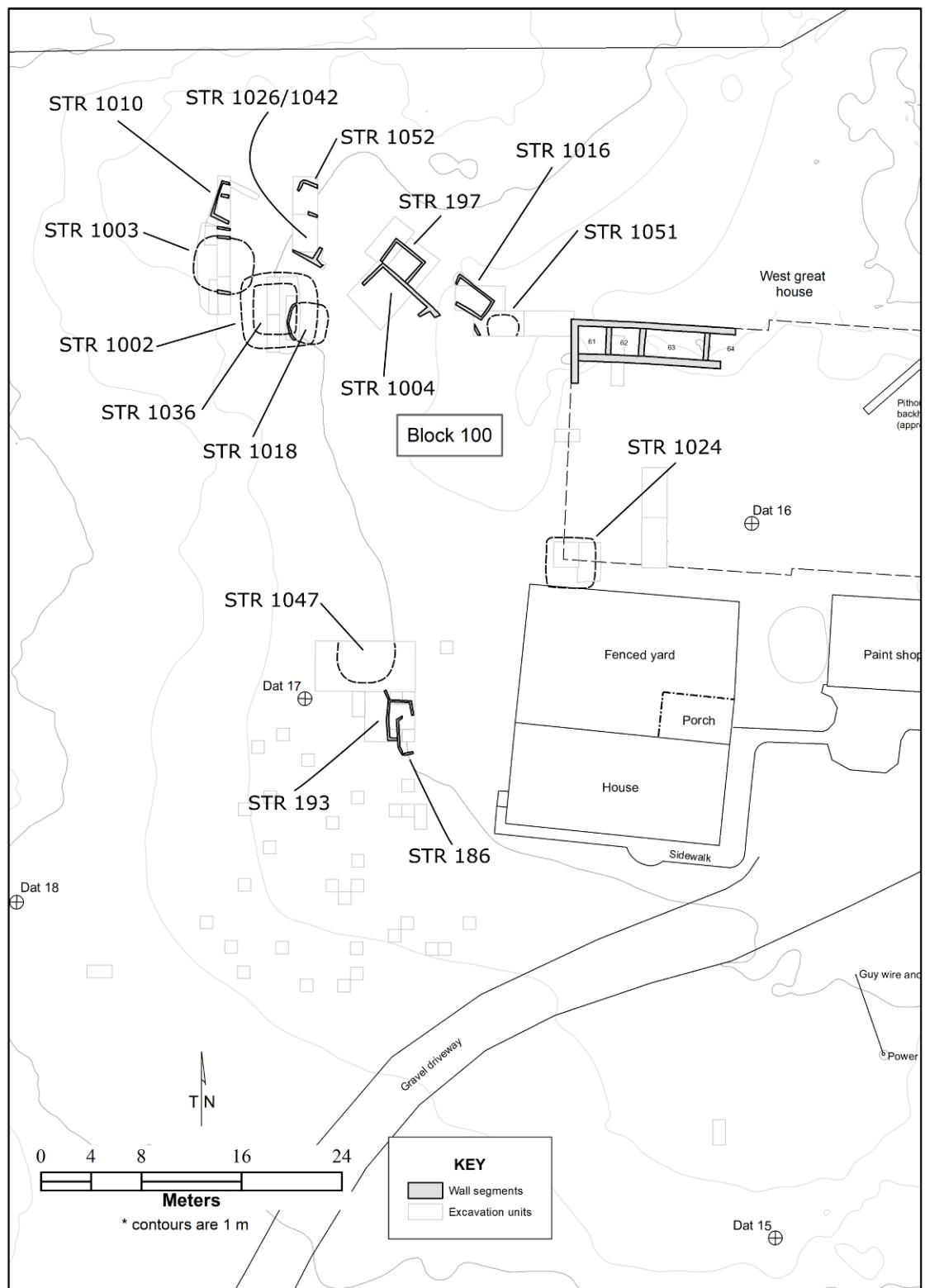
Figure . Location of numbered structures in



**FIGURE 7.2:** Haynie Block 100 Excavation Areas



**FIGURE 7.3: Haynie Block 100 Segments Labeled**



**FIGURE 7.4:** Haynie Block 100 Structures

Architectural Block 100 of the Haynie site. Locations of pit structures are dashed in, and should be considered approximate.



