The Pre-Twentieth Century Development of Watercraft Construction in Pittsburgh and its Impact on Western Waters of North America

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THE PRE-TWENTIETH CENTURY DEVELOPMENT OF WATERCRAFT CONSTRUCTION IN PITTSBURGH AND ITS IMPACT ON WESTERN WATERS OF NORTH AMERICA

A Thesis
Submitted to the School of Graduate Studies and Research
in Partial Fulfillment of the Requirements for the Degree
Master of Arts

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August 2013
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This research focuses on the pre-twentieth century development of watercraft construction in Pittsburgh, Pennsylvania. It begins by discussing the mid-eighteenth century development of the boatbuilding industry in Pittsburgh and continues on to explore the city’s early attempts at shipbuilding. Pittsburgh’s major contributions to the development of steamboat technology, and the westward expansion of riverine commerce that followed, are also examined. This research further addresses Pittsburgh’s role in inland waterway navigation improvement projects, and discusses the use of Pittsburgh watercraft for military purposes as well. The primary objective of this investigation is to discover the locations of as many shipyard and boatyard sites as possible within the pre-twentieth century boundaries of Pittsburgh and to analyze the archaeological potential of these watercraft construction sites through the use of documentary research, historical maps, and an onsite evaluation of the level of disturbance of each site.
ACKNOWLEDGEMENTS

There were several individuals whose efforts proved vital in making this research possible. First and foremost the guidance, suggestions, extensive editing, lending of resources, and prompt handling of thesis material by Dr. Benjamin Ford, thesis chair, was instrumental in the completion of this thesis. Another major contributor in making this work possible was Harrison Wick, the IUP special collections coordinator, who assisted in pulling numerous books from the archives and provided many of the essential sources on Pittsburgh’s history and development. I’d further like to thank Drs. Phillip Neusius and Jeanine Mazak-Kahne for their contributions of sources, editing feedback, and agreeing to serve on this thesis’s committee.
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CHAPTER I

INTRODUCTION

“Like two great arms, the rivers gathered in goods and travelers across a broad front and funneled them toward the busy little town at the confluence of the rivers.”

(McCollester 2008:48).

Strategically situated at the confluence of the Allegheny and Monongahela rivers, Pittsburgh, Pennsylvania played a crucial role as the launching point for the westward expansion of the United States. Pittsburgh’s geographical location at the head of the Ohio served as the primary entrance to the vast Mississippi basin and would prove to be of immense importance to the growth of Pittsburgh as a major center for shipping. This city’s location had “destined it to become a boat builder during the next two centuries” (McCollester 2008:48).

Those looking to start a new life, immigrants in particular, flocked to Pittsburgh to embark on their journeys west. Boats were cheap and land was abundant. Pittsburgh rapidly became the “chief highway between the East and West” (Knight Templar 1898:22) and quickly was dubbed the “Gateway to the West” (Reiser 1951:vii). The strategic geographic position of this city and its natural resources gave its industries a significant advantage over potential competitors. Industries developed so rapidly, and with such vigor, that over the years Pittsburgh secured the nicknames Iron City, Coal City, Steel City, Glass City, City of Coke, City of Petroleum, City of Natural Gas, City of Electrical Manufactories (Knights Templar 1898:19), and Smokey City (A.F. Parson 1894:34). Once the age of steam was factored into the equation, Pittsburgh’s prominence was greatly multiplied. With the first steamboats to travel the inland waterways of North America, Pittsburgh found itself at the heart of western commerce, inland navigation, industrial development, and technological innovation.
The following research provides an in-depth look into the historical background of Pittsburgh with a specific focus on its watercraft construction and waterway shipping industries prior to the close of the nineteenth century. The remainder of this introduction provides a look into shipyards themselves, including layout, facilities, employment, and tool kits. This is then followed by a discussion of maritime and shipyard archaeology in chapter two. The information covered in the following chapters include a look at Pittsburgh’s development since its conception. This discussion introduces Pittsburgh’s environmental and geographical context as well as the early European occupancy of, and rivalries within, this region. It is then followed by a section discussing early watercraft construction within Pittsburgh, and the variety of early boats and ships built within the city.

This research further examines the intended military and commercial impacts these vessels had on western waters of North America, and it discusses Pittsburgh’s major role in launching the westward expansion of the United States. This sections includes a discussion of the military’s role in the development of Pittsburgh’s watercraft industry, and the research goes on to discuss Pittsburgh’s major markets and how the watercraft and shipping industries evolved over time. This is then followed by a discussion of the transition of the watercraft industry from wood and wind to iron and steam. A discussion of the competition faced by Pittsburgh from nearby riverfront settlements is also provided as well as an examination of Pittsburgh’s role in western waterway navigation improvements. It further provides a look at how Pittsburgh’s watercraft had impacted the American Civil War. The primary goal of this research was to locate as many boat and shipyard facilities as possible within the pre-twentieth century historical boundaries of Pittsburgh and to further provide a brief analysis as to the archaeological potential for each of these sites.
Shipyard Layout and Facilities

Yards were constrained by the physical limitation of the yard space, and this was often quite limited due to the high value of waterfront property in urban centers (Moser 2011:838). There were few major structures in pre-industrial shipyards, but every yard had at least one slipway, while some had two or three (Thiesen 2006:11). All reputable wooden shipyards had at the least one saw mill or saw pit, blacksmith shop, a tool shed, an oakum shed, a timber storage yard, and stocks. Some yards also included a ropewalk, sail loft, and the yards located farther from town would include housing for their workers as well (Ford 2002:10). Oak was the most important factor for wooden ship construction as it forms both the skeleton and the skin of the vessel (Ford 2002:3). White oak was preferred because of its denseness and ability to deter rot.

Some yards had their wharf extending into the water, many had storage sheds, and some had steam sheds (Thiesen 2006:11). Launching ways in colonial America were for the most part temporary, and throughout history there have been a variety of different launch methods employed in different regions of the world (Ford 2002:10; Ford 2006:129). Launching ways were typically angled one inch to the foot in both wood and iron yards (Thiesen 2006:101). Two main types of shipyard launch methods are bow launch and side launch. Bow launching was the more common techniques used in the United States; while side launching is not well documented, but photos suggest it was used in locations where the channel was narrow or the water depth was relatively shallow (Moser 2011:842). Differences in launching methods are often based on regional traditions as well (Moser 2011:844).

Although shipyards would not fundamentally change until the introduction of steam and iron, they would make a significant transition to cradles and slipways toward the end of the eighteenth century (Ford 2006:130). Every yard had to have a slipway (Figure 1), or shipway as
it is sometimes called, for each vessel that was being built, and if a yard wanted to maintain continuous production they would have to have more than one (Moser 2011:839). Once a vessel was launched, fitted, and rigged, another vessel was reaching completion, often while a third vessel was just beginning on the stocks (Moser 2011:839). Slipways were generally indicated by an oblong rectangle consisting of two simple parallel lines (Gawronski 2003:140). The floor was located in a straight angle to the harbor bank, and it was constructed all the way to the shore to provide the access to the water. The foundation of the slipway was heavier at the center axis often with a set of three or more piles grouped together to support the weight of a ship resting on its keel (Gawronski 2003:140), although, this was not always the case. The central axis was reinforced at the shore with heavier piles to resist the increasing pressure placed on the shore end of the slipway floor during the launch (Gawronski 2003:140).

Figure 1. Slipway (Nick 2006).
A slip is “a place lying with a gradual decent on the banks of a river convenient for shipbuilding” (Moser 2011:841). The strength and complexity of this feature was dependent upon the types of soil it was built on, the type of vessel being built, and the intended lifecycle of the slipway (Moser 2011:841). They utilized natural slopes along the banks or modified the shoreline, and the building of these structures included multiple components such as the substructure, groundways, launching ways, and the cradle (Moser 2011:841). There were also various supporting, shoring, and scaffolding components as well. The earlier slipways were often constructed of traverse oak beams bolted to the bedrock and filled in with rubbish (Moser 2011:841). The patent slipway invented in 1818 my Thomas Morton was an improvement that could be used to haul vessels out of the water for repairs, and it consisted of parallel inclined iron rails and a carriage. (Moser 2011:845).

The first major component of a slipway was the substructure, which included a sufficient number of piles driven into the ground to support the keel block (Moser 2011:843). The second major component of a slipway was the groundway, which consists of large timbers often fixed and/or fastened to the substructure, and it formed the platform supporting the blocks, and later, the launching ways (Moser 2011:843). The third component of a slipway was the launching or sliding way, which consists of a large timber or plank or several pieces of wood that were bolted together and installed on the slipway parallel to its orientation, and was used to carry a vessel from the building slip into the water (Moser 2011:843). The timber was either fixed in place or temporary, but either way, this feature rarely ever survives the archaeological record (Moser 2011:843).

The forth component of the slipway was the cradle that rests on the launching way and conforms to the shape of the ship’s bottom, which it was tightly attached to (Moser 2011:844).
The cradle was a wooden framework that was custom-built for each vessel being constructed and was designed to hold the vessel in an upright position during the launch (Moser 2011:844). The lower surface was made up of two runners that sat directly upon the launchingways, and the runners of the cradle sat on the opposite side of the ship’s bottom at the turn of the bilge (Moser 2011:844). The hull sat on the cradle, which in turn sat on the launching ways, which were used to carry the weight of the ship and the cradle as it slid down the lubricated launchingways (Moser 2011:844).

The bilgeways consisted of inclined planking located on the floor of the slipway directly below the vessel being launched. When the hull had finished being constructed it was raised, and the keel block was removed (Moser 2011:843). The vessel would then be lowered into place and vertical supports were secured between the vessel and the bilgeways. The entire weight of the vessel would then be transferred to these bilgeways, which had to be securely fastened to the slipway and strongly anchored to pilings and posts along the slipway (Moser 2011:843).

Many temporary timbers were put in place for each launch. The shoring, standards, and scaffolding were erected as the vessel was assembled on the keel blocks, which elevated the keel a few feet off the slipway or dry-dock, and would allow the workers access to the bottom of the vessel (Moser 2011:845). Shoring usually required heavy timbers to keep the vessel in place while under construction and smaller timbers that would help prevent it from tipping over while it was still on the keel blocks (Moser 2011:843).
A dry-dock (Figure 2) was often used in larger yards, but they were ten times more expensive to construct as well as operate (Moser 2011:839). Slipways and dry-docks were the largest and most durable features of a shipyard (Moser 2011:839). Prior to the mid-nineteenth century proliferation of dry-docks, most vessels were launched on slipways (Moser 2011:841). Dry-docks were used for repairing, or on occasion, constructing vessels. They could be drained of water and refilled as needed, and their development was the culmination of two centuries worth of technological refinements (Moser 2011:840).

Shipyards came to be sorted into five different typologies called Tiers (Moser 2011). Tier #1 shipyards are the largest and are exclusively state-owned and operated. These yards are well funded and well organized operations, and they signify the mobilization of power and resources that only states intending to create large navies are capable of producing. Such yards would
include their own rope, sail, and anchor making shops. An example of a Tier #1 shipyard would be the Royal Naval Dockyards of Great Britain. Tier #2 yards are equally well organized and still possess a large labor force. They are generally smaller than Tier #1, but they could still be owned or funded by the government. The VOC shipyard in Oostenburg, Amsterdam is an example of such a yard (Figure 3). Tier #3 shipyards were also fairly well organized. They had a substantial labor force and could build or repair multiple vessels at the same time. The shipyard of Stephen Steward, located south of Annapolis, Maryland, is an example of such a site. Few Tier #4 sites have been identified. These yards are small shipyards with a marginal investment in permanent infrastructure, and they are usually built to repair or build only a single ship at a time. Wicomico Creek Shipyard in Somerset County, Maryland is one such site. Tier #5 shipyards are the smallest yards. They are expediently organized with little investment in permanent infrastructure. They were likely used for repairing or constructing only a few vessels, and the archaeological remains of these yards are often mistaken for other waterfront activities.

Figure 3. VOC Shipyards, a Tier #2 shipyard (Gawronschi 2003)
The first component of a vessel laid was the ship’s keel. Then the framing was added followed by planking, which was done by the shipwright, from the bottom of the hull working upwards (Thiesen 2006:13). Trunnels, wooden fasteners, were used to fasten the planking to the frame before the final touches of decking, joining, caulkking, and painting were completed (Thiesen 2006:14). The interior was covered with ceiling planking, and the interior joiners also built the cabins, ladders, and stairs. The caulkers drove oakum into the planks and deck to make them watertight, and it was scraped and smoothed before being painted (Thiesen 2006:15).

Shipyards transported materials and completed tasks that involved lifting, through the employment of manpower or livestock, and both types of power were used in iron and wooden shipyards (Thiesen 2006:99). Steam engines eventually came to replace these traditional forms of power as well. The trees were dragged in on two wheeled carts where the limbs were then removed, and they were cut in the saw pits (Thiesen 2006:12). Some yards were fortunate enough to have water-driven sawmills (Thiesen 2006:12).

Besides building ships, shipyards performed a number of other activities including routine maintenance, repair work, and cleaning (Moser 2011:839). Documentary evidence suggests that repair made up a major component of this industry’s workload and was the “bread and butter” of their activities (Moser 2011:839). Shipyards would also perform activities such as breaking up older vessels to salvage timber and other materials at these sites. The remainder of the salvaged vessel, that was unusable for new vessels, was most often sold as firewood (Moser 2011:839).

Careening techniques were also improved upon, but they were still a dangerous and costly method of repairing ships. It involved hauling a vessel into shallow water at high tide and laying it to one side to allow workers free access to the other side for cleaning or repair at low
tide (Moser 2011:840). This method was more commonly used on smaller vessels, and it could also be completed on a gridiron. The gridiron was basically a grid made of timber framing that was placed in the water near the shore (Moser 2011:840). Inclined planes would soon become a newer, American technique for pulling vessels out of water (Moser 2011:845). The first of these marine railways was designed and built by Commodore John Rogers in 1821-1823 for the U.S. Navy (Moser 2011:845), and the first civilian marine railway was built in Salem, MA in 1824 by the Salem marine Railway Company (Figure 4).

![Marine Railway Diagram](image)

Figure 4. Marine Railway (Moser 2011).

**Shipyard Employment**

A variety of people were employed in shipyards to perform the many different tasks involved with building or repairing watercraft. For much of the early nineteenth century, joiners, caulkers, painters, carvers, glaziers, plumbers, coopers, sawyers, sail makers, riggers, mast
makers, block makers, mason, tin men, ship smiths, and common laborers were all be expected to work a ten hour day, six days a week (Ford 2002:9). Shipbuilders were also responsible for owning their own tools and bringing them to work with them every day (Thiesen 2006:11). Each yard had to have at least one master builder with the full set of skills to oversee a vessel from “stump to ship” (Thiesen 2006:4). This individual often had to fulfill the roles of owner, foreman, lumberjack, designer, bookkeeper, teacher, and salesman, and he would often have close personal contact with the employees (Thiesen 2006:4-5).

Shipyards had their own hierarchical structure beginning with boys who could progress to apprentices, then laborers, then to journeymen. The master carpenter trained the boys to work in all matters of ship construction including hull construction, joinery, caulking, scraping, painting, timber selection, and rigging (Thiesen 2006:6). He also trained an apprentice from their mid-teens until about the age of 20, and once a young shipbuilder completed an apprenticeship, the new journeyman traveled and worked at various shipyards in order to gain the necessary experience so that he too could become a master shipwright. This would also result in migrating workers spreading their own knowledge from yard to yard and to other nations as well (Thiesen 2006:6).

“The American wood shipbuilding community represented an exclusive conservative work culture characterized by intermarriage, shared work ethic, and close ties between builders and workers” (Thiesen 2006:46). Shipwrights and their families would live near shipyards, and they formed a cohesive work society (Thiesen 2006:46). A large network of extended families formed the “cornerstone of culture and trade of shipbuilding as social status passes along generations down the male line” (Thiesen 2006:6). As early as the thirteenth century there is documentation indicating the strong family orientation toward the craft of shipbuilding, and it
was not at all uncommon for dynasties of families to work side by side with one another over many generations (Thiesen 2006:6).

The increasing size of shipyards, vessels, and labor force would eventually replace the multi-skilled master carpenter with an increased division of labor (Thiesen 2006:62). A variety of subcontracting opportunities were opened up in larger nineteenth century yards to sawyers, blacksmiths, riggers, rope makers, block makers, and spar makers for project by project work, and sub-contracting eventually replaced shipyards employing large numbers of professional shipwrights. After this, apprentices never learned the whole trade anymore, and they began specializing in just one skill set which resulted in limited upward mobility or likelihood of them every owning their own yard (Thiesen 2006:65). Apprenticeships would, however, continue on into iron shipbuilding and preferential treatment was given to the children of other employees (Thiesen 2006:97).

**Shipyard Tool Kits**

From the middle ages through the nineteenth century, tool kits in wooden shipyards remained the same for the most part (Thiesen 2006:8). In wooden shipyards, axes and pit saws were used for transforming timber into stems, frames, knees, and beams (Moser 2011:838). Broad axes were one type of axe heavily associated with shipbuilding, and they were used mostly for shaping and finishing timbers (Thiesen 2006:8). They had a short handle set off a few inches to one side and a long heavy head. Ship carpenters also used a hand axe, which was the primary axe used by ship carpenters working on board the vessel and is commonly found on many shipwrecks (Thiesen 2006:9). Adzes were the second most important tool used mainly for secondary shaping, final trimming, and smoothing (Moser 2011:838). They were an edge tool shaped like a common garden hoe with a nine inch blade, and an up to three foot handle (Thiesen
Saws consisted of a two-man cross cut saw, which was durable enough to cut down trees, and also a two-man frame saw used for cutting planks (Thiesen 2006:9). Other tools include chisels, gouges, shaves, hammers, augurs, braces, caulking irons, and caulking mallets (Thiesen 2006:7). The mallet used for caulking ships was called the beetle, and it was made of hardwood with a head banded together with iron rings for reinforcement (Thiesen 2006:10).
CHAPTER II

MARITIME AND SHIPYARD HISTORY AND ARCHAEOLOGY

For the past half century, maritime archaeology has focused mainly on ships and shipwrecks. These archaeologists “headed for the water without paying much attention to the shore” (Gawronski 2003:133). Shipyards tend to be underdeveloped features in archaeological research, and they are one of the least often investigated industrial sites (Gawronski 2003:133; Moser 2011:834). There are numerous cultural, academic, and practical reasons for this under-representation. Access to them is one of the biggest factors hindering research as many shipyard sites are located along urban waterfronts that still remain a center of industrial and commercial activity today, or they are located in wetlands along river banks and harbors (Gawronski 2003:133-134; Moser 2011:835). Archaeologists often have difficulty investigating and interpreting such large and dynamic sites. They are rarely dealt with in a systematic way, and many archaeologists do not have the required water-oriented archaeological reasoning skills (Gawronski 2003:133). In the present day, the focus of maritime archaeology is increasingly shifting from the vessels themselves to the yards they were built in as a growing number of maritime and historical archaeologists have begun studying such sites (Gawronski 2003:132; Moser 2011:835).

“Throughout the past decade there has been burgeoning international interest in shipyard sites in response to an increasing desire to understand how historic vessels were constructed and how they were linked to markets and terrestrial trade networks” (Ford 2006:125). Maritime archaeology has expanded to include all material things associated with the maritime world. This includes wharves, piers, quays, shipwrecks, and shipyards (Moser 2011:834). Shipyards are one of the most fascinating types of site. They are closely linked with both the ships and the cultures
that constructed them. They provide a physical connection with the events that took place there, and they “reflect socio-economic forces in which the watercraft constructed were intended to operate” (Moser 2011:834). Shipyards and ship construction reflect a small portion of the broader social, geographic, and economic aspects involved with building watercraft (Moser 2011:836).

To date, few shipyards have been excavated, and many of those that have had archaeological work done have had that work limited to only small portions of the site. This is often the result of such sites being located in developed urban areas. This prevents archaeologists from being able to obtain the bigger picture for such a diverse type of site. This has also resulted in historical literature making rather generalized statements about “shipyards” that do not reflect or apply to all or even most watercraft construction sites (Moser 2011:850).

Shipyards can be looked at “as a workplace, distribution centre, artisan workshop, production complex, assembly plant, or a meeting location” (Gawronski 2003:133). They are part of a “system that influenced the globalization of exploration, commerce, communication, migration, and the dispersal of cultures throughout the world” (Moser 2011:834). Their fixed infrastructure acts as a proxy measurement of intensity and longevity, and the most visible components are associated with the launching of the vessel (Moser 2011:850). Such features may include the slipways, dry-docks, and marine railways.

Data can be collected regarding the infrastructure, spatial environment, functional planning, technical facilities, utility building, technology, and material culture (Gawronski 2003:135). Typology often causes problems when looking at sites occupied over multiple generations, or even multiple centuries, as shipyards were constantly upgraded, expanded, reused, abandoned, and/or destroyed (Moser 2011:851). The topic of “shipyard archaeology” has opened
new doors to the development of more advanced and accurate models of industry, commerce, technology, and the economics of many different areas over many time periods (Moser 2011:851).

**Locating a shipyard**

One of the most important elements of shipyard archaeology is the ability to locate these sites. “In any pre-industrial society from the Paleolithic to the nineteenth century A.D., a boat or (later) a ship, was the largest and most complex machine produced”, and there are very few above-ground indicators of shipyards (Ford 2006:125). Most wooden shipyards can generally be identified by a small number of timbers sticking out of the shoreline and by underwater or sub-surface features, however, the brief nature of shipyards often makes them difficult to identify in many regions (Ford 2006:125). Many shipbuilding sites were not recorded on maps or in land descriptions, and it is essential to combine the existing historical accounts and environmental modeling to narrow the search parameters for such sites (Ford 2007:261). For starters, shipyards were often clustered together in shipbuilding districts along the shoreline, mainly as the result of environmental factors, and the desire for shipbuilders to make their yards more accessible and convenient to their supply line, clients, and employees (Ford 2007:262).

A GIS model employed in one study examining shipyard locations in Maryland, conducted by Dr. Ben Ford, discusses six key factors in shipyard placement. The factors include proximity to cities, environmental protection, slope, local soil’s suitability for construction, soil suitability for oak growth, and the absence of soils suitable for tobacco growth (Ford 2006:125; Moser 2011:838). Moser (2011) adds channel width as an additional factor, but this could fall under environmental protection as well. Some or all of these factors could be used in similar studies elsewhere to locate shipyard sites or locations where there is a higher probability for such
sites to be discovered, and this predictive model can form a foundation for shipyard research in other regions (Ford 2006:129).

Most of the watercraft facilities were located within five miles of an urban center as this is thought to be the maximum distance a person is willing to travel in a day (Ford 2006:130). Of the shipyards examined in Maryland, 79% were located within this distance to an urban center, and more than half were located within the historic boundaries of their towns (Ford 2006:131). The degree of environmental protection offered refers specifically to the protection offered from wind and waves, and the builder would weigh the pros and cons of storm protection against the degree of flexibility in terms of construction when determining where he placed his yard (Ford 2007:270). The water width and depth had to be both wide and deep enough to launch the vessel and float it to open water (Ford 2006:129), while the stability of the soil on land had to be stable enough to support the immense weight required for building large vessels without excessive compaction, although builders could lay a foundation of paving stones to correct this problem (Ford 2007:271). The slope of the shoreline also had to be in the range of not less than three degrees and not more than eleven degree, as too steep of a slope could result in a premature launch, which would put employees in unnecessary danger, while not enough slope would result in requiring an extraordinary effort to move the vessels off the stocks (Ford 2007:269; Moser 2011:841; Thiesen 2006:11).

The soils also needed to be suitable for oak growth, as it was easier to have raw materials on site than to transport them to the yard, and the availability of timber was one of the primary factors in choosing shipyard placement (Ford 2007:272). It was “common for early shipyards to be established in sheltered water near a plentiful supply of wood” (Thiesen 2006:11). Of the 46 shipyards studied in Maryland, all were located within 0.7 miles of oak growing soil and 34%
were within a tenth of a mile (Ford 2007:272). Even if the location met all the other criteria, if it was good soil for tobacco growth it would not likely have been used for a less profitable venture like shipbuilding, and it seems as though this land was intentionally avoided (Ford 2006:130).

Ford (2006) indicated four factors necessary for identifying shipyards. These factors include appropriate descriptions drawn from the historic record, application of the predictive model, on site evaluation of the predicted area using visual inspection and local informants, and good site preservation (Ford 2006:131). Local considerations should also be incorporated into local models, and the on-site evaluation may include excavating test pits on a tight grid, using side scan sonar, a sub-bottom profiler, or a magnetometer survey (Ford 2006:135). The presence of overland trade routes and political predicaments should also be taken into consideration when applying this model (Ford 2006:136).

Although shipyard archaeology has been a previously understudied section of the discipline, there has been work done on a number of sites. Among the first archaeologists to ever report an excavation at a shipyard came from T. W. Courtney in 1972 at the Royal Dockyard in Woolwich, and Jonathan Adams would later excavate a shipyard in Beaulieu River in England in 1994. Cynthia Peterson excavated a boat and boiler works on the Mississippi River in Dubuque County, Iowa. This investigation stands out for its synthesis of previous shipyard investigations in the United States, which drew on 70 shipyards in 34 states (Moser 2011:837).

Archaeological work was also done at Oostenburg and Hogengijk, both of which were used to show the usefulness of comparative approaches to shipyard archaeology (Moser 2011:846). The development of the first typology to organize nineteenth century shipyard sites was by Scott Emory, and it was based off his work done at the Vinyard shipbuilding Company in Delaware. This typology uses vessel size and type as a means of providing a basic system of
classification and comparison of shipyards. This system was unique but proved impractical for comparing older wooden shipyards as the archaeological remains for these types of sites are usually scattered, and the investigation usually only covers a very limited area of the site (Moser 2011:846). Without the accompanying resource of historical documentation, it is usually not possible to tell what types of vessels were built at a particular shipyard (Moser 2011:845).

