



# THE CULTURAL LANDSCAPE OF JACANA



## VOLUME II PART 10

SITE STABILIZATION AND PRESERVATION

ARCHAEOLOGICAL INVESTIGATIONS OF SITE PO-29  
MUNICIPIO DE PONCE, PUERTO RICO

US Army Corps of Engineers  
Jacksonville District





**The Cultural Landscape of Jácana:  
Archaeological Investigations of Site PO-29,  
Municipio de Ponce, Puerto Rico**

**Volume II, Part 10: Site Stabilization and Preservation**

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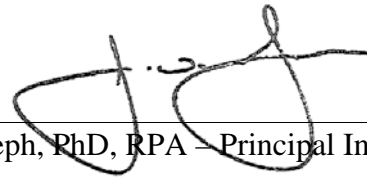
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# THE CULTURAL LANDSCAPE OF JÁCANA: ARCHAEOLOGICAL INVESTIGATIONS OF SITE PO-29 REPORT STRUCTURE

New South Associates, Inc. is pleased to present a comprehensive study of the Archaeological Investigations of Site PO-29 located in Municipio de Ponce, Puerto Rico. This study is submitted in a two-volume, multi-component series.

Volume I is a synthesis of the results of the technical information presented in Volume II.

Volume II presents a collection of 10 sections that concentrate on the technical aspects and analyses of the site. Each part is separated out by specialization. The following is a list of the different parts and what they entail:

- Part 1: Introduction, Natural and Cultural Settings, and Method
- Part 2: Site Contexts and Feature Patterning
- Part 3: Batey Borders/Rock Art
- Part 4: The Houses of Jácana
- Part 5: Human Remains from Jácana
- Part 6: The Pottery of Jácana
- Part 7: Lithic Artifacts of Jácana
- Part 8: Paleoethnobotany of Jácana
- Part 9: The Zooarchaeology of Jácana
- Part 10: Site Stabilization and Preservation



# ABSTRACT

New South Associates conducted archaeological data recovery of Site PO-29 for the US Army Corps of Engineers, Jacksonville District's Portugués River Flood Control Project in Municipio Ponce, Puerto Rico. Fieldwork was conducted from June until October of 2007.

The data recovery efforts at Site PO-29 revealed that the site was larger and more intensively occupied than believed at the time data recovery was initiated. These excavations also encountered and partially exposed four borders of a pre-Columbian ballcourt, or batey, with well-preserved petroglyphs and a large cemetery population. This batey is one of the largest known in Puerto Rico and indicates that Site PO-29 was a very significant settlement during prehistory.

As a result of these discoveries and in consultation with the Puerto Rican State Historic Preservation Office and the Department of Natural and Environmental Resources, the Jacksonville District determined that the site warranted preservation.

Stabilization and preservation efforts at the site followed a plan developed by the Jacksonville District, and included covering the excavation surfaces with geotextile fabric, backfilling the excavation blocks with clean alluvial fill, placing a second layer of geotextile fabric over the site's core area, and placing a fill cap over the site's surface and backdirt piles.

Documentation of the stabilization and preservation effort was made with digital photographs and video and representative images are included in this report.

# ACKNOWLEDGEMENTS

New South Associates appreciates the efforts, insights, and advice offered by a number of personnel from the agencies associated with the PO-29 project. We are very appreciative of the efforts of David McCullough, Archaeologist and Project Manager for the US Army Corps of Engineers, Jacksonville District, who developed the Stabilization and Preservation Plan that guided this work and who oversaw the site close-out while in progress. Most importantly, it was David who recognized, following the discovery of the north border petroglyphs, that site PO-29 deserved preservation and long-term study and interpretation, and who successfully worked with the Jacksonville District's engineers to allow this site to be preserved. This effort, to remove a site from construction plans when Phase III data recovery excavation was well underway, is perhaps unique in the history of cultural resource management archaeology, and the archaeological community, the citizens of Puerto Rico, and visitors to the island should all applaud Mr. McCullough and the Jacksonville District for their efforts to save this monumental site.

The Puerto Rican Department of Natural and Environmental Resources (DNER) sponsored the archaeological preservation and stabilization efforts and their partnership was instrumental to the successful completion of this effort. We wish to recognize the Honorable Javier Velez Arocho, Secretary of DNER and Mabel C. Rivera-Sanabria, DNER Project Manager, for committing the resources needed to complete this project in a timely manner. Señora Rivera-Sanabria administered all of DNER's work on the site's restoration, and her willingness to actively address needs and questions and to keep the fill flowing to the site are greatly appreciated. We are also appreciative of the assistance provided by Mr. Pedro J. Torres, DNER Ponce Regional Office Director and Mr. Félix Santiago, DNER Cerrillos Dam Director. The DNER Ponce Rangers personnel provided excellent site security throughout the project, and their vigilance of this landmark in Puerto Rico's past is greatly appreciated.

At the Puerto Rican State Historic Preservation Office, SHPO Aida Belén Rivera-Ruiz, Miguel Bonini, and Dr. Yasha Rodriguez were site visitors and provided the SHPO's input to the site preservation plan. They also shepherded efforts on the Puerto Rican's government's behalf to call for the preservation of the site and to encourage the Jacksonville District to find a means to save this significant location. We thank them for their interest and advice.

Pedro Alvarado of the Consejo Para La Protección del Patrimonio Arqueológico Terrestre de Puerto Rico served as a site monitor for the Consejo and was a regular presence at the site. Señor Alvarado's review and comments on the preservation and stabilization work were a



welcomed benefit to our progress. We also appreciate the efforts of Dr. Jose Vega, Executive Director of the Institute of Puerto Rican Culture, for the Institute and the Consejo's review and thoughts on the site stabilization efforts. Carmen Martinez-Adaime, staff Archaeologist at the Tibes Civic and Ceremonial Center, is thanked for her assistance throughout the project.

Dr. Johannes Loubser of Stratum Unlimited and Dr. Neville Agnew of the Getty Conservation Institute are thanked for the perspectives they provided on the use of application of geo-textile fabric to petroglyphs. Their insights and advise are greatly appreciated and influenced the stabilization approach used on the batey's northern border.

The archaeology of site PO-29 captured the attention and the hearts of Puerto Rico's archaeological community and its citizens. We are very pleased to be able to conclude the data recovery studies with the site's stabilization and preservation, rather than destruction, and agree with all of Puerto Rico that this is a highly important site that can yield years of important research and can provide another venue where the public can marvel at the culture and accomplishments of the island's prehistoric inhabitants. We thank the Jacksonville District for the opportunity to leave this site preserved for future generations and look forward to seeing the discoveries of Puerto Rican archaeologists at PO-29 in the coming years.



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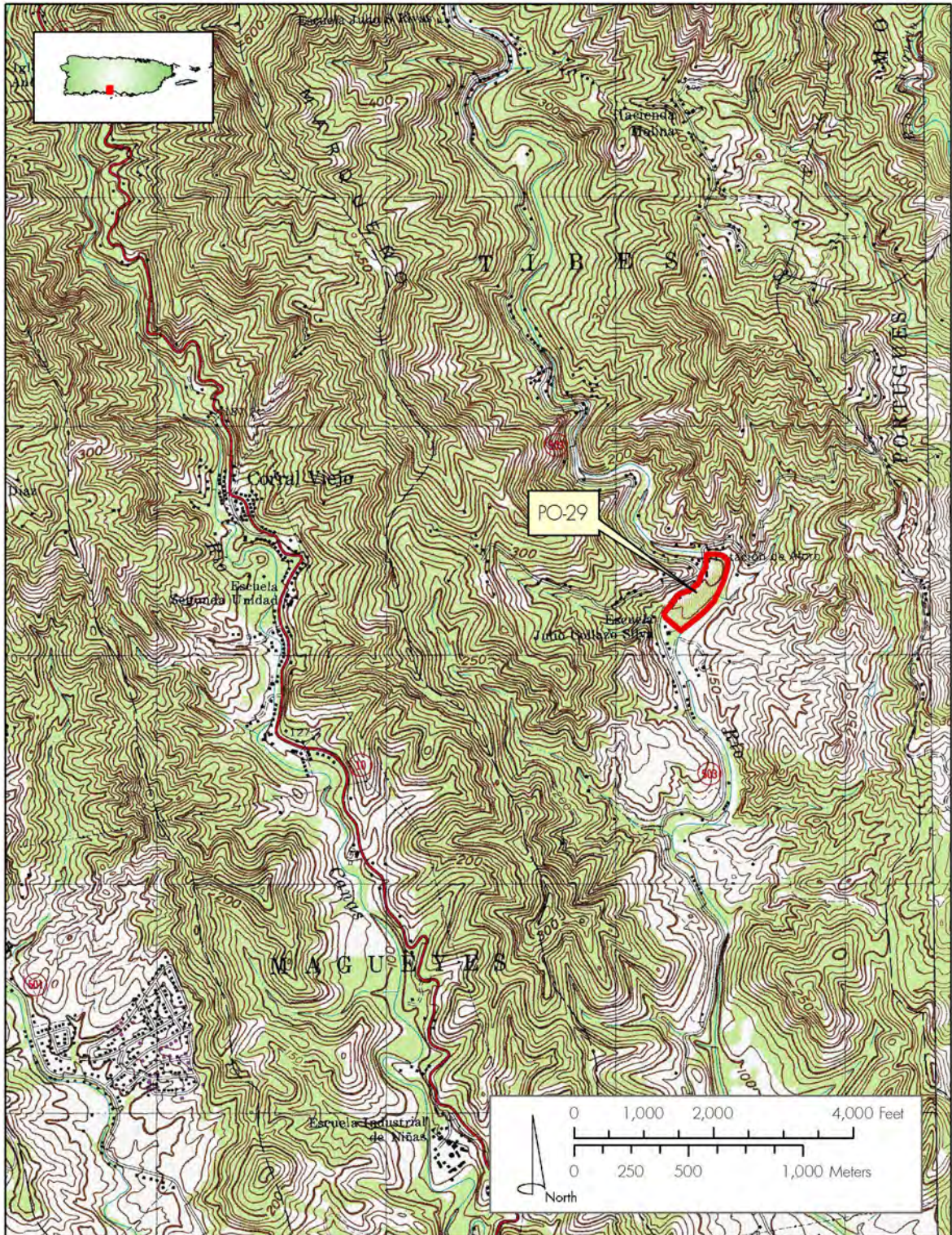
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# I. INTRODUCTION

