

3.0 RESEARCH DESIGN AND
METHODOLOGIES



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3.1 Research Design

The purpose of the Phase IB Archaeological Survey of the SR 1 Frederica Interchange project was to assess the presence or absence of potentially significant cultural resources within the project APE. In this effort, research aimed to determine: 1) the sedimentary/pedological sequences within the APE; 2) the range of historic and precontact-era activities that occurred within the APE and the broader project area; and 3) the presence and relative integrity of archaeological deposits within the APE.

To achieve these determinations: 1) archaeological fieldwork was conducted within the APE; 2) geomorphologic fieldwork was conducted within the APE; and 3) the cultural material from the excavations was processed and analyzed. A Phase IA Archaeological Survey of the project has already been completed and used to establish the testing methodology for the Phase IB effort for the project (Emory 2003). The archaeological and geomorphologic methods and results are discussed below.

3.2 Methodologies

The geomorphologic investigation focused on assessing the depositional history and archaeological integrity of project landforms (Appendix C). Daniel Hayes of Hayes and Monaghan conducted the geomorphologic investigation on April 21, 2004. The analytical methods used were designed to evaluate the formation/depositional history of project landforms in order to reconstruct the morphology and relative age of landform components. This study included assessments of general surface topography and internal stratigraphic characterizations of test unit exposures, including descriptions of sediment and soil characteristics (including any buried soils).

Sediment and soil characteristics within this project area were recorded for several test unit profile exposures. Standard field recording procedures documented details of the sedimentological and pedological environments of formation. These included observations of lithology (texture) of each distinct stratum as well as bedding, sorting, and the contacts

(boundaries) between strata. Elevation differences were measured as depths below ground surface at each individual exposure. Post-depositional weathering and soil formation characteristics were recorded following standard soil descriptive terminology developed by the United States Department of Agriculture, Soil Conservation Service (USDA-SCS 1974). These characteristics include descriptions of texture, color, mottling, structure, consistency, inclusions, intrusions, and transferals. Soil horizon designations represent modern conditions.

The Phase IB Archaeological Survey included a controlled surface collection, and the excavation of STPs and test units. The archaeological survey focused on an assessment of the archaeological potential and content of project landforms. For the purposes of this Management Summary, the excavation methodology for each section in the APE will be discussed separately.

3.2.1 Area 1

A grid system composed of 10.0-meter (32.8-ft) square grid cells was imposed over the plowed field setting in Area 1 (Attachment A). Using a transit and a 100.0-meter (328.0 ft) reel tape, a baseline was established along the eastern edge of SR 12 using two road signs as fixed reference points. From the southeastern corner of the bridge deck, a series of pin flags were set in the western baseline at 10.0-meter (32.8-ft) intervals. At 30.0 meters (98.4 ft) north of the bridge deck, a perpendicular transect was established east across the southern portion of Area 1 using the transit and a 100-meter (328.0-ft) reel tape. This transect represented the southern baseline of the grid. A 100-meter (328.0-ft) reel tape was used to fill in and mark with pin flags 10.0-meter (32.8-ft) intervals between the established transects.

Once the grid was established across Area 1, a system of numbers and letters was designated to define each column and row. The southern baseline was designated by a series of letters, beginning with the letter A in the westernmost column and proceeding to the letter S in the easternmost column. The western baseline received numerical designations, beginning with 1 in the southernmost row and ending with 25 in the northernmost row. Each cell was then designated by the row and column heading (i.e., 3-C, 16-L).

A controlled pedestrian surface collection was conducted of the plowed field setting in Area 1. A.D. Marble staff walked the 10.0-meter (32.8-ft) square collection blocks at an interval of approximately every 1.0 meter (3.3 ft). All historic and prehistoric cultural material was collected by individual block provenience.