**FIGURE 7.5:** photo of walls below floor of STR 1010

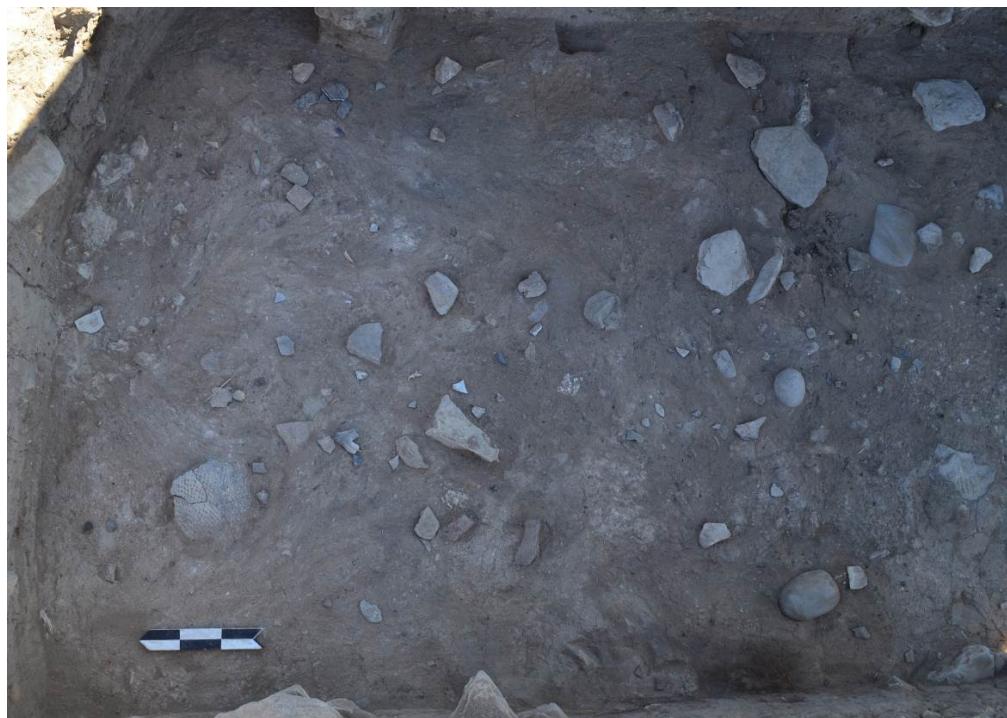
[]{#\_Toc29378645 .anchor}Figure . Photo showing wall segment or structure corner beneath floor of Structure 1010.

[]{#\_Ref27639721 .anchor}Figure . Artifacts on the floor (SR00-01) in the north half of Structure 1042.

[]{#\_Ref27642823 .anchor}Figure . In progress excavation photo showing Structure 1016 wall alignment.

[]{#\_Ref27643014 .anchor}Figure . Burned roof beam and well-preserved roofing material from Structure 1024.

[]{#\_Ref27639986 .anchor}Figure . Final excavation photo of the floor



**FIGURE 7.6:** photo of floor of STR 1042

surface in Structure 1024, showing northwest posthole, sand-filled pits, portion of complex sipapu, and paho marks.

Figure . Photo showing extent of burned bulrush/cattail open-twined mat on floor of Structure 1024. Beams from roof fall are visible at the top of the image in the Excavation Unit profile face. The artifacts north of the mat are a mano and two sherds.



**FIGURE 7.7:** photo of STR 1016 midway through excavation



**FIGURE 7.8:** photo of roof material from STR 1024 in profile



**FIGURE 7.9:** Photo of exc floor of STR 1024





**FIGURE 7.10:** 20190724\_132034

Figure . Detail of burned open-twined mat.  
Arrow points to location of one crosswise row of weft thread.



Figure . Lower end of mat, warp ends shown vertically, showing cut ends of flattened stems.

Table . List of Excavation Units in Architectural Block 100 of the Haynie site.

Area	Size (m)	Northing	Easting	Date Opened	Date Closed
A	Segment 10	8/13/2019	8/26/2019		
A	1-X-1	420	384	4/13/2017	In Progress
A	1-X-1	423	385	4/13/2017	In Progress
A	1-X-1	427	388	4/18/2017	In Progress
A	2-X-2	421	384	5/3/2017	In Progress
A	1-X-1	423	384	5/3/2017	In Progress
A	1-X-1	420	385	9/6/2017	In Progress
A	4-X-2	420	382	9/7/2017	In Progress
A	4-X-8	424	378	5/23/2018	In Progress
A	2-X-1	422	381	6/26/2019	In Progress
B	1-X-1	407	380	4/13/2017	8/28/2019