Site PO-29, the Rodriguez Soler Site (also known by the name Jacaná) was first recorded in 1978 by Gus Pantel as Site PO 22-5. Later in that same year, Juan González Colón recorded Site P4 nearby on the same landform. A site visit by Carlos Solis Magana and Jeff Walker in 1985 confirmed that these two sites were the same, which was subsequently registered as Site PO-29. Site PO-29 was tested in 1990 by Carey Oakley and Carlos Solis (Oakley and Solis 1990). Based on their work, the site was determined to measure approximately 350 meters in length by 125 to 85 meters in width, expanding in width as the terrace landform the site is situated on widens moving downstream. The site was determined to measure approximately 34,300 square meters in size or roughly 8 acres (8.24 cuerdas) in area. The site is located on a terrace below a sharp bend in the Portugués River where the river appears to have crossed a fault zone before entering into a valley. The terrace declines in elevation moving downstream (Figure 1). An intermittent drainage ravine cuts across the lower third of the site. Here, Oakley and Solis found relatively dense deposits of prehistoric ceramics, which they interpreted as representing the use of this gully for prehistoric refuse disposal. Finally, near the southern edge of the site, local residents showed Oakley and Solis a large stone with multiple petroglyphs that had reportedly been recovered from the site. This stone led to the interpretation that this site may contain the remains of a prehistoric ballcourt (*batey*). In addition to prehistoric artifacts, Oakley and Solis recovered nineteenth and twentieth-century historic materials within the site area.

Based on Oakley and Solis' recommendations (1990), Site PO-29 was determined eligible for nomination to the National Register of Historic Places (NRHP) by the USACE-Jacksonville District and this determination was concurred by the State Historic Preservation Office of Puerto Rico (Puerto Rico SHPO). The determination of eligibility included the prehistoric components of the site, while the historic occupation and artifacts were not considered to contribute to the site's eligibility. As the site location was scheduled for the disposal of quarry debris from the construction of the Portugués Reservoir and as the reservoir's construction would thus have an adverse effect on the archaeological components of site PO-29, the USACE-Jacksonville and the Puerto Rico SHPO executed a Memorandum of Agreement that provided for the data recovery mitigation excavation of the site to mitigate the adverse effects of construction. As a federal undertaking, all elements of the compliance review were conducted in accordance with the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470).

Figure 1.  
The Location of Site PO-29



Source: USGS 7.5' Quadrangle Penuelas, Puerto Rico, 1988



While the Portugués Reservoir Dam was initially planned and designed in the late 1980s, at the time of the site survey and evaluation studies, engineering and cost concerns resulted in a re-design of the initial plans for the dam and a delay in the project's schedule. With new design plans and funding in place in 2005, the USACE-Jacksonville contracted with New South Associates to complete the data recovery excavations of the site under the district's Indefinite Quantity/Indefinite Delivery Contract for Cultural Resource Services. The first task order issued for the site's mitigation was a data recovery planning study.

In July 2006, New South Associates completed detailed Phase IIIa investigations and Phase III planning at the site. As reported in Espenshade et al. (2007), the investigations included: detailed site mapping; excavation and geomorphological description of 13 3x1-meter backhoe trenches; hand excavation of two 1x1-meter units, one 1.5x0.5-meter unit, and 15 50x50-centimeter units; and the machine-assisted scraping of seven 5x5-meter blocks. The 2006 investigation identified four major components or occupations: 1) late Cuevas/early Monserrate, 2) Santa Elena, 3) Boca Chica/Capá, and 4) mid nineteenth-century. The late Cuevas/early Monserrate component includes several midden deposits and a suspected batey or plaza with associated midden mound. A single midden represents the Santa Elena component. Dense midden and numerous post and pit features are present in the Boca Chica/Capá locus of the site. The historic component of the sites was identified as a veneer capping much of the site, and, in areas, included dense midden and cultural features.

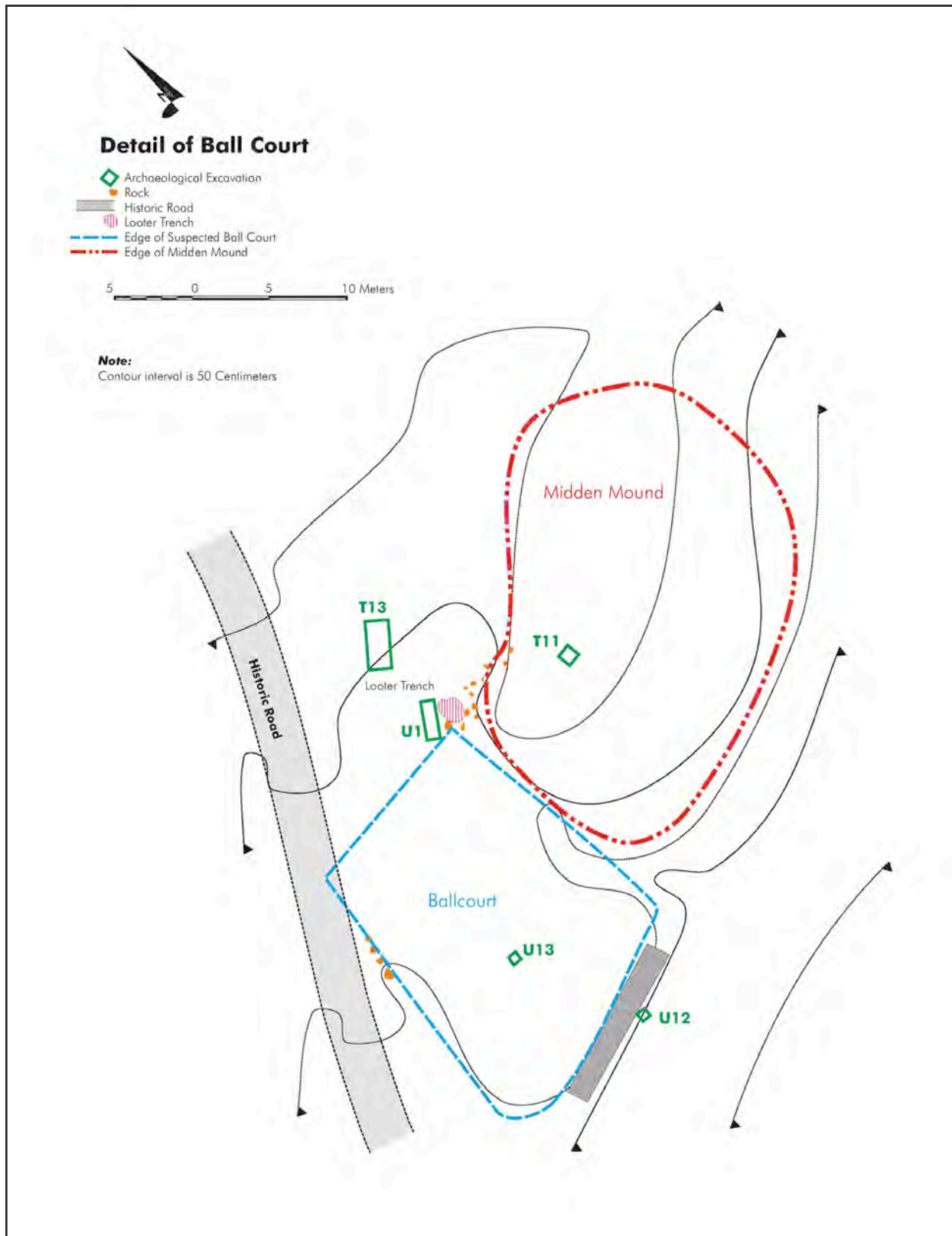
Espenshade et al. (2007:34-40) also identified what they interpreted to be the location of a ball court or batey. Located to the east of the midden mound, this location was distinguished by a concentration of stones that Espenshade et al. interpreted as an end-pavement. They also identified two stones with petroglyphs in what was interpreted to be the northeast corner of the batey. Based on these findings, they interpreted the batey to measure approximately 10.5x20 meters, or 210 square meters, in dimensions (Espenshade et al. 2007). Figure 2 shows the interpretation of the batey's location following the data recovery planning study.

