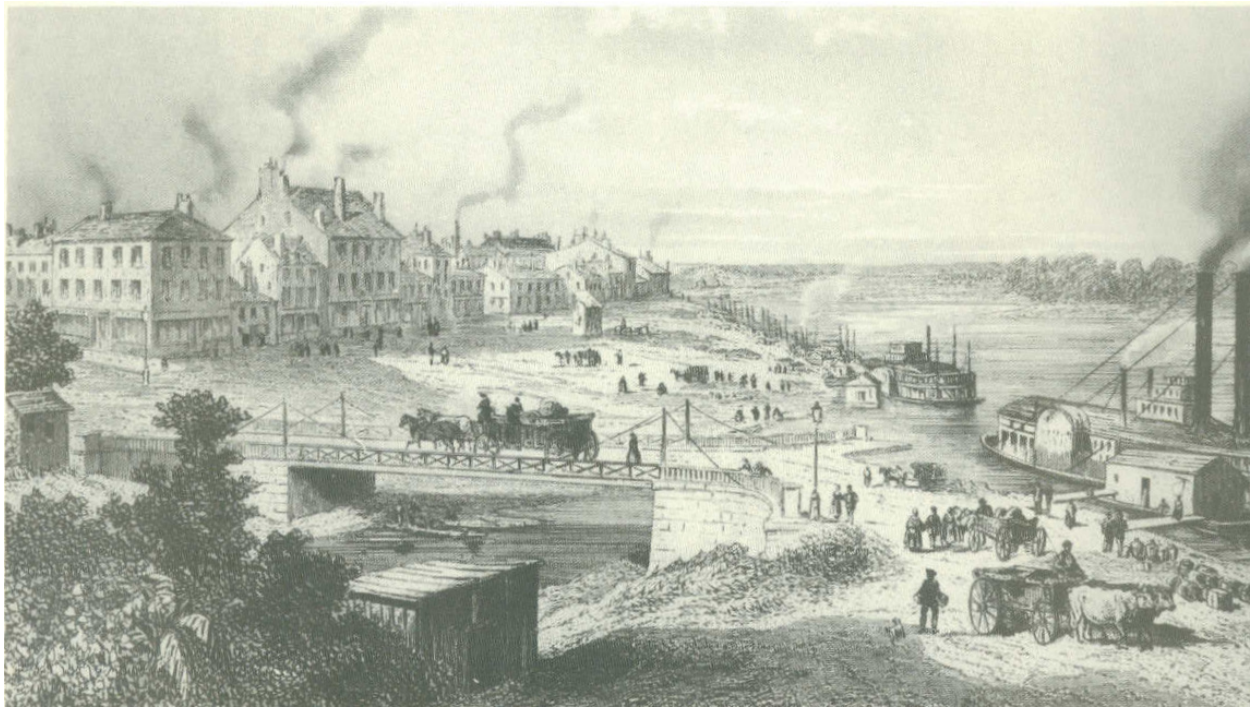
ARCHAEOLOGICAL INTERPRETATION OF RESULTS OF SIDE-SCANNING SONAR SURVEY OF SECTIONS 2 AND 5 OF THE OHIO RIVER BRIDGES PROJECT IN JEFFERSON COUNTY, KENTUCKY

(STATE ITEM NUMBER 5-118.00)

(UK-PAR PROJECT No. 06-15)



University of Kentucky
Program for Archaeological Research
Department of Anthropology

Technical Report No. 573

30 April 2007

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Technical Report No. 573

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30 April 2007

ABSTRACT

At the request of the Kentucky Transportation Cabinet (KYTC), the University of Kentucky Program for Archaeological Research (UK-PAR) conducted a side-scanning sonar survey along two proposed bridge crossings of the Ohio River, Sections 2 and 5 of the Louisville-Southern Indiana Ohio River Bridges Project, in Jefferson County, Kentucky. The sonar survey was intended to provide specific information concerning the nature and distribution of potential cultural resources that are currently under water but within the proposed bridge alignments. UK-PAR subcontracted with Mainstream Commercial Divers, Inc., of Murray, Kentucky (MCDI) to produce high-resolution images from side-scan sonar survey data along the bridge crossings. No deep testing was conducted, and no surface or subsurface survey work was performed.

The images show three anomalies, two in the Section 2 (Downtown) crossing (Anomaly 2A and Anomaly 2B) and one in the Section 5 (East End) crossing (Anomaly 5A). Anomaly 5A is rectilinear in outline with two distinct levels; it also may have two evenly spaced and similarly-sized holes. These attributes suggest it is cultural in origin, but it also may be a convoluted area of bedrock shelving and larger rocks that project from the river bottom. If it is cultural, its position close to the shore and its depth suggest it is related to river transportation activities. It may be part of a wharf, dock, or other mooring facility, especially one related to industrial activities conducted at Utica, Indiana. Anomaly 2A is linear feature near the Indiana shoreline that runs nearly parallel to the shore for a distance of at least 150 meters. This anomaly is most likely a remnant of a mill race, or possibly a retaining wall or floodwall. Anomaly 2B is a rectangular object measuring about 46 feet long and 20 feet wide. Given its dimensions and position, this object may be the remnants of a flatboat, work flat, or coal barge.

These anomalies have not been reported as sites to the Kentucky Office of State Archaeology because their nature and cultural origin has not been confirmed. UK-PAR recommends conducting targeted underwater surveys with still or video imagery combined with visual inspection to determine the cultural or natural origin and possible function of these anomalies. The results of these further investigations will serve as “ground” truth verification of the anomalies and will provide information necessary for management of those that are determined to be cultural resources. The NRHP status of the anomalies cannot be determined at this point, Anomalies 2A and 2B are likely cultural in origin. Their NRHP status and management as cultural resources will need to be addressed once additional information is obtained. Anomaly 5A may prove to be natural in origin rather than cultural, in which case no management recommendations will need to be made.

If any of these anomalies prove to be cultural in origin they will be reported as sites to the OSA. Based on the results of the targeted diving, the potential NRHP significance of any cultural resources then can be addressed. Based on what is known at this time, we recommend that impact to any anomalies that prove to be cultural resources be avoided if possible. If avoidance is not possible, then additional physical documentation of the anomalies should be made along with historic archival research to provide detailed interpretation of the cultural resources and their significance.

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CHAPTER 1
INTRODUCTION

At the request of the Kentucky Transportation Cabinet (KYTC), staff of the University of Kentucky Program for Archaeological Research (UK-PAR) conducted archaeological survey of the two proposed Ohio River crossings that are part of the Louisville-Southern Indiana Ohio River Bridges Project (LSIORBP) in Jefferson County, Kentucky (Figure 1.1). These are Sections 2 and 5 of the LSIORBP, which are the downtown and east end crossings, respectively. Each surveyed section is approximately 600 feet (180 meters) wide and approximately 2,600 (800 meters) in length. The purpose of this survey was to use side-scanning sonar technology to conduct an underwater survey of the proposed crossings and identify and record any potential archaeological resources within the sections that might be affected by future construction efforts. There was minimal survey or inspection of exposed ground surfaces, as the areas of interest are now under water and adjacent shorelines either had been previously surveyed or were covered in recent fill deposits. This report presents the results of the side-scanning sonar survey, provides archaeological assessments of the anomalies identified by the survey, and formulates recommendations for additional work. The potential eligibility of these anomalies for nomination to the National Register of Historic Places (NRHP) cannot be addressed given the current level of information, but recommendations are made for acquiring additional information that will permit their significance to be assessed.

Field work was limited to a remote-sensing survey of the river bottoms along the proposed Section 2 and Section 5 rights-of-way using a side-scanning sonar. No on-ground survey was conducted, save for a brief inspection of the shorelines of both the Indiana and Kentucky sides of the river at the crossing locations. The approach taken in this survey was to collect the side-scanning sonar data independently of a historical review of the crossings. Any anomalous locations on the river floor that were identified in the sonar data would then be interpreted and assessed for possible cultural or historical significance in light of the independently gathered historical data. This assessment was conducted in compliance with provisions of the National Historic Preservation Act of 1966 (as amended), the National Environmental Policy Act of 1969, Procedures of the Advisory Council on Historic Preservation, Executive Order 11593 (Protection and Enhancement of the Cultural Environment), and the Kentucky Heritage Council's *Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports* (revised June 2001).

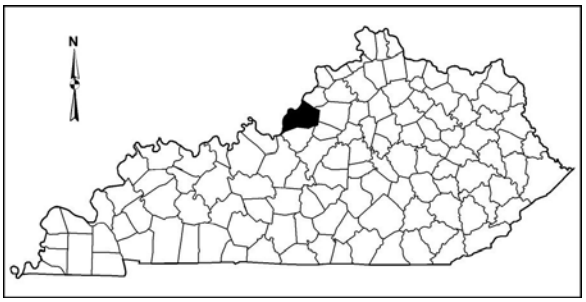

Figure 1.1. Location of Jefferson County, Kentucky.

UK-PAR director Dr. Steven R. Ahler was the Principal Investigator. The side-scanning sonar survey was conducted by Mainstream Commercial Divers, Inc. (MCDI), of Murray, Kentucky, a firm that commonly uses this technology to locate and evaluate the conditions of commercial barges and other submerged features in the Ohio River and its tributaries. Ahler and KYTC Division of Environmental Analysis archaeologist Wayna Roach accompanied the sonar survey crew when they collected the data on Section 5. University of Kentucky staff archaeologist M. Jay Stottman conducted the historical review. The actual side-scanning sonar

Figure 1.2. General Location Map of Sections of the Louisville-Southern Indiana Ohio River Bridges Project. Downtown Crossing is Section 2, and East End Crossing is Section 5. Map taken from KYTC web site http://www.kyinbridges.com/

survey was conducted on 19 October 2006 and required approximately 12 person-hours to complete. No artifacts were collected as a result of this survey. The field notes, photographs, and other project-related materials are curated at the University of Kentucky William S. Webb Museum of Anthropology in Lexington, Kentucky. Jay Stottman and Steven Ahler were responsible for preparing the final report. Hayward Wilkirson and Alex Thor assisted with figure preparation.

PROJECT AREA DESCRIPTION

Sections 2 and 5 of the LSIORBP are also referred to as the Downtown Crossing and the East End Crossing, respectively (Figure 1.2). Each of these crossings is about 800 meters in length, and each has a proposed right-of way about 500 feet (150 meters) wide. The actual surveyed area of Section 2 is about 180 meters wide, while the Section 5 survey area averages 220 meters in width. The precise boundaries of rights-of-way and bridge construction design had not been established at the time the survey was conducted, so precise locations of bridge support footings and related cofferdam construction areas were unknown. As a result, the entire length of both sections was subjected to the side-scanning sonar survey, while the width of the surveyed areas covered slightly more than the proposed right-of-way- width to account for potential shifts in right-of-way location. The total area surveyed in Section 2 is about 14.4 ha, while the Section 5 survey coveres about 17.6 ha. Anomalies of potential cultural significance may be avoided if these survey data can be incorporated into planning for the bridge construction. Both sections are on the 1982 (photorevised 1987) Jeffersonville, Indiana-Kentucky 7.5' USGS quadrangle. Section 2 runs parallel to and just east of the present location of the John F. Kennedy Memorial Bridge, near the southwest corner of the quadrangle (Figure 1.3). Section 5 traverses the Ohio River near Transylvania Beach on the Kentucky side, running north-northwest and intersecting the Indiana shore just north of the town of Utica (Figure 1.4).

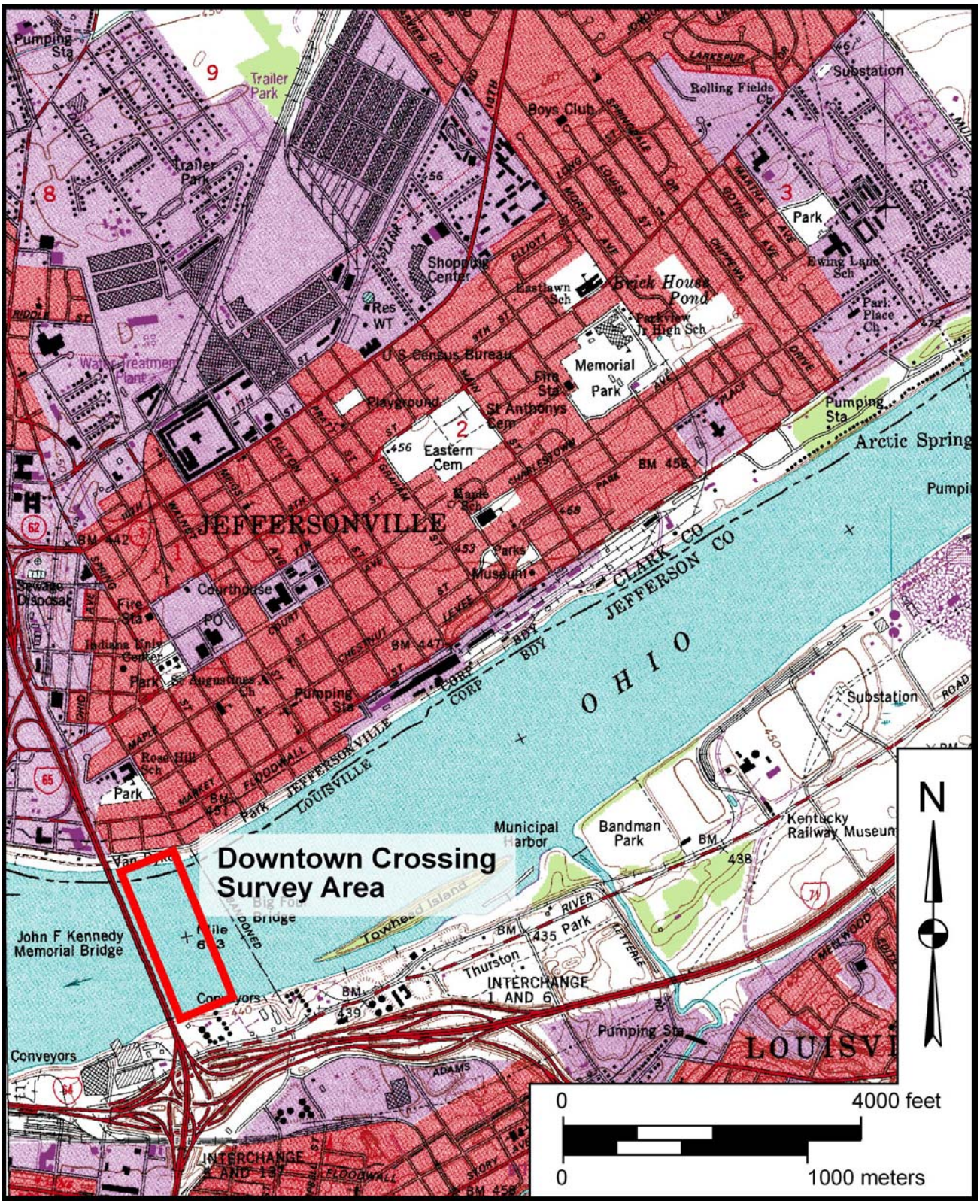

Figure 1.3. Topographic Context of the Section 2 Survey Area (Downtown Crossing). Adapted from 1982 USGS 7.5' Jeffersonville, Indiana – Kentucky quadrangle.

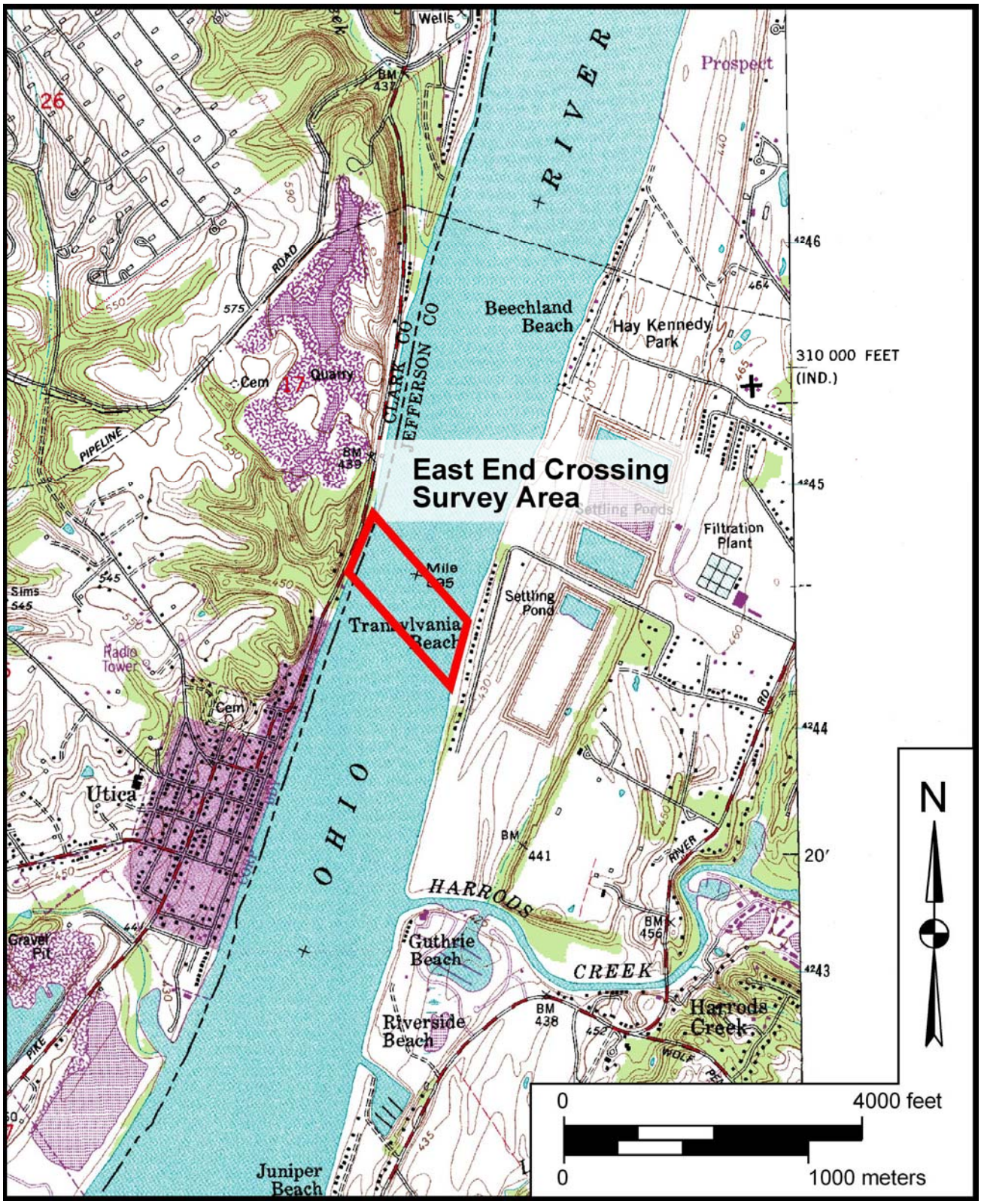

Figure 1.4. Topographic Context of the Section 5 Survey Area (East End Crossing). Adapted from 1982 USGS 7.5' Jeffersonville, Indiana – Kentucky quadrangle.

The Ohio River is impounded (among other places) at the Falls of the Ohio by the McAlpine Locks and Dam, located less than a kilometer downstream from Section 2. This impoundment has raised the water level in Section 2 and Section 5 areas about 11 to 12 vertical feet above what would have been the historic water levels prior to any impoundment. The current normal elevation for the upper pool above McAlpine Dam is 420 feet AMSL, while the normal elevation of the lower pool is 383 feet AMSL. This difference in elevation of 37 feet is about 11 feet greater than the historically recorded change in elevation through the Falls (see Johnson 1974:177 and US Army Corps of Engineers website at http://www.lrl.usace.army.mil/opl/article.asp?id=89). This relatively small difference in vertical elevation due to impoundments has two implications for the present project. First, the water depth for the sonar survey is not particularly great, so the resolution of the resulting images is correspondingly high. Second, there may be little physical evidence of river-related facilities that were once present along the shorelines along the Ohio River (such as docks, wharves, warehouses, etc.) or activities associated with these facilities. These material remains were likely removed or relocated when the higher pool levels were created, which would keep the navigation channel and adjacent zone relatively free of urban or transportation-related debris. Thus, while both the Kentucky and Indiana shorelines near Louisville, especially in Section 2, have historically been the focus of transportation-related activities since the founding of the city, there may be little direct evidence of these activities remaining underwater within the surveyed areas.

