The 2019 Seasons of the Belize Estates Archaeological Survey Team

EDITED BY

Brett A. Houk

Papers of the
Chan Chich Archaeological Project,
Number 14
Texas Tech University • Lubbock, Texas
2019

Belize Estates Archaeological Survey Team

BEAST

Gallon Jug ◆ Belize ◆ Laguna Seca

The 2019 Seasons of the Belize Estates Archaeological Survey Team

EDITED BY

Brett A. Houk

WITH CONTRIBUTIONS BY

Hillary Bedrosian
Tomás Gallareta Cervera
Amy Copper
Bridgette Degnan
Rafael Guerra
Brett A. Houk
Julia Kleine
Taylor McKinney
Anna C. Novotny
Claire Novotny
Briana Smith
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Gregory Zaro

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Department of Sociology, Anthropology, and Social Work
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Cover art: Photograph of polychrome sherd from Gallon Jug by Amy Copper.

Acknowledgments

Our project's activities spanned most of 2019, with a spring field season of the Belize Estates Archaeological Survey Team (BEAST) in February and March, a summer season of BEAST and the Chan Chich Archaeological Project (CCAP) in May and June, a short few days of lab work in August, and frantic report writing during the fall. To say 2019 was exhausting would be an understatement. This report, our second to be published in this calendar year, represents the culmination of a lot of hard work by a great many people and fittingly brings the 2019 seasons to a close.

To begin at the beginning, we would like to thank the National Geographic Society (NGS) for supporting our spring investigations at Tikin Ha through Grant NGS-51012R-18 and Miguel Vilar, our program officer at NGS, for assisting us through the process. We especially extend our gratitude to Dr. John Morris at the Institute of Archaeology (IA) in Belize for issuing us a permit to explore and test Tikin Ha. The other staff members at the IA provided assistance throughout the spring and summer seasons, including George Thompson, Delsia Marsden, Josue Ramos, Antonio Beardall, and Melissa Badillo.

The project staff for the spring season included Bridgette Degnan, Julia Kleine, Briana Smith, Cayden Willis, Mark Willis, Greg Zaro, me, and Rafael Guerra, our local collaborator for the NGS grant. We are sorry that Bridgette, Cayden, and Mark did not get to stick around the whole time because they missed Greg's Big Day, a 12-mile trek through the jungle, including a little side jaunt to the edge of the Booth's River Marsh and a return hike back up the Booth's River Escarpment. Finally, Fred Valdez kindly examined the ceramics from our spring excavations.

The landowners, represented by Alex Finkral of The Forestland Group, kindly granted us permission to conduct research on their property. Jeff Roberson of Yalbac Ranch generously worked with us to arrange for a crew from Yalbac Ranch to assist us for much of the season. We would like to thank everyone on that crew as well as the other gentlemen who assisted us in clearing and excavations: Victor

Greg's Big Day, somewhere on the trail to the Booth's River Marsh. From left to right are Brett A. Houk, Briana Smith, and Julia Kleine. Not pictured is Gregory Zaro.

Aguire, Fidel Alvarado, Samuel Bah, Oswaldo Bolaños, Alex Calderon, Nicholas Castillo, Jose Cortes, Javier Diaz, James Flowers, Phillip Gongora, Fernando Hernandez, Marlon Hernandez, David Ireland, Jeffery Leonard Martins, Allen Richard Rodriguez, Levi Rodriguez, Kevin Taylor, Wayne Tush, Fidel Vasquez, Jr., Fidel Vasquez, Sr., and Jacinto Villamil. Finally, we'd like to thank Alan Jeal and the staff at Gallon Jug, particularly Marleny Lemus and Rita Vasquez, for facilitating our stay and our research at the Stable Lofts during the spring.

During the summer, we returned to Chan Chich Lodge and foolishly ran a field school again. At Chan Chich Lodge, we would like to thank Malcolm Robinson, Amit Dixit, Anabella De La Rosa, and all the other staff who made our stay pleasant and productive. Special thanks go to Michael Bowen and the Bowen family for allowing our group to use the lodge as a field camp. The 2019 summer season marked the fourth with funding from the Alphawood Foundation. I would like to thank the board of directors of Alphawood for funding the project. Kristin Hettich, the program officer at Alphawood, has been tremendously helpful and a huge advocate for the archaeology portfolio at Alphawood over the past four years. We, along with everyone else with Alphawood funding, are in her debt.

As always, we could not have accomplished anything in the summer without the assistance of our field and lab assistants. This summer,

The Tikin Ha mapping crew and the team from Yalbac Ranch. Front row (left to right): Cayden Willis, Bridgette Degnan, Briana Smith, Julia Kleine, James Flowers, and Brett A. Houk. Back row (left to right): Fidel Vasquez, Sr., Fidel Vasquez, Jr., Jeffery Leonard Martins, David Ireland, Levi Rodriguez, Phillip Gongora, Alex Calderon, Fernando Hernandez, Marlon Hernandez, Javier Diaz, Mark D. Willis, Kevin Taylor, and Gregory Zaro. Not pictured: Rafael Guerra, Nicholas Castillo, Victor Aguire, and Allen Richard Rodriguez.

those were Fidel Alvarado, Mauricio Alvarado, Pablo Alvarado, Rigoberto Alvarado, Samuel Bah, Oswaldo Bolaños, Kevin (Hader) Castellanos, Klevert Chan, Jose Cortez, Carlos Diaz, Kevin Garcia, Yazir Garcia, Justin Gomez, Erwin Guitierrez, Nohoman Guitierrez, Norman Guitierrez, Israel Jones, Vidal Ku, Chris Majaras, Joel Melara, Denvert Moh, Felipe Moh, Hipolito Moh, Leonardo Moh, Chelis Monroy, Lusbin Monroy, Ory Monroy, Eduardo Olivares, Randa Pinelo, Gary Romero, Roel Romero, Jerviani Serminia, Wayne Tush, and Juan Velasquez.

The project staff in summer included Hillary Bedrosian, Tomás Gallareta Cervera, Amy Copper, Julia Kleine, Taylor McKinney, Anna Novotny, Claire Novotny, and Mark Willis. Our 11 field school students were Johnny Ambriz, Henry Biedron, Alexia Calderon, Maddy Feagan, Evan Fishman, Camille Johnson, Molly Keen, Nicholas Kopp, Kayla Padilla, Tera Stocking, and Brandon Trevino. I would like to thank Fred Valdez and Lauren Sullivan for analyzing our ceramics. Brendan Culleton and his staff at Penn State University analyzed our radiocarbon samples from the spring and summer seasons. Finally, the authors of the chapters in this report deserve thanks for all their hard and thankless work.

Guns (and trowels) up!

Brett A. Houk, December 30, 2019

The summer field school staff and students. Back row (left to right): Brett A. Houk, Tomás Gallareta Cervera, Hillary Bedrosian, Julia Kleine, Molly Keen, Johnny Ambriz, Nicholas Kopp, and Evan Fishman. Middle row (left to right): Amy Copper, Claire Novotny, Taylor McKinney, Anna Novotny, Camille Johnson, and Alexia Calderon. Front row (left to right): Brandon Trevino, Maddy Feagan, Tera Stocking, and Kayla Padilla. Not pictured: Mark Willis and Henry Biedron.

An Introduction to the 2019 Seasons of the Belize Estates Archaeological Survey Team and the Chan Chich Archaeological Project

Brett A. Houk

The Chan Chich Archaeological Project (CCAP) and the Belize Estates Archaeological Survey Team (BEAST) conduct research in a 590-km2 permit area in northwestern Belize (Figure 1.1). The CCAP completed its 13th season of research at the site of Chan Chich in 2019. BEAST enjoyed a spring season at Tikin Ha, sponsored by the National Geographic Society (NGS), and a summer season at Gallon Jug. This report summarizes the preliminary results of the 2019 field seasons, including the work mentioned above, as well as additional

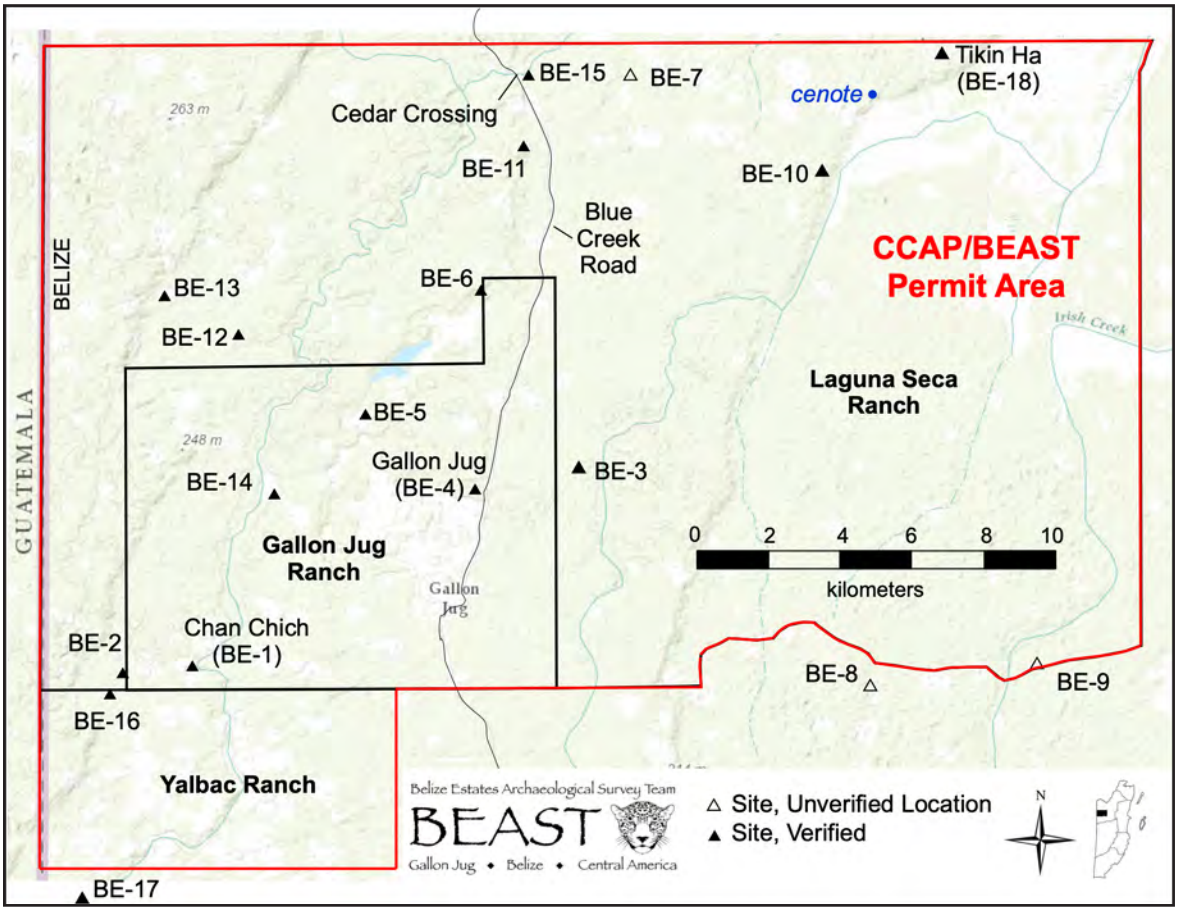

Figure 1.1. Map of the CCAP/BEAST permit area showing the locations of Chan Chich (BE-1), Gallon Jug (BE-4), and Tikin Ha (BE-18).

Houk, Brett A.
2019 An Introduction to the 2019 Seasons of the Belize Estates Archaeological Survey Team and the Chan Chich Archaeological Project. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 1–12. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

special studies. This chapter includes details on dates, staff, permits, funding, and so on, and presents short summaries of the 2019 investigations.

WHAT'S IN A NAME?

For the 12 seasons and 11 technical reports prior to this one, our field reports have been named after the CCAP. However, in 2019, BEAST dominated the research agenda with investigations during the spring and summer and work at Gallon Jug and Tikin Ha, in addition to an aerial survey of the entire permit area. We have therefore decided to showcase BEAST in our report title this season, although the series name, Papers of the Chan Chich Archaeological Project, remains unchanged.

PERMIT AREA

As established by the Institute of Archaeology (IA) in June 2014, the CCAP and BEAST permit comprises Gallon Jug Ranch, Laguna Seca Ranch, and the northwestern corner of Yalbac Ranch, an area of approximately 590 km^2 in northwestern Belize (see Figure 1.1). Houk and Zaro (2014) discuss the history of land sales that resulted in the current configuration of the permit area. The area includes 18 numbered Belize Estate (BE) sites, and the CCAP and BEAST conducted archaeological work at three of the 18 sites in 2019—Chan Chich (BE-1), Gallon Jug (BE-4), and Tikin Ha (BE-18).

PROJECT TIME LINE, STAFF, AND CONSULTANTS

The BEAST spring field season ran from February 20 to March 27, 2019. The project staff consisted of seven archaeologists plus Rafael Guerra, our local collaborator for the NGS grant (Table 1.1). The Tikin Ha project began on February 20, 2019, when Brett A. Houk arrived with Briana Smith and Julia Kleine from the U.S. The advanced crew secured the archaeological permit from the Institute of Archaeology, purchased field supplies, and met with Jeff Roberson, the manager of Yalbac Ranch and Laguna Seca Ranch. The other U.S. staff—Gregory Zaro, Mark D. Willis, Bridgette Degnan, and Cayden Willis—arrived on February 22. Bridgette Degnan, Mark Willis, and Cayden Willis departed Belize on March 3. BEAST used the Stable Lofts in Gallon Jug for lodging, meals, and lab space. We completed fieldwork at Tikin Ha on March 23, and the remaining crew members departed Gallon Jug on March 27.

The fieldwork phase of the summer session of the project began on May 20, 2019, with the arrival of the project staff (Table 1.2). Eleven field school students participating in Texas Tech University's (TTU) Field School in Maya

Table 1.1. List of Project Staff and Consultants, Spring 2019

Name	Role	Affiliation
Dr. Brett A. Houk	Project Director	TTU
Dr. Gregory Zaro	Associate Project Director	University of Maine
Mark D. Willis	Survey Director	Flinders University
Julia Kleine	Assistant Surveyor	BEAST
Briana Smith	Field Archaeologist	TTU
Bridgette Degnan	Field Archaeologist	BEAST
Cayden Willis	Archaeological Intern	Amarillo College
Dr. Fred Valdez, Jr.	Project Ceramicist	UT-Austin
Rafael Guerra	Local Collaborator	University of New Mexico

Table 1.2. List of Project Staff and Consultants, Summer 2019

Name	Role	Affiliation
Dr. Brett A. Houk	Project Director	TTU
Dr. Tomás Gallareta Cervera	Operation Director	Kenyon College
Dr. Anna C. Novotny	Bioarchaeologist	TTU
Dr. Claire Novotny	Associate Project Director	Kenyon College
Hillary Bedrosian	Bioarchaeological Field Technician	TTU
Amy Copper	Bioarchaeological Field Technician	TTU
Julia Kleine	Project Surveyor	BEAST
Tayor McKinney	Laboratory Director	TTU
Mark D. Willis	Consultant	Flinders University
Dr. Fred Valdez, Jr.	Project Ceramicist	UT-Austin
Dr. Lauren A. Sullivan	Assistant Project Ceramicist	UMASS-Boston

Archaeology (FSMA) arrived on May 23. The students departed Chan Chich Lodge on June 20, and the project staff left on June 25 to attend the Belize Archaeology Symposium.

PROJECT FUNDING AND PERMITTING

A generous grant from NGS (Grant NGS-51012R-18) funded the spring season at Tikin Ha. A grant from Alphawood Foundation of Chicago and program fees from the FSMA supported the summer field season. The Institute of Archaeology, part of the Belizean National Institute of Culture and History, issued Permit No. IA/H/2/1/19(04) to Houk for the investigations at Tikin Ha, Chan Chich, and Gallon Jug. At the time the permit was issued, Dr. John Morris served as Director of the IA. The landowners of Gallon Jug Ranch and Laguna Seca Ranch also gave permission for the research.

AN OVERVIEW OF THE 2019 BEAST SPRING SEASON

Tikin Ha

BEAST spent approximately 5 weeks exploring, mapping, and testing Tikin Ha, a recently recorded major Maya ceremonial center in northwestern Belize (Houk, Zaro, et al., this volume). We first reported on Tikin Ha following a short reconnaissance to the site in February 2017 (Houk et al. 2017). Originally, we called the site Xma Ha Ak'al but renamed it Tikin Ha based on conversations with Mopan speakers. Our investigations in 2019 determined that Tikin Ha is the sixth largest site in the eastern half of the Three Rivers adaptive region but has the second largest plaza and one of the tallest structures (approximately 18 m tall). The site does not follow either of the common site planning templates documented in the area.

We located seven stone monuments, but only one, a highly fragmented stela, shows evidence of having been carved. The plaza and courtyard test pits all encountered a heavily eroded floor with one layer of fill over shallowly buried rock approximately 40 cm below the modern surface. Ceramics date the construction to the late Late Classic period, and a single radiometric age from a bone pin dates one of the structures in the acropolis to cal AD 669–769. The available data suggest Tikin Ha was short lived and apparently abandoned while some of the key architectural features were still under construction, as evidenced by a construction ramp in the site core. Tikin Ha's brief occupation period may explain why the

Main Plaza accounts for such a high percentage of the monumental area at the site. Despite its relatively small monumental area, Tikin Ha may have been the capital of a small territory near the end of the Late Classic period.

Cenote

In 1998, the then manager of Chan Chich Lodge, Tom Harding, told me about a cenote located in the eastern part of Gallon Jug Ranch, but two half-hearted attempts to locate it in the ensuing decades failed. In 2019, discussions with Jeff Roberson and Estevan Alvarez at Yalbac Ranch revived my interest in locating the cenote after we learned it was located within several kilometers of Tikin Ha. Allen Richard Rodriguez, an employee of Yalbac, led the Tikin Ha crew to the cenote, which was located south of the logging road we used to get to Tikin Ha. The feature sits on the edge of the Booth's River escarpment (see Figure 1.1) and is actually visible on satellite imagery available on Apple Maps (Figure 1.2). Steep slopes lead down to the water's edge, approximately 25 m below the surrounding terrain. We were only able to climb down to within 5 to 7 m above the water without risking a painful slide the rest of the way. The cenote appears to be approximately 40 m in diameter at the water's level (Figure 1.3). Finally locating this feature opens up promising avenues of future research.

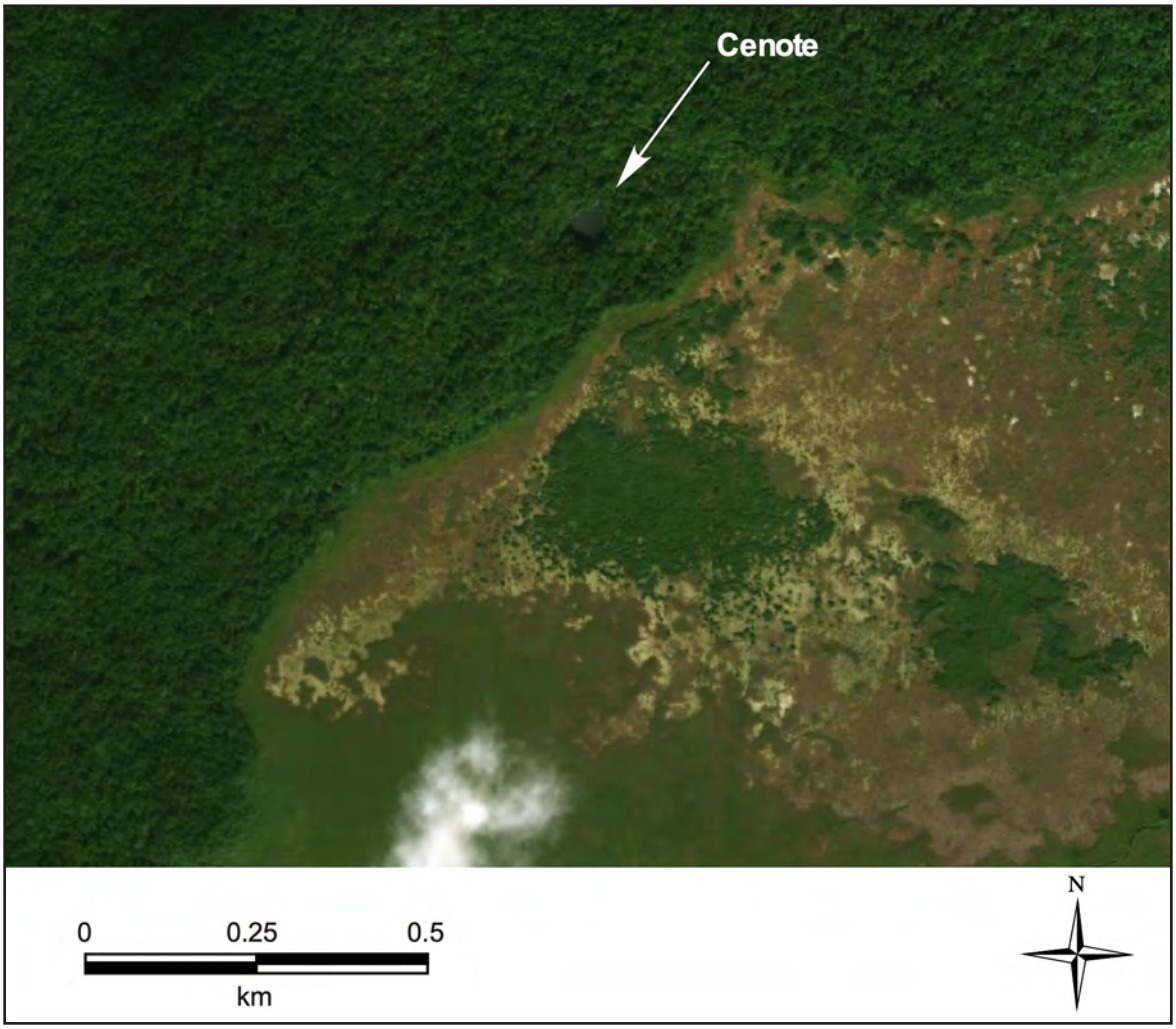

Figure 1.2. The cenote near the edge of the Booth's River Escarpment, visible on Apple Maps.

As Lisa Lucero's work at the Cara Blanca pools on Yalbac Ranch, south of the BEAST permit area, has demonstrated, these types of features have the potential to inform us about ancient Maya settlement and ritual (Lucero et al. 2017) and paleoenvironmental data stretching back into the Pleistocene (Larmon et al. 2019).

AN OVERVIEW OF THE 2019 BEAST AND CCAP SUMMER SEASON

Upper Plaza at Chan Chich

During May and June, at the site of Chan Chich, Tomás Gallareta Cervera and Brett A. Houk directed the fourth season of Alphawood-funded research in the Upper Plaza (Op CC-19), focusing on the eastern buildings, Structures A-12 and A-13. Gallareta Cervera and Houk (this volume) expanded our knowledge of Structure A-13 by defining its basic architectonic form and size, as well as obtaining information regarding its previous construction phases, including the upper masonry rooms, the superstructure of the final construction phase, and two construction phases of the building's 6-m wide frontal staircase. Our excavations discovered an extremely well-preserved earlier phase of Structure A-13 (Figure 1.4), which the CCAP had missed in limited excavations on the structure in the 1990s (Robichaux 2000), but curiously did not encounter any caches or burials. Commonly, eastern structures are "packed and stacked" with such features, to quote Dr. Terry Powis (personal communication, 2019).

The excavations at Structure A-12 yielded a masonry structure with multiple rooms and a c-shaped bench with remains of ancient

Figure 1.3. Photograph of the cenote.

Figure 1.4. Photograph of well-preserved "steps" on the western face of one of Structure A-13's earlier phases.

graffiti at its northeastern edge. Anna Novotny concluded the excavation of Burial CC-B22 previously found at the end of the 2018 season and reburied due to a lack of time (A. Novotny et al., this volume).

Salvage Excavations at Structure A-4, Chan Chich

Prior to our arrival in May, contractors installing a new cell tower excavated four pits in the summit of Structure A-4, a large platform in the northwestern corner of the Main Plaza at Chan Chich (Houk, Bedrosian, and McKinney, this volume). Their central pit destroyed part of a Late Preclassic/Early Classic cache comprising at least four pairs of lip-to-lip bowls. Salvage excavations recovered two pairs of vessels and part of another vessel, in situ. While the discovery of Cache CC-B02 was unexpected, perhaps more so was our encountering a buried monumental platform in the same excavation unit (Figure 1.5). This feature, described by Houk, Bedrosian, and McKinney, pre-dates the cache.

Topographic Mapping at Norman's Temple, Chan Chich

In preparation for the 2020 field season, Julia Kleine created a topographic map of the central courtyard in the Norman's Temple complex (Figure 1.6). Kleine and her assistants mapped the courtyard over the course of four days.

Figure 1.5. Excavations on the summit of Structure A-4 uncovered a buried monumental platform, which we nicknamed Randa.

Mapping and Excavations at Gallon Jug

In summer 2019, Claire Novotny continued excavations at the site of Gallon Jug with the help of the field school students and workers from Chan Chich Lodge and Sylvester Village (C. Novotny et al., this volume). This season we focused our efforts on Courtyard B-1, an elite residential group 165 m east of the Main Plaza. Our goals were to collect chronological information about the group, clarify its connection to the site core, and evaluate its possible socio-political connections to regional sites such as Chan Chich. In addition, we collected chronological information from several settlement groups and revised the original maps made by Thomas Guderjan and colleagues in 1991.

Our excavations at Courtyard B-1 comprised 27 suboperations in Op GJ-02 and included the horizontal clearing of three structures and the preliminary excavations of a chultun containing a burial. Two structures—Structures B-1 and B-2—are interpreted to be residential due to their masonry architecture and the presence of benches and artifacts associated with household activities such as corn grinding implements, stone tools, and ceramic vessels. Anna Novotny and her students, Amy Copper and Camille Johnson, excavated three burials associated with these two structures (A. Novotny et al., this volume). The third structure, Structure B-4, had a perishable superstructure and a well-preserved plaster floor that included several examples of patolli boards incised into

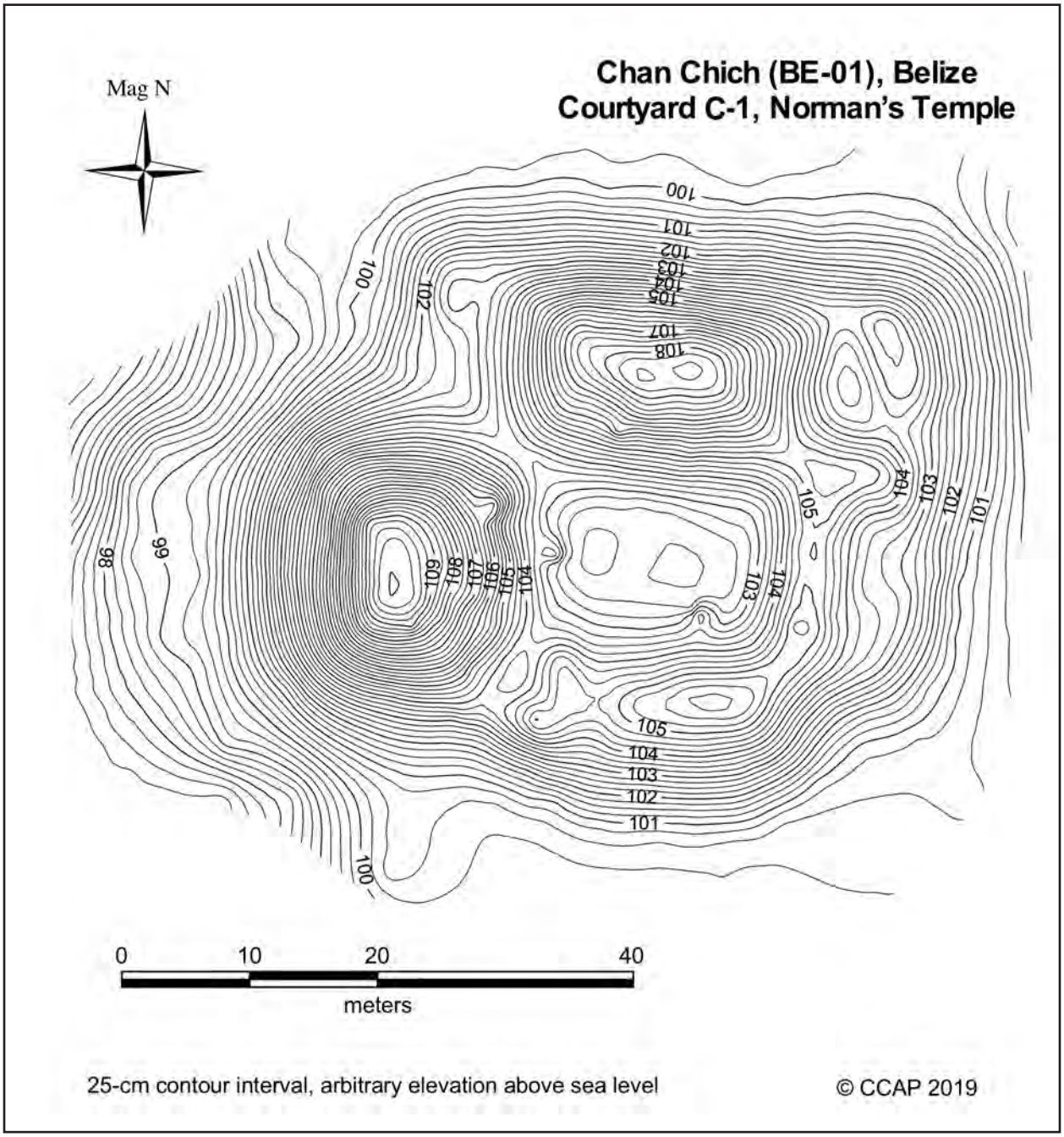

Figure 1.6. Topographic map of Norman's Temple courtyard.

its surface (Figure 1.7). Patolli is a game played throughout Mesoamerica that has ritual and divination elements, but whose rules among the ancient Maya are poorly understood. The presence of several distinct board styles in a residential group not only suggests a specialized function for the building but also provides insight into the contexts in which patolli was played in the Maya lowlands. The only other examples excavated in the permit area are from Structure C-6 in the Western Plaza at Chan Chich (Harrison 2000).

In addition, Julia Kleine mapped the Gallon Jug Main Plaza, Courtyard B-1, and several

Figure 1.7. Photograph of one of the patolli boards incised into the floor of Structure B-4. The image's color has been inverted to enhance the visibility of the incisions in the floor.

outlying settlement groups with the TDS, which allowed us to refine the rectified map of the site core. With the help of field school student Alexia Calderon, we conducted nine test units in five settlement groups in order to gain chronological information about their construction.

Overall, our efforts at Gallon Jug during the 2019 season have added significantly to our understanding of the temporal development of settlement in the region as well as the social dynamics of residential groups. The findings also provide new directions for work at the site in 2020.

Canopy Mapping

While toiling away in the forests of Tikin Ha during the spring season, Gregory Zaro proposed a plan to create a DEM of the forest canopy in the BEAST permit area. The impetus for this idea was a small-scale test of this approach in 2017 at Tikin Ha. Mark Willis flew a single drone mission at the site with a small quad-copter drone and used Agisoft PhotoScan Pro to create a DEM of a small section of forest canopy (see Houk et al. 2017). Our work at Tikin Ha in February–March 2019 determined that the locations of monumental structures corresponded to the highest canopy elevations (see Houk, Zaro, et al., this volume). While not a surprising conclusion, we decided employing this approach on a larger scale might lead to the

identification of previously unrecorded sites in the permit area. Therefore, we contracted with Mark Willis to fly over the entire BEAST permit area and take high-resolution aerial photographs of the forest canopy in June 2019 following the completion of the field school (Figure 1.8). Over the course of three days, Willis and a private pilot flew systematic east-west transects and took over 22,000 photographs of the permit area. Willis (this volume) presents his methods and preliminary results. A more detailed analysis of the data is planned for 2020.

Obsidian Analysis

In August 2019, Houk returned to Belize with Bridgette Degnan to pick up the 2019 export materials and to conduct pXRF analysis on obsidian artifacts collected since 2012 by CCAP and BEAST. Using an Olympus Vanta pXRF from the Archaeology Laboratory at Texas Tech University, Houk and Degnan analyzed 330 obsidian artifacts over the course of two days (Figure 1.9). The results of the study are still being compiled, but Degnan's statistical analysis has preliminarily identified three clusters of artifacts. At this point, however, we have not matched those clusters to known obsidian sources. That analysis is ongoing at this point in time.

Radiocarbon Analysis

BEAST and CCAP contributed additional radiocarbon results to our growing database, adding dates from Tikin Ha and Gallon Jug to the many samples run from Chan Chich over the years (see Project Lists for the 1996 through 2019 Seasons, this volume). Perhaps the most surprising date from this year's batch of samples was one from Burial GJ-B02 at Gallon

Figure 1.8. If you squint, you can see Mark Willis' canopy mapping plane flying over Chan Chich in the center of the photograph. The dead tree on the right side of the image fell and destroyed Cabana 6 about two months later (just as a little side note).

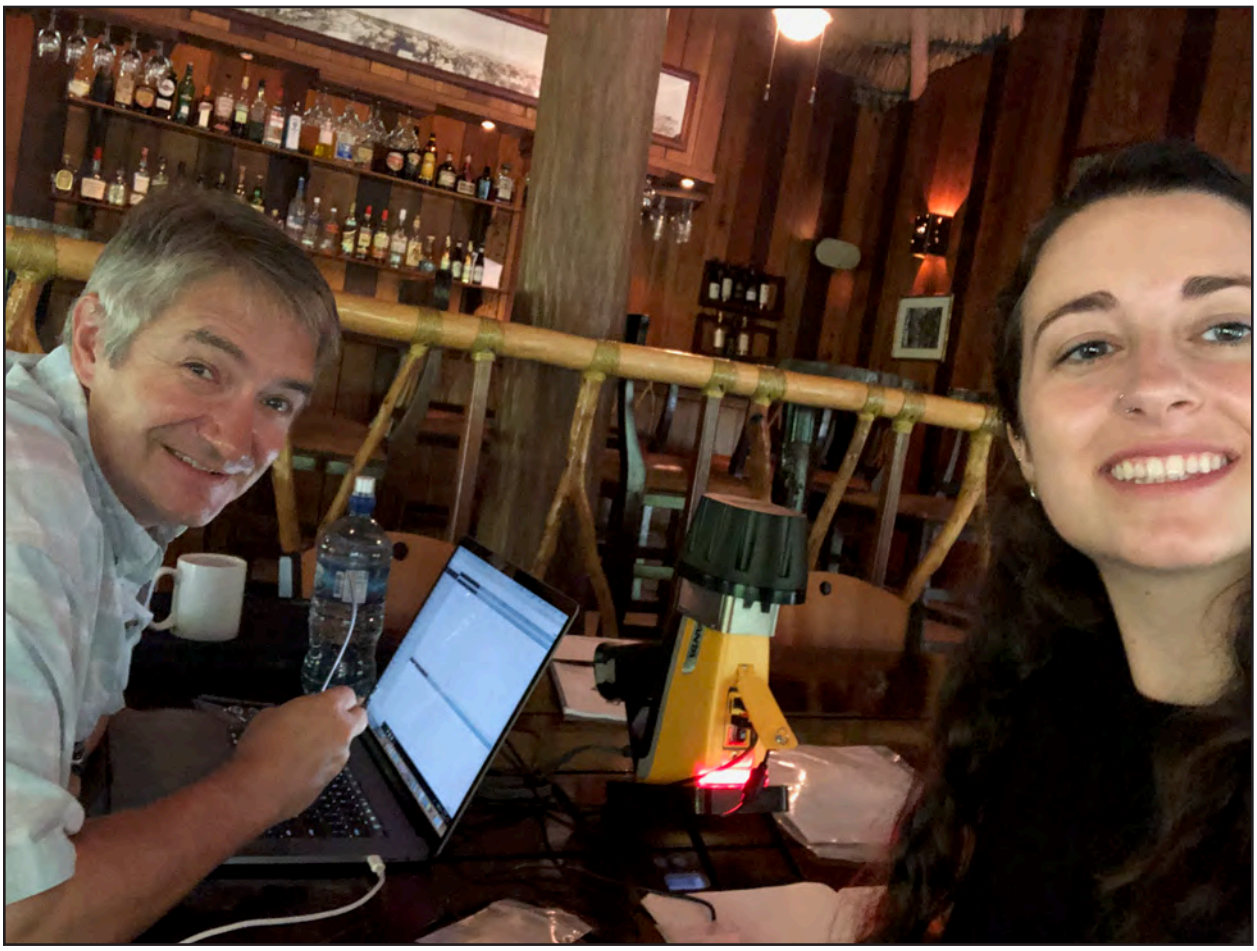

Figure 1.9. Brett Houk and Bridgette Degnan analyzing obsidian in the bar at Chan Chich Lodge. The Olympus Vanta pXRF is in the center of the selfie.

Jug. The sample (PSUAMS# 6914) yielded a 2-sigma calibrated date range of AD 907–1020, which is firmly in the Terminal Classic period (see C. Novotny et al., this volume).

ORGANIZATION OF THIS VOLUME

In Chapter 2, Tomás Gallareta and Houk describe the 2019 excavations in the Upper Plaza at Chan Chich, which focused on Structures A-12 and A-13, but also included Burial CC-B22. Houk, Hillary Bedrosian, and Taylor McKinney describe the unplanned salvage excavations at Structure A-4 at Chan Chich in the third chapter of this volume. Chapter 4 shifts over to BEAST investigations and presents the 2019 summer investigations at Gallon Jug. In Chapter 5, Houk and colleagues describe the NGS-funded research at Tikin Ha from spring 2019. Mark Willis presents the methods and preliminary results of the aerial canopy mapping of the BEAST permit area in Chapter 6. In Chapter 7, Anna Novotny, Hillary Bedrosian, and Amy Copper describe the bioarchaeological investigations at Chan Chich and Gallon Jug. Finally, Chapter 8 presents the updated project lists through 2019.

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The 2019 Investigations in the Upper Plaza at Chan Chich, Belize

Tomás Gallareta Cervera and Brett A. Houk

During May and June, at the site of Chan Chich, Tomás Gallareta Cervera and Brett A. Houk directed the fourth season of Alphawood-funded research in the Upper Plaza (Operation [Op] CC-19), focusing on the eastern buildings, Structures A-12 and A-13. Gallareta Cervera and Houk expanded our knowledge of Structure A-13 by defining its basic architectonic form and size, as well as collected information regarding its previous construction phases, including the upper masonry rooms, the superstructure of the final construction phase, and two construction phases of the building's 6-m wide central-west staircase. Excavations at Structure A-12 yielded a masonry structure with at least two rooms with benches, one of them c-shaped with remains of ancient graffiti at its northeastern edge. Anna Novotny concluded the excavation of Burial CC-B22 (Suboperation [Subop] CC-19-A) previously found in the 2018 season and reburied due to a lack of time (Gallareta Cervera et al. 2019). After the 2018 hiatus of the field school, in 2019 the project incorporated field school students from multiple US universities and colleges who participated in excavations and did work in the field lab, gaining experience in artifact processing and analysis.

PREVIOUS INVESTIGATIONS OF STRUCTURE A-13

Structure A-13 is an approximately 5-m high mound occupying the eastern edge of the Upper Plaza. It is 27 m long by 18 m wide at its base, and has a wide, mostly level summit. Structure A-12, a 1.5-m high mound, connects Structure A-13 to the southeastern corner of Structure A-1. Previous work at Structure A-13 included two seasons of exploratory excavations in 1998 and 1999 (Robichaux 2000; Robichaux et al. 2000) and a 2017 chronological test pit at the eastern base of the mound (Gallareta Cervera et al. 2017). Prior to 2019, the only excavation conducted at Structure A-12 was a single trench that exposed collapse debris on the western face of the mound in 2018 (Gallareta Cervera et al. 2019).

In 1998, Hubert Robichaux and colleagues (2000) excavated a centerline trench on the western face of Structure A-13. Extending from the base of the mound to its summit, the trench comprised a series of contiguous units and measured 8 m long and 1.5 m wide, expanding to 2 m wide at the summit. The trench failed to find evidence of a stairway (Robichaux et al. 2000:53).

On the summit of the mound, Robichaux et al. (2000:51) interpreted the topography as two rectangular, symmetrically positioned structures with long axes running north-south and occupying the rear (east side) of the mound's upper surface. Robichaux et al. (2000) designated the two symmetrical superstructures as Structure A-13 North and Structure A-13 South and estimated their size

Gallareta Cervera, Tomás, and Brett A. Houk
2019 The 2019 Investigations in the Upper Plaza at Chan Chich, Belize. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 13–48. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

to be approximately 3.9 m in length and ca. 2.3 m in width.

On Structure A-13 North, excavators opened Subop CC-02-L, a 3-x-3-m unit, and uncovered a single, narrow room framed by low stonewalls with upper walls and a roof once made of perishable materials. They estimated the external dimensions of the structure at 3.7 x 1.87 m with a plaster floor of 2–3 cm thickness. Bad preservation of the superstructure did not allow the identification of its central doorway. Robichaux et al. (2000) excavated through the deteriorated floor of the platform surface in front of Structure A-13 North down to a depth of ca. 2.5 m below the surface and encountered several possible floors or fill-stabilizing layers as well as layers of construction fill. They dated Structure A-13 to a late period near the end of Chan Chich's life cycle and reflected on a deteriorating situation at the site.

Robichaux (2000) returned to Structure A-13 in 1999 and re-opened Subop CC-02-L. His team expanded the investigations with Subops CC-02-AB, -AL, and -AM, all on the summit of the mound's northern half. Robichaux (2000) encountered part of a buried masonry building beneath the final, poorly preserved phase of Structure A-13, which he designated Structure A-13 Sub 1—our work, described below, determined this is not the penultimate phase of the mound, but is an even earlier construction. Robichaux (2000) uncovered the western face of an exterior masonry wall preserved to 1.4 m high with a 25-cm tall footer at its base, resting on a 12-cm thick plaster floor. The excavations also uncovered a doorway through the wall and exposed some of the room's interior. Robichaux (2000) did not recover sufficient numbers of ceramics to date the earlier phase, but he tentatively dated its infilling to the Late Classic period. He also reported a "pervasive presence of Mamom sherds, together with a consistent trace of Swasey sherds, in the construction fill below Structure A-13-N directly in front of Structure A-13N Sub 1" (Robichaux 2000:62–63).

Excavations in 2017 targeted chronological data from the plaza. Excavations along the eastern edge of the Upper Plaza (Subop CC-15-M) at the base of Structure A-13 documented a construction sequence of six plaster floors spanning from the Middle Preclassic period to the Late Classic period, as well as a deeply buried, Middle Preclassic, cut-stone platform (Gallareta Cervera et al. 2017). Excavators documented a posthole cut into bedrock that predated the Preclassic platform with an associated human tooth. Charcoal found on bedrock returned a date of cal 787–552 BC (Sample CC-15-S88), and charcoal from the fill inside the posthole returned a date of cal 730–411 BC (Sample CC-15-S127), suggesting the deepest deposits at Subop CC-15-M date to the Middle Preclassic period (Gallareta Cervera et al. 2017:Tables 2.2 and 2.3).

2019 RESEARCH QUESTIONS

In 2019, we continued investigating the dynastic architecture in the royal acropolis, the Upper Plaza, at Chan Chich. Our excavations focused on Structure A-13 at the eastern side of the Upper Plaza to test the hypothesis that the building is an ancestor shrine (Figure 2.1). Eastern structures commonly contain burials and are often considered to be ancestor shrines, but we have not yet documented that pattern at Chan Chich.

Hubert Robichaux (2000) conducted limited excavations on Structure A-13 in the late 1990s but did not penetrate the penultimate architectural phase. We most recently excavated a plaza test unit at the base of the structure in 2017 (Gallareta Cervera et al. 2017), which was able to connect Structure A-13 with the Upper Plaza floor sequence.

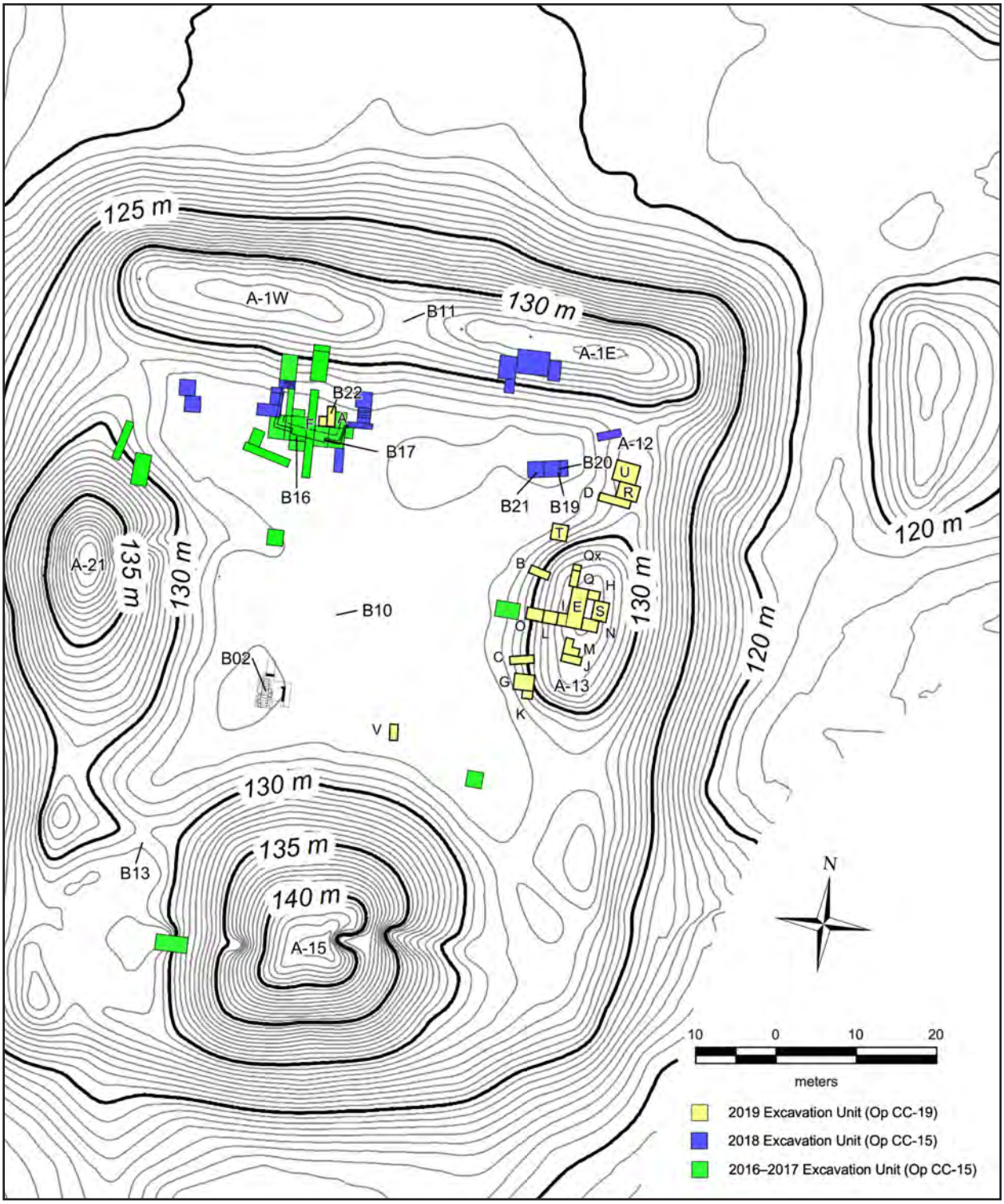

Figure 2.1. Topographic map of the upper plaza showing the location of excavations from 2016–2019, all burials (Burials CC-B02, etc.) from the Upper Plaza, Blanca, and Tomb 2's excavation area (Burial CC-B02).

Our specific goals included:

- Build on previous excavations, document the architectural style of Structure A-13's superstructure. Specifically, we planned to locate Robichaux's original excavation units, remove the backfill, and expand on his excavations to understand more about the form, function, and construction phases of the building.
- Define the northwestern and southwestern corners of the substructure to determine the length of the building.
- Excavate a center-line trench through the structure to look for tombs, burials, and caches to test the hypothesis that the structure served as an eastern-focus ancestral shrine.
- Relocate and excavate Burial CC-B22, which was discovered in 2018 but was reburied due to lack of time for excavation.
- Expand our knowledge of the northeastern section of the plaza by excavating Structure A-12, a previously unexplored building directly to the north of Structure A-13.

RESEARCH METHODOLOGY

Excavations during the 2019 season were catalogued under a new operation (Op CC-19) and involved the excavation of 22 units: Subops CC-19-A through -V, plus -Qx (Table 2.1). Excavations, recording, and artifact/sample collecting procedures followed those described by Houk and Zaro (2015) for the CCAP. As discussed below, Subops CC-19-A and -F focused on retrieving backfill and locating and excavating Burial CC-B22 at the central-north section of the plaza. Subops CC-19-D, -R, and -U focused on the exploration of Structure A-12 at the northeastern corner of the plaza. Subop CC-19-V tested a previously unexplored portion of the southeastern part of the Upper Plaza. Finally, the majority of the excavation units investigated Structure A-13, hypothesized as an eastern shrine and the main royal ceremonial building at the Upper Plaza.

RESULTS (OPERATION CC-19)

Radiocarbon Sampling

The main goal of our excavation is to have a fine grained chronology and construction detail history for the eastern side of the Upper Plaza. The 2019 season collected multiple radiocarbon samples and obtained five radiocarbon date ranges from five different contexts in Structure A-13 and two date ranges from the Burial CC-B22 excavations. In Tables 2.2 and 2.3, the contexts and ages of the seven samples are organized by sample number. The radiocarbon plots for the samples are shown in Figure 2.2. The construction phases mentioned in the table are described further below in the text.

Excavations at the North-Central Area of the Upper Plaza

During the 2018 excavations, while researching the relationship between two architectural features, which we nicknamed Blanca and Crystal, in the north-central area of the Upper Plaza, the crew came across the remains of a complete femur in Subop CC-15-R (Gallareta Cervera et al. 2019). Excavations in this area from previous seasons encountered multiple burials, most of them intrusive to Blanca, which suggested the possibility that the femur was part of a primary burial (Burial CC-B22). Due to a lack of time, we decided to rebury it for excavation during the 2019 archaeological season.

Our objectives during the 2019 season were to relocate the femur discovered in Subop CC-15-R and expose any other associated skeletal remains. We first used photos and land

Table 2.1. Descriptions of Op CC-19 Suboperations Excavated in 2019 by Area

Area	Subop	Size (m)	Purpose
Central-north plaza	CC-19-A	1 x 2.5	Excavating Burial CC-B22
Structure A-13	CC-19-B	4 x 1	Locate and define the northeastern corner of structure A-13
Structure A-13	CC-19-C	1 x 3	Locate and define the southeastern corner of structure A-13
Structure A-12	CC-19-D	4 x 1	Explore the form and chronology of Structure A-12
Structure A-13	CC-19-E	5 x 2	Locate Robichaux's 1999 excavation units
Central-north plaza	CC-19-F	1.2 x 1	Excavating Burial CC-B22
Structure A-13	CC-19-G	3 x 1	Locate and define the southeastern corner of structure A-13
Structure A-13	CC-19-H	1 x 1.5	Locate units excavated in 1998 and 1999
Structure A-13	CC-19-I	1.5 x 1	Expose architecture of Structure A-13 and locate earlier excavations
Structure A-13	CC-19-J	2.5 x 1	Locate the two walls of Structure A-13's sub-structure, understand form and chronology of the building
Structure A-13	CC-19-K	1.5 x 1	Locate and define the southeastern corner of structure A-13
Structure A-13	CC-19-L	2 x 1.5	Expand excavation of Subop CC-19-I, clear out backfill, and uncover Structure A-13's architecture
Structure A-13	CC-19-M	2 x 2	Understand how Structure A-13's western steps articulate in Subop CC-19-J
Structure A-13	CC-19-N	2 x 2	Extension of CC-19-E to the east to locate the front facade of Structure A-13 3rd
Structure A-13	CC-19-O	2.1 x 1.5	Uncover the west staircase of Structure A-13
Structure A-13	CC-19-Q	3.2 x 2	Expose Structure A-13's superstructure and room
Structure A-13	CC-19-Qx	0.75 x 1	Extension of Subop CC-19-Q
Structure A-12	CC-19-R	2 x 2.25	Explore form of Structure A-12's room and its relation to the northeastern corner of the Upper Plaza
Structure A-13	CC-19-S	2 x 2.4	Locate and define the north-south wall in Subop CC-19-H
Structure A-13	CC-19-T	2 x 2	Locate northwestern corner of final phase of Structure A-13's basal platform
Structure A-12	CC-19-U	3 x 2.5	Explore the dimensions of Structure A-12 and the extension of its bench
Southeastern plaza	CC-19-V	2 x 1	To recover chronological information

features to identify the approximate location of the femur in the Upper Plaza. Afterward, we proceed by removing the backfill dirt until locating the plastic sheet that covered the burial area of excavation (Figure 2.3). Subop CC-19-A measured 1 m east-west by 2.5 m north-south. Four flags creating a 50-x-50-cm area marked the location of the femur. After relocating and exposing the femur, the crew excavated the full extent of Subop CC-19-A (down to the elevation of the skeletal elements). The femur and other foot elements were observed in a north to south orientation, with the feet to the south. Anna Novotny proceeded to excavate

Table 2.2. 2019 Upper Plaza by Sample Number

Sample	Lot	Context	Material
CC-19-S03	CC-19-A-05	Construction fill, below Burial CC-B22, Faunal Bone	>30kDa gelatin
CC-19-S04	CC-19-N-04	Beneath the level of the stucco floor associated with Structure A-13 4th.	Charred material
CC-19-S07	CC-19-N-05	East corner of the unit, in construction fill.	Charred material
CC-19-S09	CC-19-O-07	Southwest portion of the unit, below floor 3 of the upper plaza.	Charred material
CC-19-S012	CC-19-L-12	Fill directly on top of the possible stairway east of Structure A-13.	Charred material
CC-19-S014	CC-19-S-07	Fill directly on top of the possible stairway east of Structure A-13.	Charred material
CC-19-S015	CC-19-A-03	Burial CC-B22.	XAD amino acids

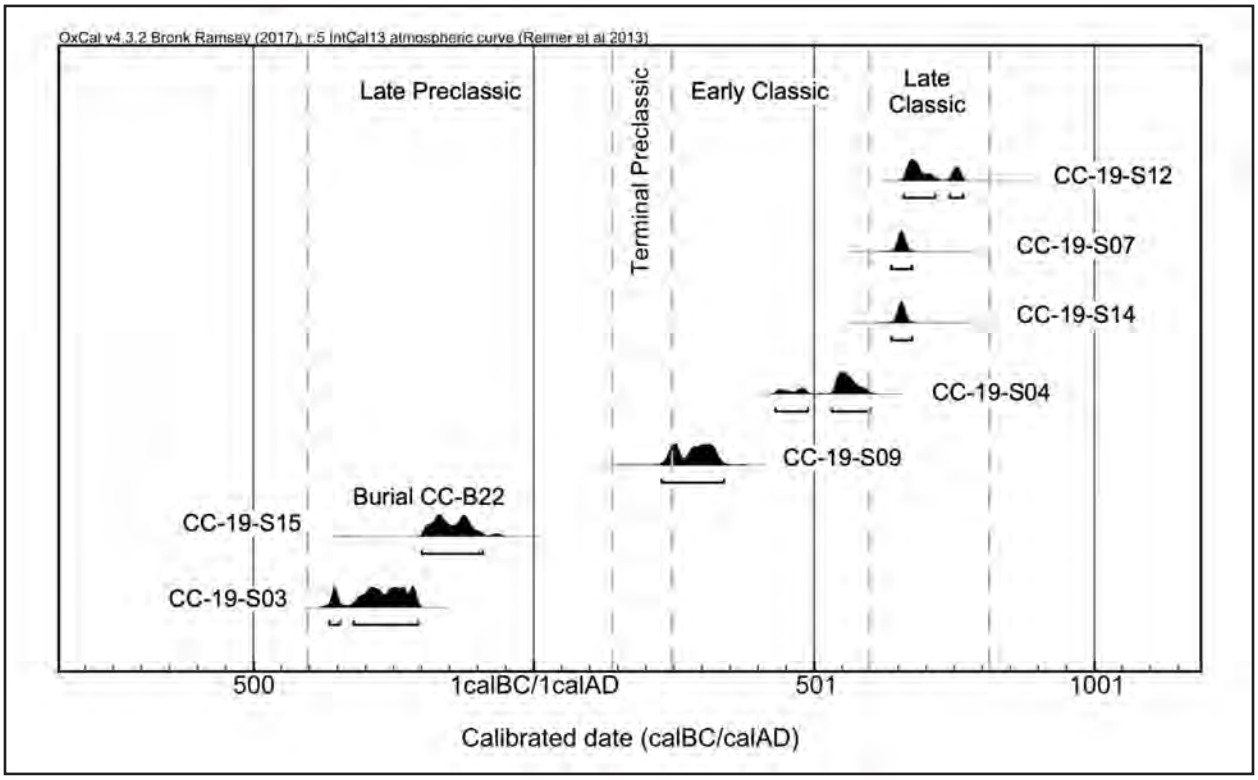

Figure 2.2. Plots of radiocarbon dates results from the 2019 Upper Plaza excavations.

the northwest corner of the unit and uncovered a semi-complete inverted vessel, covering the individual's skull (Figure 2.4). Ceramic analysis indicates that this vessel is a Late Preclassic Society Hall jar. A second vessel, which appeared to be smashed, was discovered to the left of the burial and along the west wall of the unit. The second vessel consisted of a Late Preclassic period jar of an unknown type (Figure 2.5).

Novotny and Hilary Bedrosian excavated Burial CC-B22. The excavation started by exposing the upper portion of the body in the

Table 2.3. AMS Samples by Sample Number

Sample	PSUAMS#	14C Age (BP)	±	Calibrated age (AD/BC)	% Under curve	2σ Age Range
CC-19-S03	6912	1370	20	322-206 BC	84.2	365-206 BC
				365-346 BC	11.2	365-206 BC
CC-19-S04	6647	1520	20	AD 432–490	19.8	AD 432–601
				AD 532–601	75.6	AD 432–601
CC-19-S07	6648	1370	20	AD 639–676	95.4	AD 639–676
CC-19-S09	6649	1760	20	AD 229–340	95.4	AD 229–340
CC-19-S012	6650	1310	20	AD 660–717	70.9	AD 660–767
				AD 742–767	24.5	AD 660–767
CC-19-S014	6651	1370	20	AD 639–676	95.4	AD 639–676
CC-19-S015	6913	1520	20	200-91 BC	95.4	200-91 BC

Figure 2.3. Initial probe to relocate Burial CC-B22 at the Upper Plaza.

northern section of the unit (Lot CC-19-A-02). The human remains were mapped after excavation and then immediately removed from the field and stored at the lab to avoid further deterioration. For a complete bioarchaeological report, see A. Novotny et al. (this volume). The context was covered by a construction fill composed of medium-sized rocks measuring approximately 10 cm, which were dispersed within the soil matrix surrounding the larger

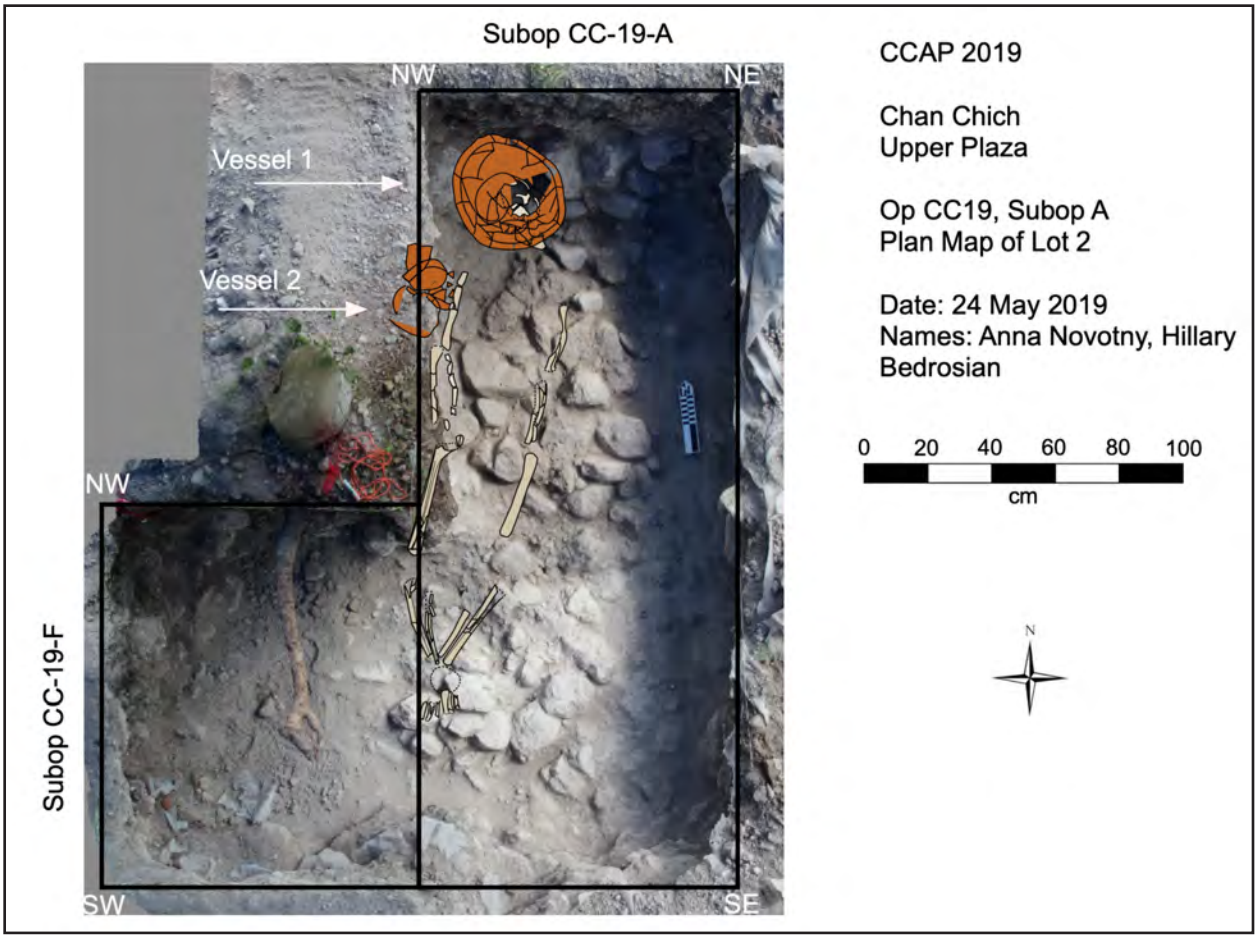

Figure 2.4. Plan map of Burial CC-B22 located in Suboperations CC-19-F and -A.

Figure 2.5. Vessel 1 (left) and Vessel 2 associated with Burial CC-B22.

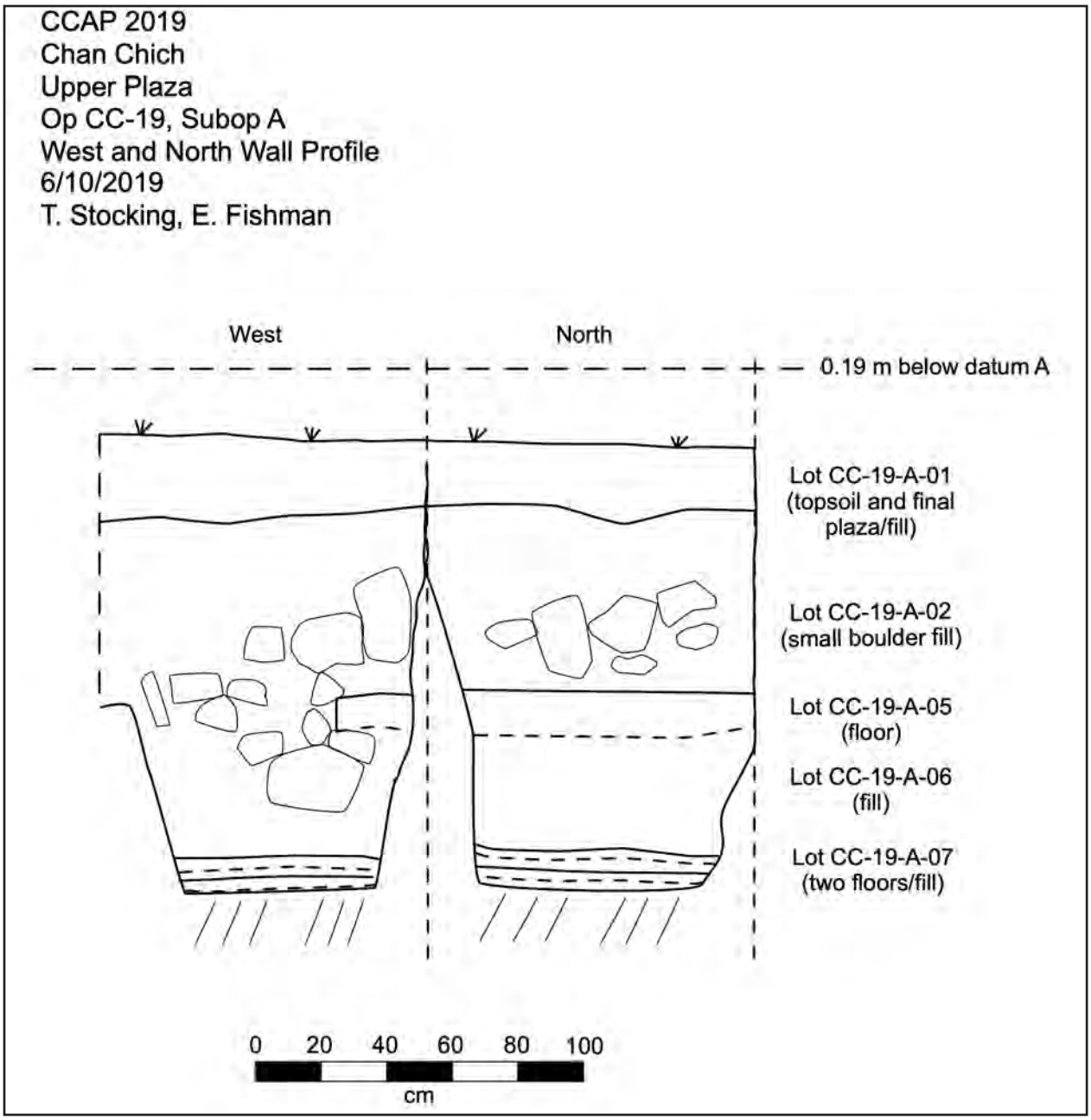

Figure 2.6. West and north profiles of Subop CC-19-A.

rocks (Figure 2.6). A second unit (Subop CC-19-F) was excavated to expose the southern half of the burial. Other artifacts that were not in situ, such as dentition, bone fragments, shell, and ceramic sherds were also collected and dated to the Late Preclassic period.

Both units were located in the fill of Blanca's construction pen (Table 2.4). We removed sediment and large amorphous stones (between 7 cm and 17 cm long) beneath Burial CC-B22 and exposed a plaster surface in profile (Lot CC-19-A-06). The floor was observed at the periphery of the burial but not under the individual, suggesting that Burial CC-B22 was intrusive. Two plaster floors, measuring between 11 and 16 cm thick, are located below the burial and are prominently visible in the north profile (see Figure 2.6). The two floors

Table 2.4. Suboperations and Lots in North-Central and Southern Areas of the Upper Plaza

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-19-A	1	Construction Fill	Chicanel	31
	2	Construction Fill	Chicanel	27
	3	Burial CC-B22	Chicanel	75
	4	Construction Fill	Chicanel	44
	5	Construction Fill	Chicanel	68
	6	Floors 2 and 3		
	7	Construction Fill	Chicanel	36
CC-19-F	1	Construction Fill	Chicanel	11
	2	Construction Fill		
	3	Construction Fill	Chicanel	1
	4	Construction Fill	Mamom	?
	5	Construction Fill	Chicanel with Mamom trace	6
CC-19-V	1	Topsoil	Tepeu 2 with Chicanel trace	55
	2		Chicanel with Mamom and Tzakol trace	144
	3		Chicanel with Tzakol trace	230

might have been built one directly after the other, and their context suggests that they are the same as Floor 2 (Lot CC-15-FF-09) and Floor 3 (Lot CC-15-FF-11), both of which also had a mix of Mamon and Chicanel sphere ceramics in their construction fills (Gallareta Cervera et al. 2019: Table 2.5).