With these results presented as a data recovery plan (Espenshade et al. 2007), the US Army Corps of Engineers-Jacksonville developed a Memorandum of Agreement with the Puerto Rico SHPO for the data recovery mitigation excavation of the site prior to construction and site demolition. New South Associates conducted archaeological data recovery of PO-29 for the US Army Corps of Engineers, Jacksonville District's (USACE-Jacksonville) Portugués River Flood Control Project in Municipio Ponce, Puerto Rico.

Fieldwork was conducted from June until October of 2007. The data recovery plan involved work on nine excavation blocks of the site, designated A, B, C, D, E, F, H, O, and T12, as well as the Midden Mound, a site feature. Test trenches were dug first to confirm the depth of deposits in each area, and these were followed by hand-excavated test units designed to sample

Figure 2.

Espenshade et al. 2007 Plan Showing Interpreted Location of Batey



and recover artifacts from the cultural middens in each block's area. Following sampling, block surfaces were stripped and cultural features were mapped and excavated. The fieldwork confirmed that the site was well preserved and extensive, with cultural features including structures, storage pits, and burials identified in several areas. Figure 3 shows the site plan for the trench, unit, and block excavations.

Testing of the stone pavement that had been interpreted as the end pavement of a batey during the Phase III planning study revealed that this structure was a historic road or retaining wall, rather than a prehistoric pavement. Excavation recovered nineteenth-century bottle glass and ceramics from within and beneath this wall, indicating that it had been built during the historic era. Unit excavation adjacent to the petroglyph boulders north east of this location did not encounter additional stones in alignment with these petroglyphs, and based on these results, it was believed that a batey, if present in the area, had been removed and stones reused during the historic era.

The hand excavation of a 1x1-meter unit in the Block H area encountered two upright, stone slabs, as might be expected in a batey border. Following the machine stripping of the surface of Block H, trenching was undertaken to delineate the suspected batey border alignment. The trenching revealed a row of stones adjacent to the north edge of the midden mound that potentially represented a border of a batey, in a different location than interpreted by the Phase IIIa study. Backhoe testing trenching along this border confirmed that it represented a batey border alignment and identified the angle where this southern border turned to the north. A short trench segment north of this angle also encountered a stone alignment, representing a portion of the eastern border of the batey. Meanwhile, several stones were identified on the eastern edge of Block T-12, which, following trenching, were determined to be part of a batey's western border. With three locations of stone alignment identified, test trenching was conducted to the north of the eastern border, which resulted in the discovery of a section of the north border.

The four borders, if all elements of a single batey, would represent a batey measuring 50 meters east-west by 40 meters north-south, or 2,000 square meters in size (Figure 4). While full exposure of these borders and their potential corner intersects was not conducted, a batey of these dimensions would be one of the largest known in Puerto Rico and the Caribbean. The petroglyphs exposed along the batey's north border were also among the largest and most elaborate known to date in Puerto Rico, and exhibited reworking and multiple design placements that indicated an extended period of use and the presence of a highly significant batey/settlement. Finally, machine stripping and shovel shaving/troweling of the surface of Block H, within the batey, revealed the presence of 27 burials in an area measuring 11x11 meters in dimensions (121 square meters). The presence of a prehistoric cemetery within the batey's footprint is a cultural

Figure 3.

PO-29 Site Plan Showing the Locations of 2006 Phase IIIa and 2007 Phase III Excavations

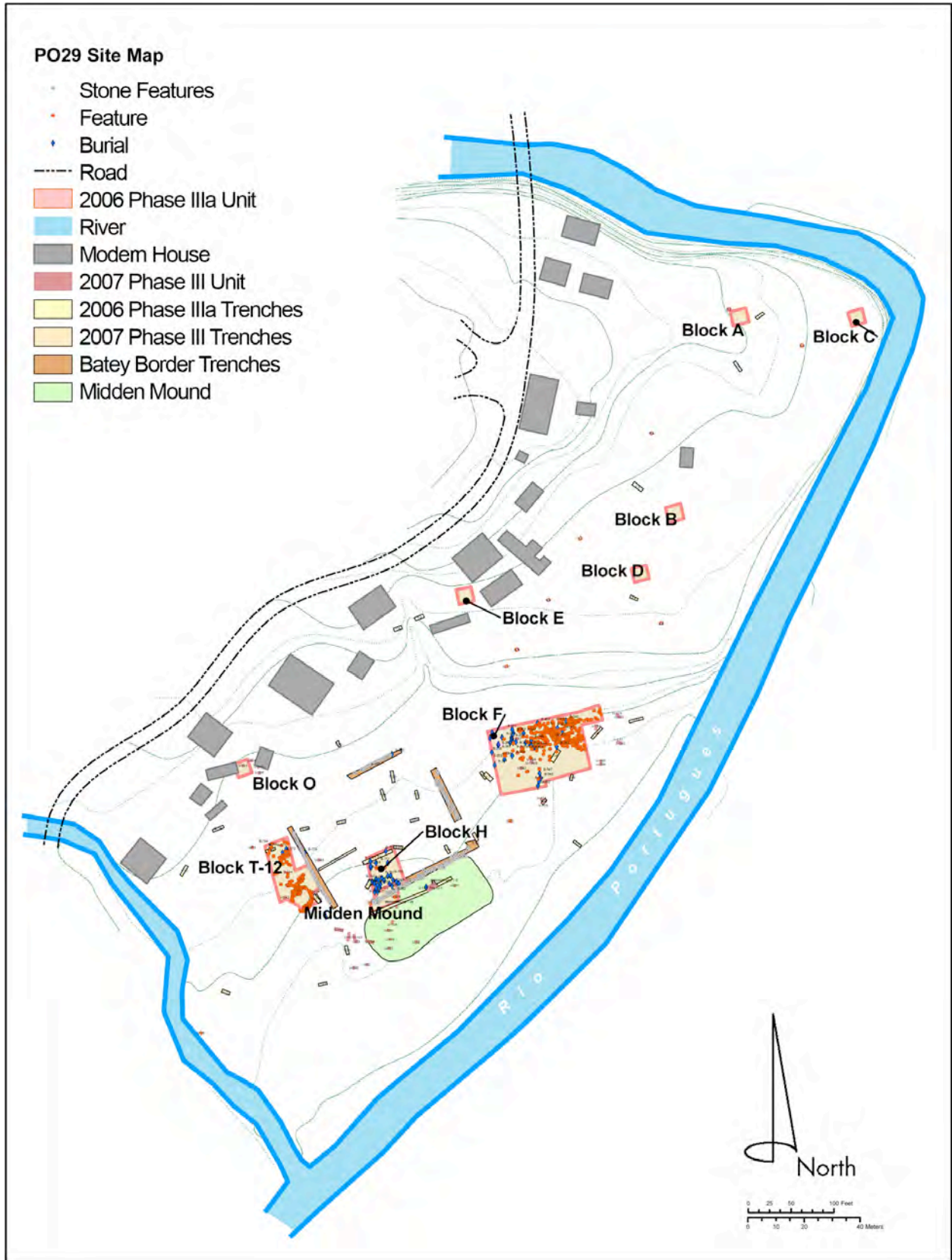
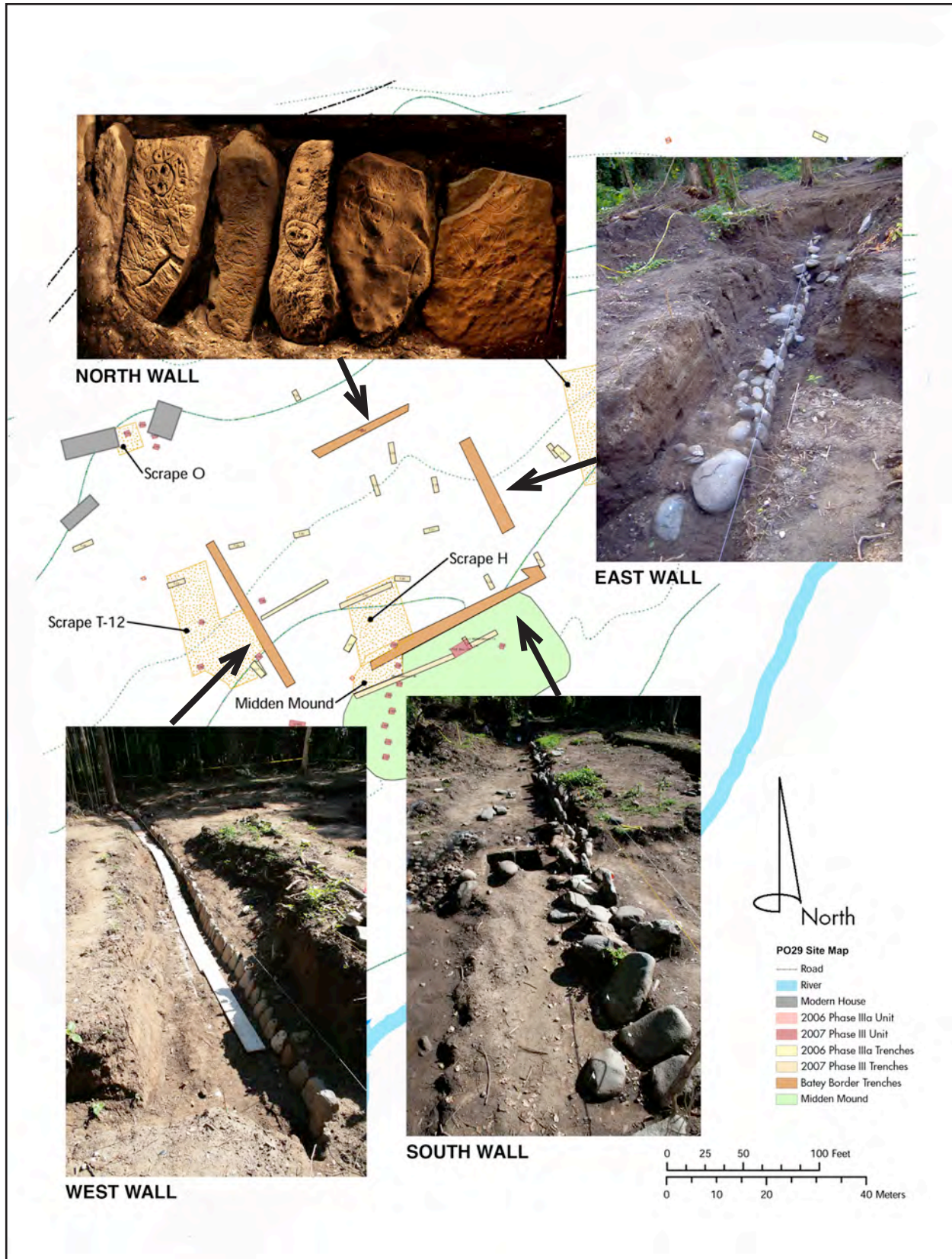