SUMMARY OF FINDINGS

The side-scanning sonar survey Section 2 documented two anomalies that are potentially cultural in origin. Anomaly 2A is near the Indiana shoreline and is a long, linear segment running nearly parallel to the shore. This is likely a remnant of a retaining wall or floodwall. Historic photographs and sketches of the area show cribbed retaining walls at many places along the shoreline. Anomaly 2B is about 80 meters north of the Kentucky shoreline. A rectangular high-reflective area indicates an object on the river bottom that is about 46 feet (14 meters) long and 16 feet (5 meters) wide. MCDI personnel suggest that it may be the remnants of a work flat or flat boat. Flat boats were ubiquitous on the Ohio River in the 19th century, and they were commonly in the size range of 50 by 20 feet. Though these boats were extremely common, they were considered disposable and were almost always used for a single hauling trip, after which they were dismantled or salvaged with the lumber being reused at their destination. Few examples survive to the present day, and they are primarily documented in sketches and photographs.

The side-scanning sonar imagery of Section 5 shows a single anomaly of interest. Anomaly 5A is roughly rectangular object that projects well above the river bottom about 80 meters from the Indiana shoreline. Nearby, a mosaic of shadows and bright areas in the sonar imagery is consistent with subaqueous bedrock shelves. However, Anomaly 5A clearly shows two levels of projecting material, with a smaller rectangular shape projecting upwards from a larger rectangular base. The basal shape measures about 28 feet (8.5 meters) long and a maximum of 20 feet (6 meters) wide, while the upper rectangular projection measures about 20 feet (6 meters) long and 5 feet (1.5 meters) wide. The upper projection also appears to be perforated by two large holes, based on the presence of two reflective areas within the shadow cast by the upper projection. These reflective areas measure about 4-5 feet (1.2 to 1.5 meters) in diameter and are regularly spaced relative to the edges of the upper projection. The regularity and rectilinear outline of the anomaly, the presence of two distinct levels, and the possible presence of two evenly spaced and similarly-sized holes suggest that Anomaly 5A represents a human-made object. However, its function is not interpretable given the present data. Its position relative to the shore and its depth suggest it is related to river transportation activities and not just an abandoned car or truck. It may represent part of a wharf, dock, or other mooring facility. It is also possible that Anomaly 5A may simply be a highly convoluted segment of bedrock shelving and larger rocks that project from the river bottom.

SUMMARY OF RECOMMENDATIONS

The three anomalies identified in this side-scanning sonar survey have not been reported as sites to the Kentucky Office of State Archaeology because the nature and origin of these anomalies has not been confirmed. We propose a follow-up series of underwater surveys targeting each anomaly to determine their cultural or natural origin and possible functions. This is probably best accomplished by diving and documentation of the anomalies using video or still camera imagery. The results of these additional investigations will serve as "ground" truth verification of these anomalies and will provide information necessary for management of those that are determined to be cultural in origin. After consultation with MCDI personnel, it appears that the best time of year for conducting such visual inspection is in August and September, when water levels are lower and suspended silt is less concentrated in the Ohio River.

The NRHP status of the anomalies cannot determined on the basis of the existing information. However, Anomalies 2A and 2B are likely cultural in origin, and their NRHP status and management as cultural resources will need to be addressed once the additional information is obtained from the targeted diving and visual documentation. Anomaly 5A may prove to be natural in origin rather than cultural. If any of these anomalies prove to be cultural they will be reported as sites to the OSA. Using the results of the follow-up targeted investigations, the potential NRHP significance of any cultural resources can be addressed. Based on what is known at this time, we recommend that impact to any anomalies that prove to be cultural resources be avoided if possible. If avoidance is not possible, then additional physical documentation of the anomalies should be made along with historic archival research to provide detailed interpretation of the cultural resources and their significance.

CHAPTER 2
ENVIRONMENTAL SETTING

This section provides background information on the environmental setting of the project area, including discussion of the physiography, geology, soils, climate, flora, and fauna of the region. When possible, this information is presented with a historical perspective that provides information on how the environmental setting has affected human settlement in the region.

PHYSIOGRAPHY

Physiographically, the project areas lie within Jefferson County, Kentucky, which includes part of the Outer Bluegrass and Knobs physiographic regions. The Outer Bluegrass in Jefferson County forms a gently rolling tableland that generally slopes down toward the southwest to meet the Knobs. However, the current project areas are dominated by the effects of the Ohio River, the major tributary of the Mississippi River. The topography of Jefferson County varies from steep knobs in the southwester part of the county, with elevations up to 902 feet, to gently rolling terrain in the Outer Bluegrass, with elevations ranging from about 790 to 500 feet. The most prominent topographic feature is the broad Ohio River valley with its associated Pleistocene and Holocene terraces that rise 20 feet or more above the flood plain (McGrain and Currens 1978:41).

The most significant feature within the Ohio River valley in Jefferson County is the Falls of the Ohio, a series of low cataracts that stretched for about three miles along the Ohio River just west/downstream from Louisville. While the Falls do not create a breathtaking vista like some waterfalls in the mid-South, this feature played a significant role in the settlement of the region and subsequent historical growth and development of Louisville and surrounding municipalities. These towns were initially founded and grew economically because of the need for overland portage around this nonnavigable reach of the Ohio River. The history of Louisville and nearby river towns is explored more fully in Chapter 3.

GEOLOGY

Geologically, the Falls of the Ohio is formed by the presence of thick beds of resistant Jeffersonville Limestone. This formation is Devonian in age outcrops at the surface along the eastern edge of the Knobs region in Jefferson County. Farther to the west are outcrops of Mississippian-age limestones, shales, and sandstones the form the Knobs region. The Devonian Jeffersonville Limestone is highly fossiliferous, and many fossil taxa have been documented and collected in the Falls area. In 1981, a portion of the Falls that had been minimally modified by dam and canal construction was designated as a National Wildlife Conservation Area that is administered by the Louisville District of the US Army Corps of Engineers.

SOILS

In the Outer Bluegrass physiographic region, soils on the flood plains and stream terraces derive from alluvium deposited during the Quaternary period. The Ohio River valley has a long and complex quaternary history and includes several terrace segments that range in age from the Pleistocene to the Holocene. Zimmerman (1962) includes the soils along the Ohio River and its terraces in the Wheeling-Weinbach-Huntington association. As this was an underwater survey, discussion of soils will be curtailed except to point out that soil series included in this association, especially the Huntington series, would have been present in the project areas prior to impoundment of the Ohio River and elevation of water levels to maintain navigation channels.

CLIMATE

Jefferson County has a temperate climate, creating warm humid summers and cool winters. Average daily high temperatures for Jefferson County range from 43.5 ^{o}F in January to 88.5^{o} F in July. Precipitation averages about 41.3 inches per year, and this is distributed relatively evenly throughout the year. However. Rainfall is highly variable from year to year, and Zimmerman (1962:132) reports that one year in ten will have more than about 8 inches of rainfall in January, March, and April. These are the months for which floods along the Ohio River are most common. Flooding in turn increases the risks of river vessel loss. Such losses were common prior to implementation navigation and flood control projects along the Ohio River, and are still significantly higher during flood stages, even with help of modern engineering and technology.

FLORA AND FAUNA

Jefferson County lies partially within the Outer Bluegrass region and partially in the Knobs region, both of which are located within the Western Mesophytic forest (Braun 1950:146). Oak and hickory trees dominate the Western Mesophytic forest, but many other species are represented, especially in the flood plains, which have highly diverse communities. The majority of the forest in the project area vicinity has been cleared for agricultural use (primarily pasture land).

Habitat conditions for this and adjacent areas of Kentucky are generally suited for open land and woodland wildlife (Zimmerman 1962). Early settlers in Louisville and along the Ohio River noted white-tailed deer, elk, buffalo, black bear, rabbit, squirrel, raccoon, opossum, wild turkey, pigeon, panther, fox, wolf, rattlesnake, otter, muskrat, and beaver. These modern fauna replaced cold-adapted species such as ground sloth, horse, tapir, reindeer, caribou, musk ox, mastodon, peccary, and grizzly bear common to the area during the Pleistocene Epoch.

CHAPTER 3
BACKGROUND RESEARCH AND SURVEY PREDICTIONS

This section presents a brief history of the Louisville area as it relates to the Falls of the Ohio and development of river transportation facilities. Because this project involves survey of tracts that are currently under water, and there is no potential for recovery of prehistoric materials or documentation of prehistoric sites, a prehistoric context section will not be presented. Instead, the focus is entirely on the historical context, with specific aspects of this context emphasized due to the nature of the project.

HISTORIC CONTEXT OF THE FALLS OF THE OHIO

European and colonial exploration of the Ohio River began in the late 1600s and continued sporadically through the mid 1700s. These efforts were largely oriented toward establishing trade relations with Indian groups, such as the Shawnee and Cherokee, who claimed the area as part of their own hunting grounds and also probably lived in the region (see Henderson et al. 1986). These explorations were also part of the continuing struggle between France and Britain for control of the North American interior. More systematic exploration for the purposes of settlement began with Christopher Gist's 1750-1751 journey down the Ohio River while he was employed as an agent of the Ohio Land Company. Though this trek was aborted, Gist made other trips to the Falls region in the 1750s. Other land companies also sponsored exploration and settlement of the region. During this time the famous Long Hunters parties provided additional information about the region as well as additional economic incentive for settlement of the Ohio River valley region. The Falls of the Ohio area was surveyed by Thomas Bullitt and others in 1773, acting on behalf of several people who held warrants for land grants in the Ohio River valley, and in the following year by John Floyd (Harrison and Klotter 1997:9-22)

The onset of the American Revolution postponed settlement, but by 1778 the first European/American settlement in the Falls of the Ohio region was made at Corn Island by George Rogers Clark and others. In 1779 John Floyd and others settled on and near Beargrass Creek, and the settlement was named Louisville in honor of King Louis XVI of France. Settlement was slow because of threats from Indian groups and Spain's closure of the Mississippi River and New Orleans to travel and commercial enterprise. However, the Louisiana Purchase in 1803 and treaties with the Indian groups living along the Ohio River ended most serious impediments to American settlement of the Falls region. By 1811 when the first steamboat arrived at Louisville, the city was a growing river port due to the necessity of overland portage around the Falls during periods of low water on the Ohio River. Steamboat traffic increased the amount of goods and people transported on the Ohio River, and Louisville's importance increased due to its location above the Falls.

The advent of steam travel on the river gave additional impetus to creation of a lock and canal system that would circumvent overland portage around the Falls of the Ohio. The Ohio Canal Company attempted to construct a lock and canal system first on the Indiana side, then on the Kentucky side of the river in the first decade of the 1800s. However, this effort failed, and it was not until 1830 that the Louisville and Portland Canal was completed. This canal was used and improved throughout the early 19th century.

Early transportation on the Ohio River employed very shallow-draft vessels, and water depths of three feet were considered adequate for navigation. Even so, in the early 19th century large stretches of the Ohio River were not navigable in low-water months (July-October) due to shallow water depth. With the coming of steamboats, with their larger capacities and deeper drafts, need arose for deeper water channels and artificial control of water depth. Enhancement of inland waterway navigation has been one of the primary missions of the US Army Corps of Engineers since the 1820s. The most common form of transport on the

Ohio River (and most other rivers) was the flatboat. This is a square-ended boat of simple construction, having sides three to five feet high. A few oars provided a means of propelling the boat cross-current or levering it off shallow bars, and steering was maintained by a simple rudder at the rear. Flatboats were usually used for a single trip, constructed at the upstream end of the journey, and dismantled at the downstream end. For the Ohio River, Louisville was the terminus for a downstream journey on the upper Ohio. Flatboats were either dismantled and the lumber resold, or the vessels and cargo were transported overland past the Falls of the Ohio if water levels were too low to permit passage (Johnson 1974:21-37). This portage was only a distance of some three miles and involved a change in elevation of only about 26 feet, but the need for it made Louisville and surrounding communities thriving river towns (Figure 3.1).

In addition to the labor and facilities needed for portage around the Falls, pilots and shipbuilders also contributed to the commercial success of Louisville and adjacent communities. Steamboat transport greatly increased the amount of river traffic in both goods and people, and the amount of steamboat traffic greatly increased after 1815. To help with this increased traffic, the Louisville and Portland Canal Company was created in 1825 to construct a canal and navigational locks that would permit river traffic to circumvent the Falls and eliminate at least some of the need for portage. When completed in 1830, the Louisville and Portland Canal had three lift locks, each 8 feet 8 inches in height, and each measuring 183 feet in length and 52 feet in width. The canal and lock system allowed tremendous increases in traffic on the Ohio River. However, the locks were designed to accommodate boats built in the 1820s, and by 1853 more than 40 percent of the vessels in use on the Ohio River were too large to pass through the locks (Johnson 1974:57-69).

The Louisville and Portland Canal was enlarged to accommodate larger vessels, beginning in 1860. However, due to higher costs and delays arising from the Civil War, the project completion was delayed from 1865 to 1872. Completion of the enlargement project created a two-flight system of locks, each measuring 350 feet in length and 80 feet wide, the largest locks in the world at that time. These locks and canal were under the direct supervision of the federal government and were operated free of charge. The new Louisville Canal replaced the privately run Louisville and Portland Canal, which charged tolls for each vessel that passed the locks. Along with the federal efforts to construct a new lock system, a new canal was also installed, and the first of several dams was completed in 1881 (Johnson 1974:121-130). This first cross-river dam raised the water level about three feet to enhance river navigation and provide a deeper channel for larger vessels.

Between 1879 and 1929, a series of 46 dams was constructed along the Ohio River to enhance navigation and provide a consistent eight-foot deep channel for barges and other river traffic. Beginning in the 1950s the Corps of Engineers began replacing this system of locks with 19 new navigations structures, each with locks measuring 110 feet wide and 1,200 feet long, with lifts ranging from 12 to 37 feet. In addition, the old Louisville Canal was widened from 200 feet to 500 feet to accommodate multiple barges. McAlpine Locks and Dam at the Falls of the Ohio was completed in 1965, providing a 12-foot deep navigation channel that has raised the water level at Louisville between 11 and 12 feet above its original level (Johnson 1974:227-236).

CONTEXTS OF THE CROSSING AREAS

To help interpret the images derived from the side-scanning sonar survey, historic documentary research was conducted. This research focused on identifying river-related cultural resources that might be present within or adjacent to the survey areas. General historic contexts of the crossing areas is presented in this section, while additional documentary findings pertinent to interpretation of specific results of the sonar survey are included in Chapter 5.

The documentary research presented here is not comprehensive. It focuses specifically on the survey tracts of the Section 2 and Section 5 crossings and adjacent shore areas in Kentucky and Indiana. It is also not

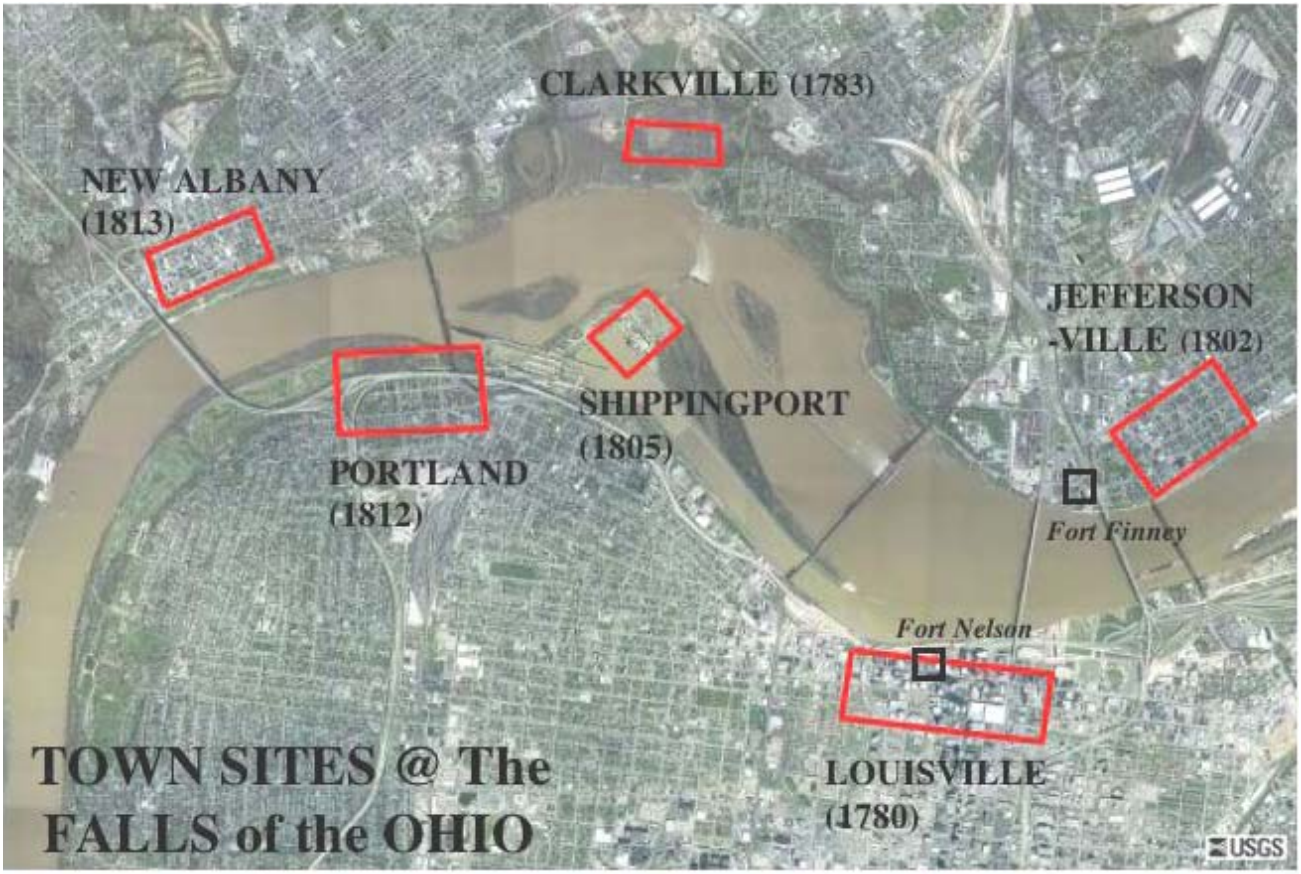

Figure 3.1. Historic Town Sites at the Falls of the Ohio, Superimposed on a Modern Aerial Photograph. Image taken from Wikipedia entry for Shippingsport (http://en.wikipedia.org/wiki/ShippingportKentucky). Fort locations are approximate.

comprehensive in the sense that there is not a detailed listing of all sinkings of barges, flatboats, steamboats or other vessels that might be represented as material remains within the survey tracts. This listing would be extremely large, given the amount of river traffic on the Ohio from the late 18th century to the present and the large number of vessels that were lost over this period of time. Instead, the purpose of the documentary research was to identify the kinds of resources that might be present and their possible ages and potential connections to specific properties or landowners.

M. Jay Stottman is the author of the historical summaries presented here. For information about river traffic, dam and lock construction, and engineering, Mr. Stottman drew heavily on the knowledge and experience of Chuck Parrish, the historian and archivist for the Louisville District of the US Army Corps of Engineers. We gratefully acknowledge Mr. Parrish's contributions to this report and his interest in our findings.