Area	Size (m)	Northing	Easting	Date Opened	Date Close
B	1-X-1	408	381	4/13/2017	8/22/2019
B	1-X-1	410	381	4/13/2017	8/28/2019
B	1-X-1	413	379	4/13/2017	6/3/2019
B	1-X-1	414	384	4/13/2017	In Progress
B	1-X-1	414	385	4/13/2017	In Progress
B	1-X-1	416	385	4/13/2017	7/24/2018
B	1-X-1	400	377	4/17/2017	9/19/2017
B	1-X-1	400	380	4/17/2017	7/9/2018
B	1-X-1	401	381	4/17/2017	7/25/2018
B	1-X-1	403	375	4/17/2017	7/26/2018
B	1-X-1	403	381	4/17/2017	8/23/2018
B	1-X-1	403	387	4/17/2017	5/7/2018
B	1-X-1	403	388	4/17/2017	5/7/2018
B	1-X-1	404	384	4/17/2017	8/23/2018
B	1-X-1	405	385	4/17/2017	6/19/2019
B	1-X-1	405	390	4/17/2017	8/29/2018
B	1-X-1	408	379	4/17/2017	8/22/2019
B	1-X-1	403	371	4/18/2017	7/18/2018
B	1-X-1	405	369	4/20/2017	6/12/2019
B	1-X-1	408	372	4/20/2017	6/7/2019
B	1-X-1	411	374	4/20/2017	9/25/2019
B	1-X-1	414	372	4/20/2017	In Progress
B	1-X-1	415	374	4/20/2017	In Progress
B	1-X-1	408	380	9/9/2019	9/26/2019
B	2-X-1	413	306	9/16/2019	In Progress
C1	Segment 4	10/30/2018	In Progress		
C1	Segment 5	5/28/2019	In Progress		
C1	Segment 9	6/26/2019	In Progress		
C1	4-X-1	457	370	4/21/2017	In Progress
C1	3-X-1	454	370	6/1/2017	In Progress
C1	4-X-1	461	370	5/29/2018	In Progress
C1	2.75-X-0.65	454	369.35	5/28/2019	In Progress
C1	1.5-X-1	459.5	369	5/28/2019	In Progress
C2	Segment 11	8/26/2019	In Progress		
C2	Segment 6	5/28/2019	In Progress		
C2	3-X-1	451	374	6/1/2017	In Progress

Area	Size (m)	Northing	Easting	Date Opened	Date Close
C2	3.5-x-1	452	375.5	5/29/2019	In Progress
C2	3-x-2	459	376	5/29/2019	In Progress
C2	3-x-2	462	376	9/3/2019	In Progress
C3	Structure 197	5/31/2018	7/2/2018	Undisturbed, sterile native sediment	
C3	Segment 3	4/21/2017	10/18/2017		
C3	Segment 1	5/4/2017	8/16/2018		
C3	Segment 2	6/28/2017	10/5/2017		
C4	2-x-4	452.4	390.5	4/26/2017	In progress
C4	2-x-4	452.4	394.5	4/26/2017	In progress
C4	2-x-4	454.4	398	7/22/2019	In progress
D	Segment 7	9/2/2019	In Progress		
D	4-x-2	434	404	4/26/2017	10/5/2017
D	4-x-2	438	404	4/26/2017	10/23/2017
D	2-x-2	434	397	5/26/2017	10/22/2019
D	1-x-2	444	397	5/26/2017	11/2/2017
D	4-x-1	448.5	401.5	9/20/2018	9/24/2019
E	2-x-1	388	410	5/23/18	In progress
F	Segment 8	6/3/2019	6/5/2019	Encountered propane pipe	

[[{\_Ref27660356 .anchor}Table . Descriptions and locations of Study Units used during the 2019 field season.

SU	Number	Areas Used	Description
Arbitrary	170	Area A Area B	Thin, recently-developed upper topsoil.
Arbitrary	171	Area C	Thin, recently-developed upper topsoil.
Arbitrary	174	Area C	Mechanically disturbed and redeposited cultural material.
Arbitrary	176	Area A	Naturally redeposited (colluvial) cultural material.

SU	Number	Areas Used	Description
Arbitrary	179	Area B	Mechanically redeposited cultural material from the West Great House. Contains material from 1970s–1990s.
Arbitrary	181	Area B	Undisturbed native sediment that contains artifacts and charcoal.
Arbitrary	182	Area B	Sandstone bedrock.
Arbitrary	183	Area D	Mechanically redeposited cultural material from the West Great House. Contains material from 1970s–1990s.
Nonstructure	192	Area C	Stratified midden deposit within pit structure depression.
Arbitrary	194	Area D	Undisturbed, sterile native sediment.
Arbitrary	195	Area E	Thin, recently-developed topsoil.
Nonstructure	196	Area C	Stratified midden deposit. Dense charcoal, artifacts, and faunal bone.
Arbitrary	1001	Area B	Thin, recently-developed topsoil.
Structure	1002	Area C	Large (oversized?), earthen-walled pit structure.
Structure	1003	Area C	Masonry-lined pit structure.
Arbitrary	1009	Area B	Undisturbed native sediment that contains artifacts and charcoal.
Structure	1010	Area C	Surface room with masonry walls.