Excavations suggest that Burial CC-B22 was a primary but intrusive interment placed into a fill matrix of amorphous stones and gray soil. A single sample of bone from this burial yielded a date of cal 200–91 BC (Sample CC-19-S15; see Tables 8.11 and 8.12). This correlates with the ages of the two vessels in the burial, placing the interment in the Late Preclassic period.

Importantly, Burial CC-B22 provides an opportunity to refine our estimation of when the Maya truncated Blanca. Previously, we used Burial CC-B17, another Late Preclassic burial located about 4 m south of Burial CC-B22 to establish a terminus ante quem date for Blanca's truncation as 154 cal BC to cal AD 47. Burial CC-B17 was placed in fill above Blanca and therefore must post date its truncation. Assuming our interpretation is correct and Burial CC-B22 intrudes into Blanca, thus post-dating its burial, then Blanca was truncated before 91 cal BC.

A faunal bone collected below the burial from Lot CC-19-A-05, interpreted to be intact fill associated with Blanca, yielded a 2-sigma date range of 365–206 cal BC (Sample CC-19-S03). This is our first absolute date from fill within Blanca, suggesting that at least the third tier of the platform was built between 365 and 206 cal BC, during the first couple of centuries of the Late Preclassic period.

Excavations in the Southern Area of the Upper Plaza

We excavated one 2-x-1-m unit, Subop CC-19-V, in the southern part of the plaza, north of Structure A-15, to recover chronological information from this previously unexcavated area. The topsoil (Lot CC-19-V-01) consisted mostly of loose soil, small rocks, and a mixed context of ceramic sherds dated to the Late Classic and Late Preclassic periods (see Table

2.4). As excavations proceeded to go deeper the quantity of sherds increased considerably. Lot CC-19-V-02 is suspected to be the fill of a plaza floor, but there was not an observable plaster surface, and the materials, just as in Lot CC-19-V-01, were also mixed, with Early Classic, Late Preclassic, and Early Preclassic ceramic sherds. Lot CC-V-19-03, a layer of larger cobble fill, also contained a large quantity of ceramics, including some polychrome sherds. Unfortunately, we had to terminate this unit due to a lack of time approximately 1 m below surface.

Excavations at Structure A-13

Robichaux's crews made multiple test pits on Structure A-13 in 1998 and 1999, where they uncovered partial segments of the superstructure on the summit of the mound (Robichaux 2000; Robichaux et al. 2000). Their excavations found evidence of the last two modest substructures to be built, Structure A-13 N and S, and the front (west) wall of what they called Structure A-13 Sub-1. This buried wall measured 4.85-m long by 0.85 m thick, was oriented north-south, was made of large and small rectangular facing stones, had a decorative basal molding, and had a doorway (Robichaux 2000:60). Moreover, they concluded that the building had once been vaulted but was truncated and filled with rubble during the construction of the final phase of the building. Robichaux (2000) also concluded that the back wall of the room as well as the eastern edge of final phase building had collapsed down the back of the mound. Finally, even though dating these structures was difficult, the presence of Tepeu sherds within that fill dates the construction of Structure A-13 N to the Late Classic.

The CCAP excavated to the east of Structure A-13 during the 2018 excavation season. The objective was to collect chronological data from the northwestern section of the Upper Plaza. Subop CC-15-U and Subop CC-15-Z yielded evidence of a Middle Preclassic period north-south wall and six different plaster floors dated from the Middle to Late Preclassic periods and the Late Classic (Gallareta Cervera et al. 2019:57).

Excavation on the 2019 season focused on defining Structure A-13, specifically its superstructure, function, and chronological stages (Figure 2.7). We used previous field reports and excavation notes to identify old unit locations. We then removed the backfill and located the previously excavated features of the structure. We can group the excavations in three segments of objectives. Subops CC-19-B, -C, -T, -G, and -K had as an objective to define the dimensions of the final stage of Structure A-13 as well as defining its relation to the Late Classic period floor of the Upper Plaza. Subops CC-19-I, -L, and -O had the purpose of exposing and identifying the east stairway and central access to the structure. Finally, Subops CC-19-Q, -Qx, -E, -M, -J, -H, -S, and -N focused on defining the superstructure on top of the pyramid, expanding our data from previous excavations, and testing our hypothesis that Structure A-13 was an eastern shrine structure. The excavation comprised 16 suboperations with lots based on natural and cultural stratigraphic layers (Table 2.5), which revealed at least four different construction phases that date from the Late Preclassic to the Late Classic period.

Excavation Narrative

Summit of Structure A-13

Our excavations at the summit of Structure A-13 began with Subop CC-19-E. The unit was located straddling the centerline and extending onto the northern half to find Robichaux's units from 1999 (CC-02-AL, CC-02-AB, and CC-02-AM) and uncover Structures A-13-1st and A-13 Sub 1, as designated by Robichaux

Figure 2.7. Structure A-13 before excavation. View to the east.

(1999). Excavation started from north to south, digging out back dirt from previous excavations (about 20 cm) and looking out for the northern portion of the superstructure. Excavations uncovered a structure with at least three tiers or steps on its west side, oriented north to south, and with an architectural style and form vastly different from any structure reported by Robichaux. We ultimately named this new superstructure, a stepped platform that was previously unexcavated, Structure A-13-3rd (Figure 2.8). Our excavations ultimately determined this new superstructure consisted of eight narrow, step-like tiers; the uppermost is built of eight, well carved, rectangular stones measuring 60 cm long by 25 cm wide by 20 cm high (Figure 2.9). Both of the lower two visible rows consist of two, brick-like, stacked rectangular carved stones, each about 20 cm long by 10 cm tall (Figure 2.10). Unfortunately, the construction fill from this structure, located in Lot CC-19-E-03, did not yield any dateable ceramics, only large amorphous stones and a layer of uneven plaster, which we interpreted as a stucco stabilizer for the construction of Structure A-13-3rd.

Due to this, we opened two new 1 m x 1.5 m suboperations at the northeast and southwest parts of CC-19-E (Subops CC-19-H and CC-19-I, respectively). Both units yielded backfill from previous seasons' excavations. Subop CC-19-I, located directly in front of Structure A-13-3rd's stepped platform yielded a Late Classic period plaster surface, which we interpret as a fill stabilizer (Lot CC-19-I-02), and plaster floor, both associated with the covering of Structure A-13-3rd. The fill in front of the staircase was placed in a systematical way, rocks were stacked by size, from large to small, and then a layer of soil was placed to fill the gaps. The plaster floor was the base of the eight rows or steps of the platform, which is in concordance with the centerline of Structure

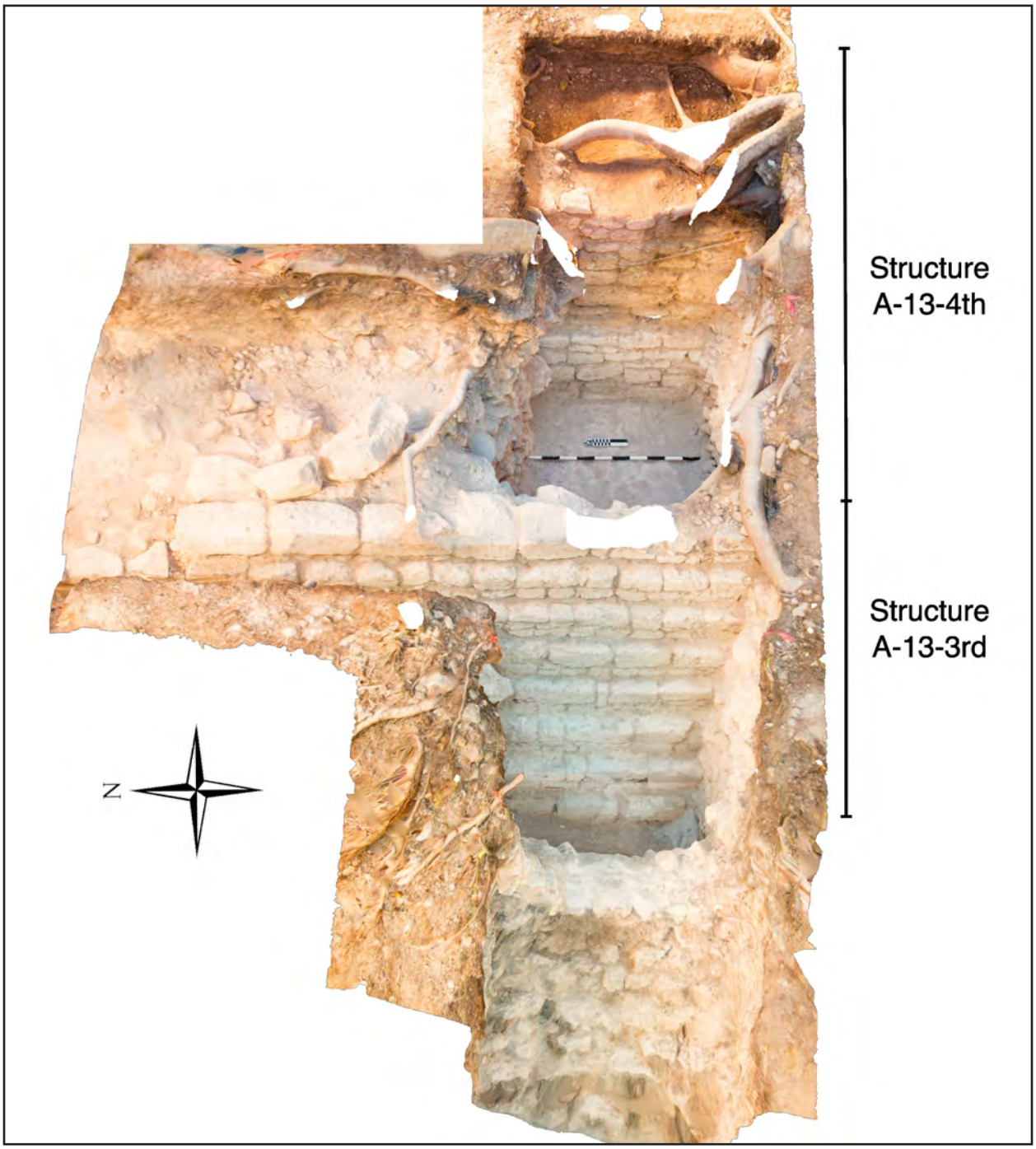

Figure 2.8. Orthomosaic perspective view of Structure A-13 and its construction phases.

A-13-3rd. The small size of the steps, however, made it difficult to use as a staircase, which suggests that this feature might have been exclusively for aesthetics. Moreover, the size of Structure A-13-3rd suggests the possibility of more than one room on the summit of the structure.

Subops CC-19-Q, -Qx and -H, were placed at the northern section of the mound to understand the full extent of Structure A-13-3rd and its relationship with Structure A-13-4th, previously excavated in 1999—which Robichaux and originally called Structure A-13 Sub 1. After excavating through the topsoil

Figure 2.9. Photograph of Lot CC-19-E-02, showing the summit of Structure A-13-3rd. View to the south.

Figure 2.10. Photograph of Lot CC-19-E-04, showing the upper three tiers of Structure A-13-3rd's façade. View to the east.

and some backfill from previous excavations, we encountered two low masonry walls of Structure A-13-1st, the front wall, running north to south, and the north wall, running east to west (Lot CC-19-Q-02).

Supob CC-19-Q chased the façade of Structure A-13-3rd's summit to search for the northern end of the platform. As Figure 2.11 shows, one of Robichaux's excavation units from the late 1990s clipped and destroyed part of the structure. Ultimately, we had to extend Subop CC-19-Q with 0.75-x-1-m north extension (Subop CC-19-Qx) to reach the northern corner of the structure. The fill on top of Structure A-13-3rd dated to the Late Classic period, which suggests that the last construction phase of the mound completely covered previous buildings.

Excavations at the southeastern section of the mound focused on locating architectural features and determining the extension and chronology of Structures A-13-3rd and A-13-4th. Subop CC-19-J, a north to south 2.5-x-1-m trench, had the objective of locating the walls of Structures A-13-1st and 2nd. The collapsed debris observed at the surface dated to the Late Classic period and associated with Structure A-13-1st. Moreover, a wall of carved stones associated with a well-preserved plaster floor (CC-19-J-02) was located below the debris and dated to the Late Classic period. A second floor level, which was not very well preserved, connected to the first floor via a stone alignment and suggests that the context is a stairway. A layer of plaster (Lot CC-19-J-02) above the rock alignment connected the two steps to a wall (Lot CC-19-J-03) located at the west of the unit (Figure 2.12). Our excavations exposed only about 20–30 cm of the wall's width, which was made of two courses of heavily eroded cut stone blocks measuring 30 cm long by 12 cm thick. The contexts of these two steps, which are capped by a plaster floor (Lot CC-19-J-02), suggest that they are not part of the final construction phase. Intriguingly, these steps are not resting on any floor. We suspect that their base was probably destroyed when Structure A-13-2nd was constructed or perhaps when Floor 2 was built. It might have been destroyed completely

Figure 2.11. Photograph of Lot CC-19-Q-04, showing the upper three tiers of Structure A-13-3rd's façade. The damaged portion in the foreground is from one of the units excavated in the late 1990s. View to the north.

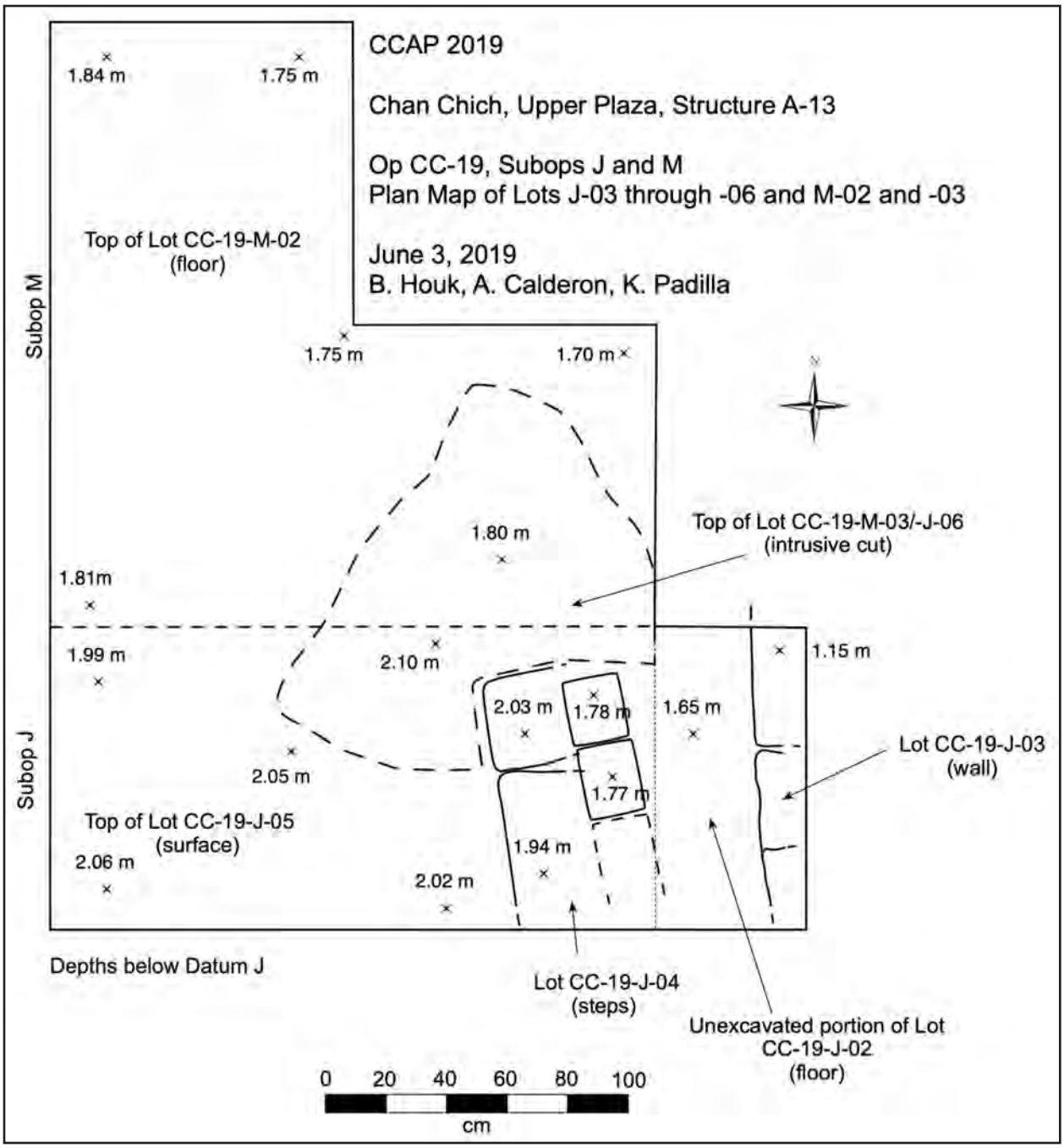

Figure 2.12. Plan map of Lots CC-19-J-03 through -J-06 and -M-02 and -M-03.

since there is no evidence of it in the unit. There is nothing between these steps and the corner of Structure A-13-3rd. A mark of plaster can be seen in the southeast corner of Structure A-13-3rd. It is likely that the steps are part of Structure A-13-3rd, since they are in the same direction, made of the same kind of stones, and are at the same height.

Another plaster surface (Lot CC-19-J-05), which appeared to be cut by an intrusive feature (Lot CC-19-J-06), found in the west half of the unit was interpreted as a construction stabilizer that dated to the Late Preclassic period and was associated to Structure A-13-3rd (Figure 2.13). Moreover, the staircase located in Subop CC-19-J and the plaster floor located at Subop CC-

Figure 2.13. Photograph of Lot CC-19-J-05. View to the south.

19-M (see below) seemed to have been intruded and dismantled in antiquity, suggesting that some cultural activity had happened in the past. However, as we excavated the unit, we did not locate any other indices of why this area was intrusive.

To understand more about the intrusive feature and its relationship with Structure A-13-3rd and the central staircase, we created a new suboperation (Subop CC-19-M) between Subops CC-19-J and CC-19-E on the summit of Structure A-13. The unit was L-shaped, so the measurements are irregular. The unit excavation started at the south following the staircase located in the southeast of Subop CC-19-J. We located an eroded plaster floor (Lot CC-19-M-02) with Late Classic period ceramics on top of the collapse debris. As seen in Figure 2.12 the surface was cut by an intrusion, which extended into Subop CC-19-J. The southern platform face of Structure A-13-3rd, made of finely carved squared stones, oriented east to west, was observed at this unit. A stucco floor (Lot CC-19-M-03) was located in the northern section of the unit and is associated with A-13-3rd and had Late Preclassic period ceramics as part of its fill (Lot CC-19-M-04). Intriguingly some of this context had a combination of Late Preclassic and Late Classic ceramics (Lots CC-19-M-05 and -06; Table 2.5).

Floor 1 is associated with Structure A-13-1st or A-13-2nd and covers Structure A-13-3rd. A rough wall that goes north to south is also associated with this floor, which suggests this might have been a room. The plaster floor is about 10-cm thick. After excavating a layer of gray-brown soil with medium amorphous rocks, we reached an area we suspect was intruded in antiquity, which goes below the steps of the southwest corner and Floor 2.

Table 2.5. Suboperations and Lots from Structure A-13 Excavations

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-19-B	1	Topsoil	Chicanel	2
	2	Collapse Debris	Tepeu 1-2	5
	3	Collapse Debris		
	4	Collapse Debris	Tepeu 2	51
	5	Platform Face		
	6	Floor 1, Upper Plaza		
	7	Platform Face		
CC-19-C	1	Topsoil	Tepeu 3 with Tzakol trace	20
	2	Construction Debris	Tepeu 2	22
	3	Construction Debris	Tepeu 2 with Tzakol trace	9
	4	Construction Debris	Tzakol 2-3 to Tepeu 1-2 mix	83
	5	Wall		
	6	Floor 1, Upper Plaza		
	7	Other Surface	Chicanel	1
CC-19-E	1	Topsoil		
	2	Platform Face		
	3	Construction Fill		
	4	Construction Fill		
	5	Construction Fill		
	6	Construction Fill		
CC-19-G	1	Topsoil	Tepeu 2 with Chicanel trace	7
	2	Construction Debris	Tepeu 2 with Chicanel trace	97
	3	Wall		
	4	Floor 1, Upper Plaza		
	5	Construction Fill		
	6	?		
CC-19-H	1	Other		
	2	Wall		
CC-19-I	1	Other Surface		
	2	Floor Associated with Structure A-13-3rd	Tepeu 2	1
	3	Construction Fill		
	4	Construction Fill	Chicanel	45
CC-19-J	1	Topsoil	Tepeu 2	5
	2	Floor Associated with Structure A-13-1st	Tepeu 2	14
	3	Wall		
	4	Step		
	5	Other Surface	Chicanel with Tzakol trace	15
	6	Other Surface	Tepeu 1?	10
	7	Construction Fill	Tepeu 2	18

Table 2.5. Suboperations and Lots from Structure A-13 Excavations (continued)

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-19-K	1	Topsoil/Collapse	Tepeu 2 - Chicanel admix	24
	2	Wall		
	3	Floor 1, Upper Plaza		
CC-19-L	1	Topsoil		
	2	Construction Fill		
	3	Wall		
	4	Construction Fill	Chicanel to Floral Park	65
	5	Construction Fill	Chicanel with Tzakol trace	46
	6	Construction Fill	Tepeu 2-3 with Chicanel trace	16
	7	Other Surface		
	8	Construction Fill	Chicanel	4
	9	Other Surface	Tepeu 2	74
	10	Other Surface	Tepeu 2, Chicanel admix, Tzakol trace	90
	11	Other Surface		
	12	Construction Fill		
CC-19-M	1	Topsoil	Tepeu 2	13
	2	Floor Associated with Structure A-13-3rd		
	3	Construction Fill		
	4	Construction Fill	Chicanel	13
	5	Construction Fill	Tepeu 2 and Chicanel mix	52
	6	Construction Fill	Chicanel	16
	7	Other Surface		
CC-19-N	1	Topsoil		
	2	Construction Fill	Chicanel	7
	3	Wall	Tepeu 2	1
	4	Floor of Structure A-13-4th	Tepeu 2 with Tzakol trace	9
	5	Construction Fill	Chicanel	23
CC-19-O	1	Topsoil/Construction Fill	Tepeu 2-3 with Chicanel trace	47
	2	Construction Fill	Tepeu 2 with Tzakol trace	28
	3	Construction Fill	Tzakol and Chicanel mix	46
	4	Other Surface	Chicanel	2
	5	Construction Fill		
	6	Floor 2, Upper Plaza	Tepeu 1-2	66
	7	Floor 3, Upper Plaza	Chicanel	28
CC-19-Q	1	Topsoil		
	2	Collapse Debris	Tepeu 2	6
	3	Wall		
	4	Collapse Debris		

Table 2.5. Suboperations and Lots from Structure A-13 Excavations (continued)

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-19-Qx	1	Topsoil		
	2	Construction Fill	Tepeu 2	6
	3	Wall		
	4	Construction Fill		
CC-19-S	1	Other		
	2	Construction Fill	Tepeu 2	31
	3	Floor of Structure A-13-1st		
	4	Wall		
	5	Wall		
	6	Construction Fill	Tepeu 2 with Chicanel trace	115
	7	Construction Fill	Chicanel and Tepeu 2 admix	18
CC-19-T	1	Topsoil	Tepeu 2	1
	2	Collapse Debris	Tepeu 2	45

A second plaster floor found in the south of the unit is ambiguous in its context since it does not have a clear structure associated with it. The floor was flat and well preserved and "hits" the staircase between steps, all of which suggest that this might be a stabilizer level associated with the fill that covered Structure A-13-3rd. There are at least three other lines of the same stucco surface in the eastern profile, which might also be construction stabilizing.

Subop CC-19-L, a 2-x-1.5-m unit, was located directly to the south of Subop CC-19-I with the purpose of defining Structure A-13-2nd's central staircase. The first 20 to 30 cm of excavation consisted of backfill from Robichaux's 1998 excavations. The first Maya context located in this suboperation consisted of Late Classic period construction fill associated with Structure A-13-1st (Lots CC-19-L-02 and -03). However, we noticed a change when uncovering the construction fill from Subop CC-19-L-04, which yielded Late Preclassic period ceramics (see Table 2.5). The architecture was noticeably degraded and the style and quality of the staircase was a substantial departure from the staircase associated with Structure A-13-3rd (located in Subop CC-19-I), which was made of very well-cut stones and was well preserved. The fill was uniform and consisted of medium to large-sized rocks followed by very loose dirt. We suggest that the fill was part of a now unpreserved structure, Structure A-13-2nd. The staircase was oriented west to east at the centerline of the mound and its design looks similar to Structure A-13-3rd but executed much more poorly since the rocks are of lower quality, less well carved, and placed less carefully on top of each other. At the east edge of the unit, at the top of the staircase, we observed a semi-dismantled stonewall made of rough medium stones (CC-19-L-07). The wall consists of at least six rows of roughly medium-sized rocks and is associated with Structure A-13-2nd. This context also suggests that Structure A-13-2nd might have been built on top of Structure A-13-3rd.

One possible explanation for the crude construction quality of Structure A-13-2nd's stairway is that the Maya removed the cut facing stones to recycle them prior to building Structure A-13-1st. Herndon et al. (2013) documented this practice at Structure A-5 in the Main Plaza. There, they encountered the core face of an earlier construction phase, but

the facing masonry had been entirely removed prior to the structure's renovation.

At the bottom of the staircase associated with Structure A-13-3rd, below the plaster floor, the construction fill dated to the Late Preclassic period (Lot CC-19-L-08). Our following excavations (Lots CC-19-L-9 and -10) yielded construction fill made of small to medium rocks and very pale brown dirt within uneven plaster surfaces, with mixed Late Classic, Early Classic, and Late Preclassic ceramics. Moreover, the large quantity of ceramic sherds in these lots, their relative date, forms, and types, as well as their location between two uneven plaster surfaces suggests an intrusive ceramic deposit (Lot CC-19-L-10). A charcoal sample yielded two calibrated radiocarbon date ranges (Sample CC-19-S012) for this deposit, dating it to cal AD 660–717 and AD 742–767 (See Table 2.3). Additionally, the excavation yielded a circular feature located inside a small portion of mortar (Lot CC-19-L-11); we interpret this feature as the negative imprint of an ancient scaffold, probably dating to when the Maya were constructing Structure A-13-3rd or 2nd (Figure 2.14).

To keep exploring the centerline of Structure A-13-1st, we opened a new suboperation (Subop CC-19-O) measuring 2.1 x 1.5 m and located directly to the west of Subop CC-19-L. The first layers consisted of a combination of collapse debris and the backfill from the 1998 archaeological excavations and artifacts from the final construction stage of the structure dated to the Classic (Lots CC-19-O-01 and -02) and Preclassic periods (Lot CC-19-O-03). As we uncovered the centerline staircase, we reached a plaster surface (Lot CC-19-O-04), which we identified as a construction fill stabilizer. We initially classified this fill stabilizer and another similar surface as floors, but after further analysis they were reclassified as fill

Figure 2.14. Photograph of Lot CC-19-L-10. View to the north.

stabilizers. We uncovered a plaster floor (Lot CC-19-O-06) dated to the Late Classic period by a decent ceramic sample of 66 sherds. This plaster floor is located at the same level as Floor 2 from the Upper Plaza. As we broke this floor and excavated to a lower level, we located a second stucco floor (Lot CC-19-O-07), which we interpret as Floor 3 of the Upper Plaza. The floor was very well preserved. A charcoal sample (Sample CC-19-S09) dates this context to cal AD 229–340, and its modest sample of 28 Chicanel sherds suggest it was constructed near the very end of the Late Preclassic period.

Subops CC-19-H, -S, and -N, focused on uncovering the eastern section of Structure A-13-4th, the superstructure that was uncovered by the 1998 and 1999 excavation seasons and originally called Structure A-13 Sub 1. After removing backfill from previous excavations (Lot CC-19-H-01), Subop CC-19-H, which was a 1.5-x-1-m unit located at the northern corner of Subop CC-19-E, yielded the presence of a small wall (Lot CC-19-H-02) made of finely carved rectangular stones, oriented north to south, which, by its location, we identified as the northern part of Structure A-13-4th.

Subop CC-19-N, an extension of Subop CC-19-E and located directly to the east of it, first yielded a plaster floor, which had a fill dated to the Late Preclassic period (Lot CC-19-N-02). Excavations of Lot CC-19-N-02 were deep, due to the high volume of the construction fill for Structure A-13-3rd. We excavated from west to east to uncover the façade of the Structure A-13-4th's wall and substructure. After locating the wall and its footer, first documented by Robichaux (2000), we gave it a lot number (Lot CC-19-N-03) and excavated a little more to reach the base of the structure (Figure 2.15). The masonry wall was located in the middle of the unit, and it was oriented north to south and was composed of multiple rectangular, brick-like, stones. Its base consisted of a very well-preserved plaster floor (Lot CC-19-N-04).

Dating Structure A-13-4th, is unfortunately, problematic, as our relative and absolute dates

Figure 2.15. Photograph of floor, footer, and western wall of Structure A-13-4th. View to the east.

are contradictory and jumbled. The small sample of ceramics (n=9) from floor Lot CC-19-N-04 date to the Late Classic. However, a charcoal sample (Sample CC-19-S04) from the same lot yielded two date ranges (cal AD 432–490 and cal AD 532–601) that suggest a late Early Classic date. The construction fill located in Lot CC-19-N-05, on the other hand, dated to the Late Preclassic period based on ceramics, and we associated it with Structure A-13-4th. Most difficult to explain in this sequence is charcoal Sample CC-19-S07, which yielded a cal AD 639–676 date range from Lot CC-19-N-05, suggesting a Late Classic period for this context. We are unable to resolve the inconsistencies in the dates, which means we are unable to confirm the age of Structure A-13-4th.

Suboperation CC-19-S consisted of a 2-x-2.4-m unit located between Subops CC-19-H and CC-19-N. Its purpose was to expose the north-south wall of Structure A-13-4th, which was located in Subops CC-19-H and -N. At the southern portion of this unit we uncovered an east to west running wall (Lot CC-19-S-05) as well as the north to south running wall, the southern doorway jamb of Structure A-13-4th, and an eroded plaster floor (Lot CC-19-S-03) dated to the Late Classic period (and hence, a floor associated to Structure A-13-1st). The wall was made of carved square-ish stones and was 0.72 m tall. The fill associated with the back of Structure A-13-3rd (Lots CC-19-S-06 and -07) consists mostly of large to medium amorphous stones and plaster with a Late Preclassic and Late Classic period ceramic mix. However, a charcoal sample (Sample CC-19-S014) dates this context to cal AD 639–676, a virtually similar date found in Lot CC-19-N-05. These samples indicate that the fill is dated to the Late Classic period. This also suggests that perhaps the source of confusion in dating Subop CC-19-N's various lots lies in misclassification of the lots' contexts in the field.

Excavations below the floor in Structure A-13-4th yielded the presence of a platform, a plaster surface and a large flat surface that looks like a capstone. This feature was located roughly 0.8 m below the plaster floor associated with Structure A-13-4th, and its fill was mostly white marl. Due to this, we interpret it as being a separate substructure, and we refer to it as Structure A-13-5th. This Late Preclassic period filled architecture observed in the lot consists of three apparent steps of stones; the first two rows are made of two long stones while the third one consists of a singular large stone. The relationship between these steps and Structure A-13 is unclear. Moreover, another carved stone of similar size and height directly to the west of the unit seems to be aligned to the third step (Figure 2.16) and located on top of a plaster surface. We excavated the fill of the plaster surface to search for the presence of a cache or burial since the unit is located at the centerline of the structure. After removing multiple large flat stones and smaller amorphous rocks (about 1.75 m below the second floor level), we concluded the lot at an arbitrary level due to lack of space and time for excavating this season.

Structure A-13's Platform

Excavations to define the form and size of Structure A-13's substructural platform began with two trenches near the north and south ends of the western face of the mound, Subops CC-19-B and -C, respectively. The goal with these trenches was to encounter the final plaza floor and base of the building's platform to give us a starting point to follow the architecture to the corners of the building. Near the northwest corner, a 1-x-4-m trench yielded large and medium rough stones identified as the Late Classic period collapse debris from the top of the structure (Lots CC-19-B-02 and -04). After removing about 2 m of collapse, we uncovered the western platform face of the structure and the Late Classic period floor of the Upper Plaza

Figure 2.16. Photograph of Lot CC-19-S-07, Structure A-13-5th. View to the east.

(Figure 2.17). The platform face was about 1.12 m high from its base and consists of eight courses of stones of different sizes, shapes, and carving quality. This variation in facing stones suggests the use of recycled material from other stone buildings, something that is typical in the Upper Plaza during the Late Classic period. The lower three rows are of notably better quality than the top five, which might suggest the presence of two different construction phases. Moreover, carved stones at the east end of the trench and the existence of plaster under these stones suggest the presence of a second terrace.

At the southwest corner of Structure A-13, excavation yielded similar contexts. We exposed the west platform face, which consisted of four preserved rows of carved to semi-carved stones of different sizes (Figure 2.18). Just like at the northwest face, we observed rocks of varying carving quality. The first three courses of stones seem to be well carved, with one stone being denser than the others. The top tier of the wall is made from lower-quality stones. The preserved portion of the platform was 60 cm tall from the Late Classic Upper Plaza floor; however, the profile of the unit suggests that the platform may have been more towering, maybe up to 60 cm higher, which would make it a 1.2 m tall frontal face.

As planned, Subops CC-19-B and -C only reached the face of Structure A-13's platform and not its corners. We opened three additional units to locate the southwestern (Subops CC-19-G and -K) and northwestern (Subop CC-19-T) corners. Subop CC-19-G consisted of a 3 m long by 1 m wide trench and aimed to locate the southwestern corner of the structure. The ceramics in the topsoil and collapse debris date to the Late Classic period. While excavating Lot CC-19-G-02, we observed a partially collapsed platform face of roughly carved stones. The feature corresponds to the same

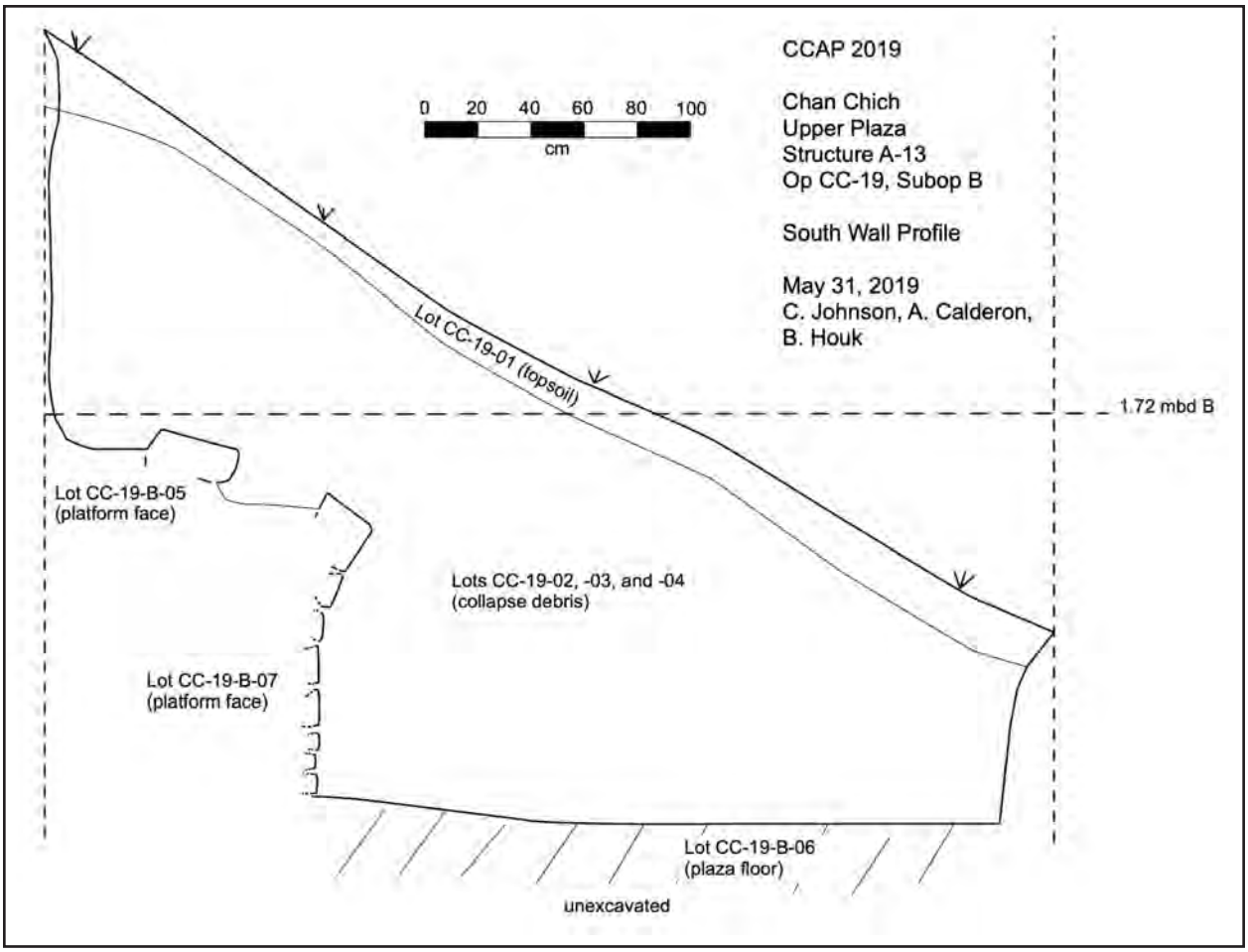

Figure 2.17. Subop CC-19-B south profile.

platform located in Lot CC-19-C-05 and is oriented north-south. From this we learned that the dry construction fill found in the eastern end of Subop CC-19-C was part of an unpreserved higher terrace face and that the basal platform face had originally been higher in elevation than seen in the excavation. The lower face consisted of six courses of semi-carved and rectangular stones and was 1.2 m tall from the plaza floor. The plaster floor located in this unit (Lot CC-19-G-04) corresponds to the same level as the floor located in Lot CC-19-C-06. The unit failed to find the corner, however, so we opened Subop CC-19-K directly south of Subop CC-19-G. The unit exposed the corner (Lot CC-19-K-02), which curved to the southeast. Herndon et al. (2013:47) documented similar rounded platform corners on the final phase of Structure A-5 in the Main Plaza.

Subop CC-19-T was 2 x 2 m and excavated in two lots to find the northwestern corner of the final phase of the structure (based on the location of the southwestern corner). Lots CC-19-T-01 and -02 consisted of collapse debris from the structure and contained ceramics dating to the Late Classic period. The building's platform face was located in the southern portion of the unit. It consisted of three courses of rectangular and squared stones, made of different carving quality, situated on top of a plaster floor associated with the last construction phase of Upper Plaza. The plaster floor was not level, sloped to the west, and was very deteriorated (Figure 2.19). Even though our excavations missed the northeast corner of Structure A-13,

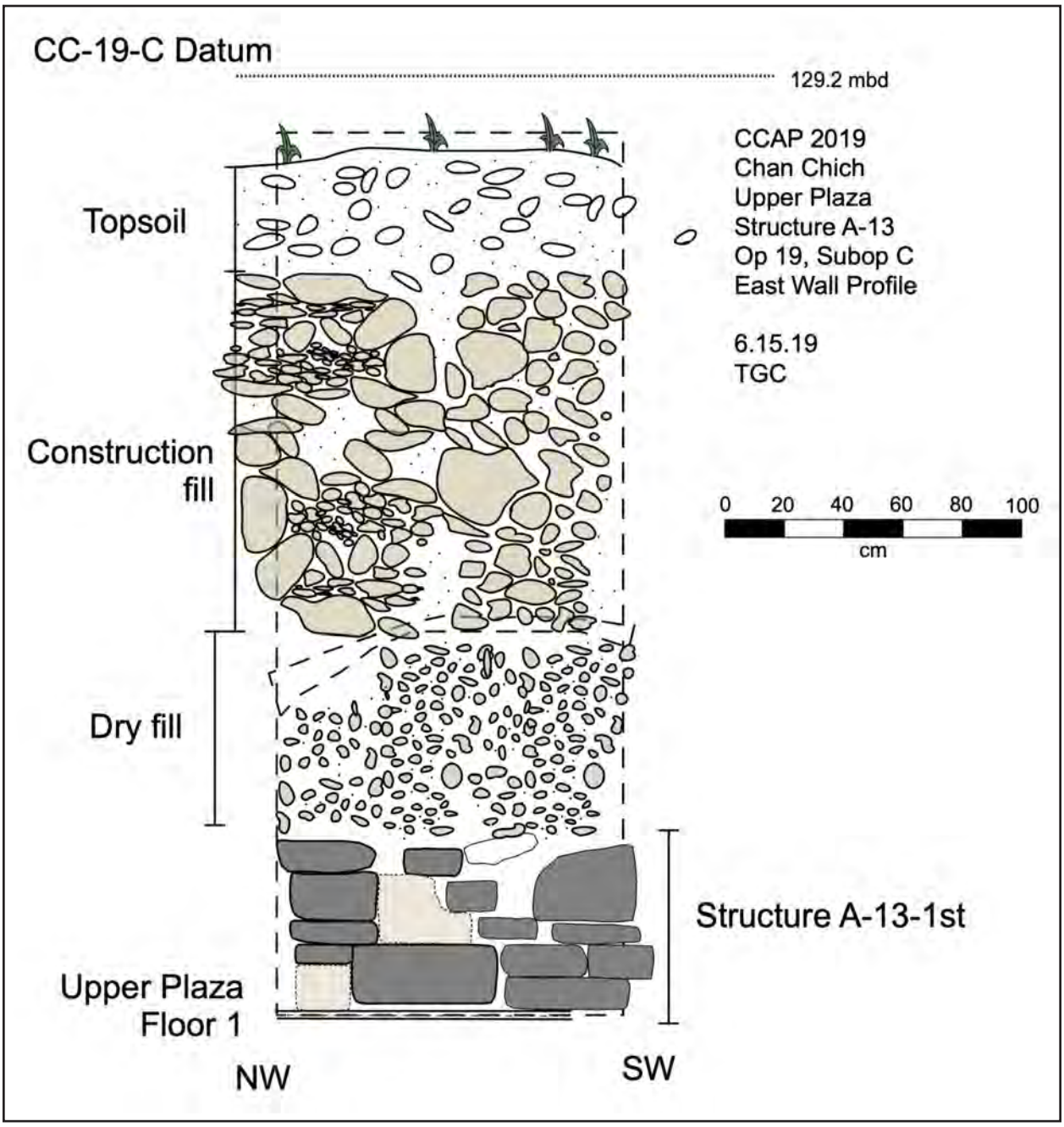

Figure 2.18. East elevation drawing of Subop CC-19-C.

we can project its location using the positions of the platform faces found in Subops CC-19-B, -C, -G, and -K.

Summary of Construction Phases

Excavations at Structure A-13 corroborated some of the past excavation's hypothesis and added new information to our knowledge of the mound. By expanding upon the 1998 and 1999 excavations, we conclude the following points.

New excavations yielded information that changed the known construction sequence. We located more substructures, walls, and plaster floors from Structure A-13's construction history. In total, Structure A-13 consisted of five construction phases.

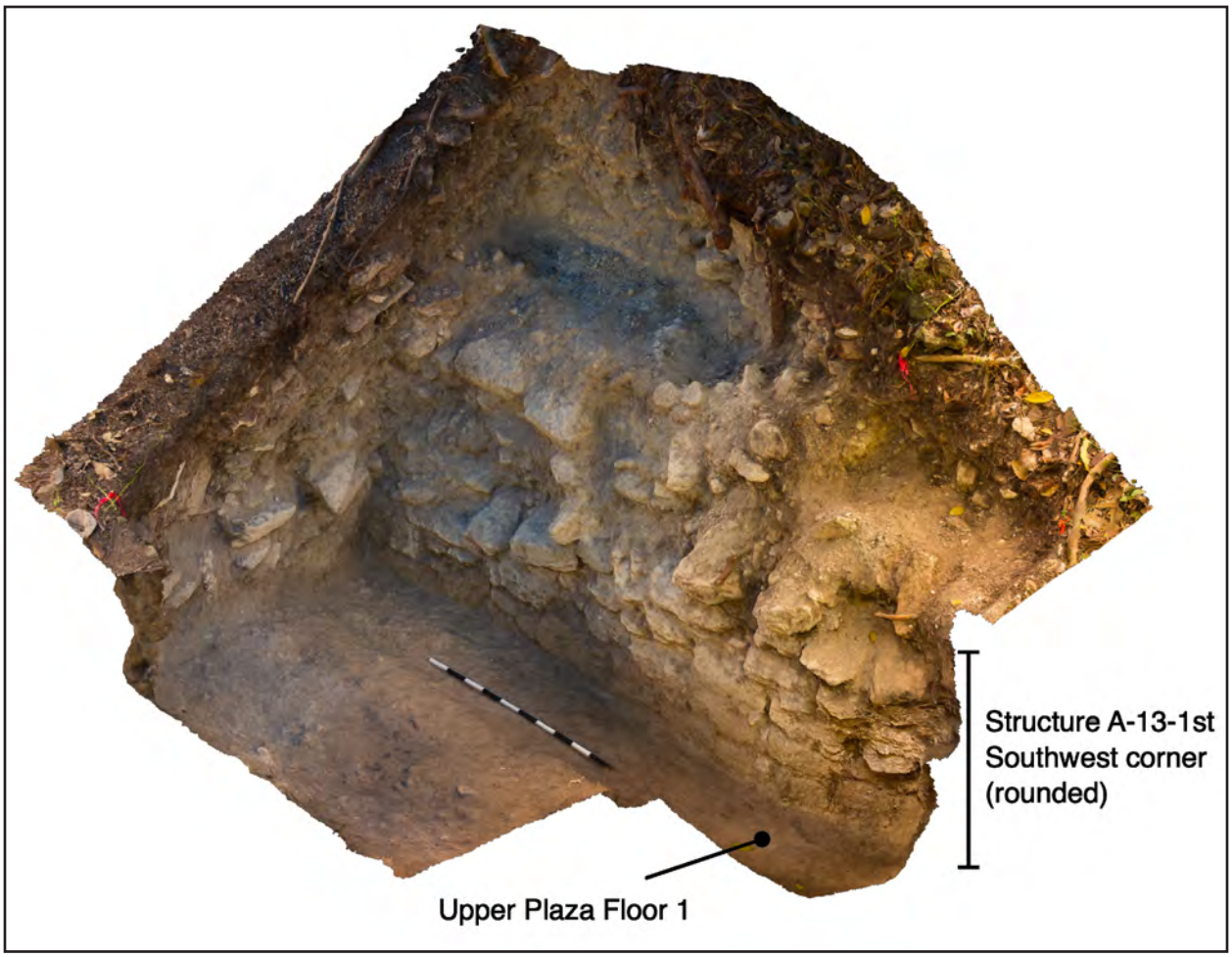

Figure 2.19. Orthomosaic perspective view to the northeast of Structure A-13-1st's southwest corner.

Structure A-13-5th

Structure A-13-5th consists of a three-step platform located on top of a Late Preclassic period plaster floor in the easternmost excavations on the mound. Stratigraphically, it is located at a lower elevation than Structure A-13-4th, roughly 0.8 m below the plaster floor associated with Structure A-13-4th. We know very little about this substructure, only that its likely extends to the east. The very small exposed section of this structure, which we are tentatively calling a platform, consists of three rows of rectangular carved stones forming steps. The first two rows are made of two long stones, while the third one consists of a singular large stone. The platform seemed to be located on top of a surface, although its unclear if it was a formal plaster floor (Lot CC-19-S-08). It is unclear when the platform was constructed, but the context suggests it was covered with a fill of large stones and white marl during the Late Preclassic period.

Structure A-13-4th

Structure A-13-4th is the earliest formal construction phase and consisted of the well-made stone building that Robichaux and his team located in the 1999 archaeological season and named Structure A-13 Sub 1. Our excavation during the 2019 season corroborate that the building was a rectangular multi-room masonry structure with its doors looking into the Upper Plaza. The building is about 10 m north to south and about 5 m east to west. The masonry walls we composed of well carved

rectangular, brick-like, stones. As discussed above, we are unable to resolve the age of this phase, however, if we rely on the 2-sigma age range of Sample CC-19-S04, which is cal AD 432–601, then we tentatively conclude Structure A-13-4th dates to the late Early Classic period. Our excavations also suggest that the substructure was probably buried with a high volume of construction fill, leaving the front façade intact, during the Late Classic period.

Structure A-13-3rd

This superstructure was not previously excavated by Robichaux. Structure A-13-3rd is a large platform built of sizable well-carved rectangular stones oriented north to south at the summit of the mound. Our excavations exposed the top of the platform, which consists of eight tiers of very narrow step-like tiers. The top tier is built of a single course of eight, well carved, rectangular stones measuring 60 cm long by 25 cm wide by 20 cm high. The lower seven tiers are made of two courses each of smaller rectangular carved stones, each about 20 cm long by 10 cm tall. The lowest tier sits on a landing consisting of a plaster surface. The northwest and southwest upper corners of Structure A-13-3rd were located in Subops CC-19-Qx and CC-19-J, respectively. The southern platform face of Structure A-13-3rd was made with finely carved squared stones and oriented east to west. Our data only allows us to suggest that the substructure was both constructed and buried sometime during the Late Classic period. Interestingly, the basal platform of Structure A-12, as is discussed later in this report, is of a similar architectural style as StructureA-13-3rd, suggesting that they are contemporaneous to the Late Classic period.

Structure A-13-2nd

Structure A-13-2nd consists of a 13-step stairway made of roughly carved stones at the centerline of the mound. As noted above, the Maya may have removed the facing stones of these steps prior to the construction of Structure A-13-1st. On top of the stairs, a platform face made of rough stones is the only remaining evidence of the superstructure supported by the platform. This rough face was constructed on top of a platform base made of finely carved stones on top of a plaster floor, a context that resembles the retention walls located at the bottom of the mound. The bottom of the staircase was associated with two plaster floor levels or landings related to Structures A-13-2nd and A-13-3rd. Moreover, both contexts also present evidence of burned ceramics between their two respective plaster floors on the top and bottom of the mound. The staircase consisted of 13 insert-rows of narrow steps that connected the platform of the superstructure to the floor of the Upper Plaza. Our excavations suggest that the substructure was constructed sometime during the Late Classic period. A charcoal sample (Sample CC-19-S012) from a ceramic deposit located between Structure A-13-3rd and A-13-2nd's staircases yielded a 2-sigma date range of cal AD 660–767 and suggests that Structure A-13-2nd.

Structure A-13-1st

The final construction phase, which Robichaux et al. (2000) called Structure A-13 N and S, is referred to in this report as Structure A-13-1st. Most of the architectonic features of this structure did not preserve and are found as collapse rubble covering Structure A-13-2nd. The north and south profiles of the suboperations located at the centerline of the structure indicate the presence of consistent construction fill as well as multiple plaster surfaces used to stabilize it. Excavations at the periphery of the structure suggest that it was built on top of the Late Classic period floor of the Upper Plaza. It is not clear if the last floor of the plaza is associated with only Structure A-13-1st or if it also articulates with Structure A-13-2nd. The

lower level of the structure consists of a 1.2-m tall base platform that steps back to a second terrace to the east. It has curved corners. The deterioration of the final phase has caused the platform faces of the building to tilt outward (in fact, the face located in Subop CC-19-C largely collapsed from this tilting). The platform face located in Subop CC-19-B indicates the presence of at least two construction phases, perhaps associated with Structures A-13-2nd and -1st, respectively. Regardless, it is clear that the Chan Chich masons reused carved stones from other structures—perhaps even Structure A-13-2nd—to create this platform face. The superstructure of Structure A-13-1st is unclear but apparently consisted of low masonry walls as first noted by Robichaux et al. (2000).

Excavations at Structure A-12

Robichaux et al. (2000:51) describe Structure A-12 as an extension directly at the north side of Structure A-13. Until 2019, Structure A-12 was essentially unexcavated. Some exploration near the area includes excavation of Structure A-1E (Subops CC-15-T, -Y, -AA, and -BB) and a few exploratory units at the northeastern section of the upper plaza (CC-15-V, -X, -VV, and -HH) in 2018. Excavations in Structure A-1E revealed the presence of two vaulted rooms with benches, dated to the Late to Terminal Classic period, although a charcoal sample (Sample CC-15-S188) dates the fill of one bench to cal AD 544–605, suggesting a Late Classic construction date with occupation and use extending over a century longer (Gallareta Cervera et al. 2019:29). Subops CC-15-V, -X, and -VV uncovered one platform, and two construction pins, three burials, and a sequence of five stucco floors that date from the Middle Preclassic to the Late Preclassic period. An additional exploratory unit in 2018, Subop CC-15-HH, revealed the presence of the last plaster floor of the plaza near the base of Structure A-12, but failed to encounter architecture associated with the building (Gallareta Cervera et al. 2019:51).

Our objectives during the 2019 season were to explore the form and chronology of Structure A-12, its relationship to Structure A-13, and its relation to the construction sequence of the Upper Plaza. The crew first opened an exploratory 4-x-1-m, east-west trench (Subop CC-19-D) to catch the central axis of the structure. The trench yielded evidence of multiple architectural features including the structure's two tier-stepped west outer platform face, its construction fill, and internal wall, a masonry wall addition (or later subdivision of the room) to the southwest, and the plaster floor from the interior of the structure (Figure 2.20). Based on these findings, two additional suboperations, Subops CC-19-R and -U, were implemented to explore the architectural characteristics and chronology of Structure A-12's rooms (Figure 2.21).

Subops CC-19-D, -R, and -U were excavated in 13, 8, and 9 lots, respectively, based on natural and stratigraphic layers (Table 2.6). Structure A-12 is a masonry building of multiple rooms with at least two benches, and it once had a roof made of perishable materials. The southern room was 4 m north to south by 1.9 m east to west. Its north wall, which separates this room from the northern room, is 0.6 m thick and preserved to 1.1 m tall. Veneer stones and stucco cover did not preserve on the northern and eastern walls, leaving only their compact rock and dirt fill visible. The southern wall was composed of at least three courses of squared carved stones with a thin stucco cover. The room had a 1.5-m wide doorway and a c-shaped bench that covered the width of the room and was about 0.8 m tall. Its plastered surface was 5 cm thick and preserved relatively well.

Excavations yielded the presence of at least two stucco floors beneath a bench which, albeit based on small ceramic samples, date from the

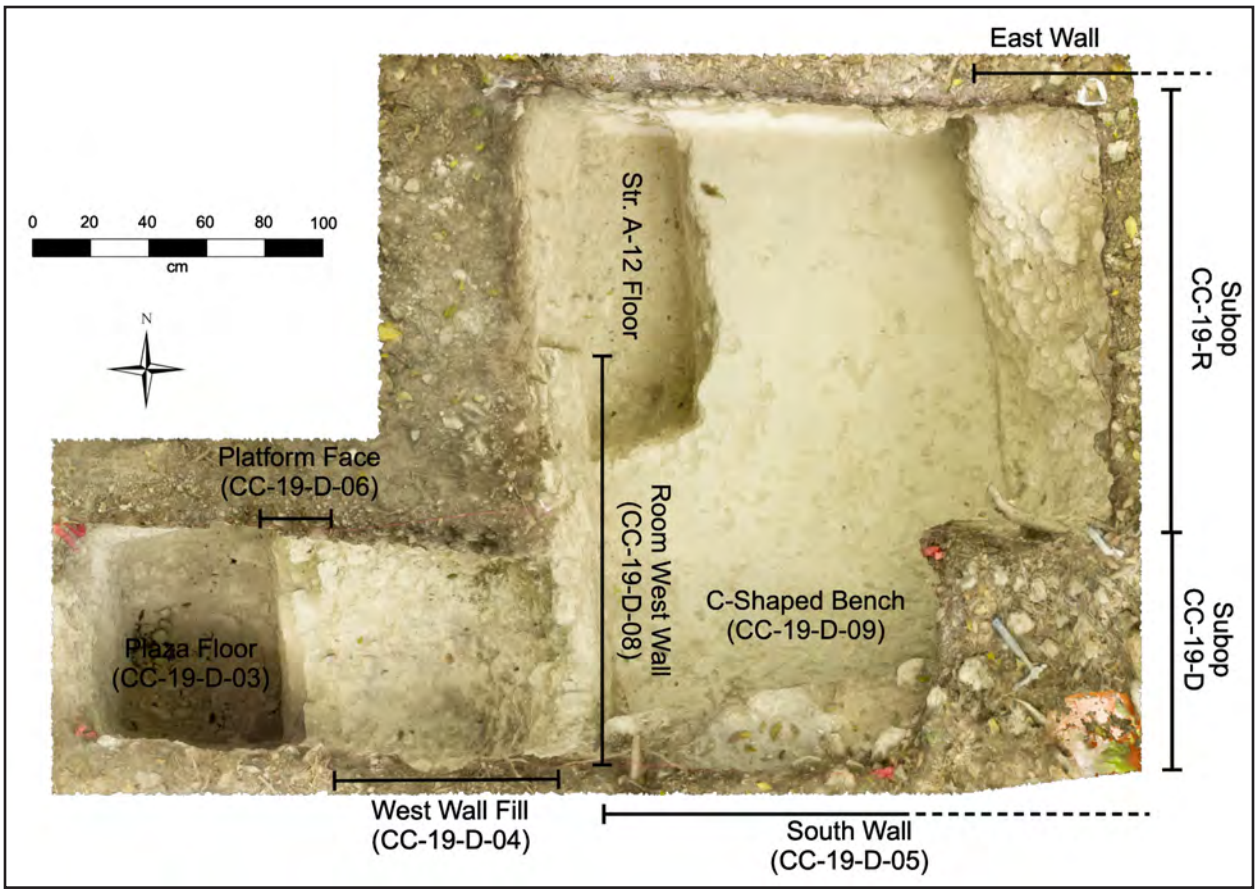

Figure 2.20. Orthomosaic plan view of Subops CC-19-D and -R.

Middle Preclassic to the Late Classic period. It is difficult to determine the earliest date for Structure A-12 due to the small quantity of ceramic evidence that our deepest excavations yielded. Moreover, it is likely that an even earlier substructure is buried underneath the fill that we were not able to reach this season. Two subunits were placed simultaneously to explore the southwestern (Lot CC-19-D-12) and northeastern (Lot CC-19-R-06) areas of the south room. The subunits yielded evidence of two plaster floors and a large bench. The earliest plaster floors (Floor 3 and 2 located at Subop CC-19-D-12), were approximately 5-cm thick and separated by a 3-cm layer of gravel. Both of these were preserved in both excavation subunits. Floor 2 may be a later renovation of Floor 3. The excavation yielded a very small sample of ceramics (Lots CC-19-D-13 and CC-19-R-06), due to which we cannot confirm its chronological period. We can only affirm that Floor 2 is earlier than some of the final architectonic features of the south room of Structure A-12. Our excavations indicate that Floor 2 predates the north, west, and eastern masonry walls of the room, which date to the Late Classic period (Lot CC-219-D-09). Moreover, the southern wall of the room was added at a later time, as evidenced by its base, which is placed on top of the plaster floor. This suggests that the 4-m wide room might have been initially built to be more extensive and was later segmented, indicating the presence of at least another room at the southern section of Structure A-12.

After the construction of the northern, western, and eastern masonry walls, a c-shaped bench was built inside the southern room. The bench

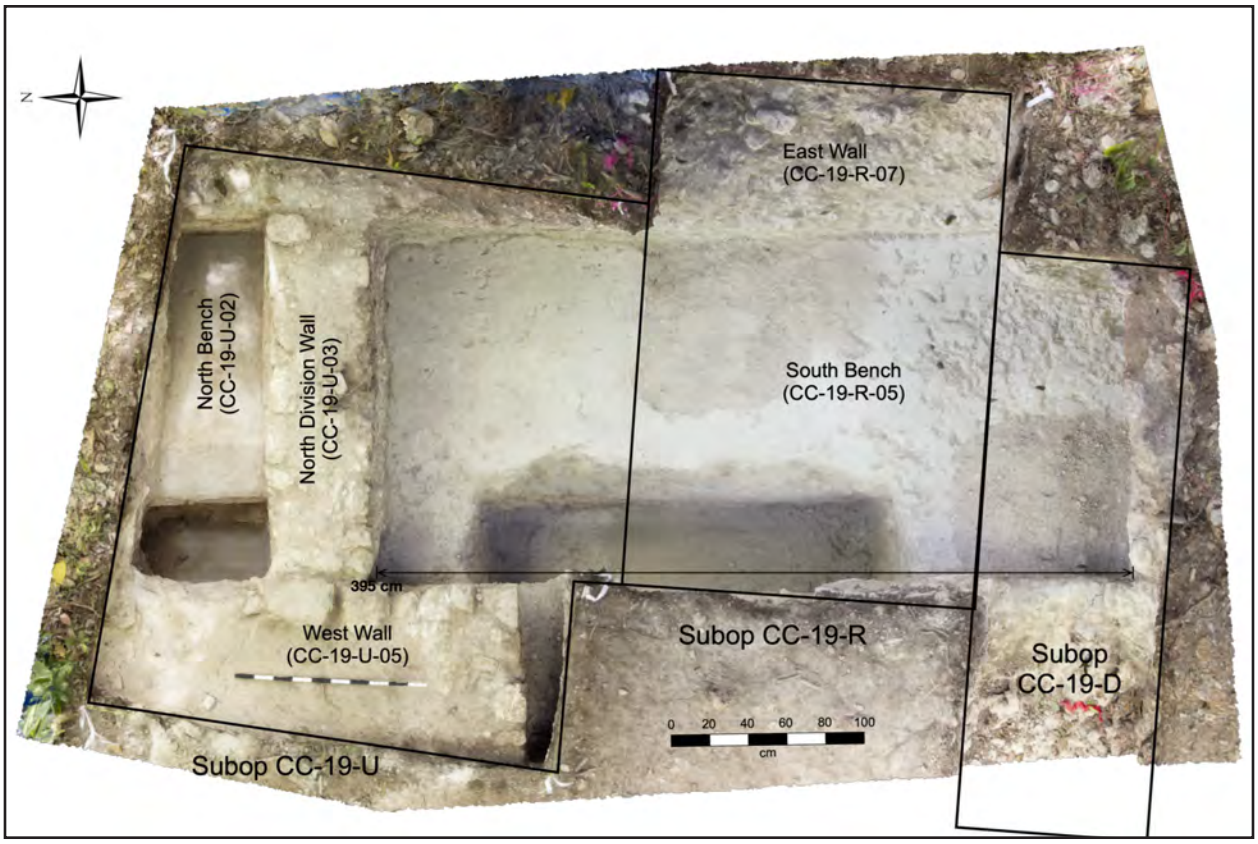

Figure 2.21. Orthomosaic plan view of Subops CC-19-D, -R, and -U.

expands through Subops CC-19-D and -R. While cleaning the surface of the top of the bench, we noticed a pattern of inlaid lines at the northeastern section between the east and north walls of the room (Figure 2.22). Later inspection confirmed the presence of a graffiti image. The pattern consists of two semi-parallel lines forming a "belt" that expands over a meter from north to south. The belt had other grooved, two parallel inclined lines, and the north and a half-circle to the south of the graffiti, respectively. This new graffiti is the fifth we have found at the site of Chan Chich and the second one at the northeastern section of the Upper Plaza (Gallareta Cervera et al. 2019:35).

A third suboperation, Subop CC-19-U, was placed at the north of Subop CC-19-R and had the purpose of exploring Structure A-12's northern room. We began by removing the structure's collapse debris from south to north following the top of the bench. This exploration yielded the presence of a northern masonry wall that divides the south and north rooms. The wall divider (Lot CC-19-U-03) measured 1.83 m by 0.50 m wide. Other features include the western wall of Structure A-12, which measured 2.13 m long by 0.90 m thick, in which a clear doorway to the southern room can be observed. Structure A-12's Floor 1 was found in both the south room (Lot CC-19-U-08) and the northern room (Lot CC-19-U-09). The bench was different than the one located in the southern room; it appears to be rectangular shaped (Lot CC-19-U-07). This bench measured 1.35 m east-west and at least 60 cm north-south.

Our excavations at Structure A-12 concluded that it was a Late Classic period multi-room masonry structure with mid-height walls and multiple benches (Figure 2.23). The building rests on top of a two-tier stepped basal platform and looks to the west, into the Upper Plaza.

Table 2.6. Suboperations and Lots from Structure A-12 Excavations

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
CC-19-D	1	Topsoil		
	2	Collapse Debris	Tepeu 2?	1
	3	Floor?	?	3
	4	Construction Fill	Tepeu 2	12
	5	Wall	Tepeu 2	16
	6	Platform Face		
	7	Collapse Debris	Tepeu 2	29
	8	Wall		
	9	Bench	Tepeu 2 and Chicanel mix	34
	10	Collapse Debris		
	11	Construction Fill	Tepeu 2	84
	12	Floor 3	?	5
	13	Construction Fill	Chicanel	2
CC-19-R	1	Topsoil/Collapse Debris	Tepeu 2	37
	2	Construction Fill	Tepeu 2-3	15
	3	Construction Fill	Tepeu 2	59
	4	Construction Fill	Tepeu 2	27
	5	Bench	Tepeu 2 with Chicanel trace	26
	6	Floor 3	Mamom	17
	7	Wall		
	8	Wall		
CC-19-U	1	Topsoil	Tepeu 2	12
	2	Collapse Debris	Tepeu 2	50
	3	Wall	Chicanel and Tzakol mix	12
	4	Wall		
	5	Wall		
	6	Bench		
	7	Bench		
	8	Floor 1		
	9	Floor 1		

The rooms were large; the southern room, for example, was 4 m by 1.9 m with a 1.5-m doorway (Figure 2.24). The dating of the earliest floor levels was unsuccessful due to a lack of ceramic data. Our excavations do not rule out the presence of earlier substructures, as evidenced by three plaster floors dated to this period. The last plaster floor (Floor 1) predates the oldest construction phase of Structure A-12, evidenced by the northern, western, and eastern masonry walls, which were constructed much later, during the Late Classic period. A pattern of inlaid lines at the northeastern section between the east and north walls of the room is interpreted as ancient graffiti, the only one observed in this structure.

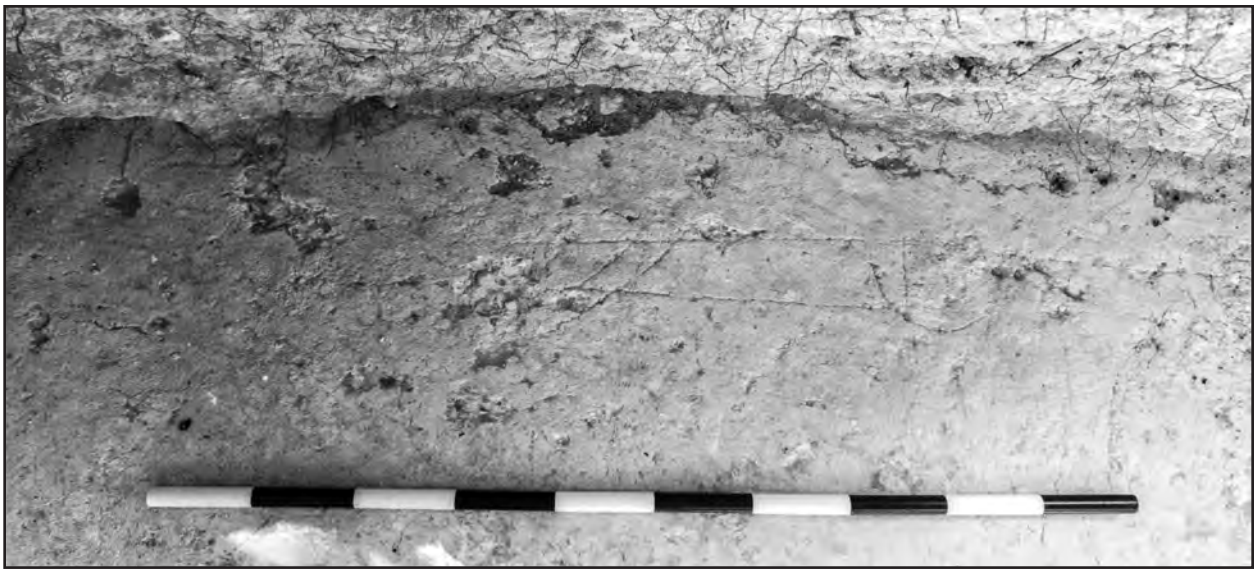

Figure 2.22. Photograph of graffiti at the northern section of the bench of Structure A-12. View to the east.