SECTION 2 (DOWNTOWN CROSSING)

The portion of the Section 2 crossing adjacent to the Kentucky shore was historically part of what was known as "The Point" during the 19th century. The Point was a peninsula formed at the confluence of Beargrass Creek and the Ohio River. In eastern Louisville, Beargrass Creek flowed parallel to the Ohio River near a small island for a distance of nearly two miles to its confluence with the Ohio River near 3rd Street, where it created a narrow peninsula of land (Figure 3.2). The creek mouth at the lower end of the peninsula

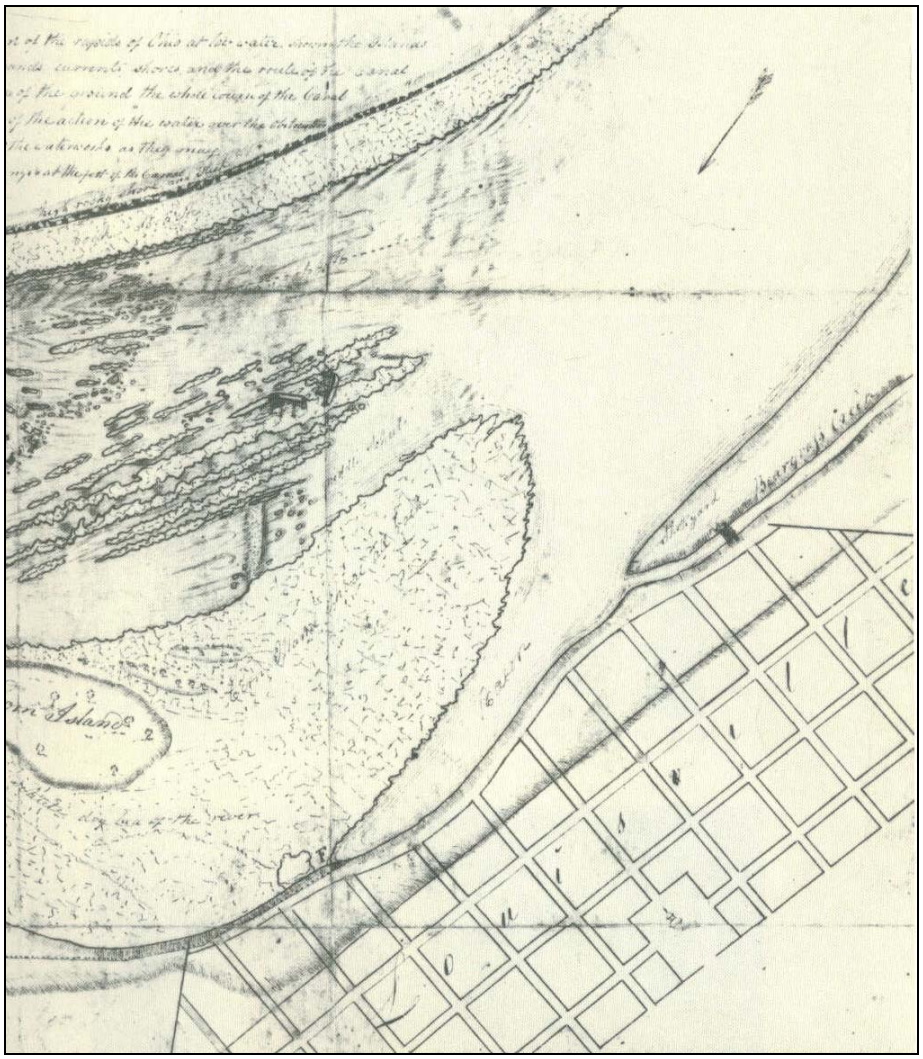

Figure 3.2. A ca. 1805 Map of the Falls of the Ohio River by Jared Brooks (on file at the National Archives [from Thomas 1971]).

was an excellent harbor for mooring boats, and the long strip of land adjacent to the river provided a landing area for docking boats and storing barges. The lower end (west of Campbell Street) of the Point was home to many taverns, grocers, coffeehouses, and some residences, while upstream, sawmills and shipyards were more common (Kleber 2001). The wooded shoreline of the Point was also a popular picnic retreat for Louisville residents throughout the 1800s.

By the late 1820s, several large mansions lined the peninsula, such as the Mansion House, the home of Margaret Wright Paget (Yater 1989). Also known as the Paget House, the building was originally constructed around 1800 by a former owner and then enlarged by Paget in 1838 based on plans from a New Orleans architect. Many of the residents of the Point had ties to New Orleans, as several families relocated from there to Louisville during the early 1800s (Kleber 2001). Many residents also had ties to the shipping business, such as Paget who owned interest in several steamboats (Kiser 1939). The Paget house still stands and may be one of the oldest buildings in Louisville.

In 1854 the Beargrass Creek cut-off was dug at the upper end of the Point to shorten the creek and give it a more direct route to the river, thus causing the Point to no longer represent an actual physical point of

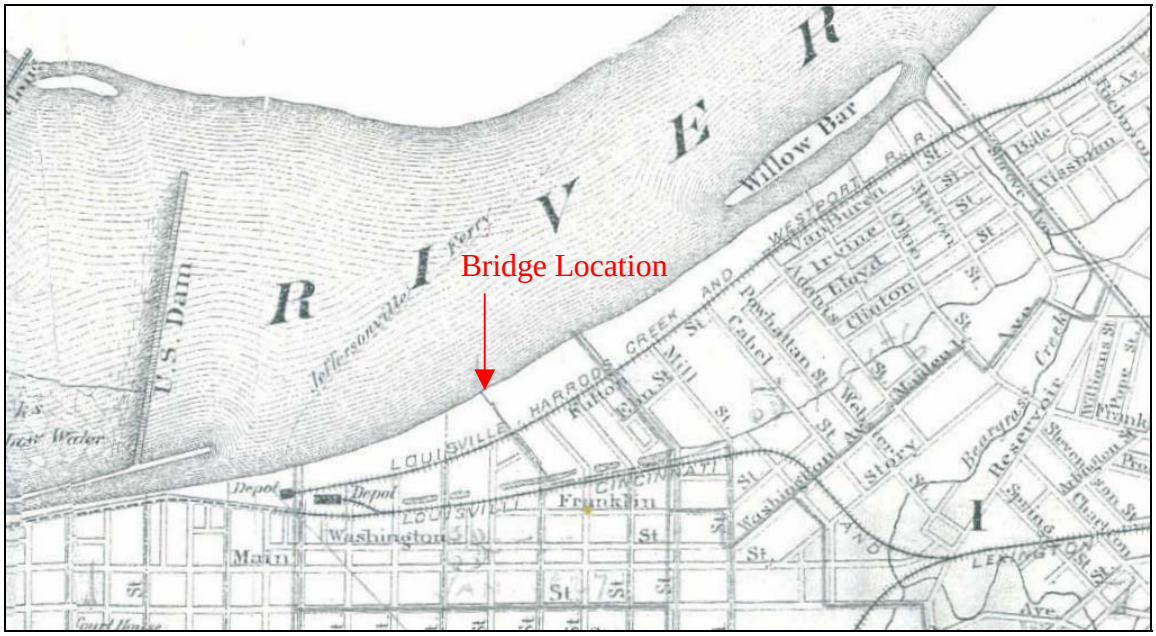

Figure 3.3. An 1884 Map of Louisville Showing the Beargrass Creek Cut-Off and Remnants of the Old Creek (Hopkins 1884).

land (Figure 3.3). The areas just west and east of the cut-off were developed as a subdivision that included small frame shotgun houses and larger brick Victorian homes, while industry and shanties became interspersed with the once-wealthy mansions. The old bed of Beargrass Creek for the most part had been filled by the late 1880's, leaving only a string of pools as remnants of the old creek (Figure 3.3). The pools became stagnant and unsanitary, earning a reputation for being quite foul (and the hence name of "Black Creek"), facilitating the decline of the area (The Commercial 1888).

The Point was very susceptible to flooding, and the major floods of 1937 and 1945 destroyed most of the buildings that existed there. The westernmost portions of the Point became industrial, serving as home to scrap yards and sand piles. Soon after these floods, the City of Louisville began purchasing land in the eastern portions of the Point and has been slowly redeveloping it as parkland ever since. More recently, the western portions of the Point also were reclaimed from industry for parkland.

Throughout its history, the tie to river transportation and industry defined the Point. This was perhaps most evident at the western portions of The Point in the location of the proposed Section 2 crossing. According to historic maps, this area of the Point was identified with shipbuilding as early as 1805 (Figure 3.2). Throughout the 19th century, Louisville was a major shipbuilding center on the Western inland waters, including a center for construction of flatboats, keelboats, barges, and steamboats (Hunter 1949; Yater 1989). For example, 1,108 steamboats were built in Louisville from 1811 to 1880, not including a large number of boats constructed in communities around Louisville, such as Shippingport and Portland below the Falls (Hunter 1949). One of the major shipyards in the Louisville area was located across the river from the Point in Jeffersonville, Indiana. This yard is still one of the largest inland shipbuilders.

Although shipbuilding was a major industry at the Point, this landform was probably most used as a harbor, landing, and boat storage area. The western end of the Point was known as an excellent harbor for mooring boats (Yater 1989). Although Louisville's public wharf and main landing was located west of the Point, the area was the location of Preston's Landing, and there are many images from the 19th century that show its function as a landing and harbor. An 1850s birdseye view (Figure 3.4) shows several steamboats at the landing between First and Third Streets, and flatboats and barges lining the shore east of Brook Street.

Figure 3.4. An 1850s Birdseye View of Louisville (Palmatary 1855, from Yater 1989).

A similar scene was depicted in the 1870, 1876, 1883, and 1890 birdseye views of Louisville. The major difference between these views (Figures 3.5, 3.6, 3.7, and 3.8, respectively) and the 1855 image is that Beargrass Creek had been cut off in these later images and was no longer visible as part of the Point.

The scene at the landing would have been similar to an 1856 view of the public landing, which was located just west of the Point, published in J.C.G. Kennedy's *The Progress of the Republic*. This image depicts numerous steamboats lining the wharf along with a couple of flatboats, with stevedores loading and unloading cargo (Figure 3.9). Another view of Louisville's public wharf from further east depicts a similar scene and includes the western tip of the Point at Second Street (Figure 3.10).

Although the decline of the steamboat in the late 19th century reduced the traffic on Louisville's wharves and landings, the Point continued to be used for river-related commerce in the new era of river transportation. By the mid 20th century, river transportation was largely carried out by the modern barge and tow system. The area that was the Point and the island known in the 19th century as Willow Bar in particular have been used to store large steel barges (Figure 3.3). Several industries also have barge-loading facilities on the Point, including a sand company and a petroleum storage facility. Also a municipal harbor for pleasure boats was developed in the mid 1900s across from Willow Bar in Thruston Park (Stottman and Granger 1992). Presently Willow Bar serves primarily as a barge mooring area and has since the late 1900s been renamed Towhead Island. Although folklore suggests that this island was actually created in the late 19th century by an accumulation of sunken barges, the island appears on the earliest maps of the Falls of the Ohio. However, the folklore does attest to the connection of the island and the Point with river transportation as well as boat wrecks.

Figure 3.5. An 1870 Birdseye View of Louisville Published in the City Directory (from Thomas 1971).

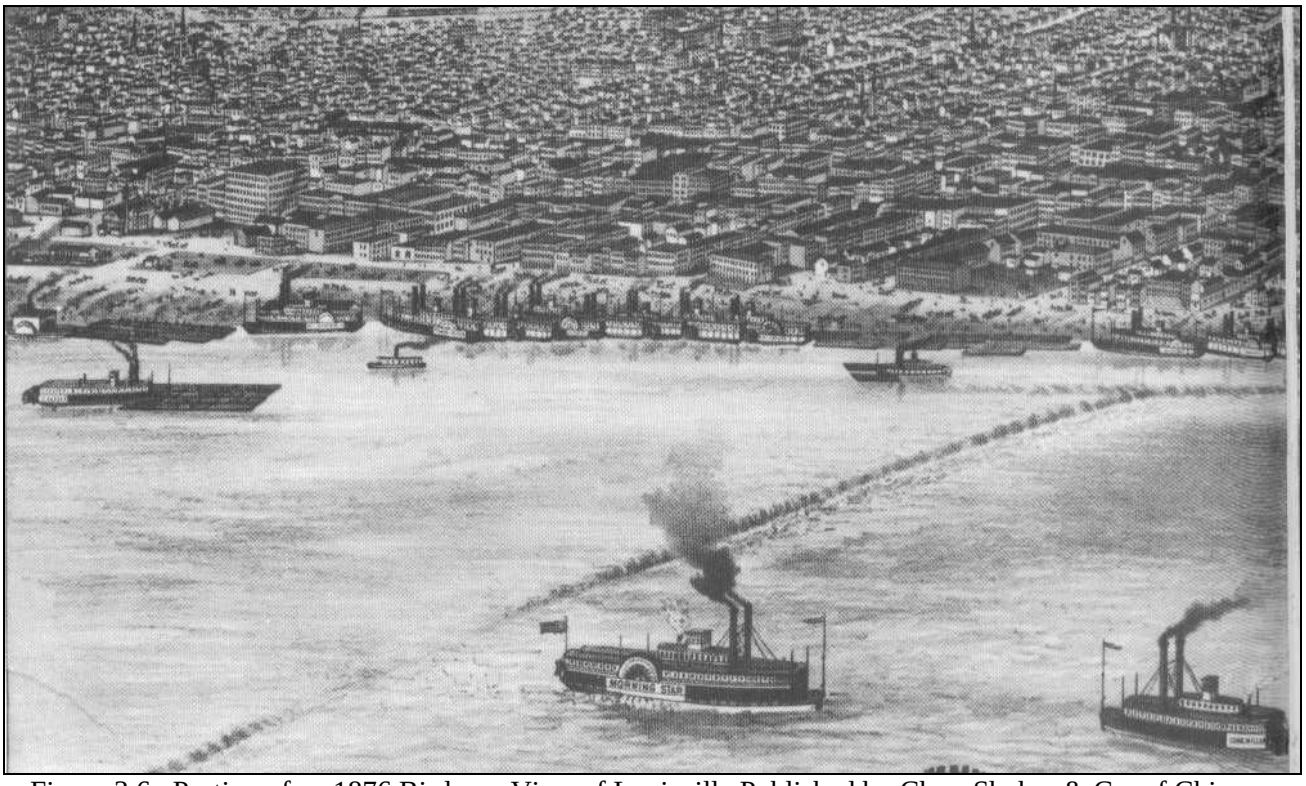

Figure 3.6. Portion of an 1876 Birdseye View of Louisville Published by Chas. Shober & Co. of Chicago (from Thomas 1971).

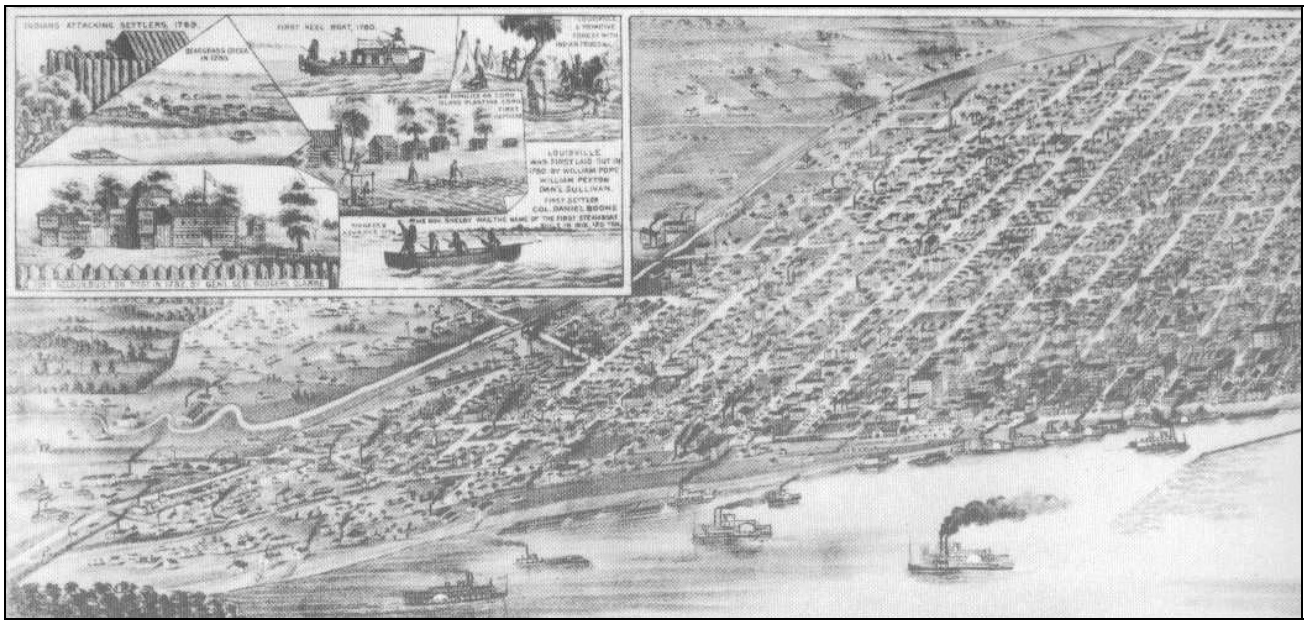

Figure 3.7. An 1883 Birdseye View of Louisville from the Riverfront and Southern Exposition (Clarke 1883).

Figure 3.8. A Birdseye View of Louisville Published in Harper's Weekly April 5, 1890 (from Yater 1989).

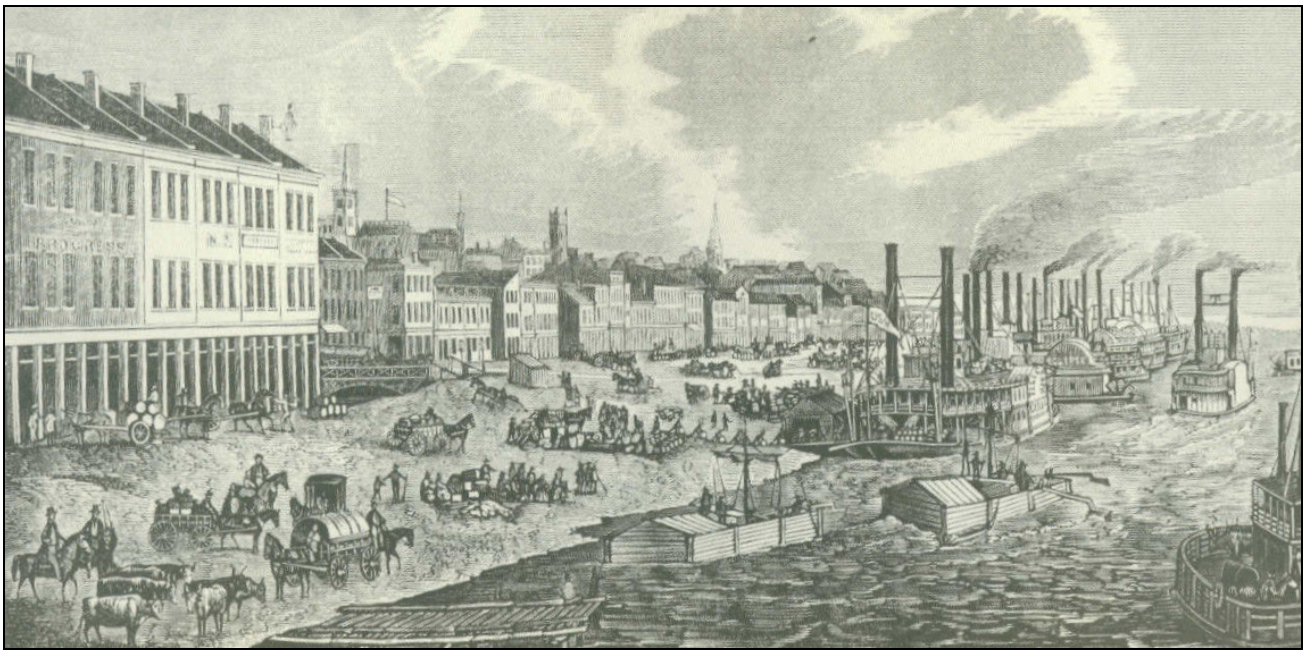

Figure 3.9. A View of Louisville's Public Wharf in 1856 Published by Kennedy (from Thomas 1971).

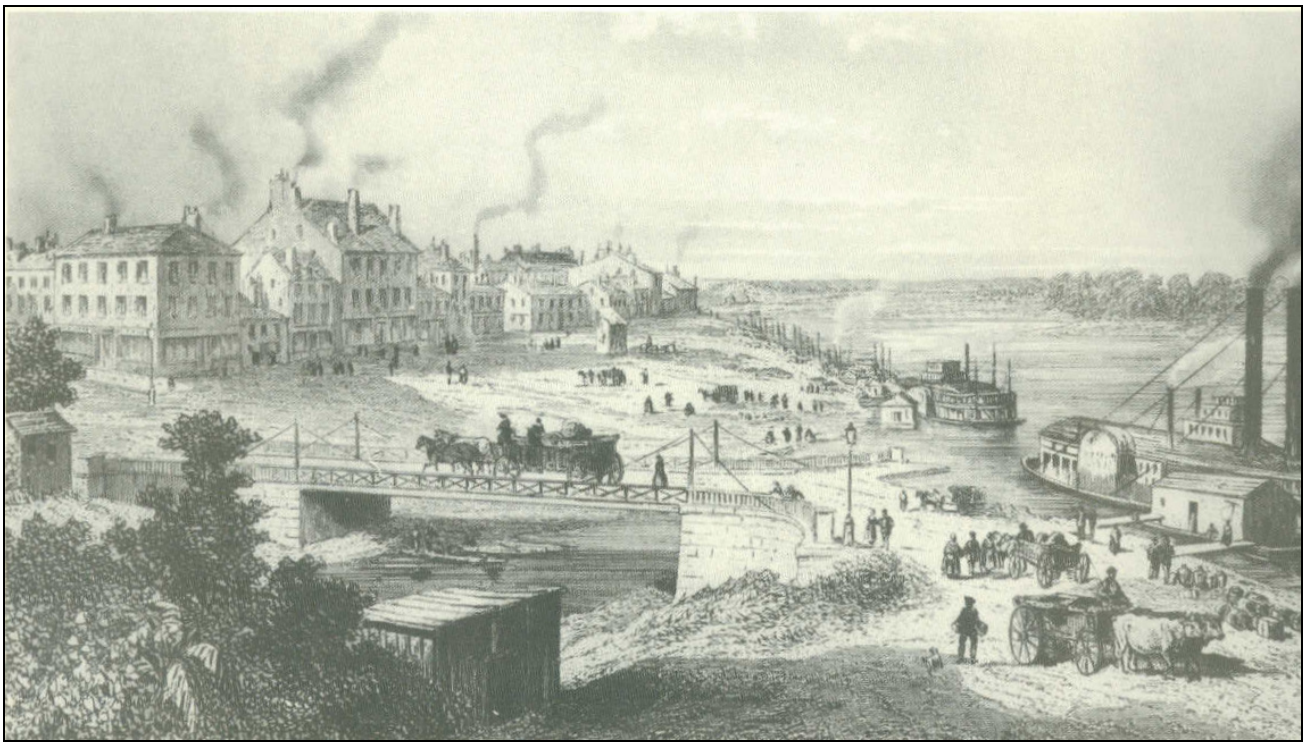

Figure 3.10. A View of Louisville's Public Wharf from The Point. Published in Oscar Comettant's Journal in 1864, copied from James River Guide (1856) (from Thomas 1971).