SU	Number	Areas Used	Description
Arbitrary	1011	Area C	Naturally deposited wind-and-water-lain sediments.
Nonstructure	1015	Area C	An extramural use surface.
Structure	1016	Area C	A surface room defined by a masonry foundation.
Nonstructure	1017	Area C	Stratified midden deposit within a pit structure depression. Dense charcoal, artifacts, and faunal bone.
Structure	1018	Area C	A slab-and-masonry-lined pit structure.
Arbitrary	1019	Area F	Thin, dark, ashy topsoil, probably recently developed. Compacted by foot traffic.
Nonstructure	1020	Area C	Stratified midden deposit. Dense charcoal, artifacts, and faunal bone.
Arbitrary	1021	Area B	Mechanically redeposited cultural material from the West Great House. Contains material from 1970s-1990s.
Arbitrary	1022	Area E	Mechanically redeposited cultural material from the West Great House. Contains material from 1970s-1990s.
Arbitrary	1023	Area C	Masonry rubble from collapsed walls of surface rooms.

SU	Number	Areas Used	Description
Structure	1024	Area D	An earthen-walled pit structure.
Structure	1026	Area C	A surface room with masonry walls.
Nonstructure	1027	Area C	An extra-mural use surface.
Arbitrary	1029	Area A	Rubble from collapsed walls of an adobe and masonry surface room.
Arbitrary	1030	Area C	An area of bioturbation.
Nonstructure	1031	Area C	A midden deposit.
Arbitrary	1032	Area C	Construction dump from structure remodeling.
Arbitrary	1033	Area C	Naturally deposited sediment, probably post-occupational, but containing cultural material.
Nonstructure	1035	Area C	A midden deposit within a masonry room.
Structure	1036	Area C	An earthen-walled pit structure
Nonstructure	1038	Area B	An extra-mural activity surface.
Nonstructure	1040	Area B	A midden deposit.
Structure	1041	Area C	A surface room with masonry walls.
Structure	1042	Area C	A surface rooms with masonry walls.
Nonstructure	1043	Area C	A construction deposit used to cap a midden.
Nonstructure	1044	Area C	A midden deposit.
Structure	1047	Area A	A suspected earthen-and-masonry-walled pit structure.

SU	Number	Areas Used	Description
Nonstructure	1048	Area C	An extra-mural use surface.
Nonstructure	1050	Area C	An extra-mural use surface.
Structure	1051	Area C	A possible shallow, earthen-walled pit structure.
Structure	1052	Area C	Surface room with masonry walls.
Nonstructure	1054	Area C	A natural deposit of melted exterior plaster and water-lain sediments.
Nonstructure	1055	Area C	A midden deposit.
Nonstructure	1056	Area C	An extramural prepared surface.
Nonstructure	1057	Area C	A construction deposit used to cap a midden and create an extramural use surface.
Nonstructure	1058	Area C	A construction deposit, possible from the remodeling of a room or building.
Nonstructure	1059	Area C	A midden deposit.
Nonstructure	1060	Area C	Naturally deposited wind-and-water-lain sediments.
Arbitrary	1061	Area C	Possible redeposited native sediment, containing charcoal flecks.

]]{{#\_Ref27575671 .anchor}Table . Radiocarbon dates obtained in 2019 from Architectural Block 100 of the Haynie site. All samples were charred maize cob fragments dated using the AMS technique.

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*Conventional C14 Age*

Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context
Bet a- 516071	1120+/-30B.P. 862– 994 A.D. (91.8%) Burned corncob frag- ment $\delta^{13}\text{C}$ -11.7 o/oo	472 truc- ture 1017	Nons ture	3-7	3x1 454N 374E	Midden deposited in a pit structure de- pression
Bet a- 516072	910+/-30B.P. 10 33–1190 A.D. (94.0%) Burned corncob frag- ment $\delta^{13}\text{C}$ -11.8 o/oo	489 truc- ture 1003	S truc- ture	7-3	4x1 457N 370E	Roof fall of pits structure

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*Conventional C14 Age*

Sample Number	IRMS Corr.	Grid			Context
		PD	SU	STLV	
Bet a- 516073	980+/-30	<sup>480</sup> B.P.	S truc- ture	7-1	4x1
			1003		457N
10					370E
70-1154					Roof fall of pit s tructure
A.D.					
(49.4%)					
993-					
1058					
A.D.					
(46.0%)					
Burned					
corn cob					
frag-					
ment					
$\delta^{13}\text{C}$					
-11.8					
o/oo					

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*Conventional C14 Age*

	Ca librated	Dates (prob)	Material	Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context
Bet a-516761	1090+/-305 8 92-1014 A.D. (95.4%) Burned corncob frag- ment $\delta^{13}\text{C}$ -12.0 o/oo	P truc- ture 1020 <sup>1</sup>	Nons ture 1020 <sup>1</sup>	3-3	2x4 452.4N 394.5E	Midden below great house fo undation				

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*Conventional C14 Age*

	Ca librated	Dates (prob)	Material	Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context
Bet a- 516762	1140+/-30	<sup>309</sup> <sub>30</sub> B.P. 854-981 A.D. (78.6%) 802- 848 A.D. (11.3%) Burned corncob frag- ment $\delta^{13}\text{C}$ -10.9 o/oo	<sup>309</sup> <sub>30</sub> S truc- ture <sup>1024<sup>2</sup></sup>	5-2	2x2 434N 397E	Upper r oof/wall fall of pit s tructure				