Figure 4.  
Location of Trenches and Projected Location of Batey, with Photographs of Border Alignments



tradition noted on other sites in Puerto Rico; however, the density of the burial population identified within Block H, if extrapolated to the batey as a whole, would yield a cemetery population of 446 individuals within the batey area.

Given the presence of a highly significant batey with a large burial population, the Jacksonville District re-evaluated their plans to use the site location as a quarry debris disposal area. Redesign, at significant cost to the District, was recommended to allow site PO-29 to be preserved, and following consultation with the PR SHPO and the Department of Environmental and Natural Resources (DNER), plans were made to preserve the core site area and transfer its administration to DNER. Phase III data recovery excavations were concluded in October.

With this change in the plans for site PO-29, the Jacksonville District, PR SHPO, and DNER developed a plan for the stabilization and preservation of excavation areas within PO-29. This plan is presented in Appendix A, and called for the following procedures:

- Covering all exposed excavation surfaces with TerraTex Nonwoven Geotextile N04 to protect archaeological features and materials from backfill materials and to provide a readily recognizable indicator of the limits and areas of excavation.
- Backfill all locations with alluvial fill deposits brought onto the site, leaving excavation back dirt piles in place.
- Place a second layer of geotextile fabric over the filled surfaces.
- Place additional fill materials over the site area to raise its elevation and further bury and preserve the archaeological deposits.
- Machine work be limited to the use of Bobcats or comparable small loaders, and that no backhoes were to be used in the site restoration.

This plan was reviewed and accepted by the Consejo Para La Protección del Patrimonio Arqueologico Terrestre de Puerto Rico (Consejo) with the condition that the Consejo be allowed to monitor the restoration and stabilization process. A copy of the Consejo's letter is included in Appendix B.

DNER has provided fencing, lighting, and security to protect the site from October 2007 until July 2008, and provided the alluvial fill material used in the stabilization and preservation work. The fieldwork was site preservation was conducted from March 3<sup>rd</sup> until June 27<sup>th</sup>, 2008, under the direction of Principal Investigator Dr. J. W. Joseph, Field Supervisor Nathan Mountjoy, and

Assistant Supervisor and Photographer Hernan Bustello. Field crew members included Ben Biligri, Sarah Boquet, Nick Joseph, Conrado Rivera, David Penland, and Laura Penland. During this period, no archaeological excavations or collections were made. Artifacts that were exposed during cleaning were left in place. The field efforts focused strictly on site preservation and stabilization.

This report discusses and illustrates the restoration and stabilization of site PO-29. Chapter II presents the project's Methods and Results, while Chapter III offers the Conclusions.





## II. METHODS AND RESULTS

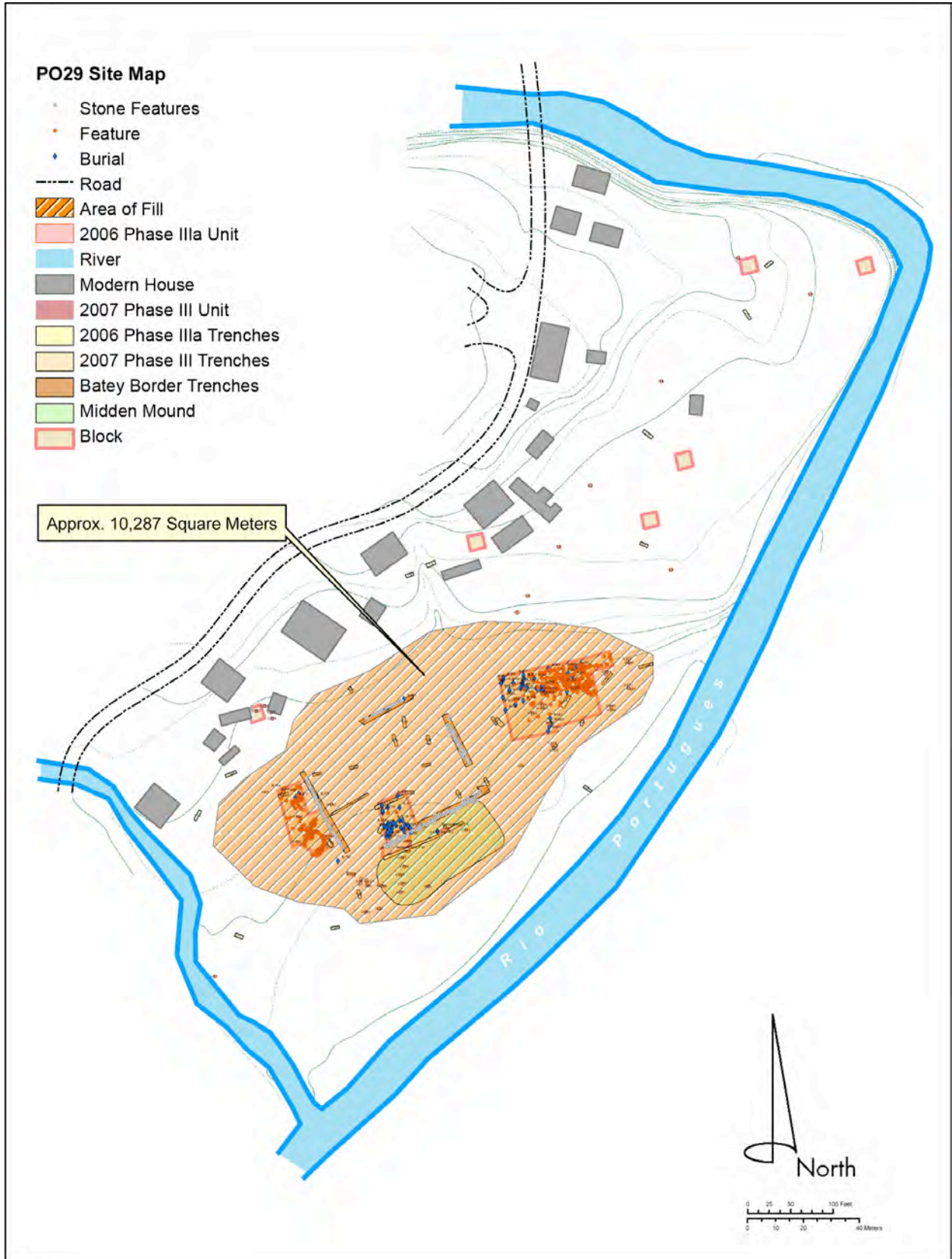
Preservation and stabilization efforts were conducted on the core areas of site PO-29, including excavation blocks A, B, C, D, F, H, and T12, all excavation trenches, all test units, and all geomorphology trenches. A fill cap was placed over the site core area, including the batey, that extended from the backdirt piles east of Block T12 to the western edge of Block F, and some the southern edge of the Midden Mound to the north of the batey north border trench. The areas filled and capped are illustrated in Figure 5. The approach employed in the stabilization effort is discussed herein, and this discussion is then followed by a photo essay showing the progression of this project.

