

## LEIPSIC RIVER BRIDGE CROSSING AREA

The Leipsic River bridge crossing and the results of the underwater archeological investigation conducted there are discussed in this section. The information provided includes a description of the natural setting, bathymetry, and subbottom stratigraphy. An overview of local history is presented with information on documented shipwrecks in the vicinity. The findings of the remote sensing survey and site evaluation work are also provided with recommendations concerning further work.

This study located three underwater archeological sites in the bridge crossing area and vicinity. These were Leipsic River Magnetic Anomaly Site "A" (7K-C-376, K-6426), Leipsic River Magnetic Anomaly Site "B" (7K-C-377, K-6430), and Leipsic River Magnetic Anomaly Site "C" (7K-C-378, K-6431).

Site 7K-C-376 was outside the designated bridge crossing area. Site 7K-C-378 was found during the Phase I survey to lack potential significance. The other site (7K-C-377) was interpreted as having the potential to be significant and was evaluated in the Phase II study.

### Natural Setting

The Delaware Route 1 Corridor bridge crossing of Leipsic River is located in Kent County about halfway between the town of Smyrna and the city of Dover (Figure 123). It traverses the river at a location 3.25 miles west of the town of Leipsic. The bridge crossing is 0.3 mile downstream of the Garrisons Lake dam.

Leipsic River is located in Kent County and forms the boundary between Duck Creek Hundred on the north and Little Creek Hundred on the south. It flows in an easterly direction for a distance of about 15 miles from its headwaters near the town of Kenton. The first seven miles of the creek pass through some of the most fertile agricultural lands in Delaware.

During the 19th century the creek was dammed at two locations, creating artificial lakes. Those lakes provided water power for mills that processed local grain into flour and logs into lumber. The upstream impoundment is Masseys Millpond, located about halfway between Kenton and U.S. Route 13. Further downstream is Garrisons Lake. The Garrisons Lake dam is on the western side of the DuPont Highway (U.S. Route 13).

The tidal portion of Leipsic River begins at the foot of the Garrisons Lake dam. From there, the river follows a meandering course towards the east between gently rolling coastal plain uplands. The terrain adjoining the river is mostly forested and swampy flood plain, except for several individual locations where fast land reaches the water's edge.

One place where fast land reaches the river bank is at a bridge crossing alternative originally considered, but later eliminated, as a potential candidate

for the project's crossing of Leipsic River. A small upland terrain feature is situated on the southern side of Leipsic River at that location (see Figure 124).

About four miles to the east, where the river nears the town of Leipsic, the swampy flood plain gives way to grassy marsh. The lower reaches of Leipsic River from there to Delaware Bay are characterized by broad marshlands.

Along the river's lowest nine miles there are only two places where it adjoins fast land terrain sufficiently large to support a commercially significant settlement. The western location is at the town of Leipsic, nine miles from the river's confluence with Delaware Bay. The eastern one is further downstream at Whitehall Landing, about six miles from the Bay.

The original colonial period name for the Leipsic River was "Little Duck Creek." It was initially regarded as a tributary of Duck Creek (Smyrna River). Little Duck Creek (Leipsic River) flowed into the old natural alignment of Duck Creek at a location about four miles downstream from the town of Leipsic.

In 1684, however, the original southern portion of old Duck Creek was cut off from the remainder of that waterway when The Thoroughfare canal was opened. The former natural mouth of Duck Creek at Delaware Bay subsequently has functioned as the mouth of Little Duck Creek (Leipsic River). The truncated lower portion of old Duck Creek became a backwater, and is now called Duck Creek Gut.

Little Duck Creek was eventually renamed Leipsic River. This was because in 1814 the Delaware Legislature adopted the name "Leipsic" for the port town that had been established along its shore. As a consequence, the portion of the watercourse downstream of the Garrisons Lake dam came to be officially named Leipsic River.

When this archeological investigation was originally undertaken, two alternative Leipsic River bridge alignments were being considered. They are labeled "Eastern" and "Western" in Figure 124. The eastern alternative was the one selected for the bridge crossing. As a result, the site evaluation work examined only the single potentially significant underwater archeological site that was situated in the eastern alignment (Site 7K-C-377).

The Phase I remote sensing survey examined the portions of Leipsic River extending 100 feet both upstream and downstream of the eastern and western bridge crossing alignments. The alignments each included 450 feet of river length counting the upstream and downstream buffer zones. The average width of Leipsic River in their vicinity is about 100 feet.

The maximum depth of the river at high tide in the bridge crossing area is about three feet. The deepest channel generally follows the centerline of the river. To either side of the channel, more shallow underwater terrain slopes upward towards the river's banks. The portion of Leipsic River in the bridge crossing area has changed a great deal during the 20th century as a consequence of both dredging and alluvial sedimentation.

Figures 125 and 126 are aerial photographs of the bridge crossing area, oriented looking towards the west. Garrisons Lake is visible in the background.