A series of 1.0 meter (10.8-ft) square test units were excavated in the plowed field setting in Area 1 after the surface collection was completed (Attachment A). In a discussion of project testing methodology in a February 26, 2004 meeting between members of DelDOT, the Delaware State Historic Preservation Office (DESHPO), Delaware Department of Natural Resources and Environmental Control (DNREC), Delaware State Museums (DSM), Delaware Division of Historical and Cultural Affairs, Century Engineering, Inc., and A.D. Marble & Company, it was agreed that a series of test units would be placed across Area 1 to obtain a profile of the landscape geomorphology, assess presence of subsurface cultural features in areas of high surface artifact counts, and collect artifacts for analysis of possible site patterns (Appendix B). A series of 20 test units were excavated within a 30.5-meter (100.0-ft) wide corridor centered on the proposed roadway design as provided by Century Engineering, Inc. (Attachment A). Testing was limited to the centerline corridor of the roadway in order to provide initial geomorphologic and archaeological data on the prehistoric archaeological potential in Area 1 within the known area of impact.

On April 21, 2004, project mapping was provided to A.D. Marble & Company that illustrated an extended limit of disturbance in Area 1. The conceptual limits of disturbance in Area 1 were extended from 45.7 meters (150.0 ft) wide at the east side of SR 12 to 84.8 meters (278.1 ft) wide at the west side of SR 1 (Attachment A). Three test unit excavations were placed south, and outside, of the 30.5-meter (100.0-ft) wide corridor to test the larger swath.

Test unit excavations were placed across the 30.5-meter (100.0-ft) wide corridor and the larger conceptual limits based on the artifact densities identified during the surface collection of Area 1 and the limits of disturbance. Test units were placed in areas with significant artifact densities along the periphery of these loci and in areas with low artifact counts. The rationale for the test unit placement was to identify potential subsurface cultural features associated with the artifact

concentrations and document any variations in soil stratigraphy that may be associated with surface artifact counts.

Soils were excavated according to identifiable horizons. The plowzone horizon was removed as one level, and the underlying subsoil horizons excavated in 10.0-centimeter (3.9-in) levels. The test units were excavated 15.0 centimeters (5.9 in) or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter (0.25-in) hardware cloth to recover all artifacts. Excavation data and soil profiles were recorded on standardized field forms. The project area and its environs were photographed using black-and-white, color slide, and digital formats.

3.2.2 Area 2

Based on the information provided in the Phase IA Planning Study, Area 2 was recommended for archaeological testing with a series of close-interval (15.2-meter [50-ft]) STP excavations across the Soulie Gray House property (Emory 2003). In a letter dated December 12, 2003, Michael Hahn, Historic Preservation Specialist at DelDOT, requested that archaeological testing in the Soulie Gray House site be temporarily postponed until further information could be analyzed through the Real Estate Section of DelDOT regarding the extent of demolition activities on the property (Appendix B). In a discussion of project testing methodology in a February 26, 2004, meeting between members of DelDOT, DESHPO, DNREC, DSM, Delaware Division of Historical and Cultural Affairs, Century Engineering, Inc., and A.D. Marble & Company, it was agreed that the archaeological investigation in Area 2 would consist of a surface collection and a maximum of 10, 1.0-meter by 1.0-meter (3.3-ft by 3.3-ft) square test units placed within a 30.5-meter (100.0-ft) wide corridor centered on the proposed roadway design (Attachment A; Appendix B). The methodology was revised on March 5, 2004 to include testing beyond the 30.5-meter (100.0-ft) wide corridor, with the limit of the testing to be determined by cultural materials recovered in Area 2; soils information; and consultation with DelDOT and Century Engineering, Inc. (Appendix B).

A combination of controlled pedestrian surface collection, STPs, and test unit excavations of Area 2 were undertaken. A collection grid was imposed in Area 2 within a 30.0-meter (98.4-ft)

wide corridor following the proposed roadway centerline. To facilitate the grid layout, a transect was established along the proposed centerline, beginning at the edge of the plowed field south of the Soulie Gray House. Pin flags were placed on the centerline transect every 10.0 meters (32.8 ft). From each centerline pin flag, a second transect was established perpendicular on either side of the centerline. Two pin flags were set on the perpendicular transect 15.0 meters (49.2 ft) from the centerline, defining the limits of the corridor. Two additional pin flags were then placed on the perpendicular transect 5.0 meters (16.4 ft) from the centerline, defining the grid cells (Attachment A).