The first element of the preservation and stabilization work was to cover the excavation surfaces with geotextile fabric. Excavation surfaces were first cleaned of leaf and limb litter and other debris that has accumulated since the excavations ceased in October 2007. Site surfaces were then covered with TerraTex Nonwoven Geotextile fabric N04. Geotextile fabric is composed of high strength, highly water permeable geotextiles, and is designed to provide erosion control, surface stabilization, and surface protection. The TerraTex N04 fabric has a tensile strength of 90 pounds, a tensile elongation of 50 percent, a puncture strength of 55 pounds, and a water flow rate of 155 gallons per minute per square foot. When used on archaeological excavations, the TerraTex fabric will allow normal water flow/percolation between excavated and unexcavated surfaces, but will prevent erosion of site surfaces by offering a barrier shield. The geotextile fabric also protects site surfaces from compaction/impact from fill materials.

TerraTex N04 fabric was purchased from Puerto Rico Wire in rolls 12 feet wide by 200 feet long. To apply the fabric, New South Associates' field crew rolled fabric across excavation surfaces and over mounded areas such as the back dirt piles, cutting the fabric into segments with the length and width needed to cover each area. Excavation units and deep features within block surfaces were first lined with a separate covering before the block surface was covered. Where units/features had recovered stone cobbles, these were placed back in the excavation following lining and the block surface geotextile fabric was then spread over the block.

Burials, when present on site surfaces, were covered with gravel obtained from the river's edge. Known burials were provided with gravel caps in Block H (where 27 burials were located), in Block F, and in the trench within the midden mound. The gravel cap prevents the possibility of any human bone coming in contact with the fabric, which will prevent bone from adhering to the

Figure 5.  
Site Plan Showing the Locations of Areas that were Filled and Capped



fabric. The use of the gravel caps also distinguishes burial location, so that archaeologists at work in these areas in the future may recognize where burials are present after removal of the geo-textile fabric.

As fabric was applied to each block, sheets were overlapped by 6-12 inches to ensure that the seams between fabric sections remained covered after backfilling. The overlaps were then secured with two-inch zinc roofing tacks. Once a block surface was covered, fill material was brought onto the site and the block was filled. Geotextile fabric was also placed over all of the excavation backdirt piles.

Trenches were covered using a slightly different process. Fabric sheets were cut to the length of the trench and to a width wide enough to cover the trench floor and borders. Fabric was then laid on the floor and tacked to the borders. Separate segments were cut to cover the trench end borders. Trench fabric overlapped the tops of the borders onto the adjoining ground surface and was secured to the surface, to prevent the fabric from slumping into the trench. These procedures were employed for the geomorphological survey trenches, the midden mound trench, and the east, west, and south borders of the batey trenches. A slightly different procedure was followed for the north border trench.

Following the development of the Stabilization and Preservation Plan and the beginning of the site restoration work, Dr. Johannes Loubser, the project's Rock Art Specialist, contacted Field Supervisor Nathan Mountjoy and expressed concern about the contact between the petroglyphs on the north border stones and the geo-textile fabric. The TerraTex N04 Geotextile fabric is made of non-woven polypropylene fibers. Polypropylene is a thermoplastic polymer and while very durable, the geotextile fabric contains a rough surface. Dr. Loubser was concerned that fabric, if in contact with the petroglyph images, would be abrasive and as a result could damage the petroglyphs. Dr. Loubser put New South Associates in contact with Dr. Neville Agnew of the Getty Conservation Institute, an internationally reknowned expert in site stabilization and restoration, to discuss the potential for abrasion of the stones and the recommended stabilization process.

In an email to Nathan Mountjoy, Dr. Agnew advised against placing the geotextile fabric immediately against the petroglyph stones. In addition to the concerns about potential abrasion raised by Dr. Loubser, Dr. Agnew also raised a caution regarding the potential that the fabric could become bonded to the stones. Dr. Agnew noted (email to Nathan Mountjoy, March 20, 2008:

there have been instances in alkaline environments, at any rate, at which redeposition of lime has cemented the petroglyphs to the geotextile. Most notably, this has occurred in very shallow burials on mosaic pavements in the Mediterranean area, but it's as well to be careful in your case as well...

Dr. Agnew advised that the best procedure was to use soil from the original site excavations to form a barrier between the geotextile fabric and the petroglyph stones, to keep the fabric away from contact with the stones and to avoid introducing new chemical elements to the stone's surfaces.

Based on this correspondence with Dr. Agnew and Dr. Loubser, New South Associates prepared a memorandum to the Jacksonville District outlining the concerns expressed regarding the proposed stabilization efforts for the north border. The memo presented three alternatives for proceeding with the north border stabilization efforts, as well as the potential issues associated with each:

1. Proceed with stabilization and preservation efforts as initially proposed, which would involve placing fabric directly on the petroglyph stones and backfilling the trench with alluvial soil. Issues associated with this approach were the potential for the geotextile fabric to abrade the petroglyphs or to cement to the petroglyphs.
2. Use alluvial fill to form a thin buffer between the petroglyph stones and the geotextile fabric. Issues associated with this approach included the introduction of soils with a different chemistry to the petroglyph stones and the potential for chemical interactions between these soils and the north border matrix, as well as some potential for soil abrasion.
3. Used screened backfill soil from the north border excavations to form a buffer between the petroglyph stones and the geo-textile fabric. To avoid the introduction of plant seeds and spores, the screened fill would be recovered from depths of 50 centimeters below the backdirt pile's surface. Issues associated this alternative included a lack of soil distinction between unexcavated and excavated surfaces and potential abrasion of the petroglyphs by the back fill.

In addition to these alternatives for the backfilling of the north border trench, New South Associates brought to the Jacksonville District's attention another concern regarding the stabilization of the north border trench. The north border trench was placed between two backdirt piles on the slope that forms the northern edge of the site area. Filling the trench following the procedures outlined in the plan would result in the trench location remaining as a depression between these two backdirt mounds. There was the potential that this depression would collect and funnel rain water from upslope during heavy rains. This would result in more water running across the location of the trench, more water percolating into the ground above the north border, and more water erosion to the stones and petroglyphs. Backfilling following this approach would also make the north border's location visible on the site surface, as a trough between two mounds, which would make the north border easy to locate by looters. To counter

these concerns, New South Associates recommended that additional fill material be placed over the north border trench's location to bring its surface to the same height as the surrounding back dirt piles.

Following consultation with the PR SHPO, the Jacksonville District informed New South Associates on May 1, 2008 to employ Alternative 3 for the stabilization of the north border and to add fill above the trench's location to blend into the surrounding backdirt piles.

Stabilization and preservation of the north border thus proceed. First, all leaf litter, limbs, plants, and debris was removed from the trench. An area of the backdirt pile was cleared approximately 50 centimeters deep, and soil from below this depth was excavated and screened. All artifacts, stones, shell, seeds, sticks, and other matter were removed and were replaced on the backdirt pile. Geotextile fabric was placed on the trench floor and was attached to the south border of the trench. Geotextile fabric was also attached to the north border, but was cut around the locations of the petroglyph stones to end on the ledge behind the stones, and not contact the stones themselves. Small pieces of geotextile fabric were cut and inserted into gaps between petroglyph stones to provide a barrier between unexcavated and excavated surfaces. Next, alluvial fill was added to the east end of the trench to provide a working platform for the fill efforts. Supervisor Nathan Mountjoy then took sections of geotextile fabric and used 2x6-inch boards to form a barrier behind these sheets. Buckets of screened backfill were then placed between the stones and the fabrics, and Mountjoy pressed the boards toward the stones to compact this layer and prevent slumpage and abrasion. While Mountjoy held the boards in place, project members shoveled alluvial fill behind the fabric and working in tandem with both backdirt and alluvial fill, the trench floor around a section of stones would be raised until the stones were covered. Backdirt soil and geotextile fabric was then placed over the tops of each stone. This process proceeded at a pace of approximately three stones at a time, working from east to west, until the entire border area had been covered. Once this was finished, a layer of geotextile fabric was placed across the length of the floor of the trench, above the locations of the stones. This layer is meant to serve as a warning to future excavators that they are nearing the stones when the trench is re-excavated. Beyond this point, the remainder of the trench was filled with alluvial soil moved by shovel and hoe, and then an alluvial mound was raised over the trench with dirt deposited by bobcat excavators.

Soil fill was brought onto the site by DNER and as specified by the Stabilization and Preservation Plan, was alluvial loam. DNER obtained this fill material from a back channel of Bucana River that was inundated during periods of heavy rain. These soils were alluvial silty loams; however, the soils included modern refuse that had washed downstream during heavy storms, such as plastic bottles, Styrofoam containers, paper, etc. Following consultation with the Consejo's site monitor, Pedro Alvarado and the Jacksonville District's Technical Representative, David McCullough, it was agreed that this refuse content did not meet the Stabilization and

Preservation Plan's stipulation that the alluvial fill be "clean." Therefore, DNER provided a mechanical screen at the alluvial fill excavation site that was used to remove trash as well as larger stones etc. from the fill. Soil was excavated by backhoe from the alluvial source site, screened through the mechanical sifter, loaded into dump trucks, transported to PO-29, dumped adjacent to work areas, and then moved by bobcat on the site.

