

## SMYRNA RIVER BRIDGE CROSSING AREA

This section describes the Smyrna River project area, northernmost of the three bridge crossings investigated. The information provided includes descriptions of the natural setting and the river's sub-bottom stratigraphy and bathymetry. That is followed by an overview of local history and a list of documented shipwrecks in Smyrna River. The findings of the remote sensing survey and site evaluation work are then provided. This includes a description of the two underwater archeological sites found to be located in the project area (Sites 7K-A-110 and 7K-A-111).

The Smyrna River bridge crossing is situated 0.7 mile northeast of the center of Smyrna, Delaware (Figure 61). It is located 0.2 mile upstream of the small community of Smyrna Landing, which was formerly the river's leading maritime port and center of industry. Smyrna Landing, however, no longer has either maritime commerce nor industry. Surviving vestiges of its former economic activities exist as archeological remains of abandoned docks, warehouses, and other commercial facilities.

### Natural Setting

The Smyrna River forms the eastern portion of the boundary between New Castle County on the north and Kent County on the south. It runs for a distance of approximately 15 miles from its headwaters about five miles west of the town of Smyrna to its confluence with Delaware Bay. The original historical name of this watercourse was "Duck Creek." However, that was officially changed to Smyrna River by the Delaware legislature in 1889. The traditional name of this watercourse is preserved in the name of the former mill pond north of Smyrna called "Duck Creek Pond."

In its natural state, Duck Creek (Smyrna River) flowed from its headwaters eastward to the western side of Bombay Hook Island. At that point, the watercourse turned south and meandered for thirteen miles generally parallel with the shoreline of Delaware Bay but separated from it by Bombay Hook Island.

That waterway segment (now called Duck Creek Gut) was the original course followed by old Duck Creek to its former confluence with Leipsic River (which was originally called "Little Duck Creek"). Near its southern terminus, Duck Creek merged with Little Duck Creek and flowed eastward an additional 1.5 miles before emptying into Delaware Bay. The north-south segment of lower Duck Creek was extremely convoluted and its many meanders made navigation very difficult.

The navigational situation regarding Duck Creek (Smyrna River) changed in 1682 when a canal was excavated by Ephraim Herman across the marshes at the northern end of Bombay Hook Island (American Canal Society 1992:5). That canal was called "The Thoroughfare" and was one of the earliest constructed in the American colonies. When opened, it became the Smyrna River's mouth and has

The Thoroughfare's position at the easternmost reach of the river's east-west alignment made its channel self-scouring and ensured its longevity. It shortened the distance from Smyrna River's head of navigation to the Delaware Bay from twenty-three miles to about ten miles.

The truncated lower segment of the natural alignment became known as "Old Duck Creek" and eventually "Duck Creek Gut." It is now largely filled with sediments. The opening of the Thoroughfare also resulted in the physical separation of Duck Creek (Smyrna River) from its former tributary, Little Duck Creek (Leipsic River).

The Delaware Route 1 Corridor project area included in the field investigation consisted of the bridge alignment along with a buffer zone 100 feet wide extending upstream and downstream from the bridge crossing (Figure 62). Including the buffer zones, the survey area amounted to a stretch of the river 450 feet in length. Smyrna River at this location is 175 feet wide and has sufficient water depth to be navigable by small watercraft at low tide.

The long axis of the river at the project area is oriented generally east-west with downstream being towards the east. Its edges are bordered by marsh grass wetlands except for a single location where a small promontory of fast land extends to the river bank. This upland terrain feature is on the southern side of Smyrna River between the bridge crossing's center line and its western boundary (Figure 62). It provides access between the adjacent upland terrain and the river.

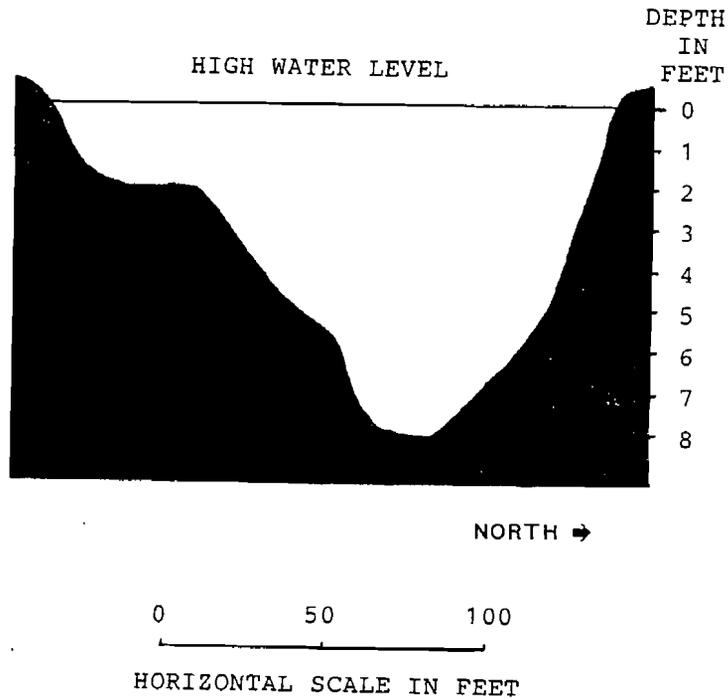
Figures 63 and 64 are aerial photographs of the bridge crossing area. The small fast land promontory is visible near the right edge of Figure 63 and near the left edge of Figure 64. It is a very distinctive terrain feature when compared to the wetlands that adjoin the remainder of the bridge crossing.

No evidence was found that the bottom terrain within the limits of the bridge crossing was ever dredged in the past. Its configuration is natural in form, and none of the recorded navigation channel improvements to Smyrna River extended upstream of Smyrna Landing as far as the project area.

The underwater topography at the bridge crossing includes a natural channel having a depth at high water of eight feet. Figure 65 is a stylized bathymetric cross section of the river along the highway project centerline. The vertical scale has been exaggerated to better illustrate the hydrographic relief. The cross section is oriented looking towards the west (upstream) with south towards the left. The bathymetric configuration provides useful information concerning the nature of the bottom sediments at this location. The irregular cross section shows that this part of Smyrna River has not been subject to heavy historic period siltation. If it had, the bottom relief of the river would have less variation and its relief would probably be almost flat.