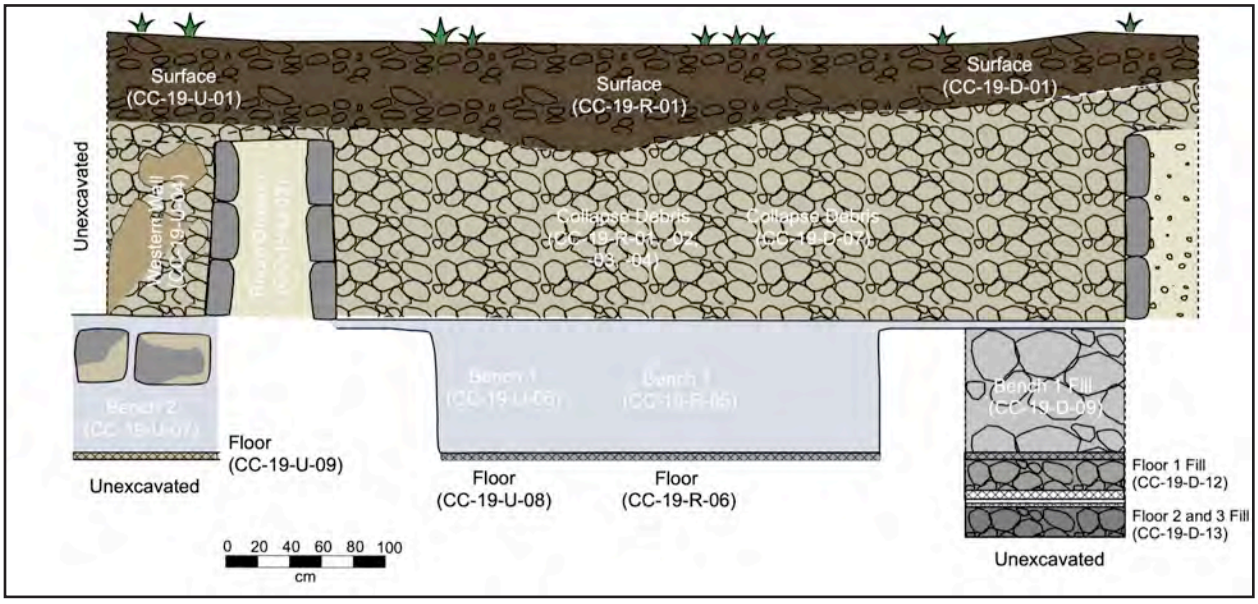

Figure 2.23. East section drawing of Structure A-12.

FINAL THOUGHTS

Our excavations in the Upper Plaza yield new information about the construction history of Structures A-12 and A-13. Perhaps the most surprising discovery of the season was the lack of burials and caches in our excavations at Structure A-13, which we hypothesized might have been an ancestor shrine. Our excavations did not penetrate deeply enough into the mound to rule out the possibility that a tomb is present in an unexcavated section of the mound. Unfortunately, time and trees hampered out our attempts to probe deep into the building.

Figure 2.24. Photograph of Structure A-12 after excavations. Camera facing southeast.

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Salvage Archaeology at Structure A-4 at Chan Chich

Brett A. Houk, Hillary Bedrosian, and Taylor McKinney

Prior to the arrival of our group at Chan Chich in late May, contractors working to install a new cell tower excavated four pits on the summit of Structure A-4, a large platform supporting three small mounds on its summit. Structure A-4 occupies the northwestern corner of the Main Plaza and appears to face the North Plaza (Figure 3.1). The pits, measuring approximately 1-x-1-m and 1 m deep, each impacted intact archaeological deposits; we discovered the impacts while taking the field school students on a site tour. Because the mound is home to a water tower, the old cell tower, and other lodge-related infrastructure we had never conducted investigations there (Figure 3.2).

Figure 3.1. Photograph of the summit of Structure A-4 showing impacts related to Chan Chich Lodge, including the foundation for an old water tower (center), a new water tower (left), the existing cell tower (center), and a satellite dish (center). The rebar frames in the foreground are associated with the planned new cell tower. View to the north.

Houk, Brett A., Hillary Bedrosian, and Taylor McKinney
2019 Salvage Archaeology at Structure A-4 at Chan Chich. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 49–56. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

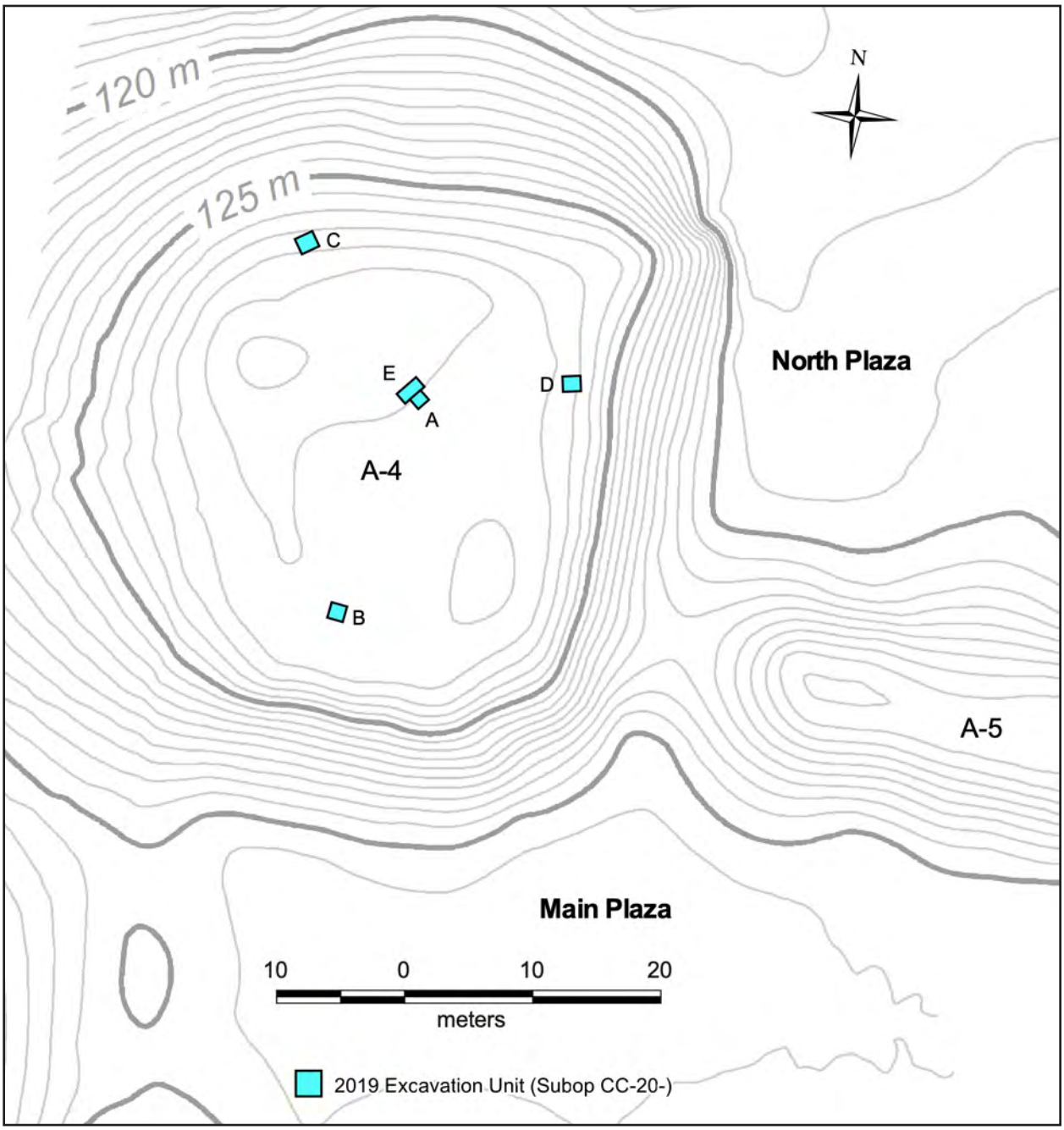

Figure 3.2. Map of Structure A-4 and Op CC-20 excavations.

The mound is large, roughly square in plan, and 8 m high. Low mounds flank the southern and northern sides of its summit; a slightly higher mound occupies the western edge. These three mounds form a small courtyard, which is open to the east. Guderjan (1991:45) reported that a seventeenth-century Lacandon Maya incense burner was found on the summit of the mound when Chan Chich Lodge was under construction. The proposed cell tower will be installed roughly in the center of the mound in a concrete block and will require three guy wires, anchored into concrete blocks, to support it. The pits for the concrete blocks impacted the western end of the northern mound, the central area of the Structure A-4 platform, the northern

face of the southern mound, and the eastern edge of the platform.

CACHE CC-C02

Following our discovery of the impacts to the structure, a Chan Chich Lodge employee informed us that the contractors had encountered whole ceramic vessels in the central pit and gave us a plastic bag full of ceramic sherds. Houk subsequently inspected the profiles of the pit and noticed a partial vessel *in situ* in one wall of the hole. To salvage what data we could, we designated Operation (Op) CC-20 to document the four contractor's pits and excavate a new unit to recover the ceramics still in the ground. Julia Kleine mapped the locations of the pits and our new unit using a TDS.

We designated the contractor's pit in the central area of the mound as Suboperation (Subop) CC-20-A, a 1-x-1.1-m unit oriented 60 degrees east of north. The contractors dug 100 to 110 cm deep in this location, exposing the following sequence: 40 cm of dark brown clay loam with frequent pebbles overlying 60 to 70 cm of large marl and limestone blocks in a loose, marly matrix. Some of the rocks in the northwest profile, where the *in situ* vessel fragments were visible, were large flat slabs, reminiscent of capstones (Figure 3.3). To excavate the remnants of the vessel deposit properly, we opened a 2-x-1-m unit, Supob CC-20-E, adjacent to the northwest wall of Subop CC-20-A; the southwest end of our new unit extended 50 cm southwest of Subop CC-20-A,

Figure 3.3. Photograph of the intact portion of Cache CC-C02, view to the northwest. Vessel A sherds in center with vessel pair B/C on the left and pair D/E on the right.

and the northeast end extended 40 cm northeast of Subop CC-20-A.

Subop CC-20-E encountered the same 40-cm thick clay loam layer covering a thick layer of small boulder fill. The suspected capstones proved to be simply large rocks in the fill. Within this layer of fill, we exposed approximately one-half of a cache deposit, designated Cache CC-C02, only the second cache documented at Chan Chich. We exposed two pairs of lip to lip vessels with a partial fifth vessel (Vessel A) above the lower pair (Table 3.1). The two complete pairs were touching with Vessels B and C west and slightly higher than Vessels D and E. The Vessel A/B pair was tilted down to the southeast 40 degrees; the other pair sloped 20 degrees to the south. Vessel A was partially excavated by the contractors, and our lab director determined the bag of sherds collected by the contractors represented four partial vessels. The only other items in the cache were two obsidian blade fragments found on top of the western edge of Vessel D. Perhaps they spilled from the other pair. No artifacts were found inside either pair of vessels. It is not known if the contractors found any artifacts in the other vessels. The cache apparently comprised four pairs of lip-to-lip vessels and a ninth, unpaired vessel. The vessels types include four Sierra Red bowls, one bowl that is either Sierra Red or Rio Bravo Red, and four Rio Bravo Red bowls. This suggests the cache dates to the early part of the Early Classic, ca. AD 250. Interestingly, the mix of ceramic types with both Late Preclassic and Early Classic period characteristics is reminiscent of the vessel assemblage in Tomb 2 from the Upper Plaza, suggesting the two features are roughly contemporaneous (see Houk et al. 2010).

Table 3.1. Spec. #s Assigned to Artifacts from Cache CC-C-02

Spec. #	Description
CC4070-01	Vessel A, partially reconstructable vessel, eroded red slip, likely Rio Bravo Red or Sierra Red (Tkakol/Chicanel ceramic sphere; Jabiru/Jacamar ceramic complex).
CC4070-02	Vessel B, Sierra Red bowl (Chicanel ceramic sphere; Jacamar ceramic complex). Figure 3.4.
CC4070-03	Vessel C, Rio Bravo Red (?) bowl (Tzakol ceramic sphere; Jabiru ceramic complex). Figure 3.4.
CC4070-04	Vessel D, Sierra Red bowl; (Chicanel ceramic sphere; Jacamar ceramic complex). Figure 3.4.
CC4070-05	Vessel E, Rio Bravo Red bowl (Tzakol ceramic sphere; Jabiru ceramic complex). Figure 3.4.
CC4070-06	Partially reconstructable vessel from contractors' collection. Rio Bravo Red (?)bowl (Tzakol ceramic sphere; Jabiru ceramic complex).
CC4070-07	Partially reconstructable vessel from contractors' collection. Rio Bravo Red bowl (Tzakol ceramic sphere; Jabiru ceramic complex).
CC4070-08	Partially reconstructable vessel from contractors' collection. Sierra Red bowl with similarities to Society Hall with streaky slip (Chicanel ceramic sphere; Jacamar ceramic complex).
CC4070-09	Partially reconstructable vessel from contractors' collection. Sierra Red bowl (Chicanel ceramic sphere; Jacamar ceramic complex).
CC3984-01	Proximal obsidian blade fragment.
CC3984-02	Medial obsidian blade fragment.

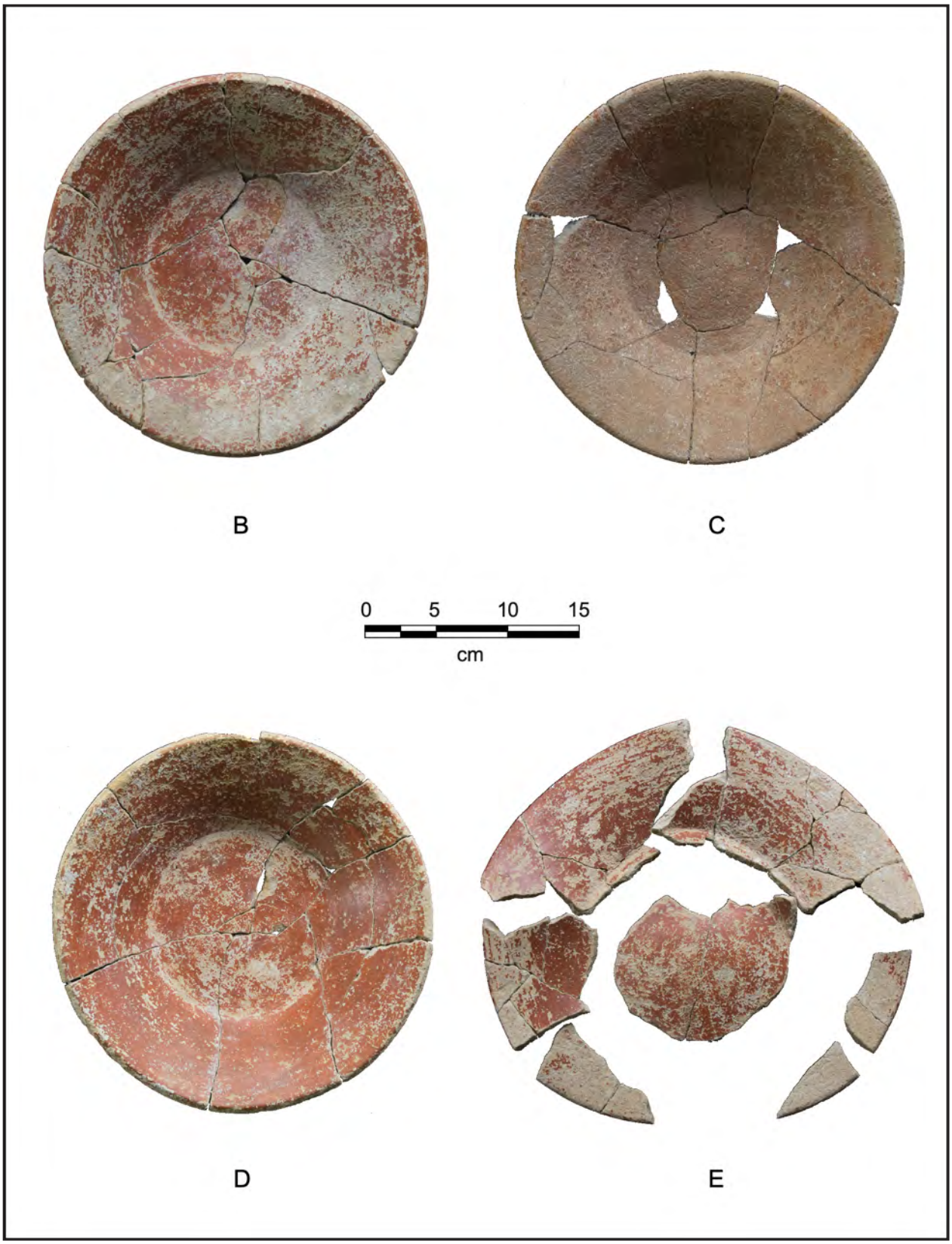

Figure 3.4. Vessels B–D from Cache CC-B02. Vessel B (Spec. # CC4070-02); Vessel C (Spec. # CC4070-03); Vessel D (Spec. # CC4070-04); Vessel E (Spec. # CC4070-05).

RANDA PLATFORM

Our excavations into the fill below the cache unexpectedly encountered a buried monumental platform (Lot CC-20-E-05), which we nicknamed Randa following the policy of the project to name buried structures in plazas or courtyards. Randa apparently faces south, has a sloping south face, and a vertical east end, both of which were partially exposed in our unit (Figures 3.5 and 3.6). The exposed portion or Randa is oriented 285 degrees along its sloping south face. The exposed summit section measures 60 cm north-south by 100 cm east-west, forming a triangular wedge in our weirdly oriented unit. The base of the platform is 45 cm farther south than the southern edge of the summit.

The sloping part of the platform, the upper section of it, is made of approximately six to seven courses of irregular marl blocks averaging 10 to 12 cm thick by 25 cm long. No plaster remains on the summit or face, giving

Figure 3.5. Othorphoto of Subops CC-20-A and -E showing the Randa platform in plan view.

Figure 3.6. Perspective orthophoto of the Randa platform, view to the northwest.

the face a sort of stair-stepped appearance. The sloping portion is 80 cm tall.

Below the sloping portion is a vertical section of the platform that is 30 cm tall. It has heavily eroded plaster obscuring the facing stones, so the number of courses is unknown. This architectural body is constructed on a lower basal platform (Lot CC-20-E-06). The platform extends 19–25 cm out from the base of Lot CC-20-E-05 and entirely surrounds the base of the visible portion of the structure and extends east of Randa, beyond the limits of our unit. This basal platform is approximately 35 cm tall and slopes slightly to the south. It rests on a heavily burned plaster floor, Lot CC-20-E-07.

Excavations into Lot CC-20-E-07 determined there are two floors, one on top of the other, that combined are 17 cm thick. The upper

plaster floor is 8 cm thick; its upper 4 to 5 cm are heavily burned. The lower floor is 9 cm thick. Lot CC-20-E-06, the platform upon which Randa sits, appears to have been built on top of these floors. Directly below these floors is a 24-cm thick layer of fill comprising small river cobbles.

Our excavations encountered another floor, Lot CC-20-E-08, below the layer of fill. This floor measured 7 cm thick and capped a layer of river cobbles in dark brown matrix. Because of space constraints, we could not excavate deeper than 12 cm into this fill before we had to terminate our excavations. The approximately 20 ceramic sherds recovered from this lot date to the Middle Preclassic period.

DISCUSSION

Our unplanned salvage work at Structure A-4 provided valuable information about this mound. The final phase of the Structure A-4 is a large platform supporting three low mounds, which we assume dates to the Late Classic period. The thick layer of brown clay loam with intermixed pebbles that covers the summit of the platform—we observed this layer in all four contractor pits and our new unit—is thus far the only example of this type of feature at Chan Chich. It may represent some sort of termination deposit. The cache initially encountered by the contractors is unusual for its placement (as it is close to but not on a central axis of Structure A-4), its age, and its contents. Typically, lip-to-lip caches contain other artifacts, but, other than two obsidian blades that may have slipped out of a pair of vessels, the pairs were empty. Perhaps they originally included perishable materials.

Unfortunately, our excavations only exposed a 1.5-m section of Randa, a buried monumental platform of unknown form and extent. Based on the fact that Lot CC-20-E-06 extends east of the north-south aligned vertical face of Randa, we propose that there may be an inset stairway just northeast of our excavations. Based on the Middle Preclassic floor below it and the early Early Classic cache above it, Randa likely dates to the Late Preclassic period, but could be a Middle Preclassic construction.

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Results of the 2019 BEAST Season at Gallon Jug, Belize

Claire Novotny, Amy Copper, and Anna C. Novotny

The 2019 season of the Belize Estates Archaeological Survey Team (BEAST) included the intensive investigation of a residential group (Courtyard B-1) located 165 m east of the Main Plaza at the site of Gallon Jug (Figure 4.1). The site is located in tropical broadleaf forest, just north of the cleared pastures of Gallon Jug Ranch. This research was initiated as part of the overall Chan Chich Archaeological Project (CCAP) mandate to clarify the relationship between the paramount site of Chan Chich and the surrounding settlements.

The 2019 season took place for five weeks, from May 21 until June 25, 2019. Dr. Claire Novotny directed the excavation team, which consisted of local workmen from Chan Chich Village and Sylvester Village, a group of 11 field school students from universities around the United States, field supervisor Amy Copper, and CCAP bioarchaeologist Dr. Anna Novotny. Preliminary analysis of artifacts and skeletal remains took place from June 21 to June 23, 2019.

Courtyard B-1 is a well-preserved residential group consisting of four structures built around a shared patio, which rests on a partially modified hill elevating the buildings about 5 m above the surrounding ground surface (Figure 4.2). In total, the group measures 25 m x 20 m with a total interior patio area of 180 m^2. A chultun was excavated into the bedrock at the center of the courtyard, likely for storage purposes, though it was also used for burial (see Courtyard Excavations, below). Structure B-1 is 12 m long and defines the eastern side of the group. It is flanked by the only two openings allowing access to the interior patio at the northeastern and southeastern corners, which sets it apart architecturally. The western side of the group is defined by Structure B-3, a 25-m long range structure that articulates at its northwestern corner with Structure B-4 (15 m long east/west) and at its southwestern corner with Structure B-2 (12 m long). The resulting horseshoe shape created by these three structures gives a sense of privacy and limited access to the group, though there may have been a staircase in the center of Structure B-3, which would have worked as a formal entranceway, but which remains unconfirmed through excavation. Preliminary ceramic analysis suggests that Courtyard B-1 may have been constructed during the Early Classic period (AD 250–500) though its final occupation phase dates solidly to the Late Classic period (AD 600–850). A Terminal Classic (AD 850–1000) radiocarbon date from a burial recovered during the 2019 season suggests that at least some portion of the site may have been occupied at that time.

BACKGROUND

The site of Gallon Jug is located 200 m north of pastures cleared by Gallon Jug agribusiness.

Novotny, Claire, Amy Copper, and Anna C. Novotny
2019 Results of the 2019 BEAST Season at Gallon Jug, Belize. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 57–92. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

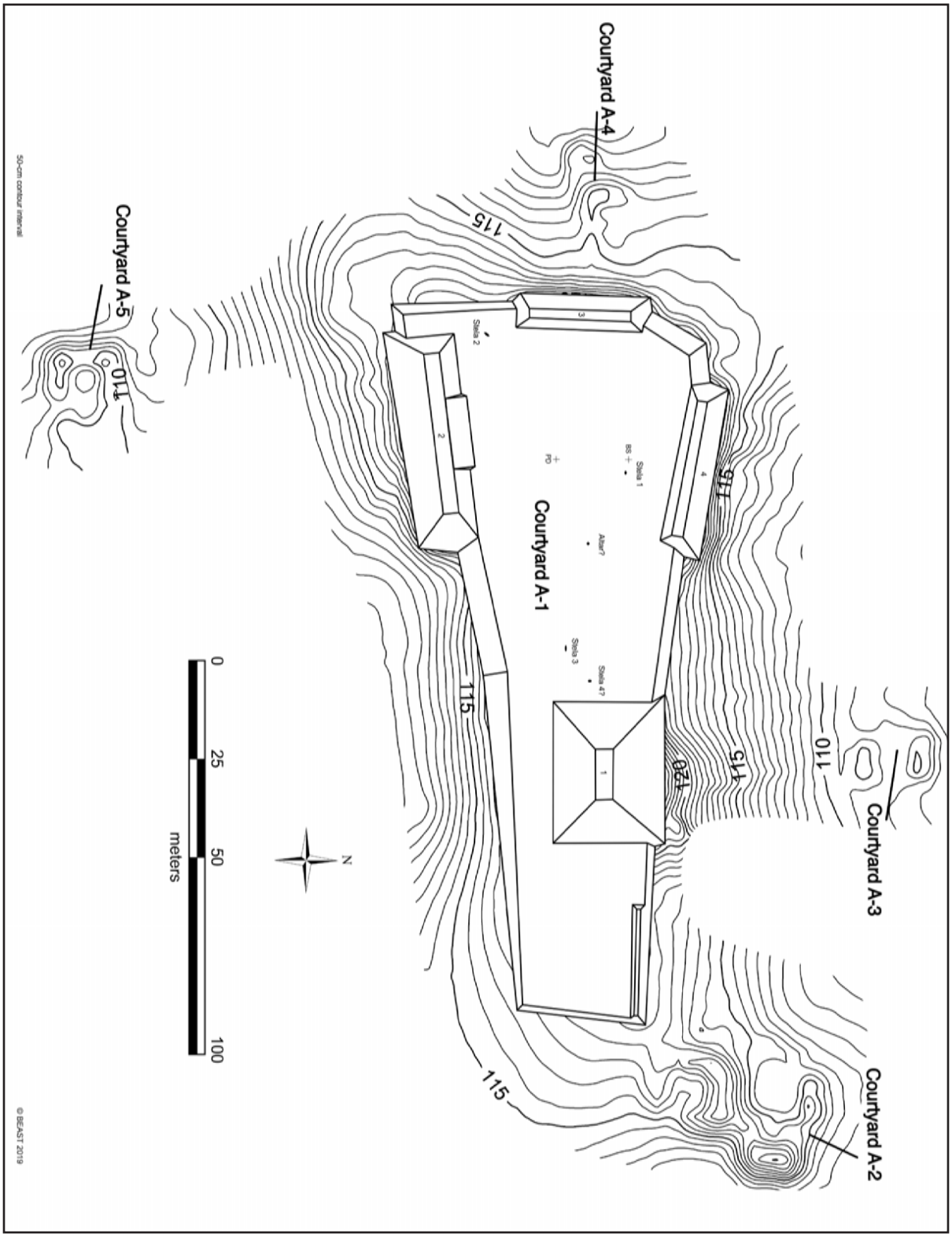

Figure 4.1. Gallon Jug Main Plaza (Plaza A-1) and associated courtyard groups (Courtyards A-2–A-6).

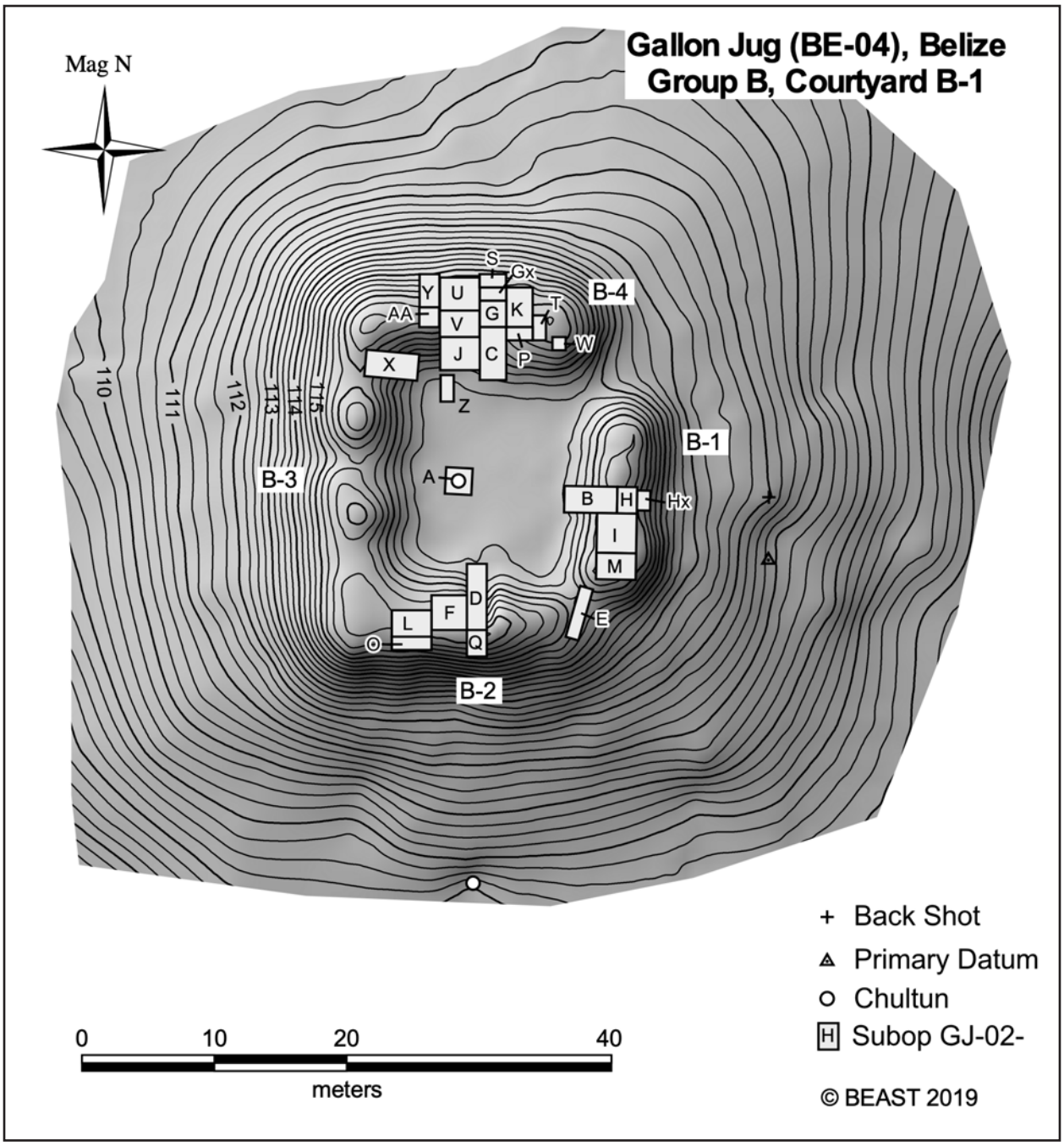

Figure 4.2. Topographic map of Courtyard B-1 showing suboperations from the 2019 season.

The site core and its associated courtyard groups are set among low-lying limestone hills covered with tropical broadleaf forest. Though the land 200 m south of the Main Plaza has been extensively cleared with bulldozers for cultivation of corn and sugar cane as well as for cattle pastures, the area immediately surrounding Gallon Jug is forested, and archaeological remains are relatively well-preserved. The nearest monumental site core is located at Punta de Cacao (BE-3), 3 km east of Gallon Jug (see Figure 1.1). It is one of the largest sites in the region, with a site core consisting of two plazas, a ballcourt, and 10 courtyards as well as several courtyards in outlying groups (Guderjan et al. 1991:61).

Though Punta de Cacao is among the largest sites in the region its hinterlands are poorly understood, as is its relationship to Gallon Jug.

A team from the Rio Bravo Archaeological Project, directed by Thomas Guderjan, first mapped Gallon Jug and conducted limited testing during their 1990 field season (Guderjan et al. 1991). During the same season, Jason Yaeger conducted a settlement survey of cleared pastures north of the Gallon Jug airstrip and west of the Blue Creek road, an area of 325 acres (Houk et al. 2018:104). An intermediate area abutting the forest that contains the Gallon Jug Main Plaza and Courtyard B-1 was under cultivation at the time and was not surveyed. Yaeger's team recorded and mapped a total of 245 archaeological features dating from the Middle Precassic period through the Late Classic period, including 111 artifact scatters, 97 large floors (> 25 m^2), and 35 floors (Yaeger 1991: Table 4). The BEAST team revisited the pastures surrounding the Gallon Jug agribusiness in 2013 and 2016 to map the pastures using drones to create a Digital Elevation Model (DEM) of topographic features, some of which were confirmed on the ground (Houk et al. 2018). The visual analysis of the DEM data helped our understanding of site density and the damage done by agricultural clearing to settlements in the permit area (Houk et al. 2018: Table 5.2). Though the structure density of the Gallon Jug site core is defined as an urban core with 340.74 structures per km^2, the drone survey area immediately south is classified as "vacant" with only 2.42 structures per km^2 (Houk et al. 2018:112; see Canuto et al. 2018). The presence of high grasses and agricultural clearing during the 1980s and 1990s likely affected our ability to detect all of the structures associated with this low-density settlement pattern.

Gallon Jug's tallest structure is a 15-m high temple-pyramid on the north side of an irregularly shaped, east-west plaza (see Figure 4.1). Guderjan's crew mapped the plaza and a number of courtyard groups surrounding it and excavated a total of six 1-x-1-m test pits to collect chronological information. However, they did not document or map the presence of Courtyard B-1, which is more than 100 m east of their map. Guderjan's team excavated three test pits placed 2 m from the bases of Structures 1, 2, 3, and 4 in the Gallon Jug Main Plaza, and recovered Late Preclassic materials from the units on the western side of the plaza (Guderjan et al. 1991). They also excavated test pits into two courtyards south of the Main Plaza, which revealed undifferentiated Classic period ceramics and relatively shallow bedrock (~40 cm below surface).

In 2018, BEAST initiated investigations at the site of Gallon Jug. Excavations into the western side of the plaza uncovered an Early Classic platform, dubbed Esperanza by excavators (Houk 2019:13). Ceramic evidence included Preclassic types in mixed-fill contexts, suggesting that this material was re-deposited from a Preclassic occupation elsewhere. In addition, three extremely weathered stelae were found in the plaza, though test units did not recover any artifacts or caches associated with the monuments. Occupational continuity and monumental architecture suggest some degree of community cohesion and leadership during a time period that is not clearly understood at the nearby sites of Chan Chich and Punta de Cacao (Houk 2019:15).

RESEARCH OBJECTIVES

Our interests in Gallon Jug lie in the relationship between the civic-ceremonial architecture and the associated settlement groups. First, the site has an Early Classic occupation phase concurrent with a recently discovered crypt at Chan Chich that dates to the same period. The crypt is interpreted as an expression of leadership and political power during this time

period; excavations at surrounding settlements such as Gallon Jug and its associated courtyards could illuminate regional socio-political relationships during the Early Classic and their development over time.

Second, the courtyards that comprise the greater Gallon Jug site offer the opportunity to pursue household-related topics. Socio-political processes are predicated on daily activities enacted in and around residential dwellings as well as community-building events conducted in association with civic-ceremonial architecture. At the moment we do not understand the relationship between the development of centralized political authority at Chan Chich during the Preclassic and Classic periods and the daily lives of Maya people living in regional settlements. Identifying the construction history and activity areas of Courtyard B-1 can extend our knowledge about how political centralization affected outlying populations. Additionally, burials are often encountered in residential structures, which can help clarify regional mortuary practices and shed light on the health and mobility of the wider population.

The guiding questions for this season's research were:

- How does the occupational history of Courtyard B-1 relate chronologically to the construction of the civic/ceremonial core at Gallon Jug?
- What can architectural history and artifacts from Courtyard B-1 tell us about socio-political relationships in the region and how they changed over time?
- What were the main activities engaged in by residents of Courtyard B-1?
- What was the overall health and mobility of residents compared to individuals interred at Chan Chich?

Our overall objectives were: to understand the architectural and occupational history of Courtyard B-1 in relation to the civic/ceremonial core of Gallon Jug; to reveal in situ artifact deposits and architectural features that will illuminate the function of each structure as well as how the structures relate to each other as a residential unit, and how those functions may have shifted over time; and to set Courtyard B-1 within understood spatial and temporal frameworks of socio-political processes at Chan Chich and Gallon Jug to further uncover complex inter-site relationships. An additional objective was to obtain preliminary chronological information from several other courtyard groups at Gallon Jug.

METHODOLOGY

In order to address the first three objectives, we undertook intensive horizontal excavations at Courtyard B-1, specifically of Structures B-1, B-2, and B-4, with less extensive testing of Structure B-3 and the chultun, detailed below. Excavations at Courtyard B-1 were conducted as Operation (Op) GJ-02 and included 29 units, designated Suboperations (Subops) GJ-02-A–AA, plus Gx and Hx), which covered an area of 95 m^2 (see Figure 4.2 and Table 4.1). Units in Op GJ-02 were placed to encounter and follow architectural features and address questions about the architectural history of the group and spatial arrangement of activity areas within rooms. Opportunistic units were excavated into structure floors to test for burials or subfloor deposits (see Table 4.2).

Op GJ-03 addressed the final objective. We excavated test units in five outlying settlement groups and included nine units, Subops GJ-03-A–I, covering an area of 9 m^2 (see Figure 4.1). We placed a series of 1-x-1-m test units in several outlying settlement groups to extrapolate preliminary chronological information. The units were excavated to sterile

Table 4.1. Description of Op GJ-02 Suboperations Excavated in 2019 by Area

Area	Subop (GJ-02-)	Dimensions (m)	Purpose
Structure B-1	B	2 x 4	Investigate the architecture and artifact deposits of Str. B-1
	H	2 x 1.5	Expose the eastern wall of Str. B-1
	Hx	1.5 x 1	Clarify the width of the eastern wall of Str. B-1
	I	3 x 3	Follow the eastern and western walls of Str. B-1 and expose the interior room
	M	3 x 2	Follow the eastern and western walls of Str. B-1 and expose the interior room
	N	1 x 1	Explore a cut in the floor of Str. B-1
	R	1 x 1	Explore a cut in the floor of Str. B-1
Structure B-2	D	1 x 5	Collect archaeological material from the looters' trench in Str. B-2
	F	3 x 2	Expose architectural features of Str. B-2
	L	2 x 3	Expose the northern wall of Str. B-2
	O	1 x 3	Expose interior floor and walls of Str. B-2
	Q	1.5 x 2	Expose bench in the eastern room of Str. B-2
Structure B-3	X	4 x 2	Investigate preserved architecture of Str. B-3
Structure B-4	C	2 x 4	Expose preserved architecture of Str. B-4
	G	2 x 2	Expose floor of Str. B-4
	Gx	1 x 2	Expose northern wall of Str. B-4
	J	2.5 x 3	Expose western section of the southern platform face of Str. B-4
	K	3 x 2	Expose interior floor of Str. B-4
	S	1 x 2	Expose the northern wall of Str. B-4
	T	2 x 1	Expose the eastern section of the southern wall of Str. B-4
	P	2 x 1	Expose plaster floor of Str. B-4
	U	2.5 x 3	Expose northern wall of Str. B-4
	V	1.5 x 2.5	Salvage excavations from tree fall
	AA	1.5 x 1.5	Expose western section of the southern wall of Str. B-4
Courtyard, chultun	A	2 x 2	Expose edges of chultun, explore interior for archaeological deposits
SE courtyard floor	E	1 x 4	Investigate possible artifact deposits
NW courtyard floor	Z	1 x 2	Expose rock alignment identified in Subop GJ-02-J

Table 4.2. Summary of Op GJ-02 Suboperations and Lots Excavated in 2019

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
GJ-02-A	1	Topsoil	Tepeu 2	7
	2	Construction Fill	Tepeu 2	107
	3	Other		
	4	Other	Tepeu 2-3	24
	5	Other	Tzakol 3	13
	6	Other		
	7	Burial	Tepeu 2-3 with Tzakol trace	12
GJ-02-B	1	Topsoil		2
	2	Collapse Debris	Tepeu 2	48
	4	Floor		
	5	Wall		
	6	Wall		
	7	Floor		
	8	Step		
	9	Floor		
GJ-02-C	1	Topsoil		
	2	Collapse Debris	Tepeu 2 with Chicanel trace	229
	3	Floor	Tepeu 2 with Tzakol trace	33
	4	Platform Face		
	5	Step		
	6	Wall		
	7	Other	Possible Tepeu 2	4
	8	Floor		
	9	Floor		
	10	Other		
GJ-02-D	1	Other	Tepeu 2	7
	2	Floor	Tepeu 2	84
	3	Other	Tepeu 2	9
	4	Floor		
	5	Step		
	7	Bench		
	8	Floor		
	9	Floor		
GJ-02-E	1	Topsoil	Tepeu 2-3	2
	2	Collapse Debris	Tepeu 2	7
GJ-02-F	1	Topsoil		
	2	Collapse Debris	Tepeu 2	140
	3	Collapse Debris	Tepeu 2	100
	4	Construction Fill	Tepeu 2	48

Table 4.2. Summary of Op GJ-02 Suboperations and Lots Excavated in 2019 (continued)

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
GJ-02-G	1	Toposil	Tepeu 2	646
	2	Collapse Debris	Tepeu 2	932
	3	Floor		
GJ-02-Gx	1	Toposil	Tepeu 2	720
	2	Collapse Debris	Tepeu 2	67
	3	Wall		
	4	Floor		
GJ-02-H	1	Topsoil	Tepeu 2	3
	2	Collapse Debris	Tepeu 2-3	11
	4	Other		
	5	Other		
	6	Floor		
	7	Construction Fill	Floral Park/Tzakol	25
GJ-02-I	1	Topsoil	Tepeu 2	17
	2	Collapse Debris	Tepeu 2	23
	3	Floor		
	4	Wall		
	5	Wall		
GJ-02-J	1	Topsoil	Tepeu 1-3	1
	2	Collapse Debris	Tepeu 2	115
	3	Collapse Debris	Tepeu 2-3	100
GJ-02-K	1	Topsoil	Tepeu 2-3	14
	2	Collapse Debris	Tepeu 2	230
	3	Floor		
	4	Wall		
GJ-02-L	1	Topsoil		
	2	Collapse Debris	Tepeu 2	64
	3	Wall		
	4	Floor		
	5	Wall		
	7	Wall		
	8	Step		
	9	Step		
	10	Wall		
GJ-02-M	1	Topsoil	Tepeu 2-3	4
	2	Collapse Debris	Tepeu 2 with Tzakol trace	35
	3	Floor		
	4	Wall		
	5	Wall		
	6	Wall		

Table 4.2. Summary of Op GJ-02 Suboperations and Lots Excavated in 2019 (continued)

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
GJ-02-N	1	Floor	Tepeu 1-3	25
	2	Collapse Debris	Tepeu 2 with Chicanel trace	19
	3	Burial		
	4	Floor		
	5	Collapse Debris	Tzakol to Chicanel	39
	6	Floor		
	7	Floor		
	8	Floor		
	9	Floor		
	10			
GJ-02-O	1	Topsoil	Tepeu 2-3	3
	2	Collapse Debris	Tepeu 2-3	46
	3	Wall		
	4	Floor		
	5	Wall		
	6	Construction Fill	Tepeu 2	59
	7	Burial	Tepeu 2	48
	8	Construction Fill	Tepeu 2	9
	9	Burial		
	10	Construction Fill		
GJ-02-P	1	Topsoil	Tepeu 2	9
	2	Collapse Debris	Tepeu 2	107
GJ-02-Q	1	Topsoil		
	2	Collapse Debris	Tepeu 2	11
	3	Bench		
	4	Wall		
	5	Construction Fill	Tepeu 2	26
	6	Bench		
	7	Construction Fill		
GJ-02-R	1	Floor	Tepeu 2	39
	2	Construction Fill	Tzakol 3/Tepeu 1	19
GJ-02-S	1	Topsoil	Tepeu 2	59
GJ-02-T	1	Topsoil		
	2	Collapse Debris	Tepeu 2	10
GJ-02-U	1	Topsoil	Tepeu 1-3	50
	2	Collapse Debris	Tepeu 2	1038
GJ-02-V	1	Collapse Debris	Tepeu 2	555
GJ-02-X	1	Topsoil		
	2	Collapse Debris	Tepeu 2	73
	3	Other	Tepeu 2	5

Table 4.2. Summary of Op GJ-02 Suboperations and Lots Excavated in 2019 (continued)

Subop	Lot	Lot Description	Ceramic Sphere	Sherd Count
GJ-02-Z	1	Topsoil	Tepeu 1-3	4
	2	Collapse Debris	Tepeu 2	15
	3	Floor		
	4	Collapse Debris		
GJ-02-AA	1	Topsoil	Tepeu 2-3	1
	2	Collapse Debris	Tepeu 2-3	97

soil or bedrock. In all excavations at Gallon Jug, crew members used pickaxes and shovels to remove significant layers of collapse debris, while smaller geopicks and trowels were used to clarify architectural features and carefully uncover floor surfaces.

The following sections include an overview of excavations at Gallon Jug, beginning with the Courtyard B-1 structures that comprise the 29 suboperations in Op GJ-02. The excavation process of each suboperation is described in detail, and preliminary interpretations of our findings are included.

OP GJ-02

Structure B-1

Structure B-1 is 2 m tall and defines the eastern edge of the courtyard. Subop GJ-02-B was a 4-x-2-m trench placed along the east/west axis of the structure to investigate the architectural history and activities associated with Structure B-1 (Figure 4.3). After removing a 20-cm thick layer of topsoil (Lot GJ-02-B-01), we encountered a 1-m deep layer of collapse debris (Lot GJ-02-B-02) consisting of gray-brown soil mixed with partially shaped limestone blocks and several large vault stones, indicating that the interior rooms of the structure had been vaulted. The collapse debris was resting on a well-preserved plaster floor (Lot GJ-02-B-04). Lot GJ-02-B-02 also revealed a doorway formed by two walls running north/south. We exposed ~30 cm of the northern section of the wall (Lot GJ-02-B-05), which consisted of eight preserved courses of shaped limestone bricks and was 0.78 m east/west and 0.74 m tall (Figure 4.4). The southern section of the wall (Lot GJ-02-B-06) had 12 preserved courses of shaped limestone bricks and was 0.95 m high and 0.80 m wide; we followed this section of the wall to the south in subsequent excavations (see Subops GJ-02-I and -M, below). The doorway itself is 1.4 m wide and is approached by a small plastered step (Lot GJ-02-B-08) that rises 0.22 m above an exterior plastered surface (Lot GJ-02-B-07). Our excavations in the western area of the unit revealed two previous paving events (Lots GJ-02-B-07 and -09) that were supported by a ballast of limestone pebbles on top of the relatively shallow bedrock, encountered just 40 cm below surface in this unit at an elevation of 102.93 m above sea level (masl).

The eastern structure wall (Lot GJ-02-H-03) was built of five courses (0.5 m high x 0.80 m wide) of small limestone bricks with patches of preserved plaster adhering to the interior surfaces. An enigmatic hole (Lot GJ-02-H-04) was exposed in the base of the eastern wall where it articulates with the interior floor (Lot GJ-02-H-05). It was roughly circular in shape and measured 0.19 m x 0.23 m and was 0.39 m deep when first encountered. Subsequent excavations in Subop GJ-02-Hx revealed that the hole extends through the wall. No artifacts were encountered in the hole, just loose gray silty soil. The hole seems to have been built at the same time as the wall, because it is structurally sound and had not collapsed in on

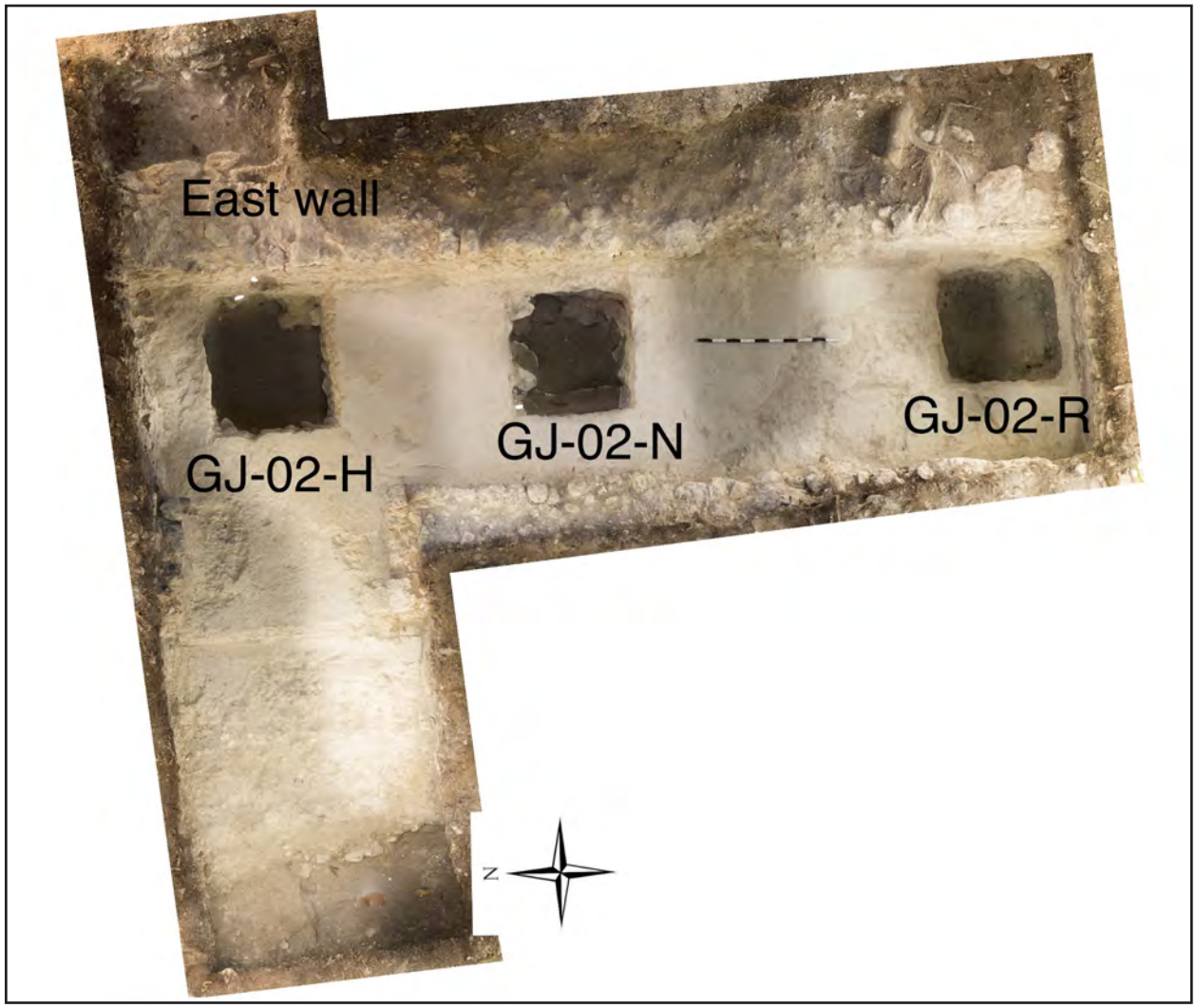

Figure 4.3. Orthomosaic of Structure B-1.

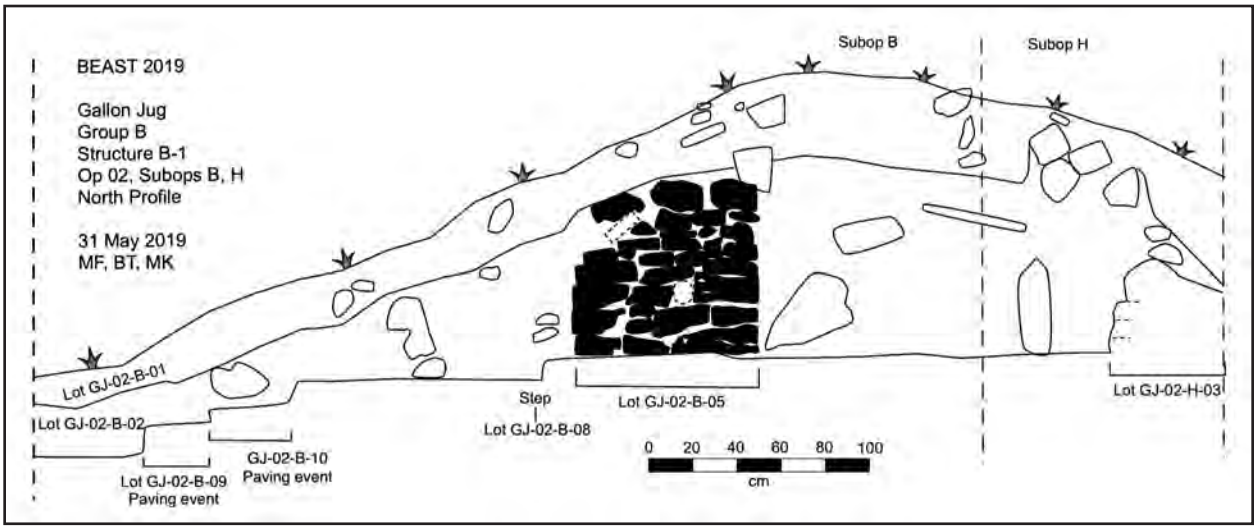

Figure 4.4. North profile drawing of Subops GJ-02-B and -H.

itself. There is no plaster on the inside of the hole, so it was not a formal, maintained space. The plaster floor was eroded in front of the hole in a semi-circular pattern and the plaster had faint burning on it.

The enigmatic feature prompted our excavation of a 1-x-1-m probe in front of the hole (Lots GJ-02-H-06 and -H-07), directly above the eroded area of the floor. Our excavations into the subfloor context in front of the enigmatic hole revealed a series of two re-plastering events that also showed signs of burning 0.20 m below the last floor (Figure 4.5). Beneath those floors was dry cobble fill with very few artifacts included. At 0.36 m below the final floor we encountered an earlier plaster floor (Lot GJ-02-H-08), which is at the same depth as the floor encountered in Subop GJ-02-N to the south (see below), suggesting these floors are part of the earliest construction phase of the structure. Excavations through that surface revealed 0.30 m of dry laid limestone cobble fill with only 28 ceramic sherds, dating to the Early Classic Floral Park/Tzakol ceramic sphere. Excavations were completed when we reached bedrock at an elevation of 102.61 masl.

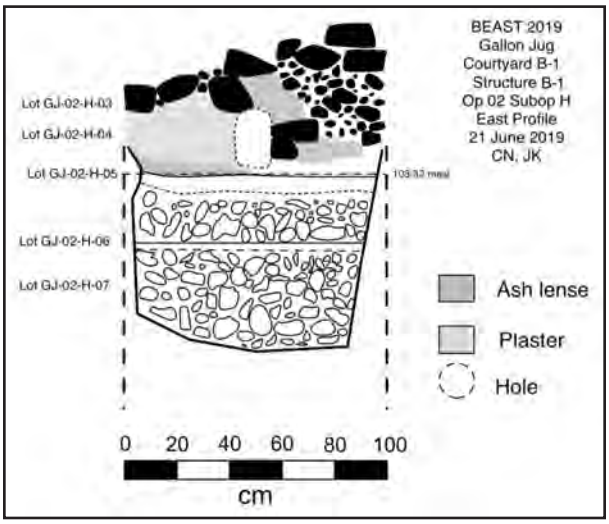

Figure 4.5. East profile drawing of the eastern structure wall and the enigmatic feature.

The hole in the wall and its associated cut in the floor remain enigmatic. The lack of plaster inside the hole does not suggest a drain or any functional purpose that would have necessitated maintenance. There could have been a perishable item, like a wooden beam, that was inserted, but with the opening directly onto the interior floor it is hard to imagine a function for a horizontal beam. The hole could also have been covered with a plaster cap that has eroded away, but again, that does not give us a clear idea as to function. Perhaps there was a ritually important item cached in this informal hole that was removed upon abandonment of the structure. The burning could be evidence of a termination ritual; in fact, there is further evidence for the repetitive burning of floors elsewhere in the structure (see Subop GJ-02-N, below), suggesting a ritual function for the entire building.

Upon reaching the eastern wall of Structure B-1, we turned our attention to the south to follow the eastern and western walls and excavate the interior of the room. As we followed the structure's western, courtyard-facing wall (Lot GJ-02-I-05) to the south, its construction quality deteriorated noticeably from well-laid limestone bricks to poorly placed, semi-shaped limestone blocks. The plaster floor rolls up onto the wall, indicating that, although the wall was poorly constructed, it would have been covered by plaster facing. The sections of the wall are so different that we thought it may be a poor infilling of a previous doorway, however, there is nothing to suggest a facing door jamb to the south.

As we removed collapse debris the southern wall was exposed, with six to eight courses of preserved limestone bricks, measuring 1.61 m x 0.84 m. Ceramic artifacts from the collapse debris dated mainly to the Late Classic period, with a few Early Classic examples. Artifacts were slightly more abundant in the southern area of the room, perhaps reflecting that post-

abandonment items were protected against these interior corners.

The excavated area of the interior room measures 8 m long by 2 m wide. These dimensions make sense with regards to the vault stones we recovered, since vaulting can only be achieved in 2–3 m wide rooms. We did not excavate the northern section, but we estimate an overall interior room of 10 m long. No benches were included in the layout of the room, which could suggest that this structure was used for activities other than daily dwelling, though we cannot rule out the presence of perishable furniture that would have decomposed post-abandonment. Artifacts were very sparsely distributed within the room—only 10 ceramic sherds were recovered from the collapse debris, along with a few pieces of debitage. We identified a cut in the plaster floor, adjacent to the eastern wall and about 2 m south of the doorway. The cut was ovoid in shape and 0.40 m x 0.60 m; we established a 1-x-1-m unit, designated Subop GJ-02-N, to penetrate the floor and investigate subfloor deposits.

Amy Copper conducted the excavations of Subop GJ-02-N. Lot GJ-02-N-01 consisted of 0.20 m of hard plaster that seemed homogenous during excavations; upon examining the western and northern profiles, however, it was clear that there had been a sequence of at least five layers of replastering (Lots GJ-02-N-6–10) ranging in thickness from 2 cm to 4 cm (Figure 4.6). Two of the plaster layers seem to have been burned before a new layer of limestone pebble ballast was laid to support the new paving. The paving sequence was only visible in the western and northern sections of the unit, suggesting that that the cut may not have extended to the eastern and southern areas; that is, we destroyed those profiles as we excavated. A large flat stone (0.41 m x 0.56 m) was encountered about 30 cm beneath the floor in the center of the unit. Upon removing the large stone (Lot GJ-02-N-02) we encountered a layer of limestone cobble and soil fill. There was a cut through the earliest floor (Lot GJ-02-N-10) to inter the individual and an Achote Black bowl, which was placed southwest of the body (Figure 4.7). The burial, Burial GJ-B01, was covered with soil and cobbles and delineated by several unshaped limestone cobbles to the

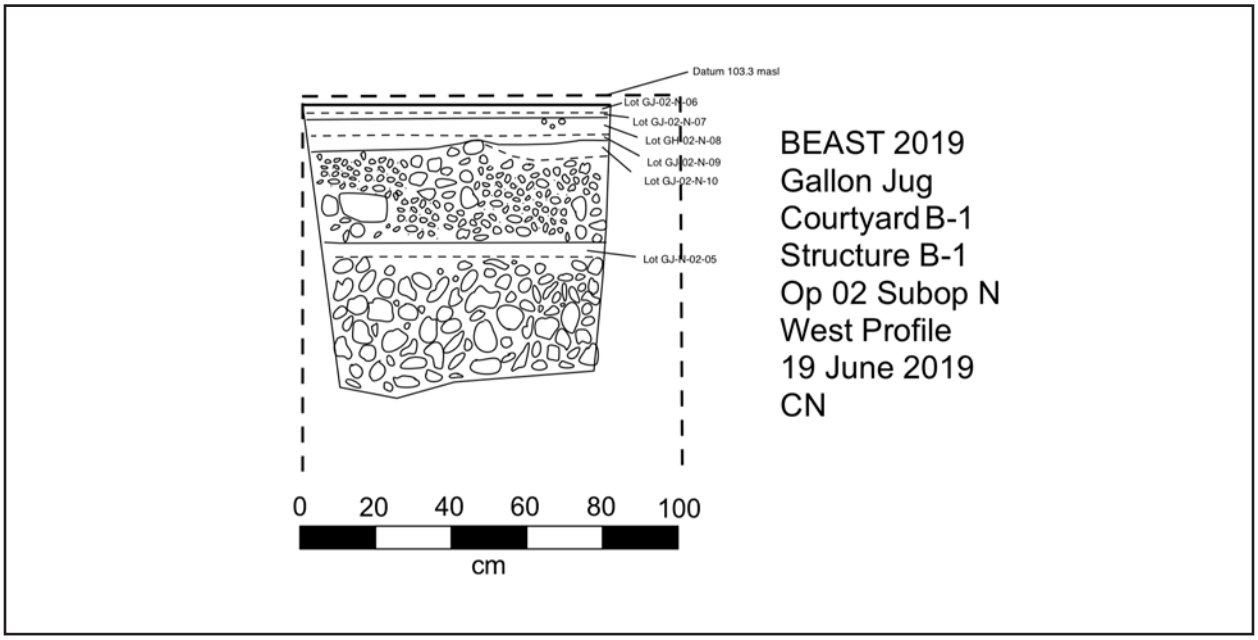

Figure 4.6. West profile drawing of Subop GJ-02-N showing burning and re-plastering events.

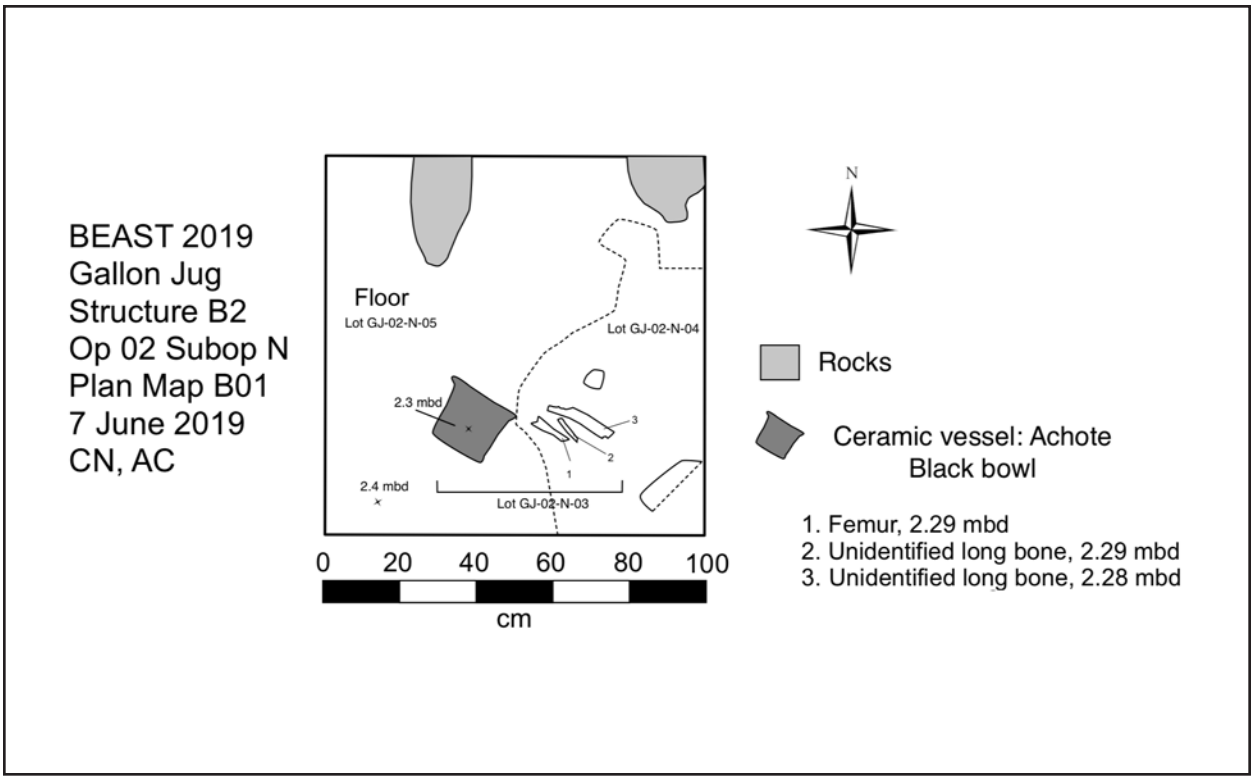

Figure 4.7. Plan view of Burial GJ-B01.

north. Though the skeletal elements (Lot GJ-02-N-03) were very poorly preserved, the individual seemed to have been tightly flexed and oriented northwest/southeast and was interred by breaking through an earlier plaster floor (Lot GJ-02-N-04) previously identified in Subop H (Lot GJ-02-H-08; see A. Novotny et al, this volume). The Achote Black bowl dates to the Tepeu 2/Late Classic period, suggesting that this internment is intrusive into an earlier phase of construction. Ceramic sherds from Lot GJ-02-N-05, the lot directly beneath the burial, included Tzakol and Early Chicanel ceramics, suggesting a Late Preclassic/Early Classic date for the construction of the structure.

Upon exposing the southern portion of the interior room in Subop GJ-02-M, we recognized a circular feature (0.31 x 0.34 m) cut into the surface of the plaster floor. In order to investigate subfloor deposits, Amy Copper and Nicholas Kopp established Subop GJ-02-R, a 1-x-1-m unit positioned over the circular feature. The first lot (Lot GJ-02-R-01) consisted of breaking through a 30-cm thick plaster floor that showed none of the repaving events present in Subop GJ-02-N (see Figure 4.3). The floor was supported by a layer of limestone cobbles and light gray (10YR7/2) soil and included Late Classic ceramics. Interestingly, we did not encounter the earlier floor present in both Subops GJ-02-H and -N to the north. This could suggest that the structure was expanded to the south during the Late Classic period; this "addition" may also account for the different construction styles in the western wall.

Lot GJ-02-R-02 included the subfloor fill, which included a mix of Late Classic and Early Classic ceramics. Notably, in Lot GJ-02-R-02 we found a small fragment of a polychrome vessel with a well-preserved rendering of a figure who may be one of the Hero Twins (Figure 4.8). No burials or caches were

Figure 4.8. Photograph of ceramic sherd with a figural profile; possibly a Hero Twin.

discovered in Subop GJ-02-R, which we closed upon reaching bedrock.

Structure B-1 consisted of two construction phases, the first likely occurring during the Late Preclassic or Early Classic period, which is suggested by ceramics in mixed fill contexts.

Other scholars in the Maya region (Hendon 1991, Robin 2012) have argued that a lack of benches, the presence of burials and caches, and a lack of associated middens suggests a ritual rather than domestic function. While Structure B-1 may have been used for both activities, the deposits encountered during our excavations suggest that ritual activity occurred here.

It is possible that the structure was remodeled during the Late Classic period with an expansion to the south; this interpretation is supported by the shift in construction style in the western wall and the absence of an earlier floor in Subop GJ-02-R. The subfloor burial with associated burning and repaving events suggests participation in wider Maya-region mortuary rituals involving the interment of ancestors beneath floors (McAnany 1995). The enigmatic hole in the eastern wall remains difficult to interpret but does not seem to play a functional role in the structure. Burnt plaster directly in front of the hole suggests that there was a smoking or burning of organic material, which could be linked to ritual practices and the caching of important items. That is, important

items may have been cached there while the building was occupied to sanctify it and then ritually removed, which included burning and smoke, upon abandonment of the structure.