Figure 127 is a bathymetric cross section of the project area looking towards the west (upstream). The bathymetric profile shows the river bottom to be quite smooth and nearly flat in cross section. The smooth bottom contours indicate that this part of the river has been subject to heavy siltation during recent times.

A cross sectional diagram of the river's subbottom stratigraphy is provided as Figure 128. It has been prepared using information from geotechnical soil borings along the project alignment (Century Engineering, Inc. 1988; Kidde Consultants 1988). This profile is oriented with the view looking upstream (westward); north is to the right.

The subbottom sediment stratigraphy shows evidence of the river's origin as a subaerial stream valley. Features characteristic of such streams are evident. One is a relict stream channel containing gravel and sandy gravel sediments that has been cut deeply by erosion into the natural sand and clay subsoil. Also present is a buried former terrace on the northern side of the ancestral stream valley. The ancestral river's erosional down cutting that formed the ancient valley took place before the river was inundated by rising sea level around 4000 B.C.

**FIGURE 127**  
**Bathymetric Cross Section of Leipsic River Bridge Crossing**

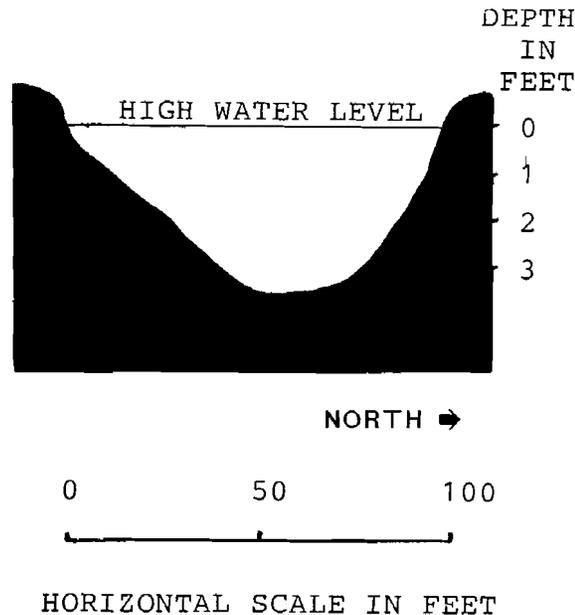
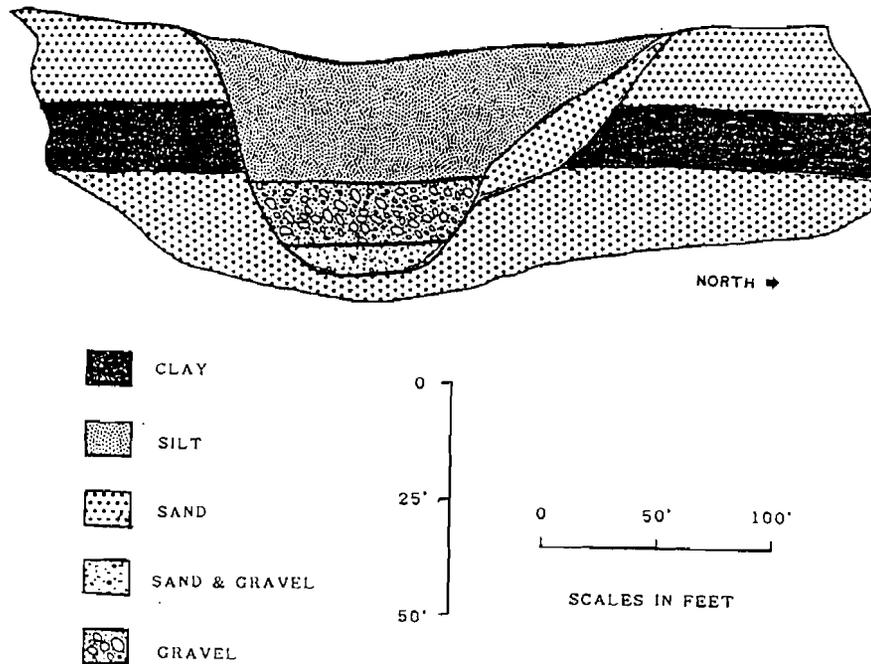


FIGURE 128  
Stratigraphic Profile of Leipsic River Crossing



Following its inundation, the Pleistocene-early Holocene former river valley began to fill with silty and sandy sediments. About forty feet of sediments have accumulated above the ancestral stream's former channel. This overburden is sufficiently thick to have buried the formerly exposed lower terrace and totally conceal the original subaerial physiography of the ancient stream valley.

Leipsic River was dredged in 1913 to create a navigation channel eight feet deep as far upriver as Garrisons Mill. However, since that time the channel was become almost completely filled with alluvial sediments. About seven feet of alluvium has accumulated in the channel over the eighty years since the early 20th century dredging.

#### Local History

This discussion is provided to establish the historical context of the project area. Its focus is on past cultural activity that may relate to submerged cultural resources.