SECTION 5 (EAST END CROSSING)

The proposed location of Section 5 (East End crossing) intersects the Kentucky shore just north of the confluence of Harrod's Creek and the Ohio River in eastern Jefferson County. Known as Transylvania Beach,

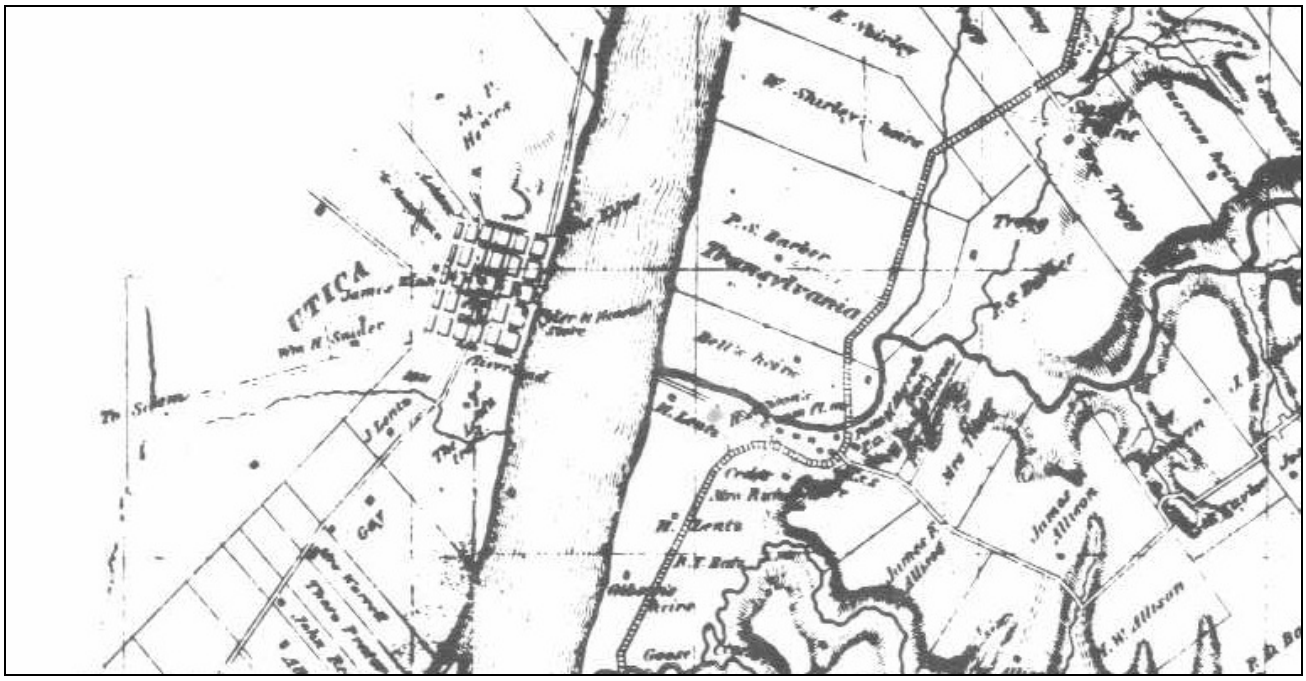

Figure 3.11. 1858 Map Showing Utica and Transylvania Beach (Bergman 1858).

area is situated directly across the Ohio River from Utica, Indiana. This area had an important early connection to river transportation, as James Noble Wood established a ferry from his property in Indiana to the south bank of Harrod's Creek in 1794. Ferry service at this location continued throughout the 1800s. It had an advantage over ferries located further south in Louisville because is was remote from the dangers of the Falls.

Utica was platted on Wood's property in 1816 and was finally chartered in 1831. Utica was a thriving small river town throughout the 1800s, anchored by the ferry service and a successful mill located above the town in the 1830s (Figure 3.11). However, the lime-burning industry also played an important role in Utica during the 1800s. The availability of various types of limestone around Utica made it a natural location for production of lime, a major ingredient of cement. The cement industry likely had important operations on the river for acquisition of raw materials and shipment of the finished product, including elevators, conveyors, and barge mooring facilities. This industry prospered in Utica from about 1818 to 1907. The Utica Lime Company continued to have limited operations in the area until around 1928 (Kleber 2001). It was replaced in the early 20th century by operations elsewhere in the Ohio Valley, mainly Kosmosdale in southwestern Jefferson County, which is still a major producer of cement (Stottman 2006). After the lime industry left and ferry service ended, Utica did not have a major economic anchor. It became a center for truck farms that supplied food to Louisville up until the 1940s (Kleber 2001). Since the mid 1900s, Utica has been a small historic community that has recently been attracting light industry and suburban residents from Louisville.

The land on the Kentucky side of the river north of Harrod's Creek has been known as Transylvania or Transylvania Beach. The name derived from Transylvania Seminary, the precursor to Transylvania University in Lexington. In 1780, the Virginia General Assembly granted a large tract of land along the Ohio River, which was taken from landowners loyal to the British during the Revolutionary War, to the seminary. On several occasions during the 1790s and 1810s the seminary platted the town of Transylvania and attempted to sell lots (Figure 3.12). Just as speculators sought to take advantage of the ferry service and established the town of Utica, the trustees of Transylvania Seminary tried to establish a town on the Kentucky

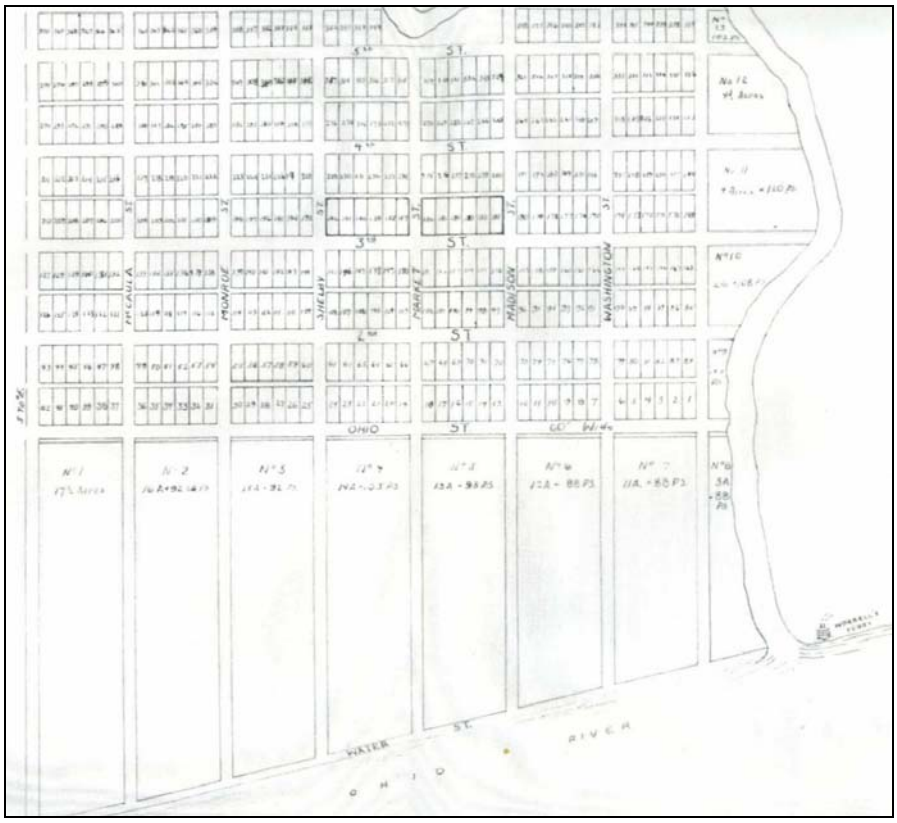

Figure 3.12. 1810 Plat for the Town of Transylvania (on file at Metro Louisville Archives).

side. Newspaper advertisements from the 1790s offered lots for sale in the new town (Transylvania Vertical File Metro Louisville Archives). One advertisement from 1798 states:

> ...made with the Trustees of the Transylvania Seminary for land in Jefferson County, belonging to the seminary; we wish to engage a number of families to settle on them, and will either give a lease for a number of years, or on their taking it for a shorter term, will pay them a sum of money for improving. For terms apply to Thomas Hart in Lexington (Transylvania Vertical File Metro Louisville Archives).

Few if any lots were sold and improved as a result of these attempts to establish Transylvania. On the plat for Transylvania, the importance of the ferry to the establishment of the two prospectus towns is evident (Figure 3.12). Transylvania was not the only platted town that failed to become reality by losing out to a neighboring community. The town of Williamsville was platted in 1792 at the confluence of the Salt and the Ohio rivers in southwestern Jefferson County. It failed to become established and lost out to the town of West Point on the opposite side of the Salt River (Stottman 1998).

With the failure of Transylvania to become established, the seminary's land was divided into large tracts and sold. A large tract was sold to Philatus S. Barber in the 1850s (see Figure 3.11). Barber built a large house in 1854 and 1855 on the high bluff over the river. This house is known as the Barber House or Rosewell, and is listed as State Historic Resources Inventory number JF452 (also OSA archaeological site number 15JF679). Barber sold the property in 1859 (Neary 2000). On the 1879 Beers and Lanagan atlas map the property is indicated as belonging to H.H. Buffenmier (Figure 3.13).

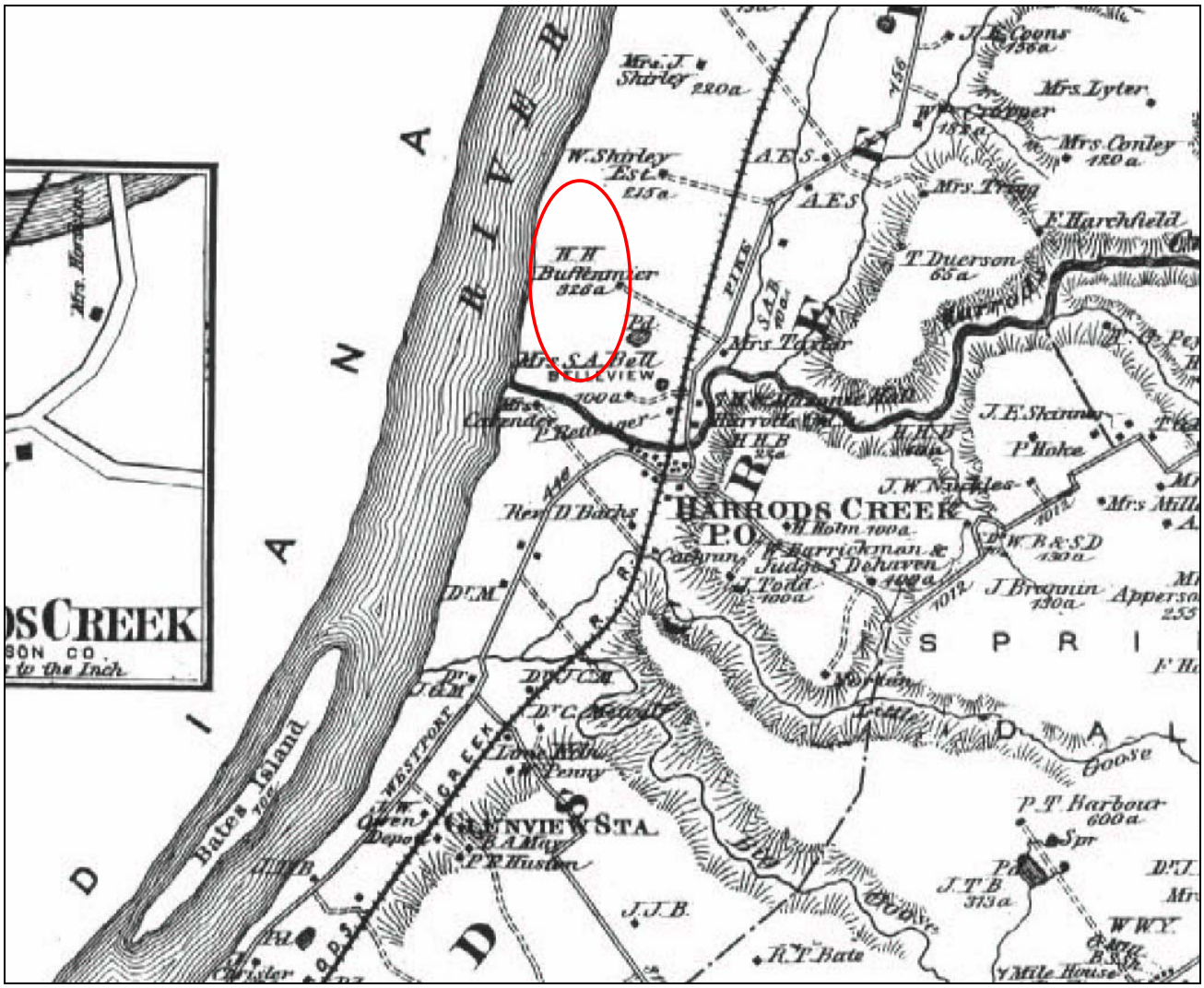

Figure 3.13. The Area of Transylvania Beach in 1879 (Beers and Lanagan 1879).

During this time, the property along the riverfront could have been used as an informal rural steamboat landing. It was common during the 19th century for steamboats to land at local farms to take on wood for the boilers and to acquire other supplies (Chapin 1996; Linn and Neary 1998). Hundreds of these landings lined the banks of the Ohio River during the 19th century, with most consisting of just a cleared area along the bank or less frequently a dock and dock house (Ball and Parrish 1985). It is not known whether Barber or Buffenmier participated in trade with steamboats from their Transylvania property. In 1923 the property was subdivided into several large lots, many of which are now included in the Country Estates of River Road National Register District. Lots located on the river were much smaller and formed what has become the Transylvania Beach community.

The link between the Section 5 crossing and river transportation is through the prominent ferry service that existed nearby and the potential for an informal rural steamboat landing on the Kentucky side of the crossing. The history of this land is rooted in 19th century river transportation, and perhaps more accurately, the hopes of taking advantage of it.

RESULTS OF PREVIOUS RESEARCH AND SURVEY PREDICTIONS

Prior to conducting the field work for the project, we would ordinarily search the Office of State Archaeology database and report library to determine the extent of previous research conducted within and around the project area. However, this project was confined to the crossings, which were under water, and there was little relevant information that could be obtained from the site files or report libraries. The most relevant previous study was the preliminary archaeological reconnaissance of the Ohio River Bridges Porject conducted by Cultural Resource Analysts, Inc. in 2000 (Reynolds et al. 2001). In that study, one of the authors (James T. Kirkwood) identified *potential* historic archaeological sites in the various project alignments based on review of available historic map data and literature.

A total of 122 potential historic sites was identified (Reynolds et al. 2001:28-44), but no map showing their locations was provided in the report. Among the potential historic sites that might be encountered, Kirkwood identified several that were related to river transportation and associated activities or were positioned immediately adjacent to the Ohio River near the Section 2 crossing. These include sites designated as PH2 (Butchertown Development Area), PH3 (1805 Ohio River shipwrecks), PH4 (an 1812 gunpowder factory), PH5 (sunken coal boats), PH8 (a Water Street residence of a boatbuilder), PH9 (George Rogers Clark gunboat sunk near mouth of Berargrass Creek), PH14 (Civil War pontoon bridge just below Towhead Island), PH16 (an antebellum steamboat yard), PH18 (the Point; see above discussion), and PH19 (a residential area near the Beargrass cut-off occupied after the 1850s). Near Section 5, Kirkwood identified PH87 (Harrods Creek Historic District), PH88 (town of Harrods Creek, which included a ferry and several businesses), PH89 (tavern at Harrods Creek), PH91 (a tinware factory in Transylvania at the mouth of Harrods Creek), and PH92 (mill associated with 1817 "paper" town of Transylvania).

Of these resources described and noted by Kirkwood, facilities or materials related to PH2, PH9, PH14, and PH18 have the highest potential for being documented in the sonar survey of Section 2. According to Kirkwood, (Reynolds et al. 2001:32-33; also Kramer 1986:336-338 and Yater 1979:107), the Butchertown Area was an outgrowth of the meat packing industry in Louisville. Drovers who brought cattle and hogs to Louisville would often stay at the Bourbon House, located between Washington Street and Beargrass Creek. The butchers lived in houses that backed onto Beargrass Creek, and the meat was transported directly from there to the wharf area for river shipment. The area developed a variety of associated industries (such as soap, tanneries, and specialty packing houses) after the 1850s. The 1805 shipwrecks (PH4) are shown on a map, but these are at the head of the Falls, and are most likely outside of the Section 2 survey area. The same is true for the sunken coal boats (PH5), which were sabotaged in 1833 near the mouth of the Louisville and Portland Canal to curtail the operation of the canal. The George Rogers Clark gunboat (PH9) was reported in 1832 to have sunk near the mouth of Beargrass Creek; it might be within the Section 2 survey area if it still exists. Though potentially within the Section 2 survey area, remnants of the Civil War ear pontoon bridge (PH14) are unlikely to be found, as this temporary structure was likely dismantled soon after it was used in 1982. Finally, most of the historic structures or other materials related to the Point are probably located on land, and not in the Section 2 crossing. However, remnants of related structures such as docks and landings may be present within the survey area, especially facilities associated with the operation of a ferry operated in the early 19th century.

For the Section 5 survey area (East End crossing), facilities most likely to be encountered relate to operation of the Harrods Creek ferry in the late 18th and early to mid-19th centuries (PH88). Other potential structures that might be encountered may relate to the mill, tavern (PH89) or tinware factory (PH91). However, the most likely form of evidence that can be linked to these locations are probably docks, landings, or other facilities directly related to river transportation and commerce.

A brief review of the OSA site files revealed several sites within two kilometers of both survey areas. Of these, the most significant is the Barber House or Rosewell (15JF679), discussed in the previous section and listed on the State Historic Resources Inventory as JF452. Other historic sites are documented near both

the Section 2 and Section 5 crossings, but these are well away from the shorelines adjacent to the present survey areas. Structures related to these sites are not expected to be encountered.

The most important information for interpreting possible cultural resources that might be encountered in the sonar survey was derived from the documentary research. This has been discussed above, but a brief summary will serve to define the types of cultural resources that might be encountered and will also serve as survey predictions for the project areas.

For Section 2, the most common types of cultural resources that might be present are associated with river transportation and commercial enterprises that used the river for transport of goods. These include sunken vessels and also the docks, wharves, and landings that served the commercial community. The Section 2 area was used for loading, unloading, and docking of flatboats and steamboats in the 19th century and tow barges in the 20th century. Given the high incidence of loss of vessels (including steamboats, flatboats, keelboats, and tow barges) that has been documented for the Falls of the Ohio (see various statistics cited in Johnson 1974), direct evidence of such loss might be highly probable in this survey tract.

For Section 5, the most probable type of cultural resources that might be encountered are related to the ferry crossing at Utica/Harrods Creek. However, the proposed location of Section 5 is probably too far upstream to intersect the actual ferry location or associated landings, wharves, or docks. On the Kentucky side of the river, there might be evidence for a rural steamboat landing associated with one of the larger farms along the river, though these facilities were often rudimentary and of a temporary nature (see Ball and Parrish 1985). There may also be evidence of ferry facilities or landings associated with Transylvania or the Harrods Creek settlement.