---

*Conventional C14 Age*

	Ca librated	Dates (prob)	Material	Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context
Bet a- 516763	1140+/-30	<sup>248</sup> <i>B.P.</i>	Nons truc- ture 196		<sup>854-981</sup> A.D. (78.6%) 802-848			3-2	2x4 452.4N 394.5E	Midden below great house fo undation

A.D.  
(11.3%)  
Burned  
corncob  
frag-  
ment  
 $\delta^{13}\text{C}$   
-10.4  
o/oo

---

*Conventional C14 Age*

Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context	
						Ca librated	Dates (prob)
						Material	
1.This Study Unit changed from Nons truc- ture 196 to Nons truc- ture 1020 after we s ubmit- ted the sample for a nalysis.							
2.This Study Unit changed from A rbitrary 1012 to Nons truc- ture 1024 after we s ubmit- ted the sample for a nalysis. Cal							

---

*Conventional C14 Age*

	Ca librated	Dates (prob)	Material	Sample Number	IRMS Corr.	PD	SU	STLV	Grid Unit	Context
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[]{#\_Ref27638054 .anchor}Table . List of public presentations involving the NCOP given by Crow Canyon staff or affiliated researchers.

Name(s)	Conference	Place and Date	Title of Paper/Poster
Samantha Fladd,	Colorado Council of Professional Archaeologists	Durango, CO 3/16/2019	The Northern Chaco Outliers Project: A 2018 Update
Susan Ryan, and Kari Schleher	Professional Archaeologists		Geoarchaeology & Paleohydrology of the Northern Chaco Outliers Project: Preliminary Results
Cynthia Fadem, Cora Johnson, Nish Shrestha, Susan Ryan	Colorado Council of Professional Archaeologists	Durango, CO 3/16/2019	

Name(s)	Conference	Place and Date	Title of Paper/Poster
Cynthia Fadem, Cora Johnson, Nish Shrestha, and Susan Ryan	Big Meeting at Crow Canyon	Cortez, CO 3/29/2019	Geoarchaeology & Paleohydrology of the Northern Chaco Outliers Project: Preliminary Results
Samantha Fladd, Susan Ryan, and Kari Schleher	Big Meeting at Crow Canyon	Cortez, CO 3/29/2019	The Northern Chaco Outliers Project: A 2018 Update
Tyson M. Hughes, Kate T. Hughes, and Bruce Bradley	Society for American Archaeology Annual Meeting	Albuquerque, NM	Curated Lithic Tools from the Lakeview Group
Kari Schleher, Kellam Throgmorton, and Susan Ryan	Colorado Archaeological Society Annual Meeting	Pueblo, CO 10/12/2019	2019 Update on the Northern Chacoan Outliers Project
Grant Coffey	Colorado Archaeology Society, Hisatsinom Chapter Meeting	Cortez, CO 11/12/2019	Designing Social Landscapes in the Central Mesa Verde Region



## 8

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### *References Cited*

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Adovasio, J. M., and J. D. Gunn

1986 The Antelope House Basketry Industry. In *Archaeological Investigations at Antelope House*, compiled by Don P. Morris, pp. 306-397. National Park Service, U.S. Department of the Interior, Washington, D.C.

Blinman, Eric

1986 Additive Technologies Group Final Report. In *Dolores Archaeological Program, Volume 9: Final Synthetic Report*. Bureau of Reclamation, United States Department of the Interior, Washington, D.C.

Bradley, Bruce A.

1988 Wallace Ruin Interim Report. *Southwestern Lore* 54(2):8–33.

1992 *Wallace Ruin: Implications for Outlier Studies*. Manuscript on file, Crow Canyon Archaeological Center, Cortez.

1993 Annual/Preliminary Report of Excavations: Wallace Ruin (5MT6970), 1993 Field Season. Report submitted to the Office of the State Archaeologist, Colorado Historical Society, Denver. Manuscript on file, Crow Canyon Archaeological Center, Cortez.

2010 Report of Archaeological Research Conducted at Stix and Leaves Pueblo (5MT11555), Montezuma County, Colorado. Primitive Tech Enterprises, Inc., Cortez. Manuscript on file, Crow Canyon Archaeological Center, Cortez.

Bradley, Bruce A. and Cynthia S. Bradley

2019 Annual Report on Excavations at the Wallace Great House (5MT6970) 2019. Report Submitted to the Office of the State Archae-

ologist, Colorado Historical Society, Denver. Electronic Document, [https://www.researchgate.net/publication/337948742\\_Annual\\_Report\\_on\\_Excavations\\_at\\_the\\_Wallace\\_Great\\_House\\_5MT6970\\_2019/link/5df795854585159aa480bf5f/download](https://www.researchgate.net/publication/337948742_Annual_Report_on_Excavations_at_the_Wallace_Great_House_5MT6970_2019/link/5df795854585159aa480bf5f/download), accessed December 19, 2019.