The historical development of the Leipsic River drainage followed the general trends of central Delaware's cultural chronology, settlement, economic development, and maritime activity. A major difference from other parts of Delaware, such the Smyrna River vicinity, is that the intensity of settlement and

economic development has been somewhat less. For example, the only substantial community that is present along the Leipsic River is the town of Leipsic, which has a present day population of about 228 people. In comparison, the largest settlement along Smyrna River to the north is the town of Smyrna, with a population twenty times greater (about 4,750 inhabitants).

Initial colonial settlement of the lands adjoining Leipsic River began late in the 17th century, though significant numbers of colonists did not move into the area until the first quarter of the 18th century. From the beginning of colonization, the river served as an important transportation route both for local use and for communication with Delaware Bay.

Only one town was established along the tidal portion of Leipsic River. It was located on land obtained by John Hillyard from William Penn in 1687. Hillyard named his 300-acre tract "Weald," meaning "open country." Hillyard sold that land in 1723 to Jacob Stout. Stout recognized the economic potential of a two hundred yard stretch of fast land along the waterway's southern shore at a point nine miles from Delaware Bay. He named it "Fast Landing" and founded a riverfront settlement there.

Over the subsequent decades, Fast Landing developed into the largest settlement in Little Creek Hundred. Its importance derived from its role as the main shipping port serving the surrounding territory.

Fast Landing was also the location where the Bay Road (now Route 9) crossed Leipsic River by ferry. It was the earliest north-south coastal roadway in Kent County.

By the early 19th century, Fast Landing had developed into a thriving village and maritime port. Its primary economic activity was the export of local products to Philadelphia, the largest commercial center of the Delaware Bay region. Exports included grain, lumber, furs, salt hay, fruit, oysters, and livestock. Fast Landing also served as the river's main entry point for imported manufactured materials and other goods.

The most important fur export consisted of pelts from muskrat trapped in the nearby marshes. These were shipped to Philadelphia where they were made into hats, mittens, and clothing. The trapping of muskrat has remained one of Leipsic's important economic activities down to the present day.

Early in the 19th century, local promoters sought to change Fast Landing's name to one that had a more sophisticated and prosperous connotation. One suggested alternative was "Vienna." However, in recognition of the local muskrat pelt industry the name adopted by the Delaware legislature in 1814 was "Leipsic," after the prominent German fur trading center of that name.

The Leipsic River area participated in Delaware's advancements in agricultural productivity and commercial activity during the first half of the 19th century. Economic activity in Leipsic expanded substantially from 1814 to 1859. By the 1830's its bustling trade had made it one the most important ports

of Delaware and its wharves could accommodate as many as twenty-four vessels at one time (Jamison and others 1983:6). The majority of the vessels calling at the port were sloops and schooners of eight to thirty tons burden.

Agricultural output in the upper portion of the Leipsic River drainage led to the development of milling as an important local industry. At the upstream limit of Leipsic River's tidal waters, a dam was constructed creating Garrisons Lake. Another dam was built to form Masseys Millpond. Water powered grist mills to produce flour from local grains and saw mills to produce lumber were built below the dams.

The mill built below the Garrisons Lake dam was identified as the Hoffecker Grist and Saw Mill on the 1850 map of the area (Figure 129). Subsequently, its name was shown on the 1859 and 1868 maps of Little Creek Hundred as the Hoffecker and Huffington Mill (Figures 130 and 131). When it originally opened, the Hoffecker and Huffington Mill was accessible by small vessels that navigated the river between its location and Leipsic, four miles downstream.

The river's natural water depth to within a mile of the Garrisons Lake dam was six to nine feet. From that point on, it shoaled gradually to a depth at low water of one foot at the mill, with a mean tidal range of 2.4 feet. This provided shipping traffic with a navigable depth of about three feet at high tide and a clear channel width of 40 feet (U.S. House of Representatives 1910).

The importance of maritime transportation to the port of Leipsic resulted in the establishment of three shipyards that operated there from the 1830's to the 1850's. In 1839, local merchants and mariners raised funds to dredge cut-off channels across three meander bends between the town and Delaware Bay in order to improve navigation.

The community's name was adopted into the Smyrna, Leipsic, and Philadelphia Steamboat Company which was founded in 1839. It was not until 1853, however, that steamers began to provide regular service between those three ports of call. From then until the 1920's, steamboat service was maintained on a semi-weekly schedule with a third weekly trip during fruit season.

Increasing economic activity and population growth led to the town of Leipsic being incorporated in 1852. However, economic developments elsewhere in Delaware served to inhibit the community's potential for further expansion. The Delaware Railroad established a railway station at Cheswold, four miles west of Leipsic, in 1859. That diverted a substantial portion of freight activity to the railroad and away from Leipsic's maritime shipping, resulting in a decline in the volume of commercial activity at the port. However, since maritime freight rates remained generally lower than the railroad's, the town continued as a functioning port.