FIGURE 65

Bathymetric Cross Section of Smyrna River Bridge Crossing



The submerged topography resembles that of a subaerial stream valley. Two physiographic features characteristic of such streams are evident. One is a level terrace on the southern side. The other is a steep slope towards the north, created by erosional down cutting resulting from a meander in the ancestral stream's channel. The meanders and erosional down cutting associated with the ancestral channel probably took place prior to the inundation that caused the river to become tidal.

The river's channel is its deepest part. It follows a meandering course along Smyrna River's submerged terrain approaching one bank and then curving back to approach the other. This meandering shows it to be a natural feature rather than made by dredging. The channel probably marks the alignment of the watercourse at the time it was initially affected by rising sea level around 4000 B.C. Following that inundation, Smyrna River became tidal.

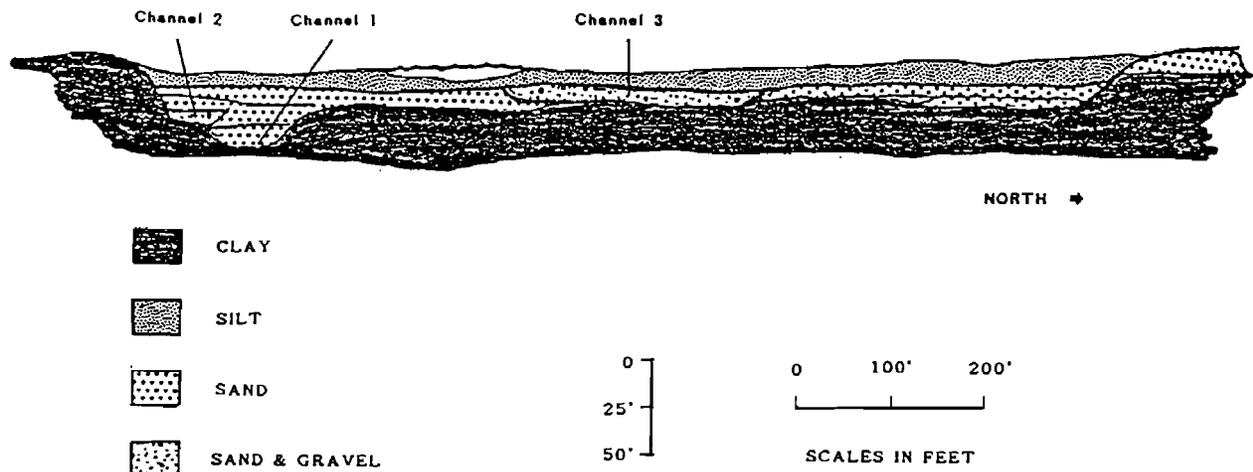
To either side of the channel, shallower underwater terrain slopes upwards to the banks of the waterway. At the bridge crossing, the deep channel approaches the northern bank and the slope towards the surface is steepest in that direction. South of the channel the slope is more gradual. At the two-foot contour, the bottom relief levels out and forms a submerged terrace that extends nearly to the southern bank of the stream.

It is certain that some amount of unconsolidated silty sediments have accumulated in the project area as a result of erosion. However, the thickness of this overburden over former subaerial sediments has not been sufficient to fill the ancestral stream's relict channel or conceal its natural relief. The scouring force of tidal currents passing along the natural channel has probably served to limit the deposition of silty mud in the deepest part of the channel.

The thickness of deposited silt accumulated in the shallower areas towards the waterway's margins is greater than in the channel. The energy level of the river's currents is lesser close to the shorelines than in the deeper mid-river channel.

The geotechnical borings performed during the design phase of the bridge crossing project provide important data concerning the river's subbottom sediments (Gannett Fleming Transportation Engineers, Inc. 1989a). A stratigraphic cross section of the river looking upstream (westward) is shown in Figure 66.

**FIGURE 66**  
**Stratigraphic Profile of Smyrna River Crossing**



The profile in Figure 66 is drawn with the river at low water (low tide). The stratigraphy as shown by the borings is illustrated as deposits of clay, silt, sand, and sandy gravel sediments. The clay represents the natural terrestrial subsoil at this location. Cut into it by the ancient river's erosional forces is a broad flood plain valley that contains a vertical succession of at least four stream channel meanders offset from each other horizontally. The fourth one is Smyrna River's current channel.

The oldest extant channel (Channel 1 in Figure 66) is the narrow sand filled deepest erosional cut seen at the left (southern) side of the illustration. Its narrowness indicates that it carried a low volume of water compared to the later ones. The presence of sand indicates that the ancient watercourse flowed freely and had a moderate energy level.

Two subsequent channel alignments are shown by the deposits of sand and gravel at higher elevations in the profile (Channels 2 and 3 in Figure 66). The presence of these coarser sediments indicates the river was still free flowing but may have had a greater energy level than earlier. The southernmost of these (Channel 2) is the older. It is narrow like its predecessor, which may indicate that the river carried a similar volume of water. The difference in sediments (sandy gravel versus sand) may indicate a greater seasonal variation in water flow than earlier.

Channel 3 is more recent than Channel 2. It also contains sand and gravel but is at higher elevation and is situated near the middle of the valley's cross section. Its substantially greater width probably shows that either the Smyrna River was carrying a greater water volume at that time than is indicated by the other channels, or that this channel remained fairly stable over time with its wider dimension indicating limited meandering. The similarity of its sediment type to Channel 2 indicates a water flow similar to its predecessor but perhaps with greater volume.

Superimposed on top of Channel 3's wide sandy gravel deposit is a thick stratum of silt. This silt layer began to be deposited when rising sea level inundated the ancestral Smyrna River, turning it into a tidal watercourse. Over time, the marshlands that developed spread across the ancestral river valley until they were contained by the elevated uplands on either side. These marshes served to trap and build up the deposit of silty sediments. The reduced energy levels of the tidal Smyrna River were no longer sufficient to carry away the fine silty sediments that settled as mud on the river bottom.