Soil in excavated area and over the midden mound was spread and distributed by shovel and hoe. Once all of the excavation blocks had been raised to the original surface elevation, a second layer of geotextile fabric was placed over the entire site core, as shown in Figure 5. With this layer of fabric in place, a soil cap of approximately 30-40 centimeters in depth was placed over the entire site. Dirt for the cap was moved and dumped by bobcat, working from east to west, so that the machines were running on capped surfaces and advancing the cap line across the entire site area. This process ensured that heavy equipment was not operated on the site surface and did not compact or damage site areas. Once the cap had been placed over the entire site area, fill material was placed over the backdirt piles using bobcats, shovels, and hoes.

The final step of the stabilization and preservation process was to re-vegetate the site area. The alluvial fill contained grass and plant seeds native to the region and had already begun to re-vegetate. The field crew collected the seeds of locally occurring plants and vines and scattered those over the site area. Bermuda grass seed was placed over the fill on the south slope of the midden mound and in other sloping locations. Bermuda grass forms a tight-knit root matt and helps to control erosion.

Once work was completed, the site was turned over to the Jacksonville District and DNER for future administration. The following figures (Figures 6-44) illustrate the process used for the preservation and stabilization efforts.

Figure 6.  
T12 Block Area Prior to Stabilization Efforts



Figure 7.  
Fabric Installation in Block T12



Figure 8.  
Principal Investigator Dr. J. W. Joseph Inspects Fabric Installation in Progress in Block F



Figure 9.  
David Penland Cleans Block H Surface





Figure 10.  
Mechanical Screening of Alluvial Soil in Progress



Figure 11.  
DNER Staff Filling Dump Truck with Alluvial Soil



Figure 12.  
Filling in Block F



Figure 13.  
F Block Filled



Figure 14.  
T12 Block Being Filled



Figure 15.  
Block T12 Filled



Figure 16.  
East Border Trench with Geo-Textile Material



Figure 17.  
Burials In Block H Capped with Gravel



Figure 18.  
Block H Covered with Geo-Textile Fabric



Figure 19.  
Block H to Edge of Midden Mound Filled



Figure 20.  
Midden Mound Trench Filled



Figure 21.  
Midden Mound Covered with Geo-Textile Material



Figure 22.  
Covering Midden Mound with Fill Cap



Figure 23.  
North Border Area Prior to Stabilization



Figure 24.  
Pulling Geo-Textile Fabric into North Border Trench



Figure 25.  
Placing Geo-Textile Fabric on North Border Trench Floor





Figure 26.  
Field Supervisor Nate Mountjoy Cutting Fabric from Around Petroglyph Stones



Figure 27.  
Securing Fabric Around Stones



Figure 28.  
North Border Trench Showing Fabric Cut-Away from Trench Locations



Figure 29.  
Shoveling Fill into Floor of North Border Trench



Figure 30.  
Screening Backdirt for Fill to Use as a Buffer Between Fabric and Petroglyph Stones



Figure 31.  
Placing Cleaned Fill Between Petroglyphs and Fabric



Figure 32.  
Using Board to Compact Fill Around Stones



Figure 33.  
Shoveling Fill into West End of North Border Trench after Capping Stones with Cleaned Backdirt Fill



Figure 34.  
Adding Cleaned Backdirt Fill to Petroglyphs at West End of North Bordertrench



Figure 35.  
Capping Stones at West End of North Border Trench with Cleaned Backdirt Fill



Figure 36.  
Shoveling Fill over West End of the North Border Trench



Figure 37.  
Leveling Alluvial Fill over the Capped Surface above the Petroglyph Stones



Figure 38.  
Placing Geo-Textile Fabric Barrier over the Surface above the Capped Stones



Figure 39.  
Final Filling of North Border Trench



Figure 40.  
Conrado Rivera Spreading Alluvial Fill over North Border Trench



Figure 41.  
Placing a Geo-Textile Fabric Cover over the North Bordertrench Location





Figure 42.  
Building Mound over North Border Trench Location



Figure 43.  
Revegetation in Progress



Figure 44.  
Block T12 Vegetation as of Early May 2008



### III. CONCLUSIONS AND RECOMMENDATIONS

Stabilization and preservation of site PO-29 has been successfully completed in accordance with the Stabilization and Preservation Plan (Appendix A). All excavation units, trenches, and blocks have been covered with geo-textile fabric and filled with clean alluvial loam. An additional layer of geo-textile fabric has been placed over the site core area and a 30-40-centimeter cap of fill material added to the surface of this site area. Revegetation had already begun at the time fieldwork was completed in late June and the site is now revegetated and has begun the transformation to a naturalized setting.

Erosion may result in the gulleying of the alluvial cap and monitoring of erosive actions is recommended. The alluvial soil is relatively loose and likely to wash away, exposing the geotextile cap, during heavy rains. Since the site was capped at the beginning of the hurricane season, it is recommended the DNER revisit the site on occasion and fill any erosional gulleys with alluvial soils. Because of the placement of the geo-textile fabric, erosion should not represent a threat to the archaeological site surfaces.

Long-term preservation of the site would benefit from the removal of acacia trees growing on the site. Acacias have extensive and aggressive root systems with destructive properties; in Puerto Rico, they are known as *matafincas*, the property killers. Acacia roots will damage archaeological surfaces and features and hence it is our recommendation that the acacias be cut down and future acacia seedlings pulled to limit their growth on the site.



## REFERENCES CITED

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1990 *Archaeological Testing of High Probability Areas in the Portugués Dam Area, Tibes, Ponce, Puerto Rico*. OSM Archaeological Consultants. Report submitted to the Jacksonville District, US Army Corps of Engineers, Jacksonville, Florida.



**APPENDIX A: STABILIZATION PLAN**





PORTUGUÉS DAM  
ARCHEOLOGICAL SITE PO-29  
PONCE, PUERTO RICO

PLAN FOR THE STABILIZATION AND PRESERVATION OF THE SITE UPON  
COMPLETION OF ARCHEOLOGICAL DATA RECOVERY EXCAVATIONS

The US Army Corps of Engineers, Jacksonville District (Corps) has undertaken archeological data recovery excavations at site PO-29 in Ponce, Puerto Rico. The investigation was conducted for the Corps under a Federal contract by New South Associates Inc. (NSA). The investigation was conducted in full compliance with the National Historic Preservation Act and its implementing regulation 36 CFR Part 800 and has been planned and implemented in coordination with the Puerto Rico State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP).

Site PO-29 is within the Area of Potential Effect of the Portugués Dam, an element of the Portugués and Bucana multipurpose project. The Puerto Rico Department of Environmental and Natural Resources (DNER) is the land owner and local project sponsor. The Portugués Dam, when completed, will include an operating pool and a larger flood control pool to provide flood protection to Ponce. The flood control pool will only fill during storm events. Site PO-29 is located outside of the operating pool but is at the edge of the flood control pool and may be inundated for short durations during extreme storm events. The primary impact to the site was from a planned disposal area to hold quarried rock and soil that is unusable for construction.

In the spring of 2006, NSA conducted a Phase II investigation and recommended that site PO-29 met the criteria of eligibility for the National Register of Historic Places (NRHP). The Phase II investigation resulted in a report titled "Detailed Phase II Archaeological Testing and Data Recovery Planning, Site PO-29, Portugués Dam and Pool, Puerto Rico." The report culminated in a detailed archeological data recovery research design and work plan. The work plan included a step-by-step outline for investigating and documenting various site elements, including a suspected batey, a midden mound, and up to several discrete cultural middens throughout the site. The Phase II investigation also identified a historic-period component that was determined to not meet the criteria for eligibility to the NRHP. The data recovery plan was incorporated by reference into a Memorandum of Agreement (MOA) executed by the Corps and the SHPO in May 2007.

The data recovery operation was undertaken by NSA under contract to the Corps beginning in June 2007 and was scheduled to be completed around mid-September 2007. At that time, one portion of the western batey wall was located and the Corps, in consultation with the SHPO, determined that field investigations needed to be extended. Goals of the additional work included: (a) locate and expose the remaining batey walls, (b) document stratigraphy within the batey through controlled hand excavations, and (c) investigate a portion of the batey interior by mechanical scraping to identify potential features. Approximately 15-25 percent of the batey interior was to be investigated.

When numerous burials, a large and complexly organized batey, and spectacular petroglyphs were identified during this extended field investigation, it became obvious to the Corps and the SHPO that site PO-29 was considerably more significant than originally estimated, with the potential to contribute unique insights into Puerto Rican prehistory. The site provides ideal conditions to perform long-term academic projects promoted by the Commonwealth. Because of the site's extraordinary significance, the Corporate Board of the Corps made the decision to move the disposal area to a different location so that the site would not be impacted by the disposal operation. When the decision was made to move the disposal area, the Corps and the SHPO determined that archeological data recovery should cease and that the site should be stabilized and preserved.