Structure B-2

Structure B-2 forms the southern side of Courtyard B-1 and is 18 x 3 m, 2.5 m tall, and oriented east/west. Looters dug a roughly 5.25 m by 1.5 m trench into the northern face of the structure, from the courtyard to the summit (Figure 4.9). Our initial goal was to clear the looters' trench and look for a stratigraphic profile and architectural features.

As we cleaned the looters' trench, we exposed a west-facing wall segment of three courses of limestone bricks (Lot GJ-02-D-06) in the eastern profile, which we followed to an interior plaster floor (Lot GJ-02-D-08) that rolled down a 25 cm step (Lot GJ-02-D-05) to the exterior, plastered courtyard surface. Cleaning of the southern end of the looter's trench revealed the plastered face of a bench covered with 3 m of collapse debris held in place by tree roots. Our excavations recovered a deposit of Late Classic ceramic sherds from the surface of the exterior courtyard floor (Lot GJ-02-D-02), including a very large bowl's rim protruding from the eastern profile. A complete obsidian blade was also recovered in this lot. The sherds and the blade seem to have been swept outside of the structure around the time of abandonment, since they were found resting on the courtyard floor. Ceramics recovered from the interior of the structure, between the doorway and the bench, were less numerous but dated to the Late Classic period as well.

To reach the top of the bench identified in Subop GJ-02-D as well as expose the southern wall of the structure, we positioned a unit (Subop GJ-02-Q) on the summit of the structure between two trees. We excavated 3 m of collapse debris (Lot GJ-02-Q-02) and exposed the top of the bench (Lot GJ-02-Q-03), as well as one course of a 0.3-x-1-m portion of the poorly-preserved southern structure wall (Lot GJ-02-Q-04). Root disturbance had cracked the surface of the bench as well as contributed to the destruction of the south wall. To investigate any interior deposits, we established a 1-x-1-m subunit on top of the bench (Lot GJ-02-Q-05). Penetrating excavations did not yield any formal deposits, but we did learn that the interior floor encountered in Subop GJ-02-D was laid first to support the bench, which was then filled with small to medium sized limestone cobbles and few Late Classic period ceramics. Lot GJ-02-Q-06 included excavations beneath the plaster floor, revealing only dry-laid cobble fill.

Though the tree roots made clearing the interior room(s) of Structure B-2 virtually impossible, we followed the floor identified in Subop GJ-02-D to expose more of the interior of Structure B-2 and to find the corresponding western door jamb that would face the one encountered in Subop GJ-02-D. Beneath the collapse debris (Lot GJ-02-F-02)—including vault stones—we encountered the northern wall of the structure, which also formed the western door jamb for the doorway in Subop GJ-02-D. The wall was 2.2 m long and 0.88 m wide, and included a footer along its base, which rolled down to the paved courtyard. Several Tepeu 2 sherds were found on the courtyard surface, consistent with our findings in Subop GJ-02-D to the east. To separate interior contexts from exterior, Lot GJ-02-F-03 consisted of the collapse debris from the southern and eastern sides of the northern wall. Beneath the collapse debris we encountered a 1.5-x-0.5-m segment of what seems to have been a bench rising 0.6 m above the interior floor and abutting the north-facing wall. A very large tree on the summit of the mound prevented us from further clarifying this feature, but it could be the arm of a C-shaped or L-shaped bench, if it articulated with the bench identified in Subop GJ-02-D. Excavations into

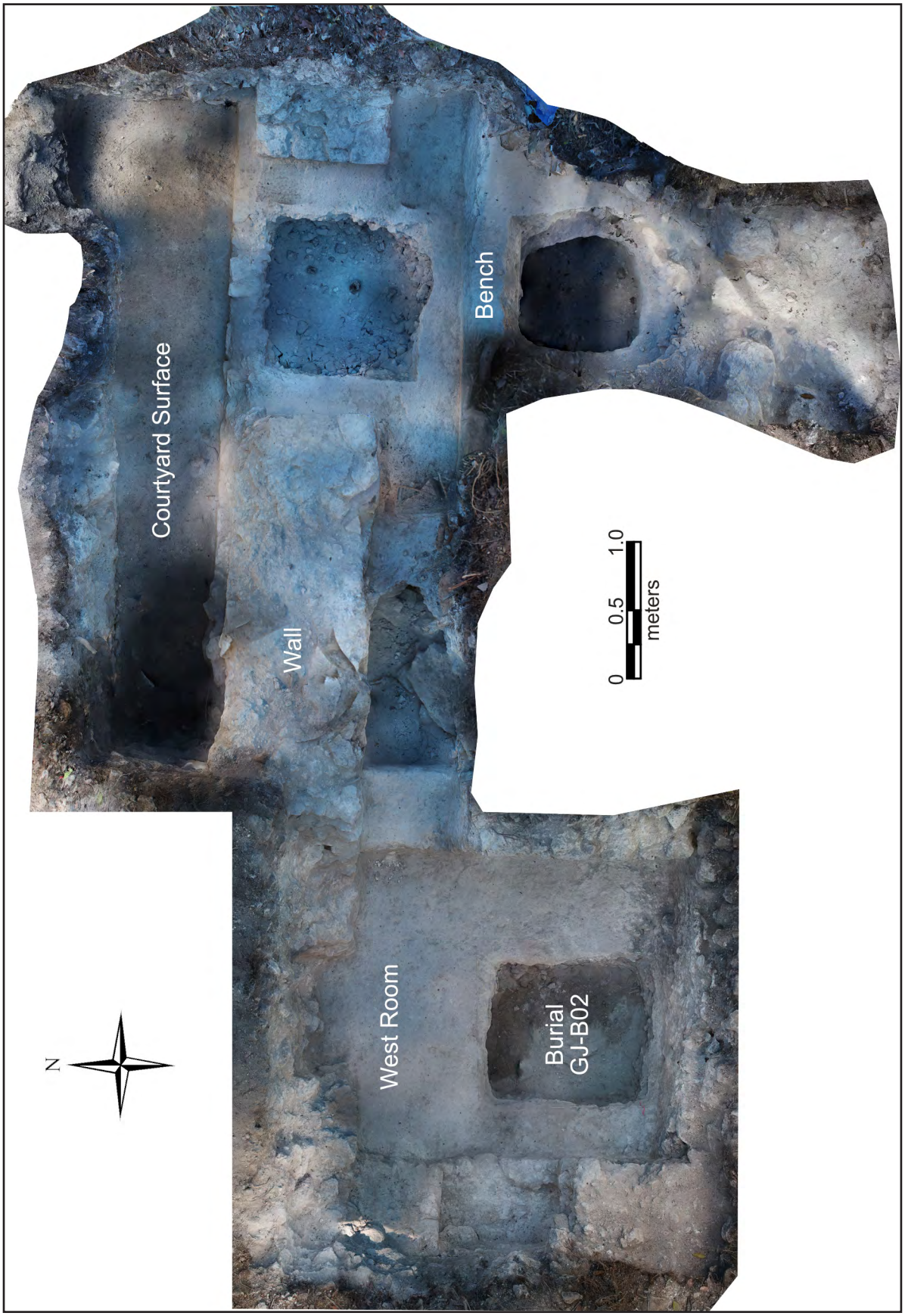

Figure 4.9. Orthomosaic of Structure B-2.

the fill of the bench produced abundant Late Classic ceramics.

To follow the courtyard-facing wall of Structure B-2 and expose an interior space to the west, we established Subop GJ-02-L, a 2-x-3-m unit located west/southwest of Subop GJ-02-F. After removing the topsoil (Lot GJ-02-L-01) we excavated about a meter of collapse debris and soil (Lot GJ-02-L-02) before encountering the top of a wall running 1.34 m north/south (Lot GJ-02-L-03) and consisting of eight well-preserved courses (1.3 m high) of shaped limestone bricks. It corners with the southern structure wall (Lot GJ-02-O-03, see below), but also corners at a 0.5-m wide passage to the east room (Lots GJ-02-F-03 and -04, above). The corner of the wall is 0.5 m wide and runs east/west. The wall corner terminates at the enigmatic bench feature excavated in Subop GJ-02-F, designated here as Lot GJ-02-L-09. Patches of preserved plaster remain on the western face of this wall, rolling down to the room's floor (Lot GJ-02-L-04). Clearing the collapse debris to the level of the floor revealed portions of the western (Lot GJ-02-L-10) and northern (Lots GJ-02-O-05 and -07) walls of the room, which both included doorways facilitating access to the courtyard and an unexcavated space to the west. The interior of the room is 3.2 m^2 and was plastered as evidenced by the plaster fragments rolling up each wall segment (see Figure 4.9). The southern wall (Lot GJ-02-O-03) was exposed beneath 0.5 m of topsoil and collapse debris (Lots GJ-02-O-01 and -02). The wall is oriented east/west and is 1.8 m long, constructed of eight courses of shaped limestone bricks. It abuts—but does not interdigitate with—the eastern (Lot GJ-02-L-03) and western (Lot GJ-02-O-05) walls of the room. This configuration suggests that the north/south oriented walls could have been constructed after the southern wall, perhaps to restrict access to this area of the structure.

Upon reaching the plaster floor (Lot GJ-02-O-4), we identified an eroded section in the southwest corner, which was interpreted as a cut for subfloor deposits. To explore this possibility, we established a 1-x-1.1-m subunit above the cut (Lot GJ-02-O-06). While removing limestone pebble and cobble fill from beneath the floor, we encountered human skeletal remains in the south/central area of the unit (Lot O-07; Burial GJ-B02; Figure 4.10). Excavated by Anna Novotny and Camille Johnson, the individual was buried in a tightly flexed position with its head oriented to the west (see A. Novotny et al., this volume). Ceramic sherds (Tepeu 2) and debitage were recovered but seem to be part of the fill rather than any formal grave offering. Lot O-08 was excavated to clear around Burial GJ-B02, and in doing so they encountered a second burial to the northwest, designated Lot GJ-02-O-09; Burial GJ-B04 (see A. Novotny et al., this volume).

A sample of bone was taken from Burial GJ-B02 for AMS dating. The sample returned a date of 1060 ± 15 BP (PSUAMS# 6914; bone). The results were calibrated with the software OxCal v4.3 (Bronk Ramsey 2009) using the IntCal13 atmospheric curve (Reimer et al. 2013). For the date 1060 ± 15 BP the two possible calibrated age ranges are cal AD 968–1020 and cal AD 907–915. The 2σ date range of cal AD 907–1020 falls during the Terminal Classic period. This was a surprising result that will take more thought and more samples to interpret.

Excavations in Structure B-2, when taken together, suggest that the structure may have had a residential function and was perhaps remodeled once. The bench in the eastern room, while we could not expose its complete dimensions, supports the interpretation that this was a residence, as do the burials beneath the floor in the western room. Interestingly, the bench in this structure is the only bench encountered in our excavations. The architecture

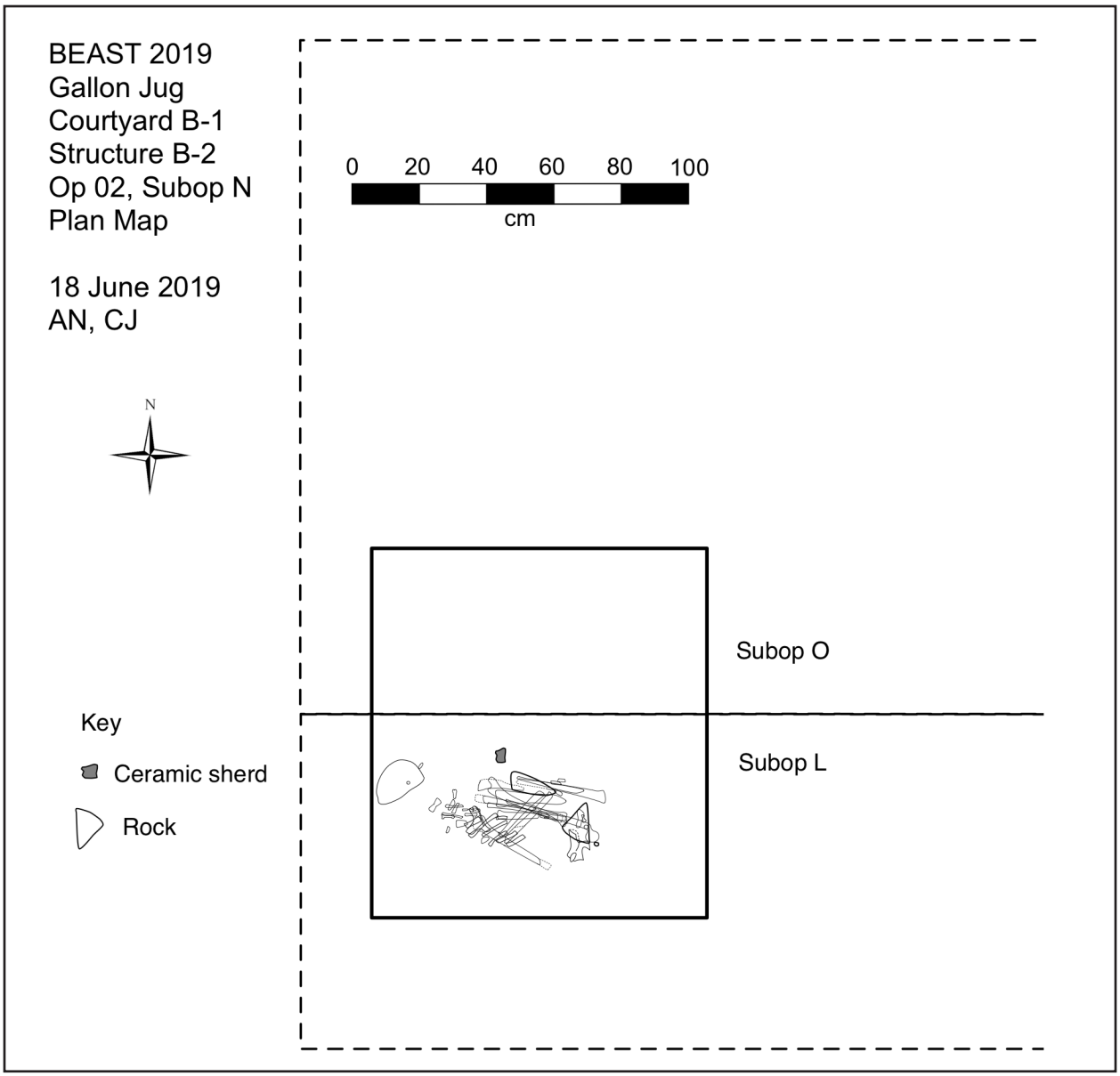

Figure 4.10. Plan view of Burial GJ-B02.

of Structure B-2 is not symmetrical, at least in its final iteration.

Structure B-3

Delineating the western border of Courtyard B-1, Structure B-3 is 25 m by 5 m, 2 m tall, and oriented north/south. It is architecturally linked to Structure B-2 at the southwestern corner of the courtyard and to Structure B-4 at the northwestern corner of the courtyard. This continuity in architectural arrangement gives an enclosed feeling to the interior of the group and leaves openings only at the southeastern and northeastern corners (see Figure 4.2). The topography included a slight swale in the center of the structure framed by mounded areas with trees growing from them. Though we did not have time to excavate these features, it is theorized that the swale could be a stairway providing formal access to the group, with the two smaller prominences representing the corners of interior rooms with well-preserved

walls. Excavations of Structure B-3 were conducted in Subop GJ-02-X.

There were three main goals of Subop GJ-02-X: 1) clarify the structure's architectural history, 2) expose how it relates to Structure B-4 to the north, and 3) evaluate the function of the structure within the courtyard group. After removing topsoil and about a meter of collapse debris (Lots GJ-02-X-01 and -02), we exposed the top of a north/south oriented wall (Lot GJ-02-X-04) consisting of upper and lower components resting on the courtyard surface (Lot GJ-02-X-05; Figure 4.11). The lower component was 1.03 m in height and constructed with four to five courses of shaped limestone blocks that would have been covered in plaster. Our excavations exposed 1.74 m of its width, from an apparent corner at its southern end to where it disappears into the northern balk. On top of this wall, but offset 1 m to the west, is the upper component of the wall. It was constructed of two to three courses of shaped limestone blocks and rose 0.71 m above the top of the lower wall. The upper wall was also 1.74 m north/south and shared the same southern corner. Though the wall remains largely unexcavated, the exposed portion is ~2 m thick, which could support a vaulted ceiling. Furthermore, the fact that it corners to a likely interior room suggests a doorway jamb instead of a platform face.

A rock alignment (Lot GJ-02-X-06) consisting of four flat stones 0.55 m wide and running 0.96 m north/south along the base of the wall may have been placed on a plaster footer, though the rocks themselves were unplastered (see Figure 4.11). A flat, square (0.41 x 0.30 m) stone was resting directly east of the basal wall on the courtyard surface, prompting excavators to remove it and look for a cache (Lot GJ-02-X-03). Several ceramic sherds dating to the Late Classic period were found but nothing else.

Lining the northern edge of our excavation unit and resting on the courtyard surface was a low wall oriented east/west (Lot GJ-02-X-07). It was constructed of two to three courses of shaped and plastered limestone bricks rising 0.25 m from the courtyard surface. Our excavations exposed 2.46 m of the wall, which terminated at the western wall and continued into our eastern balk. It is hypothesized that this low wall would line up with the basal wall of Structure B-4, providing an architectural connection between the two structures; however, we were not able to clarify that connection this season.

Our investigations at Structure B-3 were very preliminary and limited to one suboperation. Though we were not able to clarify the function of the structure, our excavations did reveal that the western structure was composed of a 1-m high wall with a second, offset architectural feature that extended that height by another 0.71 m. The exposed southern corner of this wall suggests an interior room, though we were unable to confirm that through excavation. In any case, the height of the exposed walls provides a distinct sense of privacy within the courtyard. If the structure also functioned as an entryway into the group, then it represents a significant investment in controlling access to the interior courtyard. The lack of artifacts in this suboperation was also interesting, since debris can often build up in corners of patio groups, especially upon abandonment. The absence of an artifact deposit here suggests to us that the courtyard was kept clean during occupation and perhaps that abandonment occurred rapidly. It could also indicate that any activities conducted here took place within structures and not in the open courtyard.

Structure B-4

Structure B-4 is oriented 7 degrees east of north, is 20 m x 5 m, is 2 m tall, and forms the northern edge of Courtyard B-1 at Gallon

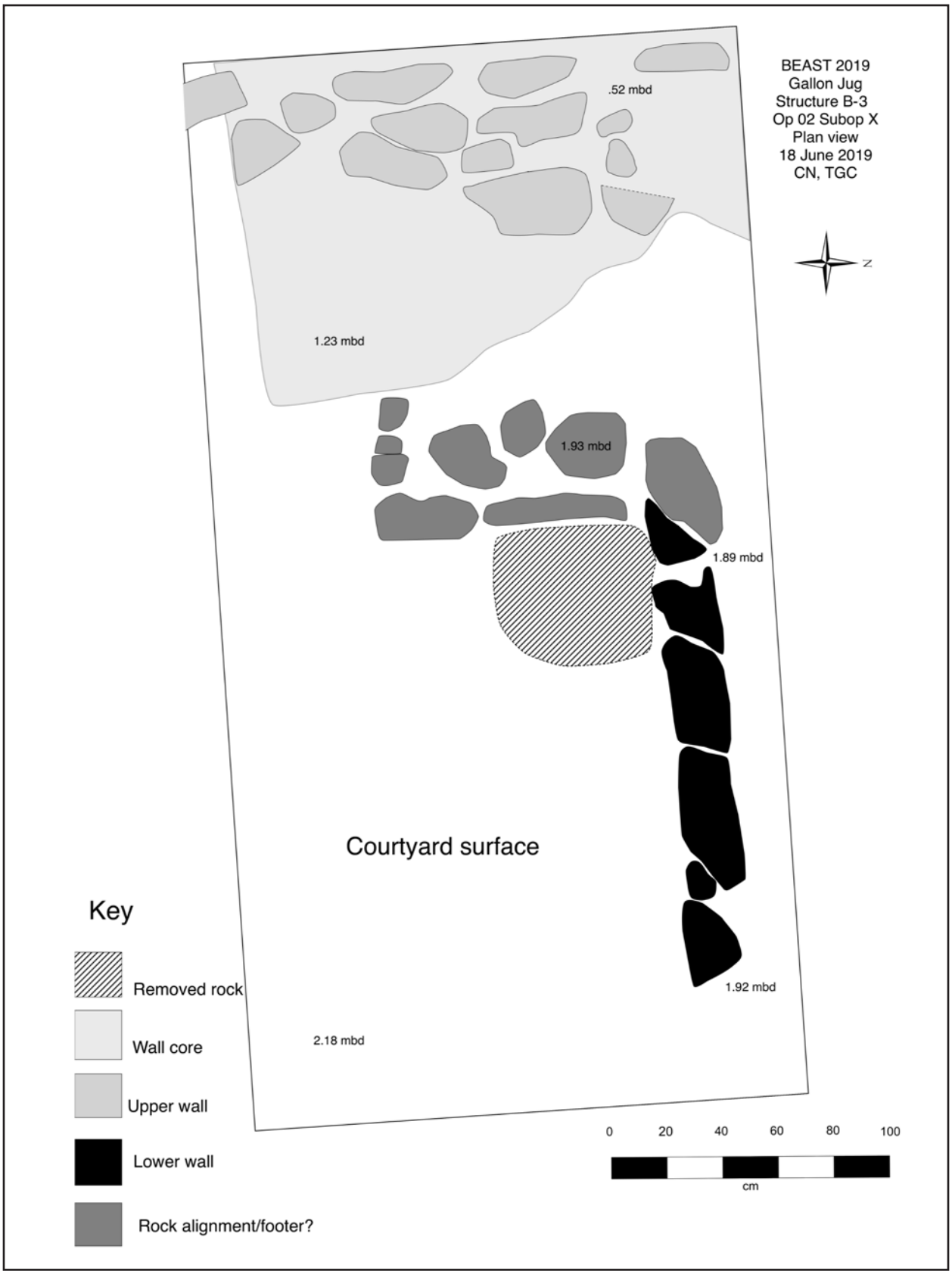

Figure 4.11. Plan view of Subop GJ-02-X showing architectural features discussed in the text.

Jug (see Figure 4.2). The slightly wide and flattened summit of the mound suggested that the underlying structure was a platform that was probably not vaulted. Our goals for excavating this structure were to expose preserved architecture, investigate the chronology of the building, and ascertain its function.

To pursue these goals, we started with a 2-x-4-m axial trench (Subop GJ-02-C) aligned north/south along Structure B-4's central axis. Removal of 1.4 m of collapse debris exposed a platform face (Lot GJ-02-C-04) oriented east/west and constructed of six courses of partially shaped limestone blocks. The preserved section was 0.67 m in height and 0.90 m wide, and it was resting on the patio floor (Lot GJ-02-C-03), which was 0.40 m below the ground surface. The platform supported two steps (Lots GJ-02-C-05 and -06) leading up to the summit of the structure. Lot GJ-02-C-05 was a severely eroded, 0.29-x-0.24-x-0.35-m segment of the original step. Immediately north and 20 cm above Lot GJ-02-C-05, Lot GJ-02-C-06 consisted of one course of two shaped limestone blocks that would likely have been plastered, due to the presence of eroded plaster pieces mixed in with the collapse debris and soil. Only a 1.10-m section of this step was preserved in the eastern half of the unit; the platform face and the steps were not well preserved in the western half of Subop GJ-02-C, and we excavated through them and into dry limestone cobble fill until reaching bedrock. We followed the steps to the west in Subop GJ-02-J to evaluate our interpretation and find a more well-preserved section of these architectural features.

Subop GJ-02-J was a 2.5-x-3-m unit established west of Subop GJ-02-C placed to expose a more well-preserved section of the platform face and steps encountered to the east. Excavations exposed a 3-m length of the western part of the platform face (Lot GJ-02-J-03) as well as two plastered steps leading to the summit of the structure (Lots GJ-02-J-04 and-05). Each step was constructed of one course of shaped limestone blocks, mirroring the architecture in Subop GJ-02-C to the west. The plaster step corresponding to Lot GJ-02-C-05 was not encountered here and may have been completely eroded away.

Midway through our excavations of Subop GJ-02-J, a tree fell from the summit of Structure B-4 directly across the exposed architecture in Subop GJ-02-J and across the entire courtyard. Unfortunately, this was the tree that held Datum C, which we replaced with Datum U (measurements were corrected in the lot forms).

The tree fall exposed the preserved sections of the summit architecture (designated Subop GJ-02-V, directly north of Subop GJ-02-J), including a 2.5-m section of the southern summit wall (Lot GJ-02-V-02) and the western balustrade of the entranceway. The western balustrade was oriented north/south (perpendicular to the steps) and constructed of two courses of small, shaped limestone bricks, which were covered by a thick layer of plaster that was partially preserved in places (Figure 4.12). The northern end of the balustrade forms a corner with the east/west oriented summit wall (Lot GJ-02-V-02) and is clearly resting on top of the final summit floor (Lot GJ-02-V-03). The western section of the entrance was draped over three earlier paving events of the summit floor (Lots GJ-02-V-04, -05, and -06), which were also visible in Subop GJ-02-C (Lots GJ-02-C-08 and -09).

We suspect that the corresponding eastern balustrade was not preserved except possibly for the limestone block (Lot GJ-02-C-10) that was enigmatic when it was first encountered; it is resting directly on the final summit floor and forms a corner with the western section of the summit wall (Lot GJ-02-P-03). Another line of evidence suggesting that there were steps and an entranceway here was the number of artifacts

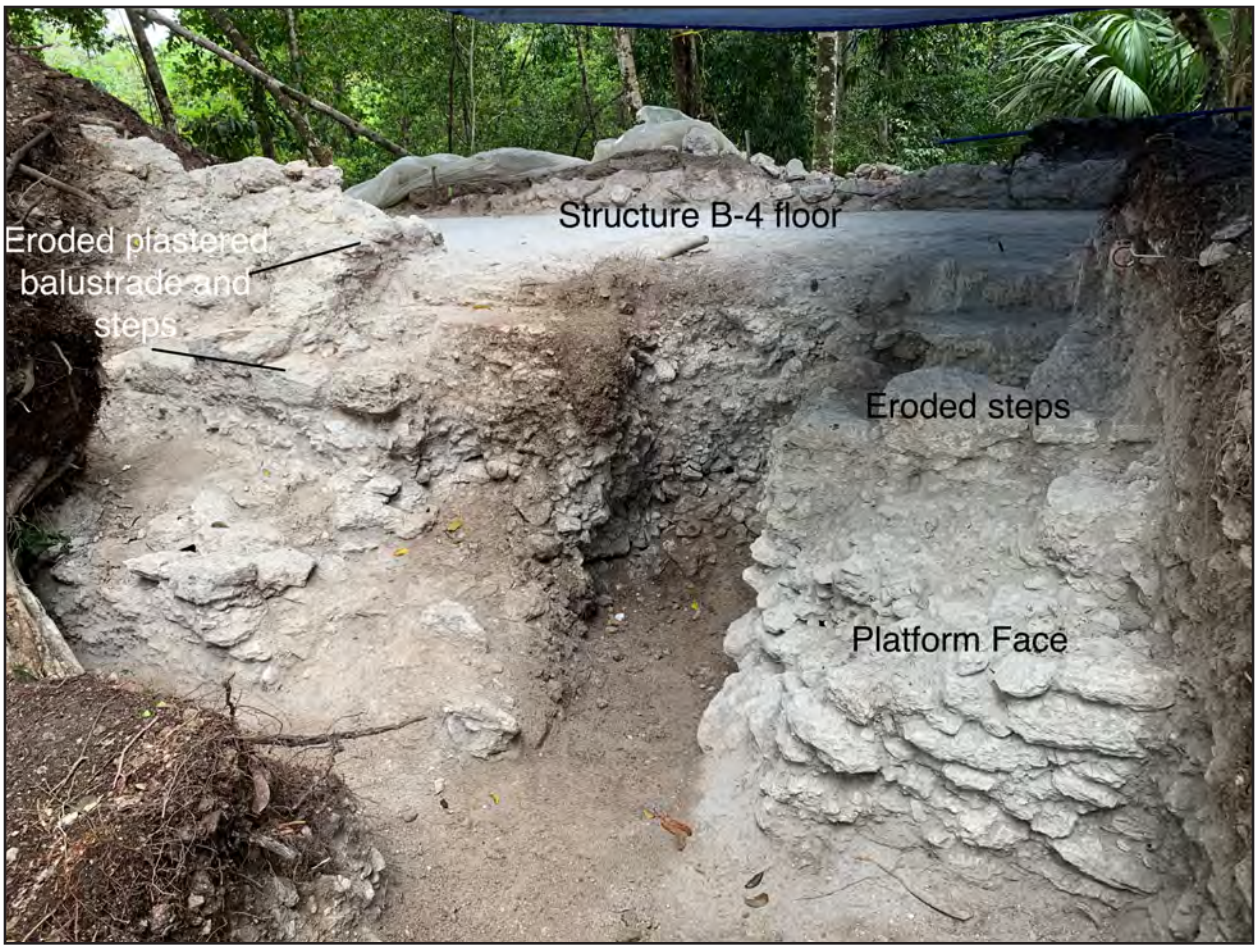

Figure 4.12. Photograph of Subops GJ-02-C and -J showing eroded plaster steps and balustrade. View is to the north.

recovered from the collapse debris covering these features. There were 200 sherds in Lot GJ-02-J-03 and 562 sherds in Lot GJ-02-V-01. To us this suggests that the artifact deposit that blankets the interior room of Structure B-4 (described below) may have been spilling out of the entrance way and onto the steps at the time of abandonment. There were very few sherds encountered in the western portions of Subops GJ-02-J and -V.

The floor on the summit of Structure B-4, which was first encountered in Subop GJ-02-C, guided our excavations in Subop GJ-02-G and -Gx—with a combined dimension of 3 x 2 m—placed directly north of Subop GJ-02-C. The final floor of the structure (Lot GJ-02-G-03) was 0.68 m below the ground surface; significantly, the amount of ceramic artifacts increased substantially in this location—there were 1,600 ceramic sherds in 4.08 m^3 of soil, along with 21 pieces of debitage, 4 broken lithic tools, and 4 groundstone fragments. The floor was eroded in the southwestern corner of the unit, showing a layer of pebble ballast and at least two earlier paving events (Lots GJ-02-G-04 and -05). The northern structure wall (Lot GJ-02-Gx-03) was poorly preserved but still extant in the northeastern corner of the unit and consisted of two to three courses of partly modified limestone blocks (Figure 4.13). Most of the wall had slumped down the hill to the north.

The excavated summit floor of Structure B-4 was 2.7 m wide by 9.25 m long and not

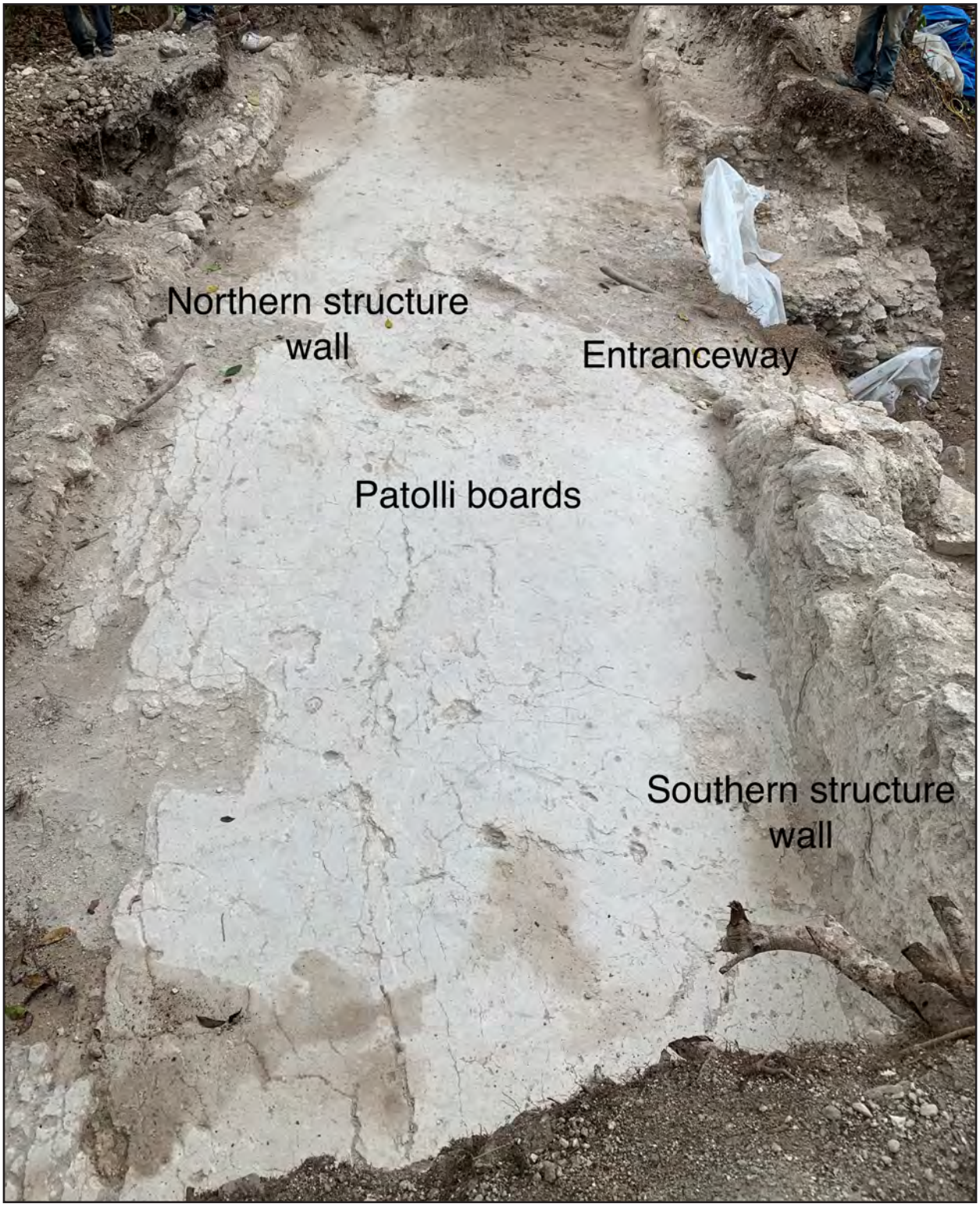

Figure 4.13. Photograph of the exposed floor of Structure B-4, showing excavated architecture. View is to the east.

divided by internal walls, suggesting that it was a platform that supported a perishable roof instead of a stone vault. There were no vault stones recovered, and because of the width of the structure we infer that the building would have had a perishable roof with low walls of about ~1 m delineating the interior room. We were unable to fully clear the interior of the structure or find the corners of the summit walls because of extensive tree growth. The northern wall was very poorly preserved, as described above. Two segments of the southern wall were excavated on the eastern (Lot P-03) and western sides (Lot V-02) of the entranceway. The eastern segment was 3.46 m long and 0.68 m wide and constructed of 2–4 courses (0.48 m) of modified limestone blocks. The plaster floor rolls up onto this section of the wall, suggesting that it was plastered in antiquity. The western segment was 3.26 m long and 0.60 m wide and consisted of 3–6 courses of modified limestone blocks that also were plastered over. The western wall seems to have been better preserved because of the tree that grew above it.

There were two significant discoveries on the summit floor of Structure B-4. The first was the artifact deposit covering the central and western portions of the floor; in total, there were 4,208 ceramic sherds (see Table 4.2) collected from an area of roughly 12.24 m^2. In addition, there were oval bifaces, debitage, broken obsidian blades, and groundstone artifacts.

The prevalence of artifacts declines in the eastern portion of the platform. The second discovery was the incising of numerous patolli boards into the central and western portions of the floor of Structure B-4 (Figure 4.14).

Patolli

Patolli are interpreted as facilitating gaming and/or divination rituals and are found throughout Mesoamerica, including on a bench in Structure C-6 in the Western Plaza at Chan Chich (Harrison 2000; Walden and Voorhies 2017). Patolli are often interpreted as cosmograms linking humans to the cosmic universe and are found in the lowland Maya region in structures with a religious function, such as temples, or in structures where rituals may have been enacted, such as in elite residences, ritual buildings, or "men's houses" (Walden and Voorhies 2017; Yaeger 2005). For example, Structure C-6 at Chan Chich was interpreted as an elite residence that transitioned to a ceremonial function with the remodeling of a room that then housed the burial of an important individual in a bench on which a patolli was carved (Harrison 2000). The Structure C-6 patolli is a cross-and-frame style patolli (Type II), as categorized by Swezey and Bittman (1983); these are the most commonly found style in the lowland Maya region.

First encountered in Subop GJ-02-G, we identified several more patolli as we excavated the western units (Subops GJ-02-U and -V); the patolli cover an area of ~15 m^2 and are oriented north/south. While it is difficult to securely date graffiti like patolli, ceramics from the midden directly on top of these patolli date to the Late Classic period, indicating that they may have been carved during that time period or earlier. The patolli boards incised into the floor of Structure B-4 vary in style and dimension, but at least two fit with previously identified patolli styles (Swezey and Bittman 1983). Moving from the west to the east, we can divide the patolli into three sections for analytical purposes.

The western section is 1.41 m x 1.67 m and includes at least five paired vertical (roughly north/south) lines bisected in places by paired horizontal lines to form what look like haphazard tic-tac-toe boards; the lines vary from 0.31 m to 0.80 m long (see Figure 4.14). One short section forms a 0.20 m x 0.10 m rectangular shape divided into two lines of three, square boxes; these could be part of

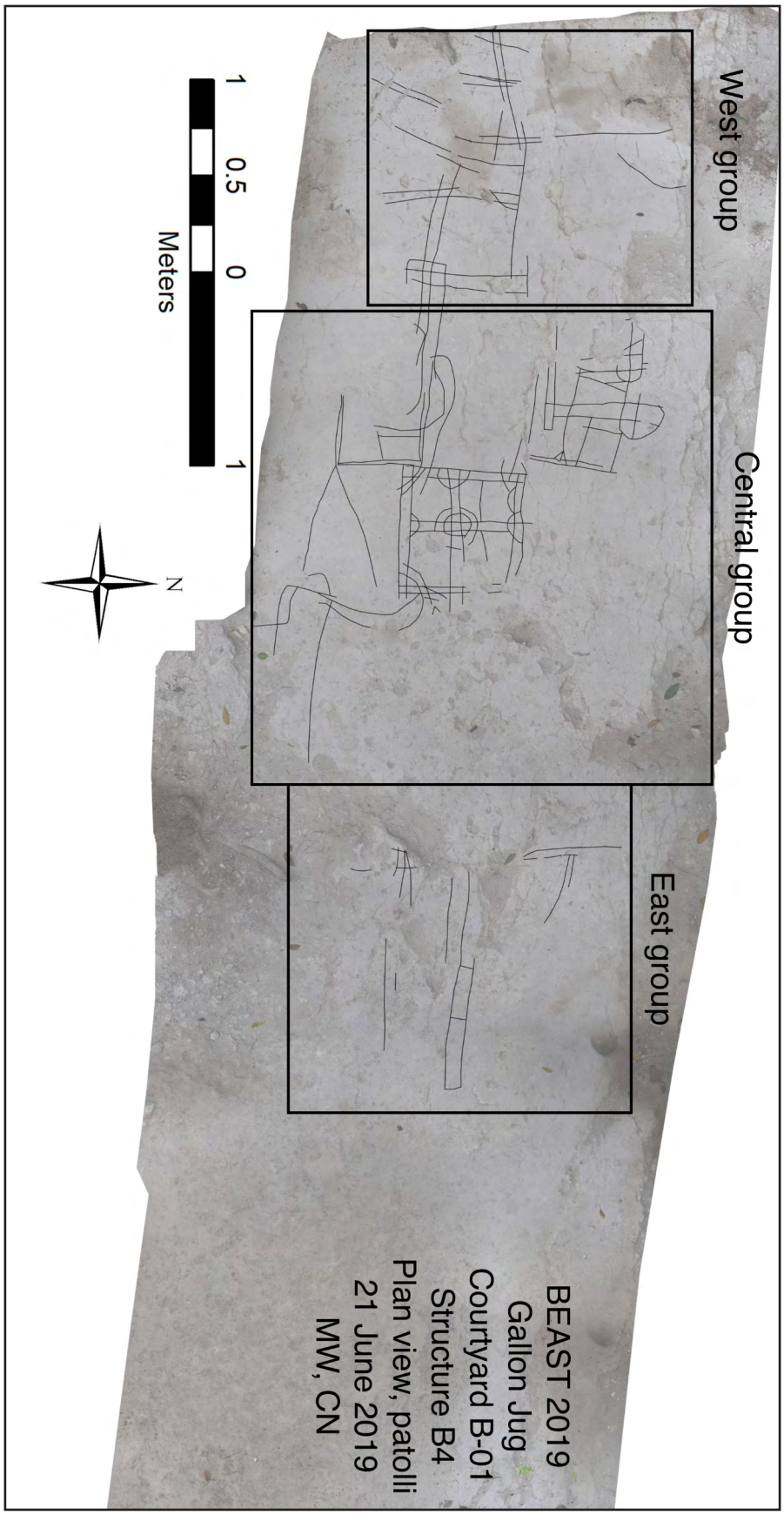

Figure 4.14. Orthomosaic of the summit floor of Structure B-4, showing the patolli boards incised into the plaster.

an eroded cross-and-frame board, similar to the patolli at Chan Chich. These could be the preserved portions of eroded boards or another type of graffiti.

The central section is 2.37 m x 2.45 m and includes at least two patolli, among several other horizontal, vertical and curvilinear lines (see Figure 4.14). The northern portion of the section has part of a cross-and-frame board with two twisted corners, which measures 0.62 m x 0.77 m (Type I, Swezey and Bittman 1983). Other lines cross-cutting this pattern may have been incised after the formal board, suggesting that there were multiple incising events. This type of board is rare in the Maya lowlands (Swezey and Bittman 1983:376) but is found in several Mixtec and Nahua codices (Walden and Voorhies 2017:202).

South of the Type I board is a second cross-and-frame board with variations that measures 0.63 m x 0.63 m (see Figure 4.14). It most closely resembles a Type III board (Swezey and Bittman 1983: 387), except those tend to have circular frames while this one is square with a circle in the middle and curvilinear elements at the corners. Type III boards seem to be found mostly in the northern Maya lowlands, at sites like Uxmal, Dzibilchaltun, and Chichen Itza.

The eastern section measures 1.69 m x 1.76 m and includes several horizontal, paired rectilinear lines, in addition to other apparently haphazard graffiti (see Figure 4.14). These could be eroded cross-and-frame boards or other graffiti.

Conclusion

Our excavations at Structure B-4 revealed that it was a platform built of roughly shaped limestone blocks with a short series of four to five plastered steps leading to a 3-m wide entranceway that opened into an interior room bounded by low walls and likely a wood and thatch roof. The artifacts recovered from the floor date to the Late Classic period and include items that are typical for a household, such as groundstone implements, oval chert bifaces, obsidian, and a substantial deposit of ceramics. Further analysis of the ceramic artifacts will focus on the amount and variety of vessel forms, which will clarify questions about the function of the building and the kinds of activities conducted within it. The presence of several patolli boards in styles that are rare for the Maya lowlands suggest that rituals related to cosmology or divination were performed here. Architectural settings where patolli have been found are often restricted, private spaces, such as the room in Structure C-6 at Chan Chich, as well as in an elite residence at Xunantunich (Yaeger 1995). Though the courtyard group itself feels private, Structure B-4 would have been a fairly large space with a wide entrance, which suggests to us that the activities conducted here—ritual and otherwise—occurred among a group of people instead of as an interpersonal interaction.

Courtyard Excavations

Excavations into the courtyard space had several objectives: first, to investigate the construction phases of the courtyard space; second, to search for midden or termination deposits on the final phase of the courtyard; and lastly, to explore the chultun located in the central portion of the courtyard space. Subops GJ-02-E and -Z addressed the first two goals, and Subop GJ-02-A addressed the last one.

Subops GJ-02-E and -Z

Subop GJ-02-E was a 1-x-4-m unit oriented 5 degrees east of north, in between Structures B-1 and B-2 (see Figure 4.2). It was established to potentially expose the exterior architecture of both structures as well as to search for any termination or midden deposits that may have accumulated in between buildings. We had

seen this pattern previously, at Structure D-4 at Chan Chich (Kilgore et al. 2019).

After removing the topsoil (Lot GJ-02-E-01) we excavated through 0.40 m of collapse debris (Lot GJ-02-E-02) before closing the unit at bedrock. There was no formal floor encountered here, though inhabitants may have paved the bedrock. For a relatively large unit it was almost entirely devoid of artifacts (i.e., only seven Late Classic ceramic sherds from 2.8 m^3). This was a surprising result, given the richness of other deposits in the corners of other courtyard groups.

Subop GJ-02-Z was a 1-x-2-m unit oriented north/south, placed directly south of Structure B-4 and ~3 m from the southeastern corner of Subop GJ-02-X. It was established to follow a stone and plaster alignment encountered in Subop GJ-02-J to the north, which may have been an earlier construction phase of Structure B-4, or an entirely different structure altogether. Due to a significant tree fall, this unit did not line up exactly with Subop GJ-02-J but was offset to the south by about a meter.

Similar to Subop GJ-02-E, Subop GJ-02-Z encountered bedrock after excavators removed about 0.40 m of collapse debris (Lot GJ-02-Z-02), suggesting that they paved the bedrock for use as the courtyard floor. This interpretation is supported by the results of the chultun excavations (below). There were 15 ceramic sherds dating to the Late Classic period that were collected, but no architectural features were encountered. Since the tree fall prohibited our unit from following the rock alignment directly south of Subop GJ-02-J, it is entirely possible that the alignment cornered to the east or west in the unexcavated area or terminates there, eluding our detection in Subop GJ-02-Z.

Chultun Excavations

Chultuns are excavated spaces into the limestone bedrock that the Maya may have used as water cisterns or storage facilities (Dahlin and Litzinger 1986; Puleston 1971). Shape may be connected to function, the latter of which is debated among archaeologists. Chultuns in the northern lowlands are bottle shaped, lined with plaster, and tend to be much bigger (up to 6 m deep) than those in the southern lowlands (~2 m deep), which often were excavated in a shoe shape, with a surface orifice connected to a lateral chamber (Dahlin and Litziner 1986: 721). The northern lowlands receive less rainfall than the southern lowlands, thus the chultuns in that region are interpreted as water cisterns (e.g., Smyth et al. 2017), while those of the southern lowlands were more likely used for storage. However, experiments conducted by Dennis Puleston (1971: 328) at Tikal in the 1960s suggested that chultuns were too warm and humid to store vegetables such as maize, beans, squash, cassava, sweet potato, and macal (Xantho- soma sp.), all of which decomposed or spoiled over short periods of time (though ramon nuts preserved quite well). Another proposed function is as a place for fermentation of maize beer or fruit wines, since the conditions are conducive for that process (Dahlin and Litzinger 1986). Finally, many chultuns are used for burials, most likely signaling a change in the function of the chultun itself or the abandonment of the surrounding structures (Chase 2016:891). Some do not rule out a ritual function for chultuns as well, noting their connection to the caves and the underworld (Brady and Layco 2018). Our goal for excavating the chultun at Courtyard B-1was to establish its dimensions, ascertain its function in relation to the courtyard structures, and investigate the presence of burials.

Subop GJ-02-A was a 2-x-2-m unit placed around the chultun, which was roughly in the center of the courtyard (see Figure 4.2). There

was an opening in the ground surface, with a small tree growing out of it and an abundance of roots and leaf debris that appeared to be falling into the hole. The purpose of Subop GJ-02-A was to clarify the size of the chultun, identify the courtyard surface, and to investigate any cultural material that may have accumulated or been cached inside the chultun.

After clearing away the topsoil, roots, and leaf debris (Lot GJ-02-A-01), we widened the entrance, revealing the northeastern edge of the chultun. Lot GJ-02-A-02 terminated at the uneven limestone bedrock and clarified the eastern and southern edges of the chultun. Though the courtyard surface was poorly preserved, the western and northern profiles of the unit show a paving event directly on top of the bedrock. Lot GJ-02-A-03 was established to record the interior contents of the chultun; materials consisted of some ceramics and one shell mixed in with soil eroding from the surface into the chultun. A depression appeared in the bedrock in the southern area of the unit that was designated Lot GJ-02-A-04. The edges of this depression suggested that there may have been a step carved into the bedrock to allow easier access the chultun (Figure 4.15). On this depression there was small artifact deposit consisting of a partially intact ceramic vessel with a ring base that was covering a cluster of other ceramic sherds; it was unclear whether they were all from the same vessel. The sherd cluster was resting on top of soil and limestone rocks, so it was likely not placed intentionally but washed in from the surrounding area.

The horizontal dimensions of the chultun were 0.80 m (north/south) by 1.10 m (east/west), and it was 0.86 m deep. There is a natural bedrock

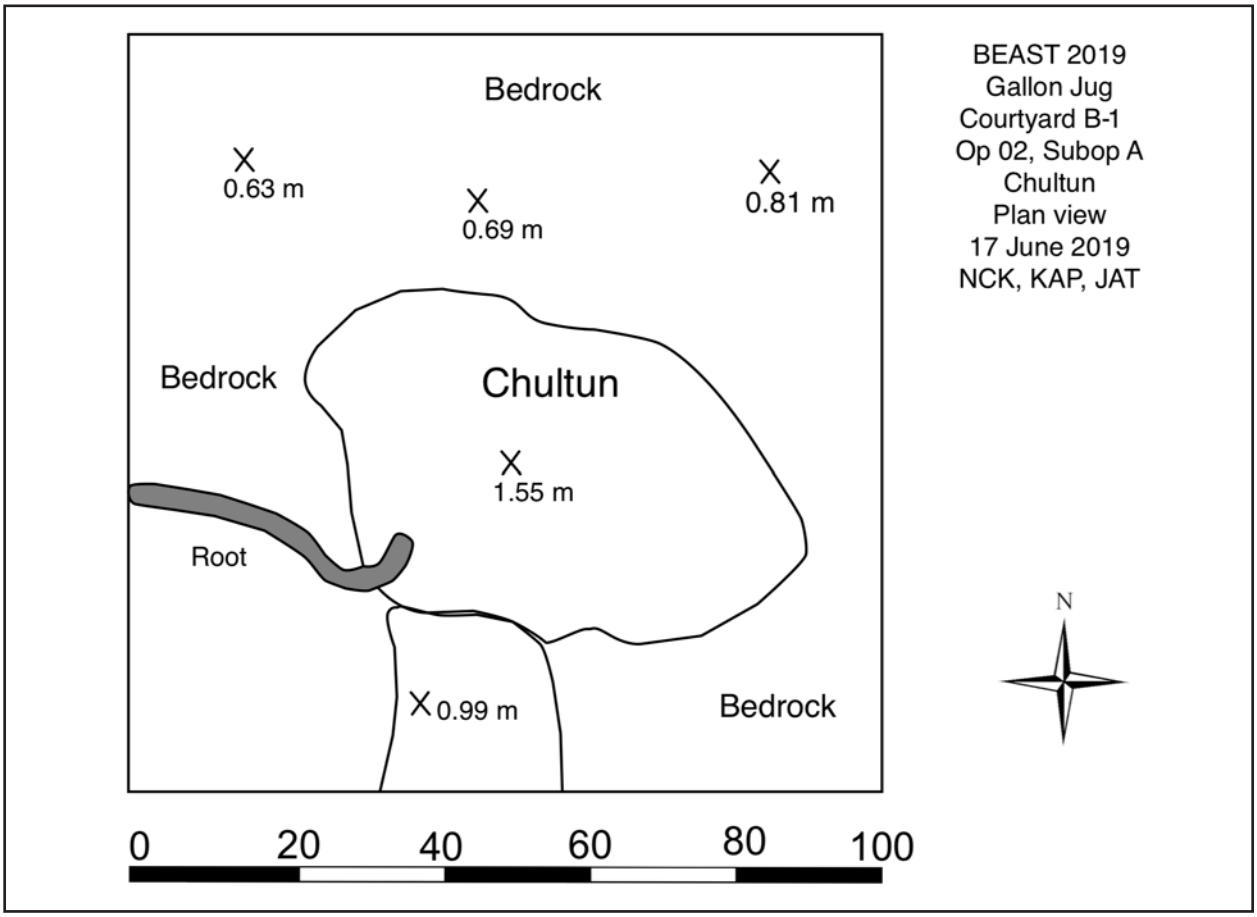

Figure 4.15. Plan view of the chultun orifice.

rise in the western portion of the chultun that slopes down to the east/southeast, beneath the courtyard bedrock to a lateral, small chamber measuring 1.15 m (north/south) by ~1 m (east/west) forming the shoe shape that is relatively common in the region. The soil became siltier and grayer, with many limestone inclusions.

Lot GJ-02-A-06 was a 1-x-1-m unit established inside the chultun because there were several large limestone blocks emerging from the loose, silty soil as well as a significant increase in cultural material, including ceramic sherds and an obsidian blade, suggesting a cache or burial. Indeed, human long bones emerged in the eastern and northern areas of the unit. Lot GJ-02-A-07 consisted of the burial (Burial GJ-B03) and its associated artifacts, including refitting ceramic sherds, chert debitage, lithic tools, and a piece of shell (Figure 4.16). The individual was interred in a flexed position in a simple cyst delineated by unworked limestone blocks (Burial GJ-B03). Preliminary excavations were undertaken, a drawing was made, and a bone sample was taken for radiocarbon dating. Due to time constraints, we re-buried the individual for future excavation (see A. Novotny et al., this volume, for the preliminary bioarchaeological analysis).

The chultun excavations helped us understand that the bedrock directly below the courtyard was paved by inhabitants to make a smooth surface. The chultun was shoe-shaped and lacked any intact vessels that could have been used for storage purposes, though we cannot

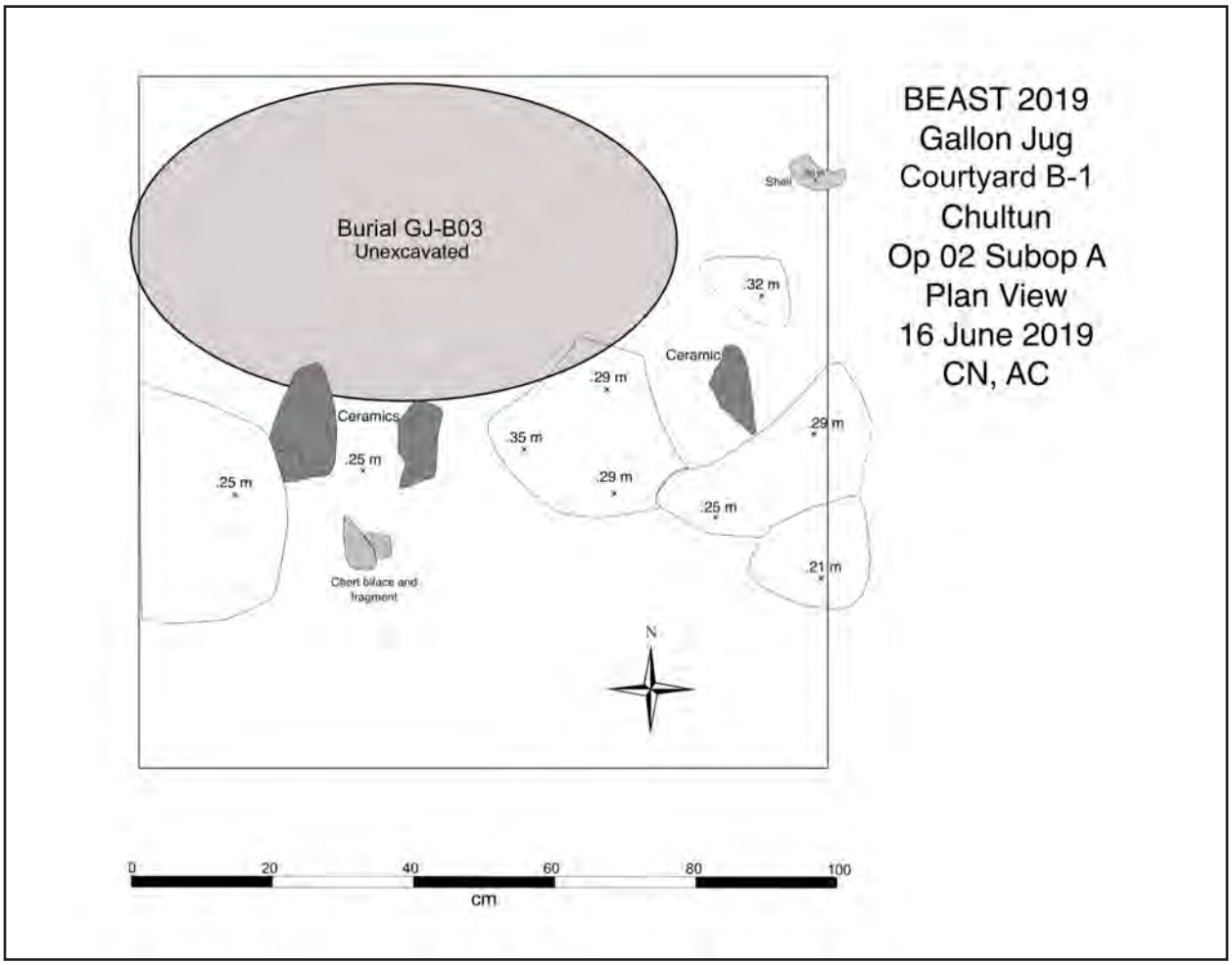

Figure 4.16. Plan view of Burial GJ-02-B03 and associated artifacts.

rule out that function. The area surrounding the orifice was plastered in antiquity, but the interior did not show evidence of plastering. The burial, though not excavated completely, was not disturbed and may have been interred around the time of abandonment, and/or as a change in function for the chultun itself.

While we do not have strong evidence for the function of the chultun, it likely was used at some point for storage. Given the heat and humidity of the space, we are intrigued by the argument that chultuns may have been used for fermentation. When combined with the patolli boards and significant ceramic deposit on the floor of Structure B-4, a dedicated location for fermenting maize or fruit for use in divination rituals is a tantalizing possibility. Finally, Subops GJ-02-E and -Z helped us establish that the courtyard surface was 0.40 m below the ground surface uniformly across the group.

OPERATION GJ-03

One of our objectives for the 2019 field season included obtaining chronological information from other courtyard groups at Gallon Jug. This information would help us plan for more extensive excavations of courtyard groups in upcoming seasons. In order to reach this goal, we conducted preliminary test units in six outlying courtyard groups that comprise Group A at Gallon Jug, along with the Main Plaza (Plaza A-1), and include Courtyards A-2, A-3, A-4, A-5, and A-6. Courtyard A-6 was not mapped with the TDS and does not appear on our map. These groups were originally mapped by Guderjan's team in 1991 using a tape and compass (Guderjan et al. 1991). This season we expanded the map of Gallon Jug using a TDS to add topographic information, an effort that was directed by Julia Kleine assisted by field school students and workers from Sylvester Village (see Figure 4.1). This map helps us understand how courtyard groups were positioned on the landscape and in relation to each other and the site core. Excavations of one or two 1-x-1-m units were placed in the interior corners of the patio groups to ascertain the depth of cultural deposits and obtain ceramic sherds for chronological information. Field school student Alexia Calderon and several workers conducted these excavations.

Group A-2 consists of two connected courtyards located northeast of the Gallon Jug main plaza. They are each formed by three structures and are joined by a common structure oriented east/west and forming the southern edge northern courtyard and the northern edge of the southern courtyard. We placed two 1-x-1-m test units in Courtyard A-2, one in the northwest corner of the patio (Subop GJ-03-A) and one at the base of the eastern structure (Subop GJ-03-B). Subop GJ-03-A was excavated in two 10-cm lots and was closed when the excavators hit bedrock or sterile soil. The ceramics recovered were primarily Tepeu 2 (Late Classic period). Subop GJ-03-A was excavated in two lots to a total depth of 23 cm and recovered 35 ceramic sherds. Subop GJ-03-B was excavated in two lots to a depth of 50 cm. This unit encountered collapse from the eastern structure and a possible north/south oriented wall. Ceramics were abundant among the collapsed stones and included Tepeu 3 sherds in the upper lot and Tepeu 2 in the lower lot.

One unit (Subop GJ-03-C) was placed in the northwest corner of the southern section of Courtyard A-2. The total depth of excavations was 22 cm and the artifacts were abundant. We recovered Tepeu 1–3 sherds as well as debitage and obsidian flakes.

Courtyard A-3 is located directly north of the Gallon Jug main plaza, and about 20 m northwest of Courtyard A-2. The group includes two main structures that make up its northern and southern boundaries and a very low-lying platform to the west. Guderjan's map indicates

a low-lying platform to the east as well but that was not apparent to us. We placed two units here, one in the northwest corner (Subop GJ-03-D) and one in the southeast (Subop GJ-03-E). After removing the topsoil (Lot GJ-03-D-01) excavators encountered an abundance of sherds (n=273) as well as debitage. These sherds are Tepeu 2 in date. Ceramics dating from Tepeu 2 were plentiful (n=150) in Subop GJ-03-E as well, and we recovered two broken obsidian blades.

Courtyard A-4 is located west of the Gallon Jug main plaza and consists of an enigmatic series of low-lying platforms oriented east/west. We excavated one unit here, Subop GJ-03-H. Artifacts were sparse, but did include eroded Late Classic (Tepeu 2) sherds as well as Tepeu 3 sherds. Debitage and obsidian fragments were collected as well.

Courtyard A-5 is located south of the southwestern corner of the Gallon Jug main plaza. Architecturally it is one of the more interesting groups, consisting of four conjoined structures with an opening at the southeastern corner. There are a series of smaller mounds on top of the main structures, which appear in Guderjan's map as well, and are likely the well-preserved corners of masonry rooms. We placed two test units in this group—Subop GJ-03-G in the northwestern corner of the patio and Subop GJ-03-F just inside the opening at the southeast corner. Subop GJ-03-G was 20 cm deep and included eroded Late Classic period sherds. Similarly, Subop GJ-03-F was 25 cm deep and had poorly preserved Late Classic sherds as well as chert debitage.

Courtyard A-6 was located south/southeast of the Gallon Jug main plaza. It was not mapped with the TDS this season due to time constraints and dense forest undergrowth. Courtyard A-6 also has conjoined structures oriented roughly east/west that form a c-shaped patio with an opening to the southeast. We excavated one test unit in this group, Subop GJ-03-I, in the southeastern area of the group. Due to time constraints, only one lot was excavated in this unit, and it produced a sparse number of eroded Late Classic sherds.

The Gallon Jug test-pitting program revealed that occupation of the other settlement groups date to the Tepeu 2-3 period. Our test units were rather shallow and did not hit bedrock, suggesting that we learned mostly about the final phase of occupation at Gallon Jug. Regardless, we learned that it is likely that all of these courtyard groups were occupied at roughly the same time, when the Gallon Jug core reached its apogee.

CONCLUSION

During the 2019 season at Gallon Jug we were able to address our main research objectives through extensive excavations at Courtyard B-1 and targeted test units in five other courtyard groups (Op GJ-03). Courtyard B-1 was likely founded during the Early Classic period (AD 250–600), but possibly earlier during the Late Preclassic period.

Late Preclassic Chicanel ceramics were recovered in mixed contexts in Structure B-1, which is also set apart from the other buildings architecturally. This could be the earliest construction of the group, with the northern, southern, and western structures added together, likely during the Late Classic period. A possible remodeling event of Structure B-1 occurred sometime during the Late Classic period, when an individual was interred beneath an earlier floor. The other structures were occupied during the Late Classic period and likely abandoned sometime during the Terminal Classic period, after AD 850. The individual interred beneath the floor in the western room of Structure B-2 lived during the Terminal Classic period (cal AD 907–1020), indicating that people were

at least living in the area at this time and may have revisited the group to bury this person.

The structures that comprise Courtyard B-1 were used for different activities, likely including daily tasks such as grinding corn and sleeping, but also specialized ritual activities. Periodic burning on the floor of Structure B-1 may point to ritual, in addition to the enigmatic hole in the eastern wall. However, the patolli boards incised into the plaster floor of Structure B-4 make a compelling case for ritual activity associated with divination and the cosmos.

In addition, Structure B-4 was informative about socio-political relationships in the region. The patolli boards incised into the floor include styles that are found in the northern Maya lowlands (i.e., Chichen Itza and Dzibilchaltun) and even Teotihuacan in the Mexican highlands. This suggests that whomever incised these patolli was aware of a wider Mesoamerican tradition associated with different styles of patolli. Additionally, the architecture of Structure B-4 suggests to us that groups of people participated in the rituals conducted within, which means that the rituals may have been used to integrate and unify groups of people rather than exclude most people in favor of a private interaction. Further analysis of the significant ceramic deposit will clarify the function of this building.

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Initial Report on Tikin Ha and its Implications for Ancient Maya Political Organization in the Three Rivers Adaptive Region

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This chapter reports on the 2019 mapping and testing of Tikin Ha, Belize. We submitted a version of this report to the National Geographic Society in partial fulfillment of the requirements of Grant NGS-51012R-18.

In 2016, while inventorying trees, a logging crew working on Laguna Seca Ranch reported coming across large mounds near the remote northeastern corner of the property atop the Booth's River Escarpment, the rugged and hilly eastern limit of the Petén Karst Plateau (Figures 5.1 and 5.2). Laguna Seca Ranch is a portion of the lead author's archaeological permit area in northwestern Belize. Although the focus of Houk's research has been the large site of Chan Chich, he established the Belize Estates Archaeological Survey Team (BEAST) in 2013 to survey and investigate other sites in the permit area. The BEAST research area is part of the Three Rivers adaptive region (3RR). The region, which extends into Guatemala and Mexico, is home to a vast but unknown number of ancient Maya house mounds, sites, and ceremonial centers, abandoned and largely forgotten since AD 850. While the dense forests that still blanket much of the region have greatly limited systematic survey investigations, archaeologists generally believe that most of the largest sites are already known, having been "discovered" through a variety of means and brought to the attention of government officials and archaeologists working in the area over the past 100 years.