Brisbin, Joel M., and Charlotte Brisbin

1973 North McElmo #8, Work Areas (A) through (D), Rooms #11 though #13, Montezuma County Colorado. Manuscript on file, Anasazi Heritage Center, Dolores, Colorado.

Brown, Gary M., Paul F. Reed, and Donna M. Glowacki

2013 Chacoan and Post-Chaco Occupations in the Middle San Juan Region: Changes in Settlement and Population. *Kiva* 78 (4): 417–48.

Brown, Gary M., and Cheryl I. Paddock

2011 Chacoan and Vernacular Architecture at Aztec Ruins: Putting Chaco in its Place. *Kiva* 77(2):203-224.

Cameron, Catherine M.

2008 Chaco and Post-Chaco in the Northern San Juan Region. In *Chaco and After in the Northern San Juan: Excavation at the Bluff Great House*, by Catherine M. Cameron, pp. 18-43. University of Arizona Press, Tucson..

Cosgrove, C. Burton

1947 *Caves of the Upper Gila and Hueco Areas in New Mexico and Texas*. Papers of the Peabody Museum of American Archaeology and Ethnology 24(2). Harvard University, Cambridge.

Crow Canyon Archaeological Center

2014 Policy on the Treatment of Human Remains, Associated Funerary Artifacts, and Human Biochemical Residues. Unpublished manuscript on file, Crow Canyon Archaeological Center, Cortez.

Dove, David

2014 Mitchell Springs Community Project Update. Four Corners Research, Cortez. Electronic document, <http://www.fourcornersresearch.com>

[https://www.mitchellsprings.org/Mitchell\\_Springs\\_Community\\_Project\\_Update\\_2014.pdf](https://www.mitchellsprings.org/Mitchell_Springs_Community_Project_Update_2014.pdf). Accessed December 19, 2019.

Emery, Irene

1966 *The Primary Structures of Fabrics*. The Textile Museum, Washington, D.C.

Fadem, Cynthia M., Cora B. Johnson, and Nischchal Shrestha

2019 Geoarchaeology & Paleohydrology of the Northern Chaco Outliers Project. Report submitted to Crow Canyon Archaeological Center, Cortez, CO. Manuscript on file at Crow Canyon Archaeological Center, Cortez.

Fladd, Samantha G., Rebecca L. Simon, Susan C. Ryan, Shanna R. Diederichs, Kari L. Schleher, Caitlin A. Sommer, Steven R. Copeland, and Grant D. Coffey

2018 *The Northern Chaco Outliers Project Annual Report, 2018 Field Season*. Electronic Document, [https://www.crowcanyon.org/ResearchReports/NorthernChacoOutliers/interim\\_reports/NCOP\\_AnnualReport2018\\_FINAL.pdf](https://www.crowcanyon.org/ResearchReports/NorthernChacoOutliers/interim_reports/NCOP_AnnualReport2018_FINAL.pdf), accessed December 19, 2019.

Glowacki, Donna M., and Scott G. Ortman

2012 Characterizing Community-Center (Village) Formation in the VEP Study Area, A.D. 600–1280. In *Emergence and Collapse of Early Villages: Models of Central Mesa Verde Archaeology*, edited by Timothy A. Kohler and Mark D. Varien, pp. 219–246. University of California Press, Berkeley.

Guernsey, Samuel

1931 *Explorations in Northeastern Arizona*. Papers of the Peabody Museum of American Archaeology and Ethnology 7(1). Harvard University, Cambridge.

Jolie, Edward A., and Laurie D. Webster

2015 A Perishable Perspective on Chacoan Social Identities. In *Chaco Revisited: New Research on the Prehistory of Chaco Canyon, New Mexico*, edited

by Carrie C. Heitman and Stephen Plog, pp. 96-131. University of Arizona Press, Tucson.

Judge, W. James

1979 The Development of a Complex Cultural Ecosystem in the Chaco Basin, New Mexico. In *Proceedings of the First Conference on Scientific Research in the National Parks, Vol. II*, edited by R. M. Linn, 901–6. Transactions and Proceedings, Series 5. National Park Service US Department of the Interior, Washington DC.

Judge, W. James, and Linda S. Cordell

2006 Society and Polity. In *The Archaeology of Chaco Canyon: An Eleventh-Century Pueblo Regional Center*, edited by Stephen H. Lekson, 189–210. School of American Research Advanced Seminar Series. School for American Research Press, Santa Fe.

Kantner, John, and Nancy M. Mahoney (editors)

2000 *Great House Communities Across the Chacoan Landscape*. Vol. 64. Anthropological Papers of the University of Arizona. University of Arizona Press, Tucson.

