

4.0 P H A S E I S U R V E Y  
R E S E A R C H D E S I G N A N D  
M E T H O D O L O G I E S

## **4.0 PHASE I SURVEY RESEARCH DESIGN AND METHODOLOGIES**

### **4.1 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 prehistoric-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 was already 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.

### **4.2 Methodologies**

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 report, the excavation methodology for each section in the APE will be discussed separately.

#### *4.2.1 Area 1*

Area 1 consists of a 4.0-hectare triangular parcel of ground situated between SR 1, SR 12, and the Murderkill River (Photograph 4). This parcel of ground is currently fallow, but historically was utilized for grazing pasture and crops. The landform gently slopes south towards marshlands bordering Spring Creek and the Murderkill River. Grassy banks line the edge of the roadways. The topographic setting of Area 1 is distinct from the flat uplands and steeply banked landforms found to the east and west of the APE.

A grid system composed of 10.0-meter square grid cells was imposed over the plowed field setting in Area 1 (Figure 11). Using a transit and a 100.0-meter 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 intervals. At 30.0 meters 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 reel tape. This transect represented the southern baseline of the grid. A 100-meter reel tape was used to fill in and mark with pin flags 10.0-meter 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 square collection blocks at an interval of approximately every 1.0 meter. All historic and prehistoric cultural material was collected by individual block provenience.

A series of 1.0-meter square test units were excavated in the plowed field setting in Area 1 after the surface collection was completed. In a discussion of project testing methodology in a February 26, 2004 meeting between members of DelDOT, 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 wide corridor centered on the proposed roadway design as provided by Century Engineering, Inc. 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 wide at the east side of SR 12 to 84.8 meters wide at the west side of SR 1 (Figure 11). Three test unit excavations were placed south, and outside, of the 30.5-meter wide corridor to test the larger swath.

A series of 23, 1.0-meter square test unit excavations were placed across the 30.5-meter 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 levels. The test units were excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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.

#### 4.2.2 Area 2

Area 2 is composed of a 0.76-hectare parcel of fallow, grassy field that skirts around the southern, eastern and northern edges of the wooded lot identified as the site of the Soulie Gray House (Photographs 5 and 6). The grassy portion of Area 2 historically served as both pasture land and plowed fields. The northern end of Area 2 encompasses a portion of a spring-fed, manmade farm pond that drains under the SR 1 roadway and into Spring Creek. The ruins of a

concrete-block foundation and rubbish pile are present within Area 2 along the eastern edge of the wooded lot.

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) STP excavations across the Soulie Gray House property (Emory 2003). In a letter dated December 12, 2003, Michael Hahn, Historic Preservation Specialist at DeIDOT, 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 DeIDOT 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 DeIDOT, 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 square test units placed within a 30.5-meter wide corridor centered on the proposed roadway design (Appendix B). The methodology was revised on March 5, 2004 to include testing beyond the 30.5-meter wide corridor, with the limit of the testing to be determined by cultural materials recovered in Area 2; soils information; and consultation with DeIDOT 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 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. 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 from the centerline, defining the limits of the corridor. Two additional pin flags were then placed on the perpendicular transect 5.0 meters from the centerline, defining the grid cells (Figure 12).

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 square collection blocks at an interval of approximately every 1.0 meter. 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 (Figure 12). 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 or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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 square test units were excavated in Area 2 after the surface collection was completed (Figure 12). 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 wide corridor centered on the proposed roadway design as provided by Century Engineering, Inc. Two additional test units were excavated outside of the corridor but within the APE.

Test unit excavations were placed across the 30.0-meter 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 levels. The test units were excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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.

#### *4.2.3 Area 3*

Area 3 consists of a small, 6.1-meter wide by 91.4-meter long grassy corridor on the west side of SR 12 (Photograph 8). This parcel of ground serves as the shoulder for southbound SR 12 and contains evidence of buried utilities along its length. The narrow corridor on the west side of SR 12 was subjected to a series of STP excavations placed at 10.0-meter intervals. A 90.0-meter long baseline was established in the corridor 4.0 meters off the edge of pavement, extending parallel to SR 12 (Figure 13).

#### *4.2.4 Area 4*

Area 4 encompasses a narrow, 18.3-meter wide corridor along the east side of SR 1 north of the farm pond and south of Barratt's Chapel (Photograph 9). A combination of grassy bank right-of-way and plowed field comprises the landscape within Area 4. Given the low to moderate potential for prehistoric and historic archaeological resources in the proposed 18.3-meter wide acceleration lane, a controlled surface collection was conducted of the plowed field by archaeological field technicians spaced at 4.6-meter wide intervals (Figure 14). 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.