Moser (2011) discusses how a more useful typology would have to take the variety of shipyards and the limited areas investigated into consideration. Information would have to be included about the local environment, vessel types, and the intensity and duration of shipbuilding, as these factors all contribute to influence the ultimate design and layout of a shipyard as well as its location (Moser 2011:846). Sites used over longer periods of time produce different patterns than short-term sites, and patterns were further dependent upon the activities that took place there such as construction, repair, refitting, breaking, and salvage. The overall form of the site was determined by its intended function (Moser 2011:847). Having a good typology can assist in drawing larger comparisons between different sites and also determine the degree of variability in developing patterns. The slipways, dry-docks, and marine railways were the most visible component to a shipyard site, and these pieces of fixed infrastructure can be used as a proxy measurement for shipyard size, function, and production intensity (Moser 2011:847). Aspects of material culture that can be measured in this type of archaeology include the number of launching ways, their permanency, methods of launch, culturally sensitive traditions, and the complexity of slipways (Moser 2011:847).

Fieldwork for the Hogendijk site in Zaandam began in 1998 (Gawronski 2003:132). Located at the north end of the dyke along the Zaan River were sixteenth and seventeenth century slipways. This area had been the industrial center of the Netherlands, and this
development occurred in the seventeenth century as the shipyard shifted, from predominantly repair, to the constructing of larger new vessels for transport, commerce, and warfare (Gawronski 2003:135). Excavations revealed an average slipway floor slope of 10 degrees with the last five meters to the water increasing to 23 degrees (Gawronski 2003:136).

The Oostenburg site in Amsterdam was the location of the Dutch East Indian Company’s shipyard, and this site was first researched in 2000 by urban archaeologists out of the city of Amsterdam (Gawronski 2003:132). It was a large scale shipyard, and it was an intensive production and distribution center. For a time, this shipyard was the core of the Amsterdam VOC shipping system until it was closed in 1799 (Gawronski 2003:132). In a span of 150 years in operation, roughly 720 ships were built in Amsterdam with over 500 being built in Oostenburg alone (Gawronski 2003:134).
CHAPTER III

GEOGRAPHICAL AND ENVIRONMENTAL BACKGROUND

The City of Pittsburgh is located at latitude 40 degrees north, longitude 80 degrees west, at an elevation of 750 feet (Craig 1851:299). It is 200 miles from the closest tidal marshes, 180 feet above Lake Erie, over 100 miles from the southwest corner of Pennsylvania (Craig 1851:299), and it encompasses 47 square miles (Bernewitz 1928:2). The Pittsburgh District, also known as the Headwaters District (Voynick 2005) or the Pittsburgh Engineer District (Dobney 1981:313), includes all territory lying in the valleys of the Allegheny, Monongahela, and Ohio rivers, and their principle tributaries, within a 30 mile radius (Bernewitz 1928:3). Pittsburgh is hilly, with beautiful valleys, rich agricultural land, and bountiful timber. Its mountainous and hilly topography frees it from high and destructive winds (Kelly 1895:43). Annual rainfall is 36 to 40 inches and temperatures span from below zero degrees Fahrenheit in the winter to over 100 degrees during the summer (Cowin 1985:14). Snowfall ranges from 30 to 50 inches and growing seasons range from 160-180 days (Cowin 1985:14).

The river systems of Pittsburgh were undoubtedly the most significant factor for its success. Pittsburgh is at the intersection of the Allegheny, Monongahela, and Ohio rivers, as well as their tributaries. Here the Allegheny River completes its 325 mile journey from the lake plain of New York and Pennsylvania. It also includes the Kiskiminetas and French Creek as major navigable tributaries. The Monongahela flows 90 miles north from its origin in Marion County, WV (Barns 1999:204). It is about 1/3rd as long as the Allegheny, but it was much more difficult to navigate prior to 1844, and its chief tributary, the Youghiogheny, taps into an area rich in mineral resources (Reiser 1951:1).
The Allegheny and the Monongahela rivers unite at a 33 degree angle to form the mouth of the Ohio River (Figure 5), which follows a course more than 950 miles long before it empties into the Mississippi at Cairo, IL (Cramer 1817:48). In the nineteenth century the Ohio River became noted for its gentleness and ease of navigation. “For nearly three-quarters of the year, the stream moves with so much gentleness that objects floating on its bosom would be carried scarcely more than two and a half miles an hour” (Barns 1999:204). In total there are 54 miles of navigable rivers within the city of Pittsburgh and 250 miles worth within the larger district (Bernewitz 1928:44). It has been said by some that the state of Pennsylvania has the best river system of any coastal state in the United States (Bauer 1988:135).

Figure 5. Significant river systems and ports for Pittsburgh commerce (Monongahela River Recreation and Commerce Committee 2013)
CHAPTER IV
EARLY EUROPEAN OCCUPANCY

Between 1727 and 1729 the first loggers began to settle the territory that was to become Pittsburgh following the removal of the local Native Americans tribes (A.F. Parson 1894:36). During the middle part of the eighteenth century, French and English military leaders began cutting trails to Pittsburgh, which they had noticed for its tactical advantage with regards to travel, trade, exploration, and power (The Planpgh Exchange 2012). The first survey of the surrounding area was conducted in 1761 (A.F. Parson 1894:36). Before the town was built, both the French and the British had tried to secure a stronghold at this strategic location. The French constructed Fort Duquesne (1754-1758) while the British constructed Fort Pitt (1759-1792) (Figure 6) shortly after they gained control over the territory (The Planpgh Exchange 2012). The Town of Pittsburgh was formally laid out in 1764, making it one of the oldest cities west of the Allegheny Mountains (Barns 1999:204). By this time, boatbuilding was already underway within the city.

Figure 6. Fort Pitt location (Cramer 2013).
Early transportation in Pittsburgh, prior to the development of a boat industry, was largely based around pack horse transportation. This was the method of travel used during the French and Indian War. These early military routes (Figure 7) were often impassible for wagons during the rainy season (Cowin 1985:70). Pack horse trains generally had 12 or more horses each with a load weighing roughly 200 pounds, and this form of transportation would prove to be vital to the fur trade (Cowin 1985:70).

Figure 7. Early military routes to Pittsburgh (Cowin 1985:65).
The Revolutionary War would greatly slow settlement, but many still continued to move into the Ohio Valley (Bauer 1988:152). Pittsburgh’s early development went through several phases. From 1784 to 1816 the city was a frontier settlement; from 1816 to 1852 Pittsburgh went through what was called the commercial period, and from 1852 to 1892 this city would become an industrial powerhouse (Cowin 1985:72). It was during the commercial period that steamboat transportation would see its greatest advancements, and the western district of the Pennsylvania Canal would also be completed during this time (Cowin 1985:72).

By 1782 merchants with interests in Pittsburgh had begun to diversify their enterprises. William Turnbull, Peter Marmie and others opened a distillery, built a saw mill on the Allegheny, and retailed boats built mainly at Elizabeth, PA (Voynick 2005). Johnson attributes these same actions mainly to Major Isaac Craig who would purchase Fort Pitt in 1785 (Johnson 1979:23). In 1783 Barthelemi Tardiueau, a French merchant from Nantes, surveyed the Ohio River Basin to address questions regarding its agricultural surplus potential, natural resources, and marketing opportunities (Johnson 1979:26). He eventually secured a land grant and flour supply contract in 1793, and attempted to settle royalist refugees fleeing from the French Revolution on his grant; however, his commercial visions never materialized (Johnson 1979:26). When he learned of a food shortage in New Orleans he loaded several flatboats full of flour but was captured on route and forced back to Pittsburgh by the British (Johnson 1979:23).

By the end of the Revolution the pioneers of the headwaters district were producing far more than they could consume (Johnson 1979:24). Grain, as well as the liquor it was often fermented into, was transported by frontier merchants via packhorses and wagons across the mountains mainly to Philadelphia and Baltimore (Johnson 1979:23). These merchants soon began searching for a more accessible and economical route to their markets and attention
quickly turned toward the rivers. As the mountains presented such a difficult barrier, the benefits of floating goods down river to market at New Orleans were quickly recognized (Hunter 1949). Through the establishment of a triangle trade system, to be discussed later in detail, Pittsburgh grew to rely heavily on trade as opposed to economic independence (Reiser 1951: vii).

The Pittsburgh Engineer District was the “home of the pioneer marine engineers and water way shippers,” and it has been described as “the cradle of American inland river commerce” (Dobney 1981:313; Voynick 2005). Since 1788 Pittsburgh had seen large numbers of emigrants passing through its streets and waterways, largely as a result of the Northwest Ordinance of 1787 that had opened up new western land (A. Warner 1889:514; Boucher 1908:370). Pittsburgh served as a convenient, if not essential, stopping point for their journeys west and southwest of the city, and nearly all these emigrants and settlers needed boats (Reiser 1951:13). Pittsburgh quickly began to employ numerous persons both as boat builders and also as boatmen (Wilson 1898:73). (See Appendix A for partial list of nineteenth century Pittsburgh watercraft builders). The forests surrounding Pittsburgh were logged to supply fuel and boatbuilding material (McCollester 2008:60). Passengers and their commercial goods were carried in a variety of river vessels such as barges, flatboats, keelboats, pirogues, rafts, Kentucky boats, tow boats, and eventually steamers of all varieties (Dobney 1981:313; Voynick 2005; Wilson 1898:73). These boats were rarely of any financial value, and they rarely ever made the return trip upriver. (Boucher 1908:370).

Prior to river navigation improvement projects, boats were generally constructed in the fall, loaded in the winter, and shipped as soon as the ice broke in the spring (Voynick 2005). These vessels were either floated, propelled by sails, rowed with oars, pushed with poles, or pulled with ropes by men walking along the shore (Dahlinger 1911:1). In the 1790 federal census
there was a population of just 376 persons living within Pittsburgh, but this figure would multiply more than 16.5 fold, to 4,768 in just 20 years, as this frontier town began developing into a rapidly industrializing city (Barns 1999:206). Pittsburgh was formally incorporated as a city in 1816, and between 1800 and 1840 the city underwent a substantial change from saw mills, boatyards, blacksmith shops, and farms to a far more diverse settlement (Cowin 1985:55; The Planpgh Exchange 2012).

Early Pittsburgh was rife with conflicts and rivalries involving both Europeans and Native Americans. In the seven years following the Revolutionary War it is estimated that 1,500 European Americans died from Native American attacks, primarily by the Shawnee, on the Ohio River or in the Kentucky Territory (McCollester 2008:56). However, by 1794 most hostilities with Native Americans in the vicinity of Pittsburgh were over (Reiser 1951:4).

Relations with France became hostile by the mid-eighteenth century (Craig 1851:272). It was France’s construction of Fort Duquesne at the junction of the Allegheny and Monongahela rivers that ignited the French and Indian War (Bauer 1988:152). At least four other early forts were also constructed in Pittsburgh including Fort Prince George, Mercer’s Fort, Fort Pitt, and Fort Fayette. The Peace of Paris in 1763 shifted all the land that was east of the Mississippi River, except the mouth, to English control while the land further west passed from French control to the Spanish (Bauer 1988:152).

The Treaty of 1783 divided the United States and Spanish territory at the Mississippi River (Reiser 1951:37). Tensions spiked the following year as Spanish officials closed their ports, as well as the Mississippi River, to foreign navigators once they realized that free navigation of the river system increasingly threatened Spain’s control over the Louisiana Territory (Bauer 1988:152; Johnson 1979:24). Trade remained closed until January 1, 1788 when
a royal decree allowed people of the Mississippi Valley to trade with New Orleans for a 15% duty, later reduced to 6% in 1793 (Reiser 1951:37). Negotiations took place in 1795 between Spain, England, and the United States. These negotiations resulted in the Pinckney and Jay treaties, but did not dispose of the problem as the three year clause inserted into the treaties expired in 1802 (Reiser 1951:37).

Many Americans found it alarming when Spain relinquished the Louisiana territory back to France on October 1, 1800 (Roland 2008:109). In 1802, presumably on French orders, Spain again revoked the rights of Americans to deposit their goods at New Orleans, as unfortunately the settlement was on the Spanish side of the river (Roland 2008:109). Trade was restricted until 1803, and this restriction was a very bitter issue in American foreign relations with both France and Spain (Reiser 1951:37). Just two months later, Thomas Jefferson purchased the Louisiana Territory from Napoleon Bonaparte, the First Consul of France. This territory included all parts of the North American continent west of the Mississippi River, up to the Rocky Mountains, and the lands east of the Mississippi now embraced in the southern portion of Mississippi and Alabama (Dahlinger 1911). This purchase was of vital importance to the growth of Pittsburgh as a center for watercraft construction and shipping. This was due to the fact that the Louisiana territory in general, with an emphasis specifically on New Orleans, was a major market for Pittsburgh’s goods. Having it under stable domestic control eliminated both the foreign duties as well as the uncertainly of foreign relations effecting this trade. The opening of this territory eventually led to the additional exploration and incorporation of lands and markets located even further west which would only increase Pittsburgh’s economic opportunities. The Embargo of 1808, the introduction of the steamboat in 1811, the War of 1812 with Britain, and increased immigration all contributed to the West’s overall economic success (Reiser 1951:42).
CHAPTER V

INTRODUCTION TO EARLY PITTSBURGH WATERCRAFT CONSTRUCTION

Boatbuilding in Pittsburgh quickly grew into an active business. Between 1786 and 1788 alone over 16,200 immigrants passed through Pittsburgh, and the early boats built in this region were not large or substantial as all that was needed by immigrants moving westward was “a solid boat sloping at the front, with well boarded and caulked sides and a roof or shelter” (A. Warner 1889:514). Two primary boat types, flatboats and keelboats, were used. Oars were used for propulsion and a sweep was used at the stern for steering, although downstream the current provided most of the power needed, and boats would typically be abandoned, sold, or used for building material at their landing spot (A. Warner 1889:514).

To address the subject of boatbuilding in Pittsburgh requires first answering the question of when it began. The early boatbuilding era of Pittsburgh occurred over the half century prior to the Tarascon yard, Pittsburgh’s largest and best known shipyard, opening in 1800. By the mid-nineteenth century Pittsburgh was considered one of the oldest and most important boatbuilding centers in America (Bruggeman 1998), although, many authors have cited incorrect dates as to exactly when boatbuilding here began. One source states that boatbuilding in Pittsburgh began in 1811 (Bernewitz 1928:2), although this is ignoring all non-steamboats. Numerous other sources indicate it began in 1777 (A. Warner 1889:466; Boucher 1908:320; Craig 1851:127; Thurston 1888; Wilson 1898:73).

On the February 23, 1777, “fourteen carpenters and sawyers arrived at Fort Pitt from Philadelphia and were set at work on the Monongahela, 14 miles above the Fort, near a saw mill. They built thirty large bateaux, forty feet long, nine feet wide and thirty-two inches deep, which were intended to transport troops” (Thurston 1888:86). These troops were American soldiers
moving to secure western lands from Native Americans hostile toward European encroachment on what had been their land for untold generations. Wilson (1898) also says it began in 1777 after the return of Captain George Gibson and Lieutenant William Linn to Pittsburgh. John McKinney described the 30 bateaux as lightly built, flat bottomed, long, narrow, and wider in the middle (A.F. Parson 1894:43). This source also states that the carpenters were set to work 14 miles above Fort Pitt (Figure 8), and that “There is nothing more definitive than this to indicate the spot, but it must have been above Turtle Creek and between that and the Youghiogheny” (A. Warner 1889:466; Craig 1851:127).

Figure 8. 1777 boatyard general area.
These bateaux boats were adapted to the system of navigation that was then in use, and their primary purpose was to transport the troops that would be needed to launch an invasion of Indian country should it have ever become necessary (A. Warner 1889:466). From Pittsburgh it is only 100 miles up the Beaver River to Lake Erie, or to the mouths of the Muskingum or Scioto rivers, which were all good starting points for a war against the native Indians (A. Warner 1889:466). This source also suggests a possibility of these craft being used to ascend the Allegheny to French Creek or Detroit, but they were never used for either of these routes (A. Warner 1889:466). According to A. Warner (1889), their construction “may well be considered the beginning of an important industry in Pittsburgh and the first boat construction on western waters” (A. Warner 1889:466).

Despite several sources making similar claims, the date 1777 is also incorrect. A merchant by the name Matthew Clarkson had noted that he had traveled to Pittsburgh in 1766 where he visited “shipyards” at Fort Pitt (Killikelly 1906:75), but other evidence shows boatbuilding was already occurring in Pittsburgh on the Monongahela River at Fort Pitt (Figure 9, Figure 10) by 1764 (Bauer 1988:173; Bruggeman 1998). Later, Pittsburgh’s early adaptation to steam technology would allow the industry to remain competitive for more than a century to follow (Bruggeman 1998:173). Although numerous source indicate the boatbuilding industry was already underway by 1764, this date is also not the earliest evidence of boat construction occurring in Pittsburgh.

The very earliest documentary evidence of boat construction in Pittsburgh dates back to 1761 where three “ship carpenters” (boat builders) were listed as working at Fort Pitt (Baldwin 1941; Cowin 1985:15, 43). George Morgan, who would build the first known keelboat in 1768, the *Three Friends*, was one of them. Based on the context of the time and place it is unlikely they
were building any sailing vessels that would be considered a “ship” by the definition for this research, and although this is the earliest written documentation of boatbuilding in Pittsburgh, it was likely occurring in this area prior to 1760 (Killikelly 1906:74), likely not long after Fort Pitt was established (1759), and it is quite possible that it was occurring even earlier at Fort Duquesne (1754-1758). These earliest government boats built were mostly bateau boats and flatboats used by early traders (Killikelly 1906:89). It is also important to point out that Native Americans had previously occupied this land and may well have been constructing boats on this location prior to Europeans settling the territory, but as there is no documentary evidence indicating this, it is merely logical speculation.

![Figure 9. Fort Pitt boatyard (Killikelly 1906).](image)
Variety of Early Pittsburgh Boat Types

There were many early types of boats on western rivers of North America prior to the introduction of steamboats. Western rivers, for this research, are considered as any river located west of the Allegheny Mountains. By the time Europeans began moving into the areas surrounding what is now Pittsburgh, during the early part of the eighteenth century, Native Americans had already been engaging in boatbuilding for generations. The birch bark canoe of northern tribes was the most advanced craft designed by Natives Americans in the area (McCollester 2008:56). Pennsylvanian Native Americans used lower quality elm bark or less maneuverable, but more durable, dugout canoes (McCollester 2008:56). Dugouts, also commonly called pirogues (Figure 11), were often 50 feet long by five feet wide and could hold 30 men. Sometimes two would be connected together for increased cargo space (McCollester 2008:56). As the French moved into the area, they and their Native allies would use both the
bateaux boats as well as canoes (Wilson 1898:73). Bateaux or bateau boats (Figure 12) were easily constructed French lake boats that could accommodate approximately twenty oarsmen (A.F. Parson 1894: 43; McCollester 2008:56). These boats would later be modified with a keel (keelboat) (McCollester 2008:56). Canoes would remain popular on all waterways until the end of the fur trading era (Bauer 1988:56).

Figure 11. Pirogue (State Historical Society of North Dakota 2013).

Figure 12. Bateau or bateaux boat (Photo by New York State Military Museum).
Once a settler reached the Ohio he had several choices of boat to carry him and his family west (Reiser 1951:252). These early boat types ranged from simple flatboats during the mid to latter eighteenth century, to keelboats becoming popular in the first two decades of the nineteenth century, to seagoing vessels prior to the introduction of steamers (Barns 1999:206). The flat and keelboats that entered the Monongahela trade were usually less than 25 tons (Reiser 1951:252). According to General O’Hara, most of the early boats heading down river were flatboats (A. Warner 1889:514). Before 1811, all boats were either rowed or floated down the river (Reiser 1951:30). Simple rafts were also used by early settlers, but such craft were notoriously dangerous and hard to control (McCollester 2008:56).

Nobody knows the origins of flatboats (Figure 13); although they appear on inland rivers by the end of the Revolutionary War to replace the bateaux for downstream navigation (Johnson 1979:21). The flatboat industry was among the, if not the, first industry in the Headwaters District (Johnson 1979:21). These boats had better cargo capacity and ease of construction than canoes, and they were used up until the end of the nineteenth century (Johnson 1979:21). The construction of flatboats was cheap and simple; “a pile of logs and a bucket of nails and you were good to go” (Dietrich 2008:14). Because they were so cheap they were used to carry troops and cargo all the way through to the end of the Civil War (Baldwin 1938:147), however, 3/4 of all accidents resulted from their poor construction (Baldwin 1938:133). The tree trunk was split in half and was shaped into rigid timbers six inches wide and 24 inches high to serve as gunwales. Cross timbers were fixed between the two gunwales, and the bottom was planked and caulked before the sides and roof were installed (Johnson 1979:21).

A price varied from a $1 to $1.50 per foot, and the average flatboat was able to carry 50 tons and make the journey to New Orleans in just four weeks (Dietrich 2008). For $35 a family
could buy a flatboat with a shed shelter for the family and an open area for livestock, and those with $10 or more could add a fireplace (Barns 1988:206). They were shaped like a flat bottomed-box usually 20-60 feet long with the two sides between two and three feet high. These boats could be as long as 100 feet and 12 to 20 feet wide (Dietrich 2008; Reiser 1951:30). Flatboats were square at both ends, too unwieldy to ascend the river, and were disassembled at their destination for lumber (Killikelly 1906:140). Thomas Ridout gives a description of them in 1788. “These boats are flat bottomed, with upright sides and stern, and the front turns up like a skate. They seldom use any sail and are steered by means of a long oar from the stern, and two or three oars are occasionally used to conduct them, for the stream (the Ohio River), which runs at the rate of five mph, carries the boat with great rapidity” (Johnson 1979:21).

Figure 13. Flatboat (Switzer 2002).

These boats would either be classified as a Kentucky boat or a New Orleans boat (Johnson 1979:21). Kentucky boat had the connotation of a “shoddily built boat” (Baldwin 1938:133). They were typically smaller, partially roofed, and less well built (Johnson 1979:21).
The usual price for a Kentucky boat was between $1 and $1.25 per foot for an average of $35 dollars total, and they were boarded up on all sides and roofed to within seven or eight feet of the bow (Wilson 1898:80). New Orleans boats on the other hand were generally of better quality. They were stoutly built, completely roofed, and made for long distance travel, although, neither vessel was intended for upstream navigation (Johnson 1979:21).

Arks were also used to take families and livestock down river and often could carry loads of 500 barrels of flour (Wilson 1898:73). Settlers with over $100 could afford a more luxurious ark (Bauer 1988:156). These unwieldy vessels were built of heavy timber with a broad V-shaped bow and stem and normally steered by a giant sweep plied by two men (Bauer 1988:156). They usually had a house erected to shelter the family at one end and a cattle enclosure at the other, and, like flatboats, they were taken apart at the end of their journey (Bauer 1988:156). Descriptions indicate they likely looked like some sort of cross between a keelboat and a flatboat, although it is possible the term may have been used to refer to one or either of these vessels, as documentary descriptions are not clear.

Keelboats quickly became popular by the end of the eighteenth century (Figure 14). They were easier to control than flatboats and could still be navigated in shallow water (Reiser 1951:30). They also made it so boats could be brought back upstream for the first time (A. Warner 1889:514; Dietrich 2008). According to Johnson (1979) the origins of the keelboat have been lost, but he cites the first known keelboat on the Ohio, already mentioned, as being the Three Friends built in 1768 at Fort Pitt by George Morgan (Johnson 1979:28, 34; Voynick 2005). Keelboat popularity began to increase by the 1780s.

These boats were built on a keel; they were long and narrow, between 50 and 80 feet long and six to 12 feet wide, pointed at both ends; and they had a freight car like cargo hold (Baldwin
1938:135). Johnson (1979) and Voynick (2005) both describe them as 40 to 80 feet long by seven to 10 feet in width, drawing about two inches of water. And Bauer (1988) uses the figures 30 to 35 feet long and says they were capable of carrying 15 to 40 tons of cargo with the average cargo capacity being 30 tons (Reiser 1951:30; Wilson 1898:73). The hulls of these vessels were framed, planked over, and built like a ship with a longitudinal timber keel that supplied rigidity and bore the brunt of collisions (Johnson 1979:27). There was a cabin built to cover the hold which was surrounded by an 18 inch gangway along each gunwale on which the crew walked when poling the boat upriver. They did this by setting their poles into the river bottom (Bauer 1988:156; Johnson 1979:27; Killikelly 1906:140). Construction costs were about the same as flatboats, according to Cramer’s Navigator of 1821, being between $1 and $1.25 (Reiser 1951:30).

Figure 14. Keelboat (Johnson 1979).
Naturalist John James Audubon in 1809 described a keelboat as being “generally manned by ten hands” and rarely carrying more than 20 to 30 tons (Johnson 1979:27). These vessels could be manned with between four and 12 men on downstream trips and steered by a crew member standing on the cabin or platform manning the tiller oar pivoted at the stern (Johnson 1979:28). Pole-men often pulled tree branches, instead of using poles, when they were near the shore. They could also pull the boat with ropes, called cordelles, from the shore when going through rapids (Johnson 1979:28). The keelboat era was a brief but wild and romanticized period where “boating often involved backbreaking labor, but singing, fighting, and drinking were compensation before reaching the ladies of Louisville, St. Louis, Natchez, or New Orleans” (McCollester 2008:59) (Figure 15). Keelboats continued to operate on tributaries of the Ohio and Mississippi until around 1840 (McCollester 2008:59).