In the middle part of the 19th century a bridge was built across the river at a point 1.2 miles upstream of the town of Leipsic. It was called "Martin's Bridge" and was a fixed structure that lacked a draw span. Its limited clearance served to restrict access upstream of the bridge to small watercraft. The clear passage underneath the bridge was twenty feet wide, but its vertical clearance was only six feet at low water and three feet at high water.

The Leipsic Canning Factory was established in 1881 on the northern shore of Leipsic River opposite the town, stimulating economic activity there. For a period of time it was the largest cannery in Delaware. At its peak the factory employed 125 people and produced over one million cans per year, mostly tomatoes. The factory finally closed in 1939 and was subsequently demolished.

It was subsequently reported that beginning in 1882 a propeller steamboat of about 130 tons made three trips per week between Leipsic and Philadelphia (U.S. Army Corps of Engineers 1884). At the same time, two schooners of 75 tons burden made weekly trips to Philadelphia. An average of two transient vessels per month also called at the port during that period. Major exports from Leipsic during the late 19th century consisted of canned goods, corn, wheat, wood, hay, peaches, general farm produce, fur pelts, and sheep. Imports consisted of phosphate fertilizer, coal, lime, box shooks, tin, and general merchandise.

In the 1880's the river channel between Leipsic and Delaware Bay was no less than six feet deep at low water. As a consequence, no federally sponsored improvements to navigation were recommended by the Corps of Engineers at that time (U.S. Army Corps of Engineers 1884).

Figure 132 is a soil map showing the territory along the river between Garrisons Lake and the town of Leipsic to be mostly marshlands. No settlement or other cultural activity in the bridge crossing project area is indicated.

Leipsic River was again studied by the Corps of Engineers in 1909. Up to that time no U.S. government funds had been expended for navigation improvements in that waterway. The only work accomplished had been the privately funded dredging undertaken in 1839, when three cut-off channels had been excavated at sharp bends in the river between Leipsic and Delaware Bay (U.S. House of Representatives 1910).

The 1909 survey reported that landings had long before been established at every farm bordering Leipsic River between Garrisons Mill and Leipsic. While these had previously been "in constant use," difficulties in navigating the upper part of the river had curtailed vessel traffic (U.S. House of Representatives 1910). A major obstacle to navigation was Martin's Bridge, which served to "shut off" all substantial commercial shipping in the river upstream of it.

Plans were subsequently drawn up for a dredging project to open the upper part of the river to commercial shipping. The project's terminus was specified as a turning basin just below the Garrisons Lake dam (Figure 133). Actual commencement of the dredging, however, did not occur until four years later.

A subsequent Corps of Engineers investigation reported that the "many farm landings along the (upper) river...bear evidence to the fact that the river was used to a considerable extent in days gone by..." when a schooner or sloop "...was owned and operated by almost every large farm" (U.S. House of Representatives 1912). However, at that time there was "no commerce at all" above the port of Leipsic. Even though Martin's Bridge had been partially dismantled following a U.S. Government order in 1909, the shallowness of the upper part of Leipsic River blocked commercial vessels large enough to carry profitable cargoes.

Maritime commerce along Leipsic River during the harvest season of 1908 included three steamboats of 100 to 150 tons each that were engaged in shipping tomatoes from Leipsic to Baltimore. At that time, the port's normal shipping traffic consisted of a 120 ton steamer operating on a regular schedule, eleven schooners ranging from 30 to 100 tons burden, and six internal combustion engine powered freight boats. A sizable fleet of oyster boats was also based in Leipsic, which had a population of about 350 persons.

Maritime commerce along the lower part of Leipsic River amounted in value to about \$225,000.00 in 1908. It included wheat, corn, fresh and canned tomatoes, salt hay, phosphate, oysters, canned pears, coal, and miscellaneous merchandise. The Corps of Engineers estimated that an addition \$125,000.00 worth of goods would be diverted from using the railroad if navigation could be opened as far up the river as the mill just below Garrisons Lake dam.

By that time the Hoffeecker and Huffington Mill had been sold to new owners and had been renamed Garrisons Mill. The body of water behind the mill dam was consequently called Garrisons Lake, the name by which it is presently known.

Interest in opening the upper reaches of Leipsic River to shipping led to waterway improvement surveys by the U.S. Army Corps of Engineers in 1909, 1912, and 1913. The object of those investigations was to evaluate the feasibility of deepening the creek to allow navigation by vessels drawing as much as seven feet between Garrisons Mill and Leipsic (U.S. Congress, House of Representatives 1910, 1912, and 1913).

Modifications to the dam's overflow weir early in the 20th century resulted in the creation of a large and deep pool in the river a short distance upstream of the mill. This feature was viewed by Corps of Engineers as a potential turning basin for boats up to 125 feet long (U.S. House of Representatives 1910).

The potential economic rewards of improving the river's navigation up to Garrisons Mill were estimated to be substantial. In addition to making the mill accessible to shipping, it was thought that the farms downstream along the river would benefit as well. Even though the railway stations at Cheswold and Brenford were as close as two miles from Garrisons Mill, the freight charges for the railroad were significantly higher than the cost of shipping by water.