Buried in the stratigraphy of Smyrna River's ancestral valley are the geological and hydrological remnants of its evolutionary development. Those sedimentary strata appear to record the river's late pleistocene and early holocene configurations and its generalized ancestral characteristics. The cross section profile presented in Figure 66 shows that dramatic changes followed the river's inundation around 4000 B.C. and have caused the ancient river valley to

become largely filled with silty mud.

### **Local History**

The recorded history of Smyrna River goes back more than three hundred years. It has long been an important avenue of communication and commerce. The following discussion is an overview of the bridge crossing's local history. Its emphasis is on past cultural activity that may be associated with submerged archeological resources.

The earliest recorded European colonial activity in the vicinity was the purchase of land from the American Indians who ostensibly controlled the area. Around 1680, Peter Bayard (or "Byard") paid Mechackit, the chief sachem of Cohensink who resided in New Jersey, for the rights to Delaware's Bombay Hook and surrounding territory (Caley 1968).

Such a direct purchase, however, did not conform to the colonial land patent system in force at the time. The English had seized control of the lands of Delaware from the Dutch in 1667. That resulted in the recognized legal ownership of the territory being vested with England's Duke of York.

Between 1674 and 1680 William Shumer was granted 1,000 acres of land on Duck Creek in the vicinity of the present day town of Smyrna. Shumer's title to the 1,000 acres passed to William Green in 1680. Green named his tract of land "Gravesend". A stream on his land was given the name "Green's Branch" and still retains that name. It was a small tributary flowing into Duck Creek (Smyrna River) at the upper limit of navigation near the subsequent site of Duck Creek Village.

Originally, the distance from Delaware Bay to the upper limit of navigation along Duck Creek (Smyrna River) amounted to twenty-three miles of meandering waterway. As described above, that situation was profoundly altered in 1682 with the excavation of a canal called "the Thoroughfare" across the marshes at the northern end of Bombay Hook Island. With the opening of the Thoroughfare the distance from the site of Duck Creek Village to Delaware Bay became only ten miles.

Waterborne travel was perhaps the most efficient and economically significant form of transportation in the Delaware Bay region during the 17th century. The opening of the Thoroughfare improved communications to and from the Smyrna River area and was an important stimulus to subsequent settlement and trade.

In 1682, when William Penn gained possession of the territory that became Pennsylvania he also obtained control of the Duke of York's lands in Delaware. The colonial governmental organization of the "lower three counties of Pennsylvania" resulted in the delineation of administrative districts called "hundreds" within the counties. The one in the vicinity of the project area was named "Duck Creek Hundred". It was originally part of the "County of St. Jones"

which was later renamed "Kent County".

Half of William Green's 1,000 acres along Duck Creek was purchased in 1687 by Frances Barney. It included the land at the fork of Smyrna River and Green's Branch. This tract was subsequently acquired by Benjamin Shumer in 1716.

The earliest recorded settlement activity along Smyrna River dates to the first decade of the 18th century. According to local history, the first inhabitants of the community were members of the Society of Friends (Quakers). In January 1705, a party of Quakers held a meeting at the subsequent site of Duck Creek Village. They resolved to erect a floored meeting house and establish a cemetery.

After his purchase of the land in 1716, Benjamin Shumer laid out the lots and roadways of a town site between Smyrna River and Green's Branch. This location was then at the tidal headwaters of Smyrna River and had navigable access to Delaware Bay. Shumer gave the name "Salisbury" to the new community and it was officially known as that for the next century. However, the settlement that developed there was commonly known as "Duck Creek Village" after the name of the waterway that served as its primary route of waterborne communication and commerce.

Duck Creek (Smyrna River) in the early 18th century was tidal up to the village site and provided maritime access from there to Delaware Bay. Since overland transportation in the surrounding territory was slow and limited by a lack of good roads, access to a navigable waterway was extremely important for communication and trade with the outside world.

Immigrants from Scotland moved into the vicinity around 1720 and several Welsh families settled there around 1733. By the middle 1700's the settlement included a combination saw, grist and bolting mill, a tannery, a tavern, a blacksmith shop, a Quaker Meeting House, an Anglican church, two cemeteries, other small business, and numerous residences and outbuildings.

The village of Duck Creek grew in population and importance through the 18th century serving as the main commercial and milling center for the surrounding farms and settlements. An important early development was the construction of an earthen dam across the creek at the western edge of the village to provide water power for milling. The dam's construction, however, had unintended environmental consequences. It reduced the creek's water flow and accelerated the accumulation of alluvial sediments downstream. As occurred in many of Delaware's other tidal waterways, land clearing and agricultural cultivation during the early historic period increased soil erosion, leading to substantial siltation in the river.

The degradation of Smyrna River's navigability up to Duck Creek Village motivated local grain merchants and shippers to develop alternative waterfront landing points further downstream. What was to become the most important landing in the vicinity was established prior to 1755 at a location on the southern side

of Duck Creek (Smyrna River) about 1.5 miles below Duck Creek Village between Green's Branch and Pearman's Branch (Mill Creek).

The tract on which the new landing was situated was owned during the first half of the 18th century by Thomas Green, a descendant of the 17th century landholder William Green. It came to be called "Green's Landing," but it was also known as "The Landing" and "Duck Creek Landing." Early in the 19th century, this important transshipment point was renamed "Smyrna Landing".

Even though Duck Creek Village and its successor, the town of Smyrna, were inland communities, they enjoyed waterborne access to one of the Middle Atlantic region's most important navigable waterways, the Delaware Bay and River. Duck Creek (Smyrna River) provided a natural route from those communities to Delaware Bay. The facility with which maritime traffic carried goods and passengers between Smyrna Landing and the Delaware Bay ensured competitive access to markets for exported products as well as a means of importing needed goods.

Maritime activity along Smyrna River during the 1700's was heavily oriented towards the export of local agricultural produce. The transportation of passengers and the importation of manufactured products were important aspects of waterborne commerce, also. Regularly scheduled packets sailed from Green's (Duck Creek) Landing up and down Delaware Bay. A substantial number of smaller schooners and sloops also called at that port to load and unload cargoes. Among the prominent grain traders who operated vessels sailing out of Smyrna River during the period prior to the American Revolution was David Kennedy of Duck Creek Crossroads (later, Smyrna).