Figure 15. Map of relevant rivers and ports (Courtesy of Mississippirivercruises.org)
By the turn of the nineteenth century keelboats were being used for hauling a variety of essential goods, that settlers could not produce themselves, upstream from Pittsburgh on the Allegheny. They then returned with agricultural staples shipped back down by the pioneers. Keelboats were also used to ship agricultural goods from pioneers settled farther west back up the Ohio to Pittsburgh, also returning to their homesteads with manufactured goods. The introduction of these vessels greatly reduced transportation costs (Voynick 2005). In 1805 there were 50 keelboats operating between Pittsburgh and Cincinnati with 150 total engaged in the upper Ohio trade (Baldwin 1938:136). By 1815, keelboats ran regularly between Pittsburgh and New Orleans, and by 1817 at least 20 passenger boats and 150 keelboats plied the Ohio River at regularly scheduled intervals coming mostly from boatyards at Pittsburgh, PA, Brownsville, PA, Cincinnati, OH, and Marietta, OH (Bauer 1988:156). Although the keelboat made upstream trips possible, they were still quite strenuous. Crews braced poles against their shoulders and lanced the iron tipped poles into the river bottom to walk the boat upstream, walking the deck until they reached the stern and then scrambling to take their place back in line at the cabin (Figure 16). This method allowed them to travel at about six miles per day (Johnson 1979:28). The cost of transportation upstream was six times more expensive than downstream on packet or keelboats, and it took three to four months to go from New Orleans back to Pittsburgh this way (Dietrich 2008; Johnson 1979:28; Wilson 1898:74).
Figure 16. Pole-men in line on keelboat (Johnson 1979).

The western river boatman was a great folk-figure in American history (Bauer 1988:157). Identified as part alligator and part horse, this stereotypical image describes a tall, sinewy man with a darkened face from the elements, capable of tumultuous action, but “normally appeared ensheathed in a cocoon of listless lethargy” (Bauer 1988:157). Their typical fashion consisted of a red flannel shirt, a short, loose blue coat, coarse brown linsey-woolsey trousers, a fur cap, and moccasins (Bauer 1988:157). These boatman “wielded their saws, adzes, and hammers as soon as traders began to move about on the western rivers” (Bauer 1988:157). Flatboats men were usually farmers, merchants, and farmhands temporarily afloat while keelboat men were usually true rivermen often called alligators for being as comfortable out of water as in the water (Johnson 1979:28). The keelboats men’s food was “the coarsest and plainest, his labor most killing, and his wages rarely exceeded a dollar a day” (Baldwin 1938:156). As it was mostly a family owned business the wages were low and the food supply was brought from home (Reiser 1951:30). Renowned author, Mark Twain, had even taken his name from the call of the
Mississippi boatmen. A mark in river jargon is a fathom while “Twain” means two; therefore “Mark Twain” means 12 feet (Bauer 1988:162).

Packet boats ran regularly from Pittsburgh by 1794 (Figure 17) (Wilson 1898:73). These boats were mainly used as mail boats but carried passengers as well (Bauer 1988:156). They were armed with cannons and guns and had bullet-proof cabins extending the length of the vessel so passengers could sleep safely onboard without risking going ashore (A.F. Parson 1894:43; Wilson 1898:73). By 1794, there was service from Cincinnati to Pittsburgh, which took about 12 days to make the trip, and also between Pittsburgh and Wheeling (A. F. Parson Publishing 1894:43; Bauer 1988:156). They were 24 feet long, had rounded bottoms, had one steersman, four oarsmen, and had portholes for firing (A.F. Parson 1894:43).

Figure 17. Packet boat being towed from shore by horses (Sadowski 2012).
Barges were another boat type seen from the beginning of Pittsburgh’s boatbuilding industry all the way through to the twenty-first century. They were less frequently used than keelboats and have been described as “a keelboat with a built in cabin or cover filling in space between gangways” (Killikelly 1906:140). Once the Mississippi River was opened there was a new demand for such vessels (A. Warner 1889:543). These vessels were similar to keelboats, but they had a larger carrying capacity, usually 50 to 60 tons, which could include a crew of sometimes 50 men. They were wider and flatter than keelboats and were steered by a rudder (McCollester 2008:56). Some barges were 120 by 20 feet, drawing four feet of water (Johnson 1979:27; Voynick 2005). They were notoriously difficult to steer and 1/3 of these vessels were destroyed while underway during the flatboat era.

Galleys were another type of western river vessel, and they can often be difficult to distinguish between a ship and a boat. There were three well documented galleys built in Pittsburgh prior to the nineteenth century. The first well known galley constructed here was the vessel, Western Experiment, launched on the Monongahela in 1792 at the foot of Redoubt Alley, west of Stanwix Street (Cowin 1985:72). Based on its description, this was likely the Fort Pitt boatyard, now occupied by Gen. O’Hara’s boatyard facility which was either the same facility as Fort Pitt’s boatyard, built directly on top of it, or located in the immediate vicinity (Figure 18). The Western Experiment was one of the earliest known large sailing vessels built on western rivers of North America (Bauer 1988:157), however, Bauer incorrectly cites the ship as being built in 1789 and mentions another schooner being built in 1793 on the Monongahela (Bauer 1988:157). McCollester (2008) described this vessel (although incorrectly calling it the Monongahela Experiment) as a row galley with 30 oars and two masts, and he states how a number of other ships were built in Pittsburgh this way which were intended to sail to ports at
Philadelphia and New York. A newspaper caption from the time states, “The sloop Western Experiment, Captain, Charles Nicholson, built on the Monongahela and bound for Philadelphia-passed Limestone on Saturday the 20th of April, navigated by Isaac Brown, Samuel Moor, Walter M’Morris, Joseph Woods, and Andrew Mitchel” (Kentucky Gazette 1792).

Figure 18. James O’Hara’s boatyard (Cramer 2013).

Two other 30 oared, two-masted galleys, the President Adams and the Senator Ross, were also built in Pittsburgh prior to the nineteenth century. These vessels were built under the supervision of Major Isaac Craig (Baldwin 1941:163). The former was built in 1798 and the later in 1799 (A. Warner 1889:514). These two vessels were valued for their contributions toward westward expansion and provided the United States with a strategic military advantage against the Spanish on the Mississippi. They will be discussed in more detail in the following section with regards to their military role.
The Military’s Role in Pittsburgh Watercraft Construction

The Army played a significant role in developing the watercraft industry in Pittsburgh as rivers quickly proved to be the primary logistical line for American troops operating on the frontier (Johnson 1979:37). In 1778, the Commissioners for Indian Affairs ordered the building of six large boats for the defense of the navigation routes between military posts in operation on the Ohio (A. Warner 1889:466). Each of these boats was to carry a four pound cannon, and be built with both offensive and defensive capabilities. Around the same time as the Western Experiment was being built in Pittsburgh, the military had dozens of other boats under construction. A letter written from Pittsburgh to the Secretary of War on December 14, 1792 indicated that 14 boats were needed from Pittsburgh, to be loaded with forage intended for Fort Washington, and an additional 20-plus vessels would be needed by March of 1793 to transport 2,000 troops downriver (Reiser 1951:255). Each of these boats was to carry 50 persons. An additional eight boats were needed just to carry artillery while another 12 were needed to carry the 160 horses and cattle accompanying the expedition (Reiser 1951:256). In total, 60 boats would be needed for this mission set to launch from Pittsburgh.

As hostile territories were progressively pacified, European settlers increasingly began their expansion westward. In 1789, Major Andre Elliot became geographer of the United States and began to survey the western and northern boundaries of Pennsylvania (Johnson 1979:31). He later conducted other surveys of the United States and Canada as well. Elliot even had a hand in organizing the renowned Lewis and Clark expedition after being sent by President Washington to survey new western lands beginning in Pittsburgh (Johnson 1979:31). 1795 represented one of the first actions that would define the westernmost boundary of the United States. It was in this year that the Spanish agreed to the 31 degree longitude boundary between the United States and
Spanish Louisiana and Florida. Between 1794 and 1798, peaking tensions with the Spanish hindered the growth of the watercraft industry in Pittsburgh. However, in the last year of these tensions Pittsburgh would be employed by the United States government to begin construction of the previously mentioned President Adams and Senator Ross. These galleys were both intended to attack Spanish ports along the Mississippi (Johnson 1979:31).

The United States had realized that it would need these superior ships if they were to effectively engage Spain’s 10 ship fleet operating on the Mississippi during this time (Johnson 1979:32). In late 1797, Major Isaac Craig and the Quartermaster of Fort Pitt, General James O’Hara, who had been appointed in 1781, began the construction of the President Adams and Senator Ross, which were to be 50.5 feet long by 14 feet wide, with two masts, 30 oars (same specifications as the Western Experiment), and each was to carry an 18-pound cannon and another smaller one located at the rear (Johnson 1979:32; McCollester 2008:61).

The President Adams was the first boat finished. It was launched on Saturday, May 19, 1798 (Lowry 2003). At the same time this vessel was completed, the keel for the Senator Ross was already laid (Craig 1851). Unfortunately, the Senator Ross was not completed on time for the engagement with the Spanish Armada on the Mississippi, and the President Adams was forced to lead a flotilla of six large flatboats and several smaller craft down the Mississippi without the assistance of her sister ship (Craig 1851:273).

The Senator Ross was completed two months later on July 27, 1798, but there was not enough water for her to launch. It was not until April 5, 1799 that she was completely rigged, launched, fully equipped, and anchored in the Monongahela (Craig 1851:274). The building of these two vessels greatly stimulated Pittsburgh’s shipbuilding industry and along with the 1803 purchase of the Louisiana Territory, already discussed, proved to be of vital importance to the
overall industrial and economic development of western Pennsylvania (Boucher 19008: 395; Johnson 1979:32).

Pittsburgh carpenters were heavily recruited to help build Commodore Perry’s fleet on the Great Lakes during the War of 1812 (McCollester 2008:60). It is not clear if any of the vessels were built in Pittsburgh or if Pittsburgh builders were brought to build these vessels closer to the Great Lakes themselves, but much of the rigging, naval hardware, and ammunition that was involved in Commodore Perry’s victory on Lake Erie on September 10, 1813, had defiantly been contracted out of Pittsburgh (Johnson 1979:44). As Magoc (2001) described it, Pittsburgh produced “tons of shot and miles of rigging” (Magoc 2001:10). The northwest army was, for the most part, provisioned by Pittsburgh whether the supplies had been made there or not (Reiser 1951:8), and a large quantity of the rigging made for Perry was produced by a Pittsburgh rope maker named Hugh Ross (Killikelly 1906:111).

Some argue the battle was really won by Pittsburgh’s shipbuilding industry, and it even earn the nickname “Shipwrights’ War” (Magoc 2001:10). Marcus Hulings, an able bodied riverman appointed by Major Isaac Craig, might not have even been able to deliver the supplies of rigging and ammunition up French Creek in his keelboat in 1813 had it not been for the recent Pittsburgh led navigation improvements intended to support the shipping industry’s commercial activity (Johnson 1979:44). French Creek is a tributary of the Allegheny which leads to Lake Erie, and Huling’s successful delivery up this improved river provided early evidence for the national defense benefits that river improvement projects could have and further fueled the debate over the constitutionality of maintaining interstate waterways with federal support.
Early Pittsburgh Boatyards

There were several early boatyards in Pittsburgh which have already been introduced. The first recorded boatyard was on the Monongahela side of Fort Pitt in the 1760s. When Mathew Clarkson visited this boatyard in 1766 he came across four finished boats already in the water with three more under construction (Killikelly 1906:74). He refers to “shipyards” in his testimony, but it is unclear what other yard or yards he was referring to and whether these yard(s) were in the commercial district of Pittsburgh or somewhere else in the territory. They also would certainly not have been “shipyards” as defined in this research.

Evidence shows that around this same time, or at least within a decade following the Fort Pitt boatyard, John Ormsby owned a small boatyard on the south side of his lot on Water Street and the corner of Chancery Lane (Figure 19) (Cowin 1985:333). This could possibly have been one of the other yards that Matthew Clarkson was referring to if it was in operation earlier than documented in historical literature. It is unclear when the boatyard began operation, but evidence shows that the house and boatyard were rented to Jacob Haymaker in 1783 who immediately began building boats, but the property was up for rent again in 1788 (Cowin 1985:334). Most of his land was sold off to his daughters Sidney and Jane between 1799 and 1805, and it is unclear what happened to his boatyard and whether it remained in operation or not (Cowin 1985:334; Killikelly 1906:111). Ormsby died in 1832 with no further mention of his boatyard except to say that his land was divided amongst his eight children (Cowin 1985:334).
The next documented yard was the 1777 yard located approximately 14 miles above Fort Pitt which employed 14 carpenters. Twenty boats were known to have been built at this sawmill but, as mentioned previously, the exact location is a mystery (Figure 8). Another early pre-nineteenth century boatyard, later shipyard, discovered in the commercial district was Fort Fayette, which straddled Pennsylvania Avenue between Ninth Street and Garrison Way (Lowry 2003) (Figure 20). An 1872 military pension request indicated that boats were definitely being built here during 1812, and this is the yard where Lowry (2003) believes the President Adams and the Senator Ross may have been built, based off records that indicate it was built on the Allegheny (Figure 21).
What records Lowry found this information in are unclear, but it is also, if not more, likely these vessels were built at O’Hara’s yard on the Monongahela, the same place as the Western Experiment was built just a few years earlier with near identical specifications. Also, the Senator Ross was anchored in the Monongahela, and at this time, prior to the wharf being developed on the Monongahela, it would have been more likely that it would have been anchored in the Allegheny if it was constructed at Fort Fayette. It makes sense for it to have likely been built at O’Hara’s yard (Fort Pitt’s) as it is the primary yard that both O’Hara and Isaac Craig were known to operate out of in Pittsburgh.

Figure 20. Fort Fayette 1795 historic map location (top-right) (Darlington Digital Maps).
Arguably the biggest factor in igniting Pittsburgh’s boatbuilding industry, already discussed, was the purchase of the Louisiana Territory from Napoleon. In 1802 Napoleon had sent 30,000 troops against rebel slaves in Haiti who were under the command of Toussaint Louverture. Napoleon’s troops were soundly defeated. The loss of Napoleon’s base of operations to colonize Louisiana forced him to sell the off the territory, and it would keep Pittsburgh’s major markets, New Orleans in particular, firmly under domestic control (McCollester 2008:56).

**Corps of Discovery and Building of the “Big Boat”**

In 1803 Meriwether Lewis was appointed by Jefferson to head the Corps of Discovery and to explore the new land acquired from Napoleon, the Missouri River in particular, with the hopes of finding a waterway passage to the Pacific (McCollester 2008:56). Lewis then chose William Clark as his companion (Johnson 1979). Pittsburgh, as the “Gateway to the West”, was selected as the obvious launching point for the expedition, and they headed there to have the necessary keelboat and canoes constructed (McCollester 2008:56). Due to costly delays from a
drunken contractor, the primary keelboat was not completed until August 1803 (Johnson 1979:37). Profile (Figure 22), plan (Figure 23), and an overall view (Figure 24) of the keelboat can be found below. This vessel proved to be a sturdy, dependable, and instrumental vehicle that would travel the 6,000 miles down the Ohio and Mississippi, and up the Missouri to North Dakota, where it would then turn back for Saint Louis (Lowry 2003). Lewis and Clark set out from Pittsburgh at 11:00am on August 31 (McCollester 2008:56). They were accompanied by seven soldiers, a pilot, and three other young men on their primary keelboat (McCollester 2008:56) with anywhere from 20 to 40 additional expedition members. All sources vary drastically with regards to the total expedition companions likely as the result of a significant fluctuation between those who were there for the start of the journey and those who remained at the conclusion. This was the result of death, mutiny, desertions, and other acts deemed criminal. The water levels were very low when the expedition began, and the crew frequently found themselves using oxen to tow the boat to deeper water (Johnson 1979:37).

One of the great controversies surrounding this event was the question of where this keelboat, sometimes referred to as the “big boat” (Lowry 2003), was actually built. Several boatyard locations claim to be the home of this historic vessel. One source outlines a popular belief that “the big boat was built in the boatyard of William Greenough, near what is now the north end of Liberty Bridge” (Lowry 2003). The boatyard that she is referring to is the Tarascon yard. Documentation indicates that when the vessel was launched on August 31 it traveled only three miles to reach Brunot’s Island, which is roughly three miles downstream from the Tarascon yard (Lowry 2003). However, the same author also states that “modern scholarship suggests that the boat was built at Elizabeth, PA, south of Pittsburgh, on the Monongahela River” (Lowry 2003:6).
Figure 22. Clark’s profile drawing of the keelboat (Molton 1983–2001).

Figure 23. Clark’s plan view drawing of the keelboat (Molton 1983–2001).
Elizabeth, one of the oldest towns in the Monongahela Valley, has long claimed that the “Big Boat” builder was its own Captain John Walker (Lowry 2003). The earliest known reference to the Lewis and Clark boat builder comes from Lyman C. Draper who was a nineteenth century historian who collected papers, maps, genealogies and oral histories of western pioneers and their families. During an interview between Draper and Colonel George Bayard, the son of Colonel Stephen Bayard, Bayard discussed how his father had prepared some of the boats for the expedition at his father’s yard in Elizabeth (Lowry 2003). It does not however, indicate whether that included the keelboat.

Colonel Stephen Bayard and Major Isaac Craig were both officers at Fort Pitt. They were the city’s first land speculators and together purchased three acres of land at the Point after the fort was demolished (Figure 25) (Lowry 2003). These three one-acre lots all became the
locations of early watercraft construction facilities. It is unclear as to whether any or all of these locations were used for boatbuilding while under their joint ownerships, but both men were known to be heavily involved in this industry.

In 1787 Bayard moved to a riverfront plot of land in Elizabeth, 21.5 miles up the Monongahela, which had belonged to his father in law, and he established a boatyard there the following year (Lowry 2003). He hired four carpenters from Philadelphia and began building “boats of every construction and size” (Lowry 2003:25). Boatbuilding, like in Pittsburgh, was one of the earliest industries in Elizabeth (Consolidated Illustrating Company 2001:49). However, the start of their formal shipbuilding industry did not occur until John Walker’s yard in 1800 (Consolidated Illustrating Company 2001:49).

Figure 25. Craig and Bayard’s land on the point (Darlington Digital Maps).
Two years before Bayard had founded his Elizabeth boatyard, Samuel Walker took his wife and children over the mountains where they would settle two miles upriver from Elizabeth (Lowry 2003). By 1800 Walker’s son, John, was building ocean-going ships at Bayard’s boatyard, but until the advent of the steamboat this yard mainly specialized in keelboats. This made it a likely possibility for being the location of the big boat’s construction (Lowry 2003). In the same year as John Walker began building boats, a group of farmers and other persons near Elizabeth, organized themselves into the Monongahela Company and began building a vessel with John Scott as the designer and master builder. This vessel was the 100 ton Monongahela Farmer launched on April 23, 1801 (Baldwin 1941:162). It was built of white oak and black walnut, decked with yellow pine, and sailed under the command of John Walker himself (Baldwin 1941:162).

None of Meriwether Lewis’s letters mention Elizabeth, the 15 mile hike by land, or the 22.5 mile trip by water they would have had to make. They do, however, discuss Lewis visiting the boatyard frequently to “castigate the drunken boat builder”, and based on the well established reputation of John Walker it is unlikely that he was this builder (Lowry 2003). In a letter from Lewis to Thomas Jefferson, he describes the boat builder as “constantly either sick or drunk” and who quarreled with his workmen until several left him (Lowry 2003:50). This behavior, accompanied by the fact Lewis never mentioned the builder’s name, assuming it would not be recognized, indicated that it was unlikely any of the above mentioned boatyards (Lowry 2003).

In the first 200 years following the expedition there were not any deep investigations into the boatyard responsible for the keelboat. This changed in the summer of 2003 when David Halaas, former head of the Library and Archives and Publications divisions at the Heinz History Center, and William Brunot, undertook extensive research on this question, and both concluded
that the boat was with little doubt built at Fort Fayette on the Allegheny, also about three miles from Brunot’s Island (Lowry 2008). Elizabeth’s town webpage, however, continues to argue for the “big boat” having been built in their town, but the evidence is contrary to those claims despite them being inscribed in stone on their founder’s grave marker. In fact, a Pennsylvania State Historic Landmark marker located in Pittsburgh reads, "On Aug. 31, 1803, Capt. Meriwether Lewis launched a 50 foot 'keeled boat' from Fort Fayette, 100 yards downriver. This marked the beginning of the three-year expedition commissioned by President Jefferson, which opened America to westward expansion." (Lowry 2008:2).
CHAPTER VI

EXPANSION OF INDUSTRY AND COMMERCE

The massive expansion of the United States, beginning largely after the Louisiana Purchase, dictated that the waterways would provide the chief means of transportation for goods being sent to New Orleans and the land west of the Mississippi River (St. Louis Action Research Report 2012). “Commerce on the great western waterway would make the United States a brown water maritime state more than a blue water nation.” (Roland 2008:110). Up until the end of the American Revolution, English goods still dominated the market (Ford 2006:127). However, this began to change more rapidly in 1789 when James Wilkinson took a 25 boat flotilla, armed with light swivel cannons and 150 men to New Orleans (McCollester 2008:56). The vessel was laden with tobacco, flour and other goods, and after this delivery he secured permission from the Spanish to make additional shipments which resulted in a rapid expansion of trade and vast new opportunities for western goods. New Orleans would provide an outlet for grain, whiskey, and tobacco for decades to come (McCollester 2008:56). According to McCollester (2008) there were large boatyards already operating in Brownsville, Elizabeth, and Pittsburgh at this time. The European wars of 1792-1815 soon offered a never before seen opportunity for American merchants, ship owners, and seamen as their overseas competition became preoccupied with their own affairs at home in Europe. This left the markets open for Americans to fill the void (Bauer 1988:61).

The abundance of Pittsburgh’s natural resources furthered commercial and industrial development as the land was covered with cheap building material (Reiser 1951:3). Pittsburgh was also situated on top of some of the richest coal deposits in America, and the first coal shipments from the area would flow down from Pomeroy to Cincinnati in 1806 (A.F. Parson
Aside from the substantial agricultural surpluses that were exported from Pittsburgh, there were manufactured wares. These wares included glass, cotton, woolen textiles, iron tools, and agricultural implements to name a few (Reiser 1951: vii). In 1800, there were 63 shops, trading establishments, taverns, hotels, industries, a brewery, two glassworks, one iron works, a salt works, saw and grist mills, a powder works, oil works, and “The Boatyard” (Cowin 1985:64). This statement likely refers to the Fort Pitt/O’Hara yard, but it is unknown whether it was still in operation or not as it could also have been referring to Fort Fayette’s boatyard. The 1802 Cramer Almanac lists similar industries as well as “boatyards” (Reiser 1951:11). This referral to plural yards is associated with the opening of the Tarascon yard in 1801-1802, and in the year 1802(3) the Cramer Almanac listed three master ship carpenters in Pittsburgh who produced a combined profit of $43,000 (Boucher 1908:320; Reiser 1951:7). It is not clear if they were operating out of the three different yards present at this time or if all of them were employed in Pittsburgh’s largest yard (Tarascon yard). It also may be that these master ship carpenters moved from yard to yard or oversaw multiple vessels at different yard simultaneously.

An Irishman by the name of Thomas Ash was traveling through Pittsburgh in 1806 when he stated the major industries as being glass, nails, hats, tobacco, and shipbuilding (Boucher 1908:347). “Milling was probably the earliest industrial pursuit as flour was essential” (Reiser 1951:12), and “whiskey was almost as much a necessity as food” (Cramer 1804). Flour would flow mostly south while whiskey would flow both south and east (Reiser 1951:12). The manufacturing establishments could be found extending seven miles up each river and three miles down the Ohio (A.F. Parson 1894:42).
River transportation was an essential element in developing these industries, which later included lumbering, woodworking, ceramic industries, and dozens more as Pittsburgh began to diversify its enterprises (Baldwin 1938:145). Alliance furnace was built on Jacobs Creek and became the first furnace west of the Allegheny Mountains, starting the iron and steel industries in Pittsburgh (Johnson 1979:24). Both the iron and glass industries came to rely heavily on coal and steam. Iron ore was plentiful at Pittsburgh, and it was forged into a variety of implements (Reiser 1951:3).

As discussed “the river was a free and open highway accessible to all who were able to obtain a boat” which was not a problem as they were cheap and plentiful (Reiser 1951:29). The wooden craft used during the early years were crude craft that could be constructed by any farmer or merchant, and the variety of types that were used was almost as numerous as the individuals who used them (Reiser 1951:30). The design depended on water levels at the time it would be launched as well as the types of cargo that it would be carrying (Reiser 1951:30). Pittsburgh’s position at the intersection of three rivers leading to the Mississippi gave it superior access to the gateway of these western lands and granted it first access to commercial enterprises moving westward. Instead of looking to eastern markets, western markets looked to Pittsburgh for their economic leadership (Reiser 1951:2).

The history of the river trade and the salt trade, in particular, are directly related (Reiser 1951:58). In 1796, General O’Hara began bringing in salt from New York for export until Pittsburgh was able to produce enough of its own supply (Reiser 1951:31). The opening of a salt works on the Allegheny and the Kiskiminetas rivers provided another boost for riverine trade down the Ohio (Craig 1851:272). By the turn of the nineteenth century, Pittsburgh was actively shipping flour, whiskey, bar iron, coarse linens, castings, glass, salted pork, beef, corn, copper,
tin wares, cordage, apple cider, peach, and apple brandy (Baldwin 1938:136; Reiser 1951:31). The boats set sail with the spring flood as soon as the ice broke, which typically occurs sometime in mid-February and lasts for about three months (Thurston 1888). Referring to a trip from Pittsburgh to Louisville in 1806, “any tonnage may descend: and it is never so low but that it may be navigated…by craft not drawing more than twelve inches of water. The highest floods are in the spring when the river rises forty-five feet: the lowest are in summer, when it sinks to twelve inches on the bars, ripples, and shoals” (Hulbert 1906:251). The rivers were unsuitable for navigation between July and October due to the low water levels (Reiser 1951:35). The fall was also a good time for navigating the Ohio (Reiser 1951:35). This season generally began in October and usually continued until the first week of December when the ice began to form (Thurston 1888:19). This season varied significantly based on the wetness of the season, the earliness or lateness of the season setting, “or the breaking up of winter” (Thurston 1888:19).