As for the survey itself, there are no other known instances of use of side-scanning sonar for archaeological survey in Kentucky. This survey method is recommended for remote sensing in underwater conditions, and is commonly used to assess shipwrecks and other underwater cultural resources. It is most often used in states with significant coastal waters where shipwrecks of potential historical significance are more likely to be encountered. It has also been used in the Great Lakes, again to assess shipwrecks. It is also almost always used in conjunction with diving or video documentation to “ground”-truth any finds.

Based on the use of this technology in other underwater survey situations, it was expected to yield good results in the present survey. Good results include production of detailed maps and images that are georeferenced so that objects can be relocated if necessary. Good results also include an interpretation of the imagery by persons who are trained in its use. Good results do not necessarily include finding any cultural resources. With these cautions in mind, we next discuss the field and laboratory methods employed in the present survey.

CHAPTER 4
FIELD AND LABORATORY METHODS

The purpose of this survey was to identify any archaeological resources within the survey areas, which consist of two bridge crossings over the Ohio River in Jefferson County, Kentucky. The crossings are designated as Section 2 (Downtown Crossing) and Section 5 (East End Crossing) of the LSIORBP. The surveys use side-scanning sonar to detect potential cultural resources below the surface of the Ohio River. The potential eligibility of these resources for nomination to the National Register of Historic Places (NRHP) was to be assessed to the extent possible, based on the information obtained from the survey and correlation of the survey data with historic documents. This chapter presents a brief discussion of the field methods used in the survey, the methods used to interpret the field results, and the methods employed in the historic documentary research.

FIELD METHODS

There is no on-ground component to this project, as the survey was conducted using remote sensing of the floor of the Ohio River at the two crossings. Even though the survey was conducted using remote sensing techniques and there are no artifacts that were recovered as a result of the field work, the methods and techniques used to conduct the survey are still relevant.

Mainstream Commercial Divers, Inc. (MCDI) of Murray, Kentucky, was contracted by UK-PAR to perform side-scan sonar surveys of two proposed bridge corridors (Sections 2 and 5 of the LSIORBP) near Louisville, Kentucky for the Kentucky Transportation Cabinet. The side-scan sonar surveys were performed in an attempt to locate objects of historical significance (i.e. sunken vessels, structures) prior to bridge construction. MCDI used an aluminum-hulled survey boat equipped with an Imagenex 855 Digital Sidescan Sonar unit (Figures 4.1 and 4.2) to conduct the actual survey. The side-scan sonar was operated at a frequency of 330 kHz. The side-scanning transducer emitted acoustic waves that covered a path width of 60 meters on both the starboard and port sides of the survey vessel. The acoustic waves refracted from the river bottom back to the transducer, which sent the return signal to the processor. Based on the strength of the return signal, the hardness of the bottom material could be classified by the processor.

The sonar system was connected to a Starlink/Raven Invicta 210 DGPS system, which utilizes differentially corrected positioning data from a US Coast Guard beacon at Louisville and is rated as submeter accurate. The DGPS connection provides a real-time readout of the boat's geographic position to the sonar processor as areas are side-scanned. Side-scan data were collected and viewed during the survey using Hypack Hydrographic Software.

DATA PROCESSING AND INTERPRETATION

Post-processing of the side-scan data was accomplished using Hypack, SonarWeb Image Processing Software, and ArcView 9.1 GIS software. During post-processing, a georeferenced mosaic was formed from the multiple side-scan images for each bridge corridor. The georeferenced mosaics are set to the UTM Zone 16 (meters) coordinate plane and the NAD83 datum. Background color aerial photos were obtained from the Kentucky Division of Geographic Information. KYTC personnel provided the bridge centerline coordinates to MCDI on site while the survey was being conducted.

The resultant images (presented and discussed in Chapter 5) incorporate information about the general configuration, texture, and hardness of the bottom surface. The general configuration of the bottom

Figure 4.1. Aluminum Survey Boat Used by MCDI for Side-scanning Sonar Surveys. Torpedo-shaped item is the side-scanning sonar transponder.

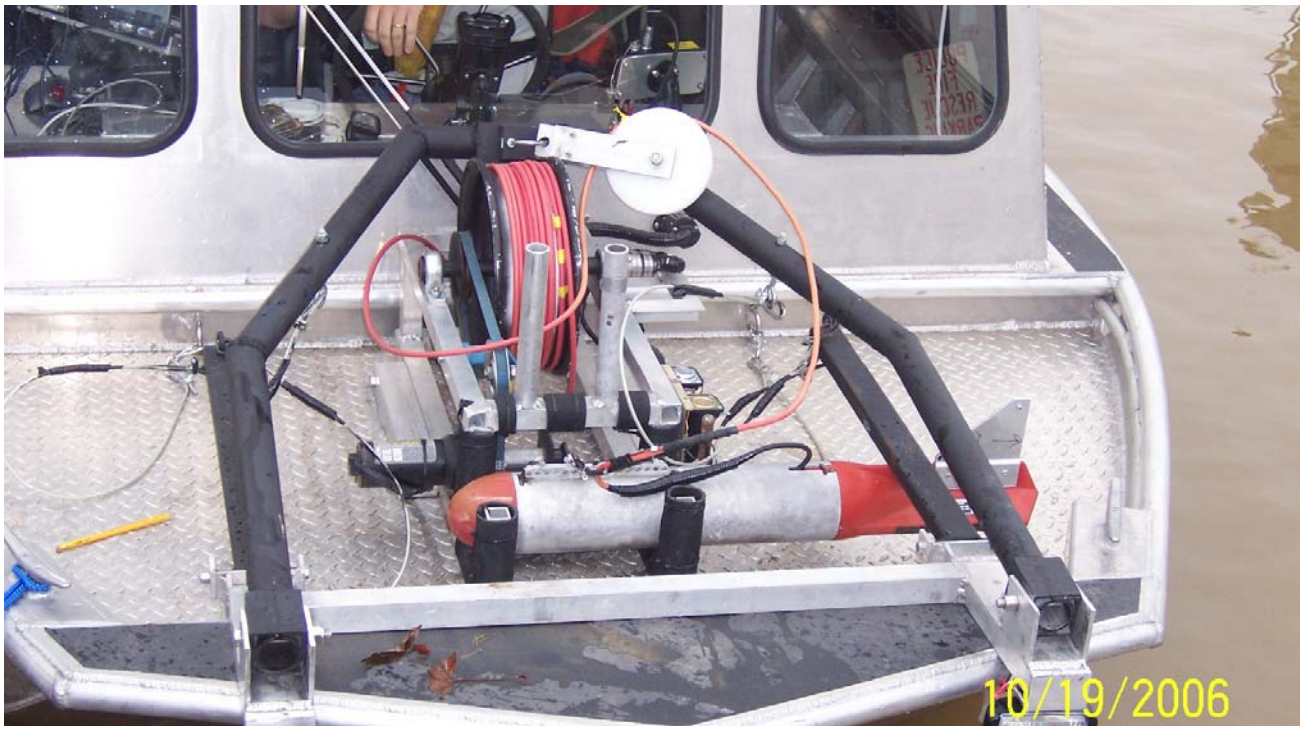

Figure 4.2. Close-up View of Side-scanning Sonar Transponder and Tow Line.

can be discerned by the presence of major features that cover large areas. These most likely represent geological or geomorphic features such as bedrock outcrops or channel paths. The hardness of the bottom or reflective surface is shown by the brightness of the image. Harder surfaces have a stronger reflection of the sonar signal and are imaged as brighter areas; softer materials attenuate the sonar signal in its reflection and are imaged as darker areas. Areas with little or no reflection of the sonar signal show up as very dark or black in the images. These areas are in the "shadow" of objects on the bottom, and the side-scan sonar signal is blocked by the object. Any object on the bottom is always adjacent to the shadow that it casts and always appears as a brighter area next to the dark shadow. A general interpretation of the texture of the bottom can be discerned by the pattern of objects and shadows and their sizes. It is important to understand that any object of interest will be a brighter reflection area. The shadow cast by this object may be more visually prominent, as it is shows as a dark area that more readily catches the attention of the casual observer. However, the adjacent object with its brighter reflection is the actual target of interest and interpretation.

Because the signal used is 330 kHz, the images of the river bottom have relatively high resolution, especially at the relatively short distances and shallow water depths encountered in the Ohio River. This high resolution permits the sizes of objects to be calculated with relatively high accuracy. MCDI personnel indicate that the horizontal dimensions of an object can be calculated to within about a half meter. Finally, because the general geometry of the river bottom, the side-scan angles, and the water depth are all known, this allows the height of objects observed on the river bottom to be calculated. These heights are measured perpendicular to the angle of the sonar signal, and are thus not true elevations, but instead are relative heights of objects. Still, this information is useful for interpreting the images.

HISTORIC DOCUMENTARY RESEARCH

To help interpret the images derived from the side-scanning sonar survey, historic documentary research was conducted. This research focused on identifying river-related cultural resources that might be present within or adjacent to the survey areas. Most of this research has been presented in Chapter 3 as part of historic contexts for the project areas. Other documentary research helps to identify and interpret the specific results of the sonar survey, and these findings are presented in Chapter 5.

CURATION

A copy of this report and all field notes, images, and photographs pertaining to this study are curated at the William S. Webb Museum of Anthropology, Lexington, Kentucky, according to the standards outlined in 36 CFR Part 79 *Curation of Federally-Owned and Administered Archaeological Collections.*

CHAPTER 5
SURVEY RESULTS

This chapter presents the results of the side-scanning sonar survey of Section 2 (Downtown crossing) and Section 5 (East End crossing) over the Ohio River. A description of the project area investigated and discussion of objects of interest identified in the sonar survey are included here. In addition, possible interpretations of these objects are discussed.

SONAR SURVEY RESULTS

As discussed in Chapters 1 and 4, MCDI conducted a side-scanning sonar survey of the Ohio River bottom for Sections 2 and 5 of the Louisville-Southern Indiana Ohio River Bridges Project (LSIORBP). Each of these crossings is about 800 meters in length. Section 2 averages about 180 meters in width, while Section 5 averages about 220 meters in width. The precise boundaries of rights-of-way and bridge construction design had not been established at the time the survey was conducted. As a result, the entire area of both sections was subjected to the side-scanning sonar survey. The area surveyed for Section 2 is about 14.4 ha, while Section 5 is about 17.6 ha in extent. Figures 1.3 and 1.4 show the locations of these crossings relative to portions of the Jeffersonville, Indiana-Kentucky 7.5' USGS quadrangle. Section 2 runs parallel to and just east of the John F. Kennedy Memorial Bridge. Section 5 traverses the Ohio River near Transylvania Beach on the Kentucky side, running generally northwest to intersect the Indiana shore just north of Utica.

The post-processing of the side-scanning sonar data (discussed in Chapter 4) resulted in creation of a georeferenced mosaic of the multiple passes conducted in each section. Figure 5.1 shows the georeferenced composite of side-scanning sonar images from Section 2. Figure 5.2 shows a similarly constructed composite for Section 5.

The imagery and sonar data are useful for assessing both the relative hardness of reflected surfaces, with harder surfaces having higher brightness in the images, was well as the smoothness of the surface and its immediate surrounding context. Shadows, which show as very dark brown or black areas, are areas where the sonar signals were not reflected. These are formed by horizontal or vertical projections of objects above the general level of the river bottom. The regularity of the shadows can help assess the nature of the object casting the shadow. Some general interpretations of the images are offered, followed by discussion of anomalies that were identified.

Figures 5.1 and 5.2 both indicate that extensive areas of the river bottom have smooth, probably silt-covered surfaces (labeled A in both figures). These silt-covered areas probably indicate the deepest part of the channel where the current is most rapid. There are also areas that are much rougher, denoted by fine patchy areas of light and dark reflections that indicate irregular reflections from the bottom surface (labeled B in Figures 5.1 and 5.2). These portions of the river bottom may be covered by urban debris or rocks of various sizes. The broad rectilinear but irregular imagery shown roughly parallel to and a hundred meters from the Indiana shoreline in Figure 5.2 (labeled C) has attributes consistent with shelving subaqueous bedrock outcrops. Submerged tree trunks with root or branch crowns attached clearly show in Figure 5.2 as elongated teardrop shapes that are oriented parallel to the stream flow (labeled D). All of these features are commonly encountered in side-scanning sonar imagery of river bottoms. After consultation with the MCDI survey team, we interpret these areas as part of the normal background that reflects natural, not cultural, conditions of the surface bottom. However, the mosaic images also show three anomalies, two in Section 2 (Anomaly 2A and Anomaly 2B in Figure 5.1) and one in Section 5 (Anomaly 5A in Figure 5.2).

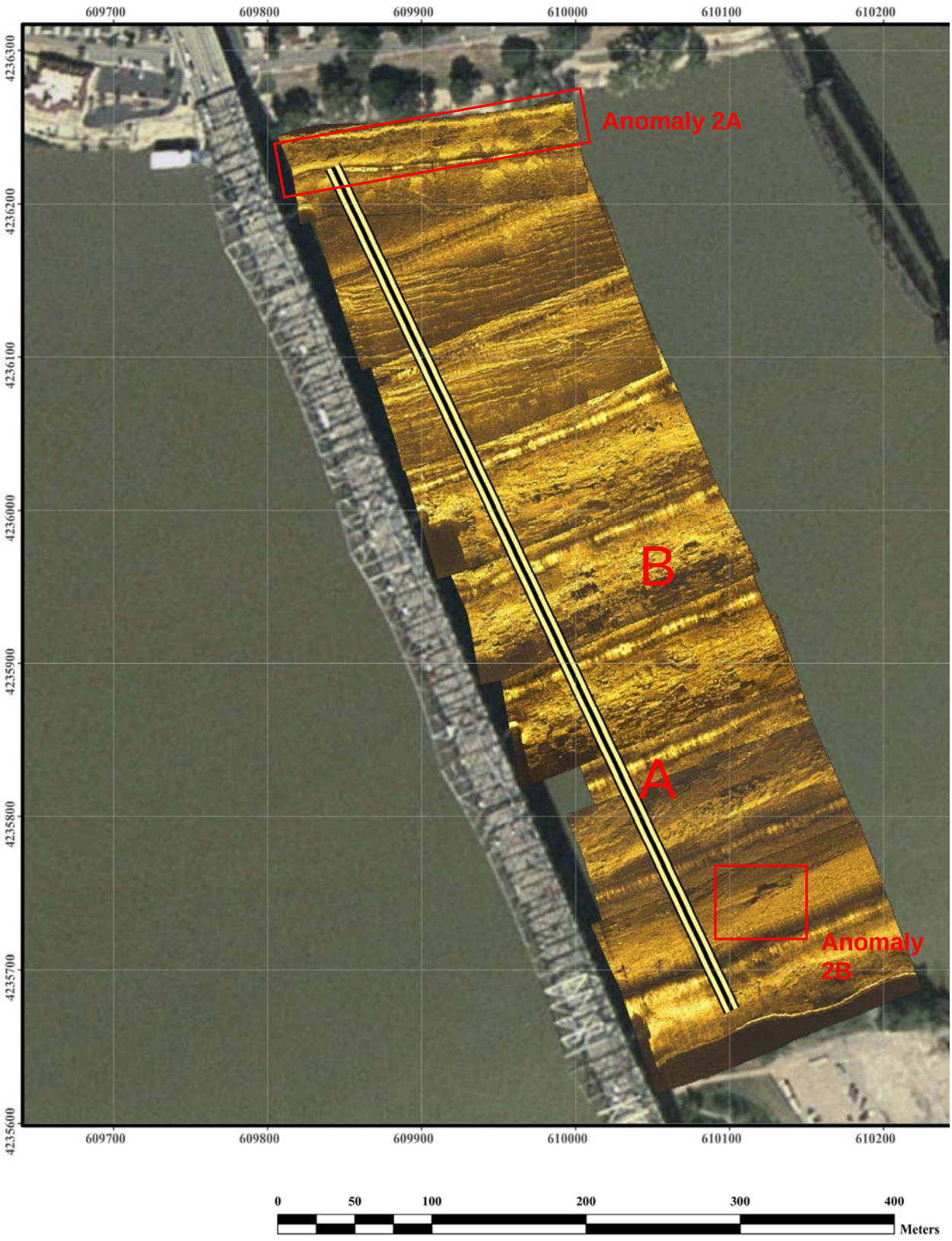

Figure 5.1. Composite Side-Scan Sonar Image of the Section 2 Survey Area. A denotes an area with a smooth, silty bottom; B denotes an area with irregular bottom. A 100-m UTM grid is shown and labeled at the margins. Boxes show locations of Anomaly 2A and Anomaly 2B.

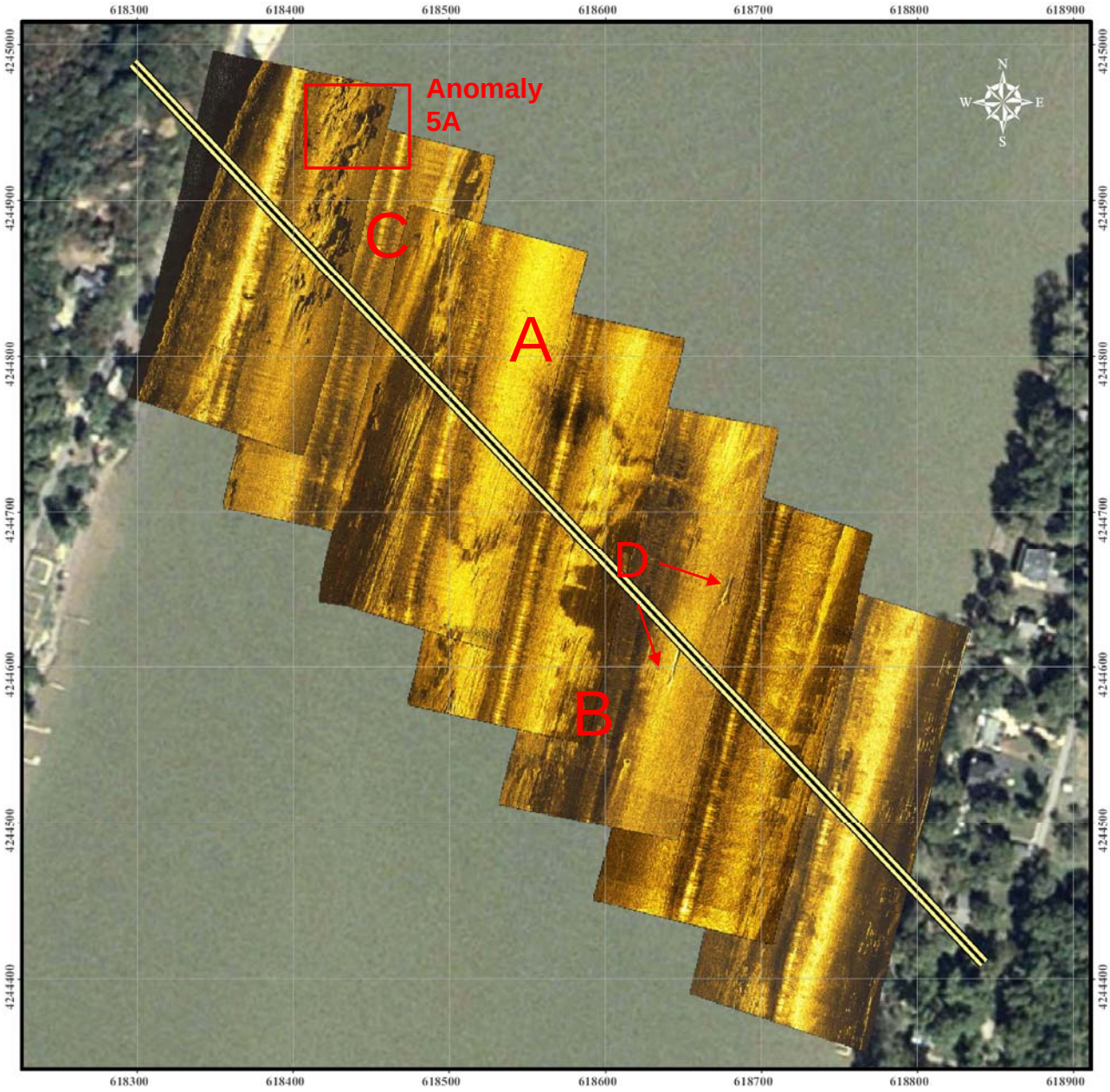

Figure 5.2. Composite Side-Scan Sonar Image of the Section 5 Survey Area. A 100-m UTM grid is shown and labeled at the margins. Boxes show objects of interest. A denotes an area with a smooth, silty bottom; B denotes an area with irregular bottom. C denotes an area of bedrock shelving. D indicates submerged trees. The box circumscribes Anomaly 5A.

