

## IV. RESULTS AND CONCLUSIONS

URS conducted an intermittent program of archaeological monitoring at Bridges 526 and 527 in Millsboro, Sussex County, between March 9 and July 3, 2003. In addition to monitoring construction activities at the two bridges, three hand-excavated test units were utilized to investigate two structural features and a surface deposit discovered during the installation of a cofferdam and new spillway for Bridge 527 (Figure 7). No features or artifacts were encountered during construction activities for the replacement of Bridge 526. The results from the monitoring activities and excavations are presented below.

### BRIDGE 527

Initial archaeological monitoring was conducted in regard to the installation of sheeting for the cofferdam surrounding Bridge 527. Construction activities began with the removal of roadway (State Route 326) pavement prior to the placement of the sheeting. A 20-x-40-foot section of asphalt, located adjacent to and overlaying the bridge decking, was removed to reveal a deposit of sand and concrete chunks used as bedding material for the roadway (Plate 5). Removal of this material indicated that the bridge consisted of a timber-frame section located at the southern end, adjacent to Betts Pond, and a reinforced-concrete section that consist of concrete abutments and two wing walls at the northern end, adjacent Fishing Creek (Plate 6). Once the cofferdam was in place, the site was dewatered and demolition of the structure began. Excavation of the box culvert floor revealed that it had rested on a base of logs (in varying diameters and lengths) and stone set in sand (Plate 7). It could not be determined if the logs and stone were original to the early milldam or dated to the rebuilding of the bridge and culvert in the 1930s, as the boundaries of the cofferdam confined the exposed area.

#### *Western Area*

*Feature 1.* Removal and excavation below the western concrete abutment and northwestern wing wall revealed the intact corner of a mortared brick wall (Feature 1), approximately eight feet below the current road grade (Plate 8). Hand clearing of the overlaying sand deposits revealed that remnants of the wall extended 18 feet to the north and two feet to the east (see Figures 7 and 8; Plate 9). The wall, oriented perpendicular to State Route 326, was one foot wide and varied in height from three to eight courses. Shovel skimming and troweling along its western edge uncovered what appeared to be a builder's trench. No evidence for a trench was discovered along its eastern edge, as the creek had completely eroded the soil deposits once present. The erosion of these deposits revealed that a variety of methods were used for the wall footings: ½-inch-thick wood planks, ½-inch- to one-inch-thick mortar, and bricks laid side by side on the edge. Wood planks were used to support the corner, while mortar was used beneath the two-foot remnant section of the southern wall. The remainder of the western wall was constructed over a brick footing. Additional clearing at either end of the wall indicated that it did not extend any farther to the north or east. However, the clearing of an area just northwest of the wall revealed