Excavations undertaken prior to the change in strategy from data recovery to site preservation included (see attached site map):

1. manual excavation of 1x1meter units
2. exposure of an area east of the east batey wall (designated Scrape F)
3. exposure of an area west of the west batey wall (designated Trench 12 Scrape)
4. manual excavation of features, including burials
5. a trench within the midden mound varying in depth between approximately 0.6 m and 1.5 m
6. exposure of the west, south and east batey walls
7. exposure of a portion of the north batey wall
8. removal of vegetation on the entire surface of the midden mound
9. exposure of an 11 x 11 meter area (6 % of the batey interior) within the batey (designated Batey Floor Scrape)

Twenty seven burial features, some with multiple internments, were exposed within the batey but not excavated after the decision was made to preserve the site. NSA will cover these burial features with clean, quarried, soil which is of a color and texture in marked contrast to the existing midden. This will make the soil easily identifiable as material not native to the site. The soil will protect the burials from coming into contact with the geotextile cloth that will then cover the midden.

Trenches excavated to expose the batey walls and interior profile of the midden mound, and hand excavated units, will be lined with a geotextile synthetic fabric and backfilled with clean, loamy, local alluvium brought in from off site by DNER. When the site is at a relatively uniform horizontal level, the entire excavated site surface will be covered with the geotextile fabric and the entire site surface will be backfilled with more clean, loamy local alluvium supplied by DNER. Finally, the soil excavated during the data recovery operation, which is presently in backdirt piles, will remain in place and be covered with geotextile fabric and covered with clean, loamy, local alluvium supplied by DNER. The site and the backdirt piles will be seeded with grasses and other native plants.

The geotextile to be used is TerraTex Nonwoven Geotextile N04, purchased at Puerto Rico Wire. TerraTex Nonwoven Geotextile N04 was selected in consultation with the geotextile agent at Puerto Rico Wire. The main performance parameters of concern were the ability to withstand

the rigors of backfilling without tearing; and the ability to allow groundwater to flow in both directions through the textile. TerraTex N04 is commonly used in public and private projects where drainage protection is needed. TerraTex N04 exceeds the standards of the US Department of Transportation. A sample of TerraTex NO4 can be provided upon request, and the product specifications are attached.

Backfilling will be undertaken by NSA archeological technicians and supervised by an archeological field director, who will be responsible for insuring that the site is not damaged during the backfilling operation. Corps personnel will monitor the backfilling process to insure quality control. Backfilling will be accomplished using shovels and a small, light earth moving machine, either a Bobcat or a similar machine. The entire backfilling process will be documented with photographs and a report will be prepared after the work is completed.

During the early stages of construction of the Portugués Dam, the Corps will construct engineered berms to reduce water flow velocities and inhibit erosion during flooding events. The design, specifications and proposed location will be coordinated with the SHPO.

A fence will be placed around the site by the construction contractor during the construction of the Portugués Dam to avoid inadvertent damage from heavy equipment. Once the project is completed, the fence will be immediately removed.

Backfilling will begin immediately after approval of this plan and will be accomplished within approximately 90 days. When backfilling is completed, control of the property, including control of access to the site, will be returned to DNER. Transfer of control of site PO-29 from the Corps to DNER is a federal undertaking subject to the requirements of the National Historic Preservation Act. Transfer documents will contain site conservation covenants and be subject to review by the SHPO. During the backfilling operation, security at the site will be provided by NSA's contracted security firm and DNER rangers. After completion of the backfilling, DNER rangers alone will continue to provide security.



www.webtecgeos.com **TerraTex N04**

**TerraTex N04** is a nonwoven geotextile made up of polypropylene fibers. These fibers are needed to form a stable and durable network such that the fibers retain their relative position. It is non-biodegradable and resistant to most soil chemicals, acids and alkali with a pH range of 3 to 12. **TerraTex N04** is manufactured to meet or exceed the following minimum average roll values:

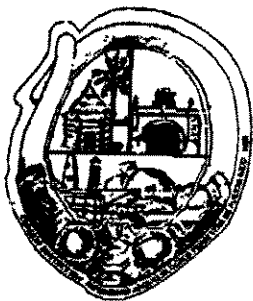
<b>Minimum Average Roll Value</b>		<b>Minimum Average Roll Value</b>	
<b><u>Property</u></b>	<b><u>Test Method</u></b>	<b><u>English</u></b>	<b><u>Metric</u></b>
<b>Tensile Strength</b>	ASTM D-4632	<b>90</b> lbs	<b>.400</b> kN
<b>Tensile Elongation</b>	ASTM D-4632	<b>50</b> %	<b>50</b> %
<b>Trapezoid Tear</b>	ASTM D-4533	<b>40</b> lbs	<b>.175</b> kN
<b>Mullen Burst</b>	ASTM D-3786	<b>185</b> psi	<b>1275</b> kPa
<b>Puncture Strength</b>	ASTM D-4833	<b>55</b> lbs	<b>.240</b> kN
<b>Permeability</b>	ASTM D-4491	<b>0.2</b> cm/sec	<b>0.2</b> cm/sec
<b>Permittivity</b>	ASTM D-4491	<b>2.1</b> sec <sup>-1</sup>	<b>2.1</b> sec <sup>-1</sup>
<b>Water Flow Rate</b>	ASTM D-4491	<b>155</b> gal/min/ft <sup>2</sup>	<b>6300</b> l/min/m <sup>2</sup>
<b>UV Resistance</b>	ASTM D-4355	<b>70</b> % @ 500hr	<b>70</b> % @ 500 hr
<b>AOS</b>	ASTM D-4751	<b>70</b> US Sieve	<b>.212</b> mm



APPENDIX B: LETTER FROM THE  
CONSEJO PARA LA PROTECCIÓN DEL  
PATRIMONIO ARQUEOLOGICO  
TERRESTRE DE PUERTO RICO  
REGARDING THE STABILIZATION AND  
PRESERVATION PLAN







**ESTADO LIBRE ASOCIADO DE PUERTO RICO**  
**INSTITUTO DE CULTURA PUERTORRIQUEÑA**

**CONSEJO PARA LA PROTECCION DEL PATRIMONIO  
ARQUEOLOGICO TERRESTRE DE PUERTO RICO**

5 de febrero de 2008

Hon. Javier Vélez Arocho  
Secretario  
Departamento de Recursos Naturales y Ambientales  
PO Box 336147  
San Juan, Puerto Rico 00936

A LA MANO, VIA FACSIMIL Y ELECTRÓNICA

**PLAN DE ESTABILIZACIÓN SITIO ARQUEOLÓGICO (PO) 29  
PROYECTO REPRESA RÍO PORTUGUES, PONCE**

Honorable Secretario:

El Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico, en su Reunión Extraordinaria del 30 de enero del 2008, tuvo ante su consideración el documento "Plan for the Stabilization and Preservation of the site upon completion of Archaeological Data Recovery Excavations". Una vez revisados los documentos entregados el Consejo tomo las siguientes determinaciones relacionadas al yacimiento arqueológico de Jácana (PO-29):

- I. Recubrir los restos óseos con arena fina de cantera de un color y textura contrastante al suelo original. La arena tendrá el propósito de proteger los restos óseos de no entrar en contacto con el material geotextil a colocarse sobre estos. Se determinó que la arena a utilizarse tenga forma globular para evitar cualquier efecto abrasivo sobre los restos óseos.

SITIO ARQUEOLÓGICO PONCE 29  
PROYECTO REPRESA RÍO PORTUGUES PONCE  
PÁG. 22

- II. No se acoge la recomendación de cubrir las áreas expuestas del sitio arqueológico con el terreno removido del yacimiento. En su lugar el material geotextil (Terratex Nonwoven Geotextile N04) será colocado sobre los montículos de material arqueológico y sobre las áreas del yacimiento expuestas durante la excavación arqueológica. No se utilizará este suelo para rellenar debido a que contiene material arqueológico perteneciente al yacimiento que, aunque descontextualizado, podría arrojar información de importancia para el análisis del sitio.
- III. El terreno que se depositará sobre el geotextil será aluvión. El DRNA esta extrayendo este material del Río Portugués como parte del proyecto. La agencia deberá someter las características fisicoquímicas del aluvión a utilizarse.
- IV. Sobre la capa del aluvión se colocara una capa de "top soil", sobre este se sembrará vegetación por semilla.
- V. Personal del Programa de Arqueología e Etnohistoria del ICP y del Consejo de Arqueología Terrestre tendrán que estar presentes durante todo el proceso de estabilización del yacimiento arqueológico. Deberá coordinarse con estas dependencias las fechas a realizarse el plan de estabilización.
- VI. Se aceptan los otros aspectos del Plan de Estabilización, tal como fueron presentados por el Cuerpo de Ingenieros.

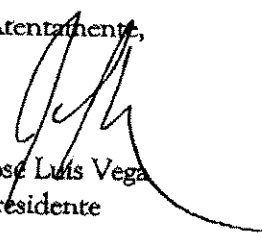
Todo el proceso debe ser documentado mediante fotografía y se requerirá la presentación de un informe al Consejo de Arqueología Terrestre. De este informe se deberán entregar un (1) original y diez (10) copias, una de estas en formato digital (PDF).

Se le advierte que el no cumplir con estos requerimientos podría constituir una violación a la Ley 112 del 20 de julio de 1988, según enmendada, lo que podría conllevar sanciones administrativas.