New Orleans’s Market and Triangle Trade

The New Orleans trade was without a doubt the most important market affecting the early boatbuilding industry in Pittsburgh. It began in the last two decades of the eighteenth century and continued well into the mid-nineteenth. During the earliest part of this industry’s development there were two major markets. The first market was the American troops down the Ohio who needed provisions for their Indian campaigns, and the second market was the Spanish at New Orleans who were cut off by a British naval blockade (Johnson 1979:23). Pittsburgh had been connected to New Orleans since the 1780s largely through flatboat traffic (McCollester 2008:48). Western merchants, using credit from eastern mercantile houses, exported manufactured goods from ports like Philadelphia, New York, Baltimore, or Boston. From there they were shipped over the Appalachian Mountains by packhorses and brought to Pittsburgh.
where they were sold on credit in exchange for agricultural products as well as a variety of other Pittsburgh goods (Church 1908:46; Johnson 1979:26; St. Louis Action Research Report 2012). These goods were shipped west and south via river boats from all ports of the Headwater District to New Orleans where brokers would buy the cargo and credit the merchants’ accounts (Johnson 1979:27).

The boats were then sold off in New Orleans, usually for scrap wood, and the crews could either walk or take ship passage back to their home port at Baltimore or Philadelphia (Johnson 1979:27; Reiser 1951:30). This was due to flatboats having a “flat and unwieldy construction” that would “preclude every idea of ascending the stream” (Reiser 1951:252). Boatmen usually traveled home walking in groups of three to four for mutual protection. They sometimes purchased horses at New Orleans or Natchez for transportation home (Baldwin 1941:125). Keelboats could also be arduously rowed or poled back upstream at a pace of 10 to 20 miles per day, but it could take three to four months just for crews to make it upstream to St. Louis, MO (Hunter 1949), and upstream trade would account for less than 10% of the total trade prior to the advent of steamboats (Bauer 1988:156; Johnson 1979:27; Reiser 1951:30).

Goods brought to New Orleans were exchanged for things like molasses, sugar, cotton, and indigo and then shipped through the Gulf of Mexico, up the East Coast, and back to the ports the transport vessels were operating out of (Church 1908:46). Farmers, merchants, real estate specialists, millers, and bankers, all came to rely on an “elaborate system of marketing composed of mills, warehouses, flatboats, and credit systems in a triangle trade” (Johnson 1979:26) (Figure 26). Over 21,500 flatboats are estimated as having arrived in New Orleans between 1806 and 1857 with the peak winter season of 1846-47 counting 2,792 alone (Bauer 1988:160). These upriver goods were also shipped to Europe and the West Indies from New Orleans (Church
This triangle trade continued well into the age of steamboats, and Pittsburgh’s share of the total New Orleans trade accounted for approximately 10% (Reiser 1951:42).

This trade system proved quite profitable for decades, but its success would not be without obstacles. Some of the earliest setbacks to this trade and boatbuilding industry resulted from the Spanish closing their ports to American goods, as discussed, but future problems emerged out of the Non-Importation Act enacted on April 18, 1806, which stopped the importation of certain goods from Britain, the Embargo Act enacted on December 22, 1807, which forbade certain trade with Great Britain and France (Reiser 1951:16), and the Non-Intercourse Act of 1808-9, which cut off trade with them completely (Reiser 1951:17). The lack of river improvement projects during this time also hindered trade (Cowin 1985:64).

![Map showing New Orleans's triangle trade route](Steamboats.org)

Figure 26. New Orleans’s triangle trade route (Steamboats.org).
CHAPTER VII

NINETEENTH CENTURY AMERICAN WATERCRAFT CONSTRUCTION

Shipbuilding in the United States was a slow and gradual industry to develop (Boucher 1908:319). There was little demand for locally built ships early on in this nation’s development. This was largely due to tobacco being such a valuable commodity that English and Dutch merchants found it easier to send their ships directly to the landowners already loaded with goods (Ford 2006:126). It was not until the close of the seventeenth century that colonists would have the financial resources required to construct ocean going vessels (Ford 2006:126). Between the turn of the eighteenth century and the American Revolution shipyards began spreading along coastal shorelines as well as inland (Ford 2007:263). Between the year 1661 and 1754 at least five laws were enacted in the United States which gradually granted Americans the right to legally construct ships (Ford 2006:127). Local shipbuilding was then stimulated largely through taxing foreign built vessels (Ford 2006:127).

American shipyards had a significant advantage over those of Great Britain in their abilities to produce cheaper vessels at a quicker pace. This had more to do with timber shortages and bureaucratic obstacles in Britain then it did with “rugged individualism and colonial can do spirit” (Ford 2006:126). The timber supply of North America provided American ship builders with a significant cost advantage in terms of hull construction; however, hemp for rigging was still cheaper and easier to import from Britain at this time. By the close of the colonial period the Chesapeake region took Pennsylvania’s number two rank among ship producing regions, trailing behind only New England, but it was not until the Industrial Revolution that the shipbuilding industries saw their most significant growth (Ford 2006:128).
The first half of the nineteenth century was a stressful period for all shipwrights in America as they struggled to incorporate new materials, crafts, and propulsion systems into the industry. Larger yards were centralized in big cities as it was necessary for yards to be close to both their employees and customers (Ford 2006:128). Depending on the demand, a shipyard could produce boats as well, and laborers could easily move back and forth from one type of production to the other. Boatbuilding both preceded and followed the peak years of ship- construction in a number of yards in Pittsburgh. Many shipyards included a basic blacksmith shop, but only the larger yards were able to employ a full time blacksmith (Ford 2006:129). Shipyards were generally located on land or immediately downstream from land capable of growing oak, as it made more economical sense for a builder to build his yard near the timber than have to haul the oak to the yard (Ford 2006:129). The significant resources a shipyard needed to operate put a substantial strain on the environment (Ford 2002:5).

Iron was used throughout wooden sailing vessels. Iron pintels and gudgeons held the rudder to the ship while iron fasteners were used in order to attach the rigging to the hull (Ford 2002:5). When a merchant entered into a contract for a vessel he generally agreed to supply the ships’ chandlery as well as the iron that was necessary for its construction (Ford 2002:5). Smaller shipyards generally did not have much division of labor, while larger yards employed a variety of workers and artisans with different skill sets (Ford 2002:8). The “space in which the shipbuilders worked tended to be as flexible and fluid as the workforce itself”, and a simple layout was kept with minimum buildings so as to maximize the available space for large timbers (Ford 2002:10).

Building a wooden ship represented a considerable investment, and shipbuilders “relied on time tested craft methods, their aesthetic judgment, and contemporary examples of the best
sailing ships as models for their work” (Thiesen 2006:1). Anglo-American builders used the conservative approach as it was simply too risky for most to experiment with revolutionary designs due to the immense amount of labor, material, and financing required for a ship’s manufacture (Thiesen 2006:1). A failed experimental ship could ruin a small builder and such vessels remained the privilege of state funded or wealthy shipyards (Thiesen 2006:2). Hulls were intended to model forms found in nature such as the duck, dolphin, and the cod’s head and mackerel tail (Thiesen 2006:2). Attributes of vessels like the size of the beam, length of the keel, and shape of the bow had been quite commonly altered to increase performance, and it was “impossible to trace any general principle which served as guides for their construction” (Thiesen 2006:54). Archaeologists have uncovered evidence that English shipbuilders used frames and structural timbers from disassembled ships as template models for the structural parts of later vessels (Thiesen 2006:2).

Many shipbuilders used traditional methods to control the shape of vessels, such as “ribbands” and “whole molding”. Ribbands could be used to form the hull around the entire vessel if only the stem, stem post, and mid ship were erected (Thiesen 2006:2). Whole molding required little calculation or drawing as shipwrights made replicas of the pieces and used the mid ship frame profile as a jig for the rest of the frames (Thiesen 2006:3). The later method could be used by uneducated ship builders as it eliminated complex calculations and guesswork (Thiesen 2006:4). Standardization took some time to occur within this industry and received a push when Lloyd’s Register of shipping and requirements for seaworthy vessels in 1760 was published (Thiesen 2006:4). During the nineteenth century American shipbuilders began adapting a three-dimensional half hull model that was foreign to earlier builders (Thiesen 2006:44), and by 1839 it was the practical half hull model that was used in most American Shipyards (Thiesen
Ship owners bought ships whose prototypes had proven successful, and this was the reason why American shipbuilders continued using standardized models. “Spinning off numerous copies was cheaper than buying new molds” (Thiesen 2006:52).

Introduction to Wooden Shipbuilding in Pittsburgh

From 1790 to 1810, wooden ocean-going shipbuilding was arguably the most important industry in Pittsburgh (Dietrich 2008). During this period Pittsburgh’s watercraft industry evolved from a small boatbuilding center, to larger galleys, to a more prominent shipbuilding hub that constructed much larger wooden sail-powered vessels capable of transatlantic voyages. During the 1790s the transition from boatbuilding to shipbuilding began with the construction of the 30 oared, two-masted galleys such as the Western Experiment, President Adams, and Senator Ross which were all constructed in Pittsburgh. The building of such galleys soon evolved into a short-lived, ocean-going shipbuilding industry. By the turn of the nineteenth century, “Pittsburgh entered the shipbuilding industry in a serious way” (Baldwin 1938:129). Peaking between 1801 and 1806, the production of seagoing craft was quite active in Pittsburgh (Reiser 1951:7).

In 1803 the secretary of the Navy called for the building of new galleys at Pittsburgh, Marietta, and Louisville (Wilson 1898:79). The specifications required them to be at least 56 feet long, by 14.6 feet wide, by 5.75 feet deep, and they would have to have a 12 foot forecastle deck, 14 foot quarter deck, a cabin, a magazine, 28 oars, two lateen masts of 28 feet in length, and two cables over 100 fathoms long (Wilson 1898:79). Much of these specifications are similar to those used for the Western Experiment, the President Adams and the Senator Ross, but the newer vessels were also built to carry one 24-pound cannon and six brass howitzers. The frames were also to be constructed of black walnut and planked with seasoned oak (Wilson 1898:79).
The Transition from Galleys to Ocean-Going Ships

The construction of wooden ocean-going vessels can only be seen occurring in Pittsburgh from the decade preceding, to the decade following, the turn of the nineteenth century. These vessels were largely intended for overseas markets in Europe. Why entrepreneurs thought building such vessels so far from the ocean was a good idea is anybody’s guess, but possibly the surplus of land and timber and the absence of much local competition made it seem like an appealing business opportunity. As early as 1770 Benjamin Franklin stated, “Whenever the farmers or merchants of the Ohio shall properly understand the business of transportation, they will build schooners, sloops, etc. on the Ohio, suitable for navigation” (Baldwin 194:160).

By 1810 it was quickly proven less profitable to build such vessels so far inland, and that same year construction began on the first steamboat in the western waters of North America, the New Orleans, which was constructed at the site of the Old Tarascon Yard (Thurston 1888). The Tarascon Shipyard was the largest wooden sailing “shipyard” to ever operate in Pittsburgh and closed prior to 1809, but its new owner, Anthony Beelen, established Eagle Foundry on this site, and this is the foundry that built New Orleans (Dahlinger 1911). After this time steamboats would come to dominate the shipping industry on western waters of North America.

During the first decade of the nineteenth century there were large boatyards in operation in Brownsville, Wheeling, and Pittsburgh, and from these points “the great bulk of immigration west set out” (Wilson 1898:80). For a time, few could believe ocean-going shipbuilding was taking place in these areas, as they were so far inland. Building such vessels in Pittsburgh was thought to be a good idea for the same reasons that the boatbuilding industry had developed. Its strategic position at a major riverine intersection that emptied into the Gulf of Mexico, its vast
supply of cheap timber, and its skilled labor force were all factors making it seem likely for such watercraft construction to be a profitable business venture.

There were only three major early nineteenth century wooden ocean-going shipbuilding facilities operating in Pittsburgh (Killikelly 1906:130). The Fort Pitt yard, Fort Fayette, and the Tarascon yard were all known to be constructing watercraft at this time. The first two had been constructing boats prior to their transition to ocean-going vessels while the Tarascon yard was entirely invested in transoceanic sailing vessels. Pittsburgh’s brief dabble in wooden ocean-going shipbuilding occurred as this industry was going through industrialization in America.

In the spring of 1796 General O’Hara had a sawmill built in Allegheny and made arrangements with Major Isaac Craig to build a glassworks. After their partnership dissolved O’Hara and Captain Eliphalet Beebe, one of Pittsburgh’s most prominent shipbuilders who was building ships for O’Hara at this time (Wilson 1898:79), built the ship General Butler at his downtown Pittsburgh yard (Figures 9 and 10). It was to sail down river with glass cargo intended for intermediate ports (Reiser 1951:216). This vessel was to take on cargo at Natchez, Mississippi intended for Liverpool, England, and then it was to return to either Philadelphia or New Orleans with goods for either market (Reiser 1951:216). It later made a trip from New Orleans to Greenock, Scotland with a load of cotton, but on October 3, 1807 it was captured by a Spanish schooner (Reiser 1951:216). Another of the ships Beebe built for/with O’Hara, was the schooner Conquest. This ship had a 126 tons burden, was pierced for 16 guns, and set sail for the West Indies under a Captain Kenny (Wilson 1898:80). He possibly built O’Hara’s Brig Allegheny around the same time as well (1802-1805) (Baldwin 1941:165). According to Wilson (1898), the Allegheny was launched by the company Barber & Lord. Captain Beebe would build a number of ships at the Tarascon yard as well.
Generals James O'Hara and James Wilkins eventually built several vessels together intended for river trade. One such vessel, the Betsey, was used for trade between Baltimore and the West Indies (Reiser 1951:216). By 1810, boatbuilding was the fourth largest industry in Pittsburgh after iron, leather, and glass (Reiser 1951:216), and for a few years after this time it would be difficult to gauge its rank in industry as boatbuilding began being classified under woodworking (Pittsburgh Gazette 1-1-1820).

Fort Fayette, already introduced with regards to early boatbuilding, was an important site in Pittsburgh’s history, particularly with its role in the removal of Native Americans from the area in the 1790s, and it was reactivated for the last time to serve Commodore Perry’s Fleet during the War of 1812 before it was sold and abandoned the following year. In fact according to Baldwin (1941) it was not the Tarascon yard that had the honor of launching Pittsburgh’s first merchant ship to sail across the Atlantic, the 170 ton Dean in 1803; it was Fort Fayette, described as being built at an “unidentified yard” on the Allegheny (Baldwin 1941:164). The Dean set sail from this yard down the Mississippi, across the Atlantic, and all the way to Liverpool (Dietrich 2008). It is uncertain if Baldwin’s research was simply lacking or if he misstated what he meant by this, as the Tarascon yard, would in fact, build at least two ocean-going merchant ships in Pittsburgh prior to 1803. These were the Amity and Pittsburgh, to be discussed shortly. Fort Fayette was the only significant wooden “shipyard” ever in operation on the Allegheny side of Pittsburgh and likely the only one that would have been well equipped enough to produce such a vessel as the Dean. Regardless of whether it was the first, it was still among the earliest ocean bound sailing vessels built so far inland.

The largest yard, as mentioned, was the Tarascon yard which was run by Pittsburgh’s most prominent ship contractors, the firm of Tarascon Brothers and James Berthoud and
Company. In 1801 they built their yard just above a rivulet at the mouth of Suke’s Run on the Monongahela near the end of Try Street just under Boyd’s Hill where the “Pan Handle” Railroad Bridge now crosses the stream (Figures 27, 28) (Baldwin 1938:131; Dahlinger 1911). This rivulet no longer exists as the Pennsylvania Canal changed the contour of the ground in 1829 (Dahlinger 1911).

In 1794 Louis Anastius Tarascon emigrated from France and became a merchant in Philadelphia (Thurston 1888). In 1799 he sent two of his clerks, Charles Brugiere and James Berthoud, to examine the course of the Ohio and Mississippi rivers from Pittsburgh all the way to New Orleans in order to determine whether it was practical to build oceangoing ships in Pittsburgh and transport them fully finished out to sea at New Orleans (Thurston 1888). After hearing favorable reports, Tarascon, his brother, John A. Anthony, and James Berthoud formed the firm of John A. Tarascon Brothers, James Berthoud, & Co in Pittsburgh where they established a wholesale and retail store and warehouse, a shipyard, a sail and rigging loft, an anchor smith shop, a block manufactory, and all other things that were needed to build ocean worthy vessels (Thurston 1888). This shipyard was built on the land of William Greenough and gained a reputation as the “best equipped shipyard in the first decade of the nineteenth century” (Lowry 2003:57). The surrounding countryside offered all the wood necessary for the construction of merchant ships (Barns 1999:206). According to Killikelly (1906) the Tarascon yard was established in 1800, and it produced many schooners, brigs, and a variety of other ships (Killikelly 1906:122; Wilson 1898:79).

Captain Beebe built Pittsburgh’s first ocean bound ship, the schooner Amity of 120 tons, at Tarascon yard, as well as Pittsburgh’s second ship, the Pittsburgh of 270 tons built in the same year (Baldwin 1941). Some sources say this year was the first year of the yards operation in 1801
(Killikelly 1906:122; Thurston 1888:19), while a newspaper account from 1803 says they were launched in that year (Wilson 1898:80), and McCollester (2008) cites 1803 as well. If this is the case the Dean may well have been the first ocean going merchant vessel launched out of Pittsburgh. However, another newspaper account from 1802 mentions the Amity and Pittsburgh having been launched already, prior to its printing on December 31, 1802 (Pittsburgh Gazette 1802), and Craig (1851) states that it was 1802 as well. It is unclear why there is so much discrepancy in data, but regardless of the exact year it was constructed, the Amity was loaded with flour and sent to Philadelphia where it then sailed to Bordeaux, France. From there it brought back a cargo of wine, brandy, and other French goods. Some of these goods ended up making it all the way back to Pittsburgh by way of wagon (Thurston 1888:19).

In 1802(3) the Tarascon yard built the 250 ton Nanina and the next year in 1804, under the supervision of Abraham Marpole, they built the 300 ton Louisiana, which was launched in April or May of 1804 and took cargo to Liverpool from the mouth of the Cumberland River (Baldwin 1941; Wilson 1898:79). One of the largest wooden sailing vessels to ever be built in Pittsburgh was the 400-ton Western Trader built in 1805 (Everts 1876:123; Killikelly 1906:123). The building of ships so far away from the ocean eventually proved impracticable after Tarascon and company lost a large schooner over the falls of the Ohio toward the end of the first decade of the nineteenth century. This resulted in the firms leading members, John Tarascon and James Berthoud, packing up and moving to Shippingport, PA on the Ohio River (Dahlinger 1911). Either before or after their departure, Nicholas Roosevelt attempted to build a steamboat at the Tarascon yard by 1809, but a sudden flood washed the shipyard away (Johnson 1979:56). Eagle Foundry was then established on the property under new ownership the same year. It seems likely that the steamboat Johnson (1979) was referring to was the New Orleans completed in
1811 by Roosevelt under Robert Fulton’s direction. 1802 to 1805 were the peak years of ship construction in Pittsburgh. During this time, the city’s shipbuilding industry produced the Pittsburgh, Louisiana, General Butler, and Western Trader; Brigs Nanina, Dean, Black Walnut, Amity, Allegheny, Conquest; and several other less well documented ships as well (Cramer 1817:51).

Figure 27. Map of the Tarascon Yard’s exact location and structure outline (Cowin 1985).
Records from 1807 would show there was a total of eight barge, boat, and ship builders operating in Pittsburgh (Consolidated Illustrating Company 2001:50). Other than the watercraft facilities thus far introduced and known to still be in operation, were five additional reputable “boat builders” working in Pittsburgh. These include “John and Mordecai McLeod, Duncan Campbell, and Joseph Brown who established their boatyard somewhere in Pittsburgh which was designed to make keel and Kentucky boats” (Wilson 1898:78). A boatyard was also located somewhere on the south side of the Monongahela, at Craig’s Ferry, called Brown & Craig, but it is unclear as to this yard’s exact location (Wilson 1898:80). A boat builder by the name Alexander Craig was working in Pittsburgh during this time, but it is unclear whether he was the builder working at this yard.
The Steam Powered Era

With the introduction of the *New Orleans* in 1811, the first steamboat on western waters, the steam powered era arrived. This industry quickly demonstrated its superiority to other watercraft industries for the remainder of the first half of the nineteenth century before it slowly gave way to railroads and tow-barges. A steamboat has been defined as “any watercraft propelled by steam, but more narrowly, a shallow-draft paddle wheel steamboat widely used on rivers in the nineteenth century, and particularly on the Mississippi River and its principle tributaries in the United States” (Encyclopedia Britannica 2012). According to Reiser (1951), the steamboat revolutionized commerce in the Mississippi Valley even more than the Louisiana Purchase. Pittsburgh, and lands in its immediate vicinity, were equipped to supply everything used in the construction of river boats including the hull, boiler, engines, cordage, nails, etc., and the city’s rich supply of coal provided cheap and plentiful amounts of fuel for these vessels (Knights Templar 1938:22, 147).

The induction of iron and steam not only affected the materials and power sources for river vessels; it drastically changed the boatbuilding industry in its entirety. Smaller boatyards did not have the capital to purchase all the new machinery and raw materials that were necessary to build these vessels, nor could they afford to hire all the specialized laborers that were needed, and a gradual transition occurred between the 1820s and the middle part of the nineteenth century, where the many smaller displaced yards were consolidated into relatively few larger yards (Ford 2002:28). The surviving larger yards were located in urban centers, particularly those with major ports or near railheads, so as to be closer to their employees and perspective clients, as well as sources of raw materials (Ford 2007:28).
After boatbuilding experienced a brief surge in the years following the War of 1812, it suffered a slight decline from the depression of 1819 (Ford 2002:26). Pittsburgh industries soon began to recover as the result of an increase in immigration (Reiser 1951:24). During this time, St. Louis became a key transshipment point for the upper Mississippi trade, as it sat atop a strategic position overlooking the start of the deep channel of the Mississippi. As its grain industries expanded in the 1830s and 1840s, St. Louis became a major grain center second only to Chicago (Bauer 1988:163).

After 1814, steamboats proved to be quite beneficial to the shipping industry (Bauer 1988:173). Freight rates from New Orleans to Louisville dropped from $5.00 per hundred pounds in 1815 to $0.25 per hundred pounds in 1860 (Bauer 1988:161). During those same years, downstream rates fell from a $1 to $0.32 as the result of increased competition, greater efficiency, faster trips, faster turnarounds, and a longer shipping season (Bauer 1988:161). New Orleans, located 2,000 miles downstream from Pittsburgh (Baldwin 1938:129), remained its most important market throughout the first half of the nineteenth century (Reiser 1951:29). Once underway, pilot fees for navigation over the falls of Louisville, and the duties that needed to be paid at New Orleans, were among the few additional business expenses for waterway shippers, aside from the standard costs of fuel, salaries, and maintenance (Reiser 1951:30).

The Pittsburgh of 1825 was vastly different from the Pittsburgh of 1800 with regards to industry and commerce (Reiser 1951:43). Products were quickly in demand throughout the entire Ohio and Mississippi Valleys, and while the Mississippi River was big enough for steamboats; keel and flatboats were still largely used on the Ohio River and tributaries (Reiser 1951:43). By 1830, all agricultural and frontier produce were being supplied from the Mississippi Valley, and Pittsburgh increased its shipments of iron, coal, and manufactured goods such as nails, glass, and
textiles (Reiser 1951:43). The value of goods reaching New Orleans would double every year from 1820 to 1860 (Reiser 1951:43) (Table 1).

Table 1. Value of Goods reaching New Orleans.

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820</td>
<td>12,637,000</td>
</tr>
<tr>
<td>1830</td>
<td>22,066,000</td>
</tr>
<tr>
<td>1840</td>
<td>49,764,000</td>
</tr>
<tr>
<td>1850</td>
<td>96,898,000</td>
</tr>
<tr>
<td>1860</td>
<td>185,211,000</td>
</tr>
</tbody>
</table>

Between April of 1825 and April of 1866 Pittsburgh exported $2,781,276 worth of goods to New Orleans listed as follows (Reiser 1951:43) (Figure 29).

Figure 29. 1825-1866 exports from Pittsburgh in dollars.
In 1826 boatbuilding found itself back on the top ten list of industries in Pittsburgh; and due entirely to the arrival of the steamboat, it was ranked as the seventh largest industry with a value of $62,000 (Reiser 1951:25). By this time, what was once the “Gateway to the West” was now providing the West with much of the goods they needed through its riverine highway system. Steamboats cut travel time in half and reduced costs of transportation by 80%, and this effect played a crucial role in the settlement and development of the Ohio River basin into a mature agricultural, commercial, and industrial region (Johnson 1979:61). Steam quickly proved itself to be the “chief technological development of the nineteenth century” (Johnson 1979:61).

Early designs of steamers were full of flaws, which took decades of technological innovations to improve upon, but as imperfect as they were, they were still the most practical transportation for goods and people moving between river ports (Bauer 1988:160). Passengers either rode as deck passengers or they could travel in luxurious cabins depending on what they could afford. Some passengers even had the option of working on firewood crews that went out in groups to collect the fuel which was kept piled along the river banks (Bauer 1988:160).

The development of the western steamboat was not the creation of any single individual. It was an evolutionary development that required the creativity of many men (Hunter 1943:1). Among the earliest accounts of a steamboat is in 1707 France where a man named Denis Papin built a paddlewheel steamer (Bauer 1988:67). This early model, however, would attract little attention. Early steamboats were clumsy and unwieldy, but over time they became far more efficient and highly profitable vessels largely through their necessity on western waters of North America. It is thought that practical steamboats were the “first great American contribution to modern technology”, and its influence was felt over the entire globe (Hunter 1943:1).
The first American steamboat pioneer was William Ramsey who joined two small keelboats together at the stern by a swivel and powered it by a primitive waterwheel operated by one man treading on treadles (Boucher 1908:370; Killikelly 1906:140). According to Johnson (1979) there were paddle wheels on both sides, and it had bicycle style pedals. This account was provided in 1761 by a fur trader, James Kenny, at Fort Pitt. It was a long way from what paddlewheel steamers would soon look like by the end of the nineteenth century, as it lacked the required power source, but the basic idea was there (Boucher 1908:370).