One reason for the renewed interest in navigating the upper part of Leipsic

River was improvements in watercraft technology resulting from the successful development of internal combustion engines. During the early 1900's, gasoline engines began to be installed in a wide variety of vessels. Commercial boats powered by gasoline engines were better able to efficiently navigate narrow interior waterways than the more unwieldy sailing craft or labor intensive rowing boats.

The Corps of Engineers undertook a major dredging project in Leipsic River in 1913 (Figure 134). The work involved deepening the natural channel and straightening several stream meanders between Leipsic and the head of navigation at Garrisons Mill. The result was the opening of the river's upper portion to commercial shipping traffic. The new channel had a depth of eight feet at low water, deep enough to accommodate vessels of substantial size. It terminated in a large turning basin at the foot of the dam a short distance upstream of Garrisons Mill. The width of the river's submerged terrain excavated by dredging was 40 feet. This left undisturbed only the portion of the river bottom measuring about 25 feet wide between the edges of the channel and the adjacent stream banks.

The 1913 channel improvement project affected a substantial portion of the underwater terrain in the Delaware Route 1 Corridor bridge crossing area. That dredging would have removed from the excavated navigation channel any cultural materials that might have been present before the work was commenced.

The improved navigability resulting from the channel dredging project did not ensure the viability of Garrisons Mill, however, for it shut down permanently during the Great Depression. After it closed, there was no viable demand for commercial maritime traffic in the upper Leipsic River. The mill had been the only potential client for freight shipping activity upriver from the port of Leipsic.

The site of Garrisons Mill was largely destroyed in the 1930's by the construction of the northbound lanes of the DuPont Highway (U.S. Route 13). A part of the former mill site may survive, however, between the eastern edge of the northbound lanes of U.S. Route 13 and the river below the Garrisons Lake dam.

The town of Leipsic remained an active port through the middle 20th century (Figure 135). Though it declined over time as a center of local shipping trade, it continued to serve as the home port for several local fishing boats.

FIGURE 135  
Waterfront of Leipsic, Delaware, in the 1920's



(Jamison and others 1983)

Following the original opening of the DuPont Highway in the 1920's, overland transport in the area became more cost efficient, reliable, and rapid than by watercraft. The 20th century's transportation emphasis on motor cars and trucks contributed to the decline in the use of Leipsic River as a corridor for commercial shipping.

At the present time, there is virtually no watercraft traffic along the upper reaches of the Leipsic River. The water depth is too shallow at low tide to permit even small craft to navigate. The eight foot deep navigation channel dredged in 1913 has almost become entirely filled with alluvial mud. Evidence that the river once served as an avenue for commercial shipping is limited to historical records and the archeological remains of past cultural activity.

During the more than two centuries that Leipsic River served as an important waterway in central Delaware's maritime commerce, it is likely that several vessels were probably wrecked or abandoned in its waters and along its shores.

The historical sources consulted for this investigation list only two such losses, however. One was the 75 ton schooner Mint. In about 1894 it sank in the river about five miles downstream from the town of Leipsic. Identified as a hazard to navigation, the Mint as blown up with dynamite and the debris placed on shore (U.S. Army Corps of Engineers 1895). The other recorded loss was the schooner James K. Burnite. It was abandoned in 1913 aground on the bank of Leipsic River. The wreck was not an obstruction to navigation, so it was not removed (U.S. Army, Corps of Engineers 1903).

#### **Field Investigation Findings**

The Leipsic River bridge crossing archeological field investigation consisted of remote sensing survey and site evaluation. The Phase I survey recorded the presence of twelve cultural targets in the project area. They were assigned numerical designations from 1 to 12. Their locations are illustrated in Figure 136. Eight of these were isolated magnetic anomalies (Targets number 3, 4, 5, 6, 8, 9, 11, and 12). The other four were magnetic anomaly clusters (Targets number 1, 2, 7, and 10).

The anomalies and anomaly clusters were classified into five isolated targets and three underwater archeological sites. The westernmost site was designated Leipsic River Magnetic Anomaly Cluster Site "A" (7K-C-376, K-6429). It was located in the western alternative project alignment. The other two sites were in the eastern project alignment, and were designated Leipsic River Magnetic Anomaly Cluster Site "B" (7K-C-377, K-6430) and Leipsic River Magnetic Anomaly Cluster Site "C" (7K-C-378, K-6431). Archeological site forms for these sites were completed and filed with the Bureau of Archaeology and Historic Preservation; copies are provided in Appendix I.

The identity and cultural association of the three underwater archeological

sites could not be determined using only the remote sensing data. Their locations along an historically documented riverine trading route indicated they might have the potential to be considered historically significant. During the Phase I survey, however, Site 7K-C-378 was found to consist of 20th century vintage refuse lacking the potential to be considered historically significant.

