## 2.0 GEOMORPHOLOGY

The Bridge 362 at Chipman's Pond archaeological APE was investigated for the presence of landforms and soils that might have the potential to contain intact pre-contact period archaeological resources. Due to the heavy historic period use of the archaeological APE, the results of the geomorphological investigations consider only the potential for pre-contact period archaeological resources. Characterizations of the lack of soil development during the geomorphological investigations help to explain historic period disturbances to the archaeological APE. Many soil auger borings were taken within the archaeological APE, with all of them exhibiting disturbed, truncated, and/or wetland stratigraphic profiles. The hand auger obtains a soil tube sample that is 2.5 cm (1.0 in) thick and up to 100.0 cm (39.4 in) long/deep. Three auger borings were determined to be representative of the specific conditions encountered in the Bridge 362 archaeological APE, and were examined and described in detail according to the methods and nomenclature prescribed by the United States Department of Agriculture--Natural Resources Conservation Service (USDA-NRCS) (Schoenenberger *et al.* 2002). Tabular descriptions of the three auger boring stratigraphic profiles are included in Appendix B.

The archaeological APE is located within the Lower Coastal Plains physiographic province, where the soils are forming in unconsolidated coastal plain sediments, which are predominantly sandy sediments with smaller amounts of silt, clay, and fine gravels deposited by receding marine waters. Along streams and valley bottoms in floodplains and wetlands, these sediments are often reworked and redeposited.

The following soils information is taken from Ireland and Matthews (1974). Soils mapped within the Bridge 362 archaeological APE belong to the Evesboro-Rumford association. This association is found in two locations in the state, including the area surrounding Seaford and Laurel and most of the Nanticoke River watershed. This association is the most extensive in Sussex County. Specific soil types found within the project APE include Evesboro loamy sand, loamy substratum, 2 to 5 percent slopes (EvB); Evesboro loamy sand, 5 to 15 percent slopes (EsD); and Johnston silt loam (Jo). Evesboro soils are very deep, excessively drained, sandy soils located on uplands. Johnston soils are very wet, very poorly drained, and located on floodplains. These soils formed in recent accumulations that consist of both sediments and a large amount of organic matter.

The original landform comprising the Bridge 362 at Chipman's Pond archaeological APE is a broad wetland valley bottom created by a tributary to Broad Creek. The tributary flows to the southwest toward its confluence with Broad Creek, which is approximately 1.0 km (0.6 mi)

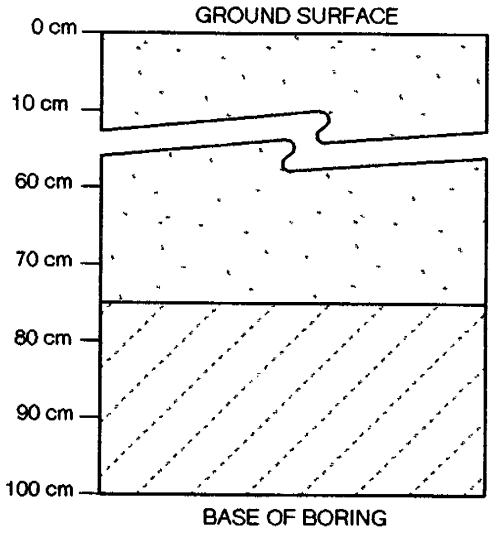
downstream. Historically, several dams have been placed across the valley bottom of Broad Creek and its tributaries, creating a series of separate ponds. Within the archaeological APE, an earthen dam was constructed to create Chipman's Pond and supply power for a mill. The existing Chipman's Pond Road roadbed is located atop the dam. At both the eastern and western extremes of the archaeological APE, a small escarpment rises from the wetland valley bottom up to well-drained, upland landforms.

The entire archaeological APE is comprised of land that is either contained within the fill of the dam, has been previously disturbed, or has been wetland throughout the Holocene. Auger Borings 1 and 2 were taken in locations at the southern base of the dam, where the fill could be penetrated by the length of the hand auger. These borings were comprised of sandy loam fill over dark, saturated, highly organic wetland deposits (Figure 3). The fill was obviously placed directly over the valley bottom wetland deposits. Areas where borrow materials were obtained throughout the historic period are noted south of the extent of the archaeological APE. Before the construction of the dam to form Chipman's Pond, this whole area was a saturated wetland that would not have been attractive for occupation by pre-contact period human populations. Due to the presence of long-term wetland sediments, with little or no potential to contain pre-contact period archaeological resources, and covered by historic dam and roadbed fill, no testing for pre-contact period archaeological remains is recommended in the central portion of the project APE south of existing Chipman's Pond Road.

Auger Boring 3 was taken on the southeastern bank of the stream/millrace. This area appears to have been extensively disturbed by the construction of the dam, the spillway, and a mill. All of the auger borings attempted within this area were refused at shallow depths due to the presence of dumped concrete fragments. Auger Boring 3 is comprised of 55.0 cm (21.7 in) of loamy sand that contains fine concrete fragments (Figure 4). The auger was refused below this depth by coarse concrete fragments. No intact alluvial sediments were found within this portion of the archaeological APE; therefore, no testing for pre-contact period archaeological resources is recommended.