Representatives from The Forestland Group (TFG), which owns Laguna Seca Ranch, contacted Houk on January 11, 2017, and mentioned the report of large mounds on Block 420 of their property. In February 2017, we secured permission from the Institute of Archaeology in Belize and investigated the location described by the logging crew. We encountered a large, previously unrecorded, Maya site, which we designated BE-18 in the project's inventory of significant sites and initially named Xma Ha Ak'al, Mayan for "lagoon without water" (Houk et al. 2017). Subsequent discussions with Mayan speakers and the Institute of Archaeology led us to change the name of the site to Tikin Ha, Mayan for "dry water." Our small team, which consisted of the three lead authors of this report, had about three hours to explore the ruins—only enough time to produce a sketch map of a large plaza and associated structures (Figure 5.3) and to conduct one drone mission above the forest canopy. The initial assessment indicated that the plaza was the sixth largest known in the 3RR, measuring approximately 150 m north-

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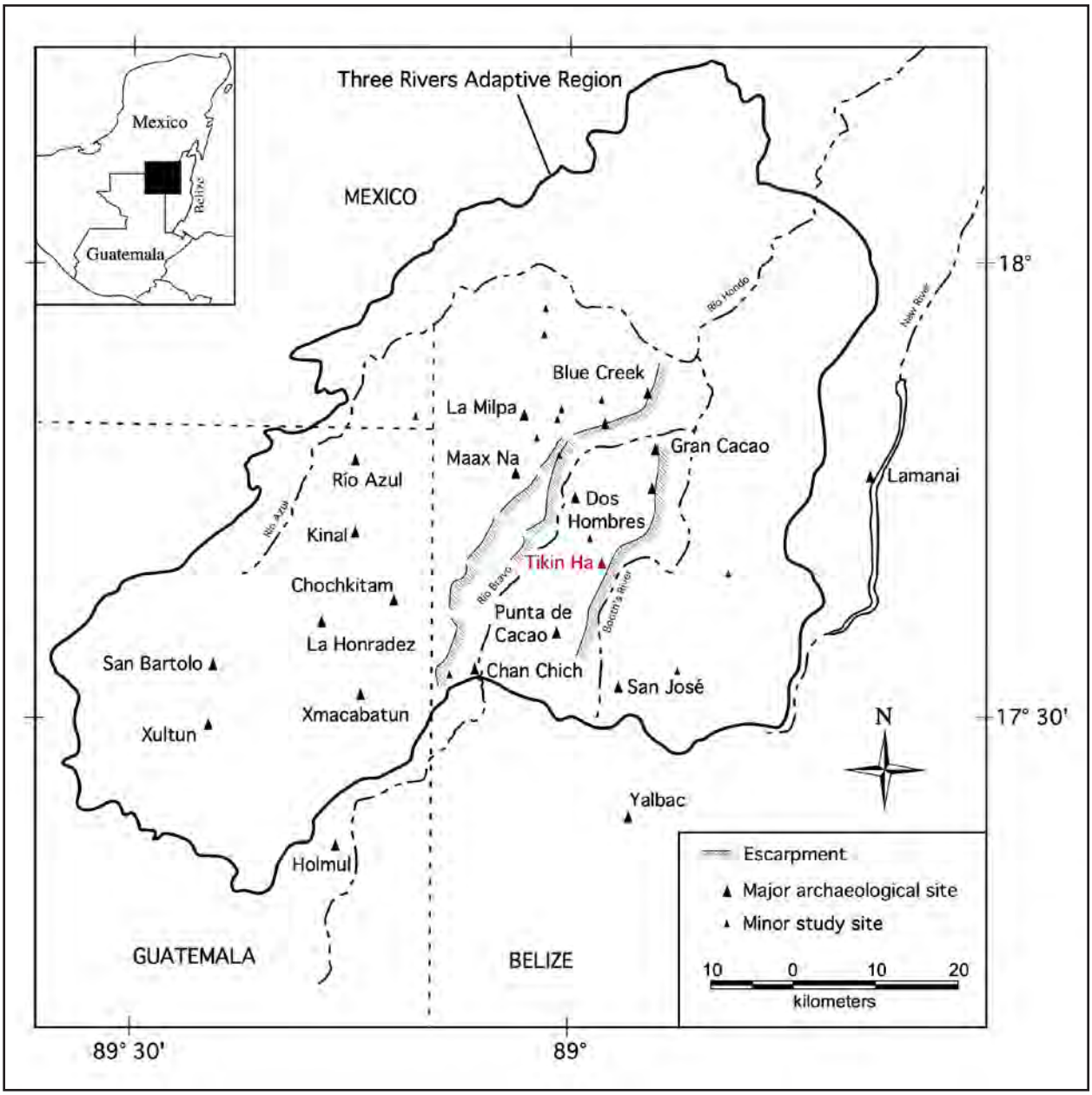

Figure 5.1. Location of Tikin Ha, the site initially reported by a logging crew, in the Three Rivers adaptive region.

south by 94 m east-west. The crew mapped an alignment of massive structures along the eastern edge of the plaza, with the tallest building, a temple-pyramid, rising an estimated 20 m above the plaza floor. The northern end of the plaza houses a large ball court oriented east-west, which is quite rare for ball courts in Belize (see Houk 2015). We documented one stela lying face down near a small temple-pyramid along the north side of the plaza and a second stone monument, tentatively designated a stela at the time, in the center of a small courtyard north of the plaza but attached to it by a *sacbe* (causeway). Based on the size of the plaza, we proposed that more monumental structures remained undiscovered at the site, including a large acropolis or several elite palace structures (Houk et al. 2017). A digital elevation model

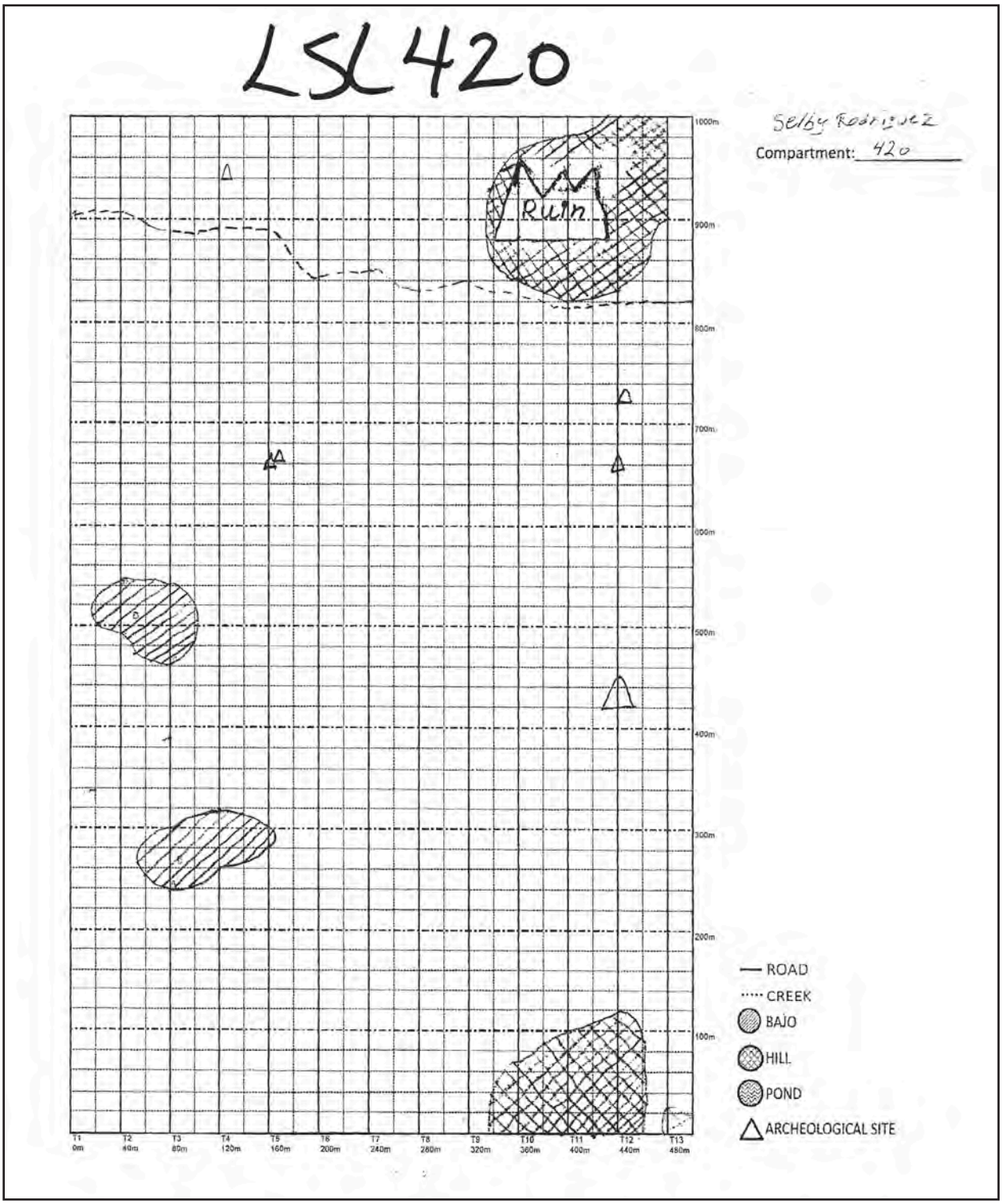

Figure 5.2. Original sketch map of the western half of Block 420, produced by the logging crew, showing the ruin in the north-central portion of the block. Map courtesy of Alex Finkral, TFG.

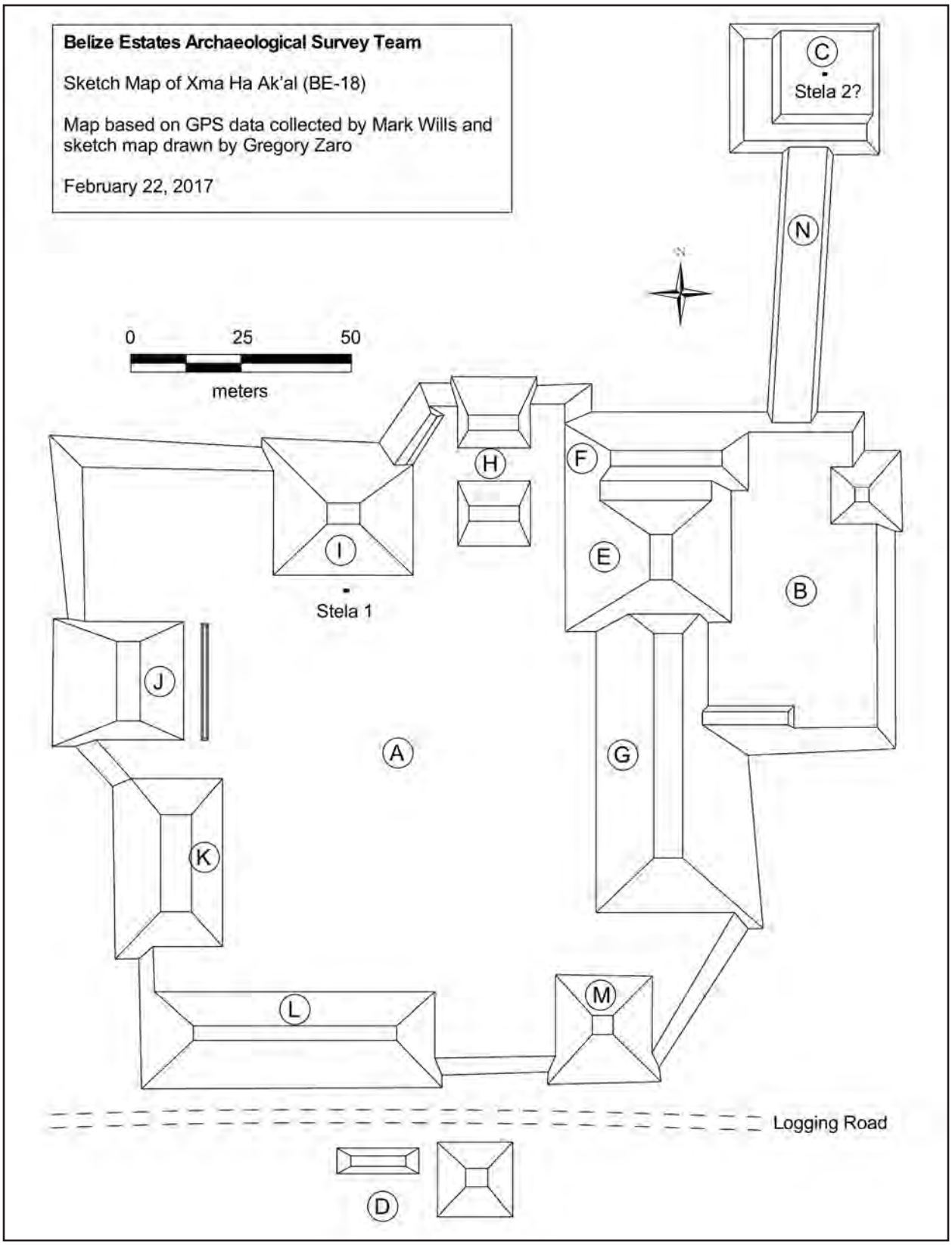

Figure 5.3. Sketch map of Tikin Ha (BE-18), originally known as Xma Ha Ak'al (after Houk et al. 2017:Figure 8.5).

(DEM) created from drone imagery of the top of the tree canopy at the site showed a direct correlation between the elevation of the tree tops and the heights of known ancient structures below the trees (Figure 5.4). Because the DEM showed another area of high canopy on the eastern edge of the mapped extent, we suspected more monumental structures would be discovered there.

SCOPE AND AIMS OF THE PROJECT

Ancient Maya civilization is an important part of the human journey, as it thrived for nearly 3,000 years in the seemingly inhospitable landscape and environment of the Yucatan Peninsula. Maya civilization is perhaps best known for its Classic period (AD 250 to 810), during which it peaked in terms of population, number of settlements, sizes of cities, and number of stone monuments. It is from this period that we also have the most extensive corpus of written records, largely from carved stone stelae, which detail the histories of individuals Maya kings and queens (Martin and Grube 2008). The emerging picture is of a city-state culture (e.g., Hansen 2000:16–17) politically divided into a large number of polities or kingdoms. Some kingdoms exercised greater power than others, even directing the affairs of weaker,

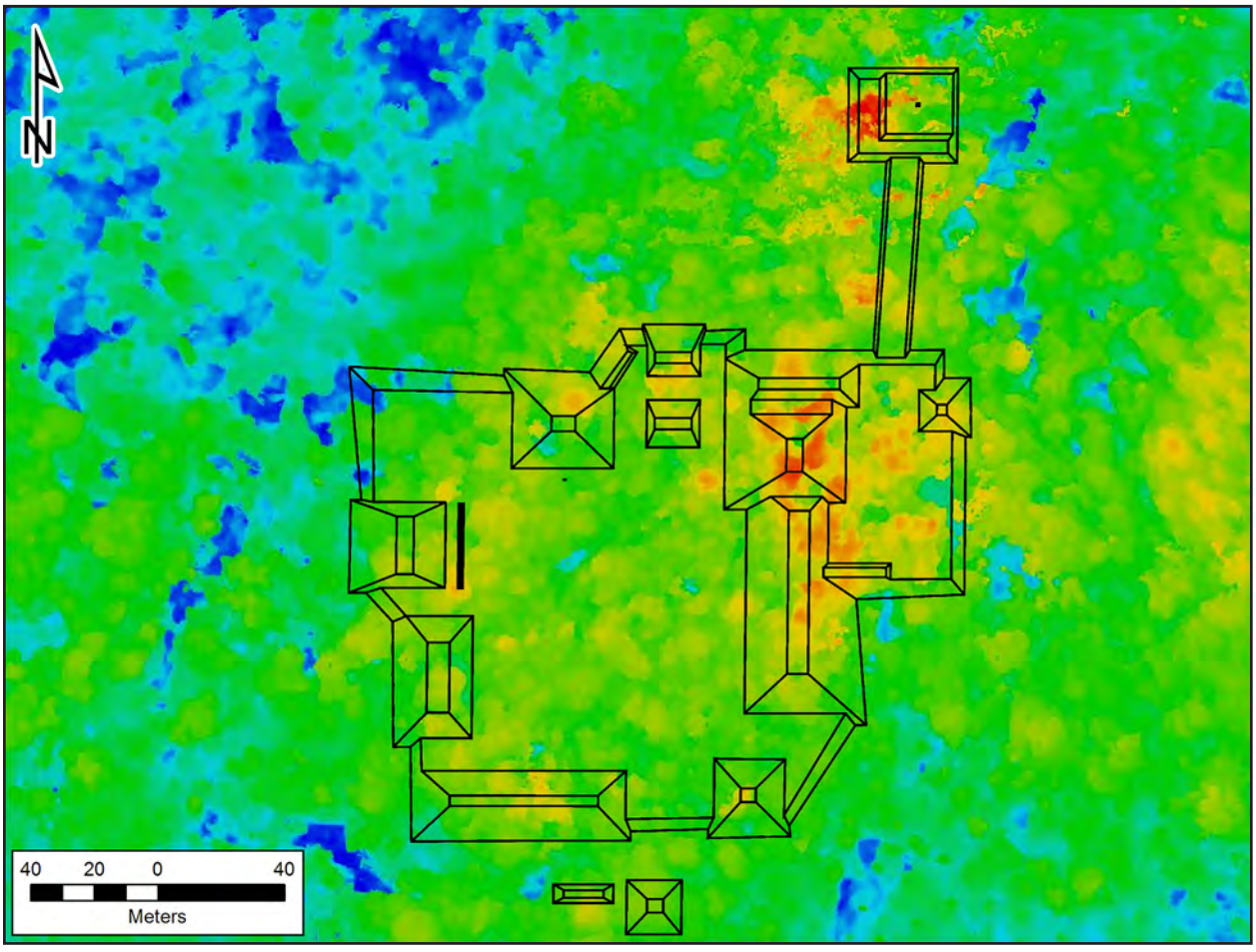

Figure 5.4. DEM of the forest canopy at BE-18 with the locations of mapped structures superimposed. Note the rough correspondence between the highest canopy (in orange) and the mapped plaza and structures. The blue areas are areas where the canopy's top is lower in elevation, reflecting the natural drop where the ground slopes downward to the north and west of the plaza (after Houk et al. 2017:Figure 8.7).

subordinate kingdoms. However, most polities likely operated autonomously with respect to their internal affairs (Houk 2015:26).

Garrison (2007) employed the term "territory" to describe what Hansen (2000) referred to as a city-state and what Houk (2015) referred to as a kingdom. Although significant gaps exist in the settlement data from the 3RR, Garrison's (2007) study of political organization during the Classic period concluded that the 3RR was divided into 10 distinct territories, each controlled from a capital. The territorial capitals of the 3RR are characterized by having one very large plaza, and Garrison (2007:319) proposed that "the large plazas of the Three Rivers region are explicit statements of hierarchical control over their hinterland populations during the Late Classic Period."

The intent of our project was to map and test Tikin Ha in the context of this regional characterization. Based on our preliminary estimates of its size, we believed the site has the potential to fundamentally change our current models of the Classic-period political landscape of the region and our understanding of how the Maya built cities in this part of their world.

Prior to initiating the National Geographic funded research, little was known about Tikin Ha except that it is large and generally well preserved. With NGS support, our ultimate goal was to reconsider Garrison's (2007) territory model and Houk's (2015) site-planning study in light of this discovery. To achieve that objective, we had to first systematically explore the site, determine the extent of the monumental precinct, map the ruins, and conduct limited testing excavations to determine the site's age. Secondary objectives were to carefully examine the two known stone monuments for evidence of hieroglyphic texts, locate any additional monuments that may exist, and examine the ball court's architectural form. Accomplishing these goals would allow us to compare Tikin Ha to other major ceremonial centers in the area in the context of existing models of political organization (see Garrison 2007; Garrison and Dunning 2009; Houk 2015).

To encourage continued conservation efforts and protection of cultural resources, we also proposed to conduct outreach to a number of local stakeholders: the teachers and school children at the Casey Community School in Gallon Jug, Belize (the site of our research base), and the logging crews who initially reported the site.

THE TERRITORY MODEL OF POLITICAL ORGANIZATION IN THE 3RR

Based on primary research in the Guatemalan portion of the 3RR and published reports from other sites, Garrison (2007:275) proposed that 10 territories occupied the 3RR but noted that the "area covered by the territories identified thus far does not cover the entire Three Rivers region," and proposed that "the southeastern portion of the Three Rivers region [where Tikin Ha is located] is also insufficiently covered by the current territories."

As defined by Garrison (2007) and Garrison and Dunning (2009:526), a territory is "an area of land and population under the jurisdiction of a particular capital." A territory is both a political entity and a "self-contained social and economic entity" (Garrison and Dunning 2009:527). A capital, minor centers, and more abundant residential sites comprise the settlement within a territory, and Garrison (2007:275–276) proposed that in the 3RR region natural physiographic features likely served as boundaries between territories.

According to Garrison and Dunning (2009:530), the defining features of capitals are monumental structures, at least one large

public plaza, at least one ball court, one or more stelae, and multiple courtyards. They also note that the stelae are usually carved and that capitals from the Classic period have emblem glyphs, signaling the presence of a royal court with "a *k'uhul ajaw* ('holy lord'), or at least an *ajaw* ('lord')," ruling the territory (Garrison and Dunning 2009:530). Other than at La Milpa, however, carved stone monuments with surviving texts have not been found in the eastern half of the 3RR. It is not currently known whether this is due to the poor quality of the available limestone or because the major sites eschewed writing.

In this territory model, each capital may have one or more minor centers under its control. According to Garrison and Dunning (2009:532), "Each minor center exhibits some, but not all, of the following attributes: one or more public plazas, one or more courtyard groups, a ball court, one or more stelae (often blank), and one or more monumental structure. From a sociopolitical standpoint, minor centers would have been managed by nonroyal elites…"

MAYA CITY BUILDING IN THE EASTERN 3RR

In a study of Maya cities in the 3RR, Houk (2003:54) noted that the larger sites share some of the following site planning traits:

1. a large, rectangular plaza;
2. a quadrangle group attached to, and elevated above, the largest plaza;
3. an acropolis juxtaposed with the largest plaza;
4. a ball court mediating between the largest plaza and the acropolis;
5. at least one stela;
6. internal *sacbeob* connecting otherwise separated groups of the site core;
7. large radial *sacbeob*;
8. a north-south alignment of the major groups of architecture.

Houk (2003:54) also observed that sites generally fall into one of two groups. In the first group, the main plaza is at the north end of the site core and the acropolis is at the southern end. In the second group, the pattern is reversed. Geographically, the first group of sites occurs in the western part of the region, while the second group is found in the eastern part of the region. The sites in the western group, which include Dos Hombres, Chan Chich, and La Milpa, share many traits of the so called "Petén template" first identified by Wendy Ashmore (1991; see Houk 2015:272). Sites along the eastern edge of the 3RR, including Blue Creek, Gran Cacao, Punta de Cacao, and San José, seem to follow a northern-Belize pattern of city design, first noted by Hammond (1981:165) at sites like Nohmul and El Pozito. The major difference between the two groups of sites is the spatial relationship between the largest plaza and the acropolis at each site. While this may seem trivial, the "Petén template" used by the western sites may have deeper, cosmological significance (Ashmore 1991). Houk (1996, 2003) has previously proposed that the two groups reflect fundamentally different ideas about how to build Maya cities stemming from participation in different cultural/political interaction spheres.

PROJECT TIME LINE AND PERSONNEL

The Tikin Ha project staff consisted of seven archaeologists from the U.S. and Rafael Guerra, our local collaborator, from Belize. The Tikin Ha project began on February 20, 2019, when Brett A. Houk arrived with Briana Smith and Julia Kleine from the U.S. The advanced crew secured the archaeological permit from the Institute of Archaeology, purchased field

supplies, and met with Jeff Roberson, the manager of Yalbac Ranch and Laguna Seca Ranch. The other U.S. staff—Gregory Zaro, Mark D. Willis, Bridgette Degnan, and Cayden Willis—arrived on February 22. The entire crew traveled to Gallon Jug on February 23 and removed equipment and supplies from the project's storage facility in preparation for the fieldwork. On February 24, the crew conducted a reconnaissance trip to assess the road conditions to the site, discovering that it was impassable within a few kilometers of the site core. On February 25, we began fieldwork with a crew from Yalbac Ranch, as described below. Clearing, mapping, and exploration of the dense forest in and around the known plaza space began on day one, with initial excavations commencing on day two. Bridgette Degnan, Mark Willis, and Cayden Willis departed Belize on March 3. The Yalbac Ranch crew completed its final day at Tikin Ha on March 15. Four members of the Gallon Jug community also joined the project crew for two days per week, beginning March 10. All fieldwork at Tikin Ha was completed on March 23, with the crew departing Gallon Jug on March 27. As described below, Mark Willis returned to Belize during the summer field season of BEAST to conduct an aerial reconnaissance of the permit area, including Tikin Ha. That work took place between June 20 and June 23, 2019.

METHODS

The data collection methods and procedures used in the field differed slightly from those described in the original proposal. Because the timing of our fieldwork coincided with the beginning of the logging season on Laguna Seca and Yalbac Ranches, we were able to hire a crew of 12 Yalbac workers who were camped nearby. This larger-than-expected crew allowed us to pursue clearing, mapping, and excavations simultaneously, rather than sequentially.

Exploration and Reconnaissance

Our grant proposal called for a small team of archaeologists and local workers to systematically explore the areas around the known plaza to look for other groups of monumental architecture. Our exploration involved cutting walking paths, called *brechas*, in various directions from the known plaza. Initially, we explored to the east to visit the area of high canopy seen in the 2017 DEM (see Figure 5.4), but eventually had crews cut *brechas* to the north, northwest, southwest, south, southeast, and east, as well as more direct walking trails between discovered groups of architecture. One *brecha* extended from the site core to the base of the Booth's River Escarpment, terminating at the Booth's River Marsh, approximately 1.1 km southeast of the site core. We used the Avenza app on iPhones to record the location of discovered mounds on a topographic map of the area provided by Yalbac Ranch.

Site Clearing

To facilitate mapping, workers used machetes to clear major architectural groups of undergrowth. Clearing extended up to 30 m beyond the bases of monumental groups to allow adequate mapping coverage. The impact from clearing was kept to a minimum as only smaller plants were cut down facilitate mapping by enhancing visibility.

Mapping

Mapping proceeded in two phases. Mark Willis initially established a series of control points around the large plaza with 40-cm-long pieces of rebar hammered into the ground and flagged with orange or white flagging tape. Willis then used an iGage iG3S GNSS unit to determine the UTM coordinates for each control point. Because the tree canopy diminished the accuracy of the GPS coordinates, we ultimately

only used the coordinates from a primary datum in the southeastern part of the large plaza to establish a UTM grid across the site. For the initial mapping, Willis and Julia Kleine used a reflectorless Leica TS15 Total Data Station (TDS) to establish control points and map the large plaza at the site. The reflectorless TDS allowed the operator to record topographic data simply by "shooting" the ground surface without requiring someone else to hold a prism pole. While this method is fast—Willis and Kleine shot approximately 10,200 points in 6 days—it lacks the precision of the method used in the second phase, since existing vegetation, tree falls, and cleared understory often obscured the actual ground surface. Willis ultimately discarded approximately 680 points.

Following Willis' departure on March 3, Houk and Kleine used a Nikon DTM 322+ TDS and Spectra Precision Nomad data collector running Survey Pro software to map additional groups of architecture and refine areas of the large plaza's map. The Nikon TDS required an operator and a second person to position a prism pole for each shot. Although this was slower than mapping with the Leica TDS—Houk and Kleine shot 2,871 points at the site core and 1,178 at two outlying courtyard groups in approximately 14 days—the person holding prism pole selected shots to record the specific topographic or architectural data.

Houk downloaded the TDS data each night and used Golden Software's Surfer to inspect the data. Ultimately, Houk used Surfer to produce contour and shaded relief maps of the site and Canvas Draw to create rectified—or prismatic—maps of the ruins based on contours and field observations. Zaro and Briana Smith made pace and compass prismatic maps of the remaining mounds and courtyards discovered at the site.

Based on the spatial arrangement of structures, Houk and Zaro subdivided the site into groups, labeled sequentially by letter. Within each group, plazas and courtyards are numbered sequentially, prefixed by the group designation. Plazas are designated first, followed by courtyards. Thus, in Group A, there is Plaza A-1, followed by Courtyard A-2, Courtyard A-3, and so forth. Structures are numbered sequentially by group, prefixed by the group designation. In general, numbering begins with the tallest structure in each group—or courtyard—and the proceeds in an orderly fashion from that point. Stone monuments are numbered sequentially by type (i.e., Stela 1, Stela 2, and so forth, and Altar 1, Altar 2, and so forth).

Structure Documentation

In addition to mapping each structure with a TDS, Zaro and Houk made notes on structures to record looters' trenches and features like possible staircase or exposed walls. Each looters' trench was numbered by structure, photographed, measured, and described.

Excavations

To establish the chronology and age of Tikin Ha, crews excavated eight test pits at the site in plazas or courtyards. Zaro oversaw the overall excavation program, and Briana Smith and Bridgette Degnan supervised individual excavation units. The excavations followed the standard methods used by BEAST (Houk and Zaro 2015). In all cases, units were excavated in cultural/natural levels to bedrock to document the number of construction episodes.

Ceramics

Crews collected all ceramics larger than 2 cm in diameter from excavated contexts. During the documentation of Stela 1 and a looters' trench, crews collected additional ceramics for analysis. Project ceramicist Dr. Fred Valdez

analyzed the ceramics using the traditional type:variety-mode analysis method (Gifford 1976; Sabloff 1975).

Radiocarbon Sampling

We had proposed to submit up to 10 charcoal samples for radiometric dating, but our excavations only recovered three very small samples, none of which, we believe, warrant analysis. Houk did manage to collect a faunal bone from a primary context in a looters' trench—discussed below—which has since been submitted to Penn State University for radiocarbon dating.

Other Documentation Methods

As described elsewhere (Houk 2014; Houk and Zaro 2015), BEAST uses a customized FileMaker Pro database to collect and store excavation and analysis information. In the field, the data are collected on iPad Minis using FileMaker Go 17. The field data are synced with the master database, deployed on a Mac Mini in the field laboratory running FileMaker Pro 17. Additionally, BEAST uses iPad Pros and Graphic—a drawing app—to draw plan maps and profiles in the field. In certain situations, the crew uses Structure from Motion to document excavations and features. A crew member takes multiple photographs of the subject on a project Nikon camera or an iPhone in the field following procedures outlined by Houk and Zaro (2015) and then builds a three-dimensional model on a MacBook Pro running Agisoft Photoscan Pro software. Crew members also documented structures, excavations, and looters' trenches with digital photographs and recorded daily activities in field journals.

Outreach

To encourage continued conservation efforts and protection of cultural resources, we conducted outreach to a number of local stakeholders: the teachers and school children at the Casey Community School in Gallon Jug, Belize (the site of our research base), and the logging crews who initially reported the site. Our proposal called for us to work with the teachers to develop and deliver short lesson plans to students about archaeology, the ancient Maya, and our discoveries at Tikin Ha, followed by a visit to our field laboratory in Gallon Jug for short tutorials in artifact processing and collections management. The plan was to build lesson plans collaboratively with teachers in a way that facilitates their delivery during periods when archaeologists may not be on site.

To involve loggers and property managers, we proposed to work with the Laguna Seca Ranch manager to schedule their visit to Tikin Ha to tour the site and share our findings. Engaging the loggers is extremely important because they systematically explore the forest each year to inventory trees and plan their logging activities and are therefore likely to come across other unrecorded Maya sites. By sharing our findings and explaining the importance of protecting the country's cultural heritage, we hoped to foster a collaboration based on trust and common purpose.

RESULTS

Exploration, Mapping, and Test Excavations

Exploration at Tikin Ha resulted in the documentation of the large plaza (Group A) originally visited by Houk and colleagues (2017) and the discovery of another large monumental group of architecture to the east of the plaza (Group B), a large courtyard group west of the plaza (Group C), three moderate-to-large courtyards southeast of the plaza (Group D), and smaller mounds and courtyards along various survey *brechas* (Figure 5.5). Of these, crews managed to create topographic maps

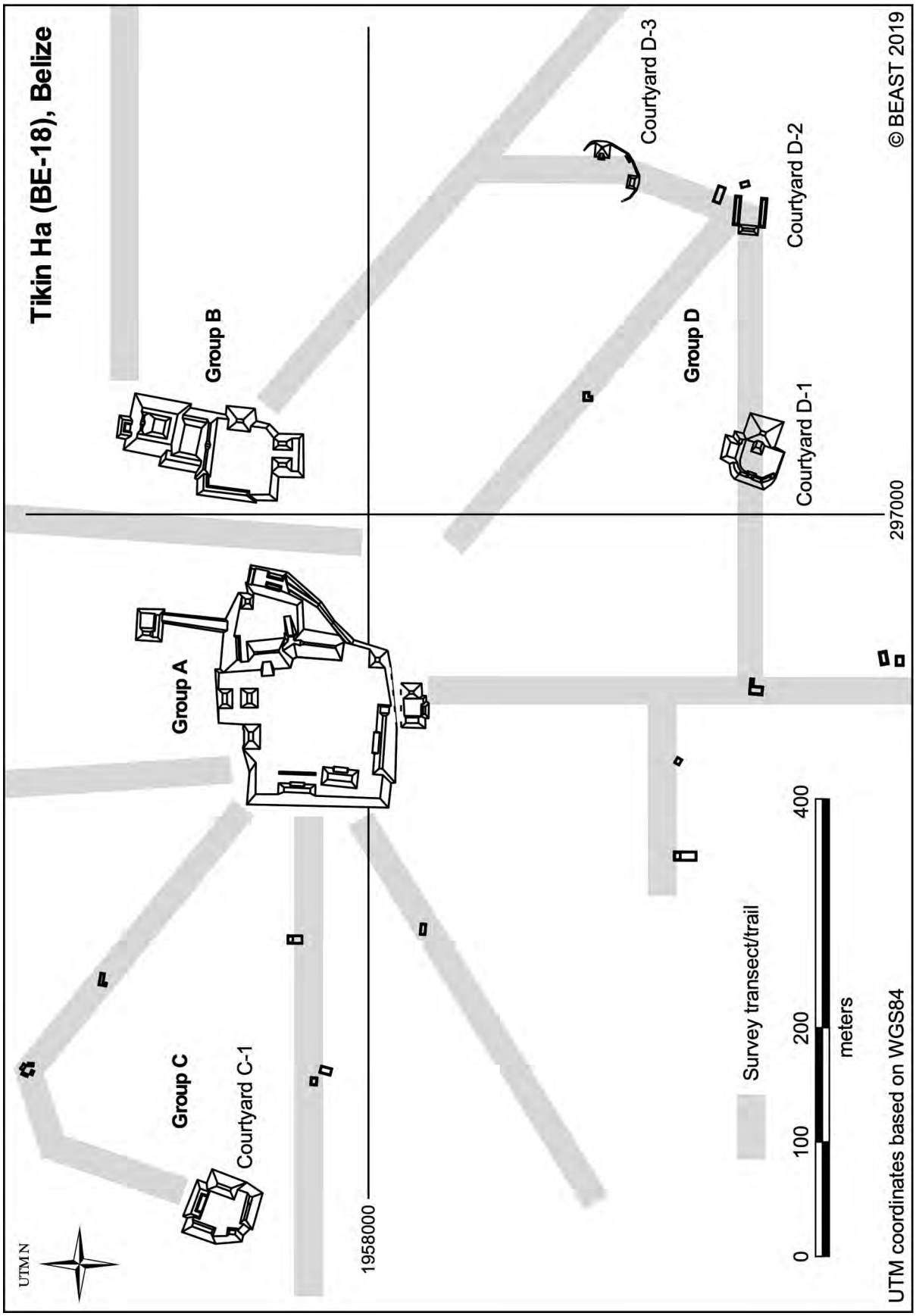

Figure 5.5. Prismatic map of Tikin Ha showing the location of survey *brechas* and known architectural groups.

of Group A, Group B, Group C (Courtyard C-1), and Courtyard D-1 (the largest courtyard in Group D). Using hardcopy versions of the topographic maps of the site core, Courtyard C-1, and Courtyard D-1, Houk drew prismatic maps of the groups based on contours and field observations. Zaro made pace and compass prismatic maps of Courtyards D-2 and D-3, and, along with Smith, the remaining small mounds discovered near *brechas* at the site.

Groups A and B constitute the monumental core of Tikin Ha. The final topographic map of the two groups is based on over 12,500 individual topographic points (Figure 5.6). The difference between data collected with the reflectorless TDS (Group A) and data collected using the prism (Group B) is visible in Figure 5.6. The somewhat irregular looking contour lines in Group A are due to the fact that some of the points collected with the reflectorless TDS are actually above the ground surface—the result of the TDS laser hitting a leaf or branch, for example, instead of the ground surface.

Group A

Group A comprises the Main Plaza (Plaza A-1), three associated courtyards, two *sacbeob*, and 21 numbered structures (Table 5.1; Figure 5.7). It is also home to Stelae 1, 2, and 3, and Altars 1 and 2. Stela 4 is located between Groups A and B.

The Main Plaza occupies a large, artificial platform bound by structures or clearly defined platform edges on all sides with the exception of a small portion on its southern edge and another on its northwestern corner. Along its southern edge, an old logging road separates the plaza from Courtyard A-4 to the south. The roadbed appears to have been bulldozed, so it is unknown if the plaza and courtyard were originally connected or not. At the northwestern corner of the plaza, the natural ground surface is slightly higher than the plaza surface on the northern side of Structure A-9, but it drops away steeply to the north approximately 20 m past the structure. The maximum length and width of the Main Plaza are 150 m north-south and 130 m east-west; the open floor space of the plaza—the plaza's internal perimeter minus the footprints of structures contained within it—covers 13,139 m^2.

Despite the massive structures that surround it and the steep drops that mark its western and eastern edges, the Main Plaza appears to have been constructed in one event, which probably involved cutting and filling to create a level plaza area. Although the plaza surface is approximately 6 to 7 m higher than the natural ground surface at the base of its platform, the five excavations placed on the plaza's surface (Subops TH-01-A–D and -H) all encountered bedrock between 0.345 m and 0.49 m below modern ground surface (Table 5.2).

Structures A-1 through A-3 form the eastern side of the plaza. The northern two of these massive buildings also form the western side of Courtyard A-2, an irregular, elevated group attached to the northeastern corner of the plaza. The floor of the courtyard is approximately 7.5 m higher than the floor of the Main Plaza. Structure A-1, a large temple-pyramid, appears to have a stairway at its western base. Structure A-3, a range building, may have a stairway as well, but collapse debris and backdirt form a looters' trench make it difficult to determine. Stela 3 (Figure 5.8), a broken, plain monument, sits at the base of Structure A-3.

Over 20 m to the south, a small temple-pyramid (Structure A-4) occupies the southeastern corner of the plaza. Midway between it and Structure A-3 are Stela 2 and Altar 2 (Figure 5.9; Table 5.3). The stela is shattered and scattered behind the altar, although its base is still upright and in situ. Although a careful inspection of the monument failed to discover any recognizable shapes or hieroglyphs, one

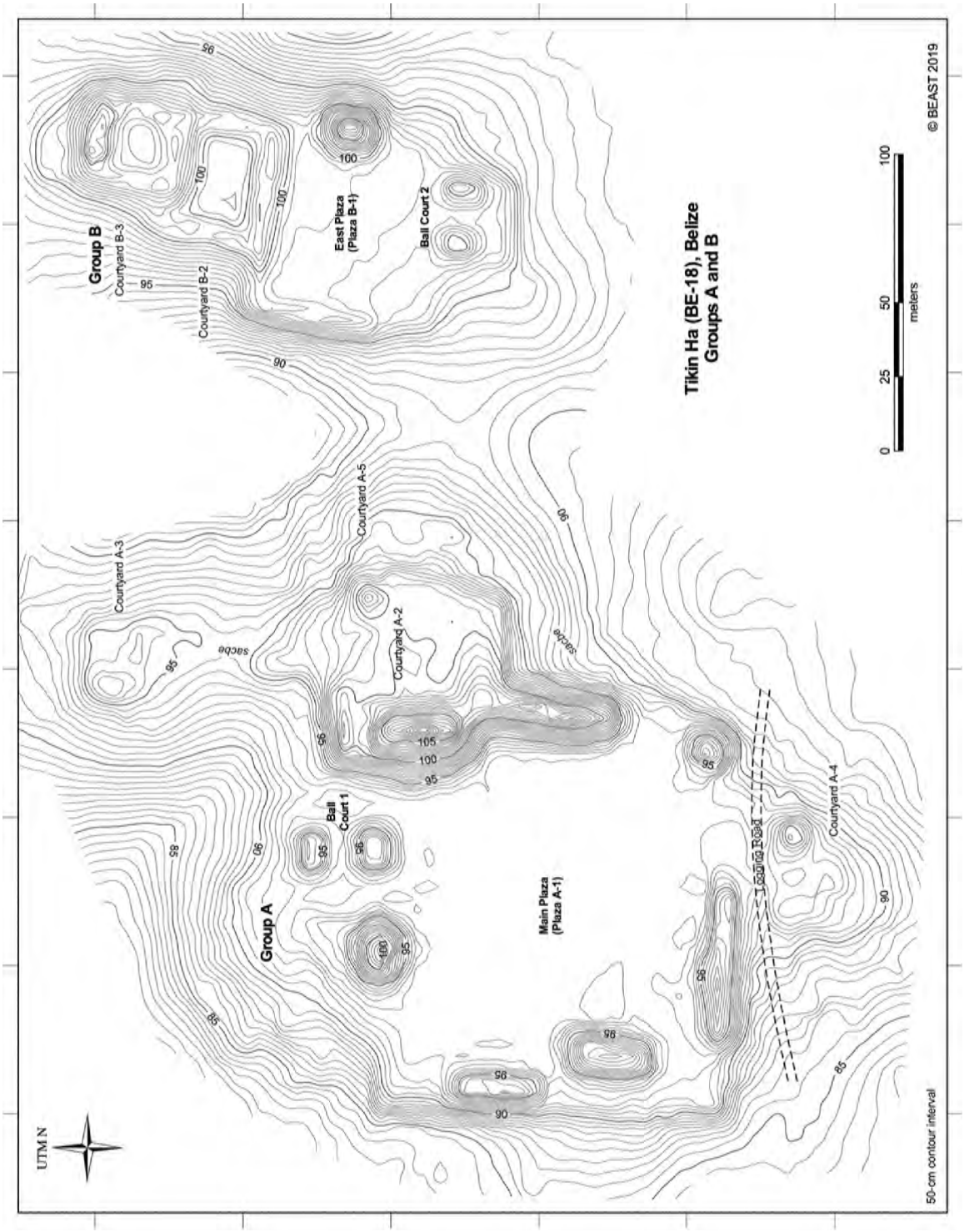

Figure 5.6. Contour map of Groups A and B at Tikin Ha.

Table 5.1. Data on Structures in Groups A and B at Tikin Ha

#	Type	Associated Courtyard/Plaza	Orientation (degrees)	Height (m)	Number of Looters' Trenches	Looting Impact
A-1	Temple-pyramid	Main Plaza and Courtyard A-2	354	18.0	4	Minimal
A-2	Range building?	Main Plaza and Courtyard A-2	330	11.2	0	None
A-3	Range building	Main Plaza	7	11.9	1	Minimal
A-4	Temple-pyramid	Main Plaza	0	5.1	2	Severe
A-5	Range building	Main Plaza	94	6.2	0	None
A-6	Range building	Main Plaza	7	7.7	0	None
A-7	Range building	Main Plaza	3	5	0	None
A-8	Unknown, wall	Main Plaza	3	0.6	0	None
A-9	Temple-pyramid	Main Plaza	91	10.2	0	None
A-10	Ball court	Main Plaza	91	4.6	0	None
A-11	Ball court	Main Plaza	91	5.4	0	None
A-12	Unknown, platform?	Courtyard A-2	87	2.2	0	None
A-13	Shrine?	Courtyard A-2	90	2.6	0	None
A-14	Unknown	Courtyard A-2	?	3.6	0	None
A-15	Unknown, platform?	Courtyard A-5	16	1.0	0	None
A-16	Unknown, platform?	Courtyard A-5	16	1.0	0	None
A-17	Range building?	Courtyard A-3	3	1.6	0	None
A-18	Range building	Courtyard A-3	94	1.0	0	None
A-19	Eastern shrine?	Courtyard A-4	0	3.3	1	Severe
A-20	Unknown, platform?	Courtyard A-4	92	0.8	0	None
A-21	Range building?	Courtyard A-4	0	1.0	0	None
B-1	Temple-pyramid	East Plaza	3	9.2	3	Severe
B-2	Ball court	East Plaza	2	3.0	0	None
B-3	Ball court	East Plaza	1	2.5	0	None
B-4	Range building	East Plaza	7	1.5	0	None
B-5	Range building	East Plaza and Courtyard B-2	98	4.4	0	None
B-6	Range building	Courtyard B-2	12	2.3	0	None
B-7	Range building	Courtyard B-2	10	2.5	1	Minimal
B-8	Range building	Courtyards B-2 and B-3	101	5.2	0	None
B-9	Range building	Courtyard B-3	11	2.2	0	None
B-10	Range building	Courtyard B-3	11	2.2	0	None
B-11	Range building	Courtyard B-3	100	4.6	6	Severe
B-12	C-shaped platform	Base of Courtyard B-3	100	0.4	0	None

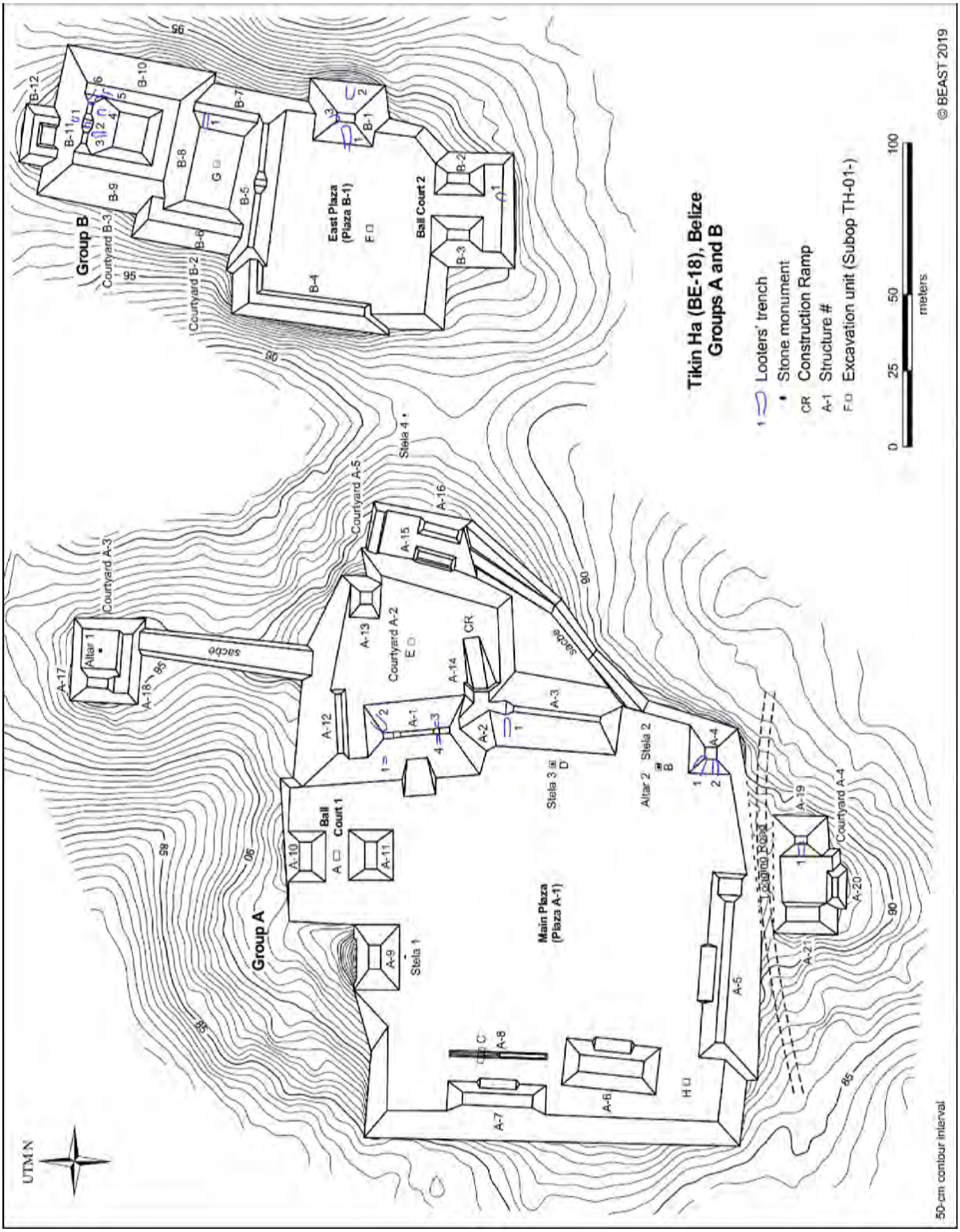

Figure 5.7. Prismatic map of Groups A and B at Tikin Ha.

Table 5.2. Depth of Bedrock in Excavations at Tikin Ha

Subop TH-01-	Area	Ground Surface Elevation (masl)	Bedrock Elevation (masl)	Bedrock Depth (m)
A	Main Plaza	92.142	91.662	0.48
B	Main Plaza	92.244	91.899	0.35
C	Main Plaza	92.880	92.390	0.49
D	Main Plaza	92.423	91.883	0.54
E	Courtyard A-2	100.258	99.728	0.53
F	East Plaza	98.069	97.759	0.31
G	Courtayard B-2	99.118	98.628	0.49
H	Main Plaza	92.072	91.622	0.45

Figure 5.8. Photograph of Stela 3. Camera view to the east.

fragment of the stela shows clear evidence that it was once carved (Figure 5.10). The placement of Altar 2 and Stela 2 suggest that the gap between Structures A-3 and A-4 may have been a formal entrance into the plaza. As discussed below, an apparent *sacbe* does enter the plaza near the southeastern corner of Structure A-3, supporting this interpretation.

Structure A-4 is a small temple-pyramid occupying the southeastern corner of the plaza. It measures 5.1 m in height and is severely damaged be two looters' trenches on the northwest and west face of the structure. Trench 1, the most pronounced and most destructive of the two, extends from the base of the mound to its summit. The area just below the summit is fairly cavernous, with an opening visible to the surface above. The second is more or less parallel to the first and extends from the base up to about three fourths the height of the mound. Profiles do not offer a great deal of information, but they evince mostly construction fill and possibly one north-south-oriented architectural face (west facing wall) that was cut by the trench/tunnel.

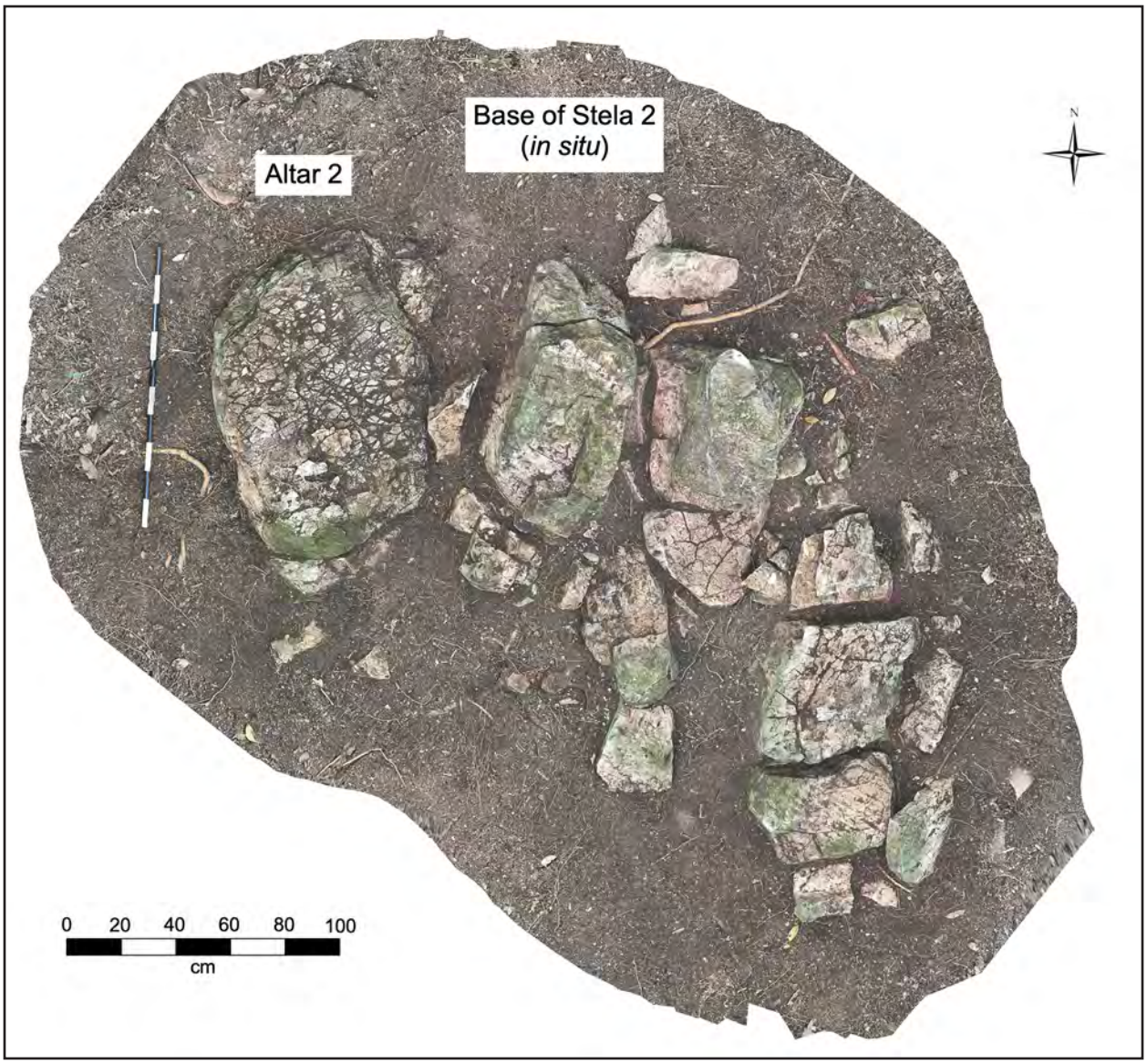

Figure 5.9. SfM orthophoto of Altar 2 and Stela 2 prior to excavation of Subop TH-01-B. Note the shattered and scattered stela fragments east of the altar.

Table 5.3. Stone Monuments at Tikin Ha

Monument	Location	Description
Stela 1	Main Plaza, base of Structure A-9	Stela 1 was found face down in front of Structure A-9. As noted upon our initial inspection in 2017, it appears that looters had originally cleaned around this monument and attempted to lift it. The monument is uncarved and measures 128 x 78 cm, with a thickness of 35 cm. It is clearly broken at one end, if not both ends. A second fragment found nearby may have been part of Stela 1 and measures 68 x 60 cm, with a thickness of 32 cm. Upon clearing debris from the stela, we collected nearly 90 Tepeu 3 sherds, with a few possible Postclassic sherds in the mix.

Table 5.3. Stone Monuments at Tikin Ha (continued)

Monument	Location	Description
Stela 2	Main Plaza, southeastern corner between Structures A-3 and A-4, with Altar 2	Set 23 cm east of Altar 2, the base of this stela is in situ, but the upper portion is broken. The top of the monument is scattered to the east of the base in approximately 16 large fragments and a half dozen small fragments. The base is 34 cm thick, 122 cm wide, and 42 cm tall. Excavations determined the base extends another 43 cm below the surface. The top is too fragmented to estimate the monument's original height. Traces of faint carving are present on one fragment from the top portion of the monument, but no hieroglyphs were observed. Excavations on the western side of the monument did not encounter a cache. The stela and altar pair may be associated with a formal entrance into the plaza through the gap between Structures A-3 and A-4.
Stela 3	Main Plaza, base of Structure A-3	This uncarved monument is broken into two pieces. The base stands upright and appears to be in situ. The second fragment was also encountered in an upright position on the ground surface adjacent to the basal fragment, but it is unclear if it fell into this position or was reset sometime later from some other collapsed position. The basal fragment measures 90 cm tall, 96 cm wide, and 31 cm thick. The second fragment measures 0.91 m tall, 73 cm wide, and 29 cm thick.
Stela 4	Between Groups A and B	Plain, broken stela set midway Between East Plaza and Courtyard A-5. The monument faces east-west (its long axis is oriented 10° east of north), toward the two architectural groups and may be associated with an unmapped sacbe connecting the two groups. The base is in situ, but the top of the stela is broken off, laying to the east of the base. Base is 75 cm tall (above ground surface), 97 cm wide, and 43 cm thick. The top is broken into two pieces and would have added 61 cm to the height of the monument.
Altar 1	Courtyard A-3	Altar 1 sits in the center of Courtyard A-3, framed by Structure A-17 to the west and Structure A-18 to the south. The primary piece lies flat and measures 100 x 80 cm, is oriented 71° east of north, and is 32 cm thick. It does not appear to be carved, but it is eroded and obscured by roots making it difficult to determine with certainty. Several smaller stone fragments lie just west of the monument and may have broken off it.
Altar 2	Main Plaza, southeastern corner between Structures A-3 and A-4, with Stela 2	Set only 23 cm west of Stela 2, this eroded, uncarved altar is approximately 35 cm thick, 108 cm long, and 78 cm wide. Small pieces have spalled off its edges, so it was originally larger. It is oriented approximately 16° west of north. In plan view, it is roughly rectangular with rounded corners. Excavations beneath the monument did not encounter a cache. The stela and altar pair may be associated with a formal entrance into the plaza through the gap between Structures A-3 and A-4.
Altar 3	Courtyard D-1	Altar 3 sits in the central area of Courtyard D-1. This small, uncarved monument measures 100.5 cm long by 85 cm wide and is 15 cm thick. It is rectangular in plan view.

Figure 5.10. Photograph of fragment of Stela 2 with faint carving.

There is a 30-m wide gap between Structure A-4 and Structure A-5, a range building marking the southern edge of the plaza. The plaza floor between these two buildings is irregular and may have been damaged during the bulldozing of the logging road that separates the plaza from Courtyard A-4 to the south. Without cleaning the road cut, it is not possible to determine if the plaza and courtyard were once connected. Structure A-5 has a clear stairway bulge and an odd low platform attached to its eastern end.

Structure A-6 is atypically placed away from the plaza's edge, occupying a portion of the plaza floor between the southwestern corner of the plaza and Structure A-7. This 7.7-m tall range building sits approximately 10 m east of the western edge of the plaza. It has indications of a stairway.

Structure A-7 is 5 m north of Structure A-6 but it is built on the edge of the plaza. Slightly shorter (5 m) than its southern neighbor, at 32.5 m long it is approximately the same length as Structure A-6. It also has indication of a stairway. Structure A-7 is paired with Structure A-8, a low mound of the same length, 8 m east of Structure A-7. At 0.3 m high along its southern half and 0.6 m high along its northern half, Structure A-8 appears to be either a low platform or poorly preserved wall from surface indications.

Subop TH-01-C, a 2-x-5-m unit oriented east-west, straddled a portion of the structure's northern half. The excavation data suggest the feature is a low masonry wall, approximately 90 cm wide. The wall is preserved better on its eastern side in our unit and appears to be constructed of cut limestone facing stones with cobble fill at its core (Figure 5.11). The facing blocks measure approximate 38 cm long, 35 cm wide, and 12 cm thick. In Subop C, the wall was only preserved to a maximum height of 25 cm. Our excavations recovered abundant but eroded Tepeu 2 and 3 ceramic sherds from the collapse debris on either side of the feature, but

Figure 5.11. Photograph of Structure A-8 in Subop TH-01-C, camera facing north.

no other artifacts that might hint at the wall's function were recovered.

Structure A-9 is a 10.2-m tall unlooted temple-pyramid built at the northern edge of the plaza. The northwestern corner of the plaza is open, similar to the southwestern corner. As noted above, immediately behind the temple-pyramid, bedrock is higher than the plaza surface. Stela 1, originally discovered in 2017, was found face down in front of Structure A-9. As noted in our reconnaissance report, it appeared as if looters had originally cleaned around this monument and attempted to lift it (see Houk et al. 2017). In 2019, we cleared debris from the stela, collecting nearly 90 Tepeu 3 sherds as part of Lot TH-01-SF-01, with a few possible Postclassic sherds in the mix. Although we did not establish a formal excavation unit, we did raise the stela to inspect it. It is uncarved and measures 1.28 x 0.78 m, with a thickness of 0.35 m, and it is clearly broken at one end, if not both ends (Figure 5.12). A second fragment that may have been part of Stela 1 was also found nearby. It measures 0.68 x 0.60 m, with a thickness of 0.32 m.

East of Structure A-9, the plaza juts to the north and supports Ball Court 1, an east-west oriented court formed by Structures A-10 and A-11. The ball court's alley measures approximately 16.5 by 7.65 m. The northern mound is 4.64 m tall, while the southern mound is 5.4 m tall. Subop TH-01-A, a 2-x-3-m unit oriented east-west in the center of the alley, did not encounter any markers or caches and terminated on bedrock approximately 50 cm below the surface. The ceramic sherds from the single construction phase in this part of the plaza are Tepeu 3 types, suggesting a very late construction date for the ball court.

As shown in Table 5.1, the orientations of structures in the Main Plaza vary from 30° west of north (Structure A-2) to 7° east of north (Structures A-3 and A-6). Nowhere is the variability in orientation more noticeable than on the eastern side of the Main Plaza, where Structures A-1, A-2, and A-3, though connected to one another, have three different orientations. Structure A-1's 6° west of north alignment is perhaps most surprising since all of the other buildings in the plaza, with the exception of Structure A-2 (whose function is difficult to classify), are oriented north-south to a few degrees east of north.

Structures A-1 and A-2 face the Main Plaza but also form the western side of Courtyard A-2. This courtyard is unusual in several respects:

- Its edges are not rectified, giving it an irregular floor plan.
- Structure A-12, a low platform on the courtyard's northern edge, seems to face the northern end of Structure A-1, leaving a narrow space between the two buildings.
- Structure A-13, a possible shrine structure, is somewhat irregular in orientation; its mapped form is a "best guess" for the structure's shape.
- The courtyard's northern edge drops several meters to a *sacbe*, which extends northward to Courtyard A-3.
- Structure A-14, which abuts the back of Structure A-2, was apparently never completed; a sloping, irregular feature extending off the eastern end of Structure A-14 appears to be a construction ramp.
- The courtyard appears to be associated with Courtyard A-5, a lower platform attached to its eastern base. Courtyard A-5 has a low wall-like feature on its northern end and supports two parallel, 1-m high mounds that resemble a ball court in plan but not size. A *sacbe* connects from the southern end of Courtyard A-5 to the opening in the southeastern corner of the Main

Figure 5.12. Photograph of Stela 1 after being re-erected, camera facing north/northwest.

Plaza, implying some sort of functional relationship between the two groups.

Courtyard A-3, though small and housing only two modest structures, is arguably important given that it is physically connected to the Main Plaza group via a 60-m *sacbe* and contains a stone monument. Altar 1 sits in the center of the courtyard with additional stone pieces found just to its west (Figure 5.13). The primary piece measures 1.0 x 0.80 m, oriented 71° east of north, and with a thickness of 0.32 m. It appears to be uncarved but is partially obscured by tree roots.

Courtyard A-4 lies at the southern end of Group A, separated from the Main Plaza by an old logging road. The courtyard has a small eastern shrine/temple-pyramid, which has been severely damaged by a centerline looters' trench, and two smaller buildings on its southern and western sides. It is possible a fourth building once closed off the northern side of the courtyard, but damage from the logging road makes it difficult to determine.

Group B

Following terminology laid about by George Andrews (1975), Group B constitutes a small acropolis group. Andrews (1975:67) describes an acropolis group as follows:

The Maya Acropolis Group consists of a number of related structures of the palace or temple type, which are situated at various levels on a large platform or, more precisely, a series of platforms…Access to the upper levels of the acropolis is by means of stairways located at strategic points, thus establishing very controlled paths of movement into the complex from the plaza or terrace at the base of the supporting platform. The major stairway(s) give access to a series of courtyards and their

Figure 5.13. Photograph of Altar 1, camera facing west.

associated structures, which are organized sequentially; movement from one space to another can only be accomplished along a predetermined path. The sequence culminates in the most important building within the complex, usually a temple, and this building occupies a position which is farthest removed from the plaza below both in terms of height and distance. The pre-eminence of this singular building is reinforced by the fact that it is likely to be at the highest point within the entire city as well as within its own context.

In the case of Tikin Ha, the acropolis group contains a small plaza, referred to here as the East Plaza, which gives way to two increasingly smaller and more elevated courtyards to the north. The plaza is notable for both its badly looted eastern temple-pyramid, Structure B-1, and Ball Court 2. The ball court, comprising Structures B-2 and B-3, sits on a small platform that juts off of the southern end of the plaza. We propose that the formal access into the acropolis group and the East Plaza was through the plaza's southwestern edge, immediately south of Structure B-4, a low range building. Although we did not map it as such, there may be a *sacbe* connecting Group B to Group A at this proposed entrance point. The terrain forms a ridge between the two groups, and the Maya placed Stela 4 midway between the East Plaza and Courtyard A-5. Stela 4 is oriented north-south so that it "faces" both groups. Its base is still upright, but the top of the monument is broken off, laying east of its base (Figure 5.14).

A single test pit in the East Plaza, Subop TH-01-F, encountered a single construction episode overlying bedrock, encountered just 31 cm below surface. Ceramics from the construction fill are Late Classic in age; unfortunately, the few sherds could not be more precisely

Figure 5.14. Photograph of Stela 4, camera facing northwest.

dated. Although not shown on Figure 5.7, we documented unusually large stones in the western part of the East Plaza. A group of these stones—uncut or at most roughly shaped, small boulders—appears to form a circle with a shallow depression in its center, while others appeared less patterned in the same general area (Figure 5.15). The circular feature measures approximately 2 m in diameter. While it resembles a fire pit in form, there is no evidence of burning. We do not speculate as to the nature or origin of this feature but note its presence 10 m east of Structure B-4 and 23 m south of Structure B-5.

Courtyard B-2, the southern of two increasingly elevated courtyards in the acropolis group, is surrounded on all sides by range buildings. The formal entry into the courtyard was through the center of Structure A-5 where a depression is visible in the summit of the mound. Although steps are not evident on either side of the structure, we suspect they are present. Subop TH-01-G in the center of the courtyard encountered 50 cm of clayey matrix, likely formed due to poor drainage in the courtyard. The ceramics from this unit are Tepeu 3 in age.

A single looters' trench pierces Structure B-7 on the eastern side of the courtyard (Figure 5.16). The trench begins at the courtyard surface and extends nearly to the summit, before transitioning to a tunnel for its final 2 m. Of interest, the trench contains a nylon sack and pieces of apparent digging sticks, suggesting the trench is not extremely old. The trench exposed a plaster bench, facing south, and a floor at its base, with large boulder fill.

Figure 5.15. Photograph of stones on the surface of the East Plaza, camera facing south/southeast. The circular arrangement of stones is in front of Houk (upper left), and Ball Court 2 is visible in the background.

Figure 5.16. Photograph of looters' trench on the west face of Structure B-7, camera facing east. The nylon sack is just visible at the point the trench turns into a tunnel into the mound.

The floor of Courtyard B-3 is 3.2 m higher in elevation than that of Courtyard B-2 and 4.2 m higher than that of the East Plaza. It is also 0.8 m higher than the floor of Courtyard A-2, making it the most elevated courtyard in the site core. This intimate group, with a courtyard measuring only 10 x 12 m, is surrounded by structures, the tallest of which is Structure B-11 on the northern side of the courtyard. Rising 4.6 m above the courtyard surface, Structure B-11 is twice as tall as the other buildings in the courtyard. Its prominence made it the target of looters who trenched or tunneled into it in six locations. Inspections of the trenches revealed collapsed, once-vaulted rooms. Trench 3, which pierces and tunnels into the western half of the mound (Figure 5.17) from the courtyard side, revealed an east-west oriented wall adorned with a plastered cord holder that still had a bone pin in place (Figure 5.18). The bone is a white-tailed deer tibia (Figure 5.19; Lori Phillips, personal communication, 2019), which we collected for radiocarbon dating (Sample TH-01-S04). The sample returned a date of 1285 ± 20 BP (PSUAMS# 6483; bone; $\delta^{13}C$ = -20.6‰). The results were calibrated with the software OxCal v4.3 (Bronk Ramsey 2009) using the IntCal13 atmospheric curve (Reimer et al. 2013). For the date 1285 ± 20 the two possible calibrated age ranges are cal AD 669–729 (p = .588) and cal AD 736–739 (p = .366). The 2σ date range of cal AD 669–769 falls squarely in the Late Classic period.

Structure B-11 is clearly an important building in the acropolis group and the site core. Only two other structures are higher than it, Structures A-1 and B-1, both of which are temple-pyramids (Figure 5.20). The occupants of the structure would have had views of all of Group B, Courtyards A-2, A-3, and A-5, and perhaps

Figure 5.17. Photograph of looters' trenches on the southern face of Structure B-11, camera facing north. Looters' Trench 3 is clearly visible on the left side of the photograph.

Figure 5.18. Photograph of bone pin *in situ* in plastered cord holder in wall, exposed in Looters' Trench 3 in Structure B-11, camera facing northeast.

Figure 5.19. Photographs of the deer tibia cord holder pin.

Ball Court 1 and the southeastern entrance into the Main Plaza, but the mass of Structures A-1, A-2, and A-3 would have blocked their view of the Main Plaza.

The final structure in Group B, Structure B-12, is a low c-shaped platform attached to the northern base of the acropolis' platform. North of Structure B-12, the terrain drops steeply.

Group C

Group C comprises the mounds and courtyards west of the Main Plaza. Survey and exploration discovered one large hilltop group, Courtyard C-1, and nine other mounds that we have so far assigned to this group (see Figure 5.5).