The local maritime activity boosted development of another early Smyrna River industry, ship building. Ample stands of timber in the surrounding territory provided lumber for constructing the intracoastal vessels that became the mainstay of Delaware Bay shipping. Ship building and repairing probably began as a local industry shortly after Duck Creek Village was founded. It had become well established by the closing years of the 18th century.

During the American Revolution at least one local seafarer, Ebenezer Cloak of Duck Creek, fitted out a privateer to raid British shipping. Unfortunately, Cloak's career was ended prematurely when his vessel was captured and he was consigned to a British prison hulk in New York Harbor where he died.

Around the time of the American Revolution, a lighthouse was erected on the south side of the Thoroughfare at the confluence of Smyrna River with Delaware Bay. It was originally called the Bombay Hook Lighthouse, but later its name was changed to the Smyrna River Lighthouse. Its purpose was to guide ships into the channel at the mouth of Smyrna River. The original wooden structure was replaced by a brick edifice about 1840. The brick lighthouse was a residence two stories tall with an octagonal frame tower on its roof for mounting the light. That building was finally abandoned in the 1930's and demolished around 1970.

Major efforts to improve the local area's rudimentary road network were

undertaken during the first half of the 18th century. The importance of establishing overland communication with Chesapeake Bay to the west led to the opening in the 1760's of the "Maryland Road." This early wagon road ran from Green's Landing (Smyrna Landing) to the navigable headwaters of the Chester River near Millington, Maryland. The Maryland Road (now Route 6) ran east-west and passed about one mile south of Duck Creek Village.

The need for north-south overland communications in the lower three counties of Pennsylvania (Delaware) led to the establishment in 1761 of "The King's Road". This important early highway connected several existing roadways into a route that ran from New Castle in the north to Lewes at the mouth of Delaware Bay. The King's Road passed through Duck Creek Village and crossed the Maryland Road at a point 0.9 mile southeast of that settlement.

The crossroads of the King's Road with the Maryland Road near Duck Creek Village became one of the most important intersections of 18th century Delaware. It came to be referred to, and is still known as, the "Four Corners." Its establishment resulted in the founding in 1768 of a satellite community of Duck Creek Village called "Duck Creek Crossroads". By the late 18th century, the crossroads settlement surpassed Duck Creek Village in population and economic importance.

Early in the 19th century, a popular local movement sought to boost the commerce of Duck Creek Crossroads and enhance its image by renaming it. The importance of the grain industry to the entrepreneurial settlement led to the adoption of the name "Smyrna" after the prominent Turkish grain port of that name. The new name was formally given to the crossroads town in 1806 by the Delaware legislature. At the same time its satellite river port was renamed "Smyrna Landing".

The first half of the 19th century was characterized by substantial prosperity for the economy of Smyrna and Smyrna Landing. Along with other local businesses, the port's ship building and repairing industry flourished. The most prominent ship builder during that period was John Mustard. Among the local ship owners operating vessels sailing from Smyrna Landing were Robert Patterson, John Cummins, and John Darragh.

Political events during the early 19th century resulted in restraints on economic activity in the surrounding region. The U.S. Government's 1807 Embargo Act against England and France served to cut off commerce with those countries. Since Smyrna's trade was predominantly oriented to the Delaware Bay region, however, the negative effects were minimal. With the outbreak of the War of 1812, the threat of British maritime-based aggression became a concern. The British raided farms on Bombay Hook Island and along the lower reaches of Smyrna River. These attacks led to the organization of a volunteer defense force to guard threatened locations.

After the War of 1812 ended, Smyrna entered an extended period of growth

and economic prosperity. Between 1815 and 1833 the town was the home of the most prominent grain dealer in Delaware, John Cummins (Caley 1978). Cummins's commercial dealings made Smyrna Landing the second most important grain port in Delaware after Wilmington.

During that period, improvements to Smyrna River's navigation were funded by local mercantile and shipping interests. That work included dredging shoals in the river between Smyrna Landing and Delaware Bay. Dredging was also conducted in the Thoroughfare channel at the river's mouth.

A fixed bridge was built in 1833 across Smyrna River at the upstream end of Smyrna Landing, 0.2 mile east of the bridge crossing project area. It carried Thoroughfare Neck Road (now Kent County Road 76) across Smyrna River. A bridge has been maintained at that location ever since. According to a report made in 1886, clearance under the bridge at high water was forty feet wide by four feet high (U.S. Army Corps of Engineers 1887). The present day structure is a one-lane steel truss bridge with only two feet of clearance at high tide.

Prior to the bridge's construction in 1833 the river upstream of Smyrna Landing was accessible to a variety of waterborne traffic. After the bridge was built, only vessels with less than four feet of clearance could move past it upstream along the river.

The decade of the 1850's was economically prosperous for Smyrna. Its role as a center of grain trading boosted commercial activity. An 1850 map showing the project area vicinity is provided in Figure 67.

Smyrna and Smyrna Landing were key locations in an agricultural trading network that included portions of Delaware's Kent and New Castle Counties as well as parts of Kent, Queen Anne, and Caroline Counties in Maryland. The town's merchants purchased grain from the area's farmers and milled it into flour or stored it in granaries awaiting shipment. As many as seven granaries were in simultaneous operation in the Smyrna area by the mid-19th century.

Smyrna's economic activity stimulated maritime traffic along Smyrna River. Steamboat service from Smyrna Landing was initiated by the vessel Oscar Thompson which began regular service between there and Philadelphia in 1837.

During the middle 19th century, packets, schooners, sloops and steamboats called at Smyrna Landing to take aboard cargoes of grain, peaches, lumber, ship timbers, and bark. The number of vessels departing with export cargoes was as many as seven per day in the peak season. Smyrna Landing's substantial orientation to maritime trades was shown by the presence there of two active shipyards by the middle 1800's.

Development of the Smyrna area's agricultural industry led to the widespread establishment of peach orchards in the 1840's. Peaches became one of the area's major products until the early 1890's when a blight began to cause serious damage to that valuable fruit crop.