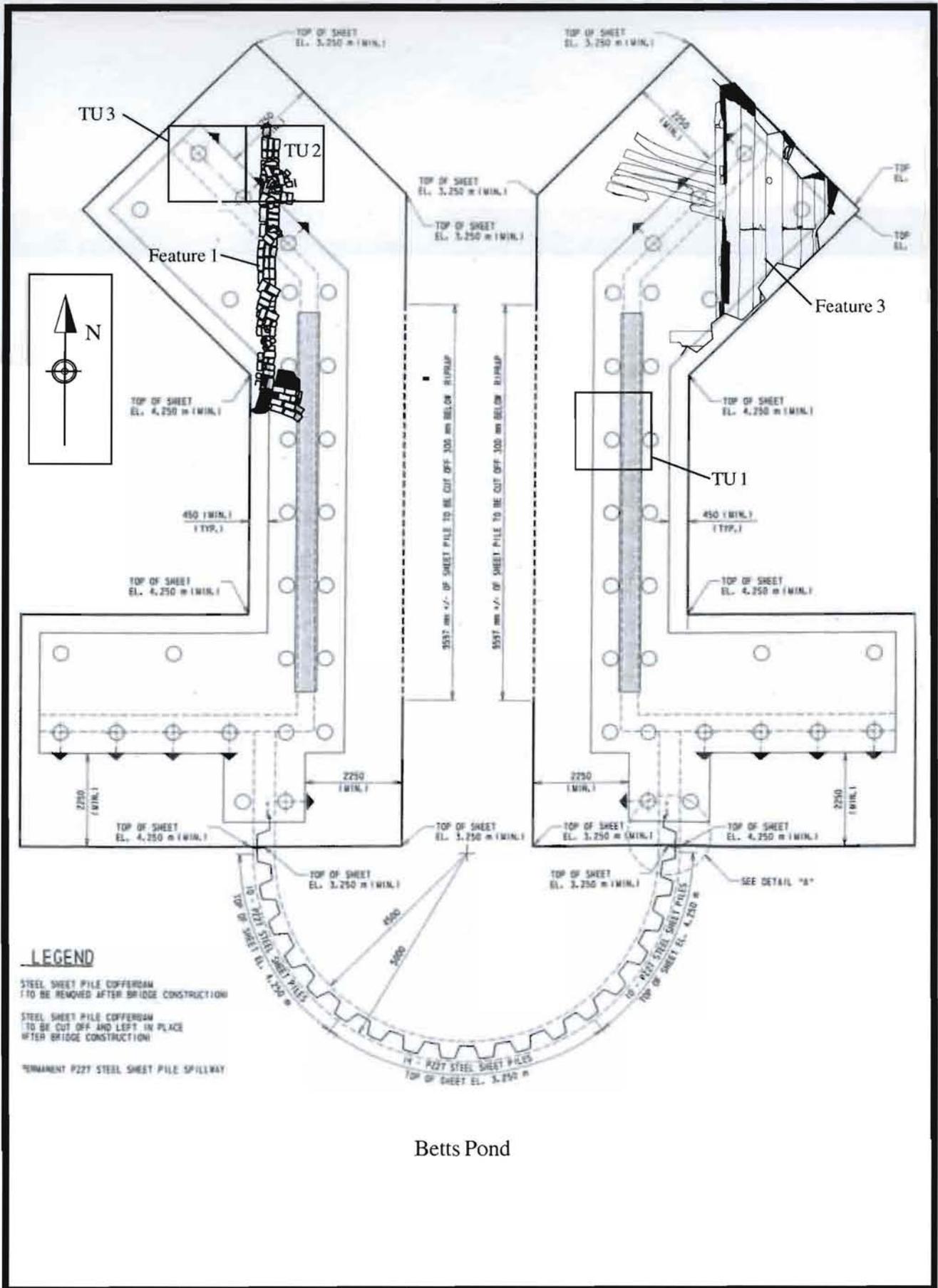


Figure 7 Locations of Test Units and Features Within Cofferdam for Bridge 527.



Plate 5 Bridge 527, Asphalt Removed (State Route 326), Showing Sand and Concrete Road Bed.



Plate 6 Northeast End of Bridge 527, View Looking Southwest.



Plate 7 Bridge 527, Log, Stone, and Sand Base for Spillway Floor, View Looking Northeast.



Plate 8 Bridge 527, Southwest Corner of Feature 1 (Brick Wall), View Looking Southwest).