Courtyard C-1 consists of five structures surrounding a 35 by 29 m courtyard, crowning the summit of a hill 350 m west of the Main Plaza (Figure 5.21). Unlike the structures in the site core, the buildings at Courtyard C-1 are oriented approximately 20° east of north. The largest structure is a 7-m tall range building on the eastern side of the courtyard, pierced by a single looters' trench. A cursory examination of the trench suggests two phases of construction are exposed. The final phase is represented by dry-laid cobble fill, but the penultimate phase

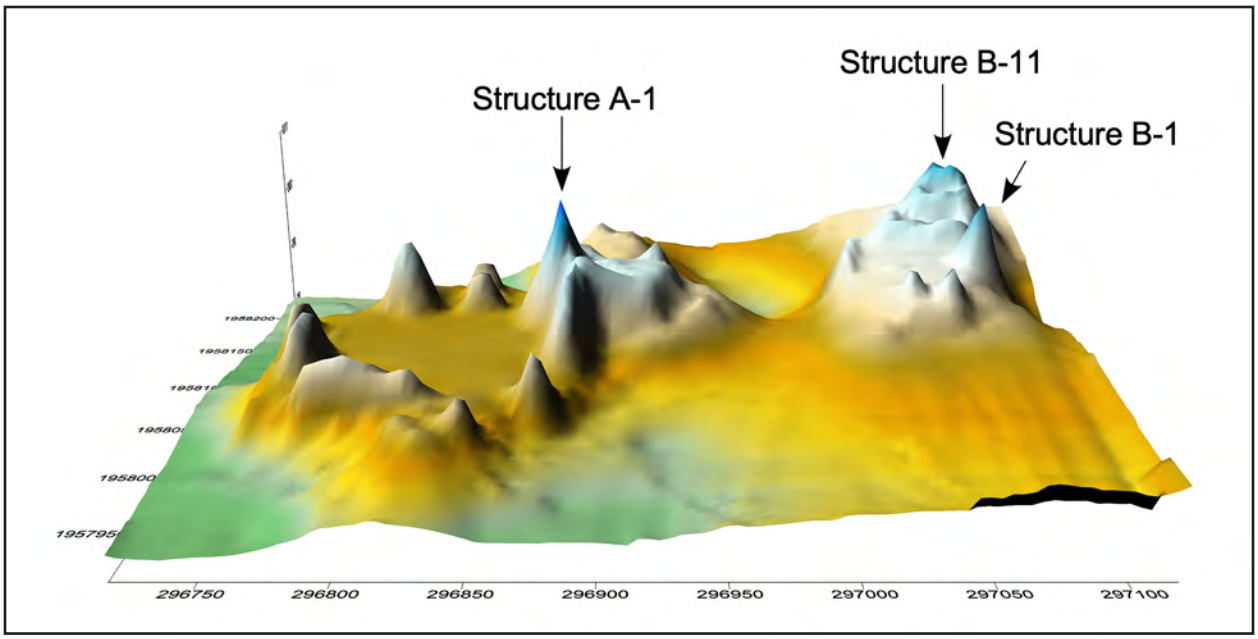

Figure 5.20. Shaded relief map, perspective view from the south, of Tikin Ha Groups A and B. The vertical scale is exaggerated.

includes a sloping platform face and possible edge of a stairway (visible in the northern profile of the trench).

A c-shaped mound on a low platform, Structure C-2, forms the northern edge of the courtyard, while a low platform or range building, Structure C-3, forms the southern edge. Structure C-4, a small platform oddly oriented 4° east of north occupies the southwestern corner of the group, and Structure C-5, a low range building, stretches along most of the southern edge of the courtyard. Altar 3 sits in the central portion of the courtyard but does not appear to be directly in the center of the group (see Table 5.3). There is an unusual depression near the base of Structure C-2, which may be a collapsed chultun in the courtyard. Dense debris from a treefall prevented a careful inspection of this feature. An obvious chultun is located off the platform, near the southwestern corner of Structure A-5.

Group D

Group D comprises the mounds and courtyards south and southwest of the Main Plaza. Mapping *brechas* discovered three large courtyards and six other structures assigned to Group D (see Figure 5.5).

Courtyard D-1 is 375 m southwest of the Main Plaza and is the largest courtyard in Group D. It is built on fairly level ground, not a prominent hilltop, and is 200 m west of Courtyard D-2 and 280 m west/southwest of Courtyard D-3. The three structures in the group are oriented approximately 20° east of north and enclose the western, northern, and eastern sides of a 35-x-27-m courtyard (Figure 5.22).

The largest building is Structure D-1, a 9.5-m tall temple pyramid on the eastern side of the courtyard. The building has an apparent *adosada* platform on its face, which is highly unusual—although another example of this style of building is found in Courtyard D-3, discussed below. Looters trenched into the face of the *adosada* platform, slightly south of centerline, and may have encountered a crypt. Upon inspection of the trench—hastened by a hornet nest—we recovered two large base-

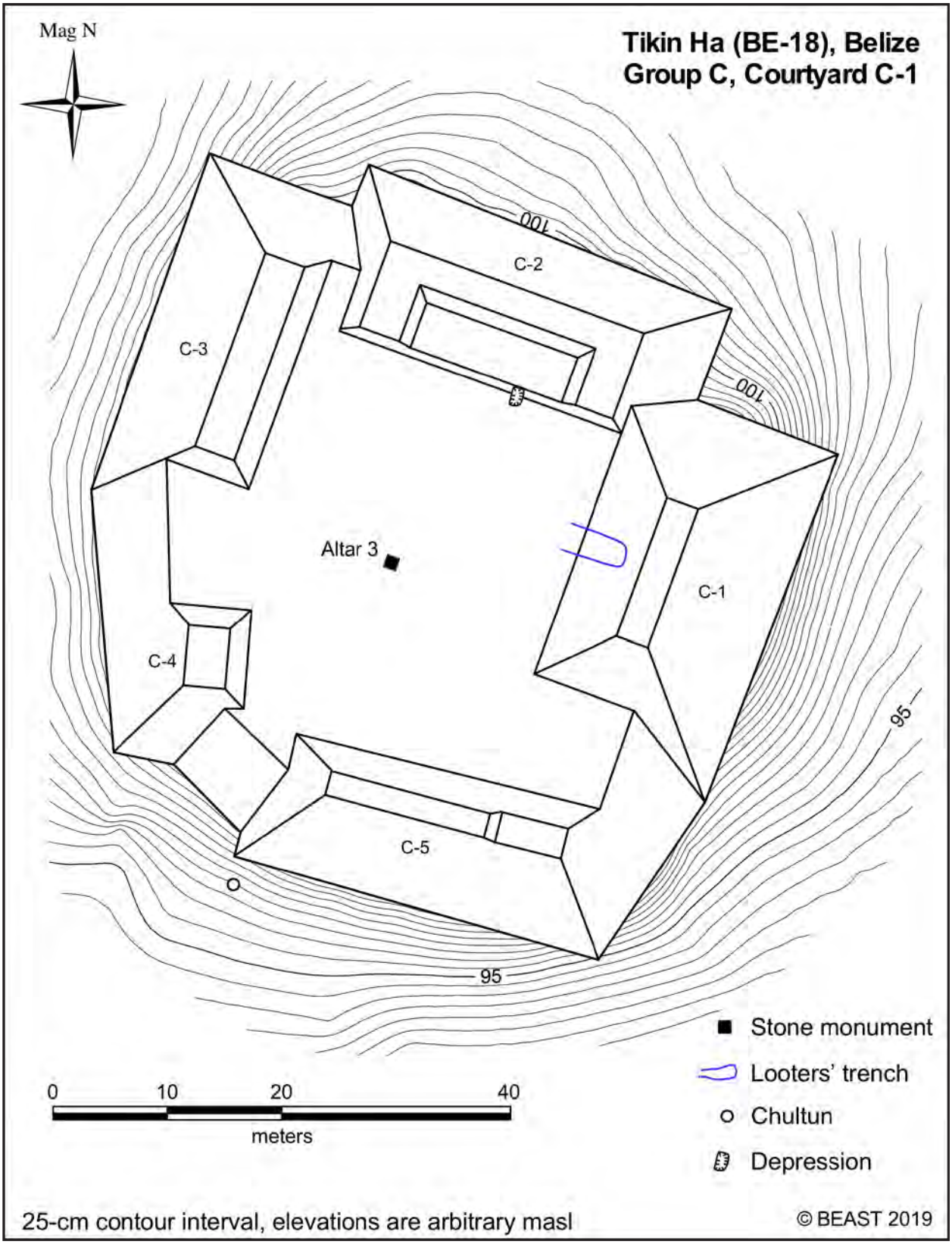

Figure 5.21. Prismatic map of Courtyard C-1.

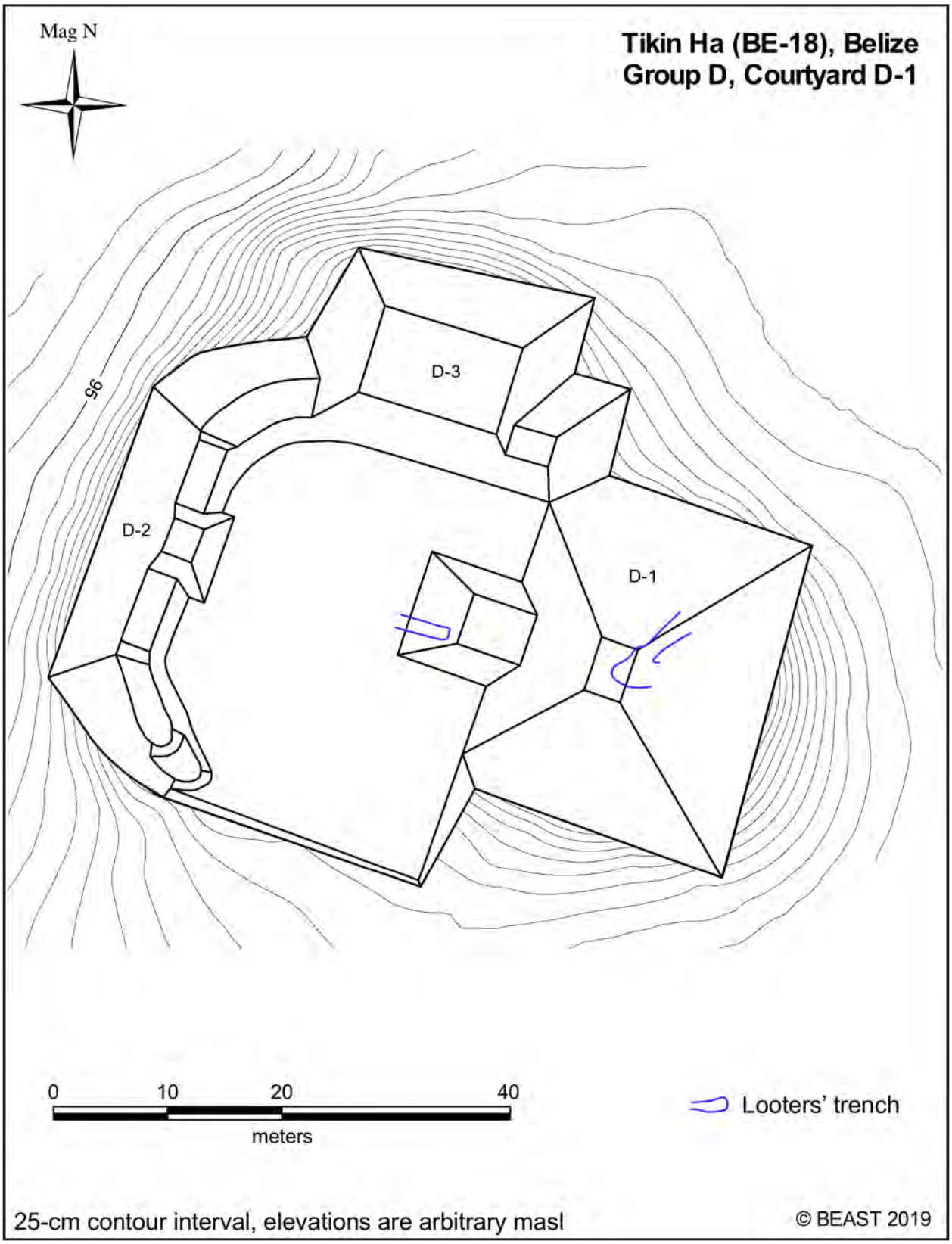

Figure 5.22. Prismatic map of Courtyard D-1.

to-rim sherds with basal flanges from Early Classic bowls (Figure 5.23).

A gaping and irregular trench on the eastern face of the summit of the mound appears to have penetrated a vaulted tomb (Figure 5.24). We were able to peer down into the chamber from two different entrances that cut partially into the ceiling and partially into the west wall, but we chose not to enter it for safety reasons (Figure 5.25). We estimate the chamber to measure approximately 2.5 x 1.5 m, with a general east-west orientation. Looters may have also penetrated the south and east walls of the chamber, but, despite this activity, it remains relatively intact, with some wall and surface debris sloping down onto the chamber floor. The west end of the chamber appears to be defined by a door jamb or some other architectural feature. The trench cut by looters above the chamber exposed additional architectural features, including a portion of a wall and plaster floor with possible resurfacing. Both features appear to lie at an elevation above and to the west of the chamber, if not slightly overlying it.

Structure D-2 is located directly across from Structure D-1 and is an unusual building that confounded our mapping efforts. The structure consists of a 2-m tall central platform with 1-m high rectangular platforms extending north and south. These platforms appear to curve inward, with the northern one joining Structure D-3, and the southern one terminating along the southern edge of the courtyard. Excavations are required to confirm our impressions, but the "wings" of Structure D-2 appear curved based on surface indications.

Structure D-3 is a rectangular platform with a flat summit measuring 13 x 8 m, rising to 2.5 m above the courtyard surface. It has a low projection off its southeastern corner.

Courtyard D-2 lies approximately 200 m to the east of Courtyard D-1 and consists of five mounds that we mapped using a tape and a compass (Figure 5.26). The three largest mounds of the group, Structures D-4, D-5,

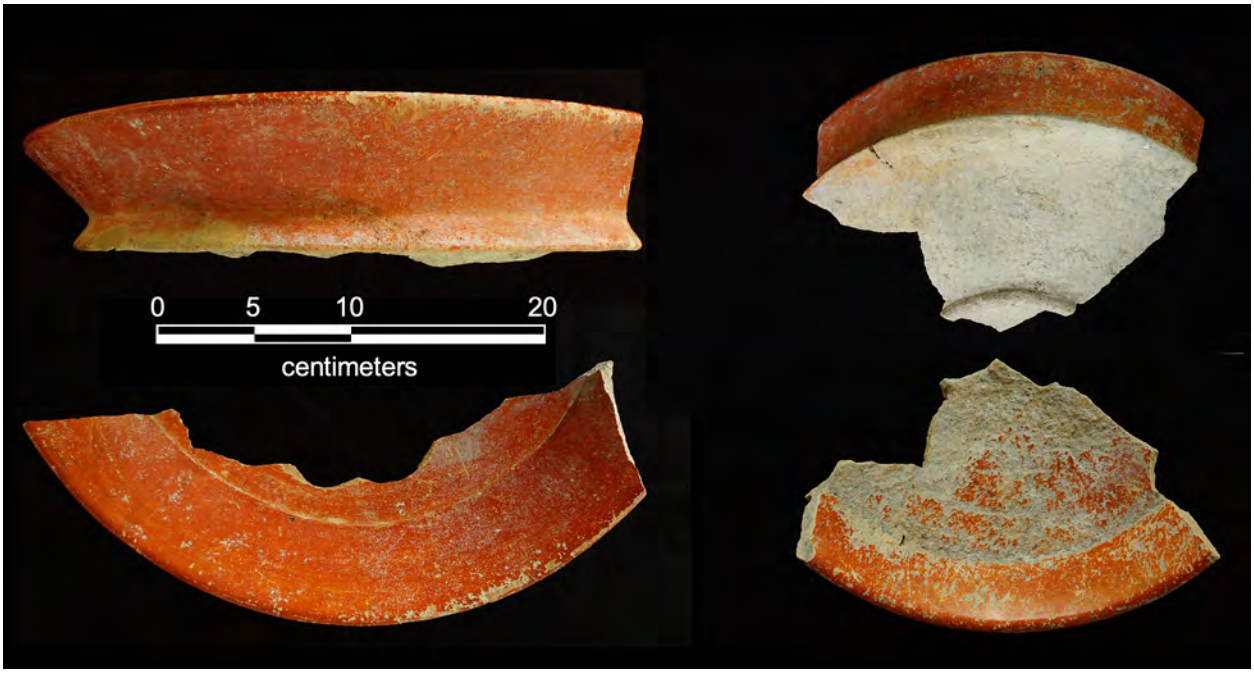

Figure 5.23. Photograph of sherds from *adosada* platform in Structure D-1. Photograph by Bruce Templeton.

Figure 5.24. Photograph of the looters' trench on the summit of Structure D-1. Note the two openings into the vaulted chamber. Camera facing southwest.

Figure 5.25. Photograph of the vaulted chamber exposed by the looters' trench on the summit of Structure D-1. Camera facing east.

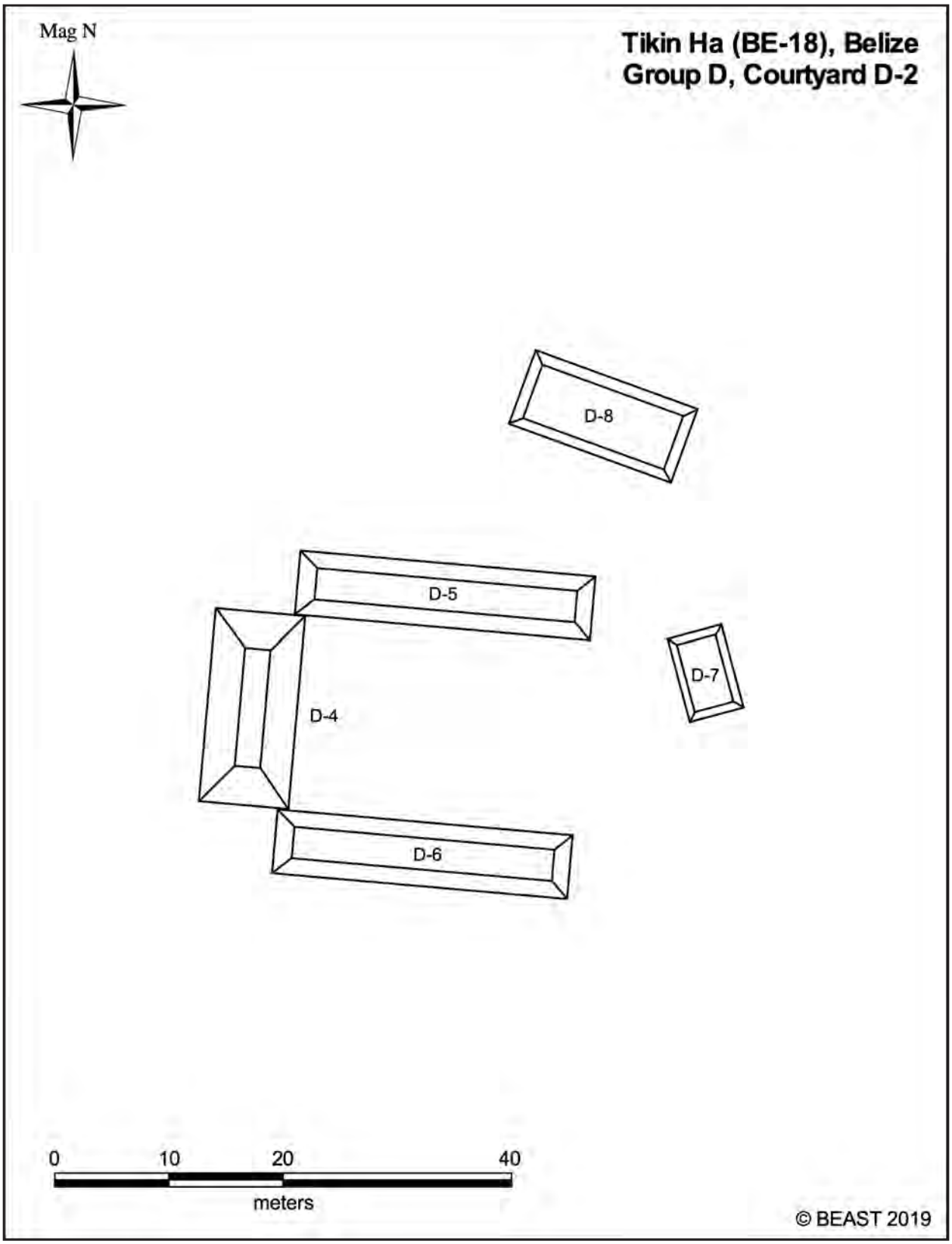

Figure 5.26. Map of Courtyard D-2. Map by Gregory Zaro.

and D-6, are organized around a courtyard space measuring approximately 25 x 18 m and oriented 95° east of north. From the courtyard, Structure D-4 is a roughly 3-m tall range building oriented 7° east of north. The base of the structure measures 17 x 8 m, with a narrower flat summit that is approximately 10.5 m long. The west side of the structure—exterior to the courtyard—measures about 4 m in height from the base to its summit.

Structures D-5 and D-6 are elongated low-lying platforms extending eastward from the northeast and southeast corners of Structure D-4. How they articulate with Structure D-4 is unclear, but surface inspection suggests they are likely connected in some fashion or constructed immediately adjacent to one another. The platforms appear to be more or less identical, each measuring approximately 26 x 8 m and oriented 95° east of north. Each is preserved to a maximum height of about 0.75 m from the courtyard surface, and up to about 1.5 m on their exterior faces. Three small, moderately defined scatters of mostly unshaped limestone cobbles are also visible on the ground surface along the general alignment between the east ends of Structures D-5 and D-6. Most cobbles measure 10–25 cm in diameter, although some are larger and measure up to about 50 cm in diameter. They are like the ruins of some unknown architectural feature.

Structures D-7 and D-8 lie just east and north of the three-mound courtyard group. They are somewhat irregularly shaped and appear to vary in orientation from each other and from the more formal courtyard group. The north end of Structure D-7 lies 9.5 m to the east of Structure D-5. It measures approximately 7.5 x 5 m and oriented approximately 165° east of north. It measures about 0.5 m in height from the west and up to about 1 m in height from its eastern side. Structure D-8 lies approximately 15 m to the north of the east end of Structure D-5. It is also irregularly shaped, measuring 15 x 7 m with a maximum height of about 0.5 m and oriented 110° east of north. It appears to fade out at the west end, where several limestone blocks lie upon the surface.

Courtyard D-3 is an east-focused group lying approximately 60 m north-northeast of Courtyard D-2 on top of a hill. It is composed of three mounds situated along the eastern and southern portions of a moderately defined courtyard space (Figure 5.27). The courtyard appears to be artificially raised on its southern and eastern edges, but less defined to its west and north, as the mostly-level surface begins to taper downward into naturally sloping terrain.

Structure D-9 is the largest structure of the group and positioned on the east side of the courtyard. It is a temple-pyramid measuring approximately 15 x 13 m, with a height of approximately 7 m from the courtyard surface and up to 9 or 10 m when estimated from its eastern (exterior) side. It is oriented 95° east of north, and similar to Structure D-1, its west façade is adorned with an *adosada* platform. A single looter's trench is present near the centerline of the west face of the structure, extending from the courtyard surface to near the summit (Figure 5.28). Stratigraphic information is not readily visible in the trench without further cleaning or excavation.

Structure D-10 is positioned along the southern margin of the courtyard. It measures approximately 15 x 11 m, with a maximum height of about 2.5 m on its north (courtyard) side and an estimated 3-4 m on its southern (exterior) side. It is oriented 100° east of north.

Structure D-11 is a small poorly defined mound along the southeastern margin of the courtyard, located roughly mid distance along the platform edge between Structures D-9 and D-10. It measures approximately 8 x 3.5 m, with a maximum height of 0.5 m from the courtyard side and oriented 40° east of north.

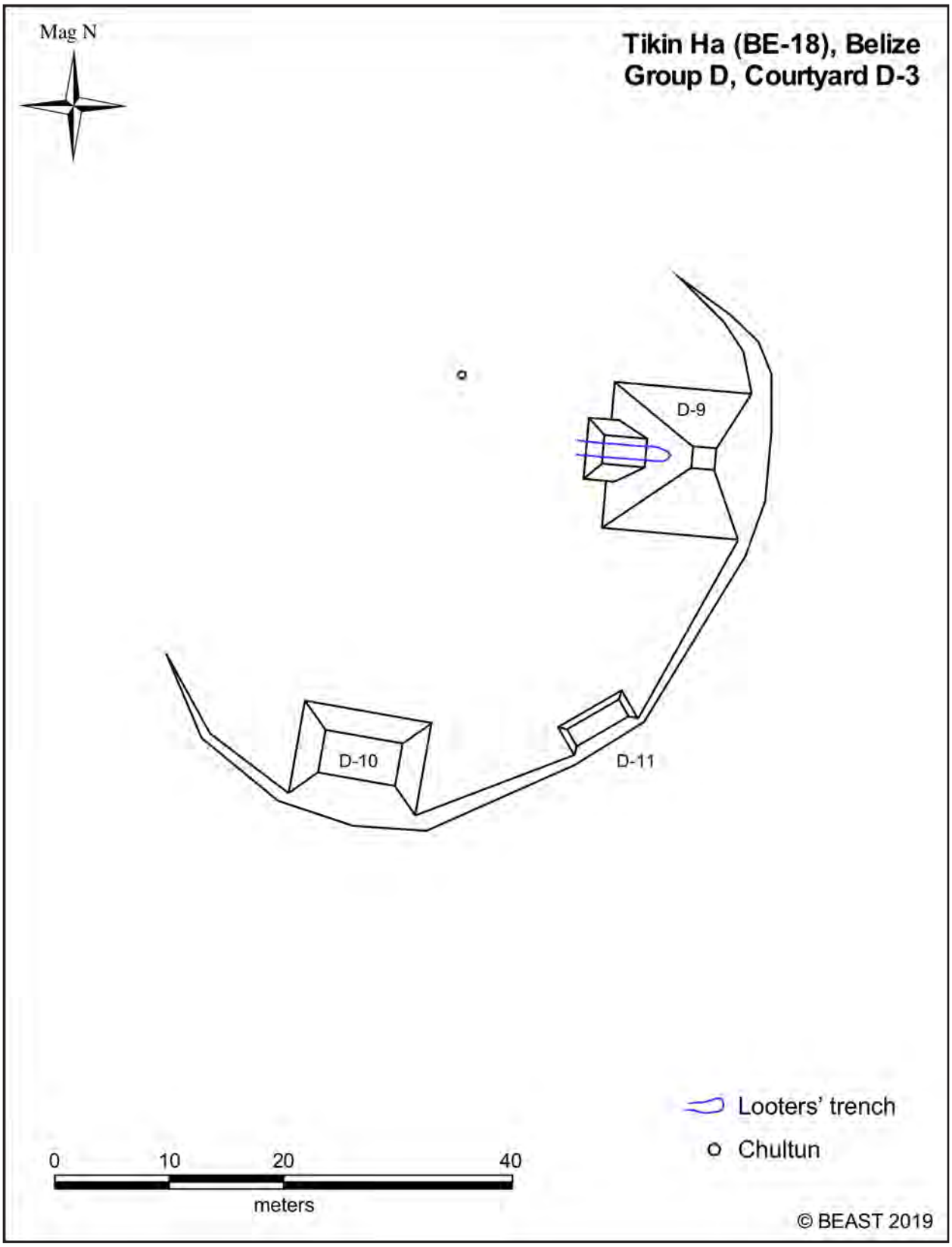

Figure 5.27. Map of Courtyard D-3. Map by Gregory Zaro.

Figure 5.28. Photograph of Structure D-9. Camera facing east.

Results of Monument Investigations

Our initial roster of two stone monuments expanded to seven based on our mapping and exploration of Tikin Ha (see Table 5.3). Of the four stelae and three altars we located, only Stela 2 has evidence of having been carved; the rest are plain but may have been covered with stucco originally. Unfortunately, no hieroglyphic texts appear to be preserved on Stela 2. All of the stelae are broken to some degree, but the bases of Stelae 2–4 are all still upright. Excavations around Altar 2, Stela 2, and Stela 3 failed to locate any caches. Without other lines of evidence, we can only estimate the age of the monuments based on ceramics found in the associated excavations. Thus, our preliminary assessment is that Altar 2, Stela 2, and Stela 3 are late Late Classic period monuments; we assume the other monuments are as well, but this is an untested hypothesis.

Results of Outreach Component

As outlined above, we proposed to engage two groups of stakeholders during our research: (1) school children and teachers at the Casey Community School in Gallon Jug, and (2) the managers and logging crews of Yalbac Ranch/TFG. In the case of the school children, our field schedule prevented us from visiting the classroom or hosting the children at our field lab—we left each morning for the field at 7:00 am and returned to camp at 5:00 pm. However, Zaro met with assistant principal Mr. Norberto Quetzal one afternoon and discussed our research with him. Based on that meeting, we decided to incorporate a module on Tikin Ha into the second edition of the Chan Chich Archaeological Project's *Archaeology Activity Book* (Kilgore and Novotny 2019). This activity book addresses the following topics:

- What is your heritage?
- What is archaeology?

- The archaeologist's toolkit
- How do archaeologists know where to dig?
- What did Maya buildings look like 1,000 years ago and what do they look like today?
- Where do artifacts go after they come out of the ground?
- What did the ancient Maya eat?
- How did the ancient Maya prepare their food?
- How can we protect our heritage?

The book includes activities such as coloring in artifacts and animals and completing mazes. The new section on Tikin Ha will include two additional topics: "How do archaeologist's find Maya sites?" and "How do archaeologists map Maya sites?". The first new topic stresses the importance of cooperation between local people and archaeologists as a way to protect the cultural heritage of Belize.

Being able to hire a team of 12 members of the Yalbac Ranch crew greatly enhanced our outreach program to the managers and loggers of TFG (Figure 5.29). Each day in the field we explained to the crew what we were doing and why, and we actively encouraged questions. Although initially reluctant to engage with us, after several days several of the workers began to ask questions about the site and the ancient Maya. We also rotated workers through our excavations, training them in proper excavation

Figure 5.29. The Tikin Ha mapping crew and the team from Yalbac Ranch. Front row (left to right): Cayden Willis, Bridgette Degnan, Briana Smith, Julia Kleine, James Flowers, and Brett A. Houk. Back row (left to right): Fidel Vasquez, Sr., Fidel Vasquez, Jr., Jeffery Leonard Martins, David Ireland, Levi Rodriguez, Phillip Gongora, Alex Calderon, Fernando Hernandez, Marlon Hernandez, Javier Diaz, Mark D. Willis, Kevin Taylor, and Gregory Zaro. Not pictured: Rafael Guerra, Nicholas Castillo, Victor Aguire, and Allen Richard Rodriguez.

methods and explaining the rationale behind the way we excavate (stratigraphy and context), how to recognize artifacts, why we collect artifacts, and so forth.

On two separate occasions, Dr. Alex Finkral from TFG visited the site. On his second visit, he was accompanied by Carlos Jimenez Barrios, a Forest Stewardship Council auditor with NEPCon, and Oswaldo Sabido, former Chief Forest Officer of the Belize Forest Department, as part of TFG's voluntary annual audit of their logging operations. During that visit, Dr. Finkral showcased Tikin Ha as an example of how TFG manages cultural resources under the umbrella of sustainable forest management. Houk toured the group around the site and explained our preliminary findings.

DISCUSSION

The project produced detailed and accurate maps of the monumental architecture at Tikin Ha and made a preliminary determination of the age of the ruins. In this section, we contextualize these spatial and temporal data within and compared to other major sites in the northeastern Petén. We follow the system Houk (2015) used in a previous study of Maya cities in the eastern lowlands, which examines site core areas (expressed as square meters of monumental architecture), architectural inventories, and site planning characteristics. This comparison allows for a preliminary discussion of how Tikin Ha fits into the geopolitical landscape of the Three Rivers adaptive region during its time of occupation.

Site Size

Archaeologists have employed a range of methods to rank Maya sites by size in the 3RR, including Adam's and Jones' (1981) courtyard counting system, Guderjan's (1991) modification to that system (which Garrison [2007] also used in his dissertation), and Houk's (2015) monumental area method. The third method, which we employ here, measures the horizontal area covered by monumental architecture at a site's epicenter; it does not include outlying monumental groups that appear to be primarily residential in function. Houk (2015:234–235) discusses the pros and cons of all three methods.

The monumental architecture of Groups A and B, which constitute the epicenter of Tikin Ha, covers 36,526 m^2 (Figure 5.30, Table 5.4). A comparison to other major Maya sites in Belize shows that Tikin Ha ranks low—eighteenth out of 26 sites. Within its own region, the eastern half of the 3RR, Tikin Ha is the sixth largest site.

Tikin Ha's small overall monumental area is surprising considering the size of the Main Plaza at the site (Table 5.5). Tikin Ha's Main Plaza is the third largest plaza in Belize and the third largest in the 3RR as a whole, behind Xultun's Plaza B (22,610 m^2 [Garrison 2007:Table 6.3]) and La Milpa's Great Plaza (17,713 m^2). Among the other sites in Table 5.5, which includes the largest sites in each of the five regions of Belize in Houk's (2015) study of Maya cities in the eastern lowlands, the largest plaza at any site accounts for less than 25 percent of the total monumental area at the site. The median and mean plaza area percentage of the sites listed in Table 5.5, excluding Tikin Ha, are 13.3 percent and 13.5 percent, respectively. Tikin Ha's Main Plaza accounts for a staggering 36 percent of the monumental area at the site. Interestingly, four of the five sites with the highest plaza area percentages are from the eastern side of the 3RR and include Tikin Ha, Dos Hombres, La Milpa, and Chan Chich.

Chronology and Construction History

The ceramics from eight excavations and one surface collection in the site's epicenter suggest the site core was built near the end of the Late

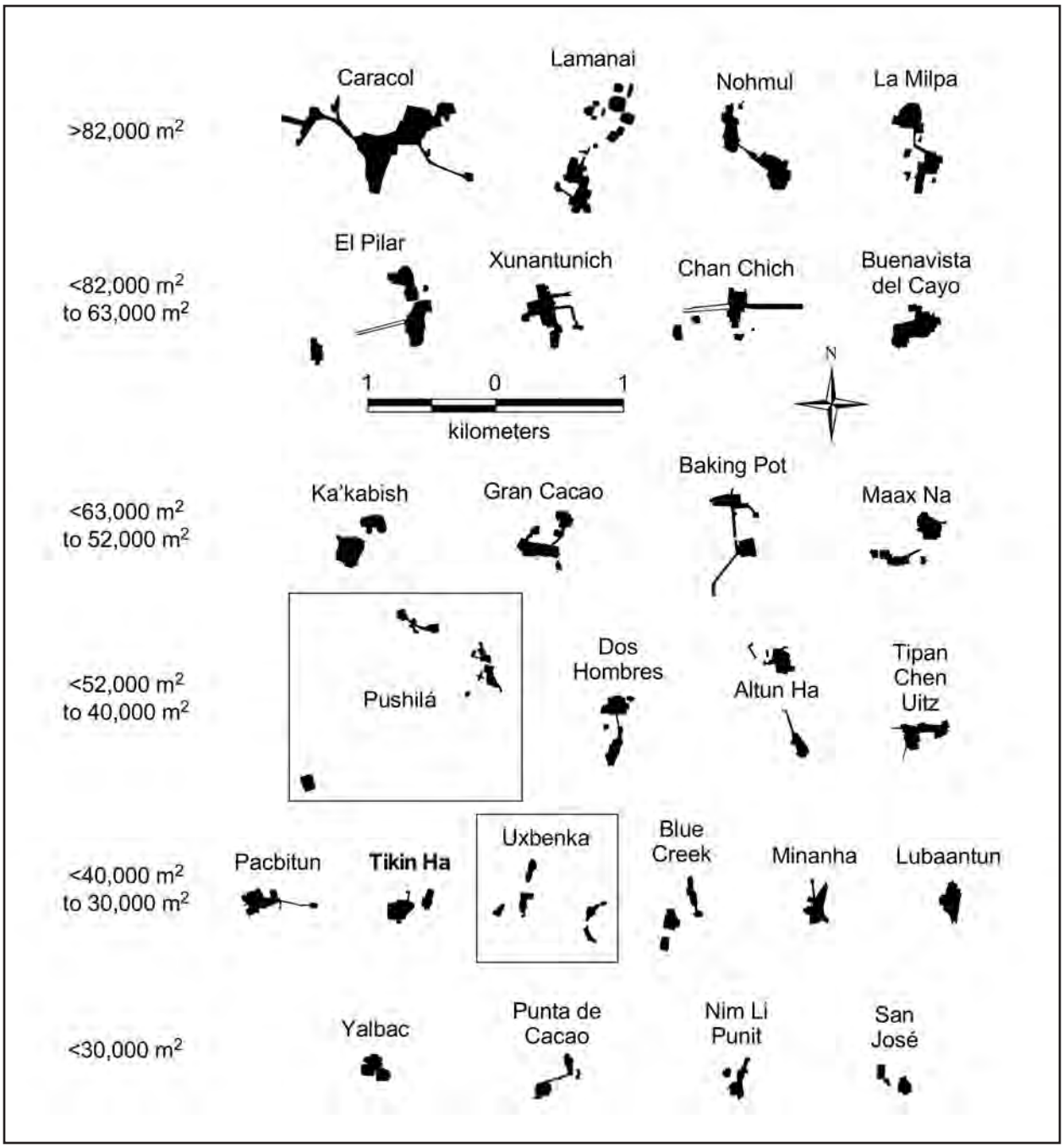

Figure 5.30. Site core monumental areas at a common scale (after Houk 2015:Figure 10.1).

Classic period. Furthermore, each excavation encountered only one construction episode. While the ceramics do not provide fine enough resolution to determine if all areas of the site were constructed at the same time, they were certainly constructed around the same time. Our single absolute date from the bone cord holder pin in Structure B-11 returned 2σ date range of cal AD 669–769. Because we did not conduct excavations on structures or clean looters' trenches to draw detailed profiles, we cannot say at this time if the monumental buildings in Groups A and B are also single-phase constructions.

Table 5.4. Monumental Areas for Major Sites in Belize

City	Region*	Monumental Area (m^2)
Caracol	VP	236,955
Lamanai	NB	109,385
Nohmul	NB	86,393
La Milpa	E3RR	82,156
El Pilar	BV	74,206
Xunantunich	BV	73,690
Chan Chich	E3RR	68,469
Buenavista del Cayo	BV	65,407
Ka'Kabish	NB	62,159
Gran Cacao	E3RR	57,201
Baking Pot	BV	56,249
Maax Na	E3RR	53,778
Pusilha	SB	51,741
Dos Hombres	E3RR	47,014
Altun Ha	NB	46,423
Tipan Chen Uitz	BV	41,316
Pacbitun	BV	38,054
Tikin Ha	**E3RR**	**36,526**
Uxbenka	SB	35,855
Blue Creek	E3RR	35,775
Minanha	VP	32,916
Lubaantun	SB	32,306
Yalbac	BV	29,409
Punta de Cacao	E3RR	25,391
Nim Li Punit	SB	23,161
San Jose	E3RR	18,918

*Area Key: BV, Belize Valley; E3RR, eastern Three Rivers region; NB, northern Belize; SB, southern Belize; VP, Vaca Plateau. 2. See Houk (2015:Table 10.1) for map sources.

While the site core appears to be a Late Classic development, the Early Classic sherds from the looters' trench in Structure C-1 indicate older occupations likely exist in the general vicinity. Additionally, the *adosada* platforms on the fronts of Structures D-1 and D-9 are a type of Early Classic architectural form that is common at Teotihuacan in Central Mexico but is rare in the Maya lowlands (Rich and Matute 2015:81).

Site-Planning Characteristics at Tikin Ha

Tikin Ha's site plan deviates from the two recognized templates in the region (Houk 1996, 2003) and has some other rare city planning traits that challenge existing models of Maya city building in the region (Houk 2015). Although the major architectural groups are both aligned north-south, their spatial relationship relative to one another—with the acropolis east/northeast of the Main Plaza—conforms to neither the Petén template nor the proposed northern Belize template. Furthermore, the east-west oriented ball court in the Main Plaza is rare. Speaking very broadly, Scarborough (1991:138) noted that "most" ball courts are oriented north-south, going on to list only six sites out of approximately 200 in his study that deviate from that pattern. More recently, Lohse and colleagues (2013:101) noted that 9 of 11 ball courts at seven sites in the eastern 3RR are oriented north-south. Thus, the east-west court at Tikin Ha is an example of a rare architectural form.

The massive Main Plaza, on the other hand, follows a 3RR preference for "overdesigned" plazas, a trend noted by Houk (1996) and elaborated on by Garrison (2007). Garrison (2007:319) suggested that large plazas, and their associated temple-pyramids, indicate the capitals of territories and "are explicit statements of hierarchical control over their hinterland populations during the Late Classic Period." Garrison (2007:319) also notes that, "With the exception of Ma'ax Na in the La Milpa territory, no other territorial capital in the Three Rivers region appears to have allowed minor centers to construct monumental temples approaching the size of those at the capital."

Table 5.5. City Features including Largest Plazas as a Percentage of Monumental Area at Major Sites in Belize

City	Region[1]	Largest Plaza	Largest Plaza Area (m^2)	Monumental Area (m^2)	Plaza as Percentage of Monumental Area	Emblem Glyph	Stelae	Stela Density[2]	Ball Courts	Cause-ways
La Milpa	E3RR	Great Plaza	17,713	82,156	21.6%	Yes	23	2.4	2	1
Nohmul	NB	"Giant" Plaza	13,458	86,393	15.6%	No	0	0.0	1	1
Tikin Ha	E3RR	Main Plazas	13,139	36,526	36.0%	No	4	1.1	2	2
Chan Chich	E3RR	Plaza A-1	12,490	68,469	18.2%	No	1	0.1	1	2
El Pilar	BV	Copal Plaza	12,238	74,206	16.5%	No	0	0.0	2	1
Dos Hombres	E3RR	Plaza A-1	11,651	47,014	24.8%	No	3	0.6	2	1
Xunantunich	BV	Plazas A-I and A-II	9,552	73,690	13.0%	Yes	9	1.2	2	3
Caracol	VP	B (Caana plaza)	8,223	236,955	3.5%	Yes	24	1.0	2	36
Pusilha	SB	Moho Plaza	7,047	51,741	13.6%	Yes	22	4.3	3 or 4	1
Minanha	VP	Plaza A	6,704	32,916	20.4%	No	8	2.4	1	1
Lamanai	NB	High Temple plaza	6,603	109,385	6.0%	Yes	9	0.8	1	0
Altun Ha	NB	Plaza A	5,386	46,423	11.6%	Yes	0	0.0	0	2
Uxbenka	SB	Group E Plaza	3,698	35,855	10.3%	Yes	23	6.4	2	1
Lubaantun	SB	Plaza V	1,954	32,306	6.0%	Yes	0	0.0	3	0
Nim Li Punit	SB	Stela Plaza	1,837	23,161	7.9%	Yes	21	9.1	1	0

1. Area Key: BV, Belize Valley; E3RR, eastern Three Rivers region; NB, northern Belize; SB, southern Belize; VP, Vaca Plateau.

2. Stela density is the number of stelae per 10,000 m^2 of monumental area.

Implications for the Territory Model of 3RR Political Organization

The preceding discussion of plaza size segues into an assessment of Garrison's (2007) territory model for the 3RR. As noted previously, Garrison (2007:275) proposes that at least 10 territories, each with a capital, occupied the 3RR during the Late Classic period, but noted that the southeastern 3RR may have more territories than his data allowed him to identify. Because Tikin Ha appears to be a late Late Classic architectural development, it is useful to review Garrison's (2007:326–327) reconstruction of Late Classic history in the 3RR:

Two major changes occurred in the Three Rivers region at the onset of the Late Classic that altered the regional structure. First, Tikal withdrew from the region creating a power vacuum, particularly in the physiographically fragmented southeastern portion of the Three Rivers region. Secondly, starting with Tepeu 2, there was a population explosion throughout the region. The resultant structure, as reflected in settlement patterns, was a series of complex territorial hierarchies. Each of these had a capital center and a supporting hinterland population organized into embedded heterarchies. Evidence for horizontal functions within the embedded heterarchies comes from their generally uniform material culture, while horizontal ties between the territorial capitals are reflected in their shared site plans. Most prominent are the large plaza spaces that were used by the Three Rivers region elites to assemble their entire hinterland populations for public rituals that were not permitted outside of the capital. Late Classic functions involved the hierarchical interactions between territorial elites and their subordinates in which sustaining ritual was exchanged for material tribute most likely in the form of agricultural surplus. The need for these rituals was fostered by a shared perception of the local environment.

Garrison (2007) envisioned five territories in the eastern half of the 3RR with capitals at La Milpa, Blue Creek, Dos Hombres, Punta de Cacao, and Chan Chich (Figure 5.31). Tikin Ha is located in a blank area in Garrison's (2007) model, 5–6 to km outside of the proposed boundaries of the Chan Chich, Punta de Cacao, and Dos Hombres territories. The closest known site to Tikin Ha is Qualm Hill, a minor center originally recorded by Guderjan and colleagues (1991) and revisited by Cackler and colleagues (2007) in 2006. Qualm Hill lies approximately 3.4 km northwest of Tikin Ha and 5.2 km southeast of Dos Hombres, which is about 1.5 km southeast of Dos Hombres' territory limits.

Garrison (2007:279) noticed a correlation between physiographic setting and capital/territory size. He observed "a northwest to southeast trend in which territories and by correlation the site scores of their capitals become smaller. This trend follows the same pattern as the general physiography of the Three Rivers region, which becomes more fractious as the horst and graben steps descend from the Peten karst plateau" (Garrison 2007:279). Given the size and physiographic limits of the previously proposed territories in the eastern 3RR, it is plausible to propose two more small territories based on data generated after Garrison's (2007) original study. One is likely centered on Gran Cacao, a large site investigated most recently by Lohse and colleagues (Lohse et al. 2013), and another on Tikin Ha (shown on Figure 5.31).

Despite its small monumental area, Tikin Ha meets the criteria used to identify territory capitals. Its late arrival on the political scene suggests that either it is a capital of a late-forming territory or it is a new capital of an older territory, perhaps one originally based at Qualm Hill.

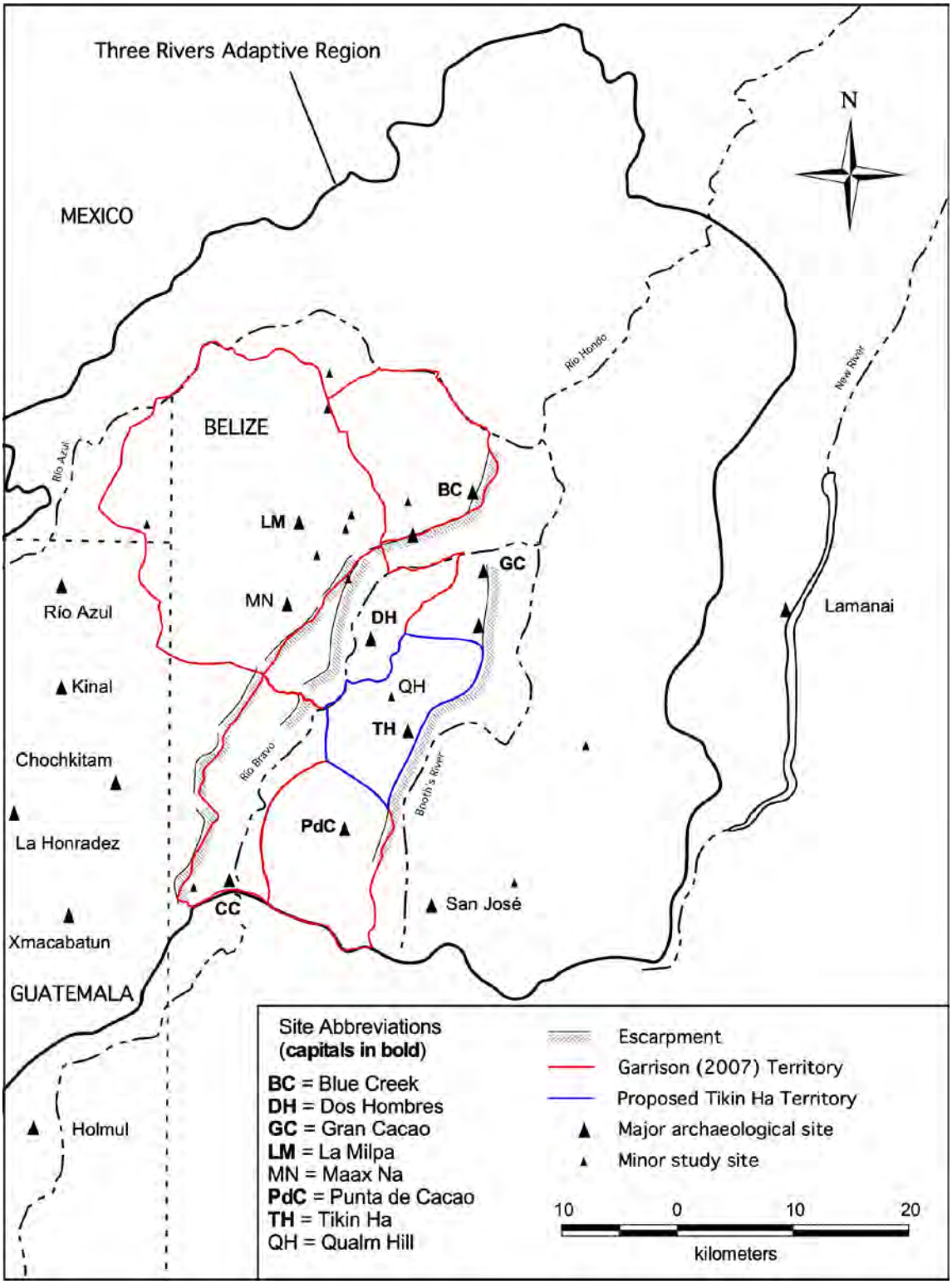

Figure 5.31. A proposed Tikin Ha territory in relation to Garrison's (2007) proposed territories for the eastern half of the Three Rivers adaptive region: La Milpa (after Garrison 2007:Figure 6.8), Blue Creek (after Garrison 2007:Figure 6.13), Dos Hombres (after Garrison 2007:Figure 6.10), Punta de Cacao (after Garrison 2007:Figure 6.12), and Chan Chich (after Garrison 2007:Figure 6.11).

CONCLUSIONS

Our research at Tikin Ha achieved our goals of mapping and testing the site. Our key conclusions from the mapping data are:

1. Tikin Ha has the second largest plaza, behind La Milpa's Great Plaza, but is overall only the sixth largest site in the eastern 3RR.

2. The site's monumental core, comprising Groups A and B, apparently was built late in the Late Classic without antecedent construction. Each tested area had only one construction episode.

3. At least one building in Courtyard A-2, attached to the largest buildings at the site, was under construction when the site was abandoned; our mapping efforts identified a construction ramp still in place at Structure A-14.

4. The site's plan does not follow either of the dominant site planning templates found in the eastern 3RR, although it does share the 3RR preference for massive plazas.

5. The site has an east-west ball court, which is a rare orientation across the Maya area.

6. The site's four stelae are the most at a center in the eastern 3RR outside of La Milpa.

7. Although the site core dates to the Late Classic, Early Classic occupation is evident in the settlement area at Courtyard D-1 and perhaps Courtyard D-3.

Tikin Ha was a late comer to the scene, but it was an ambitious political endeavor. Whoever built Tikin Ha managed to construct the second largest plaza in the eastern 3RR and one of the tallest temple-pyramids in the region, apparently without antecedent, and without regard for common site planning models. Our preliminary data suggest that the site was also short lived, and apparently abandoned while some of the key architectural features were still under construction. Tikin Ha's brief occupation period may explain why the Main Plaza accounts for such a high percentage of the monumental area at the site. Unlike mature cities, which have generations of growth and expansion, Tikin Ha's builders never had time to construct additional monumental groups. In fact, what is missing from Tikin Ha's architectural inventory are additional administrative plazas and palaces, like those found at Dos Hombres and La Milpa, which likely resulted from increasing numbers of elites and/or royal family members filling expanding bureaucracies as each center matured.

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Manned Aircraft Photogrammetry at the BEAST Permit Area

Mark D. Willis

In 2017, our team mapped the site of Tikin Ha in the dense jungle northeastern of Laguna Seca Ranch. We did this using expedient techniques such as compass and pace and the collection of waypoints from a low precision handheld GPS (Houk et al. 2017). As part of that effort we also flew a drone to three-dimensionally (3D) map the vegetation canopy above the site. Our reasoning was that vegetation on the tall mounds would have a higher elevation than that in the plazas and the surrounding area and this might help define the site better. Our 2017 study indeed found that this was the case (Houk et al. 2017). Based on these results and similar findings by others (Garrison et al. 2011) we decided mapping of a much larger area might help us identify the presence of other large Maya sites in the region.

The Belize Estates Archaeological Survey Team (BEAST) permit area is large (more than 500 km^2) and is mostly forested with dense jungle. Access to much of the area is limited to the dry season and more remote areas must be reached on foot. Using a drone to map such a large and rugged area is not practical. We opted to use a manned aircraft to collected photogrammetry data across the permit area. The results of this effort are provided here.

METHODS

In theory, photogrammetric mapping with manned aircraft should be the same as with a drone. With a drone a gimbal mounted camera automatically takes photographs as the drone sweeps across transects. To accomplish something similar, a we mounted a Mapir Survey 3 brand camera to the wing of a Bellanca Citabria airplane. The Mapir Survey 3 is a compact camera designed for photogrammetry that takes 12-megapixel (4000 by 3000 pixels) RGB photos and has a 47 mm field of view. We affixed the camera to the wing of the airplane using a GoPro-style housing. This allowed the camera to be pointed downward during flight but lacked a gimbal. The camera was set to automatically take a photograph every two seconds.

The mapping crew flew a Bellanca Citabria (American Champion 7ECA). This single engine aircraft, built in the late 1960s or early 1970s, has two seats, with the pilot in the front and co-pilot/passenger in the rear (Figure 6.1). The aircraft is extremely loud; the crew members had to communicate via an internal microphone system and head-mounted speaker system.

To fly regularly spaced transects, the author developed a mission using the opensource Mission Planner software. This software is meant for drone flying but allows for the export of transect data in GPX format, which was loaded onto two handheld Garmin 64st GPS units. This provided imaginary lines that both

Willis, Mark D.
2019 Manned Aircraft Photogrammetry at the BEAST Permit Area. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 143–150. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Figure 6.1. Citabria plane used on this project. Note camera mounted on wing.

the pilot and co-pilot could reference during flight (Figure 6.2).

Before each flight, the author installed a fresh memory card and battery in the camera and started automatic photo triggering. The mapping team used to airfields, Gallon Jug and Blue Creek. The Blue Creek airfield served as the refueling station. The team few eight flights over the course of 15.3 hours on three days (June 21 to 23, 2019) and collected more than 20,500 photographs.

After returning to the United States, the data were processed using a Puget Systems', Metashape-optimized computer running an Intel Core i9 8 Core processor with 256 gigabytes of ram and three NVIDIA GeoForce RTX 2080 Ti video cards. At the time of writing, this is considered a high-end computer for tackling large photogrammetry tasks. Metashape version 1.5.3 software, made by Agisoft, was used to align the photographs and to produce the initial GIS data. We also attempted to run the data through RealityCapture, another photogrammetry software, but the dataset was too large for it to process.

Metashape produced a Digital Elevation Model (DEM), which was exported in 32-bit TIF format for analysis. We used Global Mapper 20.1 and ESRI ArcMap 10.7.1 software to examine the DEM. Various histograms and filters were used within the GIS platforms to exaggerate details of relief so that possible patterns in the canopy could be found.

CHALLENGES

For the most part, flying the project area went smoothly, but the team faced some challenges. Weather presented the biggest data collection obstacle. This project started at the beginning of the wet season, and small storms would

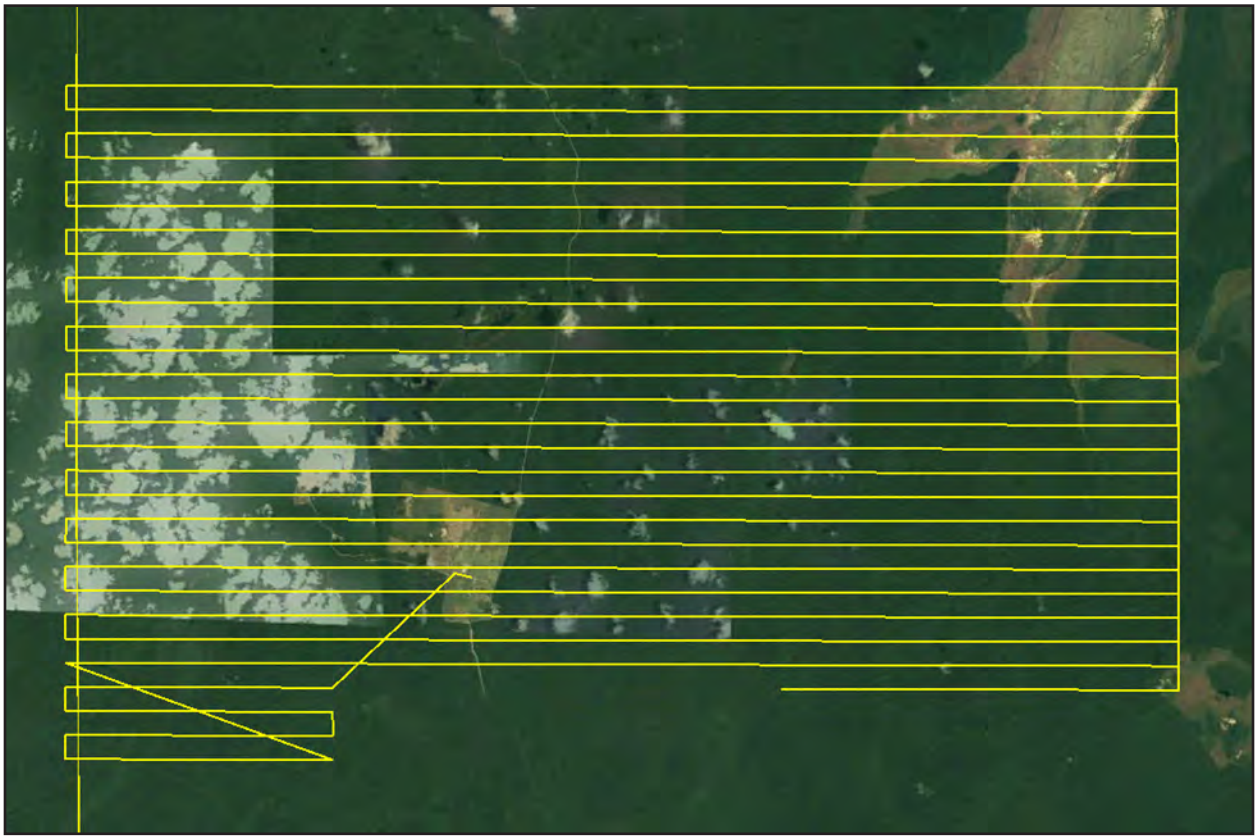

Figure 6.2. Optimal flight plan transects.

build each day. These storms caused our flights to be delayed or would divert us way from the project area to avoid danger. The presence of scattered low clouds complicated things as well. These lower clouds, while not storm related, would either obscure areas we wanted to map or would cause us to fly closer to the ground than optimal. Transect spacing is based on flying at a known height above the ground level. Flying lower than usual at times caused our photographic footprint to be smaller than necessary. The effects this had on are data are particularly evident in the western edge of the results. All of this coupled with the complexities of flying a manned aircraft caused the flying of transects to be approximate to that which we had idealized in the software.

The largest issue encountered, outside of dealing with the weather, was the sheer size of the dataset the project generated. With thousands of photographs, it was impossible to process the data daily. This would be the normal procedure for double checking project quality. Furthermore, the complete dataset, with more than 20,500 images, proved to be too large for even a powerful computer to properly align in one massive file. It took dozens of attempts and some complicated finessing of the alignment data for the processing software to complete this task.

Results

Three days of mapping resulted in the coverage of a somewhat irregularly shaped area of 30.5 km by 22 km (Figure 6.3). In all, we mapped 449 km^2 at a resolution of approximately 90 cm. This resulted in 1,231,915,527 points of 3D data being generated. While this number seems large, we had to down sample the data to get it to process successfully on a high-end desktop computer. Sampled at the highest quality, the

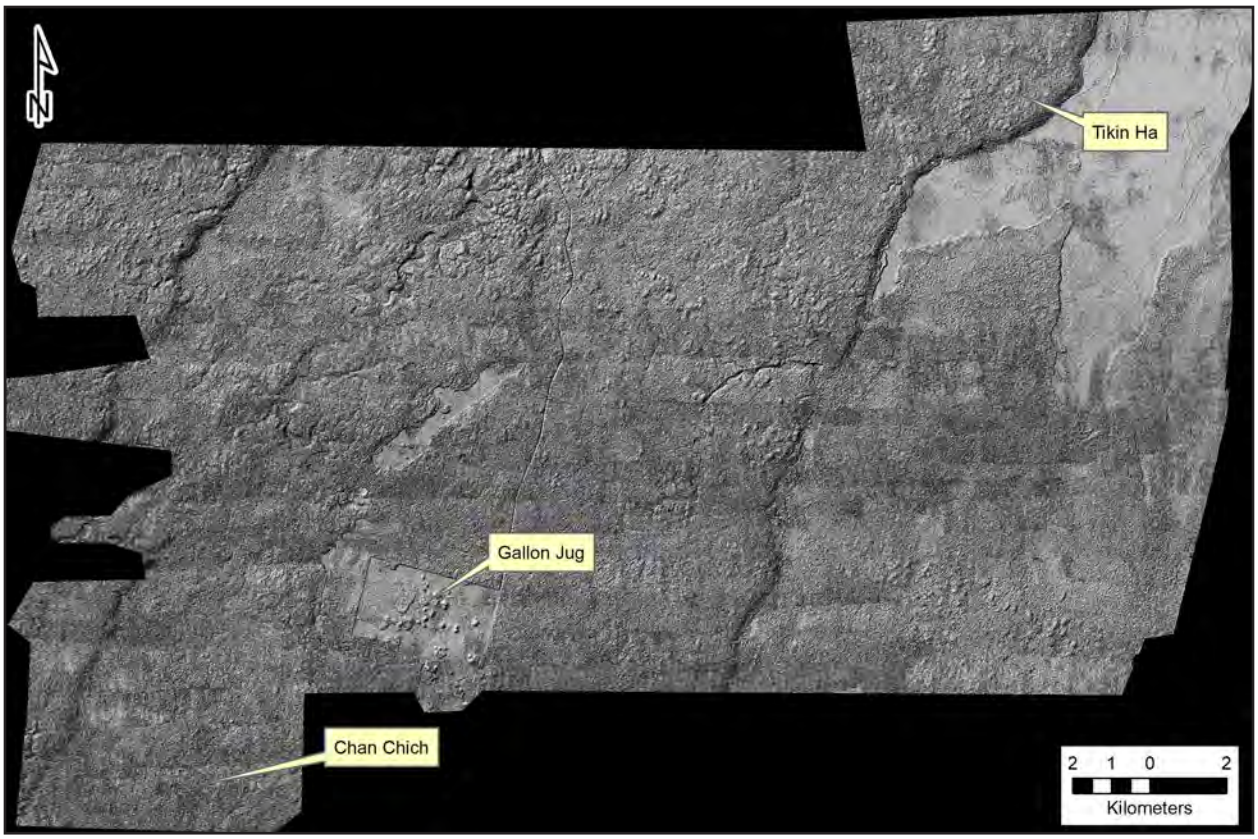

Figure 6.3. Entire area mapped. The jagged edges on the left are due to a lack of good imagery overlap.

dataset would yield a resolution of about 45 cm and contain more than five billion points. The quality in the 3D dataset is good, but some areas contain horizontal striping noise (mostly in the center of the map and running from east to west). This is likely caused from lower altitude flights when we dipped under cloud cover. Regardless, the noise does not dominate the imagery, nor does it overly obscure surface details.

The objective of mapping the canopy in the BEAST permit area was to find potential locations of additional Maya sites. In this regard the results are encouraging. To assess the results, the author examined the locations of two known sites, Chan Chich and Tikin Ha, in the data (see Figure 6.3).

Figure 6.4 shows a zoomed in detail of an area approximately 8 km by 5.5 km in size. A review of the data at this scale does not seem to reveal the presence of anything unusual. There is a higher area to the southwest of the red box that is the location of the Norman's Temple complex (Group C) but other than that, nothing stands out in the area. When we zoom in on the data, details of Group A do appear (Figure 6.5).

The data from the vicinity of Tikin Ha are less dramatic when zoomed out. Figure 6.6 has the location of Tikin Ha and the surrounding area to the southwest. At this scale the area Tikin Ha occupies, seems homogenous with the immediate surroundings. One would not assume anything special about the location based on the canopy. Zooming in and changing the color scale does shows substantially more (Figure 6.7). Changing the color scale is key in bringing out detail as the scale is adjusted.

Looking at the canopy elevation model, away from known Maya sites, finds many potential site locations beyond that which archaeologists

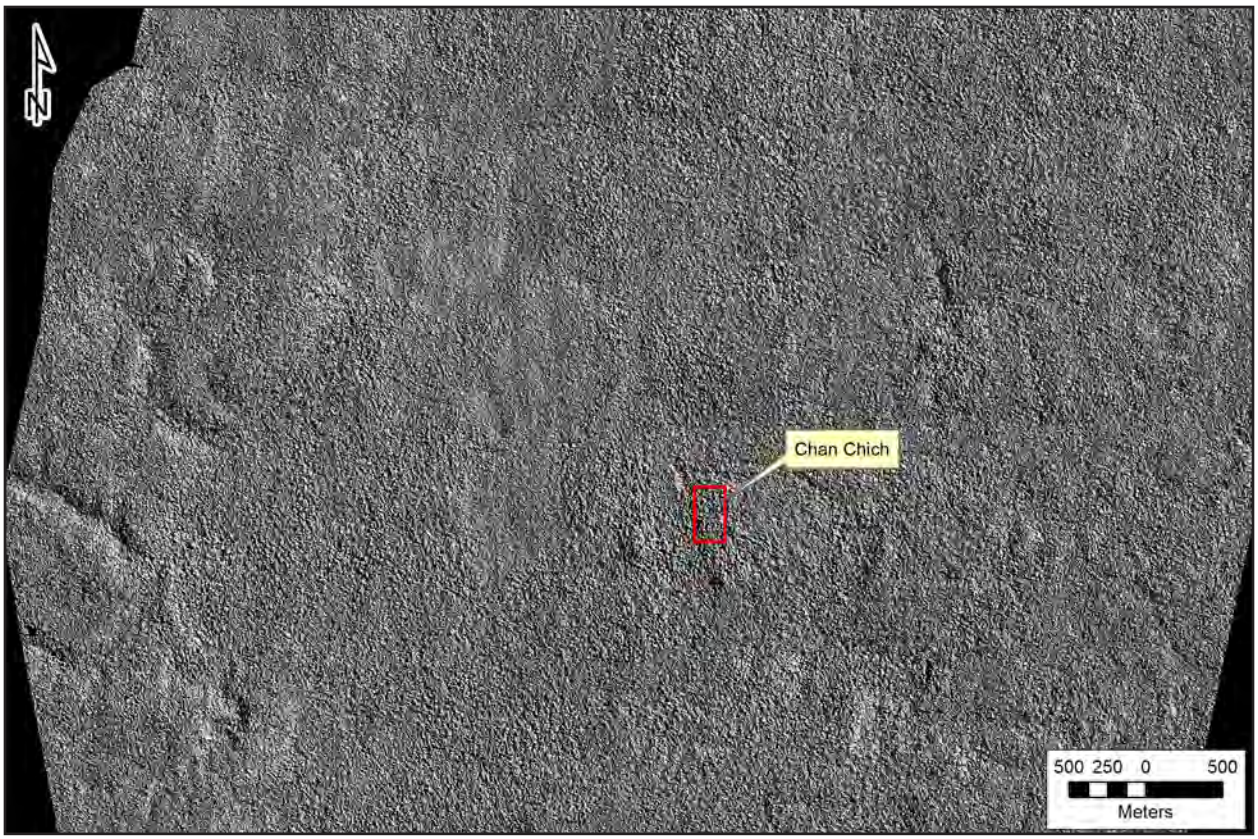

Figure 6.4. Canopy map of region around Chan Chich. Group A at Chan Chich indicated by red box.

have visited. The areas marked in yellow are both higher landforms and have irregular canopy (Figure 6.8). These locations should be field visited and reviewed for the presence of sites. This would help gestalt refinement in using the data to find more sites.