The following is a statement is from the Honorable Robert Wicklifie, vol. 1, page 36, American Pioneer:

1761, 4th mo: 4th. — A young man called Wm. Ramsey has made two little boats, being squair at ye sterns, and joined together at ye sterns by a swivel, make ye two in form of one boate, but will turn round shorter than a boat of ye same length or raise with more safety in falls and in case of striking rocks: he has alsa made an engine that goes with wheels enclosed in a box, to be worked by one man by sitting on ye end of ye box, and tredding on treddlers at bottom with his feet, set ye wheels agoing, which work scullers or short paddles fixed over ye gunnels-turning them round: ye under ones always laying hold in ye water, will make ye boate goe as if two men rowed: and he can steer at ye same time by lines like plow lines. [Thurston 1888]

The second pioneer in the steamboat industry was the moody and eccentric craftsman, John Fitch, who built a working two-man boat in 1786 (Figure 30), another driven by six paddles the following year, and third steamer, of 60 feet and capable of carrying 66 passengers, was built
two years after that (Bauer 1988:68). It was one of these vessels, in 1786 that was the first to commercially employ a steam engine on the Delaware River at Philadelphia (Hunter 1949; Johnson 1979). Although this vessel was technically the first commercial use of a steamboat, it contained many flaws. Fitch struggled to perfect his design between 1785 and 1798, but he was unable to raise enough funding to continue his work (Bauer 1988:68). This eventually resulted in him committing suicide in 1798 after struggling with a life full of failure and unhappiness.

Figure 30. Sketch of John Fitch’s 1786-87 design (Dahlinger 1911).

John Rumsey had done the same thing as Fitch but on the Potomac River, at Shepardstown, Virginia (Johnson 1979:56). Between 1784 and 1787 he experimented with both pump and pole driven craft in this area, but unfortunately he was unable to obtain enough funding to build a full-size working model (Bauer 1988:68). From 1790 to 1797, Samuel Morey picked up where Fitch and Rumsey left off by operating a series of experimental boats on the Connecticut, Hudson, and Delaware rivers, but very little is known regarding these vessels (Bauer 1988:68). 1795 marked another steamboat design milestone with the horse powered ferry flats. This vessel design had two boats placed parallel, decked over, and powered by horses and oxen turning a shaft geared to long paddlewheels, but this design technique never became widely used (Johnson 1979:56). The first British steamer was produced in 1802 by William Symington
based off the 1788-1789 design models of Patrick Miller, James Taylor, and himself (Bauer 1988:68).

Steamboats in the United States would not become practical until Oliver Evan’s introduced his Columbian Engine, also known as a Grasshopper, due to its motion (Bauer 1988:98). Built in 1801, it was the first high pressure engine in the United States (Hunter 1943). After 1816, this became the primary engine type used in early steamers, but the first three early steamers built by Henry Shreve and his Brownsville, Pennsylvania group, used Daniel French’s 1809 single low pressure engine model (Hunter 1943). This included the Enterprise which was the first vessel to ascend the Mississippi and Ohio. Evan’s engine was really a “half beam engine since its vertical piston rod was connected to a beam that in turn was attached to a bridle on either side to the framing of the cylinder which allowed a straight-line motion while the other end pivoted on the long rocking links that moved back and forth to give the engine its descriptive name” (Bauer 1988:98).

In 1803, Captain James McKeaver and Louis Valcourt bought one of Evan’s engines for $15,000 and constructed an 80 foot steamboat hull on the lower Mississippi, but when the river’s water levels were too low to launch the boat they rented the engine out to a local saw mill, which was then burnt down by disgruntled employees angry at the likely possibility of this machine eventually depriving them of their jobs (Thurston 1888:15). This also ended an early attempt to establish steamboats on the Mississippi four years prior to Robert Fulton’s experiment (Thurston 1888:15). Bauer (1988), however, states that the steam engine for this vessel had been sold to the saw mill after a spring flood had deposited the hull in a field too far from the river to recover.

In 1803 Robert Fulton had gone to study painting in England, but he soon realized that his interests lay with river steamers (Bauer 1988:69). Fulton certainly had unique characteristics.
He “had been an artist, was now an engineer, had always been a mechanical genius, and possessed rare administrative ability” (Dahlinger 1911:3). It is Robert Fulton who many have credited with the invention of the western steamboat. Fulton first demonstrated a boat propelled by steam for Robert Livingston, in 1803 France, with an engine built by Perrier Brothers (Roland 2008:113). This vessel moved successfully against the current, but it eventually broke up under its own weight (Roland 2008:113). Fulton was aware of the fact that steamboats would have their real impact in the West, and in 1807, Fulton demonstrated his boat once again; this time in the United States (Hunter 1943:1).

Robert Fulton and Robert Livingston met while they were in France, and sharing a mutual interest, they agreed to build a steamer together (Bauer 1988:70). Livingston, a politician and gentlemen inventor, had quickly taken interest in the new source of power, and used his political connections to renew his monopoly rights in New York while Fulton acquired an engine from Boulton and Watt and designed a steamboat hull in New York that met the required specifications set out in Fulton’s patent (Bauer 1988:68-69). On August 7 his Steamboat (Figure 31), as it was now named, made an epic round trip on the Hudson River, from New York City, all the way to Albany (Bauer 1988:70; Roland 2008:116). This feat was the first commercially successful navigation with a steam-propelled boat (Dahlinger 1911), as it had produced a 5% profit (Roland 2008:116). The fastest a sailing ship could have made this trip was 48 hours, while Steamboat did it in just 30 hours, proving it a huge success (Bauer 1988:70).

No single component to this vessel was Fulton’s invention. He merely combined others’ ideas into a working model that made it the first practical steamer (Bauer 1988:70). Thanks to the monopoly, it would be years before Fulton faced any serious competition. An interesting historical misconception regarding this vessel is that its name was the Clermont, however this
vessel never carried that name, and its popular referral as the *Clermont* likely occurred as the result of the city of Clermont frequently being her home port or the second major port she visited on her first historic voyage (Bauer 1988:70).

Merely 12 days after *Steamboat*’s completion, Fulton and Livingston were already planning the introduction of these vessels on the waters of the Ohio and Mississippi, and this introduction naturally occurred at Pittsburgh (Dahlinger 1911). After this introduction, steam propelled vessels were never again absent from American waters (Roland 2008:116). Fulton and Livingston created two companies for the purpose of opening commerce on American rivers and sponsored Roosevelt’s 1811 steamboat voyage from Pittsburgh to New Orleans (Roland 2008:130). In Cramer’s Almanac of 1810 he states, “A company has been formed for the purpose of navigating the river Ohio in large boats, to be propelled by the power of steam engines” (Thurston 1888).

![Figure 31. Steamboat (Clermont) (Drawing by General Smythe 1816).](image)
The real story of the steamboat on western waters begins in April of 1809 when Nicholas Roosevelt and his wife traveled to Pittsburgh (Dahlinger 1911; Killikelly 1906:140). The plans for Fulton, Livingston, and Roosevelt to introduce steamboats into western waters were dependent on the Roosevelt’s review (Killikelly 1906:141). A memorandum written in the handwriting of Robert Fulton shows that on June 28, 1809, Roosevelt was paid the sum of $600, “on Mississippi Expedition” (Dahlinger 1911). Roosevelt’s report indicated the conditions were favorable for his plan to introduce steamboats on the Ohio and Mississippi, and in the spring of 1810 Roosevelt returned to Pittsburgh’s with a “force of capable mechanics, such as could not be procured in Pittsburgh” (Dahlinger 1911). These shipbuilders and mechanics were recruited out of New York (Killikelly 1906:141). With this, the steamboat industry in Pittsburgh began, and in 1811, steam navigation of the Ohio and Mississippi rivers was introduced with the completion, launching, and successful maiden voyage of the New Orleans to the city it was named after.

The First Western Steamer

The New Orleans (Figure 32) became the first steamboat to successfully operate on inland rivers, and the first to make it to the Gulf of Mexico, with her 2,000 mile journey from Pittsburgh to New Orleans, which she had made in just two months (Cowin 1985:72; Hunter 1949). It had taken nearly a year to build and was launched in March of 1811 out of what was formerly the Tarascon Shipyard (Baldwin 1938:141; McCollester 2008:59; Thurston 1888; Wilson 1898:107). New Orleans was designed as a side-wheeler topped by a long cabin with a broad, deep keel perfectly designed to ground on sandbars (Baldwin 1938:142). This vessel by most accounts was 138 feet in length (Boucher 1908:371; Thurston 1888), although 116 has frequently been cited as well (Evans 1907; Latrobe 1871).
According to Dahlinger (1911) the *New Orleans* was a single engine, patterned after the Boulton and Watt double acting design. It was a low pressure engine that had a separate condenser. The cylinder was 34 inches in diameter, and there was no walking-beam (A. Warner 1889:564; Killikelly 1906:142). The engine was vertical and was what is known as a steeple engine, with a piston attached to a cross iron beam, which slid between guides on a gallows-frame. This portion of the engine was exposed, and it extended above the deck of the boat. The engine was built in New York, and it was brought in parts over the Allegheny Mountains in wagons as there was no establishment in Pittsburgh at that time of sufficient capacity to do work of such magnitude. The boiler was made of copper, and along with the engine, was placed in the hold of the vessel.

Figure 32. The *New Orleans* (Flemings 1932).
Dahlinger (1911) indicated an uncertainty as to whether it was a stern or side-wheel vessel. The 1809 patent taken out by Fulton was for a side-wheel design, but the patent he took out two years later, when the New Orleans was launched, was for a stern-wheel design (Dahlinger 1911). The vessel was, however, described as having more than one wheel, which was quite common on side-wheel steamers at the time and very uncommon on stern-wheel steamers prior to 1830. There is also no documentary evidence to suggest any such early double stern-wheel design (Dahlinger 1911), and it seems most probable that the description of more than one wheel was inaccurate as most evidence indicates the New Orleans was a single stern-wheel vessel. Estimates of the ship’s size vary between 300 and 400 tons (1888 A. Warner 1889:564; Boucher 1908:371; Craig 1851:276; Thurston 1888). “Her cabin was in the hold, and she had port holes: also a bowsprit eight feet in length, in ocean steamer style, which was painted sky blue. She was owned by Messrs. Fulton, Livingston and Roosevelt, and her construction was superintended by the latter gentleman. Her cost was $40,000” (Thurston 1888; Wilson 1898:107). This vessel actually had two cabins. One was for the ladies located behind a larger forward cabin for males as seen in figure 32 (Killikelly 1906:143).

The launching of the New Orleans in 1811 has been called the “most important event that had occurred in the realm of commerce for many years, and it did more than any other industry of the West” (Killikelly 1906:140). It traveled at a rate of eight to nine mph along its 259 hour journey to New Orleans (Dahlinger 1911; McCollester 2008:59; Wilson 1898:107). After its maiden voyage this vessel was restricted to trade on the lower Mississippi and operated between Natchez and New Orleans where it could make round trips in just 10 days (A. Warner 1889:564). Passenger rates were $18 downstream and $25 back up (A. Warner 1889:564). The New Orleans wrecked in 1814 after striking a snag near Baton Rouge (Bauer 1988:70; Boucher 1908:371). A
snag was usually an entanglement of branches or other obstructions in the river. They were also commonly large trees that had fallen into the water from the river banks. There were two types of such fallen trees known as planters or sawyers. Planters were trees that had their roots embedded into the bottom standing in an upright position. Sawyers on the other hand were those trees whose roots were embedded in a less perpendicular manner to the river bottom dependent on the pressure of the current (Reiser 1951:33). As they were more parallel to the surface of the water, they were often even more difficult to see.

**Early Steamboats**

After the monumental voyage of the *New Orleans*, watercraft construction in the United States was never the same again. “The way of the ship in America had turned inward.” (Roland 2008:122). The cost of building steamboats initially stunted the general use of these vessels. Between 1811 and 1816, just nine steamboats were built on western waters of North America, each of which improved on the previous vessel’s design (Reiser 1951:31). Four of these vessels were built by Fulton, and they include the *Vesuvius, Aetna, Buffalo*, and a second *New Orleans* (Johnson 1979:57). The following is an account originally from the 1817 edition of the *Navigator* regarding the experience of seeing a steamboat during its introductory years:

To see a huge boat working her way up the winding Ohio, without the appearance of sails, oar, pole, or manual labor, moving within the secrets of her own wonderful mechanism and propelled by power undiscoverable. This plan, if it secedes, must open to man flattering prospects to an immense country, an interior of not less than 2,000 miles of as fine a soil and climate as the world can produce…..The immensity of country we have not yet to settle. The vast riches of the bowels of the earth, the unexampled advantages of our water courses, which wind without
interruption for thousands of miles, the numerous sources of trade and wealth opening to the enterprising and industrious citizen, are reflections that must rouse the most dull and stupid. Indeed, the very appearance of the placid and unbroken surface of the Ohio invite trade and enterprise. [Wilson 1898:108]

Fulton’s plan was ambitious, to say the least, as he intended on providing steam service along the whole length of the rivers between Pittsburgh and New Orleans (Hunter 1943). Fulton’s plans of providing service as far upriver as Louisville were interrupted by a series of accidents that left his group with only one steamboat operating in the West (Hunter 1943). Hunter (1943) discusses both the positive and negative impacts of Fulton on the industry. While Fulton provided many contributions to the development of the steamboat, his enforcement of his patent rights greatly delayed the development of steamboat technology. Had Fulton’s Steamboat failed, there were a dozen others right behind him with similar designs in the works (Hunter 1943). Additionally, Fulton’s design caused vessels to breakdown at an unreasonably high rate. They had too deep a draft to operate on the upper parts of the river system, and their engines also lacked the power to overcome the current (Hunter 1943). Fulton’s boats were essentially sea going vessels with deep, sharply modeled hulls and pronounced keels (Hunter 1943).

The average fully developed western steamboat had a cargo weight to vessel weight ratio of about 3:2 and sometimes 2:1 (Hunter 1943). The cargo capacity ratios of Fulton’s second, third, and forth vessels were: Vesuvius (340 tons: 230 tons); Aetna (360 tons: 200 tons) and the Second New Orleans (324 tons: 200 tons) (Hunter 1943). The Vesuvius and the Aetna were both built in 1813-14 by the Mississippi Steamboat Company (Boucher 1908:371). Fulton’s early boats had both the boiler and engine placed in the hold while passengers were also either placed
in the hold or would ride on the main deck (Hunter 1943). This design had many flaws that needed to be improved upon for both safety and efficiency reasons and individual river men would quickly make free navigation an issue in court (Johnson 1979:57). Over the next 20 years over 200 boats would be built in Pittsburgh (A. F. Parson Publishing 1894: 44).

In 1814 Henry Shreve partnered, with Israel Gregg and Daniel French, became the first to challenge Fulton’s monopoly rights on the lower Mississippi with their ship the Enterprise (Johnson 1979:57). He quickly became recognized as one of the greatest contributors to both the development of steamboat technology and the expansion of navigable western waterways. “Captain Henry Shreve, uneducated, unconnected, unprivileged, innocent of political power, and devoid of capital, a common man, a Jacksonian man, became associated with opening the Mississippi” (Roland 2008:131). Shreve had been involved in the boating trade since he was a young man. The earliest historical evidence for this indicates that at 21 years old he owned a 35 ton keelboat and a large flatboat (Roland 2008:131), and it was said that he knew the rivers “as well as the wrinkles on a palm” (Pittsburgh Post-Gazette 1999:1).

Fulton’s monopoly was one of the biggest factors in stunting the growth of the steamboat industry for the first few years. In 1809 Fulton and Livingston secured the monopoly using the success of Steamboat and Livingston’s political connections (Bauer 1988:158). Shreve was the first to challenge it with his Enterprise (Figure 33). Although Fulton died in 1815, his estate filed suit in a New Orleans court in 1817, but the case was dismissed due to neither the plaintiff nor the defendant having been a Louisiana resident (Roland 2008:135). In 1819 Fulton’s heirs finally withdrew their monopoly claim, and five years later the historic Gibbons vs. Ogden ruling determined that the federal government had the power to regulate interstate commerce and not the states (Bauer 1988:107). Once the monopoly was defeated, Fulton’s dream of playing a
major role in developing the Mississippi was destroyed, and it would be Henry Shreve who remained the leader in steamboat activities on the Mississippi until 1827 (Roland 2008:135).

![Figure 33. Henry Shreve’s Enterprise (Hunter 1949).](image)

In 1813 Fulton’s group produced the 25 ton stern-wheeler, the *Comet*, in Pittsburgh, likely again at Eagle Foundry (A.F. Parson 1894:44; Boucher 1908:371). Its construction took place under the supervision of Daniel French (Roland 2008:133). While the *New Orleans* followed the deep draft design of the Hudson River steamers, it was clear a new design was needed on the shallower Mississippi and Ohio (Bauer 1988:158). This vessel was lighter and had a higher pressure engine, which reduced the draft necessary for shallow river navigation (Bauer 1988:564). The higher pressure engine contributed to the reduction of draft by allowing for a lighter and more powerful engine to be used per volume. French’s first western boat ultimately proved to be a failure as, like the *New Orleans*, it was incapable of making the return trip up the Mississippi River (Roland 2008:133).
Another boat which was launched out of Fulton and Livingston’s yard on November 29, 1813 was the 340 ton *Vesuvius* under the command of Captain F. Ogden (Wilson 1898:108). This vessel had an elegant cabin, 28 double berths on each side, a 28.5 foot beam, and drew five to six feet of water when loaded (Wilson 1898:108). It traveled successfully downstream at a rate of eight mph, but when it started upriver in 1814 she failed to make it. It was then burnt and sunk in 1815 (Hunter 1943:25; Wilson 1898:108). These first boats were too under-powered for upstream travel and could only effectively operate up to Natchez, because currents are much weaker on the lower Mississippi (Boucher 1908:372). During this time, the Ohio was not navigable year-round and large boats often were only able to pass between February and April (Cowin 1985:72). The spring and fall seasons were when prospects for steam boating were most uncertain (Boucher 1908:373).

The following year, in 1814, Fulton, Gregg, and French built their second steamer together, the 25 ton *Dispatch*, and also in that year French and Shreve’s 75 ton *Enterprise* was built in Bridgeport (*The American Telegraph* (TAT): 1815; Wilson 1898:108) or at Brownsville as cited by other authors (Dunbar 1915). The former of these boats experienced moderate success, making it from New Orleans to Louisville in just 34 days (Hunter 1943:12), while the later proved to be a pivotal moment in the industry’s development as she would be the first vessel to make the complete round trip from Pittsburgh to New Orleans and back, the first to ascend the Mississippi, Ohio and Monongahela rivers, the first vessel to tow other boats, the first to make it to the mouth of the Mississippi, the first to navigate the Red River, the first steamboat to be used in combat, and most importantly, the first to challenge Fulton’s monopoly (Johnson 1979:58).
Shreve’s and French’s *Enterprise* was designed to compete against three boats that were currently under construction in Pittsburgh by the Fulton-Livingston Navigation Company (Roland 2008:133). This vessel was described as quite elegantly finished (A. Warner 1889:564). It was the first to place the steam engine and the paddlewheels at the stern of the vessel (Johnson 1979:58). This infuriated Fulton as he still believed it was an infringement on his patent rights (Johnson 1979:58). The *Enterprise* spent its first months carrying passengers and cargo between Brownsville and Louisville, but by December of 1814 Shreve had returned to Pittsburgh to assume command of the vessel. During this time, a battle was underway at New Orleans between Andrew Jackson and British troops. On December 1, Shreve departed from Pittsburgh to deliver a shipment of supplies to Fort St. Phillip, Louisiana (Hunter 1949; Johnson 1979:58). Upon Shreve’s arrival, two weeks later, he had found the city under attack (Hunter 1949). After this initial shipment was delivered, Jackson immediately commandeered Shreve’s ship, and ordered it to carry troops and supplies between the defensive lines while often under heavy fire from British artillery (Roland 2008:133).

After his heroic service to his country, which greatly contributed to winning the battle, Shreve’s boat was confiscated for the alleged patent violation on the same day he had planned to depart back to Pittsburgh (Roland 2008:133). Shreve quickly posted bail while his lawyer got his boat released, and in May of 1815, Shreve jumped bail taking the *Enterprise* from New Orleans to Pittsburgh (Bauer 1988:159; Hunter 1943; Roland 2008). The *Enterprise*, despite its great accomplishment, still lacked enough power to smoothly and efficiently ascend the river, and Shreve realized a new design was needed (Roland 2008:134). Shreve soon began working on a larger and more powerful boat, which later became the prototype for future models (Hunter 1949). According to Bauer (1988:158), most historians date the real start of steamboat service on
western waters as occurring in 1816-17 after the 403 ton Washington’s launching in Wheeling, PA, soon followed by its round trip voyage to New Orleans. This vessel, despite not having been the first to make this voyage, was revolutionary in its own right.

Figure 34. Shreve’s Washington (Flemings 1932).

The Washington was a side paddlewheel steamer and the first on western waters to use a high pressure engine (Hunter 1943). This engine, which became standard equipment on western river boats, was described as a “high pressure, non-condensing, direct-acting, horizontal cylinder affair with a cam actuated value gear” (Hunter 1943). The Washington was the first double-decked steamer, the first to have its cylinders connected by pitman to the paddlewheels, and the first to have its boilers on the deck, which freed up additional cargo space (Johnson 1979:59; Roland 2008:134). These features all became standard for steamboat construction and the Washington pointed the way toward this new unique western river steamboat style of construction (Bauer 1988:158). On October 7, 1816, Shreve took the Washington to New Orleans, after stopping in Louisville for repairs after his own boilers had exploded. Several passengers were killed during the explosion and Shreve was blown overboard (Johnson
While he was in New Orleans he was again arrested for the patent violation and was released, after which, he sued for damages and won (Roland 2008:134).

Upon her making the return trip upstream to Shippensburg, Pa, the Washington won credit for proving the feasibility of upriver travel despite two of Fulton’s boat having already made that return voyage (Roland 2008:134). Regardless of who accomplished what, or when, by 1817, steamboats had demonstrated their feasibility in multiple successful trips from Pittsburgh to New Orleans and back. In 1818 the Washington would play another important role when courts ruled that it could not be kept out of Louisiana waters (Bauer 1988:158). The Washington would come to be known by many as “the first great steamboat on the western rivers” (Hunter 1943) and the “final steamboat triumph” that would retire keelboats to the tributaries (Baldwin 1938:143). After the Enterprise and the Washington, the average travel time from New Orleans to Pittsburgh was reduced from 100 days to just 30 (Bauer 1988:158). Passage at this time was $75 dollars downstream and $125 upstream (Bauer 1988:158).

In 1825 Shreve built the George Washington, which featured twin engines that allowed for paddlewheels on either side of the vessel to be turned independently of one another. This design innovation offered much greater maneuverability and efficiency than seen on previous steam vessels (Roland 2008:135). The bottom of this vessel was flatter and shallower than previous western river steam boats, and it featured three decks of luxurious cabins, where fine food and drink are served (Roland 2008:135-136).

Unlike the other major technological improvements of steam vessels, the flatter and shallower design of the hull depths developed more gradually (Bauer 1988:159). It was not a contribution of Shreve’s Washington as has been claimed by sources, such as Roland (2008) or Hunter (1943), and although the George Washington had a shallower and flatter hull than its
predecessors, it was by no means the shallowest or flattest needed for maximum navigational ability on North American western rivers. A list of significant steamboat accomplishment and technological innovation can be found in Appendix B.

**Additional Early Pittsburgh Watercraft**

There were a number of other steamboats built in and around Pittsburgh between 1811 and 1850. In 1816 the 125 ton *Franklin* was built by Shiras & Cromwell and launched at Point Boatyard (Figure 35) (Carnegie 1916: 36; Wilson 1898:108). In that same year the 75 ton *Oliver Evans* and the 40 ton *Harriet* were built in Pittsburgh (Boucher 1908:371). The former was built by George Evans (Wilson 1898:108). In 1818 the 120 ton *Expedition* and the 50 ton *Independence* were built (Boucher 1908:371). In 1826 the *Albion* became the first steamboat to ascend the Allegheny (Wilson 1898:93).

Three years later, the *Uncle Sam*, at a cost of $30,000, was built and launched in March of 1829 (Wilson 1898:93). It became the largest boat afloat on western waters, registering at 550 tons, and capable of carrying 500 passengers (Wilson 1898:93). Other steamers were also built during this time such as the 300 ton *Buffalo* and the *James Monroe* built by Benjamin Henry Latrobe, likely at Eagle Foundry with Robert Fulton; the *General Jackson* and *James Madison* were built by Whiting & Stackpole (Pittsburgh Rolling Mill) (Figure 36) located at the corner of Penn Street and Cecil Avenue (Carnegie Library 1916: 24); and the 320 ton *Frankfort* and *Tamerlane* were also built somewhere in Pittsburgh (Wilson 1898:108).
Figure 35. Point Boatyard (Shiras and Cromwell) (Darlington Digital Maps).

Figure 36. Whiting and Stackpole (Darlington Digital Maps).
Among the most significant contributions to the evolution of the western river steamboat was the cam cut-off switch (Hunter 1943). This was a device by which steam was used expansively by shutting off the flow of steam into the cylinder before the stroke was completed, and it had an immediate impact in reducing fuel consumption by 60% (Hunter 1943). This technological improvement has often been attributed to Shreve, however, the first vessel to use a cam cut off switch was the Western Engineer, launched at Allegheny Arsenal (Figure 37) in Pittsburgh on March 26, 1819 under the command of its builder, Major Stephen H. Long (Johnson 1979:60; Wilson 1898:108). Major Long would testify in 1849 that it was he who had designed that device specifically for this vessel (Hunter 1943). It is not clear if the Western Engineer was actually constructed at Allegheny Arsenal as every relevant source viewed during this research simply uses the term “launched”. It is possible this vessel was built in part or entirely at Fort Pitt Foundry and assembled and/or launched at Allegheny Arsenal. However, as no sources uncovered during this research ever discuss any additional vessels built or launched at this facility, it was unlikely a watercraft construction site with any archaeological significance, and although worthy of mention with regards to this vessel and its technological innovation, will not be evaluated as such for this research.