At the eastern and western extremes of the archaeological APE, the landforms are higher and well drained upland surfaces. However, the archaeological APE limits within these areas are located within 2.3 m (7.5 ft) of the existing roadway and entirely within areas previously excavated for construction of the roadbed. No intact landforms or soils of appropriate age to contain pre-contact period archaeological resources are located within these portions of the archaeological APE; therefore, no testing for pre-contact period archaeological resources is recommended.

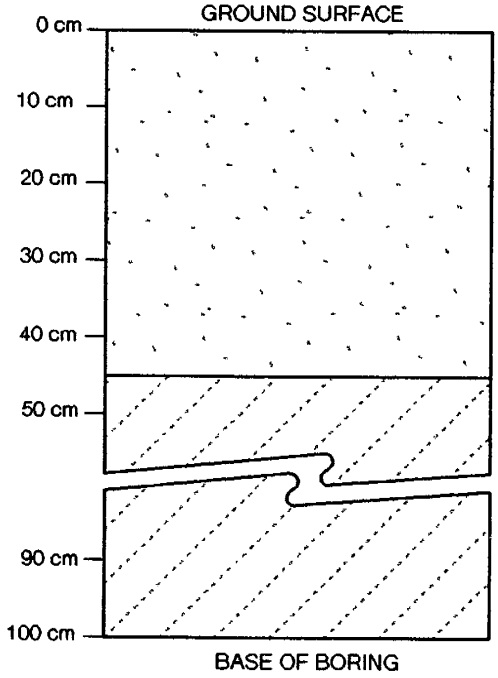
# SOIL PROFILE
# AUGER BORING 1




C1 10YR 5/3 Brown sandy loam, with fine limestone fragments.

2C2g 10YR 4/1 Dark gray highly organic sandy loam.

# SOIL PROFILE
# AUGER BORING 2




C1 10YR 5/2 Grayish brown sandy loam, with fine limestone fragments.

2C2g 10YR 4/1 Dark gray highly organic sandy loam.

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BRIDGE 362 AT CHIPMAN'S POND
BROAD CREEK HUNDRED
SUSSEX COUNTY

SOIL PROFILES
AUGER BORINGS 1 AND 2

FIGURE - 3

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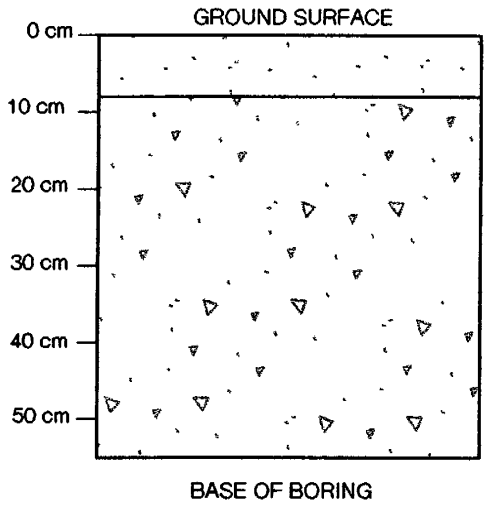
# SOIL PROFILE
# AUGER BORING 3




C1 10YR 4/2 Dark grayish brown loamy sand, with fine quartz gravels and concrete fragments.

C2 10YR 5/3 Brown loamy sand, with fine concrete fragments.

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BRIDGE 362 AT CHIPMAN'S POND
BROAD CREEK HUNDRED
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SOIL PROFILE
AUGER BORING 3

FIGURE - 4

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In general, primary (i.e., bedrock) sources of lithic raw materials are uncommon in the vicinity of the Bridge 362 archaeological APE, as the majority of the Delmarva peninsula is covered by a think mantle of Pleistocene sediments. While this situation virtually excludes surficial bedrock exposures of lithic raw material, the same processes that resulted in the deposition of these sediments also transported a variety of knappable stone from primary outcrops located to the north in Pennsylvania and New Jersey. Thus, Native American knappers could have selected from a variety of lithic raw materials, including chalcedony, chert, quartz, and quartzite, from secondary deposits (e.g., stream terraces, lag deposits, gravel bars) for stoneworking (Catts *et al.* 1988:14). Especially common in Delaware lithic assemblages is quartz, a tenacious stone of variable flaking quality. While quartz is suitable for the manufacture of flaked stone tools, its ubiquity in the region and its propensity to shatter when struck during plowing or other earthmoving activities makes the attribution of some quartz specimens as pre-contact artifacts problematic.

Occasionally, artifacts from primary bedrock sources are found on sites in the region. Sources of Iron Hill Jasper are located to the west of the project area near Newark. This distinctive material varies in color from yellow to dark brown and ranges in quality from excellent to poor. When good to excellent quality jasper is found, a wide variety of lithic tool forms are easily made (Petraglia and Knepper 1996). In addition to being found in primary outcrops, jasper cobbles can be found as secondary sources in certain streams on the Delmarva Peninsula. Primary sources of ironstone, an iron cemented sandstone, are located along the Elk River and Herring Island at the upper end of Chesapeake Bay (Ward 1988:7). Exotic raw materials occasionally encountered on archaeological sites in the region include argillite and rhyolite, both with primary outcrops located to the north and northwest of the project area, respectively.