Until the middle 1800's the primary transportation corridor for commerce in the vicinity was Smyrna River. In 1856, however, the north-south Delaware Railroad opened a station along its main rail line one mile west of Smyrna. Initially called "Smyrna Station," its name was changed to "Clayton" in 1868 by the Delaware legislature. The location of Smyrna Station (Clayton) is shown in Figure 68. In 1861, a railroad spur was extended from there to the town of Smyrna itself.

The opening of the railroad linking Smyrna with Wilmington and Philadelphia created serious competition to local shipping interests (Figure 69). It diverted a substantial portion of freight traffic away from waterborne transportation and threatened the profitability of maritime transport along Smyrna River.

The railroad dramatically reduced the previously essential position that Smyrna Landing had enjoyed in the local economy. The settlement "fell into decay" after the granaries shut down, and its population dropped to about thirty people (U.S. House of Representatives 1908:5). Rothwell's Landing two miles further downstream became the terminus of steamboat traffic and the scene of most local shipping activity (see Figure 68).

Even so, from 1866 to 1874 the R. F. Hastings Shipyard at Smyrna Landing launched nineteen vessels. The largest was the H. H. Howe, built in 1871. It was 120 feet long by 32.5 feet wide and was registered at 600 tons.

The 1868 atlas of Delaware (Beers 1868) contains detailed maps of Smyrna, Smyrna Landing, and the surrounding vicinity. It illustrates Smyrna's access to overland, railroad, and maritime transportation routes (Figure 70).

The 1868 map of Smyrna Landing shows its state of development and indicates a high level of maritime activity (Figure 71). At that time there were several commercial facilities along the river. It was a thriving settlement containing seven river front warehouses, the Hastings Shipyard, a lime kiln, and a vineyard and nursery. Just across the river to the north in New Castle County was Allen's Brickyard.

During the last quarter of the 19th century, the Smyrna area experienced substantial agricultural and industrial growth and prosperity. The local economy flourished as a result of the abundant agricultural production, predominantly of grain and peaches. By the 1870's, production of phosphate fertilizer had become another important local industry. It developed into one of Smyrna's four major exports along with grain, lumber, and ship timber (U.S. Army Corps of Engineers 1879:474). Major imports during that period were coal, general merchandise, and phosphate raw materials.

The J. E. Tygert and Company's Star Bone Phosphate Works was established at Smyrna Landing in 1873 (McCarter and Jackson 1882:183-184). That operation was highly successful and eventually included 16,000 square feet of plant facilities occupying 400 feet of frontage along the river. Initially, the fertilizer produced at the works was shipped to Philadelphia in sailing vessels. However, in 1875 the company purchased the steam barge W. C. Pierrepont and modified it to transport passengers as well as freight. It made three runs each week between Smyrna Landing and Philadelphia.

Demand for passenger and freight space was so great that Tygert and Company had a new 288 ton double-decked iron steamer built in 1879. It was named the John E. Tygert. The new ship embarked on its first trip on July 4, 1879. A print published in 1882 shows both vessels alongside the wharf at the Star Bone Phosphate Works (Figure 72).

Another Smyrna Landing plant was the Diamond Crown Phosphate Works, established by A. Lee Cummins in 1878 (McCarter and Jackson 1882:194-195). That company also opened a larger production facility the following year at Clayton.

FIGURE 72  
View of Smyrna Landing Circa 1880



(McCarter and Jackson 1882)

In 1878, a survey was conducted of Smyrna River to identify locations requiring dredging to facilitate navigation (U.S. Army Corps of Engineers 1879). At that time there was one steamboat (the W. C. Pierrepont) providing regular service between Smyrna Landing and Philadelphia. Approximately seven freight schooners ranging from 80 to 120 tons also operated regularly from Smyrna Landing. It was reported that vessels drawing seven feet could navigate at high water between there and Delaware Bay.

In 1880, the Corps of Engineers undertook a channel-deepening dredging project in the Thoroughfare at the Smyrna River-Delaware Bay confluence. That same year, it was reported that one steamboat and seven schooners of from 80 to 100 tons each were engaged in regular trade along Smyrna River (U.S. House of Representatives 1908:6). The main export products then were grain, peaches, lumber, ship timber, and phosphate. The major imports were coal, general merchandise, and phosphate raw material. Industrial installations along Smyrna River at that time included two phosphate factories, two canneries, and a tannery.

In 1886, it was reported that the head of steamboat navigation along Smyrna River was Rothwell's Landing (U.S. Corps of Engineers 1887:848). Vessels that called there included a 200-ton iron screw steamer, five 30-ton schooners, and several 100 to 200 ton barges. Their cargoes, both imports and exports, included

fruit, grain, vegetables, timber, fertilizers, coal, iron, agricultural implements, tiles, bricks, lumber, livestock, and general merchandise.

A series of navigation improvement projects funded by the U.S. Government were undertaken in Smyrna River beginning in 1888. By 1899, the entire waterway from its mouth to Smyrna Landing had a navigable depth of five feet at low water. The work accomplished included the excavation of straight cut-offs at several meander bends, and dredging shallow shoals in the river. This had the effect of straightening the channel, which shortened the distance from Smyrna Landing to the Bay and facilitated navigation. The benefits of this work included a substantial increase in the tonnage and value of goods shipped by water to and from Smyrna River. Steamboats were again able to ascend the river to Smyrna Landing as well as other points between there and the Bay (Figure 73).

At the beginning of the 20th century, the three major settlements in the vicinity remained Smyrna, Smyrna Landing, and the railroad station community of Clayton. The expansion of development had not extended, however, to the project area's locale (Figure 74).

A map showing navigation channel improvements near Smyrna Landing that were proposed in 1904 is provided in Figure 75. In 1907, additional dredging was conducted (Figure 76).

By 1908, Smyrna Landing's population had increased to approximately 250 people (U.S. House of Representatives 1908). Vessels utilizing Smyrna River included two steamboats and two gasoline engine-powered boats with an aggregate tonnage of 584 tons, five tugs with floats and barges, and several fishing boats of 100 tons and over. Freight rates for waterborne transportation varied from the same to one-half those charged by the railroad.