Kendrick, James and James Judge

2000 Household Economic Autonomy and Great House Development in the Lowry Area. In *Great House Communities Across the Chacoan Landscape*, edited by John Kantner and Nancy Mahoney, pp. 111-129. Anthropological Papers of the University of Arizona, Vol. 64. University of Arizona Press, Tucson.

Kohler, Timothy A., and Mark D. Varien (editors)

2012 *Emergence and Collapse of Early Villages: Models of Central Mesa Verde Archaeology*. University of California Press, Berkeley.

Lave, Jean, and Etienne Wenger

1991 *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge.

Lekson, Stephen H.

2015 *The Chaco Meridian: Centers of Political Power in the Ancient Southwest*. Second Edition. Rowman and Littlefield, Lanham MD.

Lipe, William

2006 Notes from the North. In *The Archaeology of Chaco Canyon: An Eleventh-Century Pueblo Regional Center*, 261–314. School of American Research Advanced Seminar Series. School for American Research Press, Santa Fe.

Morris, Elizabeth Ann

1980 *Basketmaker Caves in the Prayer Rock District, Northeastern Arizona*. Anthropological Papers of the University of Arizona 35. University of Arizona Press, Tucson.

Morris, Earl H., and Robert F. Burgh

1954 *Basket Maker II Sites Near Durango, Colorado*. Carnegie Institution of Washington, Publication 604. Carnegie Institution, Washington, D.C.

Morris, James N.

1988 Excavations in Area 8, Grass Mesa Village. In *Dolores Archaeological Program, Volume 9: Anasazi Communities at Dolores; Grass Mesa Village, Book 2 of 2*, compiled by W.D. Lipe, J. N. Morris, and T. A. Kohler, pp. 873-932. United States Department of the Interior, Bureau of Reclamation, Washington, D.C.

Nusbaum, Jesse L.

1922 *A Basket-Maker Cave in Kane County, Utah*. Museum of the American Indian, Heye Foundation, New York.

Plog, S., and C. Heitman

2010 Hierarchy and Social Inequality in the American Southwest, A.D. 800-1200. *Proceedings of the National Academy of Sciences* 107 (46): 19619–26.

Reed, Paul F.

2004 *The Puebloan Society of Chaco Canyon*. Greenwood Press, Westport.

2008 *Chaco's Northern Prodigies: Salmon, Aztec, and the Ascendancy of the Middle San Juan Region after 1100 AD*. University of Utah Press, Salt Lake City.

Ryan, Susan C

2008 Constructing Community and Transforming Identity at Albert Porter Pueblo. In *The Social Construction of Communities: Agency, Structure, and Identity in the Prehispanic Southwest*, edited by Mark D. Varien and James M. Potter, 69–87. Rowman and Littlefield Publishers, Inc., Lanham MD.

2013 Architectural Communities of Practice: Ancestral Pueblo Kiva Production during the Chaco and Post-Chaco Periods in the Northern San Juan Region. Unpublished PhD dissertation, School of Anthropology, University of Arizona, Tucson.

2016 *The Northern Chaco Outliers Project: A Proposal to Conduct Archaeological Testing at the Haynie site, Southwestern Colorado*. Proposal submitted to the Colorado State Historic Preservation Office, Denver, Colorado. Manuscript on file, Crow Canyon Archaeological Center, Cortez, Colorado.

Saitta, Dean J

1997 Power, Labor, and the Dynamics of Change in Chacoan Political Economy. *American Antiquity* 62 (01): 7–26.

Schleher, Kari L., Kate T. Hughes, Jamie Merewether, Michael J. Lorusso, and Grant Coffey.

2017 Surface Archaeology as Site Assessment: The Haynie site and the Northern Chaco Outliers Project. Poster presented at the 82<sup>nd</sup> Annual Meeting of the Society for American Archaeology, Vancouver, BC.

Sebastian, Lynne

1992 *The Chaco Anasazi: Sociopolitical Evolution in the Prehistoric Southwest*. Cambridge University Press, Cambridge.

Simon, Rebecca L., Susan C. Ryan, Shanna R. Diederichs, Kari L. Schleher, Caitlin A. Sommer, Steven R. Copeland, and Grant D. Coffey

2017 *The Northern Chaco Outliers Project Annual Report, 2017 Field Season*. Electronic document, <http://www.crowcanyon.org/ncop2017>, accessed 30 October 2018.

Smith, R. Linda Wheeler

2009 The Mitchell Springs Ruin Group: Further Investigations of a Large Community in the Middle Montezuma Valley. Electronic document, [http://www.fourcornersresearch.com/Mitchell\\_Springs\\_Report\\_1998-2004.pdf](http://www.fourcornersresearch.com/Mitchell_Springs_Report_1998-2004.pdf). Accessed December 19, 2019.

Turner, Michelle

2015 Ceramics of Aztec North and the Terrace Community, Aztec Ruins National Monument. Unpublished MA Thesis, Department of Anthropology, Binghamton University.