SITIO ARQUEOLÓGICO PONCE 29  
PROYECTO REPRESA RÍO PORTUGUES PONCE  
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Agradecemos de antemano todas las gestiones realizadas para colaborar en este caso, por el bien de la protección de nuestro patrimonio y el cumplimiento de las leyes del Estado Libre Asociado de Puerto Rico.

Atentamente,



José Luis Vega  
Presidente

c. Miembros del Consejo

David McCullough U.S. Army Corps Of Engineers, Jacksonville District

JLV/TOV



APPENDIX C: MEMO REGARDING  
PRESERVATION AND STABILIZATION  
EFFORTS FOR THE NORTH WALL AND  
ALTERNATIVES





## NEW SOUTH ASSOCIATES

PROVIDING PERSPECTIVES ON THE PAST

April 1, 2008

MEMO - Regarding the Backfilling and Stabilization of Archaeological Site PO-29

To: David McCullough, US Army Corps of Engineers, Jacksonville

The purpose of this memo is to advise the US Army Corps of Engineers, Jacksonville District (Corps) and its consulting agencies of several observations and potential issues regarding the backfilling and stabilization of the north wall of site PO-29, la Jacana or the Rodríguez Soler Site.

The first regards placing the geo-textile fabric directly on the petroglyph stones of the *batey* north wall. Dr. Johannes (Jannie) Loubser, our Rock Art Specialist for this project, expressed concern to Nate Mountjoy, the project's Field Director, that the geo-textile fabric might abrade and damage the petroglyph stones. The TerraTex fabric is very durable and has an uneven, slightly coarse surface, hence Jannie's concern for potential abrasive activities. Jannie put Nate in touch with Dr. Neville Agnew of the Getty Conservation Institute. Dr. Agnew is a well-known conservationist specializing in rock art sites.

In an email to Nate Mountjoy, Dr. Agnew recommends *against* placing the geo-textile fabric on the north wall stones. In addition to possible issues with abrasion, Dr. Agnew noted the potential for the geo-textile fabric to cement itself to the stones it was covering:

*there have been instances in alkaline environments, at any rate, at which redeposition of lime has cemented the petroglyphs to the geotextile. Most notably, this has occurred in very shallow burials on mosaic pavements in the Mediterranean area, but it's as well to be careful in your case...* (email from Dr. Neville Agnew, Getty Conservation Institute, to Nate Mountjoy, New South Associates, March 20, 2008)

Dr. Agnew recommended that a buffer of soil be placed between the stones and the fabric. Dr. Agnew specifically recommended using the original soil from the excavations as the buffer "to ensure chemical compatibility with the petroglyph boulders" but stated that:

*It's important to sieve out rocks and remains and, in particular, plant seeds since the loose fill of the reburial can act as a very good medium for germination and rapid growth of plants, as shown in the case of the Laetoli hominid trackway in Tanzania. (email from Dr. Neville Agnew, Getty Conservation Institute, to Nate Mountjoy, New South Associates, March 20, 2008)*

New South Associates has contacted the project's Geomorphologist and Soil Scientist, Dr. John Foss, about the soil chemistry surrounding the north wall petroglyphs. Dr. Foss advised Principal Investigator Chris Espenshade that he had not sampled the soils of the north wall trench, however, he observed:

*These soils, however, would not be highly alkaline. They may range from highly acid to near neutral in pH... (email from Dr. John Foss, Soils International Inc. to Chris Espenshade, New South Associates, March 28, 2008)*

Given the presence of shell in the midden deposits as well as natural occurrences from snails, we would anticipate the presence of lime in the site's soil chemistry.

We request that the Corps and its consulting parties in Puerto Rico advise us on which of the following procedures to use in the backfilling of the north wall trench, or another alternative not discussed. We have outlined below three approaches to the backfilling and stabilization of the north wall, with the potential benefits and risks that we are aware of for each. In all instances, all soil profiles and the floor of the north wall trench would be covered in geo-textile fabric and backfilled with alluvial fill – the approaches outlined below only deal with the issue of how to cover and backfill the petroglyph stones themselves.

1). Place Geo-Textile Fabric directly on the north wall petroglyphs, as originally planned. Geo-textile sheets would be cut to cover each petroglyph stone individually and a layer of geo-textile fabric would then be placed over the entire petroglyph wall. Securing individual sheet sections to the individual stones should help to limit the movement of the fabric on the stones and its abrasive action, however, we cannot guarantee that no movement occurs or that the fabric would not abrade the stones.

The advantages of this approach are that it provides a distinct barrier between the area exposed and excavated and the backfilled trench that allows future archaeologists to accurately determine the limits of excavation. This approach also provides a barrier between the potential contamination of fill material and the intact site soils. Finally, this approach limits the potential for abrasion of the fill soils on the petroglyph stones.

Potential disadvantages of this approach could include abrasion of the fabric on the stone and the possible cementing of the fabric to the stone.

2). Use the alluvial site fill material to create a thin (<10cm) buffer between the stones and the geo-textile fabric. This would require that the fabric be secured to the floor of the trench with tacks and pulled vertical in front of the petroglyph wall face, and that soil be hand shoveled on both sides of the fabric to raise a level fill surface and vertical fabric barrier.



The advantage of this approach is that it prevents contact between the stones and fabric and thus eliminates the potential disadvantages outlined in Number 1.

The disadvantages of this approach are that it places a foreign fill material against the intact site soils in the north wall profile resulting in potential contamination of these soils. Placing the alluvial fill deposits directly against the site soils could also result in a chemical reaction between the soil types. Small strips of geo-textile fabric could be used to cover exposed soil faces between the stones but all contact between soils could not be avoided. There is also the potential that the soils placed against the petroglyph stones would result in abrasion of their own through slumpage. Finally, it would be more difficult for future archaeologists to determine the limits of the profile face exposed during the 2007 excavations.

3). Use screened backdirt to create a buffer between the stones and the geo-textile fabric following the procedures outlined in Number 2. Soil would be taken from the backdirt piles adjacent to the trench, and the soil excavated for fill material would be taken from depths of more than 50 cm below the backdirt pile surface to limit the inclusion of plant seeds. Backdirt would be screened through both ¼ and 1/8-inch mesh to remove artifacts and possible plant remains. All materials recovered from the screening would be placed back in the backdirt pile.

The advantages of this approach are the same as Number 2 with the additional benefits of removing potential soil chemistry reactions and reducing the potential for contamination of the intact site soils since the buffer material would be the same as the soil surrounding the stones.

The disadvantages of this approach are that there is some potential for abrasive action by placing soil against the stones as well as the difficulty in determining the limits of the 2007 excavations.

We request that the Corps and its consulting agencies consider these alternatives and advise us of the recommended approach for the covering of the petroglyph stones and the backfilling of the north wall trench.

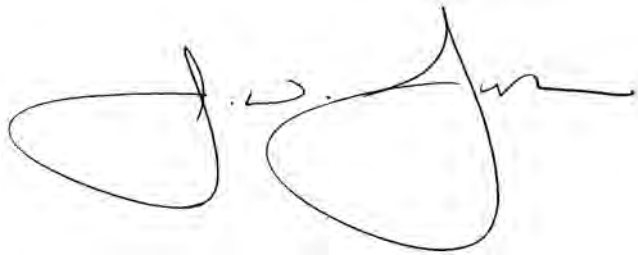
We would also like to bring to the Corps' and its consulting agencies' attention a second issue and recommendation on the backfilling of the north wall trench. The current plan states that all excavations will be backfilled and that an additional cap of fill will then be placed over the filled excavation. The north wall trench is located between two backdirt piles and if a thin cap is placed over the location of this trench, the former location of this trench will easily be recognizable to visitors to the site. Leaving this trench as a depression between two backdirt piles may also funnel rainwater into this location and lead to greater water flow over the trench and potential damage to the stones. We recommend that the fill cap in this area be brought to the same height as the adjacent backdirt piles to hide the location of the trench and shed water away from the trench location. This additional fill (roughly a meter to a meter and a half in height) would result in additional weight and pressure over the north wall trench, but given the depth of the petroglyph stones, we do not think this would have an effect on the north wall. Please advise us on the recommended approach to capping the north wall.

We do not think abrasion and cementation of the geo-textile fabric is an issue with the stones in the other walls of the *batey*. These stones are predominantly rounded boulders and hence there is less direct contact between the stones and the fabric than there would be on the north wall stones, which possess large flat surfaces. Also, there are far fewer and less detailed petroglyphs on the stones of the south, east, and west walls.

We appreciate the Corps and its consulting agencies' consideration of the issues outlined in this memo and we look forward to your response and direction on the ways to proceed with the backfilling and stabilization of the north wall.

Sincerely,

NEW SOUTH ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read 'J. W. Joseph', with a stylized flourish at the end.

J. W. Joseph, PhD, RPA  
Project Manager – Site PO-29 Backfilling and Stabilization

With the review, advise and input of Chris Espenshade, RPA, Co-Principal Investigator; Dr. Peter Siegel, RPA, Co-Principal Investigator; and Nate Mountjoy, Field Director