A 1911 map of rural mail delivery routes in the vicinity shows the continued concentration of settlement at Smyrna Landing (Figure 77). No settlement occupation, however, is shown for the nearby location of the Delaware Route 1 Corridor bridge crossing project area.

The ultimate demise of maritime commerce along Smyrna River occurred during the early decades of the 20th century. It coincided with the collapse of the peach industry and the introduction of motor vehicles for land transportation. Towards the end of the 19th century, repeated peach crop failures due to blight damaged the area's agricultural economy.

The rapid development of motor vehicle transportation during the first decades of the 20th century diminished the ability of waterborne transportation to compete with trucks and railroads. An event of major importance for overland commercial transportation was the extension to Smyrna in 1923 of the DuPont Highway. The opening of that north-south arterial thoroughfare made possible rapid and efficient motor vehicle transportation to and from the markets of Wilmington and Philadelphia.

The Great Depression of the 1930's further accelerated the decline in maritime traffic at Smyrna Landing. The only substantial business there that managed to survive the Depression was Price's Fertilizer Factory. However, it eventually closed as well. One effect of World War II was an economic stimulus that led to increases in local production and boosted the local economy. However, by the early 1950's Smyrna Landing's waterborne commerce had virtually ceased. From then until the present, business and trade in the Smyrna vicinity

have been served by highway and railroad transportation exclusively.

During the approximately three centuries of maritime activity along Smyrna River, several vessels were lost as a consequence of accidents or abandonment. However, there is a scarcity of information on shipping losses prior to the 1880's. Documentation concerning shipwrecks that occurred after that time is more readily available.

Three vessels of potential archeological or historical interest are documented as having been lost in Smyrna River. In 1881, the schooner Mary A. Rhoades sank near Eagle Nest Landing downstream of Smyrna Landing. The wreck was

subsequently removed from the shipping channel and the debris placed in a marsh. An unidentified schooner or scow sank in 1897 on the east side of the channel 0.23 mile downstream of Rothwell's Landing. Its hulk was removed in 1898 and placed on a nearby mud flat that was bare at low tide. The canal boat Zeus sank in the channel of Smyrna River in 1900 and was removed in 1901 at the direction of the Corps of Engineers.

### **Field Work Findings**

The underwater archeological field investigation of the Smyrna River bridge crossing consisted of two phases. The Phase I reconnaissance survey compiled remote sensing magnetometer data concerning the distribution of ferrous cultural materials. It also recorded bathymetric data on submerged topography. The Phase II site evaluation field work accomplished direct examinations of two underwater archeological sites that the remote sensing survey indicated had a potential for being historically significant. The results of the Phase II evaluation showed that neither of the two sites was eligible for nomination to the National Register of Historic Places. No further investigation of the bridge crossing prior to the project's construction was recommended.

Two underwater archeological sites were recorded in the bridge crossing area. They were designated Duck Creek/Smyrna River Magnetic Anomaly Cluster Site "A" (7K-A-110, K-6424) and Duck Creek/Smyrna River Magnetic Anomaly Cluster Site "B" (Site 7K-A-111, K-6425). Cultural resource site forms for these two sites were completed and filed with the Delaware Bureau of Archaeology and Historic Preservation. Copies of the forms are provided in Appendix I.

The magnetometer survey recorded the presence of three anomaly clusters and five isolated targets (see Figure 78). Two of the anomaly clusters were nearby one another and were interpreted as representing a single archeological cultural deposit (Site 7K-A-110). The third anomaly cluster was located some distance away and was interpreted as representing a separate archeological site (Site 7K-A-111).

A Phase II investigation was conducted to evaluate the eligibility of Sites 7K-A-110 and 7K-A-111 for nomination to the National Register. That work was performed to identify the sites' content and assess their historical significance. The potentially significant anomaly targets at those sites were relocated and excavations conducted to identify and recover them.

Site evaluation work was initiated during the month of February 1989. At that time Smyrna River was frozen over and the "Ice Walk" field technique was implemented. After the targets were pin-pointed a pick was used to make a hole in the ice and shovel excavations were conducted if the target was buried.

Eventually, inclement weather caused a delay in the field work until better conditions prevailed. When the field investigations were subsequently continued they employed the Direct Approach and Scuba Diving techniques.

Duck Creek/Smyrna River Magnetic Anomaly Cluster Site "A" (7K-A-110, K-6424) was the largest cultural deposit in the area investigated. It included two magnetic anomaly clusters (Targets # 6 and # 7) located in the western part of the bridge crossing. They were situated in close proximity to one another, appeared to be associated, and were interpreted as representing the presence of an underwater archeological site.

The site extended over submerged terrain 120 feet north-south by 150 feet east-west. It was directly in front of the only place in the bridge crossing area where fast land reaches the southern bank of Smyrna River. The water depth at high tide at that location varies from two feet near the southern shore of the river to eight feet in the waterway's natural channel.

Target # 6 of Site 7K-A-110 extended northward from the foot of the fast land terrain feature. It contained seven individual anomalies that ranged in maximum recorded amplitude from 43 to 430 gammas with an average of 159 gammas. These anomalies indicated the presence of numerous individual iron objects ranging in mass from approximately 1 to about 100 pounds as interpreted from the anomaly nomograph and nomogram (Figures 49, 50). They were distributed in a pattern that was approximately oval in shape measuring about 80 feet by 60 feet.

Target # 7 was found in the deepest part of the natural channel 30 feet downstream of the offshore end of Target # 6. It consisted of two magnetic anomalies measuring 53 and 1,404 gammas. These anomalies indicated the presence of iron objects having masses equal to approximately 50 and 250 pounds of iron according to the nomogram and nomograph. The dimensions of Target # 7 were about 45 feet by 20 feet and its long axis was oriented east-west, parallel with the natural channel of Smyrna River. Its position indicated that it might be associated with Target # 6 and it was interpreted as being part of the same site.

The anomaly clusters at Site 7K-A-110 had sufficient dimensional area and magnitude to potentially represent the remains of a former dock or a sunken vessel. The presence of either type of site could reasonably be expected given the project area's environmental setting adjacent to a fast land terrain feature in a waterway where recorded navigation began in the late 17th century. The vicinity of Site 7K-A-110 appeared to be a possible landing place having the potential to be historically significant.