The other two sites were recommended for a Phase II evaluation study in the event they would be affected by the bridge's construction. However, the western alignment was dropped from further consideration when the eastern alignment was selected for the actual project construction. As a consequence, Phase II work was performed only at the single potentially significant site in the eastern alignment bridge project area (Site 7K-C-377). The primary field method employed in the evaluation of Site 7K-C-377 was the Direct Approach technique.

The findings of the Phase I remote sensing survey and Phase II evaluation investigation are described below. The underwater archeological sites are described from west to east, followed by the isolated anomaly targets.

Leipsc River Magnetic Anomaly Cluster Site "A" (7K-C-376, K-6429) was situated in the western alternative bridge crossing alignment. It was the largest cultural deposit located during the remote sensing survey. This site consisted of a complex of anomaly clusters adjacent to the only place in the vicinity where the bank of Leipsc River consists of fast land terrain. This fast land feature is the first potential landing site downstream from the former site of Garrisons Mill. The current water depth at high tide there varies from one foot near the southern shore to three feet in the middle of the river.

Site 7K-C-376 consisted of two anomaly clusters that were designated Target # 1 and Target # 2. They were considered to be related because of their close proximity to one another. The site's dimensions were about 60 feet north-south by 200 feet east-west.

Target # 1 contained four magnetic anomalies. Its long axis was oriented perpendicular to the river's southern shore and extended 60 feet out into the river from the riverbank. The magnetic anomaly width of Target # 1 varied from 30 feet near the southern shore to about 70 feet in the middle of the river.

Another cluster consisting of two anomalies was found 80 feet downstream from Target # 1 in the middle of the river. It was designated Target # 2. This cluster extended over an area about 70 feet north-south by 25 feet east-west.

The amplitude of the anomalies associated with Site 7K-C-376 ranged from 20 gammas to 261 gammas. This indicated the presence of multiple magnetic objects containing from about five to thirty pounds of iron.

Site 7K-C-376 had sufficient amplitude and dimension to represent the remains of a potentially significant cultural deposit. Its configuration (Targets # 1 and # 2) indicated the possible presence of at least two related cultural features.

The location of Site 7K-C-376 was observed during low tide during subsequent field work nearby at Site 7K-C-377. Several eroded and rotted wooden pilings aligned in rows were visible at low water. These pilings extended from the shore out into the river for a distance of at least 25 feet. Other piling remains appeared to be present beneath the water's surface. The size and patterning of the pilings indicated they were the remains of a small private boat dock. Nearby on the shore, the bed of an abandoned roadway was visible leading away from this location towards the west.

The structural remains at Target # 1 of Site 7K-C-376 indicated that some portion of the anomalies there probably are associated with iron fastenings used for holding the dock's timbers together. Artifacts associated with use of the dock may account for the other anomalies. The offshore terminus of Target # 1 is in the former channel of Leipsc River that had been dredged in 1913. As a consequence, vessels of substantial size would have had access to this vicinity in the past.

The location of Target # 1 appears to have functioned as a landing place.

It was improved with a boat dock that had been utilized in former times but is now abandoned. The presence of a dock is consistent with the environmental setting at this location, where overland access to the river's edge was possible because of the presence of fast land. Over the past eighty years, sedimentation has filled the dredged channel and made this portion of Leipsic River unnavigable at low tide.

No Phase II evaluation investigation was conducted at Site 7K-C-376. It is situated 0.15 mile upstream of the alignment that was selected for the Delaware Route 1 Corridor bridge crossing. Since it lay outside the territory that would be affected by the proposed construction, no further site evaluation work was recommended as part of this investigation. The site, however, does appear to merit further consideration. It is recommended that its significance and eligibility for nomination to the National Register be evaluated in the event it is threatened in the future by some other proposed construction project.

Leipsic River Magnetic Anomaly Cluster Site "B" (7K-C-377, K-6430) was an anomaly cluster situated on the northern side of Leipsic River near the western boundary of the eastern bridge alignment (Figure 136). Initially designated magnetometer Target # 7, Site 7K-C-377 consisted of a cluster of two moderate size anomalies. The observed maximum amplitudes for these two anomalies were 198 gammas and 42 gammas. The estimated magnetic masses associated with them were 50 pounds and 20 pounds of iron, respectively.

This site was interpreted to contain multiple artifacts having a total mass of around 70 pounds of iron. It could also be expected that additional non-magnetic artifacts would be associated with the anomalies. The remote sensing data relating to Site 7K-C-377 did not allow a definitive identification of it to be made. During analysis of the remote sensing data it was classified as an underwater archeological site of potential historical significance. It was recommended that a hands-on investigation of this site be conducted to assess its potential eligibility for nomination to the National Register. Field work to evaluate the site was subsequently conducted.