A number of other major inventions for steamboats have falsely been attributed to Shreve. While he did set the trend for the general layout of steamboats with regards to the deck, engine, boilers, cabin, etc., he did little to influence the mechanical functioning of the engine. Of the five basic features of the western river steamboat engine, including high pressure steam, lever-valve gear, direct action, cam cut-off, and the horizontal cylinder, only the last seems to be indisputably Shreve’s contribution (Hunter 1943).
Major Long was employed in the service of the United States Army Corps of Engineers when he received his orders to lead an expedition up the Missouri River to explore the West all the way to the Rocky Mountains (Johnson 1979:60). This river flowed rather irregularly, and its bends limited its traffic capacity (Bauer 1988:171). Long would make several early attempts to navigate the Missouri with steamers. In 1818-1819 he sent three boats down the Missouri, but only the *Western Engineer* was successful at navigating this river (Bauer 1988:171). This vessel measured 75 feet by 13 feet and drew only 19 inches of water. It was designed for shallow snag strewn inland rivers (Johnson 1979:60). Long placed the paddlewheel in a housing at the stern to protect it from snags (Johnson 1979:60). His contributions were significant with both his role in expanding navigable rivers west of the Mississippi as well as in improving steamboat technology. A list of all significant vessels both sailing and steam, along with their major accomplishments, can be found in Appendix C.
From 1816 until about 1870, the steamboat dominated the economy, agriculture, and commerce of the middle area of the United States (Encyclopedia Britannica 2012). By 1830, there was no question the steamboat was the undisputed leader in river trade (Reiser 1951:31). During this year steamboats first penetrated the Allegheny trade, adding a whole new market to Pittsburgh’s industry (Reiser 1951:144). An even more substantial impact on river commerce also occurred in this year as the Pennsylvania State Canal System would ring in a new era in transportation by replacing the National Road as the best route East (Reiser 1951:144). Canals were first recognized during the 1830s as the better means to move heavy freight, although they were more susceptible to freezing (Reiser 1951:152). In the words of Governor John Penn of Pennsylvania, “the time will come when canals shall pass through every vale in our land and every hill, and bind the whole country in one band of social intercourse” (Boucher 1908:394).

In the early decades of Pittsburgh’s shipping industry vessels loaded and unloaded goods from the shoreline on the Monongahela. By the time shipbuilding was fully embraced in the second quarter of the nineteenth century, Pittsburgh found its traffic substantial enough to warrant wharf construction improvements and monitoring on the Monongahela. On January 7, 1825 a wharf master was finally appointed in Pittsburgh to direct traffic on the waterfront. After this time the waterfront was divided by types of boats and commerce. Family boats and farmer boats were directed to land between Grant Street and 150 feet below the Monongahela Bridge. From there up to the southeast end of Market Street was reserved for keelboats, barges, and flatboats. From Market Street to Ferry Street was reserved for steamboats, and from there to Redoubt Alley was more space for family and farmer boats. The remainder of the shore up to Penn Street was set aside for boats being repaired, sold, or not in use for commercial business (Reiser 1951:134) (Figure 38). Over the years the Monongahela wharf (Figure 39) was gradually
improved with the fees that were collected by the wharf master (Reiser 1951:134). One of the earliest improvements came in November of 1826 when the street commissioner finished the extension of the steamboat wharf on the Monongahela from the lower end of Market Street landing to the lower end of Ferry Street Landing for a cost of $1,200 (Wilson 1898:108, 111). The wharf as it stands in present day can be seen in Figure 40.

Figure 38. Monongahela Wharf’s designated landing areas by vessel type (Map by Author).
Figure 39. Depiction of the Monongahela Wharf west of Smithfield Street (Flemings 1932).

Figure 40. Present Day Photo of the Monongahela Wharf (Photo by Author).
Pittsburgh’s Competition and Rivalries

Pittsburgh was not the only city in Pennsylvania in a position to compete in the watercraft construction industries. Franklin, OH, Meadville, PA, Waterford, PA, McKeepsport, PA Brownsville, PA, Wheeling, WV, New Geneva, PA Williamsport, PA, Elizabethtown, PA, and many others were also located on riverfront locations. The strategic locations of each of these cities near navigable rivers, the construction of important roads for trade built through them, and the establishment of iron and/or other manufacturing industries, allowed the potential for each of these riverfront settlements to play an important role in the inland shipping industry.

Marietta, OH also produced ships during this same time, and was heavily involved with this industry for about six to eight years with Jonathan Devol and James Whitney as its principle builders (Baldwin 1941:168). The cost for fully-equipped seaworthy ships at these yards were about 50 dollars a ton, and this was profitable until the falls of the Ohio began taking their toll (Baldwin 1941:168). The dangers of these falls continued until 1830 when the two-mile Louisville and Portland Canal opened as an alternative route around them. This allowed for easy passage from Pittsburgh to New Orleans (Bauer 1988:169). Marietta also produced the 220 ton Muskingum and the 130 ton Eliza Green in 1802 (Baldwin 1941:168)

Wheeling for a time was one of Pittsburgh’s biggest competitors as an inland boat/shipbuilding capital; however, they both served different areas. Pittsburgh was closely tied to Philadelphia and the Atlantic trade, and it sustained its expanding iron industry from Pennsylvania’s own Juniata iron range (Barns 1999:201). Wheeling, on the other hand, drew its trade from the developing agricultural base of southern Appalachia, and built a reputation for producing iron, nails, and glass using the natural resources of the Upper Ohio Valley (Barns 1999:201). Wheeling’s only real advantage was its downstream position to Pittsburgh, which
“outflanked the shoals and rapids which dominated the approach to Pittsburgh” (Barns 1999:210). The importance of this position was seen most during dry spells when water levels were too low to ascend all the way to Pittsburgh (Barns 1999:201). Pittsburgh quickly outgrew Wheeling during the first half of the nineteenth century, although, Wheeling still remained competitive throughout much of the antebellum period (Barns 1999:201). In the end, Wheeling proved far less dominant as the result of Pittsburgh’s high level of wealthy mercantile interest out of Philadelphia whom had too much vested in Pittsburgh being the primary “link with the growing trade of the West” (Barns 1999:201).

“Western urban growth was tied to trade, and the initial agent of that commercial development was the Ohio River. Flowing west from its origins at Pittsburgh, the Ohio River fueled the growth of that city and sparked a secondary round of urban competition with downstream rivals at Cincinnati and Louisville” (Barns 1999:201). Cincinnati, OH became a natural outlet for the fertile agricultural regions of central and southern Ohio, and its pork industry became its most economical undertaking for trade (Reiser 1951:141).

Louisville, KY also became another rival city. It functioned as a natural point for the transfer of goods by necessity, due to its treacherous waterfalls (Reiser 1951:141). Louisville became heavily involved with the trading of tobacco and was a major port of exchange between the North and the South (Reiser 1951:141). St. Louis became a rival port to Pittsburgh as well. It headed both the fur and lead trade, and it also provided a new outlet for what had become the new western frontier (Reiser 1951:141). However, none of these cities ever offered any serious competition to Pittsburgh’s shipping dominance as her volume of activities was simply too large to compete with beginning in the late eighteenth and continuing throughout nineteenth century (Reiser 1951:141).
Expansion of the Steamboat Industry

After the Washington, boatbuilding expanded greatly all along the upper Ohio with Pittsburgh at the top of the industry (Boucher 1908:372). Between 1811 and 1835 there were 226 steamboats built in Pittsburgh (Bauer 1988:160). Of these vessels, 197 of them have been identified by name (see Appendix D). Twenty-two of the remaining 29 were built in Brownsville, and seven were built at Beaver (Boucher 1908:372). By 1818 there were 22 steamers on the Ohio and Mississippi with 23 more under construction (A. Warner 1889:543, 599). Of these vessels, at least nine were built in Pittsburgh, five in Cincinnati, seven at Beaver, two at Wheeling, one at Corydon, and one at Maysville (A. Warner 1889:543). By 1819 there were 60 steamers following the Pittsburgh-New Orleans route, and the following year there were 69 steamboats operating in the West (Bauer 1988:158; St. Louis Action Research Report 2012). Johnson (1979) lists 75 steamboats and 2,500 crew employees in that same year.

After a slight set back during the economic decline of the early 1820s, steamboat growth increased, and over the next decade, “American shipbuilders became the finest builders of river steamers, increasing their ships speed from five knots to over twenty” (Thiesen 2006:54). Between 1820 and 1860, steamboat production increased more steeply than any other form of nineteenth century transportation (Roland 2008:137). Reiser (1951) lists all steamboats built and launched on western waters from 1817-1850 as follows: 1817-1818: 36 total steamboats in operation; 1818-1819: 191; 1825: 502; 1830: 989; 1835: 1,272; 1850: 2,918, and by 1880 over 6,000 steamboats had been constructed on inland rivers of North America. (St. Louis Action Research Report 2012).

Sixty-one vessels had been built in Pittsburgh in 1836 alone making 287 total steamboats built in the quarter century since the New Orleans was launched (A. Warner 1889:543; Boucher
In 1837 there were 63 steamboats actively running to and from Pittsburgh (Boucher 1908:372). According to Wilson (1898), prior to April 20, 1839 there were 130 steamboats built in Pittsburgh, 83 built in Cincinnati, and 22 in Wheeling. In 1840, 32 steamboats were built in Pittsburgh followed by 49 more in 1841; another 49 in 1842; 28 in 1843, 44 in 1844, 45 in 1845, 39 in 1846, (although Boucher (1908) says 63), 56 in 1847, 66 in 1848, 51 in 1849 (Wilson 1898:101).

Between 1840 and 1846 some 225 steamboats were lost on western rivers, and this may account for some discrepancies in figures between those built and those still in operation. These losses were the result of fires, explosions, and snags (McCollester 2008:59). By 1949 western river steamboats were carrying 3.32 billion freight ton-miles and 1.1 billion passenger miles (Roland 2008:138), and just one year later, the total steamboat tonnage on western rivers of the United States had surpassed the combine tonnage of all foreign and domestic steamers (Johnson 1979:61). These figures represent about 30% more tonnage than all railroads in the United States would carry a decade later (Roland 2008).

Contrary to what one might expect, the older, slower, and less efficient method of carrying cargo, via flat and keelboats, continued even after the advent of the steamboat as it was cheaper and still considered the surer form of transportation (Henshaw 1911). Between 1806 and 1857 over 21,500 flatboats are estimated to have arrived in New Orleans with the peak winter season of 1846-47 accounting for 2,792 arrivals alone (Bauer 1988:160).

The following is a list of all steamboat, keelboat, and flatboat arrivals in New Orleans between 1843 and 1848 (Table 2) (Wilson 1898:104).
Table 2. Boat arrivals in New Orleans between 1843 and 1848.

<table>
<thead>
<tr>
<th>Year</th>
<th>Vessel Type</th>
<th>Boats passing through Pittsburgh</th>
<th>Tons of cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1843</td>
<td>steamboats</td>
<td>1,707</td>
<td>165,317</td>
</tr>
<tr>
<td>1843</td>
<td>keels and flats</td>
<td>582</td>
<td>13,675</td>
</tr>
<tr>
<td>1844</td>
<td>steamboats</td>
<td>1,966</td>
<td>216,236</td>
</tr>
<tr>
<td>1844</td>
<td>keel and flats</td>
<td>621</td>
<td>14,180</td>
</tr>
<tr>
<td>1845</td>
<td>steamboats</td>
<td>2,169</td>
<td>227,994</td>
</tr>
<tr>
<td>1845</td>
<td>keel and flats</td>
<td>621</td>
<td>14,180</td>
</tr>
<tr>
<td>1846</td>
<td>steamboats</td>
<td>2,585</td>
<td>276,572</td>
</tr>
<tr>
<td>1846</td>
<td>keel and flats</td>
<td>634</td>
<td>5,965</td>
</tr>
<tr>
<td>1847</td>
<td>steamboats</td>
<td>3,171</td>
<td>372,465</td>
</tr>
<tr>
<td>1847</td>
<td>keels and flats</td>
<td>764</td>
<td>20,730</td>
</tr>
<tr>
<td>1848</td>
<td>steamboats</td>
<td>2,885</td>
<td>361,009</td>
</tr>
<tr>
<td>1848</td>
<td>keels and flats</td>
<td>705</td>
<td>20,570</td>
</tr>
</tbody>
</table>

From Wood and Wind to Iron and Steam

Wooden shipbuilding was more of an art form than iron was (Pike 2012). The design and appearance of wooden vessels remained relatively unchanged for several centuries. It was said that a sailor from the Spanish Armada of 1588 transported suddenly to the first half of the nineteenth century, would be instantly familiar with the ship and could take up his duties without much delay (Pike 2012). There were several key parts that acted as the skin and skeleton of these
vessels. The most important is undoubtedly the “keel”. This component is a timber or a series of timbers joined together, extending along the center of the bottom of a ship from bow to stern. It essentially functions as the backbone of the vessel and often projects below the bottom of the hull. The frames are built off of this feature as well as the hull plating (Pike 2012). The “hog” is a term used to describe the curvature of the ships’ keel, which occurs when weight and buoyancy factors cause the ship’s bow and stern to sag and forces the keel to rise in the middle.

The hull planking in wooden vessels was typically constructed with numerous, relatively small, individual planks, often overlapping or staggered to increase longitudinal strength, and while these techniques were effective for centuries of building large wooden ships, those needed for nineteenth century shipping required a change in hull capacity and an increase in rigidity (Pike 2012). Even vessels that began incorporating iron bracing were still limited in cargo capacity due to the wooden support structures still occupying internal volume (Pike 2012). The early nineteenth century saw the induction of wire rigging where chain and linked rods were used for standing rigging (Pike 2012). The benefits of using iron rigging resulted in less bulky masts through a reduction in weight, increased durability, and increased strength. This type of rigging also decreased maintenance over time (Pike 2012).

The transition of the shipbuilding industry from wood and wind to iron and steam changed how shipbuilding had been thought of for centuries. Early in the nineteenth century, urban shipyards began producing steam-powered woodworking machines (Thiesen 2006:67). Pittsburgh, with its heavy investment in industrial activities, was at the forefront of this technology and was the first center of steam engine construction in the American West (Bruggeman 1998). This change did not occur overnight, and although Thiesen (2006) stated that the iron shipbuilding industry emerged from engine building and machine shops with little help from wood shipbuilders, this was
not entirely the case. A very gradual and linked shift from early wooden vessel construction, to the all iron vessel construction of the early-middle to late nineteenth century, is noticeable in many aspects of the watercraft industry’s development and transition, particularly the building procedures and designs. Although the methods of construction were more associated with machine shops and foundries, iron shipbuilders continued to use the same names and similar designs for parts as in wooden ships. For example, a knee became an iron knee, a timber became an iron timber, etc. (Thiesen 2006:86). Steamships would certainly have never developed so rapidly without iron. This was due to paddlewheel shafts, steam engines, screw propellers, rivets, and the machines used to produce these parts all requiring this material. However, the transition from wooden components to iron parts was not accomplished in one drastic change but occurred more gradually over many decades.

Another connection between the wooden shipbuilding industry and the iron shipbuilding industry is evident in the fact that many of these steamboat yards are built on the sites of former ship or boatyards. This can be seen with several examples from Pittsburgh such as Eagle Foundry being built on the site of the Tarascon yard, foundries being built over the first boatyard site of Pittsburgh’s, Fort Pitt’s boatyard, as well as foundries built on the location of Fort Fayette’s boatyard, all seen below in figure 41 in the larger circles marked in blue. The small red circles indicate the other foundries in the early-middle nineteenth century that either have already been identified in this research as having produced steam vessels, or based on the time period and their proximity to the water, may have constructed watercraft.
Figure 41. Examples of three major ship/boatbuilding areas having been converted into Steam and Iron Foundries confirmed to have produced Steamboats (Darlington Digital Maps).

Many workers who were employed in the iron shipbuilding industry began their careers in wooden shipbuilding. “It was impossible to start an iron shipbuilding company without having substantial experience in a wooden shipyard” (Thiesen 2006:89). The first iron boat was the Aaron which had been built on the Thames River on 1822 (Gould 1889:355). The first iron hulled steamboat built in the United States was the Cordus launched on the Susquehanna River in 1825 (Bauer 1988:94; Ford 2002:27). This vessel was a stern-wheel steamer that ultimately proved to be a failure (Thiesen 2006:86). The gunboat Michigan (Figure 42) later became the first iron hulled vessel built on western waters for the U.S. Navy (Bauer 1988:97).
Iron-hulled ship design began with a period of composite-hull construction. This type of vessel used wooden hulls with iron frames and internal supports. Composite ships had the internal strength of iron, and with wooden planking, copper sheathing could be added to protect the hulls (Pike 2012). This method was gradually phased out during the middle nineteenth century and was abandoned entirely by the 1870s (Pike 2012). Iron hull construction was very similar to the construction of wooden vessels. This is demonstrated by the structural configuration of iron ships. The wooden outer hull planking on composite ships was soon transitioned to riveted iron plates bolted to frames. In the words of a Scottish shipbuilder by the name of John Scott Russel, “When iron plates were adopted for the skin of a ship, iron frames came along with them by mere tradition. It was amusing to me to see how in early ships the copy of wood frames was carried so far that frames were made in separate bits of angle iron, and scarphed and spliced just like wooden frame timbers” (Thiesen 2006:88). Iron ships even continued using frames and a protruding keel for no apparent functional reason at all (Thiesen 2006:87). Keels were the first part of the vessel lain, which was done in the same manner as wooden vessels, and timber or iron frames were then attached crossways.
In the composite ships, these frames were initially made of wood and had iron supports that eventually evolved into all iron frames (Pike 2012). Centerline keelsons, to provide internal lateral strength, were built up from heavy timbers with iron plating on their sides. Iron shipbuilders removed the wooden component and replaced it with a large, iron beam shaped like a “T” with a flat iron plate top. Sister keelsons, bilge keelsons, and side keelsons in both composite and iron ships replaced stringers in wooden ships. They could be found running parallel to the centerline keelson and were spaced evenly across the lower part of the hull. Side and bilge stringers were used to connect frames on the inward side of the vessel, and butt plates, which were flat iron plates with several rows of rivets, were used to secure the plates to each other and covered the seams on the inner face (Pike 2012). The plates used in iron vessels continued to have the same shifting pattern as wooden vessels, so that butts of each strake never lined up vertically (Thiesen 2006:87).

Support structures were gradually reduced and removed as builders came to rely more on the strength of iron (Pike 2012). The introduction of iron resulted in a number of benefits to shipbuilding, such as reducing the time it took to build vessels and increasing the internal volume for cargo and passengers by removing the unnecessary support structures (Pike 2012). Steamers naturally developed into iron hulled vessels due to the effect steam engines had on loosening the fastenings on wooden vessels with the constant engine vibrations, and the heat from the boilers rapidly accelerated dry rot (Thiesen 2006:82). Iron also proved more durable against threats such as fire, grounding, or collision, and the added double bottom hull further reduced steamboat losses (Thiesen 2006:83).

There was some delay in iron vessels being accepted. One such reason was that the construction process caused early iron ships to magnetize which disrupted their ships’ compasses. These vessels were also more susceptible to corrosion from the submerged environment. Iron
ships, particularly those with iron masts, were also more likely to attract lightning during thunderstorms (Pike 2012). Another downside of iron vessels was that barnacles slowed iron ships more than their wooden counterparts, and when hit, the shrapnel from iron was far deadlier than that of wood fragments (Thiesen 2006:83).

On September 9, 1838, the first all iron steamer on western waters, the Valley Forge, was launched at Pittsburgh (McCollester 2008:65; Wilson 1898:97). Every experienced boatman thought it would sink. A wooden vessel of its size would have drawn 21 inches of water. This vessel drew only 9.5 inches (Wilson 1898:97). The Valley Forge was said to have a well-built cabin, four watertight compartments, and be both fire and sink proof, although, it would get snagged and sink in its second or third year afloat (Gould 1889:355). Valley Forge was built at “Roberson & Mimms”, engine builders and founders and was originally owned and commanded by Captain Tom Baldwin (Gould 1889:355). The Harris business directory for 1841 lists only one engine builder and founder similar to that name. This was Robinson and Minis located on “3 Wood Street near Water” (Figure 43) (Harris 1841:48). This yard was known to be in operation during the 1830s, and between January 1 and May 15, 1839 they would build seven steamboats (Wilson 1898:101).

In the year following the Valley Forge, the first iron canal boat, the Kentucky, was built in three sections in Pittsburgh (Killikelly 1906:181). Pittsburgh quickly began producing more and more iron vessels, which caused the coal trade to rapidly increase (Killikelly 1906:181). This resulting increase of the coal trade was likely the result of an increase in the cargo capacity to weight ratio of vessels. This made riverine coal shipments more profitable and allowed them to better compete with the rapidly expanding railroad industry.
Iron ships continued to be custom built throughout the nineteenth century (Thiesen 2006:101). Iron yards included at the least a machine shop, a foundry, and a boiler shop (Thiesen 2006:101). At first, many had seen “iron shipbuilding as a curious practice, but there exists no record of open hostility toward, or resistance to, the introduction of iron to shipbuilding” (Thiesen 2006:81). The keel and frame remained the primary responsibility of the shipbuilder after the transition to iron yards. These builders had to see that each piece was fitted into the right position according to the number painted on it at the mill (Thiesen 2006:104). Once the frames were erected the plating gang took over. These gangs had to handle iron plate weighing up to a half ton between the shipways and the machine shops, and this was especially miserable in the winter months as the cold metal plates quickly caused workers’ fingers to freeze. The unskilled laborers involved in this
task were referred to as Italian gangs despite most of them being Irish. Their jobs had a number of dangers to worry about. These workers, when fitting plates, would occasionally knock or drop tools into the deck below which could cause serious injury. They were also said to be easily identifiable by missing fingers as they had to line up plates with the hole, and fingers often ended up sandwiched between the metal (Thiesen 2006:105-106).

The next step in building iron hulled vessels was riveting which required a team consisting of three to six people. This team had strikers, a holder on, a heater, and rivet boys who were usually paid by the piece for every hundred rivets driven in. An average team could put 250 rivets in by hand in a single day with the striker getting paid the largest share (Thiesen 2006:107). The holder on applied pressure to the opposite end of the rivet which was flattened by the hammer blows from the striker. The heater controlled the forge fire and placed a fresh rivet in the portable forge to give to the riveter. After the riveting was complete, the next step was caulking the hull. While wooden shipbuilders had forced oakum into the cracks to seal them, iron shipbuilders used a hammer and chisel to force exposed edges against adjacent plates. After these steps were completed interior joiners and outside joiners began working on the deck houses, companionways, hatches, windows, doors, and exterior woodwork (Thiesen 2006:107-108).

The last and most important step was launching the vessel. A poorly planned or supervised launch could destroy the hull (Thiesen 2006:109). The builders applied a coating to the slipway such as beef tallow, lubricating oil, or lard oil. Crews would knock away the oak keel blocks so that the weight shifted to the cradle, and once the wooden shoes were sawed away the vessel and cradle slid into the water (Thiesen 2006:109). The boilers, engines, and heavy equipment were all installed right after launch (Thiesen 2006:111). Steam vessels did not surpass those driven by wind in tonnage until the 1880s, and steam power did not fully obsolete sail power until World War II.
It had taken more than a century since the start of the transition for iron and steam to drive out wood and sails from the market entirely (Ford 2002:27).

**Technological Advances in Steamship Construction**

Technological improvements over time for both engine and hull designs have thus far been touched on in this research, but there were numerous related technological improvements, not yet discussed, that evolved as well. One such innovation was the walking beam developed in the United States in 1822, which consisted of a piston rod driving a crossbeam pivoted at the center, which in turn was connected to the crank-shaft. The British later modified this design in the 1830s by placing the crossbeam close to the vessels’ keel for greater stability, and this became known as the side-lever engine (Bauer 1988:98). Propellers were experimented with instead of paddlewheels, first in 1775 by David Bushnell’s *Turtle*, then by John Fitch on Collect Pond in Manhattan in 1796, and then by John Stevens, brother in law of Robert Livingston, in his 1802 *Juanita* (Bauer 1988:99). Little detail is known regarding the later of the aforementioned vessels. Wheel placement varied between stern-wheel and side-wheel with most early steamers being stern-wheel. The first side-wheel steamer to operate on the Ohio was not until the *Beaver* in 1826 (Wilson 1898:101).

Boiler improvements, as mentioned regarding Shreve’s contribution, were the second major revolution in steamboat technology. They were of unique interest to American engineers, and the placing of the boilers on the main deck had first appearing on the *Washington* (Bauer 1988:159). This allowed the hull to be constructed flatter with less draft, and quickly spelled the end for keelboats on the main rivers (McCollester 2008:59). Initially, all boilers were made of copper plates bolted together to form a rectangular box, but these boilers leaked and could not be used under high pressure as the result of it being nearly impossible to make the seams watertight.
(Bauer 1988:99). This began to change when the first wrought iron boiler was produced by Dr. Charles Lukens in 1816 in Coatesville, PA (Thiesen 2006:83).

By 1819 iron plates could be rolled in sizes suitable for use in boilers, and as technology improved, so too did their ability to handle greater pressures (Bauer 1988:99). Most early boilers could maintain 10 to 12 psi, while the ones favored in the West reached 30 to 40 psi (Bauer 1988:100). They also initially used the standard water tube design, patented by Nathan Reed in 1791, which was used until the 1850s (Bauer 1988:100). Water would pass through the fire in the tubes, and the expanding steam created pressure for power. In 1840 the boiler of the Messenger, reached 200 psi, and as boiler pressures rose during the 1850s, more compact machinery and higher speed engines were capable of being coupled directly with the propeller shaft (Bauer 1988:100). Steamers continued to largely burn wood until about 1860, due to the easy availability of simple fireboxes, but after Robert Stevens introduced forced draft on the boilers in his North America, coal too became a useful and commonly used source of fuel (Bauer 1988:100).
CHAPTER VIII

WATERWAY DANGERS AND NAVIGATION IMPROVEMENTS

Navigation on western rivers was by no means smooth sailing. There were a number of hazards that could quickly end a voyage. 1/4 to 1/3 of all the vessels that operated during the flatboat era were destroyed by snags and other obstructions in the river (Johnson 1979; Reiser 1951:33). Driftwood presented another obstacle as it formed “wooden islands” in the river, which would continually become larger and more dangerous, and sandbars and rocks proved to be dangerous obstacles as well (Reiser 1951:33). Insurance rates for flatboats during the early nineteenth century were approximately 10% of the total cost of the vessel (Johnson 1979:41).