During the Phase II investigation, Site 7K-A-110 was found to consist of an extensive scatter of miscellaneous artifacts that had been mostly deposited as refuse. A minority component of the site included artifacts that were probably lost during fishing, trapping, and hunting activity in the river. The variety and distribution of material indicated several individual ephemeral episodes of deposit. No articulated structural remains indicating the presence of a dock or sunken vessel were found and no significant artifact concentrations were encountered. Nearly all of the artifacts recovered date to the 20th century. The earliest materials were of late 19th century vintage and were few in number. The following is a summary of the artifacts encountered during the site evaluation work. This material is classified by general functional category. A complete listing of the cultural material recovered from Site 7K-A-110 is provided in Appendix II.

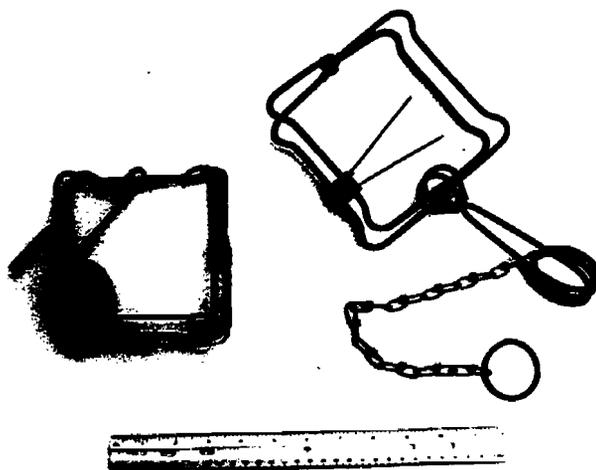
Objects that were of a personal nature included a small stamped brass brooch of the image of a deer, with attachment pin (circa early 20th century).

In addition, there were a miniature toy "Datsun" car, the handle bar of a bicycle, a cork screw fragment, and a D-size battery.

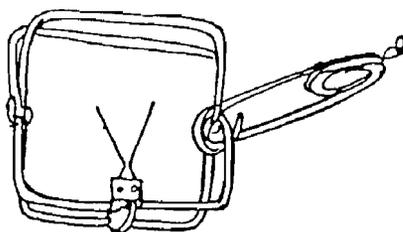
There were several artifacts associated with fishing, trapping, and hunting. These consisted of three small mammal traps, a wire mesh crab trap fragment, seven lead fishing weights, three brass shot gun shell casings, and one carbon dioxide cartridge for a compressed gas gun.

Figure 79 illustrates two of the mammal traps. They are of the "Conibear" type dating to the 20th century (Bateman 1971). These examples were probably used for trapping muskrat.

FIGURE 79  
Conibear Traps from Site 7A-K-110



SCALE = 12 INCHES



(Bateman 1971)

The Conibear trap is a body-gripping steel spring trap in which two rectangular scissor-hinged wire loops serve as the jaws which are activated by a coil spring. When set, the two jaws are held by a catch engaged at the base of the forked trigger. When the baited trigger is disturbed the jaws swing around and snap together around the neck or body of the game. The Conibear trap was one of the two types of small mammal trap encountered during this

investigation. The other was the steel jaw leghold trap (see Figure 94).

The most numerous artifacts encountered were associated with tools, building materials, fasteners, and motor vehicle parts. The tools found included a shovel, file, nail remover, hack saw fragment, screwdriver, and a broken pliers.

The building material artifacts consisted of a brass pipe fitting, a section of steel pipe, a wood fragment with an embedded wire nail, a long wood fragment with several wire nails, a long piece of lumber, one steel sign post, a fragment of rusted sheet metal, one section of aluminum pipe two feet long, and two sections of aluminum railing. The automobile parts found were two steel belted radial tires, one steel spring, and a steel valve guide. Artifacts that were classified as fasteners included one bolt with nut, one hexagonal nut, eleven wire nails, three spikes, two fragments of steel wire, and sixteen barbed wire fragments.

Several container type artifacts were recovered. These consisted of the following: an aluminum oil can top, one aluminum trash can lid, two bottle glass fragments with crown and screw tops, two bottle caps, eleven aluminum cans and can fragments, and five metal cans and can fragments.

The other site investigated was Duck Creek/Smyrna River Magnetic Anomaly Cluster Site "B" (7K-A-111, K-6425). It was found in the easternmost part of the project area in the river's natural channel where the water was eight feet deep at high tide. Site 7K-A-111 was interpreted to represent a cultural deposit of potential archeological significance. Site 7K-A-111 was situated 190 feet downstream of Site 7K-A-110.

The anomaly cluster at this site was initially designated as Target # 8. It contained two magnetic anomalies having maximum recorded amplitudes of 49 and 95 gammas. Using the nomograph and nomogram the total mass of iron contained in this anomaly cluster was estimated to be about 100 pounds. It was interpreted to be one or more iron artifacts, possibly an anchor with chain. The anomalies at this site were detected over an area measuring about 15 by 30 feet.

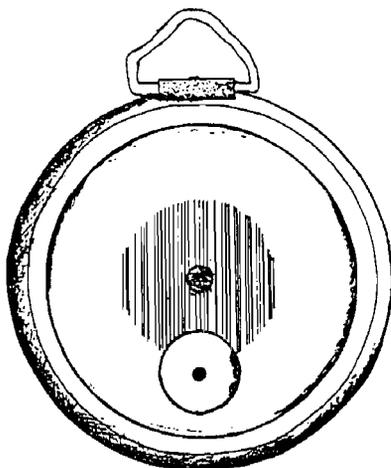
During the Phase II study, Site 7K-A-111 was found to contain a scatter of miscellaneous artifacts that appeared to have been largely deposited as refuse or accidentally lost. The variety and distribution of material indicated several individual ephemeral episodes of cultural activity. No significant concentrated deposit of cultural materials was found.

Nearly all of the artifacts encountered at Site 7K-A-111 dated to the 20th century. The earliest materials were of late 19th century vintage but they were few in number. The following is a summary of the artifacts recovered during the site evaluation work, classified by general functional category. A complete listing of the recovered material is provided in Appendix II.