LESSONS LEARNED

Regarding data collection, the takeaway is that transects spacing should be about half the width that the Mission Planner software calculates. This would compensate for lack of ability to stay exactly on transect and for variations in altitude due to low cloud cover, etc. To this end, it would be worthwhile to add a second, wider angle camera to the flight's data collection. Photos from a second camera, with a broader view, would help in the alignment step of the processing software.

Fatigue proved to be an issue. Flying for several hours a day across multiple days is especially exhausting in a small aircraft. More time should be allowed for data collection on similar projects. Having more days to work, while potentially more expensive, allows more flexibility with changing weather conditions.

CONCLUSIONS

Mapping the canopy in the BEAST permit area was successful with only a few places missing good photogrammetry coverage. The topography of the canopy appears to show the broad outline of the sites of Chan Chich and Tikin Ha. Other areas with similar elevation signals to that of Chan Chich are visible in parts of the data. These areas should be visited in person to see if mound sites are present there.

One exciting aspect of this data is that the same project area is to be mapping with an airborne

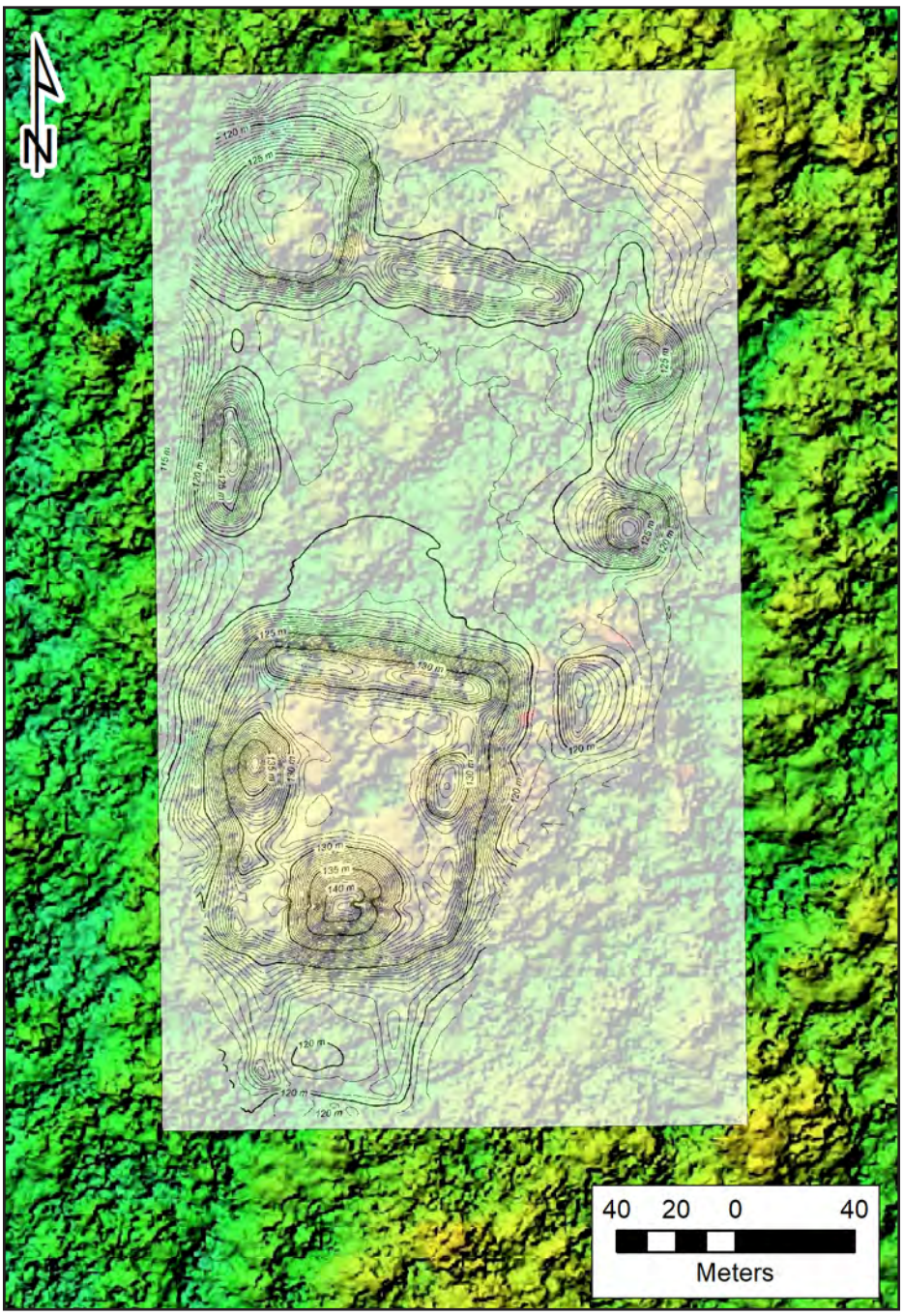

Figure 6.5. Detail canopy map of Group A at Chan Chich.

LiDAR system in 2020. If that project proceeds as planned, the current photogrammetry data can be compared to those results. It may be possible at that point to find a strong correlation between canopy patterns and canopy heights. If such an association does exist, machine learning techniques could be applied to the datasets to systematically extract possible site locations from other canopy datasets in the region (Davis et al. 2019). This could mean that less expensive aerial photogrammetry could be applied to large areas of the Yucatan and potentially increasing the number of known site locations.

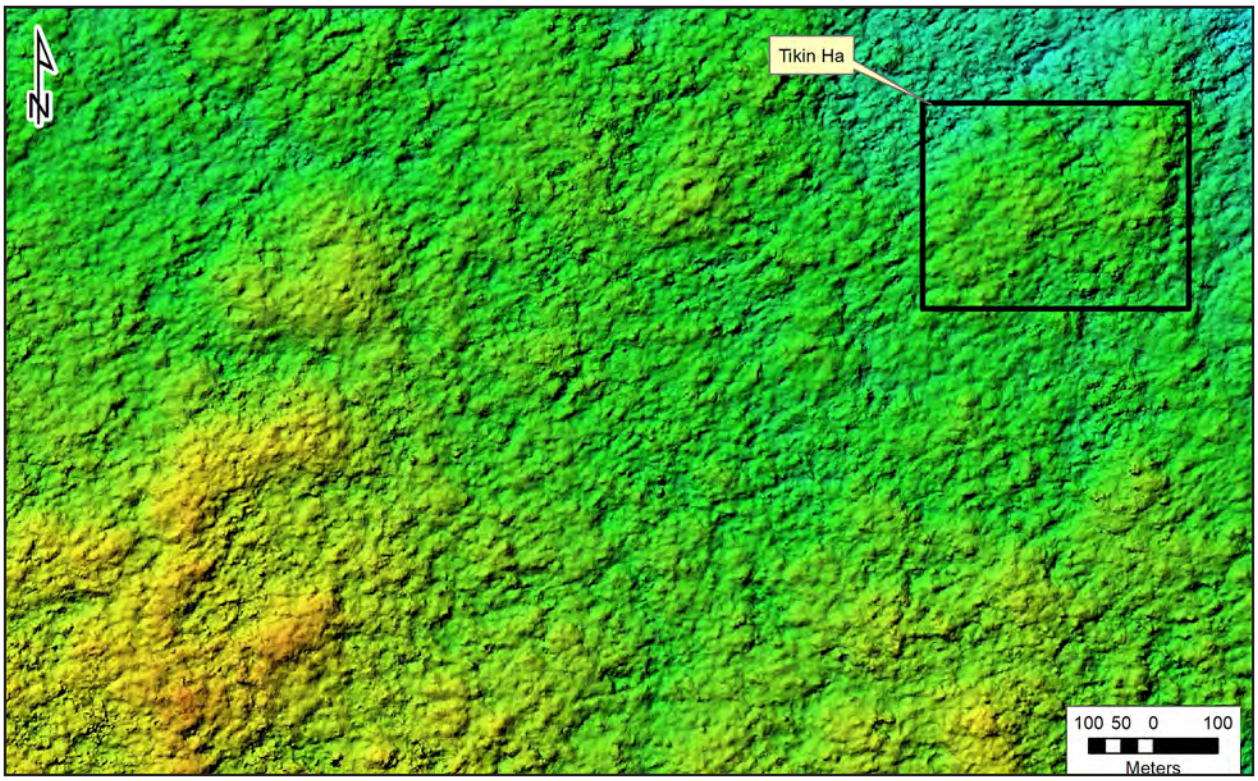

Figure 6.6. Canopy DEM around Tikin Ha.

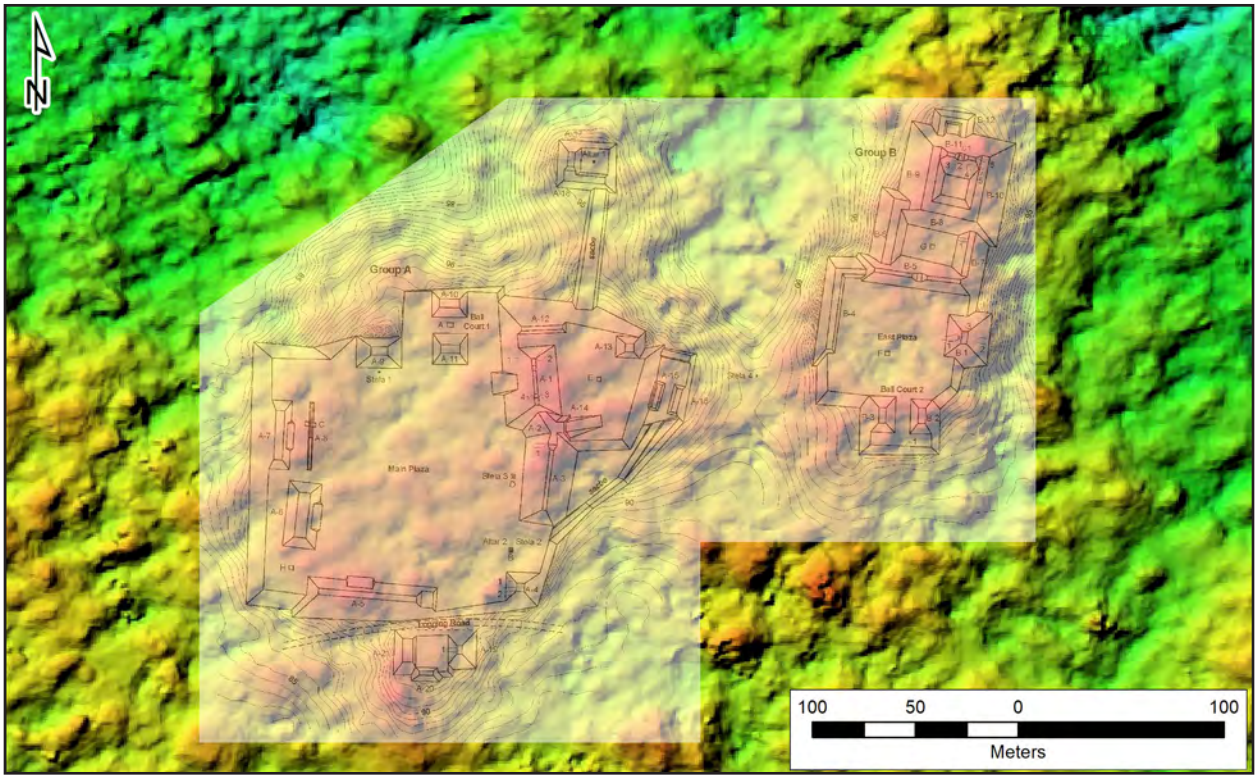

Figure 6.7. Detail of canopy map at Tikin Ha after color scale adjustment.

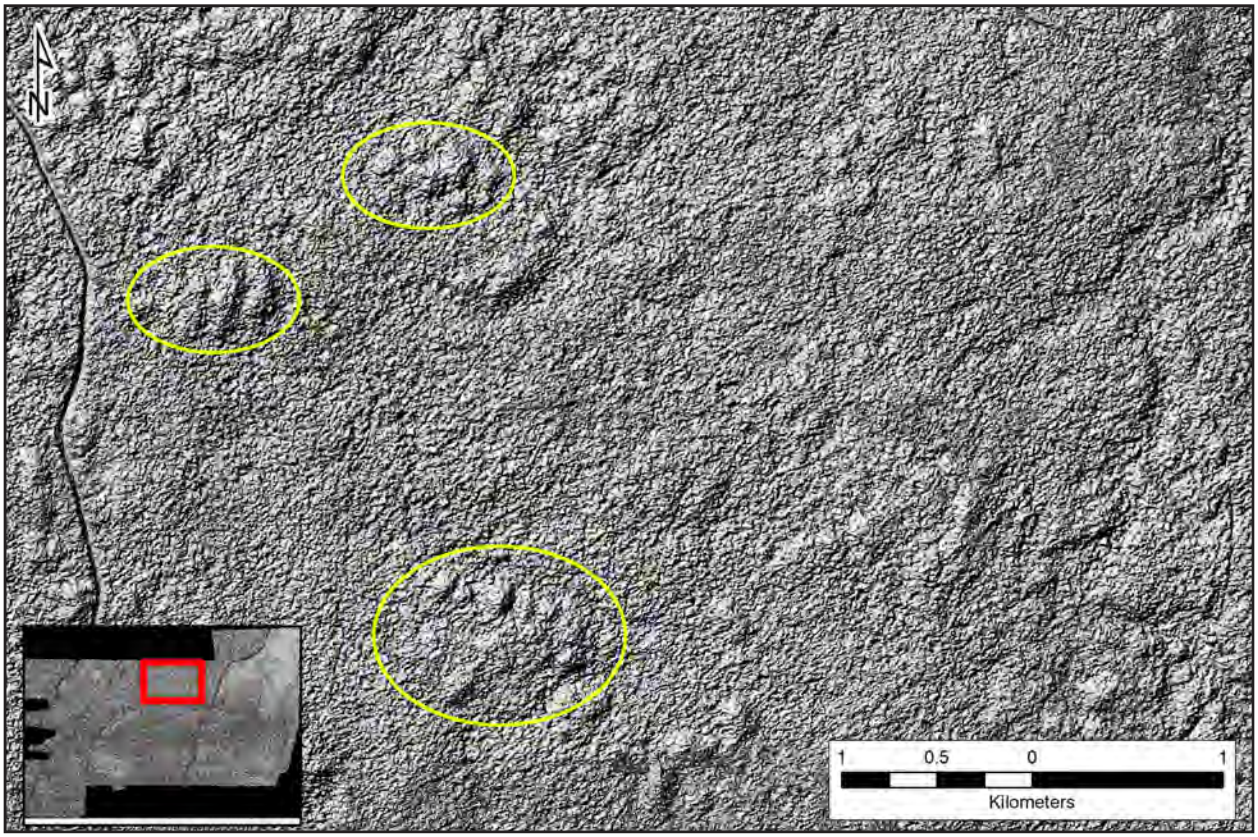

Figure 6.8. Other areas of interest.

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Bioarchaeological Analysis of Human Skeletal Remains from Chan Chich and Gallon Jug, Belize: The 2019 Field Season

Anna C. Novotny, Hillary Bedrosian, and Amy Copper

This report details the preliminary osteological analysis of human remains recovered during the 2019 field season of the Chan Chich Archaeological Project and the Belize Estates Archaeological Survey Team. Crews recovered interments of human remains from the Upper Plaza of the Chan Chich site core (Figure 7.1) and Courtyard B-1 at Gallon Jug (Figure 7.2). Burials are listed in the narrative below according to burial number and provenience. Each section reports the archaeological context from which the remains were recovered, including grave location, grave type, time period during which the interment occurred, position and orientation of the skeleton, and any grave goods recovered. The subsequent section describes osteological data for each individual including the approximate percentage of remains recovered, age at death, biological sex, dentition, and pathologies, if present.

All skeletal data were collected in accordance with the *Standards for Collection of Data from Human Skeletal Remains* (Buikstra and Ubelaker 1994). Standards is a compilation of techniques used in osteological analysis that outlines methods of determining age at death, biological sex, pathological conditions, and cultural modifications to the body. As much of these data as possible were collected for each individual. Analysis of the dentition was done according to Standards and supplemented by Simon Hillson's (1996) text *Dental Anthropology* and Timothy D. White's and Pieter A. Folkens' (2005) text *The Human Bone Manual*. Pathologies were identified with reference to *Identification of Pathological Conditions in Human Skeletal Remains* (Ortner 2003). We have refrained from citing the above texts in the report except where necessary.

CHAN CHICH

Burial CC-B22, Lot CC-19-A-03

Archaeological Context

Burial CC-B22 was recovered from excavations in the north-central area of the Upper Plaza in the Chan Chich site core. The right femur of the burial was first encountered during the 2018 field season within Suboperation (Subop) CC-15-R at approximately 70 cm below ground surface and 1.15 m below Datum A at an elevation of 120.417 meters above sea level (masl). The 2018 excavations were aimed at establishing architectural chronology and documenting the stratigraphy of the features in front of Structure A-1, and crews discovered the burial on the last day of excavations. Due to time constraints, the Operation Director, Tomás Gallareta, opted to rebury the remains until we could excavate them properly (Gallareta Cervera et al. 2019). Subop CC-19-A measured 1 m east-west by 2.5 m north-south; its goal was to fully uncover and document Burial CC-B22. The remains were intrusive into the construction fill of Blanca, a

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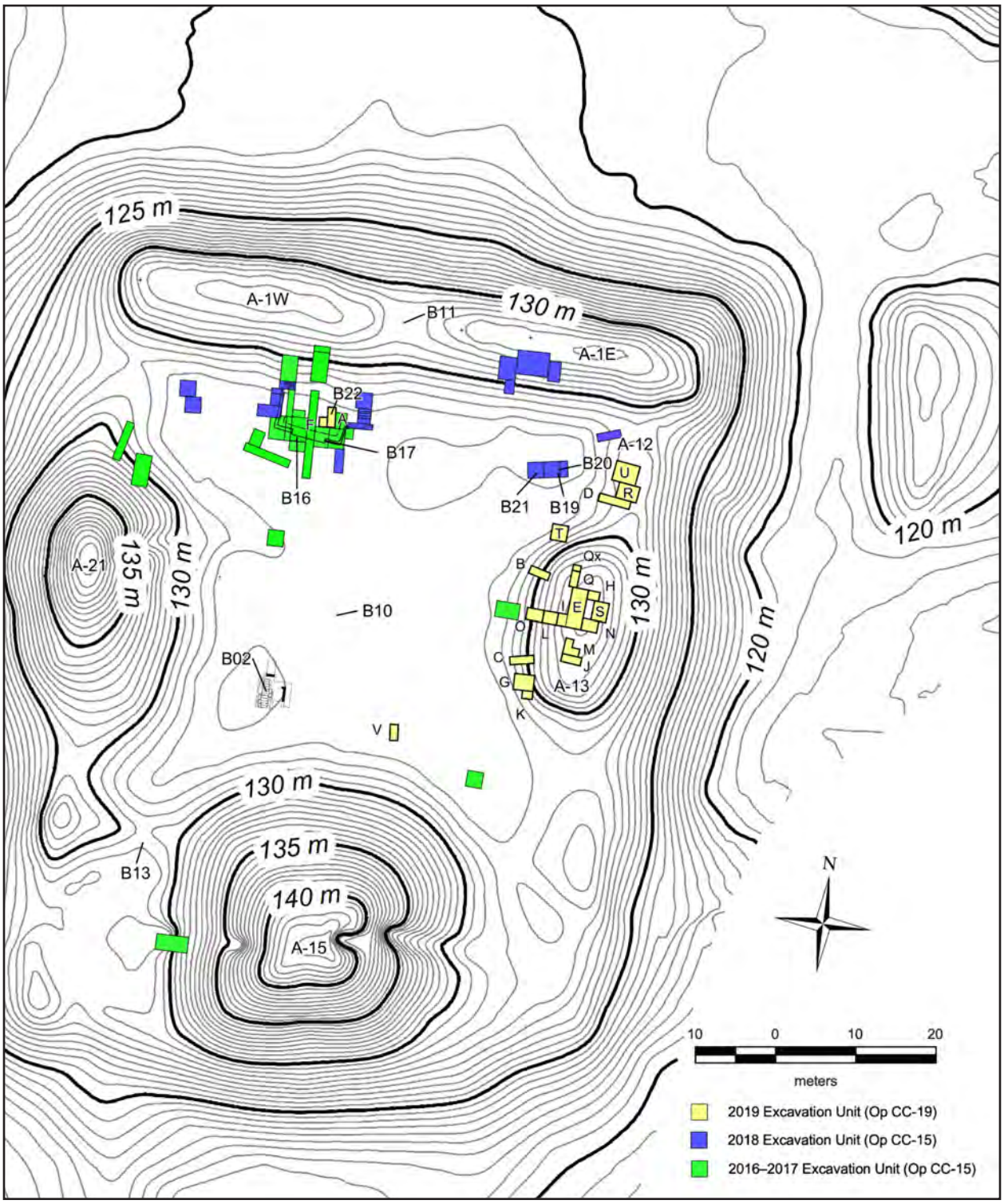

Figure 7.1. Map of the Upper Plaza at Chan Chich showing the locations of all burials excavated since 1997. Also shown are excavations from 2015–2019 along with the outline of the buried Blanca platform in northern part of the plaza.

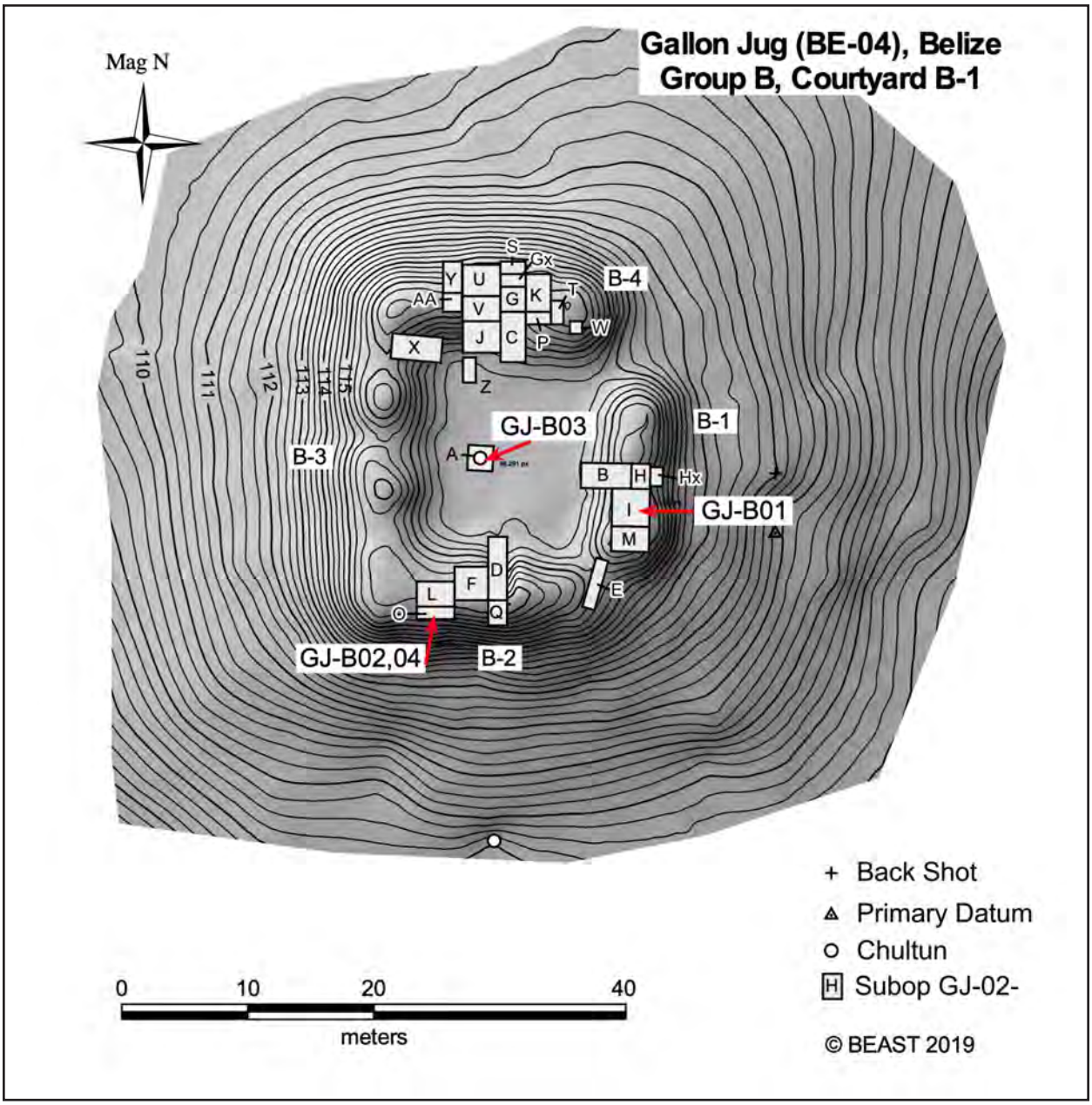

Figure 7.2. Map of the Courtyard B-1 at Gallon Jug showing the locations of 2019 suboperations and burials.

Late Preclassic platform (Gallareta Cervera et al. 2019) in a haphazard cist (see Welsh 1988; Figure 7.3). Large rocks roughly defined the perimeter of the cist, except for around the lower legs and feet, and ranged in depth from 80–96 cmbd. The grave space demarcated by the large rocks of the cist extended from the northeast corner of Subop CC-19-A to the center of the west profile, measuring approximately 150 cm long and 90 cm wide. The skeletal remains of CC-B22 were encountered at 1.0–1.18 mbd and rested directly upon a layer of medium sized stones with an area of approximately 190 cm in length by 90 cm in width. The north profile of Subop CC-19-A revealed a plaster surface which was not observed immediately beneath the bones of CC-B22 (Gallareta Cervera and Houk, this volume), suggesting

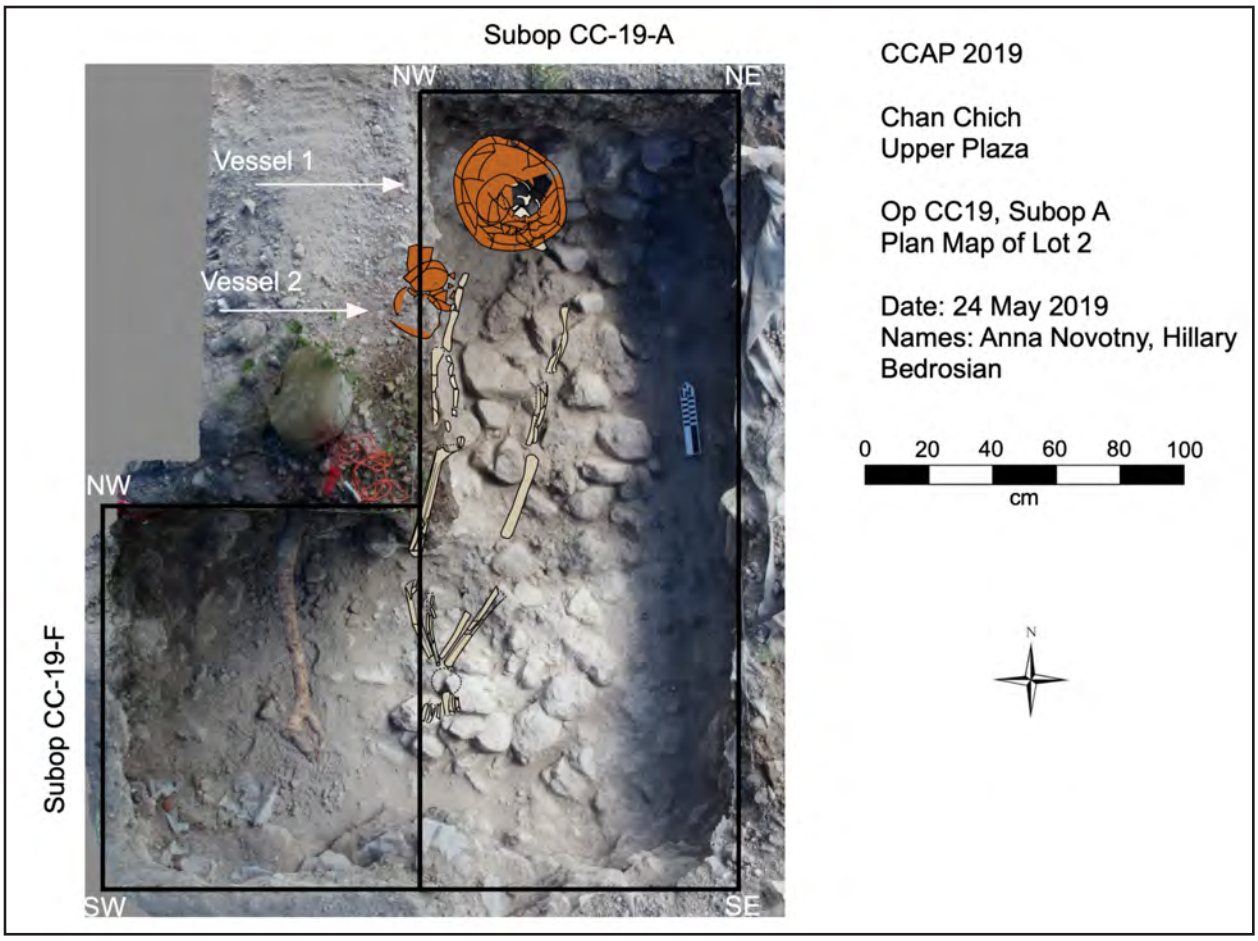

Figure 7.3. Plan map of Burial CC-B22 overlaid on orthophoto of Subops CC-19-A and -F.

that the interment was intrusive through the floor into the fill below. The skeletal elements of Burial CC-B22 were mostly complete and well-articulated. The internment consists of a primary individual placed in a prone, extended position with the ankles crossed and hands laid beneath the pelvis. The head was oriented to the north, with the face directed to the east. Two ceramic vessels accompanied the Burial CC-B22 context. The first was a Society Hall bowl, dating to the Late Preclassic period, placed directly over the cranium. The second was also a Late Preclassic vessel, an unslipped jar with strapped handle and red slipped interior rim positioned against the individual's left shoulder (Figure 7.4). Collectively, the ceramics recovered from Burial CC-B22 suggest a Late Preclassic date. A single radiocarbon sample (PSUAMS# 6913) of human bone returned a date of 200–91 cal BC for the individual's death, corroborating the ceramic chronology. A radiocarbon date from faunal bone (PSUAMS# 6912) recovered from Lot CC-19-A-05, which consisted of construction fill immediately below Burial CC-22, returned a date of 365–206 cal BC, supporting the conclusion that the interment was likely intrusive. See Tables 8.11 and 8.12 for details on the radiocarbon samples.

Osteological Analysis

Skeletal elements from both the appendicular and axial regions of the body were recovered from Burial CC-B22. Ribs were recovered but were extremely fragmented. The skeleton was well articulated and in a primary context, but its placement in loosely packed construction fill of medium sized stones likely contributed

Figure 7.4. Photograph of Vessels 1 (right) and 2 (left) in Burial CC-B22, camera facing north/northwest.

to its poor preservation. Compared to the rest of the skeleton, the skull was markedly well preserved due to the vessel placed over it. While the individual lost a number of teeth pre-mortem, those that were present at death were all recovered.

Age and Sex

The skeletal elements most reliable for estimating age and sex, features of the skull and pelvis, were not well preserved. Dental development and attrition indicate that the individual interred in Burial CC-B22 was an older adult at death. Morphology of the mandible and one small fragment of the frontal bone suggest that the individual was probably male.

Dentition

The dentition (Table 7.1) and associated alveolar bone of Burial CC-B22 were well preserved. The majority of the teeth recovered were in occlusion prior to excavation; the mandible and left maxilla fragmented when lifted from the soil. Prior to death, the individual lost all but one of their molars in both the maxillary and mandibular dental arcades; only the LM^1 was present and was in occlusion. The alveolar

Table 7.1. Dental Inventory of Burial CC-B22

RM^3	RM^2	RM^1	RP^4	RP^3	RC^1	RI^2	RI^1	LI^1	LI^2	LC^1	LP^3	LP^4	LM^1	LM^2	LM^3
			X	X	X	X	X		X	X	X	X	X		
			X	X	X	X	X		X	X	X	X	X		
RM_3	RM_2	RM_1	RP_4	RP_3	RC_1	RI_2	RI_1	LI_1	LI_2	LC_1	LP_3	LP_4	LM_1	LM_2	LM_3

bone was slightly damaged on the left side of the maxilla, but the rest of the alveolar bone was clearly well healed—these teeth were missing for a long time. The LI^1 was also lost pre-mortem. The LI_1 was missing, but the alveolar bone was too damaged to discern if it was lost pre- or post-mortem.

An abscess was present at the tip of the root of RI^1 (Figure 7.5). It is possible that the left incisor was missing due to an infection that spread from the right maxilla. New bone was present on the surface of the maxilla superior to the abscess and within the right maxillary sinus. These bony reactions suggest an infection of the right maxilla, specifically of the alveolar bone and the maxillary sinus cavity, that persisted for some time prior to death.

The teeth on the right side of the mouth were far more worn than the teeth on the left side suggesting that the individual was using the

Figure 7.5. Photograph of Burial CC-B22 right maxilla and partial left maxilla showing an abscess at the right central maxillary incisor, which is present but not in occlusion, and healing infection of the alveolar bone at the left central maxillary incisor which was lost premortem.

teeth on the right side more consistently than those on the left. The heavier attrition on the right side is surprising given the infection on the right maxilla. In addition, the maxillary teeth were more worn than the mandibular teeth, for an unknown reason. Interproximal caries at the cemento-enamel junction were observed on RC^1, LP^4, LC_1, RC_1, and, RP_3.

Pathology and Trauma

Besides the abscess in the right maxilla described above, there were no pathologies. There was no evidence of trauma.

Conclusion

Burial CC-B22 was first discovered in 2018 as part of Subop CC-15R, a 50-x-50-cm unit placed to explore a construction pen in the Late Preclassic platform nicknamed Blanca (Gallareta Cervera et al. 2019). Due to time constraints in 2018, the burial was backfilled and then excavated in 2019. The body was placed within a construction pen and was likely intrusive through an earlier plaster surface. The interment contained one, adult individual, probably a male. The body was in its primary location and was placed in an extended, prone position with head oriented to the north and face towards the east. Rocks from within the construction fill appeared intentionally placed around the body to create a haphazard cist. The bones of the thorax and pelvis were very poorly preserved, as were the small bones of the hands and feet. The individual suffered an infection of the right maxilla that involved a dental abscess associated with RI^1 and a maxillary sinus infection. The skull was covered by a Society Hall bowl and an unslipped jar was found next to the left humerus. The single radiocarbon date from Burial CC-B22 returned a date of 200–91 cal. BC, which is consistent with the Late Preclassic period.

Burials CC-B17 and CC-B22

Another Late Preclassic interment, Burial CC-B17, dated to 154 cal BC–cal AD 47 (PSUAMS# 2977), was recovered in Subop CC-15-N located south of Burial CC-B22 during the 2017 field season (Gallareta Cervera et al. 2017). The very shallow, simple cist of Burial CC-B17 contained the remains of a single individual in construction fill that covered Blanca (Gallareta Cervera et al. 2017). Both Burials CC-B22 and CC-B17 were interred with their heads to the north and ceramic vessels placed over their skulls; a Society Hall dish with a finger-impressed rope band pattern was placed over the skull of Burial CC-B17 (Gallareta Cervera et al. 2017). However, Burial CC-B22 was in a prone position, while Burial CC-B17 was supine (Gallareta Cervera et al. 2017). Both individuals were adults, with Burial CC-B17 likely the younger of the two based on dental attrition; sex was indeterminate for Burial CC-B17, and, as noted above, Bruial CC-B22 was probably male (A. Novotny et al. 2017). The two interments overlap in time, have similarities in their mortuary treatment, and apparently post-date Blanca's truncation and burial.

GALLON JUG

Burial GJ-B01, Lot GJ-02-N-03

Archaeological Context

Burial GJ-B01 was recovered from Courtyard B-1, Structure B-1, the eastern building of the architectural group (C. Novotny et al., this volume; see Figure 7.2). Subop GJ-02-N was a 1-x-1-m unit placed to investigate a large, flat stone measuring 41 cm by 56 cm that was set in the plaster floor approximately midway along the east wall of the room (C. Novotny et al., this volume; Figures 7.6 and 7.7). Removal of the flat stone revealed subfloor fill, which consisted of light gray, sandy soil and stones of

Figure 7.6 Photograph of Achote Black bowl and human skeletal remains of Burial GJ-B01 in Structure B-1.

various sizes, some of which were burned. A complete Achote Black vessel and fragments of human bone (Burial GJ-B01) were found 30 cm beneath the flat stone, which excavators interpreted as a capstone or marker to indicate the placement of the deposit. Burial GJ-B01 was intrusive through a plaster floor with at least five layers of replastering events (C. Novotny et al., this volume) and rested upon a plaster floor. The bone fragments, located partially beneath and to the west of the vessel, were disarticulated and were possibly once bundled in perishable material, such as a textile. The profile of the unit revealed a series of burned floors and subsequent paving events within this room (C. Novotny et al., this volume).

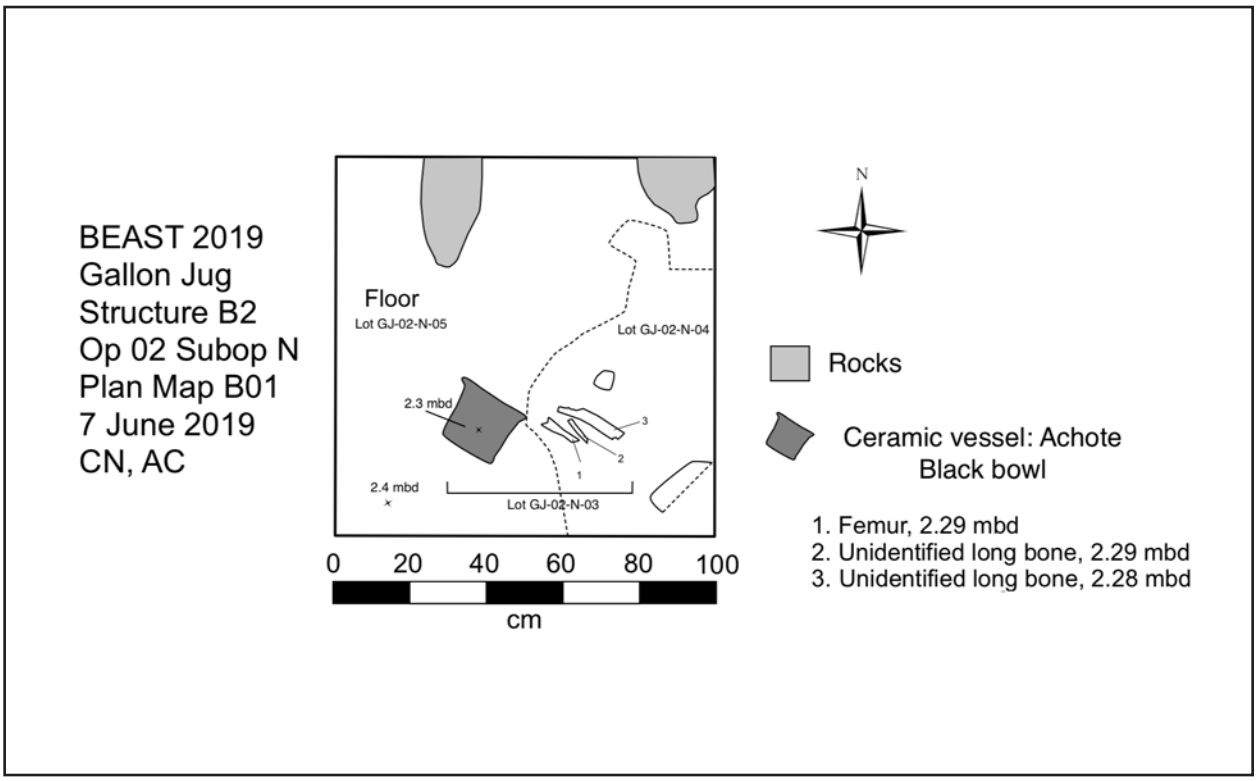

Figure 7.7. Plan drawing of Burial GJ-B01.

Osteological Analysis

The human remains recovered from Burial GJ-B01 were extremely fragmentary. Fragments included radius, ulna, tibia, femur, one rib fragment, and one cranial fragment. The surface of the bone was extremely eroded so no features indicative of side, pathology, age, or sex, were present. Several of the fragments were darkly discolored, but it was not severe enough to indicate that the bones were exposed to fire.

Conclusion

The skeletal remains present in Burial GJ-B01 were too fragmented to provide any detail as to who the individual was in life. The fragmentary state of the remains strongly suggests that the body decomposed elsewhere and was disinterred for an unknown amount of time prior to being re-interred in Structure B-1. Because the structure was located on the east side of the structural group, the deposit could be described as the final interment of a revered ancestor whose remains were curated by the living before re-deposition (see McAnany 2013).

Burial GJ-B02, Lot GJ-02-O-07

Archaeological Context

Burial GJ-B02 was recovered from Structure B-2, the southern structure in Courtyard B-1, and Subop GJ-02-O (C. Novotny et al., this volume; see Figure 7.2). Subop GJ-02-O was a 1-x-3-m unit on the summit of Structure B-2 established to complete the excavation of the western room of the building and to investigate the room's southern wall (C. Novotny et al., this volume). As the floor of the room was excavated, an eroded patch of plaster measuring 1 x 1 m was identified (Figure 7.8). The roughened spot was located about midway along the south wall of the room, and an excavation unit measuring 1 x 1.10 m was placed over the eroded plaster. Human bone was encountered at 0.35 cm below the floor surface; there was no formal architecture, only stones that were part of the platform fill. The grave space, a simple pit, was 65 x 35 cm. The grave contained the primary burial of one individual placed in a supine position with legs flexed at the hip and knees

Figure 7.8. Photograph of opening of Lot GJ-02-O-06 over rough patch in plaster floor, camera facing south.

at the chest (Figures 7.9 and 7.10). The right arm was flexed at the elbow with the forearm between the left upper and lower leg bones. The left arm was flexed at the elbow, too, but the forearm was parallel to and beneath the left leg. The major joints were well articulated. The hands disarticulated during decomposition due to their unstable position. The head was oriented to the west. No grave inclusions were recovered. Only the posterior aspect of the cranium was recovered, as well as several anterior teeth. One possible explanation for the partial skull is that it was removed, perhaps when Burial GJ-B04, discussed below, was interred. Ceramics recovered from the Burial GJ-B02 context suggest a Late Classic period date. An AMS radiocarbon sample (PSUAMS# 6914) from human bone returned a 2-sigma date range of cal AD 907–1020, which is firmly in the Terminal Classic period (see C. Novotny et al., this volume). Burial GJ-B02 was located about 20 cm above and to the south of Burial GJ-

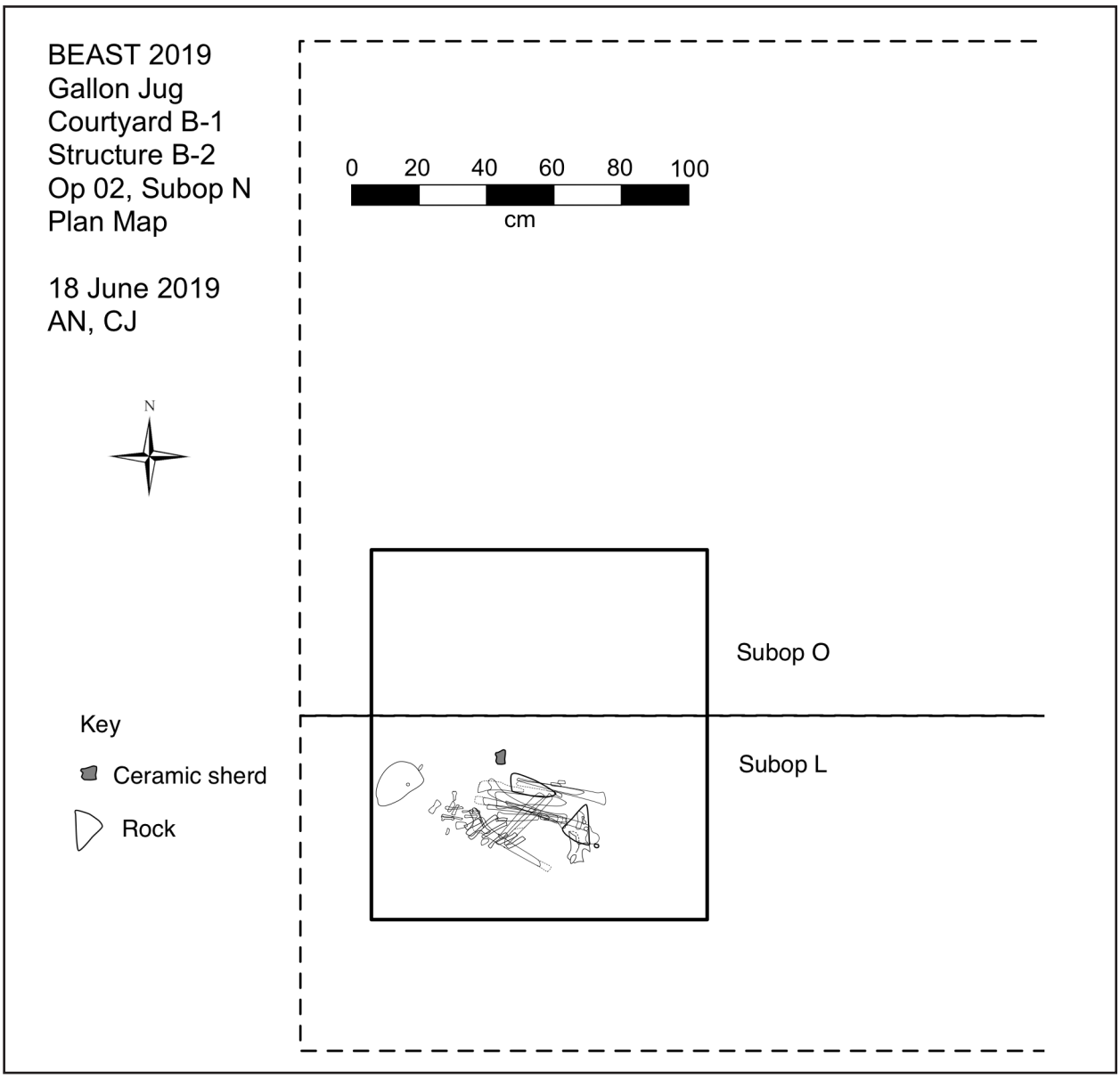

Figure 7.9. Plan drawing of Burial GJ-B02.

Figure 7.10. Photograph of Burial GJ-B02. Camera facing south.

B04, which was discovered during excavation of Burial GJ-B02.

Osteological Analysis

The entire skeleton was recovered from Burial GJ-B02, although the skull and vertebrae were extremely fragmented with many elements missing. From the skull, only fragments of the occipital and one parietal, of indeterminate side, were recovered, along with six teeth. The vertebrae, which are less dense than other bones, were likely crushed between the subfloor fill and the weight of the body. The ribs were relatively well preserved and articulated so the vertebrae likely did not preserve well as they should have been present but were not. Given the good preservation of the denser bones, the cranium should have been preserved. It seems likely that it was removed sometime after decomposition. There was red pigment visible on the right ulna, right and left femur, left fibula, and the right and left tibia (Figure 7.11). Red pigment was evident on the distal articular surface of the left femur, suggesting that it was applied after decomposition when the joint surface was exposed.

Age and Sex

One fragment of pelvis preserved the greater sciatic notch, a feature indicative of sex, which suggested that the individual in Burial GJ-B02 was probably male. No features indicative of sex were preserved on the few bones recovered from the skull. A small fragment of the auricular surface was present for observation and suggested that the individual was an older adult, 50+ years, at death.

Dentition

Six teeth were recovered from Burial GJ-B02, all from the anterior dentition (Table 7.2). The RC^1 and LI^1 were modified in the B4 style,

Figure 7.11. Photograph of the posterior aspect of the left femur from Burial GJ-B02 with red pigment, camera facing south.

with the lateral edge filed into the "Ik" shape (Romero 1958). The LI^1, RI^1, and RI^2 have extreme dental attrition on the lingual aspect of the crown and root (Figure 7.12). The right side incisors are also worn mesial and distally as if something was held between them. It is likely that the teeth were used as tools in an unknown way.

Pathology and Trauma

No pathology or trauma was observed on the bones of Burial GJ-B02.

Conclusion

Subop GJ-02-O was excavated to investigate a possible cut into the plaster floor of the western room of Structure B-2. The interment of one older adult, probable male was made into subfloor construction fill without any formal grave architecture. No grave inclusions were recovered. The only bones of the skull present were fragments of occipital and parietal, as well as six teeth. Although not well preserved, skeletal elements from the all other regions of the body were present and well-articulated,

Table 7.2. Dental Inventory of Burial GJ-B02

RM^3	RM^2	RM^1	RP^4	RP^3	RC^1	RI^2	RI^1	LI^1	LI^2	LC^1	LP^3	LP^4	LM^1	LM^2	LM^3
					X*	X	X	X*							
											X	X			
RM_3	RM_2	RM_1	RP_4	RP_3	RC_1	RI_2	RI_1	LI_1	LI_2	LC_1	LP_3	LP_4	LM_1	LM_2	LM_3

*modified tooth

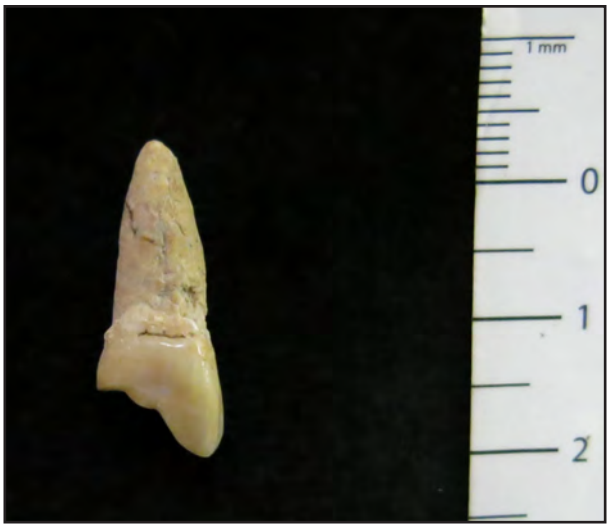

Figure 7.12. Photograph of modified left maxillary incisor from Burial GJ-B02.

indicating that it was a primary interment. The absence of the skull in an interment where all other bones were represented and the presence of red pigment suggest that the individual was subject to a mortuary ritual sometime after the body was originally placed under the floor in the Terminal Classic period (cal A.D. 902–1020). It is difficult to say when, but it may have occurred when the floor was opened to inter a second individual, Burial GJ-B04. Unfortunately, the bone sample from Burial GJ-B04 did not contain sufficient collagen for a radiocarbon date.

Burial GJ-B03, Lot GJ-02-A-07

Archaeological Context

Subop GJ-02-A was a 2-x-2-m excavation unit opened to investigate the chultun at the center of Gallon Jug Courtyard B-1 (C. Novotny et al., this volume; Figure 7.2). The goal of Subop GJ-02-A was to identify the courtyard surface, clarify its relationship to the chultun, establish the size and shape of the chultun, and recover any cultural material within the subterranean feature. Excavations cleared tree roots and debris from the edges of the chultun, which revealed that the southwestern edge of the chultun may have been a step carved into bedrock to allow for easier access. The chultun's entrance measured 0.8 m (north/south) by 1.10 m (east/west). Excavations were suspended due to time constraints prior to reaching bedrock, but the depth of the chultun at the end of excavation was 0.85 m. The chultun is roughly shoe shaped, with a smaller chamber measuring 1.15 m (north/south) by ~1 m (east/west) extending east/southwest under the courtyard floor. Several limestone blocks were uncovered at the base of the chamber, and a 1-x-1-m excavation unit was positioned over them to further investigate and recover artifacts. Human remains, Burial GJ-B03, were encountered along the eastern and northern edges of the chamber (Figure 7.13). Cultural material including an obsidian blade, shell fragments, ceramics, and lithic debitage were recovered from the burial context. In-field observations suggest that the body was that of one adult individual was placed in a flexed position, possibly with head oriented to the south, in a simple cist delineated by the unworked limestone blocks. One sample of human bone was taken for AMS radiocarbon dating, but there was not sufficient collagen preserved for analysis. Burial GJ-B03 was not fully excavated due to time constraints, and excavation will resume in the 2020 field season.

Burial GJ-B04, Lot GJ-02-O-09

Archaeological Context

Burial GJ-B04 was located within Structure B-2 of Gallon Jug Courtyard B-1 within Subop GJ-02-O (C. Novotny et al., this volume; see Figure 7.2). Subop GJ-02-O was a 1-x-3-m unit initiated to investigate the southern wall of Structure B-2 and complete the excavation of the western room of the structure. A 1-x-1-1.10-m excavation subunit (Lot GJ-02-O-06) was opened to investigate a patch of disrupted plaster. Burial GJ-B02 was encountered first (see above), and Burial GJ-B04 was discovered

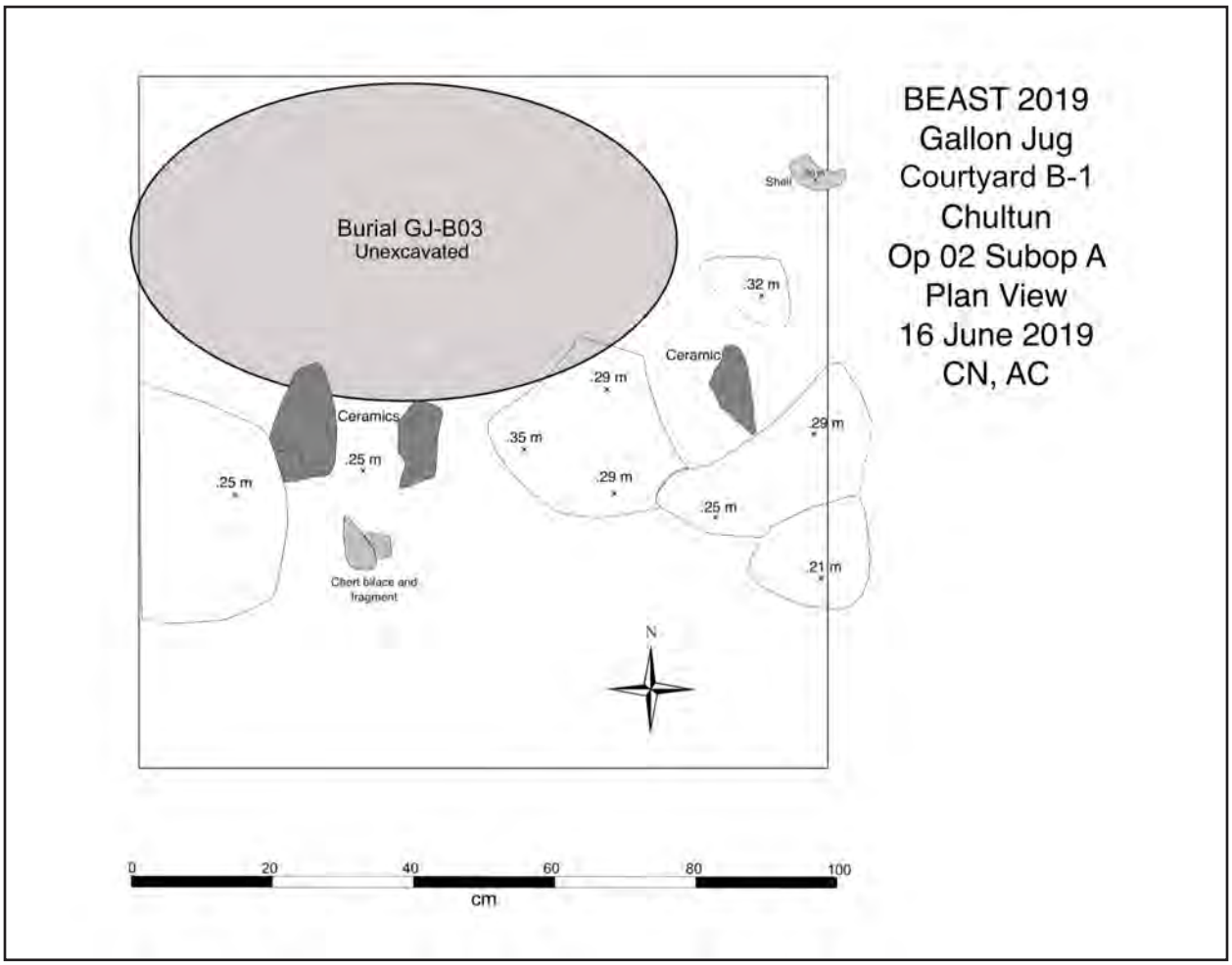

Figure 7.13. Plan drawing of Burial GJ-B03.

about 10 cm below Burial GJ-B02 during excavation of the pedestal. The grave space of Burial GJ-B04 was directly north of where the skull of Burial GJ-B02 would have been (Figure 7.14). Burial GJ-B04 was interred in a simple pit; no formal grave architecture demarcated the grave space. Burial GJ-B04 was 55 cm to 60 cm below floor surface in a space 80 cm by 60 cm. The individual in Burial GJ-B04 was interred in a loosely flexed position, supine with legs flexed at the hip and knees at the chest and was rotated slightly so that it was resting on the left side. The bones were moderately well preserved and well articulated, indicating a primary burial. The head, identified by the location of the teeth, was oriented to the south. No artifacts were recovered from within the grave of Burial GJ-B04. Sherds recovered from the fill indicate a Late Classic period date (C. Novotny et al., this volume).

Osteological Analysis

Skeletal elements were recovered from all regions of the body. The bone was moderately well preserved in the ground, but many elements disintegrated upon removal. The left side of the body was better preserved than the right.

Age and Sex

Based on dental and osteological development and dental attrition, age at death was estimated as adult. Sex was estimated as male based on measurements of the right scaphoid, a bone of the wrist (Mastrangelo et al. 2011). This sex

Figure 7.13. Photograph of the location of Burial GJ-B04, camera facing east.

assessment was supported by a fragment of pelvis that included the greater sciatic notch, which was scored as probable male.

Dentition

Twelve teeth were recovered from Burial GJ-B04; none of the teeth were in alveolar bone as the skull was very poorly preserved (Table 7.3). The RI^1 was modified in the B4 style (Romero 1958), although normal attrition changed the shape of the modification slightly.

Pathology and Trauma

There was no pathology or trauma visible on the remains of Burial GJ-B04.

Conclusion

Burial GJ-B04 was recovered from Subop GJ-02-O. Lot GJ-02-O-06 was placed to investigate a rough patch in an otherwise well-preserved floor of the western room of Structure B-2. Burial GJ-B02 was found immediately below the floor, and, while excavating around GJ-B02 to create a pedestal, additional bones were found. These were the remains of Burial GJ-B04, an

Table 7.3. Dental Inventory of Burial GJ-B04

RM^3	RM^2	RM^1	RP^4	RP^3	RC^1	RI^2	RI^1	LI^1	LI^2	LC^1	LP^3	LP^4	LM^1	LM^2	LM^3
X	X	X	X				X*		X	X			X	X	
				X	X								X		
RM_3	RM_2	RM_1	RP_4	RP_3	RC_1	RI_2	RI_1	LI_1	LI_2	LC_1	LP_3	LP_4	LM_1	LM_2	LM_3

*modified tooth

adult, probably male, interred in a simple pit grave within sub-floor fill. He was interred in a flexed position with head oriented to the south. No artifacts were recovered from the grave space. Burial GJ-B04 was stratigraphically lower than Burial GJ-B02 suggesting that Burial GJ-B04 was interred first. It is possible that the interment of Burial GJ-B02 disturbed the cranium of Burial GJ-B4, since there were very few skeletal elements of the cranium recovered. The construction fill of medium to large sized irregularly shaped limestone rocks did not preserve any stratigraphic evidence of re-opening the grave space of either of these interments.

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Project Lists for the 1996 through 2019 Seasons

Compiled by Brett A. Houk

This chapter includes lists of sites, operations, tombs, burials, caches, stone monuments, and radiocarbon dates recorded by the Chan Chich Archaeological Project (CCAP) since its inception in 1996 and the Belize Estates Archaeological Survey Team (BEAST) since 2013. It is meant to serve as a reference document for future seasons and is updated each year.

SITES

Table 8.1 lists Maya sites on and near the Gallon Jug (GJ), Laguna Seca (LS), and the adjacent Yalbac (Y) properties with Belize Estate (BE) designations. As noted by Sandrock (2013) and Sandrock and Willis (2014), BEAST assigned BE numbers to previously named sites and to newly discovered sites with four or more structures, the tallest of which must be at least

Table 8.1. Recorded BE Sites (UTM Zone 16N)

BE #	Site Name	Property	Original Source	UTM N	UTM E
1	Chan Chich	GJ	Guderjan (1991)	19 40 412	2 75 875
2	Kaxil Uinic (E'kenha)	LS	Guderjan et al. (1991)	19 40 538	2 73 381
3	Punta de Cacao	LS	Guderjan et al. (1991)	19 46 100	2 86 728
4	Gallon Jug	GJ	Guderjan et al. (1991)	19 45 700	2 83 688
5	Laguna Verde	GJ	Guderjan et al. (1991)	~19 47 250	~2 80 500
6	Laguna Seca	GJ/LS	Guderjan et al. (1991)	~19 50 850	~2 84 000
7	Qualm Hill (ruin)	LS	Guderjan et al. (1991)	~19 57 300	~2 87 500
8	Wamil	Y?	Guderjan et al. (1991)	~19 39 900	~2 94 900
9	Sierra de Agua	Y/LS?	Guderjan et al. (1991)	~19 40 600	~2 99 500
10	Gongora Ruin	LS	Guderjan et al. (1991)	19 54 400	2 93 459
11	Ix Naab Witz	LS	Sandrock (2013)	19 55 187	2 85 854
12	La Luchita	LS	Sandrock (2013)	19 50 011	2 77 178
13	Montaña Chamaco	LS	Sandrock (2013)	19 51 187	2 75 043
14	Sylvester Camp	GJ	Sandrock (2013)	19 45 510	2 78 128
15	Qualm Hill camp	LS	Sandrock and Willis (2014)	19 57 213	2 85 282
16	Kaxil Uinic village	Y/LS	Thompson (1963)	19 40 073	2 73 487
17	Sak Mut	Y	Houk et al. (2017)	19 34 386	2 72 740
18	Tikin Ha (formerly Xma Ha Ak'al)	LS	Houk et al. (2017)	19 58 096	2 96 807

Houk, Brett A. (compiler)
2019 The Chan Chich Archaeological Project: 1996 to 2019 Project Lists. In *The 2019 Seasons of the Belize Estates Archaeological Survey Team*, edited by Brett A. Houk, pp. 169–208. Papers of the Chan Chich Archaeological Project, Number 14. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

4 m high including structure and substructure or basal platform, that are not within 1 km of another recorded site BE site.

In addition to prehistoric sites, a number of historic sites are present in and near the BEAST survey area. Table 8.2 includes a list of those visited by the CCAP or BEAST or reported by other researchers. Significant historic sites are also assigned BE numbers.

Table 8.2. Known and Reported Historic Sites

Name	Location	Description	Source(s)
Kaxil Uinic village BE-16	Approximately 500 m south of BE-2 primarily on Yalbac Ranch, although the northern limits of the village are on Laguna Seca Ranch.	In 2012, the CCAP re-located the remains of the historic Maya village and *chicle* camp known as Kaxil Uinic and its associated *aguada*. The village was probably settled in the 1880s, and was closed in 1931 by the Belize Estate Co. BEAST mapped and excavated the site in 2015, recording seven three-stone hearths and multiple artifact scatters, which included turn of the century glass bottles and cast iron pots. BEAST returned to the site in 2016 and mapped additional surface finds, hearths, and mounds. The 2016 work included archival research in Jamaica and England.	Bonorden (2016); Bonorden and Houk (2015, 2016, 2019); Bonorden and Kilgore (2015, 2016); Booher et al. (2016); Houk (2012); Houk and Bonorden (2015); Houk et al. (2015); Harrison-Buck et al. 2018; Thompson (1963)
Qualm Hill camp BE-15	Immediately west of Cedar Crossing on the west bank of the Río Bravo.	A 215-x-90-m scatter of historic artifacts that likely represents the location of Qualm Hill (also known as Quam or Quam Hill), which was "the seasonal headquarters of the British Honduras Company during the mid 1800s" (Cackler et al. 2007:124). Qualm Hill is historically important as the site of a "Chichina" Maya raid led by Marcus Canul in 1865 (Bristowe and Wright 1888:27–28), yet artifacts recovered from the 2015 survey and excavation generally post-date the raid. The site, which primarily consists of surface artifact deposits, has been disturbed in recent years by individuals scavenging the historic logging equipment and modern loggers camping in the middle of the historic camp.	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Smith (2015); Bristowe and Wright (1888:27–28); Houk et al. (2015); Cackler et al. (2007:124)
El Infierno logging camp	Reportedly 1 km east of Guatemala border, northwest of Gallon Jug	This site is mentioned in reference to the location of the Maya site of El Infierno, which is described as "behind" the logging camp; no other details provided.	Guderjan et al. (1991:61)
Unnamed	Approximately 75 m southwest of BE-13, 50 m west of a swamp	BEAST located a possible abandoned *chiclero* camp, as evidenced by a small collection of bottles, in 2013.	Sandrock (2013)

CHAN CHICH CONTROL POINTS

Table 8.3 lists the UTM coordinates for important mapping control points at Chan Chich. Most of the points described are marked with metal surveyor spikes or large nails. Elevations are given for the top of the spike or nail. All points are OPUS corrected. Although the project shot several new control points in 2014, they are not included in this list because the total data station apparently was not properly calibrated. Willis and colleagues (2017) established two new control points in 2017. The elevations for these points have not yet been matched to previous control point elevations.

Table 8.3. Chan Chich Control Point UTM Coordinates

Point	Description	Northing	Easting	Elev (m)
Main Site Datum (2012)	Spike in asphalt near pavement's edge between bar and Structure A-1	1940412.85	275875.56	118.72
Structure A-1 Central Datum	Spike in central landing, summit of Structure A-1	1940390.29	275877.30	129.49
Structure A-1 East Datum	Eastern summit of mound	1940385.65	275895.98	131.76
Structure A-1 West Datum	Western summit of mound	1940395.39	275847.77	131.27
Structurea A-4 Datum	Western summit of mound	1940535.23	275863.09	126.02
Structure A-5 Central Datum	N1010 E1030 in local A-5 grid	1940519.90	275904.50	123.01
Structure A-5 West Datum	Western summit of mound	1940523.61	275891.81	122.95
Structure A-8 Datum	Summit of mound	1940494.17	275964.40	126.30
Structure A-9 Datum	Summit of mound	1940434.43	275958.13	126.41
Upper Plaza West Datum	East of Structure A-21	1940358.03	275857.15	125.99
Upper Plaza Southeast Datum	In southeast corner of plaza	1940337.89	275891.17	126.11
2017: Structure A-1	In central landing area	1940390.49	275877.58	131.00
2017: Structure A-5	Summit of structure	1940519.81	275907.97	124.33

OPERATIONS

To date, the CCAP has conducted excavations at Chan Chich and Kaxil Uinic ruins, and BEAST has made surface collections of isolated finds and at Qualm Hill camp and conducted excavations there and at Kaxil Uinic village. Operations numbers are assigned sequentially by site, preceded by a site abbreviation. Thus, the first operation at Chan Chich is designated Op CC-01. Table 8.4 lists the operations that have been assigned through the 2019 season.