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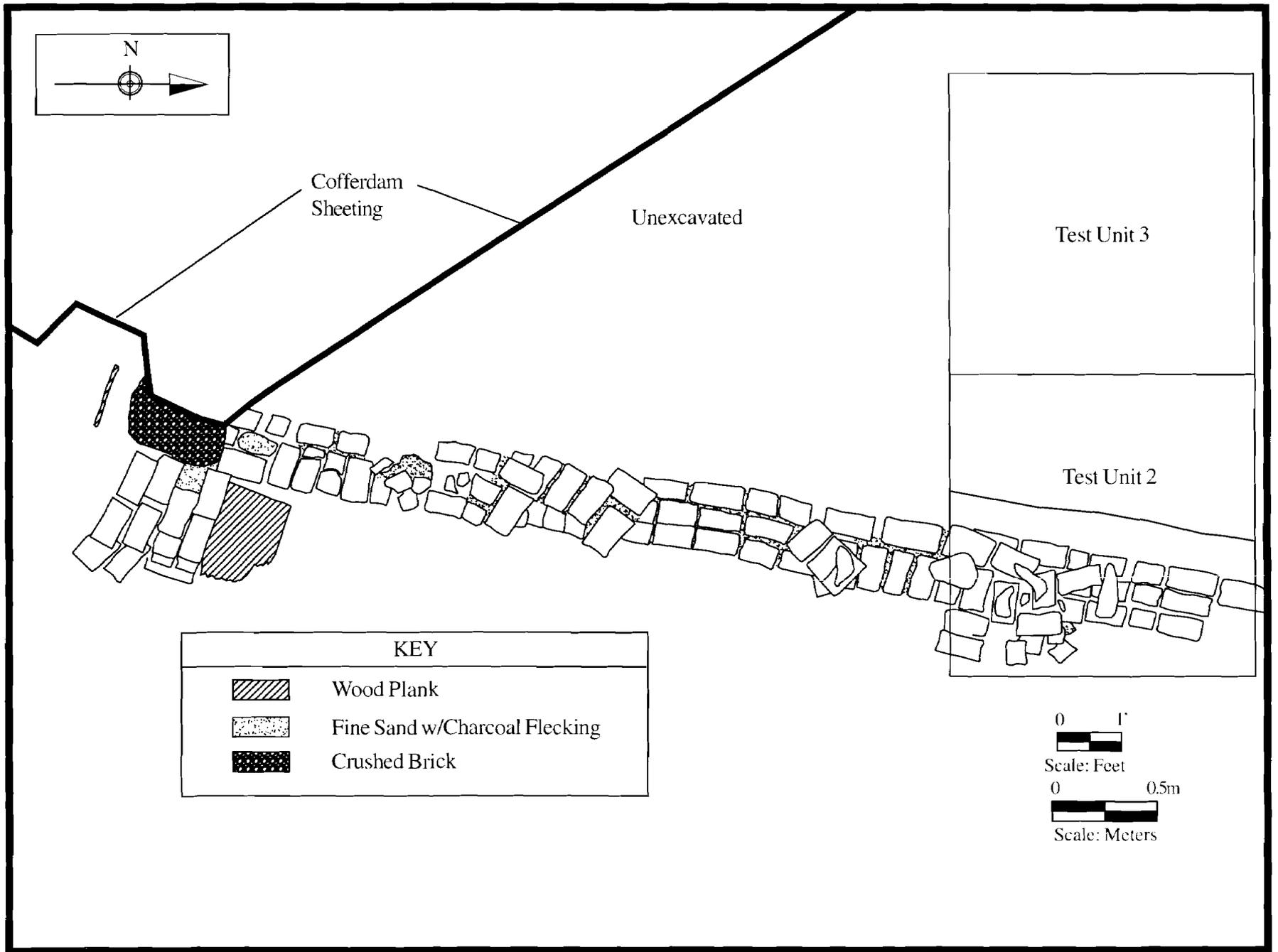


Figure 8 Plan View of Feature 1 (Brick Foundation) and Locations of Test Units 2 and 3.



Plate 9 Bridge 527, Feature 1 (Brick Wall), View Looking North.

a dark grayish brown (10YR 4/2) deposit of sandy loam that appeared to be the remains of a potential intact yard surface.

Two 5-x-5-foot test units were located within the northwestern area of the cofferdam in order to test the builder's trench and potential yard surface. Test Unit 2 was placed to straddle the brick wall (see Figure 8). Excavation was limited to the west side of the wall, as the creek had eroded the east side. The builder's trench extended to the base of the brick footing and measured one foot wide and 0.55 feet deep. The trench matrix (Context 1) consisted of a brown (10YR 5/3) sand containing small pieces of coal and brick fragments. No other artifacts were recovered. The remainder of the unit was composed of a 1.1-foot-thick deposit (Context 2) of brown (10YR 5/3) sand mottled with yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) sands that extended below the builder's trench. This stratum is consistent with constant floodwater deposition. Further excavation of the unit was terminated at a depth 0.3 feet below the wall due to water seepage that could not be pumped out fast enough. A small scattering of historic artifacts (n=6) was recovered from the deposit (Appendix A). The only diagnostic artifacts consisted of a portion of a car's air/water hose with a metal clamp (dating to the mid-to-late-twentieth century) and a foot ring fragment from a pearlware saucer (dating between 1775 and 1830). The hose and clamp are most likely intrusive to the deposit. As the water level within the cofferdam was allowed to rise at the end of each workday and pumped out the next morning, these artifacts were undoubtedly washed into the unit from another unexcavated fill area of the cofferdam.