There were numerous hazards in navigating the rivers for steamboats in particular. The average lifespan of a steamboat was only four to five years as the result of being poorly constructed and maintained, being sunk by snags and other obstruction in the river, or having their boilers explode (Bauer 198: 159). Early boats were designed and operated recklessly and explosions were not uncommon in the early steamboats as the result of irresponsible and ignorant engineers (Bauer 1988:101). In 1824 alone 3/5 of all boats navigating on the Ohio River were sunk by snags (Figure 44) (Bauer 1988:101). That same year the Aetna exploded on the Hudson River which initiated efforts to secure a steamboat licensing law (Bauer 1988:101).

Spontaneous races between steamboat captains were common and contributed greatly to the approximately 4,000 steamboat disaster related deaths that occurred between 1810 and 1850 (Encyclopedia Britannica 2012). The Steamboat Act of 1852 was another piece of legislation that attempted to reduce the danger on the river. This Act codified the rules of passing; limited the maximum engine pressure; and established additional safety regulations that resulted in boiler
explosions dropping from an average of 10 deaths per year to just four (Bauer 1988:169). In
1873 licensing became mandatory for both steamboat captains and their mates (Bauer 1988:101).

Figure 44. Snags in the Mississippi (Bodmer 1832-1843).

For a quarter century Zadok Cramer’s Navigator acted as a guide of the rivers, but it
certainly could not prevent losses entirely. Vessels lost on the Mississippi were as follows: 1810
to 1820: three steamboats; 1820 to 1830: 37 steamboats; 1830 to 1840: 184; and 1840 to 1850:
272 (Reiser 1951:36). During this time there were also 576 other losses whose dates of loss are
unknown (Reiser 1951:36). During those four decades a total of 1,070 steamboats were lost, with
a combined tonnage of 85,256, and a combined cost of roughly $7,113,940 in damages (Reiser
1951:36). From 1822 to 1827 damages were $1,362,500, but after many snags had been removed
during this time, damages dropped to $381,000 between 1827 and 1832 (Reiser 1951:36). There
were no steamboats lost in 1832, but from 1833 to 1838 40 steamboats were lost due to snags for
an estimated $640,000 in damages (Reiser 1951:36).
The origins of inland river improvement projects began in Pittsburgh. It was here that Army engineers first experimented with inland waterway navigation improvements by initially building dams and clearing snags (Dobney 1981:313). Navigation in Pittsburgh had begun expanding as soon as French and Indian forces first descended the Allegheny River to expel English forces at Fort Duquesne (Boucher 1908:370). In 1802 Zadok Cramer first printed his *Navigator*, which furnished the first navigation guide of inland rivers.

The Erie Canal, connecting the Hudson to Lake Erie, was one of the first major canal projects on western waters of North America. The 360 mile canal was begun in 1817 and completed by 1825. Its impacts were both unprecedented and instantaneous as freight rates were lowered almost immediately from $100 per ton to just $10 per ton on shipments between Albany and Buffalo (Bauer 1988:138). Over a half million dollars in revenue was generated in the first year alone, and thus sparked a great canal boom on inland rivers of the United States (Roland 2008:141). However, most canal projects of the 1830s created more losers than winners as construction and maintenance usually exceeded costs, canals were prone to floods, and they very quickly became faced with strong competition from railroads (Roland 2008:142). “The real impact of canals is best measured not in their return on investment but rather in their transformation of the American economy”, and “by reducing transportation costs, canals opened up new areas in the West to new markets” (Roland 2008:144).

By the early nineteenth century canal and river improvement projects were underway throughout the western waterways. As the nation was faced with an impending threat from the British, leading up to 1812, the country began to realize the significance that transportation improvements had on national defense (Johnson 1979:63). Issues with receiving federal funding for internal improvements came up again in 1820 when Congress authorized a survey of possible
improvements of the Ohio and Mississippi rivers. This task was carried out the following year by General Simon Bernard and Lieutenant Colonel G. Totten (Bauer 1988:166). Their recommendations included a canal around the falls of the Ohio, an installation of dikes to deepen the channels over shoals and bars, and the clearing of all snags and obstructions, but nothing resulted from this as President James Madison doubted the constitutionality of federally funded internal improvements (Bauer 1988:167). However, after the Bernard-Totten Survey in 1821, federal funding for waterway projects began to increase greatly (Johnson 1979:63).

In 1808 secretary Albert Gallatin of New Geneva recommended $20,000,000 in federal investment in a canal and road system that would cover the nation from Maine to Georgia to the Ohio River Basin (Johnson 1979:63). After reviewing Gallatin’s plan, in 1819, Secretary of War John C. Calhoun, proposed what became the General Surveys Act of 1824 (Johnson 1979:63). This waterway bill was adopted in 1826 with the Authorization Act (Church 1908: 47). It called for the removal of snags and the construction of dams from Brownsville, PA to New Orleans in order to provide a minimum of three feet depth. This was later amended by Henry Clay to leave the details up to the engineers responsible for the work. The 1824 General Survey Act was the very first river and harbor act passed, and it appropriated $75,000 to improve and maintain the Ohio and Mississippi navigation (Johnson 1979:63). Through the work of John Bruce and Henry Shreve, the worst snags and obstacles were cleared by 1830 (Bauer 1988:167; Dobney 1978:21-23). Over the next few decades, waterway improvement projects continued throughout Pennsylvania, Ohio, New York, and the remainder of the Mississippi Valley.

In the 1790s, Governor Thomas Mifflin launched Pennsylvania’s first river projects to secure trade west for the Commonwealth, and he appointed Timothy Matlock, Samuel Maclay, and John Adlum to locate and survey the best river route from Philadelphia to the Susquehanna
and clear all the obstacles along the way. These early river improvement projects were underway by 1794 (Johnson 1979:41). As early as 1791, Pennsylvania first began to formulate a canal system from Philadelphia to Pittsburgh (Bauer 1988:141). It was more than three decades before this project was realized when in 1826 merchants from both of these cities convinced the state to fund and begin construction on the 395 mile joint road and canal system which was to connect them at a cost of $10,000,000 (Craig 1851:277; Roland 2008:141). A route was then planned from Philadelphia to the Susquehanna above Harrisburg, to the Frankstown branch of the Juniata River near Hollidaysburg, to Pittsburgh (Bauer 1988:142).

The success of the Erie Canal in the 1820s was a significant threat to Pennsylvania’s western trade as Pennsylvania simply could not compete with the volume of goods moving though New York and Ohio. By 1827 Pittsburgh merchants realized they needed to expand their western market, and also the development of their industries. These merchants proposed a project to link Pennsylvania's improvements with those of Ohio (Reiser 1951:115). The Pennsylvania State Canal System was completed in the 1830s, by predominantly Irish labor gangs, and tolls were soon established (McCallester 2008:63; Reiser 1951:88). The first canal boat to cross the canal was the *Hit or Miss* (Johnson 1979:88). The eastern most 172 miles to Hollidaysburg opened in 1832, which included 108 locks (Bauer 1988:142). The next 26 miles through the Allegheny consisted of a series of incline planes that operated by canal boats traveling on special cars (Figure 45) (Bauer 1988:142). The remaining 104 miles to Pittsburgh consisted of 66 locks (Bauer 1988:142).
The Main Line Canal, as it was called, opened in March of 1834, and its effects in reducing costs were almost as dramatic as the Erie Canal (Bauer 1988:142). For example, pre-1835 it had cost $14 dollars to send a barrel of flour to Philadelphia, and after, it would cost only $1.00 (Reiser 1951:92). 1835 marked a change in exports from Pennsylvania, and specifically Pittsburgh, in that they began exporting less raw material and began manufacturing and selling more finished products (Reiser 1951:98). Important raw materials in the State System had been wheat, cotton, flour, window glass, and iron shipped east (Reiser 1951:122). Pennsylvania had built 772 miles of canals and had the construction of 162 more miles already underway when it defaulted on its debts during the depression of 1839-1843 (Figure 46) (Roland 2008:141). By 1846 more than half of all manufactured goods imported in the Ohio River Basin came through Pennsylvania (Bauer 1988:143).
The Ohio River was Pittsburgh’s expressway to the Great Mississippi. For decades water levels had posed a major problem for boatmen as snags, rocks, and unexpected obstructions made the Ohio and Mississippi safely navigable only from February to June and again in October through December (Bauer 1988:157). Federal assistance, as mentioned already, developed rather slowly as the result of it being submerged in the larger question of the constitutionality of federal aid for internal improvements (Bauer 1988:166). The Wing Dam Experiment was one of the largest early improvement projects conducted on the Ohio. Under the direction of Major Stephen Long of the Army Corps of Engineers, preparations were made in Pittsburgh to construct the first federal dam on the Ohio in 1824 (Johnson 1979:66). Long had been Henry Shreve’s predecessor and successor as superintendent of the Western River Improvements, and he later became the Chief of the Topographical Engineers (Hunter 1943:59). He quickly undertook the task of clearing the Ohio River, which was jammed with logs and trees for a distance of over 140 miles (Hunter 1943). In less than a month he had cleared a stretch of 40 miles (Hunter 1979:67). Long also built pile drivers to imbed the posts that were needed for dams (Johnson 1979:66).
The Mississippi River underwent many of the same improvements as discussed for the Ohio, as neither river was any good to Pittsburgh without the other. In the same year as the New Orleans embarked from Pittsburgh, the Mississippi River was declared a public highway (Roland 2008:138). In 1837 the Mississippi was surveyed again by Major George Hughes of the US Army Corps of Engineers. At this time, he made an observation of the river’s condition as being “dotted with dangerous snags, gravel, and sandbars, but the falls at Louisville practically cut river navigation in two, for, save at short period during the year when the water was high enough to permit boats to pass over them, all traffic stopped above and below them, necessitating slow and expensive transportation around the falls” (Henshaw 1911:3). During low stages of the river, when steamboats could not negotiate the falls at Louisville, goods either had to be transferred around the falls to other boats or be forced to wait until the water levels rose. This could take months, and both of these choices were very costly and often resulted in all boats arriving at the same time, thus flooding the markets (Reiser 1951:36). Hughes’s major recommendations included improvements for the river just above New Orleans by clearing out the snags as well as ordering mills to stop dumping their refuse into the river (Johnson 1979:90).

The Contest of 1824 was a competition designed to inspire the invention of the most efficient snag removal device, and its $1,000 prize attracted entries described as varying from “genius to weird” (Johnson 1979:67). At this time, there were an estimated 50,000 snags in the Ohio and Mississippi which needed removal (Johnson 1979:67). In 1825 the prize was awarded to a flat/steamboat captain by the name of John W. Bruce (Johnson 1979:67). His design consisted of a twin hull ferry flat with a windlass and a lever mounted on timbers between the hulls. An iron claw hanging from the short end of the lever was hooked to the snag while four men turned the windlass with sufficient leverage to break the snag free and raise it to the surface.
where it could be sawed into pieces (Johnson 1979:67). After the design was decided, a bidding
for who would complete the removal by January 1, 1827, was conducted with John W. Bruce
winning at the astronomically low bid of $60,000, while his nearest competitor was at $200,000,
a far more realistic bid (Johnson 1979:67). The contract of 1824 between John W. Bruce and
Major General Alexander Macomb for snag removal on the Mississippi and Ohio rivers can be
found in Appendix E.

Major Babcock was Bruce’s appointed supervisor who was later charged with neglecting
his duties in seeing that the river was properly cleared. Bruce failed miserably in his efforts to
clear the river, and Babcock was replaced by Samuel McKee, arrested, and later pardoned for his
ignorance in river improvements before being reinstated into military service (Johnson 1979:69).
Samuel McKee resumed work until his death when Henry Shreve assumed the role (Johnson
1979:70). Bruce was only compensated $25,000 of the original $60,000, and after filing suit, it
would stay in court for 40 years (Johnson 1979:70).

The next river improvement project, following the failed attempt of Bruce, was the 30
inch project begun under Henry Shreve. Shreve had been Superintendent of Western River
Improvements since his appointment in the 1820s (Bauer 1988; Hunter 1943; Roland 2008:136).
He quickly abandons Bruce’s snag boat after he determined that an average cost of $14 per snag
was simply too much for such a large project (Johnson 1979:72). He was then given approval
from Congress to design his new prototype snag boat, Heliopolis, in 1829 (Figure 47, 48) (Bauer

While many have credited Fulton as inventing the steamboat, it would be Henry Shreve
that would earn the title as the “Father of Western Steam Boating” (Hunter 1943). Shreve’s title
was attributed not only to his contributions to the mechanical and structural components of the

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vessel but also for his efforts in improving inland river navigation. This later feat was largely accomplished through his invention of the snag boat, “Heliopolis”, capable of clearing the river faster than any method previously attempted. Shreve focused his efforts on the trade between Pittsburgh and New Orleans (Hunter 1943).

This boat cost $26,424.71 to construct and was launched on April 28, 1829 (Johnson 1979:74). It was made up of two 100 by 12 foot steamboat hulls spaced 10 feet apart and joined by heavy timbers and a timber bulkhead at the waterline, which was covered with sheet iron and used to ram snags. This feature was called a “snag beam” (Johnson 1979:72). The snag beam would plow into the embedded trees and break them off underwater while a strong steam powered winch was used to haul the freed trees aboard the snag boat so it could be cut into manageable pieces (Bauer 1988:167). Its design proved very successful and she was dubbed “The Tooth Puller” (Johnson 1979:74).
Figure 47. *Heliopolis* (U.S. Army Corps 2013)

Figure 48. Blueprint of *Heliopolis* (Plan view) (Hunter 1949).
Shreve championed a snag prevention and removal program (Hunter 1943). He would first be responsible for clearing the infamous heavy collection of snag at Plum Point, TN, which he was able to do in just 11 hours, and in just two years he cleared all major forests submerged in the Ohio, Cumberland, Arkansas, and Missouri rivers, soon followed by the clearing the notorious 160-200 mile long amalgamation of timbers located above Natchitoches, LA known as the “Great Raft of the Red River” (Bauer 1988:167; Roland 2008:136). The intention was to clear all these rivers to a depth of at least 30 inches, thus resulting in the project’s name (Figure 49). After the river was cleared, insurance rates for boats were reduced by 75% (Johnson 1979:74). Shreve’s work was so significant that the city in which he was operating out of was named “Shreveport” in his honor (Bauer 1988:167). Following the success of the Heliopolis, the government authorized the building of its sister snag boat, the Archimedes (Roland 2008:136). In 1835, Shreve requested to be relieved of clearing the Ohio, stating that it would be more difficult and time consuming than the Mississippi had been (Johnson 1979:74).
Congress appointed Lt. Dalton to assume command of the project in 1835 with a $50,000 appropriation, and it was later reassigned to 1834 West Point graduate Lt. John Sanders (Johnson 1979:74). Sanders was sent to re-open the Ohio Improvement Office in Pittsburgh (Johnson 1979:74). From there he employed a man named Charles Fuller, and together they enter into 27 contracts to finish old dams and construct new ones (Johnson 1979:79). Sanders oversaw the construction of a third tooth puller, named the Shreve, and he later recommended that the Army Corp of Engineers build a 200 foot by 30 inch deep channel for 100 ton steamboats. He felt the channel would reduce freight rates down to 2/3 cents per mile and 1/6 cent per mile for passengers (Johnson 1979:75).

During this time, Henry McCarty invented a dredge (Figure 50) by mounting a steam engine on a boat anchored up the stream that was to be channeled. The engine was tied to a cable that dragged a small boat holding a scraper over the bar being removed. This design worked so well that Sander’s built four more to be used on the Ohio (Johnson 1979:80). He also built a number of rip-rap dams used to divert river flows up until projects were halted in 1837 by President Van Buren who felt they were unconstitutional (Johnson 1979:75). After the defeat of Van Buren, work resumed in 1842 under President John Taylor, and Henry Shreve was replaced in that year by Jack Russell (Johnson 1979:78). He then retired to a farm just outside St. Louis, where he remained until his death in 1851 (Roland 2008:136). However, prior to his retirement Shreve filed an injunction against Russell from using his tooth puller design (Johnson 1979:78). Thirty years after his death, his estate was awarded $50,000 (Johnson 1979:79).
Improvement projects did not only occur on the major rivers of the Mississippi and Ohio, they also occurred on nearly every river it was thought possible to take a boat. In 1786 John Badollet was appointed by Governor Mifflin to plan improvements on the Youghiogheny and Monongahela, which consisted of clearing all boulders, expanding the Monongahela to at least 50 feet, and expanding the Youghiogheny to at least 40 feet (Johnson 1979:43). Funding was approved in 1792, and John Gibson and Isaac Meason accepted the contract from Badollet in 1793 for improving the Youghiogheny from the mouth of Indian Creek to the Monongahela at McKeesport (Johnson 1979:44). The Conemaugh and Kiskiminetes rivers were also both expanded to 25 feet wide by 14 feet deep, at its shallowest depth, later that same year (Johnson 1979:43). This project was finished by 1796 (Johnson 1979:43). Major improvements did not begin until 1825, when Pennsylvania commenced its large scale construction project to “improve almost every stream that was capable of floating a canoe in the Allegheny, Monongahela, and Beaver Basins” (Johnson 1979:44). New York, Ohio, and Virginia followed with similar improvements (Johnson 1979:44). After the Monongahela slack water improvements, the Youghiogheny began slack water improvement projects of its own, beginning in 1848, which consisted of a series of locks and dams (Johnson 1979:99). The term slack water is referring to bodies of still water which are unaffected by tides or currents. The plans for the Youghiogheny
improvements were modeled after the Monongahela slack water projects, and the improved Youghiogheny opened on November 7, 1850 (Craig 1851:277; Johnson 1979:99). Unfortunately, in 1865 the dams and locks on the Youghiogheny were swept away (Johnson 1979:99). Below is an example of a modern lock and dam in Pittsburgh (Figure 51).

Figure 51. Example of a lock and dam in Pittsburgh (US Army Corps 2012).

Navigation structures are essential in making inland waters viable for year-round transportation. Before the construction of locks and dams on the Ohio and Mississippi, pool depths would drop to less than a foot at certain points of the year. The lifts of the locks installed in the Pittsburgh District increased the water depth to range from eight feet to 22 feet, and the distance between pools ranged from seven to 42 miles (US Army Corps 2012). These structures work by filling and emptying the lock chamber through the use of valves that control the flow of
water through large and deep culverts in the lock’s walls. Pumping is not necessary as the water flows in and out of the lock chamber entirely by gravity, and the pool only empties as low as the river level downstream of the lock.

Aside from the combined Youghiogheny and Monongahela improvements of the late eighteenth century, the Monongahela Navigation Survey of 1817 further improved the Monongahela. Laborers employed under commissioners Solomon Kripps, Joseph Eneix, and William Leckey were set to work clearing snags and boulders in the river (Johnson 1979:92). The initial survey of this river was completed in 1825, and a packet boat began regular runs from Pittsburgh to Brownsville in that year (Johnson 1979:91). In 1828 E.F. Gay, a civil engineer, surveyed the Monongahela River and suggested a system of locks and dams be modeled after those used in canal building (Boucher 1908:374). The surveys continued in 1832-1833, and in 1836 an Act was passed that authorized the governor to incorporate a company to install lock navigation on the Monongahela, and thus, the Monongahela Navigation Company was born (Reiser 1951:58). The first four locks were completed in 1838 (Johnson 1979:92; Reiser 1951:58). However, in 1841 the government was not able to meet the second installment of $50,000, and it was forced to suspend its plans for additional dams.

The company went bankrupt in 1843, and the local sheriff sold off the company’s stocks at auction to Moorhead, Robertson, and Company who finished the project over the next eight years through the construction of more locks and dams (Craig 1851:63; Reiser 1951:63). The Monongahela slack water improvements greatly facilitated trade and were as indispensable as the Ohio River improvements (Reiser 1951:63). These improvements were essential for the coal trade, as coal was the real importance of the Monongahela Valley (Reiser 1951:63). The Monongahela finally opened as the National Road on November 13, 1844, and today there are
nine locks and dams on the Monongahela that maintain navigable waters for the entire 128.7 miles of river from just above Fairmont, WV to the Point at Pittsburgh (Craig 1851:277; US Army Corps 2012).

The Allegheny River was also greatly improved upon. In 1826 it was said that the Allegheny could be navigated by any vessel less than 50 tons (Wilson 1898:93). Around this time Edward (E.F.) Gay proposed construction of 18 locks and dams to furnish slack water navigation on this river (Johnson 1979:88). The locks were to be 120 feet long by 26 feet wide (Johnson 1979:88). These surveys were completed by Colonel James Kearney in 1829 (Johnson 1979:88). The following year, in 1830, Thomas Blanchard launched his 90 foot steamboat Allegheny (Johnson 1979:86; Wilson 1898:97). This vessel was the first twin paddlewheel steamboat ever built (Johnson 1979:86). When the Allegheny was unloaded it drew less than 10 inches of water, and fully loaded drew less than 24 inches (Wilson 1898:98). It was designed with the specific purpose of navigating its namesake river (Wilson 1898:97). In 1837 the steamer New Castle further proved the Allegheny could be successfully navigated by steam, and its success convinced Congress to survey the river in preparation for it being cleared (Reiser 1951:55). Additional Allegheny improvements came in 1878 as oil was being shipped down it and the Ohio River (Johnson 1979:113). Lock and dam projects continued on and off throughout the remainder of the nineteenth century. Today, the Allegheny averages between 20.25 feet and 26 feet wide, and it consists of eight locks and dams which provide 72 miles of slack water navigation from the Point at Pittsburgh to above East Brady, PA (US Army Corps 2012).

Steam service gradually spread over wider territories as navigation improved. In 1818 service on the Cumberland River reached Nashville, TN; followed by Florence, AL in 1821; Knoxville, TN in 1822; Arkansas River in 1820, Little Rock in 1822; and up to Fort Gibson, OK
in 1827 (Bauer 1988:161). Other rivers were opened as well throughout the 1820-30s including the Green, Kentucky, Barren, Scioto, Miami, Licking, Big Sandy, and Kanawha rivers (Bauer 1988:161). The construction of the Welland Canal connected Lake Ontario and Erie in 1829 (Roland 2008:146).

The National Road began to threaten Pittsburgh’s river trade in 1820 when it reached the city (McCollester 2008:63), and after 1830 river transportation faced increasingly greater competition from railroads and canals that eventually caused New Orleans to lose its dominance as the transshipment point of eastern goods headed west and vice versa (Bauer 1988:161). Fortunately for New Orleans, they were able to offset their loss with increased cotton shipments from river plantations and the upriver movement of coffee and West Indian goods like sugar and molasses (Bauer 1988:161). Pittsburgh became interested in the Santa Fe trade in 1840, and during that decade railroads quickly began to be the preferred means of transport (Reiser 1951:152).

River work in the first half of the nineteenth century was terminated in 1845 by President James K. Polk (Johnson 1979:81). In 1852 Congress approved Colonel Major Long, Charles Fuller, and Jack Russell to continue work on the river, but President Franklin Pierce and Secretary of War Jefferson Davis denied every inland waters improvement bill to cross their desks, deeming them unconstitutional as they believed the Constitution did not give the federal government the power to regulate interstate river improvements (Johnson 1979:85). After this time, all major nineteenth century river improvements on inland rivers ended as attention shifted increasingly toward railroads (Johnson 1979:85). Today, of the 127.2 miles of the Ohio River from Pittsburgh, downstream to New Martinsville, WV, there are six locks and dams that provide navigable water (US Army Corps 2012). In 1848 construction began on the Pennsylvania railroad (Craig 1851:278), and on November 29, 1852 it arrived in Pittsburgh.
(Johnson 1979:85). “The Gateway to the West now had two parallel lines of steel that draw the life out of the river trade” (Johnson 1979:85). The popularity of railroads only continued to increase while river trade gradually reduced. “The passing of the steamer came with the coming of the Iron Horse” (Knights Templar 1898:22).
CHAPTER IX

BOATYARDS OF PITTSBURGH, 1811-1850

Shipbuilding, as defined for this research, was for the most part over with by this point in Pittsburgh, although some of what might be considered “steamships” were produced on a limited scale and continued to serve on the Great lakes and in the Gulf of Mexico. Major boatyards were also included, as well as several joint steam engine and iron foundries suspected to have produced steamboats. By the second quarter of the nineteenth century there were 140 boat builders employed in Pittsburgh (Boucher 1908:357). This does not specify a difference between those building steamboats and those still building keel and flatboats. Historic maps and directories are often unclear as to whether somebody was just a boat or shipbuilder, or whether they were actually building vessels at their listed addresses. Maps with the closest approximate locations for the boatyards positively identified as having constructed watercraft there are included in this section, just as the early boatyard locations were.

A cotton factory and “shipyard”, called Jelly H. & J Merchants was one yard located on the corner of Market and Diamond in the 1812-1813 city directories (Figure 52) (Killikelly 1906:147). As it is around the same time steamboats were being introduced to the area, and the yard is located too far inland to efficiently transport vessels to the water for launching, it is more likely this yard was producing small boats.
Other known boatyards during the first half of the nineteenth century include Thomas Boland’s yard located on Point Alley (Harris 1841). This boatyard was either the same location as Amberson S & Co., discussed later, and its predecessors or in the immediate vicinity of them. Neil McNaughton’s boatyard was located on Front and Water Street (Harris 1841) on the same site as what was once Point Steamboat Company. William Holland’s yard was located on Water Street between Grant and Smithfield in the same location as described for George Vandegriff’s, and it is unclear whether they were two different small boatyards or more likely the same yard. Robert Walker also had a yard located on the corner of Water and Pennsylvania Ave., which was likely the same yard as Point Steamboat Company (Figure 53) (Harris 1844).
Figure 53. Locations of five 1840s boatyards.