Table 8.4. List of Operations Opened by CCAP and BEAST

Op	Season	Definitions	Subops	Source(s)
CC-01	1997	Excavations on the northern stairs of Structure A-1	A–C	Houk (1998)
CC-02	1997	Excavations at the Upper Plaza	A–J	Robichaux (1998)
CC-02	1998	Excavations at the Upper Plaza, including landing of Structure A-1	K–W	Robichaux et al. (2000)

Table 8.4. List of Operations Opened by CCAP and BEAST (continued)

Op	Season	Definitions	Subops	Source(s)
CC-02	1999	Excavations at the Upper Plaza including summits of Structures A-1 and A-13	X–AK	Robichaux (2000)
CC-03	1997	Excavations at the ball court	A–E	Ford (1998)
CC-04	1997	Test pits in Group C	A–C	Meadows (1998)
CC-04	1998	Test pit in Plaza C-2	D	Ford and Rush (2000)
CC-05	1998	Excavations at Courtyard C-1	A–L	Ford and Rush (2000)
CC-06	1998	Excavations at Group H	A–F	Houk and Zaro (2015); Meadows and Hartnett (2000)
CC-07	1999	Excavations at Structure C-6	A–E	Harrison (2000)
CC-08	1999	Excavations at Structure A-11	A–B	Houk (2000)
CC-09	2001	Excavations at Plaza C-2	A–M	Unpublished field notes
CC-10	2012	Excavations at the Upper Plaza	A–F	Kelley (2014); Kelley et al. (2012)
CC-10	2013	Excavations at the Upper Plaza	G–T (plus Ix)	Kelley (2014); Kelley et al. (2013)
CC-11	2013	Excavations at Structure A-5	A–R (plus Fx)	Herndon et al. (2013)
CC-12	2014	Excavations at the Upper Plaza, Chan Chich Dynastic Architecture Project	A–T (plus Ax)	Herndon et al. (2014, 2015)
CC-13	2014	Excavations at the Back Plaza	A–N (plus ST, seven shovel tests)	Herndon et al. (2015); Vazquez (2014); Vazquez et al. (2014)
CC-14	2014, 2015	Excavations associated with processional architecture including the Eastern and Western Causeways, Courtyard D-1, Structure D-48, Structure C-17, and Structure C-18A, and Structure D-36	A–AW (plus Ex, ARx, AMx, and SF)	Booher (2016a); Booher et al. (2015); Booher and Houk (2016); Booher and Nettleton (2014); Houk et al. (2015)
CC-15	2016–2018	Excavations at the Upper Plaza, Chan Chich Dynastic Architecture Project. The 2016 through 2018 seasons focused on chronology building and the northern part of the plaza.	A–Z, AA, BB, CC, DD, EE, FF, GG, HH, II, JJ, and KK (plus Bx, Kx, and Px)	Booher et al. (2016); Gallareta Cervera et al. (2017; 2019); Houk (2016)
CC-16	2016	Excavations at Norman's Temple complex.	A–X (plus Dx)	Booher (2016b); Booher et al. (2016)
CC-17	2017	Excavations at Courtyard D-4	A–U (plus Ix, Ox, and ST)	Kilgore (2018); Kilgore et al. (2017)
CC-18	2017, 2018	Excavations at Structure A-6/ North Plaza lithic workshops and debitage deposit	A–H	Degnan (2018); Degnan and Houk (2019); Degnan et al. (2017)

Table 8.4. List of Operations Opened by CCAP and BEAST (continued)

Op	Season	Definitions	Subops	Source(s)
CC-19	2019	Excavations in Upper Plaza, primarily at Structures A-12 and A-13 in 2019	A–V (plus Qx)	Gallareta Cervera and Houk (this volume)
CC-20	2019	Salvage excavations on the summit of Structure A-4 to recover a cache discovered by cell tower contractors	A–E	Houk, Bedrosian, and McKinney (this volume)
GJ-01	2018	Excavations in the plaza at Gallon Jug in 2018	A-U	Houk (2019); Kilgore, unpublished field notes
GJ-02	2019	Excavations at Courtyard D-1 at Gallon Jug in 2019		C. Novotny et al. (this volume)
GJ-03	2019	Test pit excavations at Gallon Jug settlement groups in 2019		C. Novotny et al. (this volume)
KU-01	2012	All excavations at Kaxil Uinic in 2012	A–H	Harris (2013); Harris and Sisneros (2012); Houk (2012); Houk et al. (2012, 2013)
KUV-01	2015, 2016	All excavations at Kaxil Uinic village in 2015 and 2016.	A–AD (plus Rx and SF)	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Kilgore (2015, 2016); Booher et al. (2016); Houk (2012); Houk and Bonorden (2015); Houk et al. (2015)
QHC-01	2014	Surface collections made by BEAST at Qualm Hill Camp	SF	Phillips and Sandrock (2014); Sandrock and Willis (2014)
QHC-02	2015	All excavations at Qualm Hill camp made by BEAST in 2015	A–S and SF	Bonorden (2016); Bonorden and Houk (2016); Bonorden and Smith (2015); Houk et al. (2015)
SF-01	2014	Surface collections made by BEAST that were not associated with a site	SF1–SF3	FileMaker Pro database
TH-01	2019	Test excavations at Tikin Ha in 2019	A–H, LT, and SF	Houk, Zaro, et al. (this volume)

SPECIAL DEPOSITS

Table 8.5 lists the burials thus far recorded by CCAP and BEAST. Figure 8.1 shows the locations of all burials excavated in the Upper Plaza at Chan Chich, and Figure 8.1 includes plots of the radiocarbon ages for burials with AMS dates, and Table 8.6 lists the tombs and crypts documented at the site, including a looted tomb first recorded by Guderjan (1991). Table 8.7 includes the two caches in the list of special deposits.

Table 8.5. List of Burials

Burial	Year	Lot	Context	Source(s)
CC-B1	1997	CC-4-A-3	Primary burial in Late Preclassic fill, Courtyard C-1	Meadows (1998)
CC-B2	1997	CC-2-J-6	Tomb 2, Terminal Preclassic burial in Upper Plaza	Houk et al. (2010)
CC-B3 (4, 6)	1998	CC-5-C-3 and -H-2	Secondary scatter of human bone associated with surface deposit of artifacts on steps of Structure C-2; Terminal Classic (?). Burials CC-B3, -B4, and -B6 combined by Frank and Julie Saul into Burial CC-B3.	Ford and Rush (2000)
CC-B5	1998	CC-6-C-9	Late Classic (?) primary burial beneath Courtyard H-3	Meadows and Hartnett (2000)
CC-B7	1998	CC-4-D	Secondary scatter of human bone associated with surface deposit of artifacts on steps to Structure C-6; Terminal Classic (?)	Ford and Rush (2000)
CC-B8	1999	CC-7-B	Primary Terminal Classic burial beneath bench in Structure C-6	Harrison (2000)
CC-B9	2001	CC-9-G-7	Primary burial of a child in Structure C-12 patio; Late Classic (?)	Unpublished field notes
CC-B10	2012–2013	CC-10-A-8 (extends into CC-10-G)	Primary (?) subfloor, simple cist, burial, poorly preserved; early Late Preclassic. Interment consisted of a single, adult individual, likely of a young age at death. The presence of 19 unmodified dog teeth suggests that an animal was placed in the grave with the human individual. Oldest burial yet excavated at Chan Chich.	Kelley (2014); Kelley et al. (2013); Novotny et al. (2017)
CC-B11	2014	CC-12-D-9	Primary burial of an adult in a small crypt in Structure A-1. The burial is associated with the penultimate construction phase and was encountered beneath the central landing on the structure. The small crypt contained four complete vessels. Likely associated with Cache CC-C1.	Herndon et al. (2014); Novotny et al. (2015)
CC-B12	2014	CC-14-F-3	Primary, simple found in dry-laid fill within a bench, very close to the surface. Burial contained a single shallow Achote Black bowl with nubin feet and post-firing graffiti—incised quadripartite designs—on two exterior sides and in the middle of the vessel's interior.	Booher (2016); Booher and Nettleton (2014); Novotny et al. (2015)
CC-B13	2014	CC-12-H-13	Primary burial of robust adult in a small crypt associated with the penultimate phase of Structure A-18 in the Upper Plaza. No grave goods.	Herndon et al. (2014); Novotny et al. (2015)

Table 8.5. List of Burials (continued)

Burial	Year	Lot	Context	Source(s)
CC-B14	2015	CC-14-J-04	Primary burial of adult female buried in a seated position within a bench in Structure D-1. She was interred with a piece of anlter, a small shell bead, a *jute* shell, and a mold-made ceramic spindle whorl.	Booher (2016a); Booher et al. (2015); Mitchell and Booher (2015); Novotny et al. (2015)
CC-B15	2016	CC-16-L-02	Late Classic; primary interment of a single, young adult, male individual interred in a simple cist within a bench. The individual was placed in a tightly flexed position with head to the east. Grave goods included a small, modified shell, a shell labret, two obsidian blades, and a complete Cameron Incised bowl.	Booher (2016b); Novotny et al. (2016)
CC-B16	2016, 2017	CC-15-G-11, -13, and -14	Discovered in 2016, but only partially excavated, Burial CCB-16 was located in Crypt 1 in the Upper Plaza. The burial dates to the Early Classic period. Excavations on the crypt were completed in 2017. Burial CC-B16A, excavated in 2016, consisted of bones of the left foot, an articulated right leg, and an articulated right wrist and hand (Novotny et al. 2016). Burial CC-B16B was excavated in 2017 and was the primary interment of a single adult male in an extended and prone position with hands on the pelvis and the right leg crossed over the left. Burials CC-B16C and CC-B16D were clusters of human bone likely associated with Burial CC-B16A. The best explanation is that an individual was buried in crypt, perhaps in a flexed position given the position of the right leg (CC-B16A), and disturbed by the interment of CC-B16B before decomposition was complete. The primary individual was buried with a bib-helmet head pendant, which may indicate he was a member of the ruling family.	Gallareta Cervera et al. (2017); Houk (2016); Novotny et al. (2016, 2017)
CC-B17	2017	CC-15-N-4	Burial CC-B17 is a Late Preclassic burial of a young to middle age adult found shallowly buried beneath the plaza surface of the Upper Plaza. The individual was placed in an extended position with the head oriented to the north. A complete Society Hall Impressed bowl was intentionally placed over the skull. Subsequent excavations encountered Burial CC-B22 3 meters to the north of this burial (see below). A radiocarbon sample from this burial returned a 2-sigma calibrated date range of 154 BC–AD 27.	Gallareta Cervera et al. (2017); Novotny et al. (2017)

Table 8.5. List of Burials (continued)

Burial	Year	Lot	Context	Source(s)
CC-B18	2017	CC-17-C-9	Late Classic Burial CC-B18 was found within the southeast corner of a bench in Structure D-41, in Couryard D-4. Burial CC-B18 consisted of two individuals. Individual CC-B18A was in a flexed position in the western part of the burial area, oriented east-west. No cranium was found with this individual. The second skeleton, Individual CC-B18B was also in a flexed position in the northeastern corner of the burial, oriented east-west.	Kilgore (2018); Kilgore et al. (2017); Novotny et al. (2017)
CC-B19	2018	CC-15-V-07	The remains of two adults were recovered from Early Classic construction fill in the northeast corner of the Upper Plaza, one young in age and one possibly a male. The bones were in a secondary context, and it is not clear how they came to be commingled. The color and root etchings on the bone surface are similar but could be due to their common deposition in the primary context from which they were recovered. Ceramics from the context suggest these individuals were deposited in the Early Classic period, and a single radiocarbon date suggests one of the individuals died near the end of the Late Preclassic period or the beginning of the Early Classic period.	Gallareta Cervera et al. (2019); Novotny et al. (2019)
CC-B20	2018	CC-15-V-16	Burial CC-B20 was the primary interment of an older individual, possibly a female, in a stone-lined crypt (Crypt 2) with capstones. The crypt was constructed on an earlier floor within a platform in the northeast corner of the Upper Plaza. The burial did not include grave goods. The skeletal elements were extremely well preserved, particularly the skull, but it is not immediately clear why the bones were so well preserved in this context. The lack of soil surrounding the bones, which is acidic and remains damp in the tropical climate of Belize, may have contributed to their good preservation. There were several pathologies identified, but none that were acute or unexpected for an individual of advanced age. The interment dates to the Early Classic period.	Gallareta Cervera et al. (2019); Novotny et al. (2019)

Table 8.5. List of Burials (continued)

Burial	Year	Lot	Context	Source(s)
CC-B21	2018	CC-15-EE-06	Burial CC-B21 consists of the secondary interment of one individual who died during the Late Preclassic period. Although fragmentary, the few diagnostic elements suggest the individual was a possible female of middle to older adulthood. The secondary deposit was not marked by any formal grave architecture and dated to the Late Preclassic or Early Classic period based on ceramics found within the fill.	Gallareta Cervera et al. (2019); Novotny et al. (2019)
CC-B22	2019	CC-19-A-03	Burial CC-B22 was first discovered in 2018 as part of Subop CC-15-R, but the burial was not excavated until 2019. The interment contained one, adult individual, probably a male. The skull was covered by a Society Hall bowl and an unslipped jar were found next to the left humerus. A single radiocarbon sample returned a 2-sigma date range of 200–91 cal BC (PSUAMS# 6913; Sample CC-19-S15), confirming the Late Preclassic date for this burial. See Burial CC-B17, which is roughly contemporaneous and approximately 3 m to the south.	Gallareta Cevera and Houk (this volume); A. Novotny et al. (this volume)
GJ-B01	2019	GJ-02-N-03	The skeletal remains present in Burial GJ-B01 were too fragmented to provide any detail as to who the individual was in life. The fragmentary state of the remains strongly suggests that the body decomposed elsewhere and was disinterred for an unknown amount of time prior to being re-interred in Structure B-1.	C. Novotny et al. (this volume); A. Novotny et al. (this volume)
GJ-B02	2019	GJ-02-O-07	The interment of one older adult, probable male was made into subfloor construction fill without any formal grave architecture in Structure B2. No grave inclusions were recovered. The only bones of the skull present were fragments of occipital and parietal, as well as six teeth. Although not well preserved, skeletal elements from the all other regions of the body were present and well-articulated, indicating that it was a primary interment. The absence of the skull in an interment where all other bones were represented, and the presence of red pigment suggest that the individual was subject to a mortuary ritual sometime after the body was originally placed under the floor. This may have occurred to inter a second individual, Burial GJ-B04 (see below), under the floor. A single radiocarbon date from the burial returned a calibrated 2-sigma date range of AD 907–1020 (PSUAMS# 6914; Sample GJ-S02). The Terminal Classic date for the burial is unexpectedly late.	C. Novotny et al. (this volume); A. Novotny et al. (this volume)

Table 8.5. List of Burials (continued)

Burial	Year	Lot	Context	Source(s)
GJ-B03	2019	GJ-02-A-07	Crews encountered Burial GJ-B03 near the eastern and northern edges of the chamber in a chultun, located in the approximate center of Courtyard B-1 at Gallon Jug. In-field observations suggest that the body was that of one adult individual was placed in a flexed position, possibly with head oriented to the south. One sample of human bone was taken for AMS radiocarbon dating ,but there was not sufficient collagen preserved for analysis. Burial GJ-B03 was not fully excavated due to time constraints, and excavation will resume in the 2020 field season.	C. Novotny et al. (this volume); A. Novotny et al. (this volume)
GJ-B04	2019	GJ-02-O-09	Burial GJ-B04, an adult, probably male, was interred in a simple pit grave within sub-floor fill in Structure B-2. He was interred in a flexed position with head oriented to the south. No artifacts were recovered from the grave space. Burial GJ-B04 was stratigraphically lower than Burial GJ-B02, however the missing facial bones and teeth and the red pigment found on Burial GJ-B02 suggest that the interment of Burial GJ-B04 may have disturbed Burial GJ-B02	C. Novotny et al. (this volume); A. Novotny et al. (this volume)

Table 8.6. List of Crypts and Tombs

#	Season	Provenience	Location	Source(s)
Tomb 1	--	Structure C-31	Looted tomb referred to as the King's Tomb; Late Classic (?)	Guderjan (1991)
Tomb 2	1997–1999	Upper Plaza, CC-2-J-6	Tomb 2, Terminal Preclassic tomb in Upper Plaza (Burial CC-B02)	Houk et al. (2010); Robichaux (1998, 2000); Robichaux et al. (2000)
Crypt 1	2016, 2017	Upper Plaza, Subop CC-15-G	Early Classic crypt in northern part of Upper Plaza (Burials CC-B16A–C)	Gallareta Cervera et al. (2017); Houk (2016)
Crypt 2	2018	Upper Plaza, Subop CC-15-V	Early Classic crypt built on Middle Preclassic floor in the northeastern corner of the Upper Plaza (Burial CC-B20)	Gallareta Cervera et al. (2019); Houk (2019); Novotny et al. (2019)

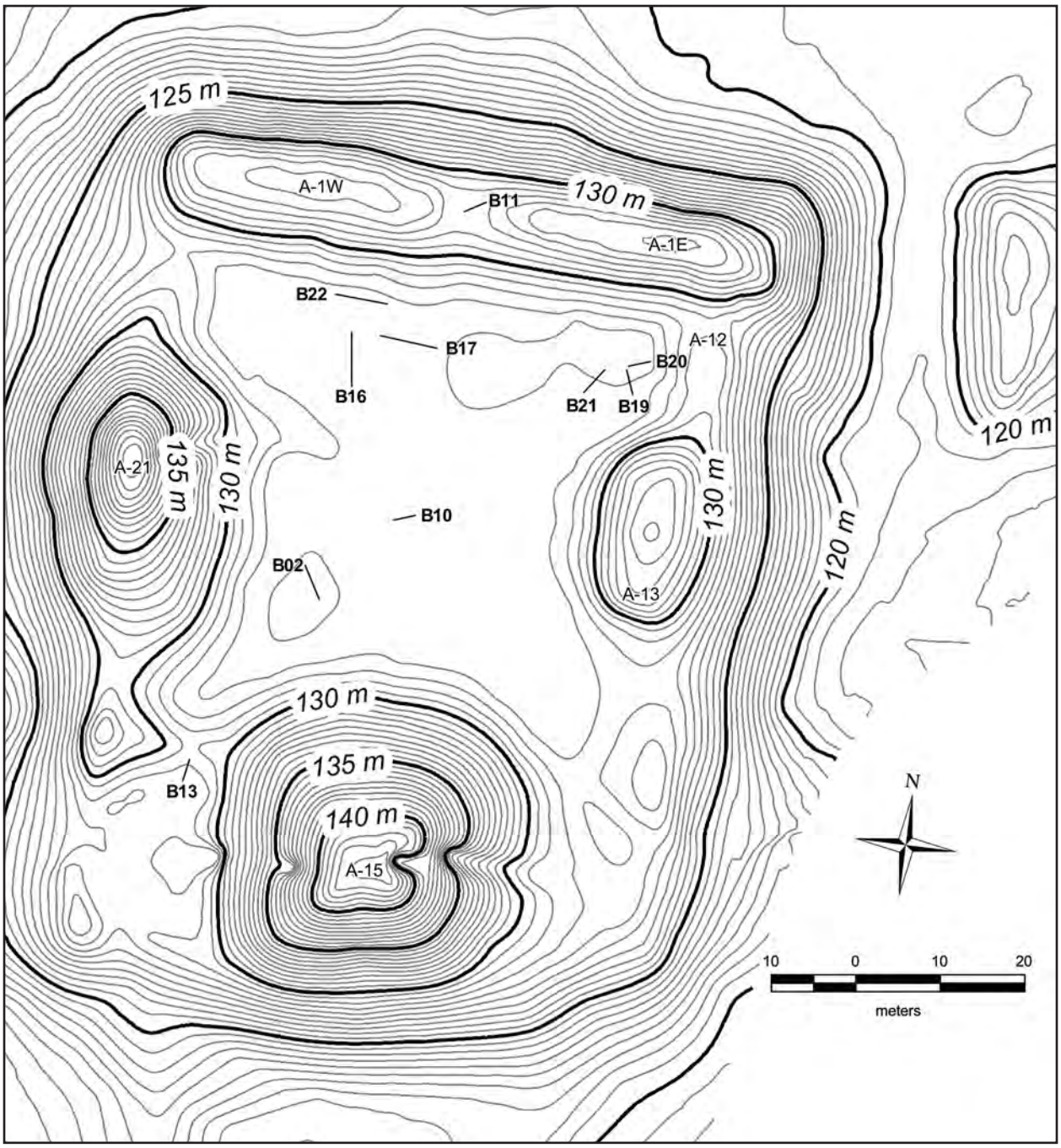

Figure 8.1. Locations of burials in the Upper Plaza at Chan Chich.

STONE MONUMENTS

Table 8.8 lists the stone monuments recorded within the CCAP and BEAST permit area. To date, no monuments with legible texts or dates have been found in the area. The only monuments with evidence of carving are Stela 1 at Kaxil Uinic (see Harris and Sisneros 2012; Thompson 1939) and Stela 2 at Tikin Ha (see Houk et al., this volume).

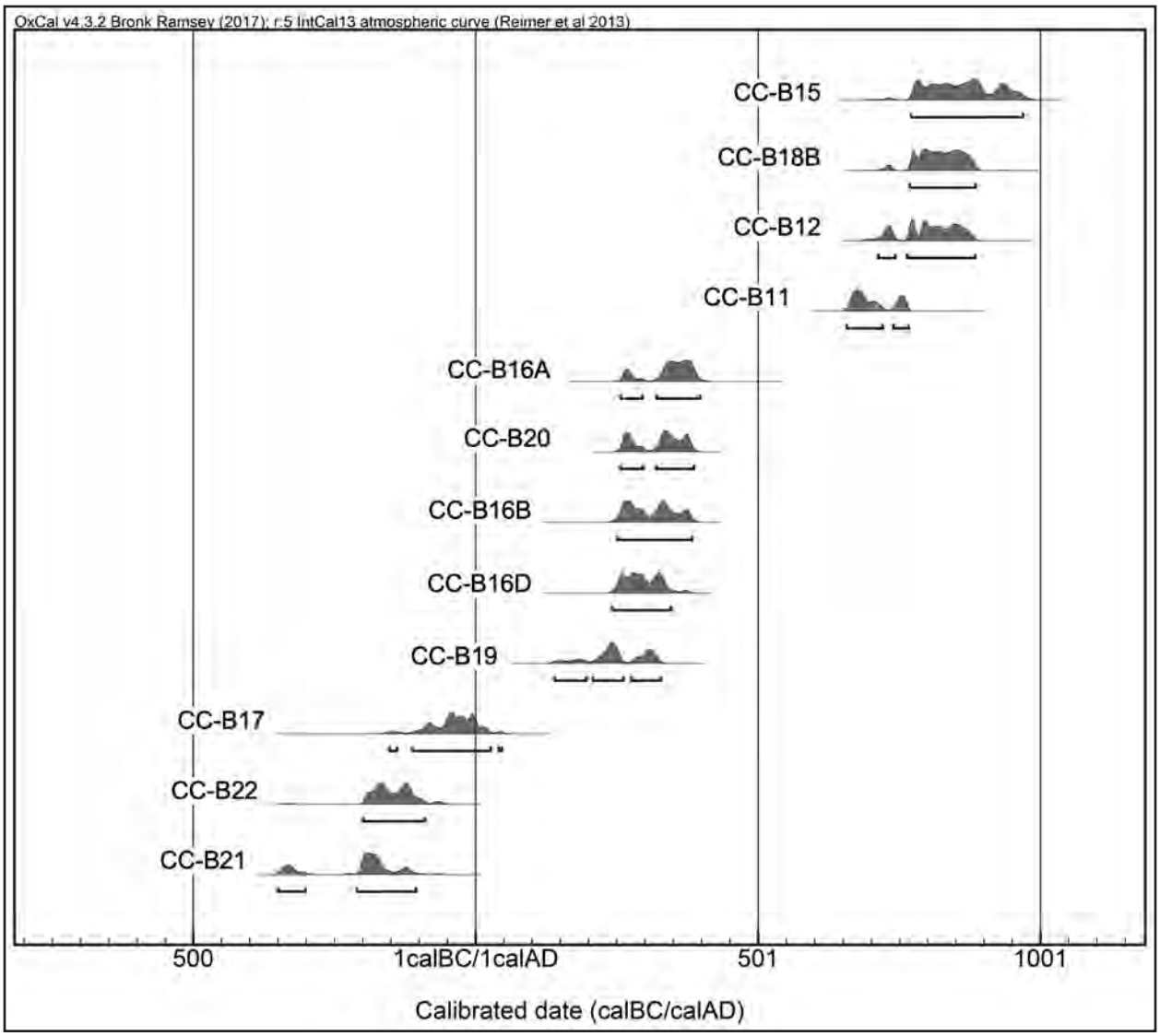

Figure 8.2. Plots of calibrated radiocarbon dates for burials from Chan Chich.

Table 8.7. List of Caches

Cache #	Season	Provenience	Context	Source(s)
CC-C1	2014	CC-12-D-8	Structure A-1, penultimate phase. This cache contained 17 obsidian blades, found loose but grouped together in fill, resting on one of the capstones of Burial CC-B11.	Herndon et al. (2014)
CC-C2	2019	CC-20-E-?	Central area of Structure A-4 platform. Initially discovered by contractors excavating pits for a new cell tower, this cache contained at least four pairs of lip-to-lip bowls and two obsidian blades. Ceramics suggest the cache dates to ca. AD 250.	Houk, Bedrosian, and McKinney (this volume)

Table 8.8. Recorded Stone Monuments in CCAP/BEAST Permit Area

BE #	Site	#	Location	Description	Source(s)
1	Chan Chich	Stela 1	Main Plaza, base of Structure A-2	Uncarved and burned stela	Guderjan (1991:43)
2	Kaxil Uinic	Stela 1	Main plaza, base of Structure 3	Broken in two pieces, heavily eroded stela with evidence of carving, illegible; 1.95 m tall, 80 cm wide, 55 cm thick	Guderjan et al. (1991); Harris and Sisneros (2012:52); Thompson (1939)
		Altar 1	Main plaza, base of Structure 3	Round, limestone altar (ca. 130 cm diameter; 30 cm thick), uncarved	Guderjan et al. (1991); Harris and Sisneros (2012:56–56); Thompson (1939)
3	Punta de Cacao	Stela 1	Plaza A, near base of Structure A-5	Uncarved stela	Robichaux (2004:200)
		Possible stela or altar	Plaza A, in front of Structure A-5	Large, uncarved block of stone, 82 x 82 x 40 cm, broken into two parts.	Hartnett (2005)
4	Gallon Jug	Stela 1	Northern part of the plaza in front of Structure 4	Upright, small uncarved stela with a hole in it. Dimensions not reported.	Kilgore, unpublished 2018 field notes
		Stela 2	Southwestern corner of the plaza between Structures 2 and 3.	Uncarved, broken, and laying flat stela. Dimensions not reported.	Kilgore, unpublished 2018 field notes
		Stela 3	Eastern end of the plaza, west of the southwest corner of Structure 1.	Uncarved stela discovered by Houk “floating” above the plaza in the roots of a fallen tree. Stela is 1.41 x 0.68 x 0.25 m.	Houk, unpublished 2018 field notes
		Stela 4?	Eastern end of the plaza, west of the of Structure 1.	Group of limestone fragments near centerline of Structure 1 which may be a broken, uncarved stela.	Houk, unpublished 2018 field notes

Table 8.8. Recorded Stone Monuments in CCAP/BEAST Permit Area (continued)

BE #	Site	#	Location	Description	Source(s)
4	Gallon Jug (cont)	Altar 1?	Approximate center of the plaza.	Small, broken, uncarved altar. Dimensions not reported.	Kilgore, unpublished 2018 field notes
7	Qualm Hill	Stela 1	Northeastern corner of Plaza A	Uncarved stela, laying flat; 1.8 m long, 0.6 m wide, and 0.4 m thick	Cackler et al. (2007:121)
		Altar 1	Plaza B	Broken in half, plain altar measuring 1.5 m in diameter and 1 m thick	Cackler et al. (2007:123)
10	Gongora Ruin	Stela 1	In plaza in front of Structure 1	Small, uncarved stela. Note that BEAST was unable to re-locate this monument in 2014.	Guderjan et al. (1991:81); Sandrock and Willis (2014)
11	Ix Naab Witz	Stela 1	Upper plaza near southwestern corner of Structure 6	Small, uncarved stela, 1.05 m tall, 40–60 cm wide, 35 cm thick	Sandrock (2013)
18	Tikin Ha	Stela 1	Main Plaza, base of Structure A-9	Stela 1 was found face down in front of Structure A-9. As noted upon our initial inspection in 2017, it appears that looters had originally cleaned around this monument and attempted to lift it. The monument is uncarved and measures 128 x 78 cm, with a thickness of 35 cm. It is clearly broken at one end, if not both ends. A second fragment found nearby may have been part of Stela 1 and measures 68 x 60 cm, with a thickness of 32 cm. Upon clearing debris from the stela, we collected nearly 90 Tepeu 3 sherds, with a few possible Postclassic sherds in the mix.	Houk, Zaro, et al. (this volume)
		Stela 2	Main Plaza, southeastern corner between Structures A-3 and A-4, with Altar 2	Set 23 cm east of Altar 2, the base of this stela is *in situ*, but the upper portion is broken into approximately 16 large fragments and a half dozen small fragments (Figure 8.3). The base is 34 cm thick, 122 cm wide, and 42 cm tall. The base extends another 43 cm below the surface. The top is too fragmented to estimate the monument's original height. Traces of faint carving are present on one fragment from the top portion of the monument, but no hieroglyphs were observed. The stela and altar pair may be associated with a formal entrance into the plaza through the gap between Structures A-3 and A-4.	Houk, Zaro, et al. (this volume)

Table 8.8. Recorded Stone Monuments in CCAP/BEAST Permit Area (continued)

BE #	Site	#	Location	Description	Source(s)
18	Tikin Ha (cont)	Stela 4	Between Groups A and B	Plain, broken stela set midway Between East Plaza and Courtyard A-5. The monument faces east-west (its long axis is oriented 10° east of north), toward the two architectural groups and may be associated with an unmapped sacbe connecting the two groups. The base is in situ, but the top of the stela is broken off, laying to the east of the base. Base is 75 cm tall (above ground surface), 97 cm wide, and 43 cm thick. The top is broken into two pieces and would have added 61 cm to the height of the monument.	Houk, Zaro, et al. (this volume)
		Altar 1	Courtyard A-3	Altar 1 sits in the center of Courtyard A-3, framed by Structure A-17 to the west and Structure A-18 to the south. The primary piece lies flat and measures 100 x 80 cm, is oriented 71° east of north, and is 32 cm thick. It does not appear to be carved, but it is eroded and obscured by roots making it difficult to determine with certainty. Several smaller stone fragments lie just west of the monument and may have broken off it.	Houk, Zaro, et al. (this volume)
		Altar 2	Main Plaza, southeastern corner between Structures A-3 and A-4, with Stela 2	Set only 23 cm west of Stela 2, this eroded, uncarved altar is approximately 35 cm thick, 108 cm long, and 78 cm wide (see Figure 8.3). Small pieces have spalled off its edges, so it was originally larger. It is oriented approximately 16° west of north. In plan view, it is roughly rectangular with rounded corners. Excavations beneath the monument did not encounter a cache. The stela and altar pair may be associated with a formal entrance into the plaza through the gap between Structures A-3 and A-4.	Houk, Zaro, et al. (this volume)
		Altar 3	Courtyard D-1	Altar 3 sits in the central area of Courtyard D-1. This small, uncarved monument measures 100.5 cm long by 85 cm wide and is 15 cm thick. It is rectangular in plan view.	Houk, Zaro, et al. (this volume)

Figure 8.3. Photo of Tikin Ha Altar 2 (left) and Stela 2 (right), shattered into multiple pieces. The base of Stela 2 is in situ and upright in the approximate center of the photograph. Camera facing northeast.

RADIOCARBON DATES

Table 8.9 presents the results of radiocarbon samples run by the project from 2012 to 2015. Table 8.10 presents the calibrated age ranges and isotope data for those same samples. Table 8.11 presents the results of samples from Chan Chich for the 2016 and 2019 seasons. Table 8.12 includes the calibrated ages of the radiocarbon samples from Chan Chich the 2016 to 2019 seasons, and Table 8.13 presents the results of radiocarbon samples from BEAST in 2019. Table 8.14 presents the calibrated ages of the radiocarbon samples from Tikin Ha and Gallon Jug from the 2019 season. Table 8.15 presents the isotope data for 2018 samples from human bone. Note that at the time of printing this report, we still had not received the isotope data on the 2019 bone samples.

Table 8.9. Radiocarbon Samples from the 2012 to 2015 Seasons

Area	Context	Sample #s	Comments	PSU #	UCIAMS #	Modern Fraction	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
Upper Plaza	Lot CC-10-C-7	CC-10-S12	Charred material. This sample came from a midden in the northern part of the Upper Plaza. This midden is above floor Lot CC-10-C-8.	6390	154684	0.7273	0.0013	-272.7167	1.3023	2560	15
Upper Plaza	Lot CC-10-C-8	CC-10-S16	Charred material. This sample comes from subfloor fill associated with the oldest floor in the northern part of the Upper Plaza.	6386	151874	0.7271	0.0019	-272.9396	1.9490	2560	25
Upper Plaza	Lot CC-10-C-4	CC-10-S03	Charred material. This sample is from the second plaster floor above the midden in the northern part of the Upper Plaza.	6385	151873	0.7561	0.0020	-243.8584	2.0222	2245	25
Upper Plaza	Lot CC-10-H-4	CC-10-S28	Charred material.This sample is associated with dense artifact deposit within northern platform buried in Upper Plaza.	6397	154691	0.7631	0.0013	-236.8672	1.3000	2170	15
Upper Plaza	Lot CC-12-O-8	CC-12-S16	Charred material.This sample comes from the lowest (fifth) identified layer of the 20-cm thick compact dirt surface that covers most of the southern part of the Upper Plaza.	6393	154687	0.7669	0.0013	-233.0904	1.2797	2130	15
Upper Plaza	Lot CC-12-O-4	CC-12-S14	Charred material. This sample comes from the second identified layer of the 20-cm thick compact dirt surface that covers most of the southern part of the Upper Plaza.	6392	154686	0.7941	0.0015	-205.9289	1.4563	1850	15
Upper Plaza	Lot CC-12-D-6	CC-12-S08	Charred material. This sample is from the plaster cap that patched the floor above Burial CC-B11.	6396	154690	0.8289	0.0016	-171.1195	1.5594	1510	20

Table 8.9. Radiocarbon Samples from the 2012 to 2015 Seasons (continued)

Area	Context	Sample #s	Comments	PSU #	UCIAMS #	Modern Fraction	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
Upper Plaza	Lot CC-12-D-7	CC-12-S13	Charred material. This sample comes from a charcoal rich layer of fill covering Burial CC-B11.	6394	154688	0.8292	0.0014	-170.7725	1.4281	1505	15
Upper Plaza	Lot CC-12-C-4	CC-12-S03	Charred material. This sample is from the subfloor fill of the final floor in a room on Structure A-18.	6391	154685	0.8489	0.0013	-151.0105	1.3403	1315	15
Upper Plaza	Lot CC-12-D-9	CC-12-S17	Charred material. This sample comes from Burial CC-B11 in the penultimate phase of Structure A-1.	6387	151875	0.8494	0.0023	-150.5843	2.2638	1310	25
Upper Plaza	Lot CC-12-A-4	CC-12-S05	Charred material. This sample is from the final phase of construction in a room in Structure A-1 (from the floor).	6395	154689	0.8512	0.0014	-148.8458	1.4124	1295	15
Back Plaza	Lot CC-13-M-3	CC-13-S14	Charred material. This sample comes from a probable cooking feature in Structure A-23. Will help date terminal occupation.	6388	151876	0.8554	0.0023	-144.6185	2.2870	1255	25
Str. D-1	Lot CC-14-F-3	CC-14-S04	Bone. This sample is human bone from Burial CC-B12 in Structure D-1.	6418	154712	0.8589	0.0017	-141.0115	1.6736	1220	20

Table 8.10. Calibrated Age Ranges and Isotope Data for Radiocarbon Samples from 2012 to 2015 Seasons

Sample #	$\delta^{13}C$ (‰ VPDB)	$\delta^{15}N$ (‰ Atm N2)	%C	%N	C:N	From	To	%
CC-10-S12						799 BC	766 BC	95.4
CC-10-S16						805 BC	569 BC	95.4
CC-10-S03						390 BC	280 BC	95.4
CC-10-S28						355 BC	171 BC	95.4
CC-12-S16						204 BC	96 BC	95.4
CC-12-S14						AD 91	AD 231	95.4
CC-12-S08						AD 435	AD 608	95.4
CC-12-S13						AD 540	AD 602	95.4
CC-12-S03						AD 659	AD 764	95.4
CC-12-S17						AD 658	AD 768	95.4
CC-12-S05						AD 667	AD 768	95.4
CC-13-S14						AD 673	AD 863	95.4
CC-14-S04	-10.49	8.83	52.73	18.60	3.31	AD 713	AD 885	95.4

Table 8.11. Radiocarbon Samples Processed from Chan Chich (2016 and 2019) by Lot

PSU AMS#	Sample # CC-	Lot CC-	Material	fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
1278	15-S016	15-A-08		0.7354	0.0020	-264.6	2.0	2470	25
3029	15-S119/120	15-A-27	multiple charcoal	0.7102	0.0015	-289.8	1.5	2750	20
5222	15-S197	15-AA-05	single charcoal	0.8578	0.0015	-142.2	1.5	1230	15
1277	15-S005	15-B-03		0.8535	0.0019	-146.5	1.9	1275	20
1280	15-S022	15-B-04		0.7340	0.0018	-266.0	1.8	2485	20
1282	15-S045	15-B-07		0.7384	0.0018	-261.6	1.8	2435	25
1327	15-S029	15-B-08		0.7238	0.0037	-276.2	3.7	2595	45
1283	15-S050	15-B-10		0.7335	0.0020	-266.5	2.0	2490	25
1285	15-S054	15-B-11		0.7308	0.0024	-269.2	2.4	2520	30
1284	15-S051	15-B-15		0.7215	0.0022	-278.5	2.2	2620	25
1276	15-S004	15-C-04		0.7960	0.0018	-204.0	1.8	1835	20
1279	15-S019	15-C-05		0.7951	0.0018	-204.9	1.8	1840	20
1325	15-S007	15-C-07		0.7545	0.0033	-245.5	3.3	2265	40
1326	15-S023	15-C-08		0.7516	0.0026	-248.4	2.6	2295	30
1281	15-S034	15-C-10		0.7300	0.0018	-270.0	1.8	2530	20
1328	15-S039	15-C-11		0.7351	0.0027	-264.9	2.7	2470	30
5457	15-S221	15-EE-04	XAD amino acids	0.7634	0.0014	-236.6	1.4	2170	15
5454	15-S216	15-EE-06	XAD amino acids	0.7654	0.0016	-234.6	1.6	2145	20
5266	15-S201	15-EE-07	single charcoal	0.8146	0.0016	-185.4	1.6	1645	20
5225	15-S203	15-FF-11	multiple charcoal	0.7352	0.0026	-264.8	2.6	2470	30
1286	15-S059	15-G-04		0.7897	0.0022	-210.3	2.2	1895	25
2724	15-S065	15-G-13	multiple charcoal	0.7940	0.0014	-206.0	1.4	1855	15
2725	15-S063	15-G-14	multiple charcoal	0.8055	0.0014	-194.5	1.4	1735	15
2726	15-S067	15-G-14	multiple charcoal	0.8007	0.0017	-199.3	1.7	1785	20
2727	15-S070	15-G-14	multiple charcoal	0.8078	0.0014	-192.2	1.4	1715	15
2728	15-S071	15-G-14	single charcoal	0.8013	0.0015	-198.7	1.5	1780	15
2729	15-S073	15-G-14	multiple charcoal	0.7350	0.0014	-265.0	1.4	2475	15
2976	15-S141	15-G-14	XAD amino acids	0.8066	0.0017	-193.4	1.7	1725	20
5455	15-S217	15-G-14	XAD amino acids	0.8053	0.0014	-194.7	1.4	1740	15
5456	15-S219	15-G-14	XAD amino acids	0.8095	0.0016	-190.5	1.6	1700	20
2730	15-S138	15-G-19	multiple charcoal	0.8035	0.0015	-196.5	1.5	1760	15
2731	15-S137	15-G-21	multiple charcoal	0.7288	0.0014	-271.2	1.4	2540	20
2750	15-S079	15-I-09	multiple charcoal	0.7627	0.0014	-237.3	1.4	2175	15
5226	15-S206	15-JJ-06	single charcoal	0.7446	0.0014	-255.4	1.4	2370	20
5223	15-S198	15-KK-06	single charcoal	0.7389	0.0015	-261.1	1.5	2430	20
2732	15-S130	15-L-16	multiple charcoal	0.7617	0.0014	-238.3	1.4	2185	15
2733	15-S126	15-L-17	single charcoal	0.7702	0.0015	-229.8	1.5	2100	20
2734	15-S075	15-M-12	single charcoal	0.8081	0.0014	-191.9	1.4	1710	15
3030	15-S083/085	15-M-17	multiple charcoal	0.7406	0.0014	-259.4	1.4	2415	20

Table 8.11. Radiocarbon Samples Processed from Chan Chich (2016 and 2019) by Lot (continued)

PSU AMS#	Sample # CC-	Lot CC-	Material	fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
2735	15-S086	15-M-21	single charcoal	0.7371	0.0014	-262.9	1.4	2450	20
2736	15-S087	15-M-22	single charcoal	0.7356	0.0014	-264.4	1.4	2465	20
2737	15-S088	15-M-23	single charcoal	0.7306	0.0014	-269.4	1.4	2520	15
2738	15-S127	15-M-24	single charcoal	0.7390	0.0013	-261.0	1.3	2430	15
2977	15-S143	15-N-04	XAD amino acids	0.7763	0.0020	-223.7	2.0	2035	25
5229	15-S212	15-P-09	multiple charcoal	0.7378	0.0017	-262.2	1.7	2445	20
2748	15-S092	15-Q-02	single charcoal	0.5727	0.0012	-427.3	1.2	4475	20
2749	15-S117	15-Q-09	single charcoal	0.7608	0.0014	-239.2	1.4	2195	15
5221	15-S188	15-T-04	single charcoal	0.8303	0.0014	-169.7	1.4	1495	15
5443	15-S218	15-U-07	>30kDa gelatin	0.8009	0.0018	-199.1	1.8	1785	20
5208	15-S144	15-V-09	single charcoal	0.8016	0.0018	-198.4	1.8	1775	20
5453	15-S215	15-V-15	XAD amino acids	0.8078	0.0014	-192.2	1.4	1715	15
5216	15-S175	15-V-19	single charcoal	0.7364	0.0015	-263.6	1.5	2455	20
5217	15-S177	15-V-19	multiple charcoal	0.7314	0.0014	-268.6	1.4	2510	20
5218	15-S181	15-V-20	single charcoal	0.7184	0.0014	-281.6	1.4	2655	20
5219	15-S183	15-V-21	single charcoal	0.7277	0.0014	-272.3	1.4	2555	20
5215	15-S166	15-Z-07	multiple charcoal	0.7320	0.0013	-268.0	1.3	2505	15
5227	15-S208	15-Z-08	multiple charcoal	0.7364	0.0014	-263.6	1.4	2460	20
5228	15-S209	15-Z-08	single charcoal	0.7346	0.0014	-265.4	1.4	2480	15
5209	15-S152	15-Z-09	single charcoal	0.7369	0.0013	-263.1	1.3	2450	15
5210	15-S154	15-Z-09	single charcoal	0.7367	0.0014	-263.3	1.4	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5211	15-S155	15-Z-09	single charcoal	0.7369	0.0015	-263.1	1.5	2455	20
5212	15-S158	15-Z-11	multiple charcoal	0.7440	0.0023	-256.0	2.3	2375	25
5213	15-S160	15-Z-11	single charcoal	0.7382	0.0016	-261.8	1.6	2440	20
5214	15-S165	15-Z-11	multiple charcoal	0.7414	0.0018	-258.6	1.8	2405	20
5444	15-S220	15-Z-12	>30kDa gelatin	0.7216	0.0018	-278.4	1.8	2620	25
5220	15-S185	15-Z-18	single charcoal	0.7281	0.0014	-271.9	1.4	2550	15
1324	16-S01	16-L-03		0.8651	0.0034	-134.9	3.4	1165	35
2975	17-S19	17-C-10	XAD amino acids	0.8607	0.0018	-139.3	1.8	1205	20
2720	17-S08	17-E-04	single charcoal	0.8607	0.0014	-139.3	1.4	1205	15
2722	17-S14	17-I-06	multiple charcoal	0.8635	0.0015	-136.5	1.5	1180	15
2721	17-S06	17-J-03	multiple charcoal	0.8536	0.0014	-146.4	1.4	1270	15
2723	17-S10	17-Q-05	single charcoal	0.8640	0.0016	-136.0	1.6	1175	15
6913	19-S15	19-A-03	Human bone	0.7678	0.0014	-232.2	1.4	2120	15
6912	19-S03	19-A-05	Faunal bone	0.7587	0.0014	-241.3	1.4	2220	15
6650	19-S12	19-L-12	Charcoal	0.8495	0.0019	-150.5	1.9	1310	20

Table 8.11. Radiocarbon Samples Processed from Chan Chich (2016 and 2019) by Lot (continued)

PSU AMS#	Sample # CC-	Lot CC-	Material	fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±
6647	19-S04	19-N-04	Charcoal	0.8276	0.0018	-172.4	1.8	1520	20
6648	19-S07	19-N-05	Charcoal	0.8430	0.0018	-157.0	1.8	1370	20
6649	19-S09	19-O-07	Charcoal	0.8034	0.0016	-196.6	1.6	1760	20
6651	19-S14	19-S-07	Charcoal	0.8435	0.0020	-156.5	2.0	1370	20

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot

Sample # CC-	Lot* CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S016	15-A-08	Floor construction; south of stone alignment. Possibly equivalent to Floor 5 in 15-C.	2470	25	767–482 BC	94.6	767–434 BC
15-S016	15-A-08	Floor construction; south of stone alignment. Possibly equivalent to Floor 5 in 15-C.	2470	25	442–434 BC	0.8	767–434 BC
15-S043	15-A-15	Floor 11; south of stone alignment. Deepest Floor.	2700	35	911–804 BC	95.4	911–804 BC
15-S119/120	15-A-27	Floor 6, south of Blanca	2750	20	968–964 BC	0.8	968–833 BC
15-S119/120	15-A-27	Floor 6, south of Blanca	2750	20	931–833 BC	94.6	968–833 BC
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 694–745	35.9	AD 694–875
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 764–780	16.8	AD 694–875
15-S197	15-AA-05	looted bench in Room 2 of Str. A-1SE	1230	15	AD 788–875	42.7	AD 694–875
15-S005	15-B-03	Terminal use of Structure A-1	1275	20	AD 675–770	95.4	AD 675–770
15-S022	15-B-04	Top of MPC/LPC Structure?	2485	20	766–540 BC	95.4	766–540 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	749–648 BC	21.3	749–407 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	667–640 BC	6.8	749–407 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	589–578 BC	1.0	749–407 BC
15-S045	15-B-07	Embedded in top of floor CC-15-B-07	2435	25	564–407 BC	66.3	749–407 BC
15-S029	15-B-08	Structure Fill?	2595	45	841–736 BC	73.4	841–547 BC
15-S029	15-B-08	Structure Fill?	2595	45	689–663 BC	5.4	841–547 BC
15-S029	15-B-08	Structure Fill?	2595	45	648–547 BC	16.6	841–547 BC
15-S050	15-B-10	MPC/LPC fill in cut	2490	25	744–536 BC	95.1	744–524 BC
15-S050	15-B-10	MPC/LPC fill in cut	2490	25	525–524 BC	0.3	744–524 BC
15-S054	15-B-11	MPC/LPC floor	2520	30	795–728 BC	29.3	795–542 BC
15-S054	15-B-11	MPC/LPC floor	2520	30	717–708 BC	1.0	795–542 BC
15-S054	15-B-11	MPC/LPC floor	2520	30	694–542 BC	65.1	795–542 BC
15-S051	15-B-15	MPC/LPC fill in cut (in CC-15-B-15, floor)	2620	25	826–782 BC	95.4	826–782 BC
15-S004	15-C-04	Top of compact dirt floor	1835	20	AD 128–236	95.4	AD 128–236
15-S019	15-C-05	Floor 3	1840	20	AD 125–238	95.4	AD 125–238
15-S007	15-C-07	Floor 5	2265	40	401–346 BC	38.3	401–206 BC
15-S007	15-C-07	Floor 5	2265	40	322–206 BC	57.1	401–206 BC
15-S023	15-C-08	Floor 6	2295	30	406–354 BC	75.1	406–231 BC
15-S023	15-C-08	Floor 6	2295	30	291–231 BC	20.3	406–231 BC
15-S034	15-C-10	Floor 8	2530	20	794–746 BC	42.7	794–552 BC
15-S034	15-C-10	Floor 8	2530	20	686–666 BC	13.5	794–552 BC
15-S034	15-C-10	Floor 8	2530	20	644–552 BC	39.2	794–552 BC
15-S039	15-C-11	Floor 9	2470	30	768–476 BC	92.4	768–431 BC
15-S039	15-C-11	Floor 9	2470	30	464–453 BC	1.2	768–431 BC
15-S039	15-C-11	Floor 9	2470	30	445–431 BC	1.8	768–431 BC
15-S221	15-EE-04	dates fill of platform, NE UP	2170	15	355–292 BC	58.4	355–171 BC
15-S221	15-EE-04	dates fill of platform, NE UP	2170	15	231–171 BC	37.0	355–171 BC
15-S216	15-EE-06	Burial CC-B21	2145	20	351–302 BC	20.1	351–106 BC
15-S216	15-EE-06	Burial CC-B21	2145	20	211–106 BC	75.3	351–106 BC
15-S201	15-EE-07	Lot CC-15-EE-07	1645	20	AD 342–429	94.2	AD 342–505
15-S201	15-EE-07	Lot CC-15-EE-07	1645	20	AD 497–505	1.2	AD 342–505
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	768–476 BC	92.4	768–431 BC
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	464–453 BC	1.2	768–431 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S203	15-FF-11	below Floor 3 of Crystal	2470	30	445–431 BC	1.8	768–431 BC
15-S059	15-G-04	"Burning event" in crypt fill	1895	25	55 BC–AD 175	91.8	55 BC–AD 211
15-S059	15-G-04	"Burning event" in crypt fill	1895	25	AD 191–211	3.6	55 BC–AD 211
15-S065	15-G-13	Fill of capstones, north wall of crypt	1855	15	AD 87–107	6.5	AD 87–227
15-S065	15-G-13	Fill of capstones, north wall of crypt	1855	15	AD 121–227	88.9	AD 87–227
15-S063	15-G-14	Burial 16/Crypt context	1735	15	AD 247–353	92.5	AD 247–379
15-S063	15-G-14	Burial 16/Crypt context	1735	15	AD 368–379	2.9	AD 247–379
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 140–197	14.1	AD 140–328
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 208–262	48.2	AD 140–328
15-S067	15-G-14	Burial 16/Crypt context	1785	20	AD 277–328	33.1	AD 140–328
15-S070	15-G-14	Burial 16/Crypt context	1715	15	AD 257–298	30.7	AD 257–387
15-S070	15-G-14	Burial 16/Crypt context	1715	15	AD 320–387	64.7	AD 257–387
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 174–192	2.3	AD 174–330
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 212–264	50.8	AD 174–330
15-S071	15-G-14	Burial 16/Crypt context	1780	15	AD 275–330	42.4	AD 174–330
15-S073	15-G-14	Burial 16/Crypt context	2475	15	762–537 BC	95.4	762–537 BC
15-S141	15-G-14	Burial CC-B16B	1725	20	AD 252–384	95.4	AD 252–384
15-S217	15-G-14	Burial CC-B16D	1740	15	AD 243–346	95.4	AD 243–346
15-S219	15-G-14	Burial CC-B16A	1700	20	AD 257–296	15.7	AD 257–399
15-S219	15-G-14	Burial CC-B16A	1700	20	AD 321–399	79.7	AD 257–399
15-S138	15-G-19	Crypt Floor	1760	15	AD 237–333	95.4	AD 237–333
15-S137	15-G-21	Fill of Crypt Floor	2540	20	796–748 BC	60.5	796–556 BC
15-S137	15-G-21	Fill of Crypt Floor	2540	20	685–667 BC	10.4	796–556 BC
15-S137	15-G-21	Fill of Crypt Floor	2540	20	641–587 BC	19.6	796–556 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S137	15-G-21	Fill of Crypt Floor	2540	20	581–556 BC	4.9	796–556 BC
15-S079	15-I-09	Floor 3 of Blanca	2175	15	355–291 BC	63.0	355–175 BC
15-S079	15-I-09	Floor 3 of Blanca	2175	15	232–175 BC	32.4	355–175 BC
15-S206	15-JJ-06	Blanca steps	2370	20	508–499 BC	2.3	508–395 BC
15-S206	15-JJ-06	Blanca steps	2370	20	492–395 BC	93.1	508–395 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	735–689 BC	15.5	735–408 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	663–648 BC	3.8	735–408 BC
15-S198	15-KK-06	inside Blanca steps	2430	20	546–408 BC	76.2	735–408 BC
15-S130	15-L-16	Top of stone feature (outside)	2185	15	358–281 BC	65.4	358–185 BC
15-S130	15-L-16	Top of stone feature (outside)	2185	15	258–245 BC	2.3	358–185 BC
15-S130	15-L-16	Top of stone feature (outside)	2185	15	236–185 BC	27.8	358–185 BC
15-S126	15-L-17	Inside of stone features	2100	20	182–52 BC	95.4	182–52 BC
15-S075	15-M-12	Floor 3 of East Upper Plaza Construction Sequence	1710	15	AD 257–296	23.3	AD 257–390
15-S075	15-M-12	Floor 3 of East Upper Plaza Construction Sequence	1710	15	AD 321–390	72.1	AD 257–390
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	728–717 BC	2.1	728–406 BC
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	707–694 BC	2.5	728–406 BC
15-S083/085	15-M-17	Fill of Preclassic platform floor	2415	20	542–406 BC	90.8	728–406 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	751–683 BC	31.9	751–413 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	669–637 BC	11.5	751–413 BC
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	622–617 BC	0.6	751–413 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S086	15-M-21	Floor 6 of East Upper Plaza Construction Sequence	2450	20	591–413 BC	51.5	751–413 BC
15-S087	15-M-22	Construction Fill	2465	20	762–482 BC	94.8	762–434 BC
15-S087	15-M-22	Construction Fill	2465	20	441–434 BC	0.6	762–434 BC
15-S088	15-M-23	Surface of posthole	2520	15	787–746 BC	32.0	787–552 BC
15-S088	15-M-23	Surface of posthole	2520	15	686–666 BC	16.2	787–552 BC
15-S088	15-M-23	Surface of posthole	2520	15	644–552 BC	47.2	787–552 BC
15-S127	15-M-24	Inside of Post hole	2430	15	730–692 BC	12.1	730–411 BC
15-S127	15-M-24	Inside of Post hole	2430	15	659–652 BC	1.7	730–411 BC
15-S127	15-M-24	Inside of Post hole	2430	15	544–411 BC	81.6	730–411 BC
15-S143	15-N-04	Burial CC-B17	2035	25	154–140 BC	1.9	154 BC–AD 27
15-S143	15-N-04	Burial CC-B17	2035	25	113 BC–AD 27	92.7	154 BC–AD 27
15-S143	15-N-04	Burial CC-B17	2035	25	AD 42–47	0.8	154 BC–AD 27
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	750–648 BC	28.6	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	668–639 BC	9.4	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	590–577 BC	1.6	750–411 BC
15-S212	15-P-09	below Floor 3 of Blanca	2445	20	568–411 BC	55.8	750–411 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3335–3211 BC	60.8	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3193–3151 BC	13.5	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3138–3088 BC	18.0	3335–3033 BC
15-S092	15-Q-02	Fill of Floor 1 of SE Upper Plaza Construction Sequence	4475	20	3057–3033 BC	3.0	3335–3033 BC
15-S117	15-Q-09	Fill of dismantled Floor 4 of SE Upper Plaza	2195	15	358–278 BC	61.0	358–199 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S117	15-Q-09	Fill of dismantled Floor 4 of SE Upper Plaza	2195	15	259–199 BC	34.4	358–199 BC
15-S188	15-T-04	dates fill in bench, Room 1, Str. A-1SE	1495	15	AD 544–605	95.4	AD 544–605
15-S218	15-U-07	Burial CC-B19	1785	20	AD 140–197	14.1	AD 140–328
15-S218	15-U-07	Burial CC-B19	1785	20	AD 208–262	48.2	AD 140–328
15-S218	15-U-07	Burial CC-B19	1785	20	AD 277–328	33.1	AD 140–328
15-S144	15-V-09	floor above Burial CC-B20	1775	20	AD 170–194	2.9	AD 170–336
15-S144	15-V-09	floor above Burial CC-B20	1775	20	AD 211–336	92.5	AD 170–336
15-S215	15-V-15	Burial CC-B20	1715	15	AD 257–298	30.7	AD 257–387
15-S215	15-V-15	Burial CC-B20	1715	15	AD 320–387	64.7	AD 257–387
15-S175	15-V-19	Lot CC-15-V-19	2455	20	752–682 BC	34.2	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	670–613 BC	16.4	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	593–428 BC	44.1	752–416 BC
15-S175	15-V-19	Lot CC-15-V-19	2455	20	422–416 BC	0.8	752–416 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	784–732 BC	23.3	784–544 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	691–661 BC	15.8	784–544 BC
15-S177	15-V-19	Lot CC-15-V-19	2510	20	650–544 BC	56.3	784–544 BC
15-S181	15-V-20	surface under Burial CC-B20	2655	20	837–797 BC	95.4	837–797 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	801–751 BC	85.0	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	684–667 BC	4.5	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	636–626 BC	1.0	801–590 BC
15-S183	15-V-21	surface under Burial CC-B20	2555	20	615-590 BC	5.0	801–590 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	772–737 BC	19.4	772–548 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	689–663 BC	15.9	772–548 BC
15-S166	15-Z-07	dates Floor 3 of NW UP	2505	15	647–548 BC	60.2	772–548 BC
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	756–679 BC	35.3	756–430 BC

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	671–606 BC	20.1	756–430 BC
15-S208	15-Z-08	Floor 3 of NW UP	2460	20	600–430 BC	40.0	756–430 BC
15-S209	15-Z-08	Floor 3 of NW UP	2480	15	761–540 BC	95.4	761–540 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	749–684 BC	36.8	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	667–641 BC	11.7	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	588–579 BC	1.1	749–415 BC
15-S152	15-Z-09	Floor 4 of NW UP	2450	15	561–415 BC	45.8	749–415 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	752–682 BC	34.2	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	670–613 BC	16.4	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	593–428 BC	44.1	752–416 BC
15-S154	15-Z-09	Floor 4 of NW UP	2455	20	422–416 BC	0.8	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	752–682 BC	34.2	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	670–613 BC	16.4	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	593–428 BC	44.1	752–416 BC
15-S155	15-Z-09	Floor 4 of NW UP	2455	20	422–416 BC	0.8	752–416 BC
15-S158	15-Z-11	dates Floor 6 of NW UP	2375	25	534–529 BC	1.0	534–394 BC
15-S158	15-Z-11	dates Floor 6 of NW UP	2375	25	519–394 BC	94.4	534–394 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	748–685 BC	24.6	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	666–642 BC	7.4	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	586–581 BC	0.5	748–409 BC
15-S160	15-Z-11	dates Floor 6 of NW UP	2440	20	556–409 BC	62.9	748–409 BC
15-S165	15-Z-11	dates Floor 6 of NW UP	2405	20	703–696 BC	0.8	703–402 BC
15-S165	15-Z-11	dates Floor 6 of NW UP	2405	20	541–402 BC	94.6	703–402 BC
15-S220	15-Z-12	dates Floor 6 of NW UP	2620	25	826–782 BC	95.4	826–782 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	798–756 BC	91.1	798–596 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	680–671 BC	2.5	798–596 BC
15-S185	15-Z-18	bedrock of NW UP sequence	2550	15	605–596 BC	1.8	798–596 BC
16-S01	16-L-03	Burial CC-B15	1165	35	AD 771–970	0.954	AD 771–970

Table 8.12. Calibrated Age Ranges for 2016 and 2019 Samples by Lot (continued)

Sample # CC-	Lot CC-	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
17-S19	17-C-10	Burial CC-B18B, tibia	1205	20	AD 769–886	95.4	AD 769–886
17-S08	17-E-04	dense artifact concentration in the southwestern corner between Structures D-42 and D-43	1205	15	AD 771–883	95.4	AD 771–883
17-S14	17-I-06	floor (at S04-019) in northern room of Structure D-42	1180	15	AD 775–890	95.4	AD 775–890
17-S06	17-J-03	plaster of the c-shaped bench Structure D-42	1270	15	AD 681–770	95.4	AD 681–770
17-S10	17-Q-05	very dense artifact concentration on the courtyard surface in the northwestern corner	1175	15	AD 775–893	95.4	AD 775–893
19-S15	19-A-03	Burial CC-B22	1520	20	200–91 BC	95.4	200–91 BC
19-S03	19-A-05	Construction fill, below Burial CC-B22	1370	20	322–206 BC	84.2	365–206 BC
19-S03	19-A-05	Construction fill, below Burial CC-B22	1370	20	365–346 BC	11.2	365–206 BC
19-S12	19-L-12	polychrome ceramic deposit	1760	20	AD 660–717	70.9	AD 660–767
19-S12	19-L-12	polychrome ceramic deposit	1760	20	AD 742–767	24.5	AD 660–767
19-S04	19-N-04	dates floor associated with Structure A-13 4th	1310	20	AD 432–490	19.8	AD 432–601
19-S04	19-N-04	dates floor associated with Structure A-13 4th	1310	20	AD 532–601	75.6	AD 432–601
19-S07	19-N-05	construction fill	1370	20	AD 639–676	95.4	AD 639–676
19-S09	19-O-07	Floor 3 of Upper Plaza	2220	15	AD 229–340	95.4	AD 229–340
19-S14	19-S-07	f ill directly on top of the possible stairway east of Str. A-13	2120	15	AD 639–676	95.4	AD 639–676

Table 8.13. Charcoal Samples Process by BEAST (2019) by Lot

PSU AMS#	Sample #	Lot	Material	fraction Modern	±	D^{14}C (‰)	±	^{14}C age (BP)	±
6914	GJ-02-S02	GJ-02-O-07	Human bone	0.8765	0.0016	-123.5	1.6	1060	15
6483	TH-01-S04	TH-01-LT-01	Faunal bone	0.8524	0.0018	-147.6	1.8	1285	20

Table 8.12. Calibrated Age Ranges for 2019 BEAST Samples by Lot

Sample #	Lot	Context	^{14}C age (BP)	±	Calibrated age (AD/BC)	% under curve	2σ Age Range
GJ-02-S02	GJ-02-O-07	Burial GJ-B02	1060	15	AD 968–1020	93.4	AD 907–1020
GJ-02-S02	GJ-02-O-07	Burial GJ-B02	1060	15	AD 907–915	2	AD 907–1020
TH-01-S04	TH-01-LT-01	*In situ* bone cord holder pin, looters' trench, Structure B-11	1285	20	AD 669–729	58.8	AD 669–769
TH-01-S04	TH-01-LT-01	*In situ* bone cord holder pin, looters' trench, Structure B-11	1285	20	AD 736–769	36.6	AD 669–769

Table 8.15. Isotope Data for Radiocarbon Samples, 2017 through 2019 Seasons*

PSU AMS#	Sample #	Lot	Burial	Material	Fraction Modern	±	$D^{14}C$ (‰)	±	^{14}C age (BP)	±	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	%C	%N	C:N
5456	CC-15-S219	CC-15-G-14	CC-B16A	XAD amino acids	0.8095	0.0016	-190.5	1.6	1700	20	-10.4	9.3	30.3	10.8	3.27
2976	CC-15-S141	CC-15-G-14	CC-B16B	XAD amino acids	0.8066	0.0017	-193.4	1.7	1725	20	-11.1	8.2	16.0	5.8	3.22
5455	CC-15-S217	CC-15-G-14	CC-B16D	XAD amino acids	0.8053	0.0014	-194.7	1.4	1740	15	-10.8	9.2	28.7	10.3	3.26
2977	CC-15-S143	CC-15-N-04	CC-B17	XAD amino acids	0.7763	0.0020	-223.7	2.0	2035	25	-11.4	10.0	8.7	3.0	3.42
2975	CC-17-S19	CC-17-C-10	CC-B18B	XAD amino acids	0.8607	0.0018	-139.3	1.8	1205	20	-12.7	9.4	14.0	5.0	3.29
5443	CC-15-S218	CC-15-U-07	CC-B19	>30kDa gelatin	0.8009	0.0018	-199.1	1.8	1785	20	-8.9	9.8	45.7	16.1	3.31
5453	CC-15-S215	CC-15-V-15	CC-B20	XAD amino acids	0.8078	0.0014	-192.2	1.4	1715	15	-11.7	8.6	28.4	10.2	3.25
5454	CC-15-S216	CC-15-EE-06	CC-B21	XAD amino acids	0.7654	0.0016	-234.6	1.6	2145	20	-10.6	10.1	22.8	7.9	3.35
6912	CC-19-S03	CC-19-A-05	N/A	Faunal, >30kDa gelatin	0.7587	0.0014	-241.3	1.4	2220	15	-8.2	8.1	42.6	15.3	3.25

*Isotope data was not available for most bone samples from the 2019 season as of December 2019.

STUDENT RESEARCH

Much of the research conducted by CCAP and BEAST supports graduate student thesis projects. Beginning with the 2012 season, seven graduate students and one undergraduate have collected thesis data through CCAP or BEAST research (Table 8.16).

Table 8.16. List of Theses Resulting from CCAP and BEAST Research

Harris, Matthew C.
2013 A Short Walk from Paradise: Initial Excavations at Kaxil Uinic. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Kelley, Krystle
2014 Establishing the Acropolis: Two Seasons of Investigations in the Upper Plaza of Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Vazquez, Edgar
2015 In Service of the King: The Form, Function, and Chronology of Courtyard A-3 at Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Booher, Ashley M.
2016 Assessing the Form and Function of the *Sacbeob* and Associated Structures at Chan Chich, Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Bonorden, Alyssa Brooke
2016 Comparing Colonial Experiences in Northwestern Belize: Archaeological Evidence from Qualm Hill Camp and Kaxil Uinic Village. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Sandrock, David
2017 BEAST Mode: Two Seasons of Archaeological Survey on the Gallon Jug-Laguna Seca Property in Northwestern Belize. Unpublished MA thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Degnan, Bridgette
2018 An Evaluation of Ancient Maya Urban and Suburban Lithic Production at Late Classic Chan Chich, Belize. Unpublished honors thesis, University of Virginia, Charlottesville.

Kilgore, Gertrude B.
2018 Maya Household Identity and Domestic Activity Areas at Courtyard D-4, Chan Chich, Belize. Unpublished master's thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

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2016 Comparing Colonial Experiences in Northwestern Belize: Archaeological Evidence from Qualm Hill Camp and Kaxil Uinic Village. Unpublished master's thesis, Department of Anthropology, Texas Tech University, Lubbock.

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2015 Navigating the Cultural Landscape of 19th-Century Belize: An Archaeological Examination of Kaxil Uinic Village. Paper presented at the 6th Annual South-Central Conference on Mesoamerica, The University of Texas at San Antonio.
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2016 Results of the 2015 Excavations at Kaxil Uinic Village. In *The 2016 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 81–134. Papers of the Chan Chich Archaeological Project, Number 11. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Bonorden, Brooke, and Briana N. Smith
2015 Results of the 2015 Excavations at Qualm Hill Camp. In *The 2015 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 67–104. Papers of the Chan Chich Archaeological Project, Number 10. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Booher, Ashley
2016a Assessing the Form and Function of the *Sacbeob* and Associated Structures at Chan Chich, Belize. Unpublished master's thesis, Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.
2016b Results of the 2016 Norman's Temple Complex Investigations at Chan Chich. In *The 2016 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 39–66. Papers of the Chan Chich Archaeological Project, Number 11. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

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