#### 4.2.5 Area 5

Area 5 consists of a large, 3.8-hectare parcel of active crop land situated east of the Soulie Gray House (Photograph 9). This parcel of ground was included in the current project study area with the introduction of the March 2005 alignment. In general, the highest point in Area 5 is found at the northern edge of the parcel, with ground slope trending to the south. Minor surface erosion, mainly small rivulets cut into the plowzone, was noted in the southern two-thirds of Area 5. Surface runoff collected into several low-lying depressions within the southern-most limits of Area 5.

A 15.0-meter-interval test grid was established over Area 5, with STP excavations conducted at alternating points (Figure 15). To maintain continuity with previous Phase I excavations, the eastern edge of the Area 2 surface collection was utilized as the north-to-south axis for the Area 5 grid. The Area 5 grid was measured from a 50.0-meter long linear transect at the southern end of Area 2 to avoid any potential distortions created by the curve. The northern edge of cells in Row 1 and Row 4 served as the east-to-west axis for the Area 5 grid. From these three axes, the remainder of the Area 5 grid was established across the plowed field. Each STP was designated by a north and east co-ordinate respective to its location to the southwest corner of its associated grid.

Soils in each STP were excavated according to identifiable horizons. Each STP was excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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.

#### 4.2.6 Area 6

Area 6 includes two smaller sections of grassy fields and wooded ground situated in the inside curve of Area 2. These parcels of ground were included in the current project study area with the

introduction of the March 2005 alignment. The northern portion of Area 6 includes a 120.0-meter long by 24.4-meter wide parcel of fallow grassy land flanked by Area 2 to the north and the driveway to the Soulie Gray House to the south. The 65.0-meter long by 24.4-meter wide parcel of land in the southern portion of Area 6 consists of a small segment of wooded ground from the historic house lot to the north and fallow land to the south.

A 10.0-meter-interval test grid was set up over Area 6 (Figure 16). The Area 6 test grid could not be anchored into the Area 2 grid due to its excessive curvature. Instead, a utility pole located near the driveway entrance was designated as datum point and assigned the co-ordinates N500 E500. From this datum, a north-to-south transect (E500 line) was instituted by compass along the east side of the farm pond, roughly 54 degrees east of magnetic north. A second transect (N500 line) was created from the utility pole perpendicular to the north-to-south transect. Using the N500 and E500 lines, a series of STPs were established across Area 6 at alternating 10.0-meter-intervals. Each STP was designated by a north and east co-ordinate respective to its location to the N500 E500 datum.

The initial survey methodology for the southern portion of Area 6 included a combination of STP excavations in the fallow sections and surface collection of 10.0-meter squares in the plowed sections. The northern section of Area 6 was designated to be tested by STP excavations. However, at the time of the fieldwork in July 2005, the setting of the southern portion of Area 6 consisted of fallow, grassy fields and wooded lot. Subsequently, STP excavations were conducted at alternating 10.0-meter intervals across the entire parcel for Area 6. Each STP was designated by a north and east co-ordinate respective to its location to the N500 E500 datum.

Soils in each STP were excavated according to identifiable horizons. Each STP was excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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.

In addition to the STP excavations, a series of three, 1.0-meter by 1.0-meter square test units were excavated in the northern portion of Area 6 (Attachment A). The purpose of the test units was to assess the presence of subsurface cultural features associated with the remains of the Soulie Gray House farm complex. Test unit excavations were placed based on the artifact densities identified during the STP excavations.

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 levels. The test units were excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened through 0.64-centimeter 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.

#### *4.2.7 Areas 7 and 8*

Area 7 includes a 1.3-hectare parcel of fallow grassy land and active agricultural field southeast of the farm pond and north of Area 2 (Photograph 10). The 1.6-hectare parcel of land in Area 8 consists of fallow grassy land and active agricultural field northwest of the farm pond (Photograph 11). Area 4 borders the western edge of Area 8, while Area 7 is found at the southeastern edge of the parcel.

The 10.0-meter interval test grid set up in Area 6 was extended to the north to include Areas 7 and 8 (Figures 17 and 18). The initial survey methodology included a combination of STP excavations in the western and southern fallow sections of Areas 7 and 8, respectively, and surface collection of 10.0-meter squares in the eastern and northern plowed sections of Areas 7 and 8, respectively. However, at the time of the fieldwork in July 2005, the entire setting of Areas 7 and 8 consisted of fallow, grassy fields. Subsequently, STP excavations were conducted at alternating 10.0-meter intervals across the entire parcel for Areas 7 and 8. Each STP was designated by a north and east co-ordinate respective to its location to the N500 E500 datum.

Soils in each STP were excavated according to identifiable horizons. Each STP was excavated 15.0 centimeters or deeper into culturally sterile, Pleistocene deposits. Soils were screened

through 0.64-centimeter 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.

#### *4.2.8 Phase I Geomorphological Investigation*

The Phase I 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.