Test Unit 3 was placed adjacent to and up slope of the west wall of Test Unit 2. It was located at a higher elevation than Test Unit 2 (+1.6 feet), as backhoe excavation in this area had not penetrated to the same depth. Excavation revealed five soil strata. The dark horizon (Context 1), initially considered to be a yard surface, consisted of a dark grayish brown (10YR 4/2) sandy loam mottled with a light brownish gray (10YR 6/2) sand. The deposit varied in thickness from 0.2 to 0.6 feet. The 35 artifacts recovered from this layer were a mix of recent modern and historic material (Appendix A). Four evenly spaced parallel dark soil stains were encountered at the base of the deposit. Excavation of the stains determined that the teeth from the backhoe's bucket had created them. Therefore, the previous deposit could not be an intact yard surface. Instead it had been created from the dewatering activities (i.e., the daily raising and lowering of the water level) within the cofferdam. The next deposit (Context 2) was a light brownish gray (10YR 6/2) sand with gravel ranging in depth from 0.10 to 1.15 feet in thickness. The recovered artifacts consist of unidentifiable nail fragments (n=14), brick fragments (n=4) and undecorated redware sherds (n=3). A very dark grayish brown (10YR 3/2) silty sand (Context 3), approximately 0.25 feet thick, followed this layer. Only a decomposing section of wood planking was present. Beneath this deposit was a brown (10YR 5/3) sand mottled with yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) sands that were identical to the soil present in Test Unit 2. The artifact assemblage was comprised of a cut nail, unidentifiable nail fragments (n=8), undecorated redware sherds (n=4), and a brick fragment. The last deposit (Context 5) consisted of a light olive gray (5Y 6/2) medium sand and was excavated only 0.03 feet. Further excavation was terminated (11 feet below the current road grade), due to water seepage. Only five artifacts were recovered: an unidentifiable nail fragment and four sherds of redware ranging in dates from 1750 to 1830.

The brick wall appears to be the remains of an early mill foundation rather than an early retaining wall for a bridge. This interpretation is based on its location to the current bridge and roadway. If it were a retaining wall or bridge abutment, the wall would have lined up with the roadway that spans the culvert; it does not. The wall's southwestern corner is situated at the northern end of the culvert and bridge. The wall also extends to the north, beyond the dam's embankment, into an area where water is discharged from the pond. In addition, the intact corner revealed that a south wall section was once present and extended toward the east, away from the embankment. Finally, remnants of wood boards were encountered adjacent to the interior corner of the wall (see Figure 8); this might indicate that a previous floor. An 1840 survey map depicts a three-story gristmill with a gable roof in this location. Brick would have been the preferred material to use as a foundation to support such a structure. Mills with brick foundations were common in the area. Carter states that the early mills at Betts Pond would have been similar to others in the area; these mills were usually built on brick foundations (1980: 4). A similar type of mill foundation was uncovered during archaeological investigations at the Cabbage Mill Site. The brick foundation measured 26 x 24 feet and used timber as well as brick footers to help support the foundation

### *Eastern Area*

*Feature 2.* Machine excavation continued within the eastern half of the cofferdam with the removal of the concrete and timber abutment and the northeastern concrete wing wall, all in hopes of finding additional brick wall sections. A concentration of bricks and wood was encountered approximately 20 feet east of the foundation's exposed corner and eight feet below the current road grade (Plate 10). Hand clearing indicated that it might be the remnants of its eastern wall section. Therefore, a 5-x-5-foot test unit (Test Unit 1) was excavated to investigate this concentration (see Figure 7). It became quickly apparent that the bricks were not the remains of the foundation and that the wood was part of an apparent retaining wall (Feature 2) for the culvert or part of the interior structure of the milldam (Plate 11). The wall was oriented perpendicular to State Route 326 and consisted of a series of vertical posts set within the creek bed that were faced on either side with horizontally laid boards. The boards, measuring 0.2 feet thick and 0.5 feet wide, extended to at least three courses deep and were attached to the posts with nails. Water seepage prevented further excavation to determine the final depth. However, machine excavation in the southeast corner of the culvert exposed a similar structural configuration to a depth of five feet below the base of Test Unit 1, indicating that the retaining wall extended to a depth of at least 7.5 feet below the top of the first set of boards encountered in Test Unit 1 and spanned the entire eastern side of the existing culvert. Several fill episodes of sandy loam to sand, containing mostly architectural material, were identified on the east side of the feature. The majority of this material consisted of bricks and brick fragments, along with pieces of boards and posts. Diagnostic material is comprised of stoneware, white granite, Japanese porcelain, a medicine bottle, and a glass liquor flask ranging in age from the mid-nineteenth to mid-twentieth centuries (Appendix A). The presence of the mid-twentieth-century material in and around the feature is most likely due to construction episodes of the overlaying culvert during the last 70 years.