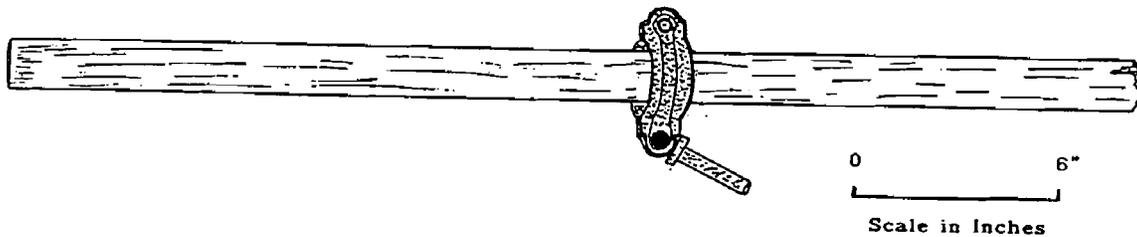
During the Phase II evaluation, artifacts were encountered scattered over an area measuring about 100 feet east-west by 50 feet north-south. They were non-articulated and appeared to be distributed haphazardly. Their spatial patterning indicated that the site contained material deposited at various times either through accidental placement during ephemeral cultural activity or as a consequence of being carried by various riverine currents (normal flow, tidal, or flood).

The artifacts recovered included two non-articulated rectangular wooden timbers containing machine made steel spikes and both wire and cut nails. They were of 20th century vintage and were not from a watercraft. These timbers appeared to be components of a wooden dock or shoreline bulkhead structure, possibly deposited after having drifted downriver from the location of Garrisons

Mill. Subsequent to the dredging of Leipsic River in 1913, commercial watercraft would have ascended the river to that location and construction of wharf and bulkhead waterfront structures would have been necessary to accommodate them.

Other artifacts recovered from this location included the broken handle of a wooden oar with a clamp type iron oar lock attached (Figure 137). There were also two lead fishing weights, a fishing hook with nylon line attached, a steel tack, five aluminum beverage cans and can fragments, a fragment of steel wire, and four corroded metal can fragments.

**FIGURE 137**  
**Broken Oar with Iron Clamp-On Oarlock from Site 7A-C-377**



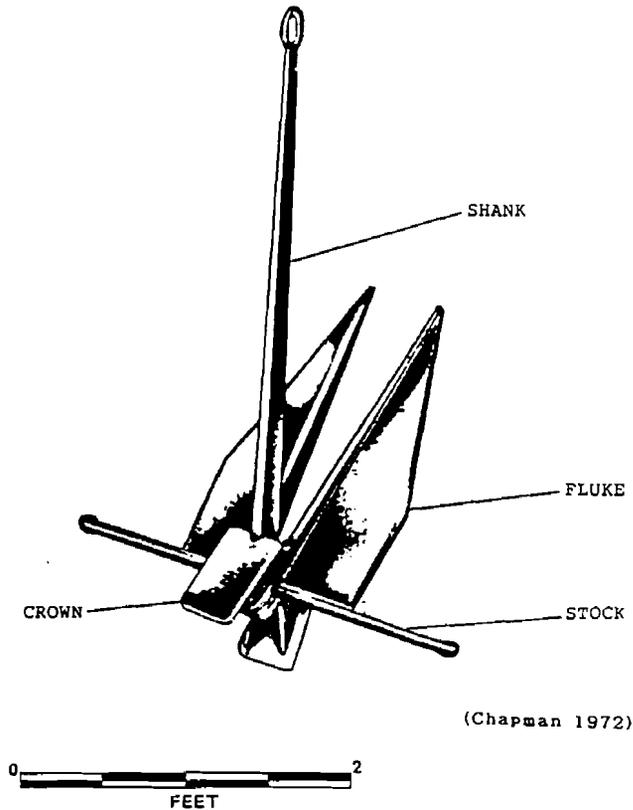
The cultural materials at Site 7K-C-377 were not associated archeologically significant concentrations or features. Their scattered patterning indicated they were randomly deposited over time by drifting or intermittent deposition. The site does not merit being considered eligible for nomination to the National Register. No further investigation of this site was recommended.

Located further downstream was Leipsic River Magnetic Anomaly Site "C" (7K-C-378, K-6431). It was situated near the eastern limit of the bridge crossing area, and extended from the northern to the southern side of the river over an area approximately 150 feet from east to west by 80 feet from north to south.

This site consisted of an anomaly cluster (Target # 10) and three isolated anomalies (Targets # 9, # 11, and # 12). Their amplitudes ranged from 13 to 951 gammas. The estimated masses of iron associated with them, as calculated from the nomograph and nomogram charts, were 5 to 200 pounds. Site 7K-C-378 was interpreted to represent the presence of an underwater archeological site.

During the Phase I field work, a large steel anchor of the Danforth type was observed resting on the bottom within the limits of Site 7K-C-378. Its location is shown by the small anchor symbol in Figure 136. The Danforth anchor was developed around 1940 and quickly became very popular because of its superior holding power and ease of recovery (Figure 138).

FIGURE 138  
Danforth Type Anchor from Site 7A-C-378



The Danforth anchor at Site 7K-C-378 was recovered and found to weigh seventy pounds. Its size was appropriate for use on a vessel having a length of from 75 to 100 feet. Commercial vessels of that size were commonly used as freight boats along Delaware's rivers during the first half of the 20th century. This anchor appears to be evidence that such vessels navigated this part of Leipsic River as late as the 1940's.