A system of numbers and letters were designated to define each column and row in the grid for Area 2. The southern baseline was designated by a series of letters referencing column location, beginning with the letter L (Left) in the westernmost column and proceeding to the letter R (Right) in the easternmost column. The western baseline received numerical designations, beginning with 1 in the southernmost row and ending with 25 in the northernmost row. Each cell was then designated by the row and column heading (i.e., 5-L, 14-R).

A.D. Marble staff walked the 10.0-meter (32.8-ft) square collection blocks at an interval of approximately every 1.0 meter (3.3 ft). All historic and prehistoric cultural material was collected by individual block provenience.

In the grassy, fallow ground located to the north of the Soulie Gray House, STPs were employed on the grid network established for the surface collection (Attachment A). An STP was excavated at each pin flag location on the grid. Each STP was designated by its location to the southwest corner of its associated grid. Test pits located along the eastern edge of the corridor were designated “RR” (Right Right). For example, an STP located in the southwest corner of grid square 22-R is designated STP 22-R, while the STP located in the southeast corner (along the eastern edge) of grid square 22-R is referenced as STP 22-RR.

Soils in each STP were excavated according to identifiable horizons. Each STP was excavated 15.0 centimeters (5.9 in) or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter (0.25-in) hardware cloth to recover all artifacts. Excavation

data and soil profiles were recorded on standardized field forms. The project area and its environs were photographed using black-and-white, color slide, and digital formats.

A series of 1.0-meter by 1.0-meter (3.3-ft by 3.3-ft) square test units were excavated in Area 2 after the surface collection was completed (Attachment A). Similar to the test unit methodology in Area 1, the purpose of the test units was to obtain a profile of the landscape geomorphology, assess presence of subsurface cultural features in areas of high surface artifact counts, and collect artifacts for analysis of possible site patterns. A series of five test units were excavated within a 30.5-meter (100.0-ft) wide corridor centered on the proposed roadway design as provided by Century Engineering, Inc. (Attachment A). Two additional test units were excavated outside of the corridor but within the APE.

Test unit excavations were placed across the 30.0-meter (98.4-ft) wide corridor and the larger conceptual limits based on the artifact densities identified during the surface collection of Area 2 and the limits of disturbance. Test units were placed in areas with significant artifact densities, along the periphery of these loci, and in areas with low artifact counts. The rationale for the test unit placement was to identify potential subsurface cultural features associated with the artifact concentrations and document any variations in soil stratigraphy that may be associated with surface artifact counts.

Soils were excavated according to identifiable horizons. The plowzone horizon was removed as one level, and the underlying subsoil horizons excavated in 10.0-centimeter (3.9-in) levels. The test units were excavated 15.0 centimeters (5.9 in) or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter (0.25-in) hardware cloth to recover all artifacts. Excavation data and soil profiles were recorded on standardized field forms. The project area and its environs were photographed using black-and-white, color slide, and digital formats.

3.2.3 Area 3

The narrow corridor on the west side of SR 12 was subjected to a series of STP excavations placed at 10.0-meter (32.8-ft) intervals. A 90.0-meter (295.3-ft) long baseline was established in

the corridor 4.0 meters (13.1 ft) off the edge of pavement, extending parallel to SR 12 (Attachment A).

3.2.4 Area 4

Given the low to moderate potential for prehistoric and historic archaeological resources in the proposed 18.3-meter (60.0-ft) wide acceleration lane, a controlled surface collection was conducted of the plowed field by archaeological field technicians spaced at 4.6-meter (15.0-ft) wide intervals (Attachment A). All cultural materials, excluding modern roadside refuse such as beer bottles, paper waste, and plastic, identified during the surface collection were marked with a pin flag and mapped on a scale map of the corridor.