*Feature 3.* The last area to be excavated was the northeast corner of the cofferdam. A large north/south oriented mortised beam was partially exposed approximately 12 feet below the road



Plate 10 Bridge 527, Retaining Wall (Feature 2), View Looking Northwest.



Plate 11 Bridge 527, Feature 2 in Test Unit 1, View Looking South.

surface during fill removal by the backhoe. Hand clearing indicated that the cofferdam's sheeting had truncated both ends of the 15.5-foot hand-hewn beam (Plate 12). Further clearing of the fill deposits revealed additional structural elements associated with the beam that almost filled the entire northeast corner of the cofferdam (Plate 13; Figure 9). The remnants of two vertical posts (0.6 feet square) with tenons and decomposing boards were found in situ atop the beam. The posts were apparently designed to provide lateral support to the horizontally laid boards. Adjacent and to the east, a series of 0.15-foot-thick boards were discovered that varied in width between 0.8 to one foot and formed an apparent floor. In addition, a number of logs with varying diameters extended westward from beneath the west side of the beam into the creek bed. These logs appear to have served a dual function, as footing supports for the beam and to protect the creek bed from eroding away.

The removal of the floorboards revealed a joist support system. Four east/west oriented logs extended from the beam's east wall and rested on the underlying sand deposits (Plate 14). The western ends of the logs were attached to the beam using either a dovetail or a half lap joint and secured by wood pegs. In addition, the tops of each log had been hewn flat in order to provide a level surface to lay the floorboards. No evidence of how or if the floorboards were fastened to the logs was established during the investigation of the feature.

The function of this structural feature could not be determined, as only a portion of it could be investigated and documented during construction of the bridge and culvert. How much of it is still intact beyond the confines of the cofferdam is unknown. It may be a structural element of the milldam or the remains of the first gristmill at this location that predated the brick foundation (Feature 1). The fact that the main beam and floor joists were hand-hewn and attached with wood pegs indicates an early construction date. However, no artifacts were recovered in association with the feature that could more reliably define its function or date.

## BRIDGE 526

Bridge 526 carries State Route 326 over an existing water channel that had been utilized for an earlier nineteenth-century mill, which once stood in this location. A timber-and-concrete culvert was constructed sometime in the early to mid-1930s as an improvement to the current mill (Warren Mill), rebuilt circa 1930 in the same location after fire destroyed it (Plate 15). It was similarly constructed as Bridge 527 and its associated culvert. The timber frame section was located on the south side of the roadway, along with a wooden spill gate that controlled the flow of water from Betts Pond (Plate 16). The concrete section extended the structure beneath the road and the mill to a second spillway that ended on the north side of the mill. The spillway then channeled the water flowing from the pond, when not in use by the mill, to a small stream that emptied into Millsboro Pond. When water was needed to power the mill, a gate was utilized to divert it to the headrace and then on to the turbine (Plate 17). The culvert functioned as a penstock (flume) to channel the water from the pond to the turbine.

Construction plans for Bridge 526 consisted of the removal and replacement of the bridge's decking, the timber wing walls, and spillway located on the pond side. In addition, the current



Plate 12 Bridge 527, Feature 3, View Looking Northeast.



Plate 13 Bridge 527, Feature 3 (Cofferdam Sheeting in Background), View Looking East.