2019 Becoming Chacoan: the Archaeology of the Aztec North Great House. Unpublished PhD Dissertation, Department of Anthropology, Binghamton University.

Varien, Mark D., Scott G. Ortman, Timothy A. Kohler, Donna M. Glowacki

2007 Historical Ecology in the Mesa Verde Region: Results from the Village Ecodynamics Project. *American Antiquity* 72(2): 273-299.

Van West, Carla R.

1994 *Modeling Prehistoric Agricultural Productivity in Southwestern Colorado: A GIS Approach*. Reports of Investigations, No. 67. Washington State University, Pullman, Washington and the Crow Canyon Archaeological Center, Cortez, Colorado

Van Dyke, Ruth M

2007 *The Chaco Experience: Landscape and Ideology at the Center Place*. School for Advanced Research Press, Santa Fe.

1999 The Chaco Connection: Evaluating Bonito-Style Architecture in Outlier Communities. *Journal of Anthropological Archaeology* 18 (4): 471-506.

Vivian, R. Gwinn

1990 *The Chacoan Prehistory of the San Juan Basin*. Academic Press, New York.

Ware, John A.

2014 *A Pueblo Social History: Kinship, Sodality, and Community in the Northern Southwest*. School for Advanced Research Press, Santa Fe.

Webster, Laurie D.

2009 Pueblo I Perishable Artifacts. Chapter 4 in *Animas-La Plata Project, Volume XIII, Special Studies*, edited by James M. Potter, pp. 85-190, SWCA, Denver.

2012 The Perishable Side of Early Pueblo Style and Identity: Textiles, Sandals, and Baskets. In *Crucible of Pueblos: The Early Pueblo Period in the Northern Southwest*, edited by Richard H. Wilshusen, Gregson Schachner, and James R. Allison, pp. 159-184. Cotsen Institute of Archaeology Press, Los Angeles.

2019 Analysis of a Twined Mat from 5MT1905, the Haynie site. Report submitted to Crow Canyon Archaeological Center, Cortez, CO. Manuscript on file at Crow Canyon Archaeological Center, Cortez.

Wilshusen, Richard and Scott Ortman

1999 Rethinking the Pueblo I Period in the San Juan Drainage: Aggregation, Migration, and Cultural Diversity. *Kiva* 64(3):369-399.

Wilshusen, Richard H., Scott G. Ortman, Shanna Diederichs, Donna M. Glowacki, and Grant Coffey

2012 Heartland of the Early Pueblos: the Central Mesa Verde Region. In *Crucible of Pueblos: The Early Pueblo Period in the Northern Southwest*, edited by Richard H. Wilshusen, Gregson Schachner, and James R. Allison, pp. 14-24. Monograph 71 Cotsen Institute of Archaeology Press, University of California, Los Angeles[]{#\_Toc28268414 .anchor}A

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## *Appendix A – Personnel*

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### **Permanent Crow Canyon Field and Laboratory Staff**

Susan Ryan – Chief Mission Officer

Kellam Throgmorton – Supervisory Archaeologist

Samantha Fladd – Supervisory Archaeologist

Kari Schleher – Laboratory Manager

Jamie Merewether – Collections Manager

Grant Coffey – Database Manager

Tim Wilcox – Field Archaeologist

Steve Copeland – Field Archaeologist

Kate Hughes – Laboratory Analyst

Leigh Cominiello – Laboratory Analyst

Sean Gantt – Director of Education

Tyson Hughes – Educator

Winona Cordova – Education Enrollment Manager

Paul Ermigotti – Educator

Rebecca Hammond – Educator

Cara McCain – Educator

### **Seasonal Staff**

Jonathan Dombrosky – Teaching Assistant, College Field School

JoJo Matson – Seasonal Educator

**IT Support Staff**

Dylan Schwindt – Systems Administrator

Jerry Joplin – Application Support Administrator

**Cultural Explorations Staff**

Sarah Payne – Chief Outreach Officer

Adam Kackstetter – Explorations Coordinator

Taylor Hasbrouck – Explorations Coordinator

**Crow Canyon 2019 Interns**

Sarah “Katie” Seaberg – Field Intern

Esemeralda Ferrales – Field Intern

Sandra Zarzycka – Field Intern

Amanda Dobrov – Field Intern

Hannah Bauer – Laboratory Intern

Kimberly Sheets – Laboratory Intern

Sarah Foster – Laboratory Intern

Mariana Lujan Sanders – Laboratory Intern

Thea O’Hea – Education Intern

Addy Zeigen – Native American Initiatives Intern

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2019 *The Northern Chaco Outliers Project Permit Report for the State of Colorado, 2019: Archaeological Permit No. 73671*. Electronic document, <http://www.crowcanyon.org/ncop2019><sup>1</sup>, accessed day month year.\*

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