Anomaly 5A (Figure 5.2) is an image of an object that projects above the river bottom about 80 meters from the Indiana shoreline near the north corner of the surveyed area. Anomaly 5A casts a fairly regular rectangular shadow to the southeast. An enlargement of this general area (Figure 5.3) shows a pattern of nearby shadows and bright areas that is consistent with sonar imagery of subaqueous bedrock shelves. However, there are attributes of the Anomaly 5A area that are unusual and suggestive of a cultural rather than natural origin. A further enlargement (Figure 5.4) shows these attributes more clearly. First, there are clearly two levels of material projecting upward above the general level of the river bottom. A smaller rectangular object projects either horizontally of vertically from a larger rectangular base. The lower tier of Anomaly 5A measures about 28 feet (6.5m) long and 20 feet (6m) wide; the upper tier is about 19 feet (5.5m) long and 10.5

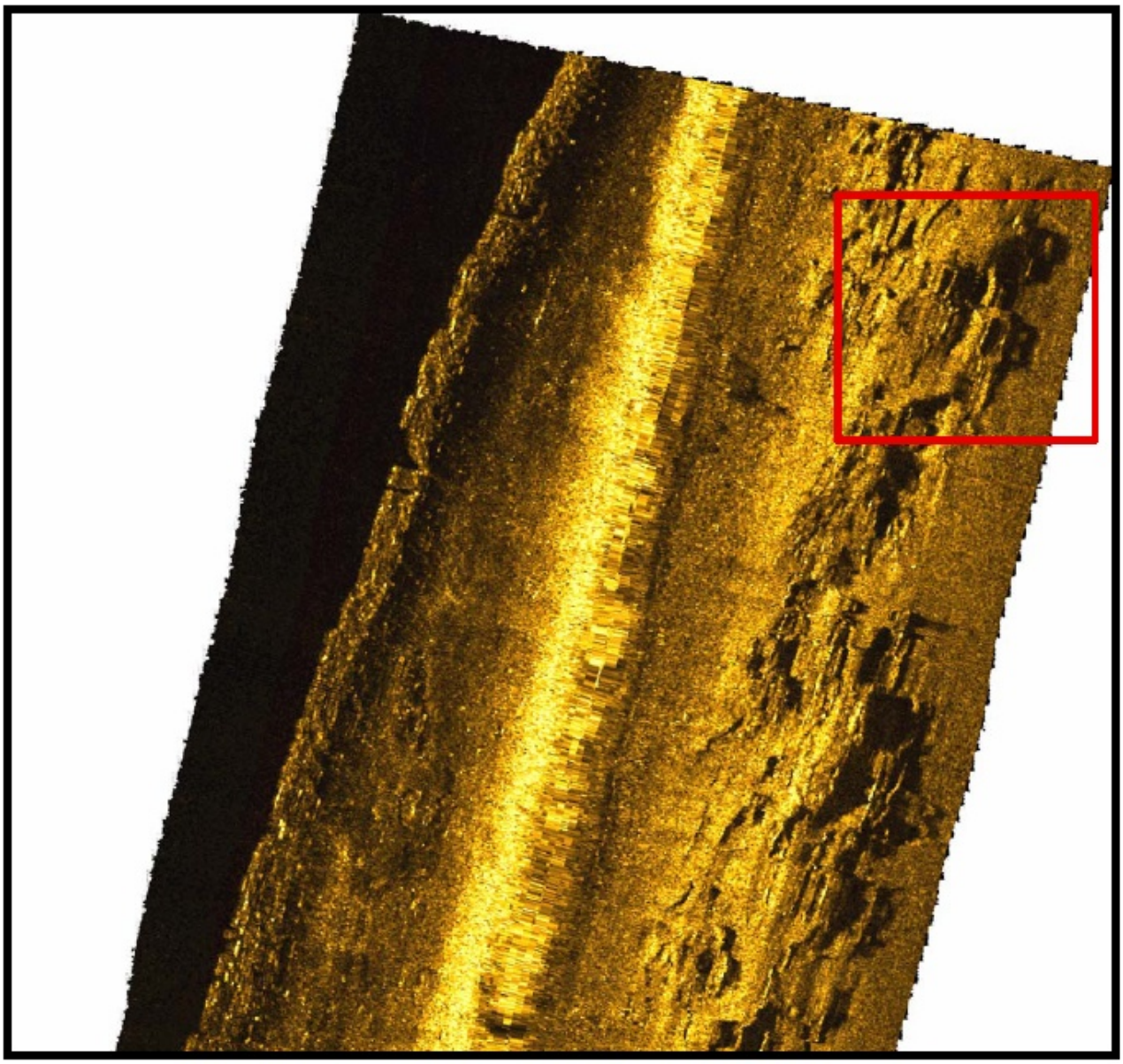

Figure 5.3. Enlargement of the Northwest Portion of the Section 5 Side-scan Sonar Imagery. The roughly linear mosaic of bright reflections and deep shadows is consistent with subaqueous bedrock shelves. Anomaly 5A is indicated by the box.

feet (3.2m) wide. The upper tier projects approximately 1 foot above the level of the lower tier, while the lower tier projects approximately 2 feet above the general river bottom (see also Figure 5.5). Also unusual is the presence of two reflective areas *within* the shadow cast by this object (Figure 5.4 and blue arrows in Figure 5.5). These reflective areas measure about 4-5 feet (1.2-1.5m) in diameter and are regularly spaced relative to the shadow boundaries. These reflective areas likely derive from holes in the object itself which allowed sonar signals to pass and create a reflection. The regularity and rectilinear outline of the object, the presence of two distinct levels, and the possible presence of two evenly spaced and similarly-sized holes suggest that the object is cultural in origin. However, its function is not interpretable given the present data. The MCDI personnel have not seen any imagery like this, and they maintain that the image is most likely a real object rather than an artificially regular image created during post-processing of the sonar data. Its position relative to the shore and its depth suggest it is related to river transportation activities and not simply

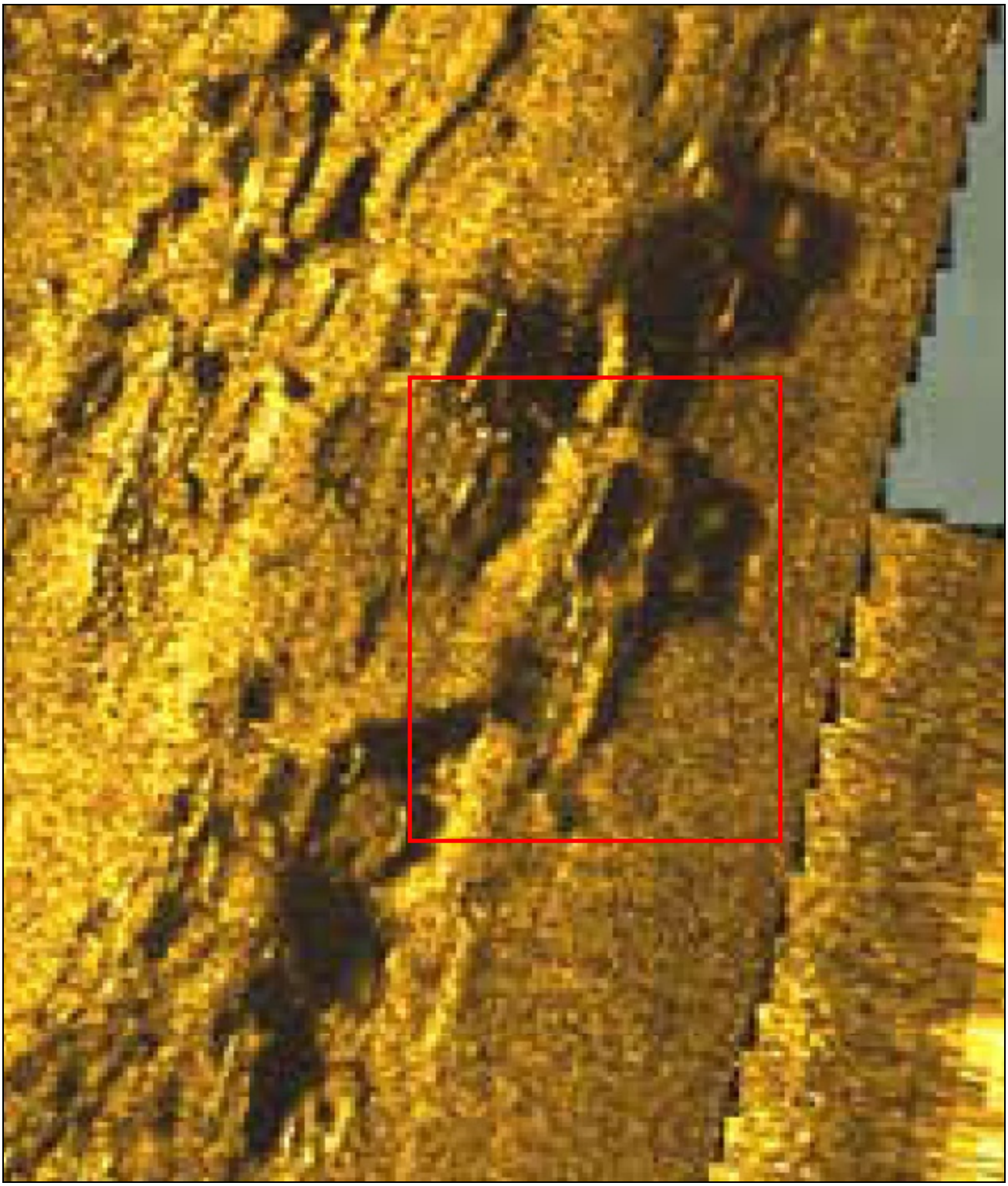

Figure 5.4. Enlargement of Anomaly 5A. The area of interest and associated shadow is outlined by the box.

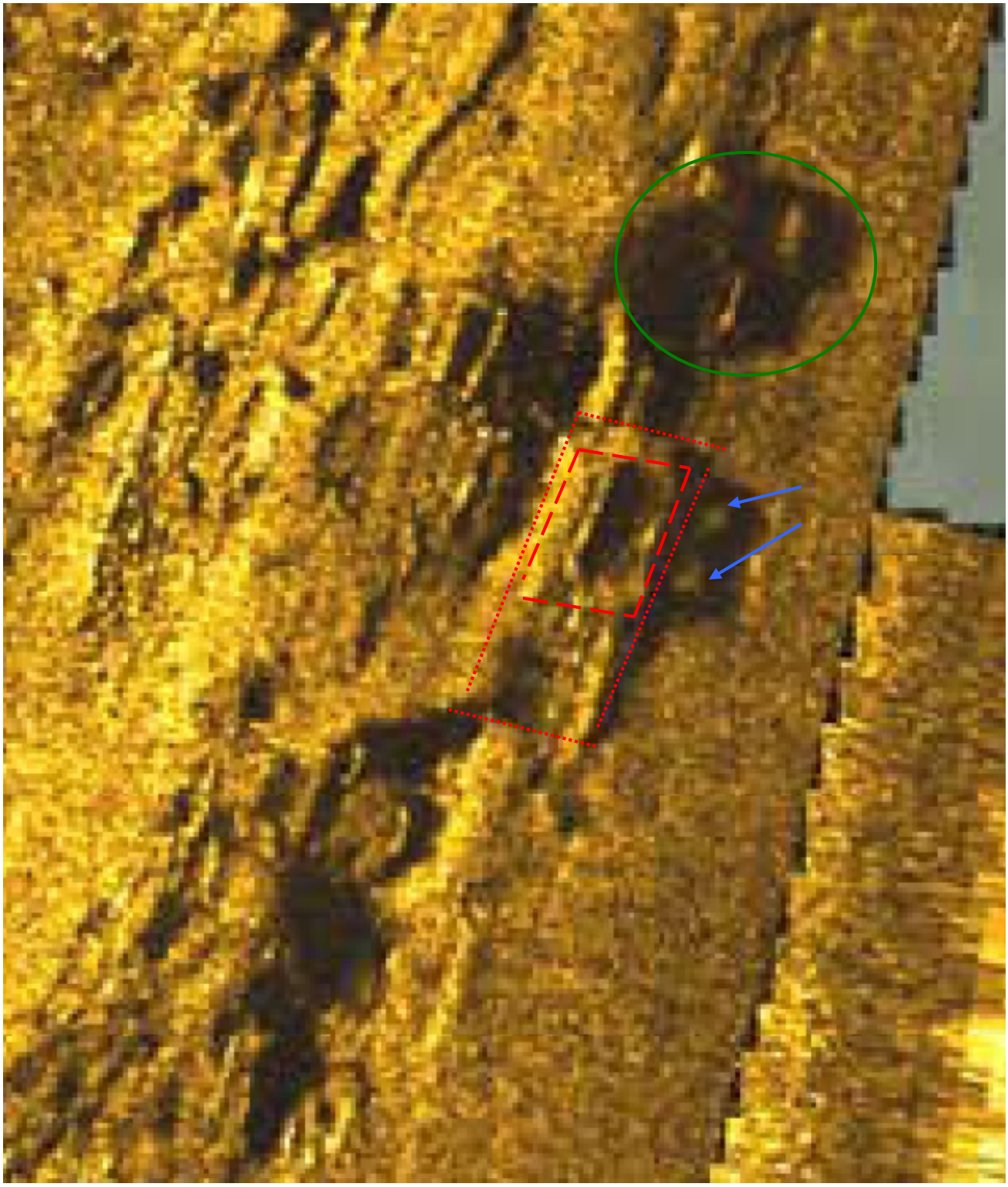

Figure 5.5. Enhanced Enlargement of Anomaly 5A. Red lines show possible limits of basal tier and upper tier portions of Anomaly 5A. Blue arrows show reflective areas within a shadow cast by the anomaly. Green circle shows another area of reflective surface within a shadow, possible a natural rock outcrop.

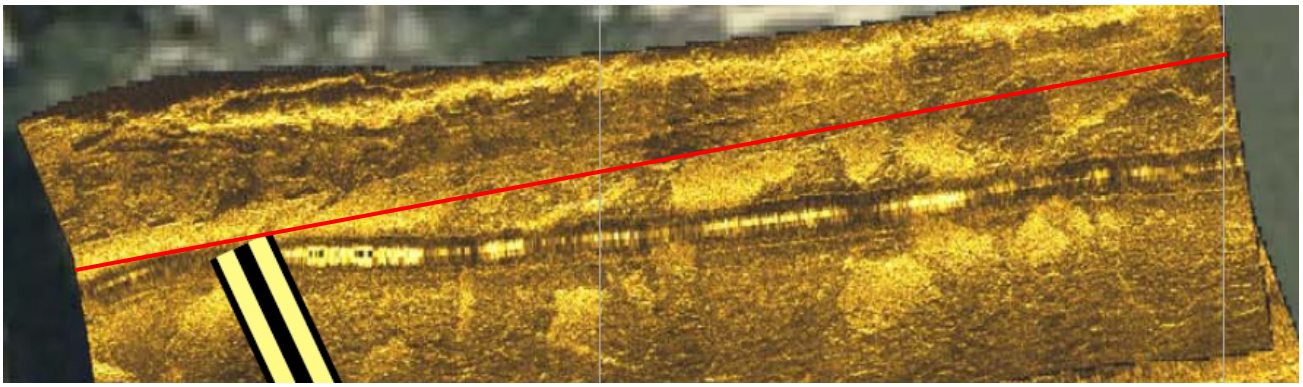

Figure 5.6. Enlargement of Anomaly 2A at North End of Section 2 Survey Area. Red line is just south of anomaly, which shows alternating light and dark segments (representing higher areas casting shadows), especially to the west.

an abandoned car or truck. It may represent part of a wharf, dock, or other mooring facility, or it might be a sunken houseboat.

It is also possible that Anomaly 5A may simply be a highly convoluted area of bedrock shelving and larger rocks that project from the bottom at odd angles. This interpretation is supported by another area just to the northeast of Anomaly 5A (see green circle in Figure 5.5) that also has reflective areas surrounded by shadow.

In Section 2 the sonar survey detected two anomalies. (red boxes in Figure 5.1). Anomaly 2A (Figure 5.6) is near the Indiana shoreline and is a long, linear segment running nearly parallel to the shore. This area shows some alternating shadows and bright zones that measure about 10 meters in length for each segment. Anomaly 2A runs the entire width of the survey area (approximately 615 feet or 188 meters). The western portions of Anomaly 2A that have associated distinct rectangular shadows protrude approximately 1 to 1½ feet (0.3 to 0.5m) above the river bottom. The feature is about 60 feet from shore on the west side of the image and about 26 feet from shore on the east (right) side of the image. The linearity and regularity of Anomaly 2A strongly indicate that it is cultural in origin rather than a natural phenomenon. It is likely part of a floodwall or retaining wall, or possibly part of an old roadbed.

Anomaly 2B is about 80 meters north of the Kentucky shoreline (Figures 5.1 and 5.7). A brighter rectangular area and adjacent rectangular shadow indicate an object protruding upwards from the river bottom. The calculated dimensions of this object are about 46 feet (14m) long and 16 feet (5m) wide. The object protrudes about 3½ feet (1.1m) above the river bottom. Based on the size of the object and its location in the river, it is likely to be the remains of a sunken vessel, most likely a work flat or small barge.

ADDITIONAL INTERPRETATIONS FROM HISTORIC DOCUMENTARY DATA

The anomalies in the sonar readings recorded in the Sections 2 and 5 crossing could represent a wide variety of submerged objects, as the Ohio River has been an important river transportation route and it has sustained thousands of industrial, residential, and recreational activities for over 200 years. These objects could represent some of the countless vessels that have plied the river, mercantile support buildings and apparatuses, or structures washed away by the numerous floods that have occurred along the banks of the river. Based on the historic contexts presented in Chapter 3, both Sections 2 and 5 were locations where such facilities would have been prevalent, more so for the downtown Section 2 location. The types of objects that might be represented by the anomalies are discussed briefly below.

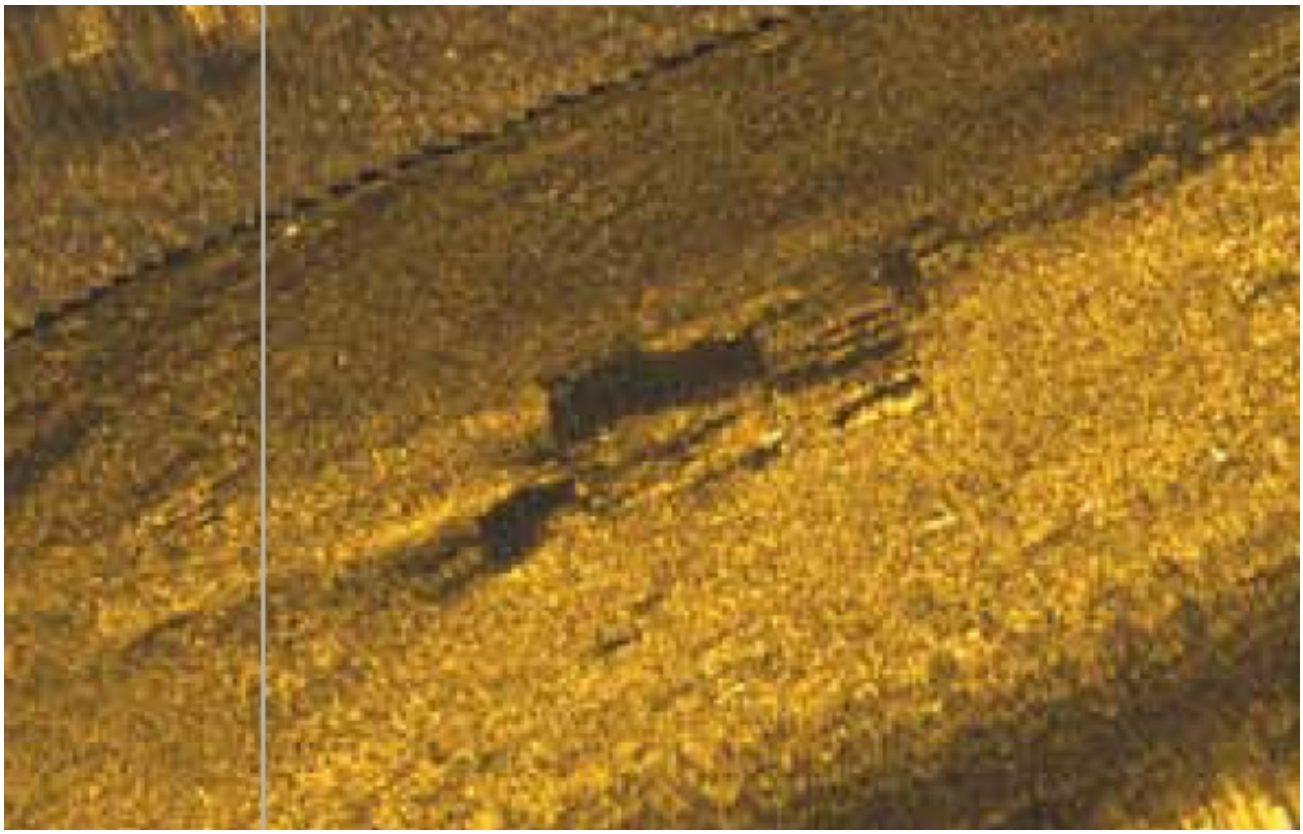

Figure 5.7. Enlargement of Anomaly 2B near South End of Section 2 Survey Area.