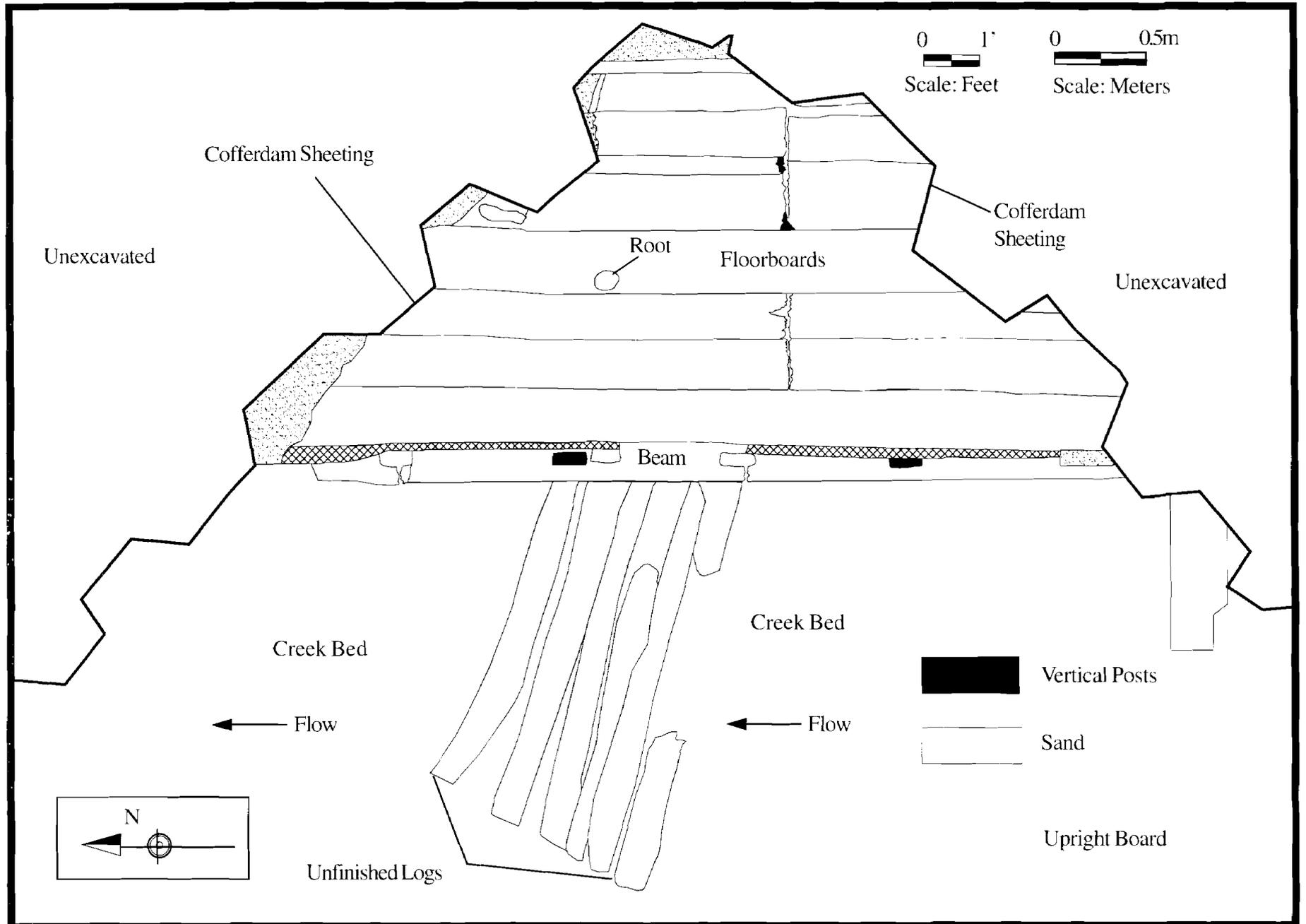


Figure 9 Plan View of Feature 3.



Plate 14 Bridge 527, Feature 3, Joist Supports for Floor Boards, View Looking Northeast.



Plate 15 Removal of Bridge 526 Decking and Culvert Timber Wing Walls, View Looking North. Note Warren mill in background.



Plate 16 Bridge 526, Timber Spill Gate and Wing Walls, View Looking Northeast.



Plate 17 Warren Mill Showing Concrete Headrace (Center), Used to Direct Water to the Turbine (Right), View Looking South.

box culvert was not removed, but was left in place. A precast concrete box culvert was lowered in place between its existing walls. Therefore, since a limited amount of disturbance from construction activities occurred in this area of the project, no features were encountered or artifacts recovered.

## CONCLUSIONS

The previous discussion has summarized the findings of the archaeological monitoring program conducted at Betts Pond. A very apparent outcome of these findings is the inability to provide definitive interpretations of the three structural features encountered and documented during construction activities for the replacement of Bridge 527. This inability results from a number of factors. First, monitoring revealed that twentieth-century construction of the bridge and culvert destroyed substantial portions of both the brick and wooden features, which may have been associated with a gristmill that once occupied this location. Second, the small number of artifacts recovered in association with each of the features could not better define the feature's function or date. Third, historical documentation was unable to provide sufficient information on the possible function or date of the features. Finally, as archaeological investigations were restricted to only those areas within the limits of construction disturbances, more of the structural feature located in the northeastern area of the cofferdam or the northern extension of the brick foundation could not be explored.