Objects that were of a personal nature included a brass pocket watch bearing the following maker's mark inscription: "E. Ingraham Co., Bristol, Conn.

USA" (Figure 80). The E. Ingraham Company was founded by Elias Ingraham in 1835 and remained in operation in Bristol, Connecticut until 1964 when it relocated to North Carolina. This watch is of a commonplace mass-produced design, circa 1890-1940.

**FIGURE 80**  
**Brass Pocket Watch from Site 7A-K-111**  
**Front View (Watch face is missing)**



0                      1"  
└──────────────────┘  
Scale in Inches

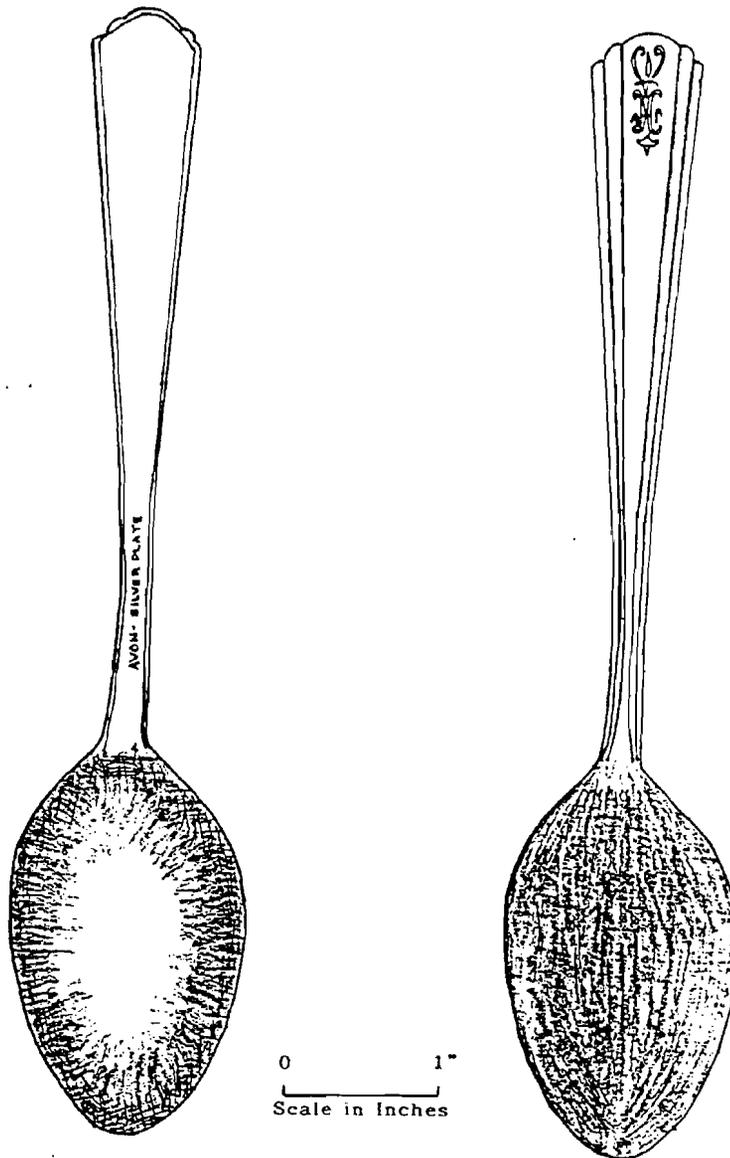
Other 20th century material of a personal nature consisted of a plastic toy jeep and a silver-plated spoon with an ornamental design on the handle. The spoon had the maker's mark "Avon - Silver Plate" (Figure 81).

There were also several artifacts associated with fishing and hunting. These consisted of three lead fishing weights, and one brass shotgun shell casing basal fragment.

The most numerous artifacts encountered were associated with tools, building materials, fasteners, and motor vehicle parts. The tools found included one flashlight, an iron tool handle, and one conical iron tool fragment.

Building material artifacts consisted of a brass door lock plate, two wire fragments with plastic insulation, two fragments of sheet metal, two wooden beams, two wood fragments with nails and screws, three brick fragments, two slag fragments, and two small corroded steel fittings with a hole through the middle.

**FIGURE 81**  
**Silver Plated Spoon from Site 7A-K-111**



The automobile parts found at the site were two tires, and a brass and rubber gas tank float. Artifacts that were classified as fasteners included one steel spike, one iron pin, and eight metal strapping fragments.

There were also several container type artifacts. They were the following: sixteen aluminum beverage cans and can fragments, one glass cup, one metal paint bucket, one small aluminum tube of paint, one sardine can, one brown glass bottle fragment, and two clear glass jars.

The other remote sensing targets in the bridge crossing area consisted of five isolated magnetic anomalies. They were assigned numerical designations from 1 to 5. Their locations are illustrated in Figure 78.

The following table summarizes the remote sensing data compiled for these five isolated magnetic targets. The estimates of mass are derived from the interpretive nomograph and nomogram (Figures 49, 50) and take into account approximate distances from the magnetometer sensor to the anomaly source.

Target Number	Maximum Amplitude	Approximate Mass (pounds of iron)
1	152 gammas	70 pounds
2	158 gammas	75 pounds
3	9 gammas	5 pounds
4	27 gammas	35 pounds
5	63 gammas	40 pounds

Each of these five anomalies was associated with a single artifact or a small artifact concentration containing iron. Their amplitude and dimensions indicated that they were small isolated objects not associated with larger cultural deposits. None was situated in close proximity to other anomalies.

As isolated anomalies they were interpreted as probably representing artifacts deposited through accidental loss or disposal during ephemeral episodes of cultural activity. While their age and identity could not be determined using only the remote sensing data, they were interpreted as being unlikely to have sufficient significance to be considered eligible for nomination to the National Register of Historic Places.

At the conclusion of the Phase II 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-A-110 and Site 7K-A-111 were both found to be predominantly 20th century refuse deposits probably associated with several ephemeral episodes of artifact deposition. Artifacts dating prior to 1900 were few in number, widely scattered, and not of historical significance. In addition, 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 be required prior to the proposed construction.