VESSELS

A wide range of vessels have been used on the Ohio River since humans first inhabited the area, from Native American bull boats and canoes to modern barge tows. However, the most prevalent of these vessels were those used during the 19th century, when the Ohio River was America's first superhighway. The first commercial vessels used on the river during this time were keelboats and flatboats, which arrived by the 1790s. Baldwin (1941) notes that there were two types of keelboats typically used on the Ohio River—keelboats proper and barges (Figure 5.8). Although the terms keelboat and barge were often synonymous during this period, there were some differences. The typical keelboat was 40 to 80 feet in length and 7 to 10 feet in beam (width). It had a shallow keel and drew around 2 feet of water. They could carry anywhere from 15 to 50 tons, but its burden was usually around 30 tons (Baldwin 1941:45). Barges were generally the same length as keelboats, but were wider, varying between 12 and 20 feet. Their draft was around 3 to 4 feet, and their burden usually was around 40 tons, but could reach up to 170 tons. They often had one or two masts outfitted with a square sail (Figure 5.8). Both keelboats proper and barges were constructed of wood and were built on keels with ribs, and were covered by planks. They were generally in use prior to the Civil War.

Flatboats differed from keelboats in that they were not built on a keel, and had a flat bottom, which rendered them unable to travel upstream (Figure 5.8). They were constructed of wood (preferably oak) using mortise and tenon techniques with pegs or treenails (Baldwin 1941). They ranged in length between 20 and 100 feet and in width between 12 and 20 feet. However, the typical flatboat was probably between 12 and 14 feet wide and 45 to 50 feet in length. Flatboats on the Ohio River were known as "Kentucky Boats" and were

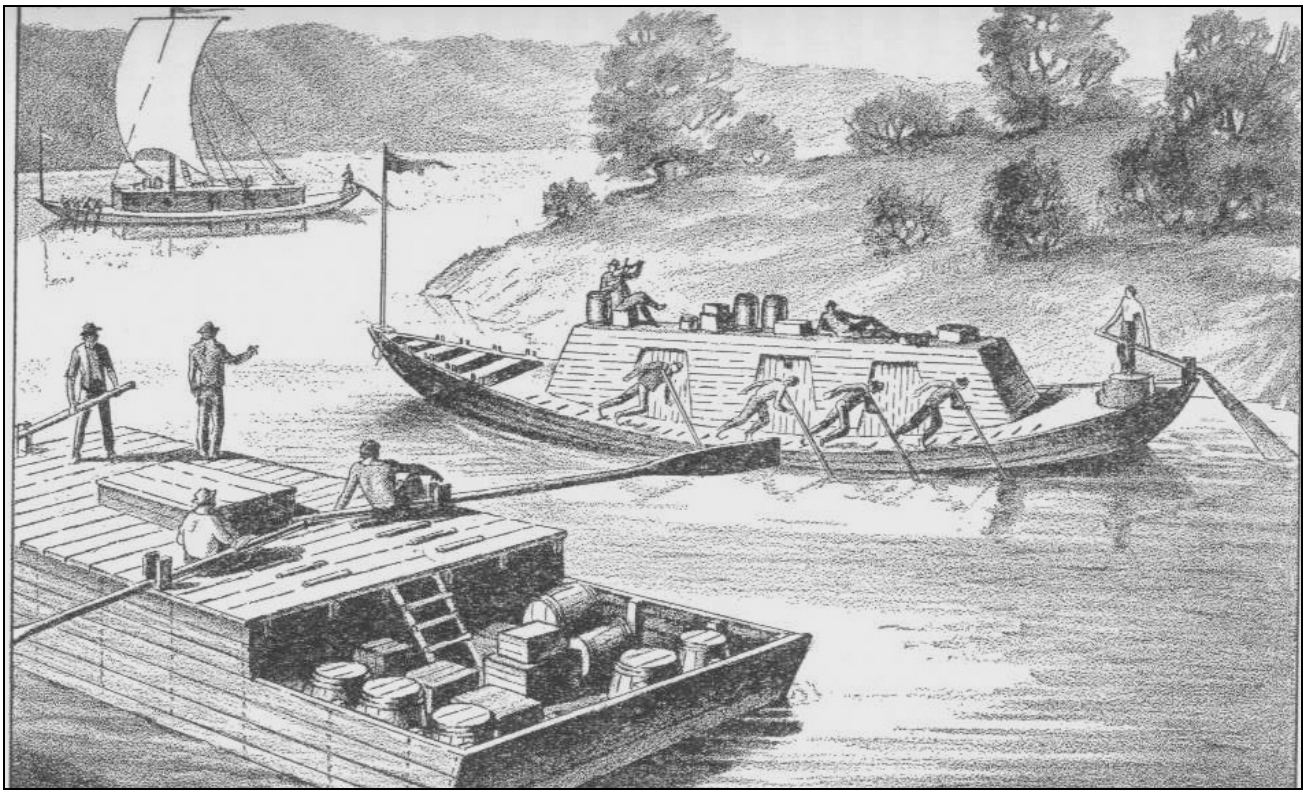

Figure 5.8. Two Types of Keelboats and a Flat Boat (from Baldwin 1941).

typically built only to survive a trip downstream to the Falls or a trip from the Falls farther downstream (Baldwin 1941; Yater 1989). An average flatboat could hold around 40 to 50 tons (Figure 5.9). Since flatboats could not travel upstream, they were often constructed of inexpensive materials. Once a destination was reached downstream, the boats were sold, dismantled for construction materials or firewood, or set adrift and sunk (Baldwin 1941). It has been said that Fort Washington at the site of Cincinnati was constructed from the remains of forty or fifty flatboats (Baldwin 1941:49).

On October 28, 1811, the steamboat age arrived in Louisville when the *New Orleans* steamed into town. The steamboat changed Louisville from a small town into a major city and port, and it also transformed the Ohio River (Yater 1989). The early steamboats on the Ohio River were based on designs of those used in the East on the Hudson River, which resembled ocean-going vessels. They were generally small, as the larger vessels could not make an upstream trip on the upper Ohio. However, the story of steamboat design on the western rivers was one of constant adaptation and redesign (Hunter 1949, Johnson 1974). Eventually the western steamboat became the flat-bottomed shallow-draft vessel with multiple levels that has become the iconic symbol of the steamboat era (Figure 5.10).

Through the 19th century steamboats became larger and could accommodate more tonnage as improvements were made to the water level and conditions in the river. Steamboats from 1818 to the 1830s ranged in length from 109 to 154 feet and in width from 18.1 to 31.6 feet. Between 1835 to and 1845 the size ranged from 129 to 209 feet in length and 19.3 to 29.3 feet in width. Between about 1847 and 1880 vessel size ranged from 132 to 143 feet in length and 23.2 to 37.7 feet in width (Hunter 1949:74). They were constructed of wood typically with decks of pine, beams of ash, and planks of oak. Due to the harsh conditions of the western rivers which included sand bars, snags, landings on shore, and rough handling, the lifespan for a steamboat was only about five years.

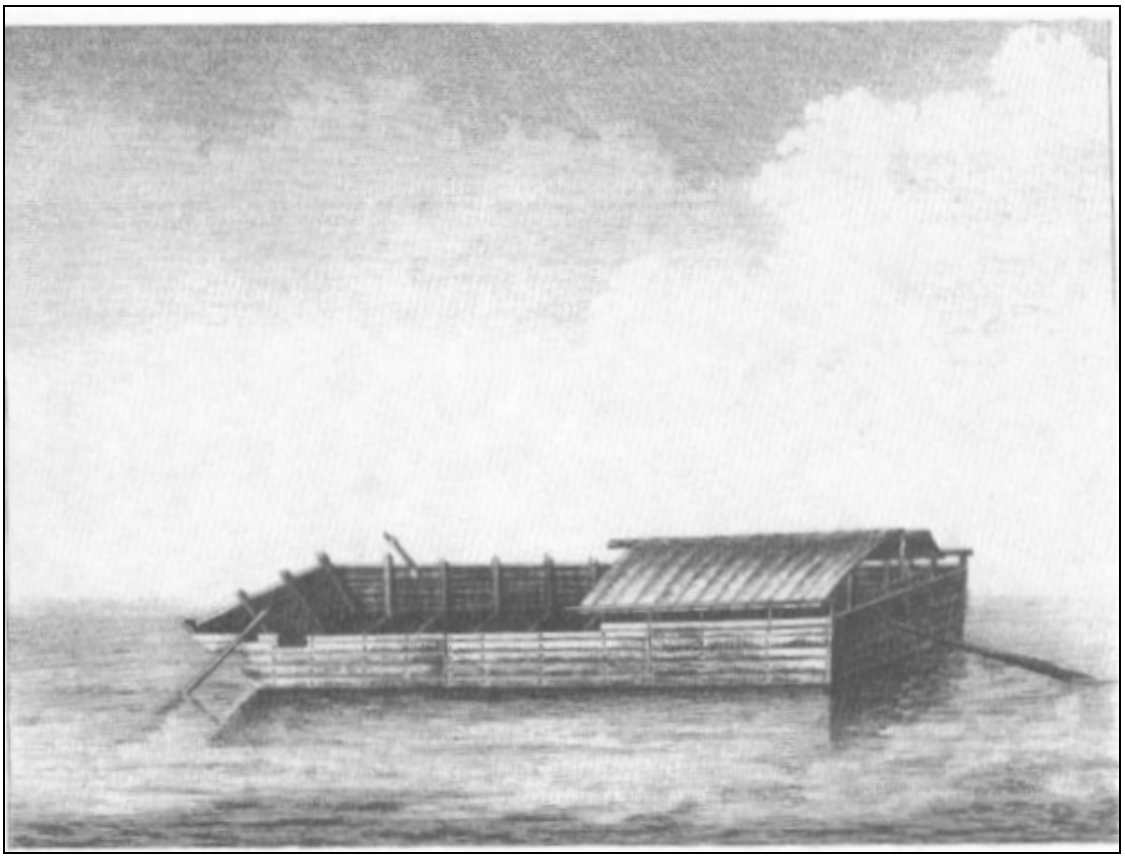

Figure 5.9. Engraving of A Typical Flatboat by Victor Collot (from Allen 1990).

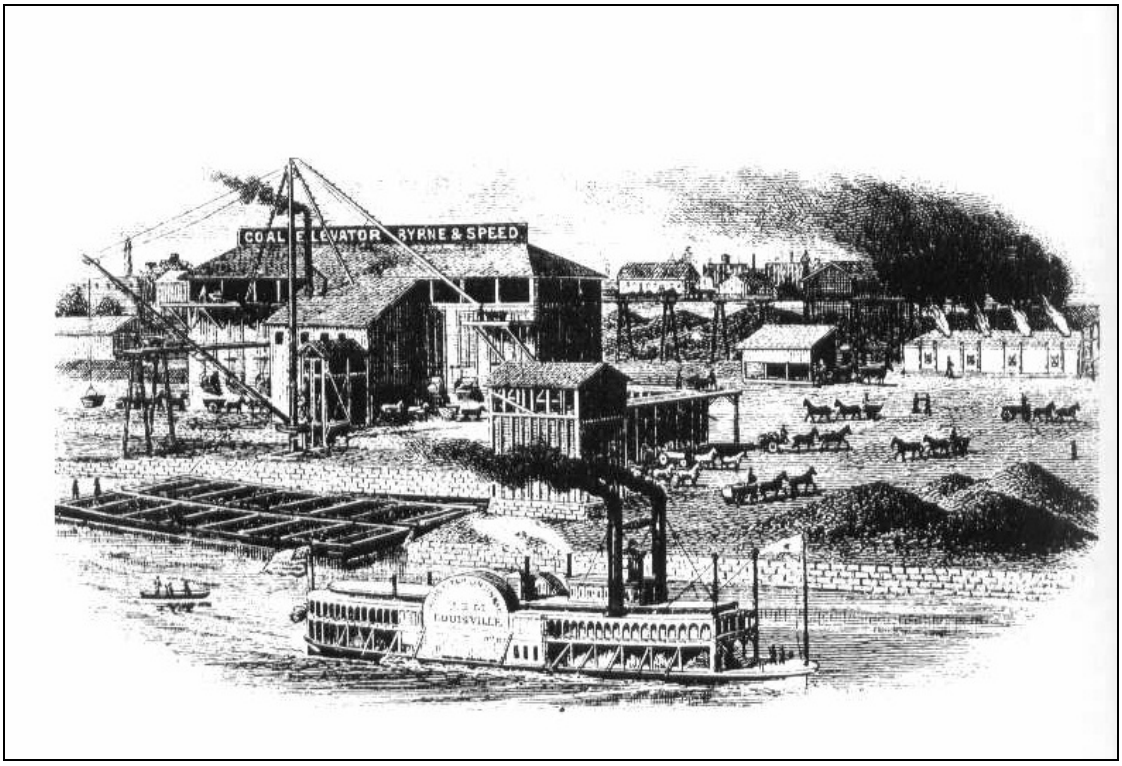

Figure 5.10. A Typical Western Steamboat Steams Past Barges Being Loaded with Coal. Published in Smith's Louisville Commercial Directory 1875-1876 (from Yater 1989).

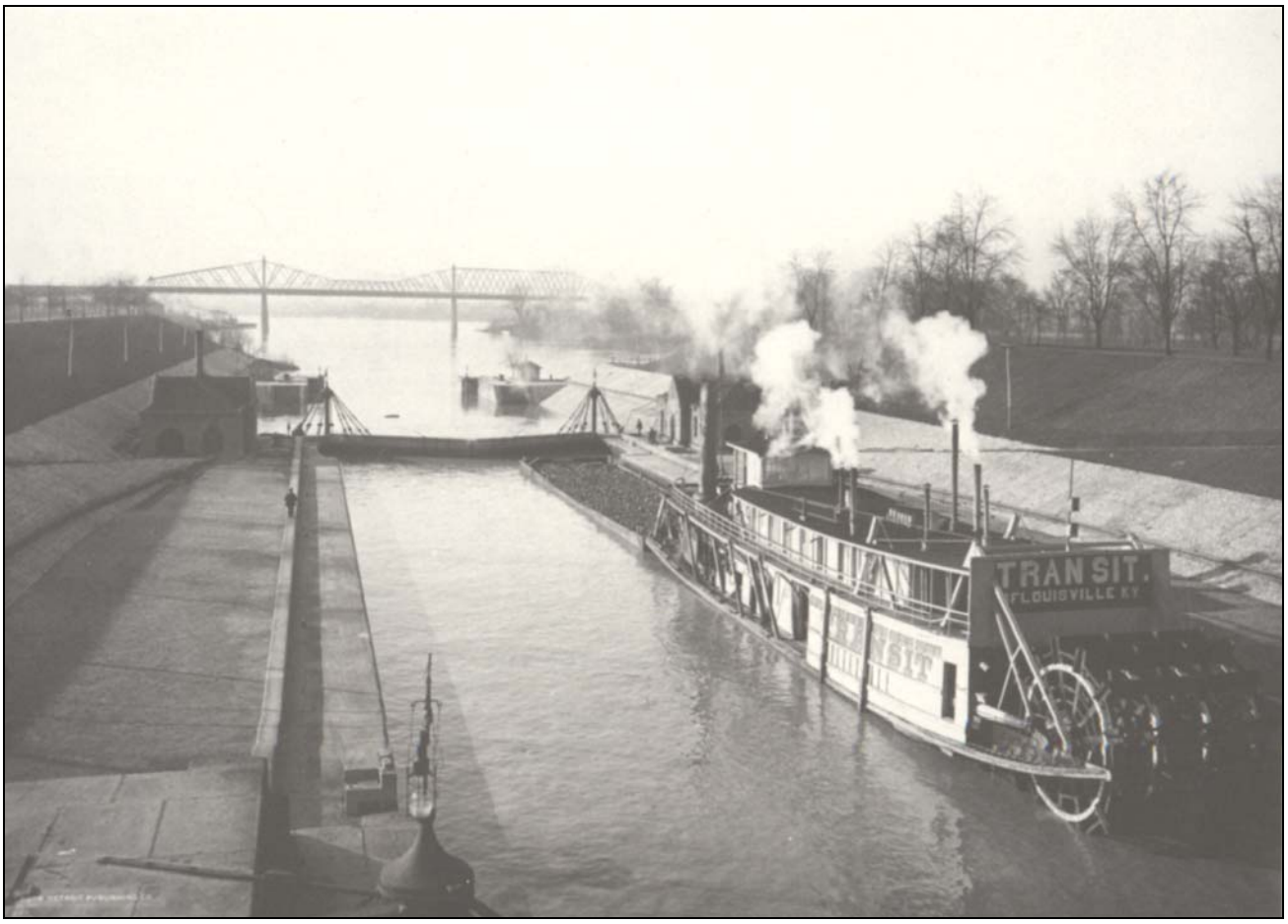

Figure 5.11. A Steam Tow with a Coal Barge in the Portland Canal in 1906 (From Thomas 1971).

Wrecks, boiler explosions, and breakdowns were common in steamboats on the Western Waters. However, wrecked or damaged vessels were often salvaged. The engine was the most durable part and was often reused in other boats. They would be recovered by hand from sunken and wrecked boats. Other materials also were reused in the construction of new boats. Occasionally the hulls of steamboats could be reused as tow barges or as wharfboats. By the 1840s, recovery of cargo and parts from sunken vessels became more common with the introduction of the diving bell. Later in the 1800s, powerful pumps allowed salvage boats to raise sunken vessels (Hunter 1949).

Although steamboats initially carried passengers and cargo within the vessel, by the late 1800s to early 1900s they also were used for towing barges. Thus, the modern tow and barge system was developed initially using steam-powered paddlewheel tows (Figure 5.11). Coal in particular was transported by barges pushed by paddlewheel tows, as the demand for coal increased greatly by the mid-1800s (Figure 5.10). Wooden barges were the most common type of container used for transporting coal on the river during the 1800s and were used up to around 1900. Wooden barges were known to have lined the riverbank along the Louisville shore (see Figures 3.4, 3.5, and 3.6). These barges often broke free from their tow lines, and there are many instances of barges sinking. By the mid-1900s, cargo was primarily moved on the river using diesel tows hauling large steel barges.

Figure 5.12. 1876 Birdseye View of Louisville (published by Chas. Shober & Co, Chicago). Of interest is the mill in the foreground (Jeffersonville side of the river) with millrace that has a retaining wall running parallel to the Ohio River shoreline (from Thomas 1971).

WHARF SUPPORT STRUCTURES AND APPARATUSES

The objects detected during the sonar survey could also be parts of structures, buildings, or apparatuses used in the shipping industry. Although many rural boat landings typically were just cleared areas along the bank, many public wharves and landings such as those found at the Point had more formal structures, including wharf houses, warehouses, docks, elevators, etc. that were used for storing or moving cargo. Figure 5.10 shows an 1870s coal loading operation along the river, which consisted of loading apparatuses (cranes and conveyors), a coal elevator, and storage facilities. Many of these structures were at the river's edge or near it. Figures 3.9 and 3.10 also show a wharf house and a large wooden dock in 1850s views of Louisville's public wharf. Some wharves and landings were improved to make access to boats and barges easier. These improvements included paving the landing with stone, constructing cribbed docks, or placing stone retaining walls along the bank. Figure 5.10 shows a portion of the Louisville wharf that has been improved with a stone retaining wall around a coal elevator. A stone wall that was apparently part of a millrace is visible on an 1876 Birdseye View of Louisville (Figure 5.12) just off the riverbank in Jeffersonville (Personal communication from Chuck Parrish, Historian U.S. Army Corps. of Engineers, Louisville District 1-25-2007). This same mill is shown on the 1865 map of Louisville and its Defenses (Figure 5.13) and is noted as the Smith and Smyzers Mill. The mill is also shown in part on an 1874 view, but it was not visible on the available 1840s and 1850s imagery. Remnants of the millrace or other support structures could have still be submerged by the river, particularly after water levels were raised on the Ohio River to create a 12-foot navigation channel.