Several other artifacts were recovered or observed at this site. They are listed in the catalog provided in Appendix II. This material may be grouped into several categories according to function.

Items that can be classified as building materials were encountered. These consisted of nine fragments of wooden timbers containing wire nails and cut nails, five cut nail and cut nail fragments, and one large wooden beam with bolted iron handles at each end. This material appears to have been deposited at this location after drifting from locations upstream. The timbers appear to be fragments of shoreline bulkheading or from a wooden dock. They may have been derived from riverfront facilities at Garrisons Mill.

Evidence of hunting and fishing was also found. This material included a wire mesh crab trap of recent vintage, which was left in place. A photograph of similar crab traps is shown in Figure 139. In addition, there were three lead fishing weights, a shotgun shell casing, and a broken aluminum boat hook. Container type artifacts that were recovered consisted of one aluminum can fragment and ten bottle glass fragments of light blue color.

Fasteners and other miscellaneous hardware were also found. Artifacts recovered included an iron ring of one inch diameter, a padlock marked "REESE Made in USA", and a U-shaped iron gaff hook (Figure 140). There were also an S-shaped steel hook, a U-shaped steel hook, two iron square nuts, a large steel bolt with a thick cotter type pin attached at one end, and a brass ring.

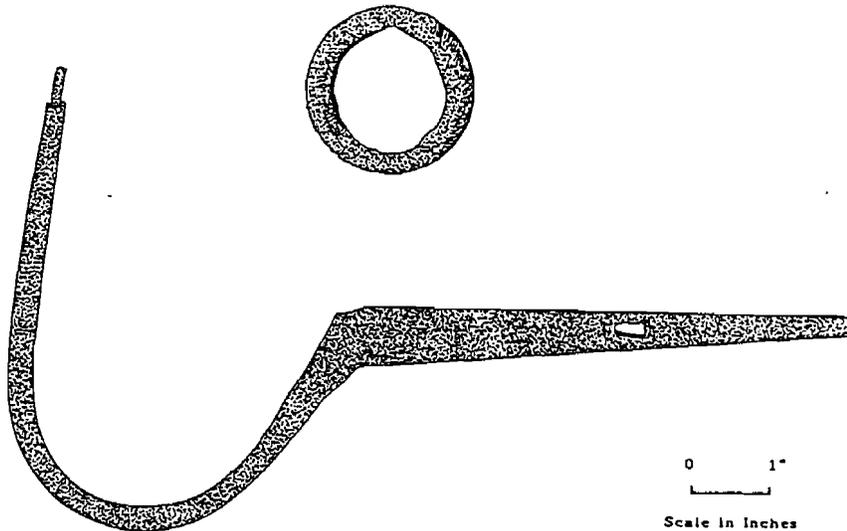
**FIGURE 139**

**Wire Mesh Crab Traps on the Docks at Bower's Beach, Delaware**



(Tyler 1955)

**FIGURE 140**  
**Iron Gaff Hook and Ring from Site 7A-C-378**



Site 7K-C-378 lacked discrete artifact concentrations or cultural features of potential historical significance. The scattered distribution of the artifacts indicated that this material had been randomly deposited over time, probably by drifting, accidental loss, or purposeful disposal. All of the artifacts encountered at Site 7K-C-378 were of 20th century vintage. As a consequence, no site evaluation investigation was recommended. The site did not merit being considered potentially eligible for nomination to the National Register of Historic Places.

The magnetometer survey also recorded the presence of five isolated anomaly targets having small dimensions and masses. The following table summarizes the remote sensing data for them. The estimates of mass are derived from the interpretive nomograph and nomogram illustrated in Figures 49 and 50. These estimates take into account approximate distances from the magnetometer sensor.

Target Number	Maximum Amplitude	Approximate Mass (pounds of iron)
3	97 gammas	60 pounds
4	229 gammas	100 pounds
5	80 gammas	55 pounds
6	41 gammas	35 pounds
8	31 gammas	30 pounds

Each of these five magnetic targets was interpreted to be an isolated cultural artifact containing iron. As isolated objects, they were most likely to have been deposited by accident or disposal into Leipsic River during

ephemeral episodes of cultural activity. While their age and identity could not be identified using only the remote sensing data, they were considered unlikely to be archeologically significant or potentially eligible for nomination to the National Register of Historic Places.

At the conclusion of the field work, the two archeological sites in the bridge crossing area had been sufficiently evaluated to assess their eligibility for nomination to the National Register. Site 7K-C-377 and Site 7K-C-378 were both found to be 20th century refuse deposits probably associated with several unrelated ephemeral episodes of artifact deposition. No diagnostic artifacts dating prior to 1900 were found. Evidence of trapping, fishing, and hunting activity indicated intermittent use of the project area for those activities. It was recommended that no further cultural resources investigation of the proposed bridge crossing project area be required prior to the proposed construction.