These structures as well as the remains of houses could have been deposited at the bottom of the river by several major floods that hit the area during the late 19th and early 20th centuries, of from the rise of river levels due to impoundments. Major floods occurred on the Ohio River in the late 1880s and early 1900s, with the most devastating being the 1883, 1884, 1937, and 1945 floods. These floods removed houses from their foundations and floated them far downstream (Figure 5.14). Such floods and many smaller ones could have

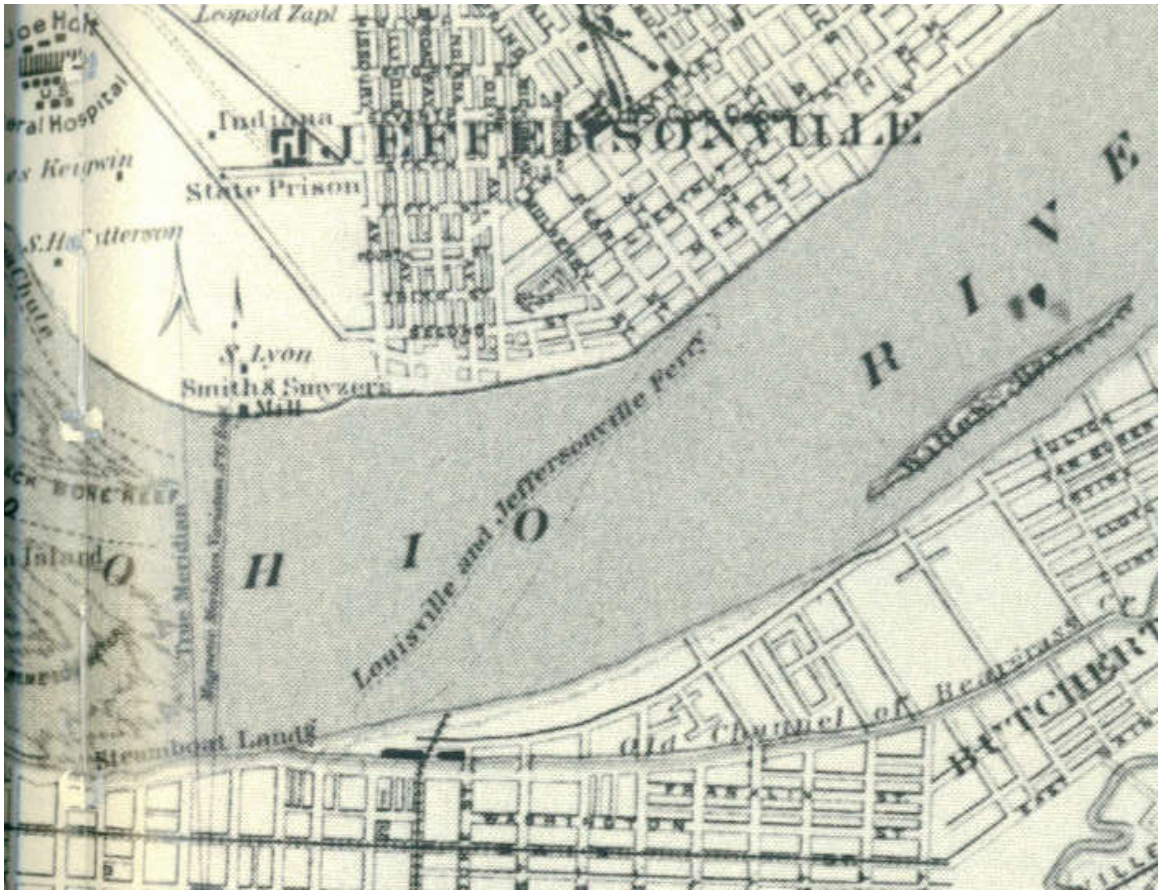

Figure 5.13. Portion of 1865 *Louisville and its Defenses* Map (Simpson and Slayton 1895) Showing Smith and Smyzers Mill. The Louisville and Jeffersonville Ferry course may be offset to avoid crossing the millrace.

washed away houses, docks, sheds, and other structures located along the river's edge and submerged them in the project area. The anomaly in the East End may be the remains of some type of structure. If so, this could more easily explain the and two-tiered level of the object and the holes.

Improvements to the river for navigation took place in the late 1800s and 1900s. A dam constructed at the Falls in the 1880s helped divert water into the Indiana Chute of the Falls and into the Portland Canal, but did not significantly raise water levels in the river (Figure 3.3). Major projects to establish a six-foot and later a nine-foot navigation depth took place in the early to mid 1900s, with the construction of Dam 41 at the Falls (Personal communication by Chuck Parrish, Historian, U.S. Army Corps. of Engineers, Louisville District 1-25-2007; see also Johnson 1974). Water levels in the upper pool were raised between about 8 and 11 feet above the historic normal water level, depending on proximity to the dam. Thus water levels were not dramatically raised due to these impoundments, but this action extended the river width slightly and could have submerged some structures nearest the shore.

CONCLUSION

Based on the historic context of the proposed bridge locations, thousands of vessels from keelboats to tow barges and even pleasure boats plied the waters of the Ohio River during the last 200 years. The wreck of any of these vessels could represent the objects detected during the sonar survey of the Sections 2 and 5 crossings. This is particularly true for the Anomaly 2B in Section 2, as vessels were often stored or moored in this area. However, it is just as likely that Anomaly 2B and Anomaly 5A could both represent large remnants

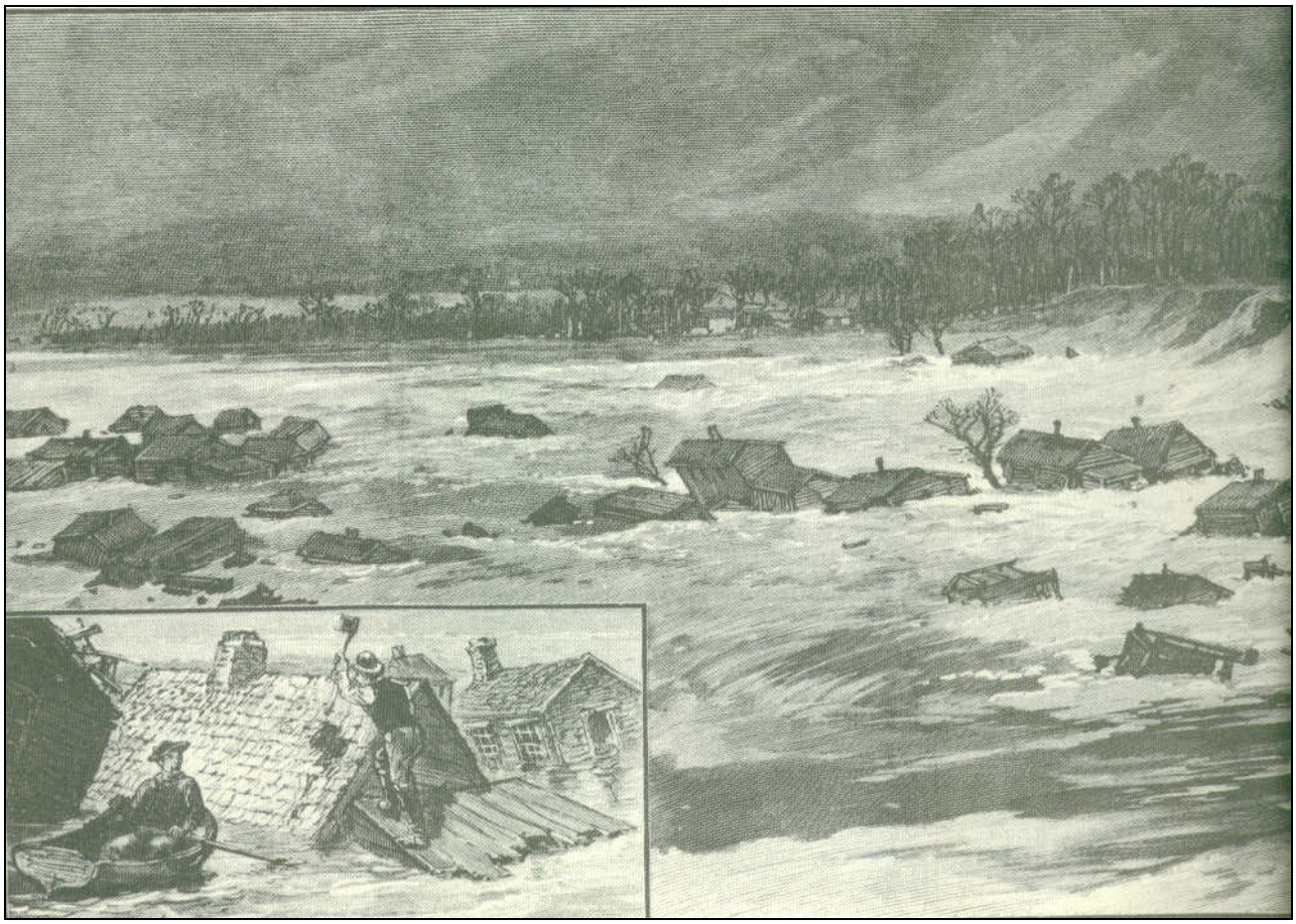
Figure 5.14. Sketch of the 1883 Flood Published in *Harper's Weekly* February 13, 1883 (from Thomas 1971).

of debris washed away from the riverbank, such as houses, docks, wharf support buildings, and loading apparatuses. It is also quite possible these objects are modern in origin, as automobiles and large trees frequently end up at the bottom of the river. The river is a very dynamic body of water and there are many processes at work that can deposit a number of large fragments of debris on its bottom. This action is a part of the river's history, which can conceal remnants of the past in its dark muddy water.

The sonar survey detected three anomalies that could be man-made objects. Anomaly 5A in the East End crossing could be related to a shipping or ferry vessel or perhaps structures associated with one of the industries located near Utica. The linear Anomaly 2A near the Indiana shore in Section 2 is most likely associated with a stone wall that formed a millrace, as shown in Figure 5.12. The rectangular Anomaly 2B near the Kentucky shore in Section 2 has dimensions that are similar to those of a flatboat or barge. Based on the history of these types of vessels, it is possible that the anomaly is the remains of a flatboat, workboar, or coal barge.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

In September 2006 the Kentucky Transportation Cabinet (KYTC) contracted with the University of Kentucky Program for Archaeological Research (UK-PAR) to prepare an archaeological report that would interpret the results of a side-scanning sonar survey to be conducted along two proposed bridge crossings of the Ohio River (Sections 2 and 5 of the Louisville-Southern Indiana Ohio River Bridges Project [LSIORBP]) in Jefferson County, Kentucky. The sonar survey was intended to provide specific information concerning the nature and distribution of potential cultural resources that are currently under water but within the proposed bridge alignments.

These crossings traverse the Ohio River. The surveyed area for Section 2, the downtown crossing, is about 800 meters long and averages 180 meters in width, immediately to the east of the existing John F. Kennedy Memorial Bridge. The surveyed area for Section 5, the East End crossing, is also about 800 meters long, with an average width of about 220 meters. The principal focus of the work was an underwater survey of the crossing locations, which was undertaken using side-scanning sonar to image the river bottom and provide remote-sensing imagery of possible cultural objects and features. No deep testing was conducted, and no surface or subsurface survey work was performed. UK-PAR subcontracted with Mainstream Commercial Divers, Inc., of Murray, Kentucky (MCDI) to conduct the side-scan sonar survey at the Sections 2 and 5 crossings. MCDI used an aluminum-hulled survey boat equipped with an Imagenex 855 Digital Sidescan Sonar unit linked with a Starlink/Raven Invicta 210 Differential GPS system that provided accurate horizontal locations of the sonar tracks and potential anomalies. Post-processing of the side-scan data was accomplished using Hypack, SonarWeb Image Processing software, and Arcview 9.1 GIS software. The post-processing of data resulted in creation of a georeferenced mosaic of the multiple passes conducted within each section.

The mosaic images (Figures 5.1 and 5.2) show three anomalies of interest, two in Section 2 and one in Section 5. Anomaly 5A in the East End crossing shows an object projecting above the river bottom about 80 meters from the Indiana shoreline that is casting a fairly regular rectangular sonar shadow to the southeast. Nearby shadows and bright areas are consistent with subaqueous bedrock shelves, but there are attributes of Anomaly 5A suggest it may be cultural in origin. Anomaly 5A shows two levels, with a smaller rectangular tier resting on a larger rectangular base. The basal level measures about 28 feet long and a maximum of 20 feet wide, while the upper level measures about 10.5 feet wide and 19 feet long. Also unusual is the presence of two reflective areas within the shadow cast by this object. These reflective areas measure about 4-5 feet in diameter and are regularly spaced relative to the shadow boundaries. These reflective areas likely result from holes in the object itself, and the holes are about 4-5 feet in diameter. The regularity and rectilinear outline of the object, the presence of two distinct levels, and the possible presence of two evenly spaced and similarly-sized holes suggest the object is human-made. However, its precise function remains unclear given the present data. Its position relative to the shore and its depth suggest it is related to river transportation activities and not just an abandoned vehicle or houseboat. It may represent part of a wharf, dock, or other mooring facility, especially one related to ferry mooring or industrial activities conducted near Utica, Indiana. It is also possible that Anomaly 5A may simply be a highly convoluted area of bedrock shelving and larger rocks that project from the bottom at odd angles. This interpretation is supported by another area just to the northeast that also has reflective areas surrounded by shadow.

In Section 2 the sonar survey detected two anomalies. Anomaly 2A is near the Indiana shoreline and is a long, linear segment running nearly parallel to the shore. This is likely a remnant of a retaining millrace, or possibly a wall or floodwall. Historic photographs and sketches of the area show a mill on the Indiana shore with a millrace running parallel to the shore. This mill was has been documented in 1864, 1874, and 1876 images of the area, but could not be seen on earlier or later images.

Anomaly 2B is about 80 meters north of the Kentucky shoreline in the Section 2 crossing. A rectangular area and adjacent shadow indicate an object on the river bottom that is calculated to be about 46 feet long and 16 feet wide. It projects about 1.5 feet above the general level of the river bottom and is likely partially covered with silt. Given its dimensions and position relative to the pre-impoundment shoreline, this object may be the remnants of a flatboat, work flat or coal barge.

Flat boats were ubiquitous on the Ohio River in the 19th century, and they were commonly in the size range of 50 by 20 feet. Several available sketches and photographs of the Louisville wharves show rectangular flat boats in use. Even though flatboats were extremely common throughout the 19th century, they were considered disposable and were almost always used for a single hauling trip, after which they were dismantled or salvaged, with the lumber being used at their destination. Few examples survive to the present day, and even fewer have been investigated as archaeological resources (but see Wagner 2002 for a notable exception). They are mainly documented in sketches and photographs.

SUMMARY OF RECOMMENDATIONS

The three anomalies identified in this side-scanning sonar survey have not been reported as sites to the Kentucky Office of State Archaeology because the nature and origin of these anomalies has not been confirmed. The recommendations proposed here are to conduct another series of underwater surveys to determine cultural or natural origin and possible function of Anomalies 2A, 2B, and 5A. This may be accomplished by conducting targeted diving and documentation of the anomalies using video or still camera imagery as well descriptions based on visual inspection. The results of these further investigations will serve as "ground" truth verification of these anomalies and will provide information necessary for management of those that are determined to be cultural resources. The best time of year for conducting such visual inspection is in August or September, when water levels are lower and suspended silt is less concentrated in the Ohio River.

The NRHP status of the anomalies cannot determined on the basis of the existing information. However, both Anomalies 2A and 2B are likely cultural in origin, and their NRHP status and management as cultural resources will need to be addressed once confirmation and additional information is obtained from the targeted diving and visual documentation. Anomaly 5A may prove to be natural in origin rather than cultural.

If any of these locations prove to be cultural after follow-up inspection they will be reported as sites to the OSA. Based on the results of the targeted diving, the potential NRHP significance of any cultural resources then can be addressed. Based on what is known at this time, we recommend that impact to any anomalies that prove to be cultural resources be avoided if possible. If avoidance is not possible, then additional physical documentation of the anomalies should be made along with historic archival research to provide detailed interpretation of the cultural resources and their significance. A follow-up investigation and documentation of Anomaly 2B is of highest priority. If this object should prove to be the remains of a 19th century flatboat, it would be a rare surviving representative of these important, but ultimately disposable, river transport vessels.

REFERENCES CITED

Allen, Michael
1990 *Western Rivermen, 1763-1861: Ohio and Mississippi Boatmen and the Myth of the Alligator Horse.* Louisiana State University Press, Baton Rouge.

Baldwin, Leland D.
1941 *The Keelboat Age on Western Waters.* University of Pittsburgh Press. Pittsburgh, PA.

Ball, Donald B. and Charles E. Parrish
1985 Riverboat Landings in the Central Ohio Valley: An Archaeological Perspective. *Proceedings of the Symposium on Ohio Valley Urban and Historic Archaeology,* edited by Donald B. Ball and Philip J. DiBlasi, 5:151-182. Archaeological Survey, University of Louisville, Louisville, Kentucky.

Beers, D. G., and J. Lanagan
1879 *Atlas of Jefferson and Oldham Counties Kentucky*. Beers and Lanagan, Philadelphia, Pennsylvania.

Bergman, G.T.
1858 *Map of Jefferson County, Kentucky.* Korff Brothers, New York.

Braun, E. Lucy
1950 *Deciduous Forest of Eastern North America*. Blakiston, Philadelphia.

Chapin, Sarah (editor)
1996 Edward Jarvis's Journal. *The Filson Club Quarterly* 70 (3):227-303.

Clarke, William F.
1883 *Birdseye View of Louisville from the Riverfront and Southern Exposition.* M.P. Levyeau and Co. Cincinnati, Ohio.

Commercial Newspaper
1888 The Point. *The Commercial*. April 15, 1888.

Harrison, L. H., and W. C. Klotter
1997 *A New History of Kentucky*. The University Press of Kentucky, Lexington.

Henderson, A. G., C. E. Jobe, and C. A. Turnbow
1986 *Indian Occupation and Use in Northern and Eastern Kentucky During the Contact Period (1540-1795): An Initial Investigation*. Report submitted to the Kentucky Heritage Council, Frankfort.

Hopkins, C.M.
1884 *Atlas of Louisville and Environs.* 320 Walnut St. Philadelphia, Pennsylvania.

Hunter, Louis C.
1949 *Steamboats on the Western Rivers: An Economic and Technological History*. Dover Publications Inc., New York.

Johnson, Leland R.
1974 *The Falls City Engineers: A History of the Louisville District Corps of Engineers, United States Army*. US Army Corps of Engineers, Louisville District.

Kennedy, J.C.G.
1856 *Progress of the Republic.*

Kiser, Walter
1939 Sketch of the Paget House. *Louisville Times*, May 28, 1939.

Kleber, John (editor)
2001 *Encyclopedia of Louisville*. University Press of Kentucky, Lexington.

Linn, Patti and Donna M. Neary
1998 *Riverside, The Farnsley-Moremen Landing: The Restoration of a Way of Life*. Jefferson County Fiscal Court, Louisville.

McGrain, P. and J. C. Currens
1978 *Topography of Kentucky*. Kentucky Geological Survey, Special Publication 25, Series X. University of Kentucky, Lexington.

Neary, Donna M
2000 *Historic Jefferson County*. Jefferson County Fiscal Court, Louisville.

Simpson, James H. and Slayton, Chester M.
1895 *Louisville and Its Defenses* Map. U.S. War Department, Office of U.S. Engineers, Cincinnati, Ohio, June 1865. Julius Bien and Co., Lithographer, N.Y.

Stottman M. Jay
1998 *An Archaeological Survey of Kulmer's Beach, Jefferson County, Kentucky.* KAS Report 18, Kentucky Archaeological Survey, Lexington.

2006 *Archaeological Investigations at the Kosmosdale North Village Site (15Jf713), Jefferson County, Kentucky.* KAS Report 114, Kentucky Archaeological Survey, Lexington.

Stottman, M. Jay and Joseph E. Granger
1992 *Towards a Research Management Design: Cultural Resources Studies in the Falls Region of Kentucky. Volume V-Historical Archaeology in Louisville and Vicinity: A Sampling.* University of Louisville, Louisville, Kentucky.

Thomas, Samuel W. (editor)
1971 *Views of Louisville Since 1766.* The Courier Journal and Louisville Times, Louisville, Kentucky.

Wagner, Mark
2002 The Flatboat *America* (11Pu280): An Early Nineteenth Century Flatboat Wreck in Pulaski County, Illinois. *Illinois Archaeology* 14:90-156.

Yater, George
1987 *Two Hundred Years at the Falls of the Ohio: A History of Louisville and Jefferson County*, Filson Club Historical Society, Louisville.

Zimmerman, William H
1962 *Soil Survey of Jefferson County, Kentucky*. United States Department of Agriculture, Soil Conservation Service and Kentucky Agricultural Experiment Station. Soil Survey Report No. 11, Series 1962.