There were several steamboat and iron foundries also producing steamers. There was a “shipyard” used mainly for keelboats and steamboats, built in 1817, on the Monongahela side of Fort Pitt on the waterfront (Cramer 1817:51). This is likely the same site location as the 1764 Fort Pitt and 1795 O’Hara boatyards seen earlier (Figures 5, 14). Pittsburgh Foundry was another site known to produce steamers. It is not clear if steamers were assembled there, as it is not on the water, but the components for them were definitely being built at this foundry. It was originally owned by McClurg & Co and was located on the corner of Fifth Ave and Smithfield Street where the Park Building now stands (Cowin 1985:62; Killikelly 190:130). This was the first iron foundry in Pittsburgh and was opened in 1803-04 by Joseph McClurg along with Joseph Smith, and John Gormley (Craig 1851:276). It was at this foundry that much of the ammunition, cannons, and supplies were made for both Commodore Perry’s fleet on Lake Erie and General Andrew
Jackson’s troops at New Orleans (Killikelly 1906:130). McClurg continued the business with his son, Alexander, until 1814 when it became owned and operated by McClurg and McKnight and then by Alexander McClurg & Co until 1830 when it was purchased by Kingsland & Lighter who later absorbed the Jackson and Eagle Foundry into Pittsburgh Foundry (Everts 1876:106). They continued its operation from 1831 until 1836 as Kingsland, Lightner, and Cuddy, before it passed to Bollman & Garrison from 1840 to 1863, Bollman, Garrison, & Co until 1865, and finally, A. Garrison & Co was formed on January 1, 1865. This foundry was also the predecessor to Macintosh-Hemphill (McCollester 2008:59).

Figure 54. Location of original 1803 Pittsburgh Foundry (Darlington Digital Maps).
Just a few years after Pittsburgh Foundry opened; the most famous steamboat yard/iron foundry would open. This yard was the previously mentioned Eagle Foundry, which was the one responsible for producing the first steamboat to ever navigate in western waters of North America. This foundry’s location was described as being located “at what was then known as Suke’s Run, a small creek that entered the Monongahela at or near the inter-section of what is now Second Avenue and Try Street” (Thurston 1888:23). This is a description of the site of the former Tarascon Shipyard. In what year Anthony Beelen bought this property is unclear, but according to Dahlinger (1911) it was bought in 1806 and Thurston (1888) speculates to it as having been in 1809-10. Regardless, Eagle Foundry was in operation by 1810, at the latest, for the building of the New Orleans. As mentioned, this site was later absorbed by the Jackson and Eagle foundry, which was eventually absorbed by the Pittsburgh Foundry under Kingsland & Lightner in the 1830s (Everts 1876:106).

There were a number of historically less known steamboat yards and foundries as well. The Pittsburgh Steam Engine Company, located on the corner of Redoubt Alley and Front Street, below Ferry Street, produced Evan’s model steam engines and anchors (Figure 55, 56) (Reiser 1951:125). They were described as having a “yard” on the Monongahela in December of 1818 (Wilson 1898:108). The location of this yard again appears to be on the same location as the original Fort Pitt boatyard.
Figure 55. The Pittsburgh Steam Engine Company location (Cramer 2013).

Figure 56. The Pittsburgh Steam Engine Company (1819 Map) (Cowin 1985).
There was another steamboat yard shown in 1812 and still there in 1815. This boatyard was Point Steamboat Company, originally Point Boatyard, located on the corner of Liberty and the Water (Cowin 1985:85). It appeared this yard was owned by Richard Drummond from the 1810s to the 1830s when it was taken over by Robert Walker who was described as having a yard on the Corner of Penn and Water by the 1840s (Figure 57).

Another boatyard in this area was the boatyard of Messrs. Frisbee (Frisby) in operation by 1831. The Frisbee Yard was operated by brothers Ephraim and Samuel Frisbee who built a number of steamboats, including the 250 ton Napoleon (Hazard 1831:192). Sometime around 1840 Messrs. Frisbee moved their yard two miles down the Ohio at the head of Adam’s Island, but there is another steamboat and lumber yard that takes over operation of this site during the 1840s (Cowin 1985:88; Harris 1837:280). This yard was Amberson, S. & Co. described as being located on Water and Point in the 1840s (Harris 1841:13). This yard was either another yard built near the location of the previous two or more likely on the exact same spot after the earlier yards were out of business (Figure 58). Scaife, Atkinson, and Okley (Figure 59) was another confirmed steamboat yard located on First Street between Wood and Market. It is quite possible that this yard was the same as the earlier Robinson and Minis yard, located at 3 Water Street (Figure 43). The five recently discussed 1820-1850 steamboat yards can all be seen below (Figure 60).
Figure 57. Point Steamboat (Top-left) (Cowin 1985).

Figure 58. Amberson S. & Co. (1835 Darlington Digital Maps).
Figure 59. Scaife, Atkinson, & Okely advertisement (Harris 1841).
Figure 60. Five 1820s-50s Steamboat yards in operation (Darlington Digital Maps).

Figure 61. Lewis and Clark Fashionable Boat makers (Darlington Digital Maps).
Lewis and Clark Fashionable Boat Makers (Figure 61) was another yard operating in the 1830s and was located on Ferry and Fourth Street (Cowin 1985:149). It is not clear if they were a steamboat yard or a small wooden boatyard. BRH Morrison and Co was also another boatyard in the Pittsburgh area, which was in operation somewhere on Herr’s Island, in the Allegheny River, during the 1840s, but no more definite of a location is known (Cowin 1985:322).

In 1840 a man named Robert Wightman built a machine and engine shop (Figure 62) to which James Rees succeeded in 1854 (Thurston 1888). From then on, the shipyard and the attached Duquesne Engine Works were operated by James Rees & Sons (Thurston 1888). This yard was located at Duquesne Way (now Duquesne Boulevard) and Fancourt Street (later Fourth Street and roughly where Stanwix Street is now) (Colton 2011). This yard built river boats, light draft vessels, and marine boilers. It was also connected with the building of the first steel boats (Thurston 1888) and will be discussed more with reference to post-1850 watercraft construction.

Figure 62. Robert Wightman’s Machine and Engine Shop location (Darlington Digital Maps).
One of the better known foundries in Pittsburgh during the early-middle part of the nineteenth century was that of Stackhouse and Thompson located on the corner of Liberty and Second Street (Figures 63, 64). It was attached to their steam engine foundry, which mainly produced steam engines intended for boats (Boucher 1908:355; Cowin 1985:147). The firm was originally organized in the early 1820s by James Thompson, the first superintendent of the Pittsburgh Gas Works, along with Samuel Stackhouse, under the name of Stackhouse and Thompson (Thurston 1888).

Figure 63. Stackhouse and Thompson (Darlington Digital Maps).
By 1933, the location of what was Stackhouse and Thompson’s was owned by Stackhouse and Tomlinson. This company’s address was described in different locations by different sources. Boucher (1908) and Thurston (1888) say Liberty and Second Street and Liberty and First Street for the locations of their foundry and attached engine manufacturers. This is the same location as seen for Stackhouse and Thompson just a few years earlier. It is also known that this is the foundry where the *Michigan* was built, and it was described as being assembled on Liberty and First Street. The 1841 Harris Directory says it was at Short and First Street, which may be describing the same spot. The 1835 Darlington map, however, shows it as being at Penn and Point, and the 1837 map found in Cowin (1985) shows it on the corner of Penn and Bell’s Alley with a steamboat yard just one block away at Penn and Point (Figure 65).
Figure 65. Stackhouse and Tomlinson (1837 Map) (Cowin 1985).

Figure 66. Two possible locations for Stackhouse and Tomlinson (Darlington Digital Maps).
In 1841 Joseph Tomlinson erected Vulcan works, at the Corner of Duquesne Way and Cecil Ave, which was merged with Stackhouse and Thompson to form J. Tomlinson and Co. (Thurston 1888). There is some confusion as to the link between Stackhouse and Thompson and Stackhouse and Tomlinson. Stackhouse and Thompson may have become Stackhouse and Tomlinson either before or after the merger and before or after J. Tomlinson built Vulcan works. It is also possible that Stackhouse and Tomlinson had multiple lots and/or was under the simultaneous ownership as J. Tomlinson & Co. This would account for the conflicting sources as to whether the *Michigan (Wolverine)* was built at J. Tomlinson & Co or Stackhouse and Tomlinson. Whatever the case, the *Michigan* was unlikely built at Joseph Tomlinson’s Vulcan Works based on sources describing the location of its launch at First and Liberty (Figure 67); however, it is not only possible, but likely that components of the vessel work fabricated at Vulcan Works, and it was likely launched there as well, which would explain the confusion.

Figure 67. Vulcan Works- J. Tomlinson & Co (Darlington Digital Maps).
The final major steamboat building company was established in 1847 as White, Hartupee & Co. (Thurston 1888). They built a large engine and machine works at the corner of First and Short Street, and this firm was soon succeeded by the better known A. Hartupee & Co (Figure 68) (Thurston 1888). This steamboat yard was yet another watercraft construction yard built on what was the original Fort Pitt boatyard.

Figure 68. White, Hartupee, & Co (Darlington Digital Maps).
Steamboats for Military Use

Steam vessels were first used by the United States Navy in the 1840s. The first American military use of an all iron steamship occurred as the result British forces continually patrolling along United States shores of the Great Lakes in armed warships, which was a blatant violation of the de-armament treaties (Magic 2001: 19). Congressman William W. Irwin of Pittsburgh pushed a bill, the Fortification Act, through Congress, and it passed in 1841 authorizing funds for the construction and arming of naval steamers in the Gulf of Mexico and on the Great Lakes with a particular concern for defending Lake Erie (Magoc 2001). One such steamer ordered by Navy Secretary Abel P. Upshur was the Michigan (later named Wolverine) (Figures 42, 69) (Bauer 1991:82). This ship was a fourth-rate iron steamship built in Pittsburgh. Its hull was designed by Samuel Hartt and its engines were built by Charles W. Copeland, both at Stackhouse and Tomlinson of Pittsburgh in 1842 (Bauer 1988:82; Magoc 2001:20).

It was said to be a very well built steamship, after being transported via the Erie Canal and reassembled in Lake Erie in 1843 (Magoc 2001:19). It had a 685 ton displacement; its dimensions were 163 feet three inches by 27 foot one inch; 110 nominal horsepower (NHP), 365 actual horsepower (AHP), two inclined, direct acting condensing engines; 36 inch by eight foot side-wheels; and it could travel at 10.5 to 13 knots at full speed, making it the fastest vessel on the Great Lakes (Bauer 1991:82; Magoc 2001:19). To clarify, nominal horsepower is calculated by reference to the size of the cylinder bore and the speed of the piston while actual horsepower is a measurement of the actual power produced by an engine. Its construction was authorized on September 9, 1841; it was laid down in 1842; launched on December 5, 1843; and was commissioned on September 29, 1844 (Bauer 1991:82).
In the 1850s the *Michigan* was used to quell civil disturbances in the Great Lakes region, including the Wisconsin and Michigan timber rebellions. During its service it engaged in battle with lumber pirates, the Mormon tyrant (King) Jesse James Strang of Beaver Island, and some minor conflicts associated with the Civil War (Pike 20120). It would, however, be used more for rescuing distressed American and Canadian ships than keeping the British in check (Magoc 2001:19). It was equipped with two 64 pound guns and four 32 pound carronades, and although she was utilized in a number of violent conflicts, “no blood was every spilled on her decks” (Magoc 2001:20). After serving over 60 years as the *Michigan*, it was renamed the *Wolverine* in 1905, and decommissioned in 1912 (Magoc 2001:21). The ship was finally given to the city of Erie, PA on July 19, 1927 where it remained until being scrapped in 1949 (Bauer 1991:82).

Pittsburgh steamships were further used by the Military during the Mexican American War. In 1846 Lt. John Sander, purchased 14 steamships from Pittsburgh (Johnson 1979:82). According to Thurston (1888) there were 15 to 18 iron vessels built in Pittsburgh during the war, of which
nine were war vessels. Two of the vessels were columbaids, a vessel type that Pittsburgh would become famous for, constructed at Fort Pitt Foundry in 1845 (Thurston 1888). Both of these vessels were 210 feet long by 21 feet wide and had a 17 foot depth of hold. They were constructed of iron, varying from 1/2 to 3/16 of an inch thick (Thurston 1888). One of these vessels was the Jefferson, which would be taken apart and reassembled at Oswego. This vessel cost $180,000 (Thurston 1888). It was still in service upon George Thurston writing his 1888 book. The other vessel was the George M. Bibb named after the Secretary of the Navy (Thurston 1888). It went to New Orleans in 1845 where it would see action in 1847 (Johnson 1979:182).

Three other warships, the revenue cutter Hunter, the frigate Allegheny, and the Walker were constructed for the Navy in 1845 Pittsburgh as well (Thurston 1888). The latter two of these vessels were built by J. Tomlinson & Co. (Wylie 2007:44). The Allegheny had a 989 ton displacement, was 185 feet long by 33 foot, four inches wide, by 14 foot, eight inch in height. It also had a two to eight inch armament or dimension of its guns barrels (Bauer 1991:61). It was rigged as a bark; its machinery was 243 NHP, 560 IHP, two horizontal low pressure condensing engines (Bauer 1991:61). It was laid down in 1844, launched on February 22, 1847, commissioned that same day, and sold May 15, 1869 (Bauer 1991:61). Its hull was designed by William W. Hunter and its engines by C.H. Haswell (Bauer 1991:62). It failed due to a weak hull and flawed eight bladed hunter wheels (Wyllie 2007:44). It was rebuilt in 1852 and again failed due to boiler problems. It was used as a receiving ship from 1856 to 1868 (Bauer 1991:61), and it later served in the Civil War (Wyllie 2007:44). The Walker was a 305 ton side-wheel steamer launched in 1845. It was 132 foot by 24 foot six inches by 10 foot (Silverstone 2006:43). It had two horizontal half beam engines, and she later sank in a collision off Absecon. NJ on June 21, 1860 (Silverstone 2006:43).
CHAPTER X

POST-1850 WATERCRAFT AND SHIPPING INDUSTRIES

Pittsburgh’s commercial boat and shipbuilding industries changed dramatically during the second half of the nineteenth century. Since 1800, Pittsburgh had grown from a small isolated frontier town of 2,400, to an industrial and commercial center of 21,000 in 1840, to an even larger city of 46,000 by 1850 (Reiser 1951:191). Then, in the following decade, the population tripled to 156,000 with European immigrants making up about 1/3 of this figure (The Planpgh Exchange 2012). It was during this decade that Pittsburgh Shipyards were again utilized by the United States Navy, this time for the American Civil War. After this time, steamers again thrived for a short time, with the majority of river freight being moved in barges towed by steamers (Johnson 1979:113).

By the mid-late nineteenth century, Pittsburgh had 11 boatyards, which employed 500 men, 24 machine shops for producing engines, 12 plants making boilers, and 10 forges for making chains, anchors, and boat iron work (Johnson 1979:112). During this same time there were also 45 iron and copper foundries (Thurston 1857:5). It is not clear how authors attempted to distinguish small wooden boatyard, from steamboat yards, from machine shops producing steamboats, as many yards are simply listed as boatyards, and many foundries that built steam vessels are listed only as foundries, machine shops, or rolling mills. It is difficult to determine which of these businesses were responsible for constructing vessels, with regards to steamers in particular, as often times different companies were responsible for building the engine, boiler, anchor, hull plating, etc. It is also quite often unclear as to who assembled the vessel and at which location it was launched.
Statistics can be used to show the general situation of ship/boatbuilding in the second half of the nineteenth century. In 1850 there were 3,000 steamboats on the Mississippi River System (McCollester 2008:59). Between 1852 and 1856, 362 steamers were built at Pittsburgh; 78 in 1853, 83 in 1854, 72 in 1855, and 59 in 1856 (A. Warner 1889:543). Eighty-four steamers were built in Pittsburgh in 1857 and from then until 1875 649 steamers (155,243 tons) and 578 barges (100,883 tons) were built at Pittsburgh (A. Warner 1889:543). From 1836 to 1856, the value of boats constructed in Pittsburgh was over $20,000,000, and between 1856 and 1875 the total value was 22,000,000 (A. Warner 1889:543). Between 1811 and Thurston’s book written in 1888, about one million tons of steamboat tonnage had been constructed in Pittsburgh which was the equivalent of about $50,000,000 worth (Thurston 1888). This rate steadily decreased ever since due to the competition from railroads.

Railroads, by 1870, were well established as the more efficient mode of transport, and they soon caused the retirement of almost all steamers on inland rivers. Competition from railroads eventually beat out the inland waterway navigation of rivers and canals as the preferred and more reliable means of transportation. According to historian Hunter Louis, the steamboat industry began its slow decline in 1850, and he notes that by 1870 “the steamboat commerce of Pittsburgh with the important river cities below had virtually collapsed.” The commerce from Wheeling shared a similar fate (Barns 1999:226). “Once the railroad had become the dominant form of transportation, river commerce was reduced to business done by small packets running between Pittsburgh and the little towns of the lower Monongahela (Barns 1999:226).

“Between the War of 1812 and the Civil War, the United States experienced a transportation revolution. It came in three realms of transportation: rivers, canals, and railroads, all of which shaped America’s maritime history” (Roland 2008:130). By the second half of the
nineteenth century the commercial value of goods traveling on rivers was only a small part of the total trade. In 1851-1852 the total value of commerce moving in the United States was $1.46 billion with $594 million traveling via canals, trailed by $540 via railroad, and only $170 million worth of goods on rivers (Roland 2008:147).

Commerce began to change all together by the mid-nineteenth century, and demand from whole new western markets began to open up, which Pittsburgh was ready to meet (Reiser 1951:123). At this time, Pittsburgh was already an industrial powerhouse thanks in part to its iron industry, and it was firmly dubbed “Iron City” by 1850 (Reiser 1951:191). Prior to 1850, coal was sent down the Ohio from Pittsburgh in big flat bottomed boats, about 125 feet by 18 feet by eight feet in dimension, which could carry approximately 450 tons (Wilson 1898:107). These boats were lashed together in pairs and floated down river in high water.

This changed after 1850 as Pittsburgh began sending larger shipments of coal downriver (Bauer 1988:173), which was loaded in large flats and towed downstream by tow boats that drew two to three feet of water and carried no load themselves but could pull enormous loads (Reiser 1951:51). More than 150 tow boats of the late nineteenth century called Pittsburgh their home port (Knights Templar 1898:24). Prior to the 1850s, the coal supply came mostly from adjacent counties, but Thomas Jones Jr. took the first coal shipment down the Ohio River from Pittsburgh in 1855 (Boucher 1908:386). All the famed Pittsburgh coal was mined on the lower Monongahela and was shipped down the river through its system of locks and dams (Kelly 1895:61; Knight Templar 1898:26) to the Ohio and Mississippi rivers where it travelled to ports such as Cincinnati, Louisville, St. Louis, Memphis, Vicksburg, and New Orleans (Knights Templar 1898:23). This trade system was said to be “the cheapest transportation in the world” and that “necessity had forced engineers to devise this system to compete with railroads” (Wilson 1898:107).
The Civil War from 1861-1865 disrupted river trade, but after this time “well-built two way tow boats and barges quickly took over trade” (Bauer 1988:174). By 1869, there were 40 steamers working full time hauling coal downstream from Pittsburgh with another 60 employed locally (Bauer 1988:174). Prior to 1880, most tow boat operators ran boats only during the day as the dangers of night navigation were significantly greater (Bauer 1988:174). This started to change in the late 1870s when steamboats first began being fitted with extremely bright electric spot lights (Bauer 1988:174). Coal had made up the largest portion of cargo on late nineteenth century rivers (Reiser 1951:43).

Oil was another commodity that made its appearance during the mid-nineteenth century. While the coal trade was disrupted during the Civil War, the oil trade on western waters of North America experienced a boom beginning in 1860 and peaking until 1867 (Johnson 1979:113). This was the result of an opening of European markets to large quantities of oil shipments. Petroleum tows carried oil between Pittsburgh and Oil Creek during this time and over 2,000 flatboats, guiphers, keelboats, bulk boats, and steamboats were used in the Allegheny oil trade alone (Johnson 1979:113). This boom began to diminish after 1867 as railroads began supplying a cheaper and more direct system of transportation directly to refineries.

**Pittsburgh Watercraft and the Civil War**

Pittsburgh again played a significant role in watercraft construction for the U.S. Navy during the Civil War. By the mid-nineteenth century, the Navy had transitioned itself from a wood and sail based fleet to an iron and steam based one. Steam powered propellers had by now become the primary propulsion system of the Navy (Ford 2002:27). During the Civil War, Pittsburgh remained a major shipbuilder, employing over 5,000 men and producing over 750 steamboats, barges, ferry, keelboats, and flatboat during the war years alone (McCollester 2008:90). Pittsburgh
shipyards produced heavy armed ram boats, monitors, and ironclads, and they also provided iron plates, turrets, and naval machinery to other shipbuilding locations as well. Fort Pitt Foundry was the most important producer of military equipment in Pittsburgh during the war (McCollester 2008:90).

Inland rivers proved to be the backbone of the Union’s supply during the Civil War (Johnson 1979:110). In order to maintain these supply lines, the Navy focused on incorporating ramming vessels into their fleet. Ramming vessels were by no means new, having been in use for millennia, but at this time iron was first used as framing to reinforce ramming ships (Pike 2012). These new ramming vessel designs intended for combat had been inspired by Henry Shreve’s *Heliopolis* (Johnson 1979:102). Congressman Charles Ellet purchased powerful coal boats, the *Mingo Lioness, Samson, Dick Fulton, and T.D. Horner* at Pittsburgh, where he then installed timber bulkheads anchored with iron rods from stem to stern (Johnson 1979:102). He then bought the side-wheelers *Monarch, Queen of the West, Switzerland,* and *Lancaster* at Cincinnati for similar conversion (Johnson 1979:102). This fleet sailed to Memphis on June 6, 1862 and crushed the Confederate fleet (Johnson 1979:107).

A number of shipyards in Pittsburgh received naval contracts for shipbuilding, and these contracts were organized by William J. Kountz, General George McClellan, Captain John Rogers, and Colonel Charles Ellet (Johnson 1979:107). They purchased a steamboat fleet to convert to tinclads, and the most important contracts went to the shipyards of Mason and Snowden and Hartupee and Tomlinson to build ironclads with swivel turrets (Johnson 1979:107). Each shipyard under contract worked from set specifications, but developed its own model and material lists (Robert 2002).
The company of Snowden and Mason was formed in the early 1860s when John Snowden and Albert Mason joined together to bid on the monitor *Manayunk* (Roberts 2002). They had boatyard facilities at Brownsville, but they were inadequate, as only wooden vessels had been built there previously, and the locks on the Monongahela were too small to manage the passage of steam vessels. After winning the bid, they rented land on the Monongahela directly across from Pittsburgh where they built their shipyard yard and machine shop (Figure 70). Their yard was located at the center of a cluster of metal and engineering production companies, and they were just 300 yards away from their iron supplier Lyon, Shorb, & Co. on the Southside of the Monongahela across from downtown Pittsburgh (Roberts 2002).

![Figure 70. Snowden and Mason (Cramer 2013).](image)

The *Manayunk*, later renamed the *Fury* in 1869, was laid down in 1862, launched on December 18, 1865, commissioned on September 27, 1865, and sold on October 10, 1899 (Bauer
1991:44). It was a turret ship of the Canonicus Class, armed with two 15 inch guns. Manayunk was 224 feet in length, 43 feet three inches wide; had a depth of hold of 12 feet, a 21 foot inside turret diameter, a 2100 ton displacement, a two to 15 inch armament, a 1.5 inch thick iron deck, and its 320 IHP, two vibrating-lever engines, 48 by 24 inches, which were used to power a single screw propeller an average of eight knots and a maximum of 13 (Bauer 1991:44). According to Thurston (1888), good naval authority had declared it a most admirable boat in all respects, indicating she was a “steamship”, capable of sailing around the world. It took 1,247 tons of iron for her construction (Thurston 1888).

Also under construction by this firm in 1863 was the Umpqua, laid down on March of that year, launched on December of 1865, commissioned on May 7, 1866, and sold on September 12, 1874 (Bauer 1991:45). The vessel was a lighter draught turret monitor, 225 feet long by 45 feet wide, had a seven to ten foot hold depth, and drew six feet six inches of water (Bauer 1991:45). Its turret had a 20 foot wide inside diameter and a height of nine feet. It had a two to 11 inch armament with an eight inch turret thickness and three inch sides (Bauer 1991:45). It was armed with one 11 inch gun and a 150 pound Parrot rifle gun (Thurston 1888), and with its 600 IHP, two inclined direct-acting engines, 22 by 30 inches, powering two screw propellers, it could travel between five and eight knots (Bauer 1991:45). Its construction had required 813 tons of iron and, along with the Manayunk, Umpqua steamed out to sea via the Ohio-Mississippi rivers (Thurston 1888).

Two other smaller vessels built for the same purpose as the Manayunk and Umpqua, were the Marietta and Sandusky. These vessels were contracted to Tomlinson, Hartupee, & Co. (Bauer 1991:51). They were both of the Marietta Class, had a 479 ton displacement, were 173 foot 11 inches long by 52 foot one inch wide, had two to 11 inch thick armaments, a six inch thick armored
turret, four high pressure engines 15 by 24 inches that powered four screw propellers which could move the vessels at around nine knots (Bauer 1991:51).

The Marietta’s hull was built by Tomlinson while the machinery was built by Hartupee at different locations. It was laid down in 1862, launched on January 4, 1865, completed December 16, 1865, and sold off on April 17, 1873 (Bauer 1991:51). This vessel was likely designed by its builders. It was a flat bottomed, iron hulled river turret boat, and although it had the potential to be an effective weapon for the Union, it was never commissioned due to the war ending before its completion (Bauer 1991:51). The Sandusky was also laid down in 1862. It was launched January 17, 1865, completed on December 26, 1865, and sold April 17, 1873 along with the Marietta (Bauer 1991:51).

Pittsburgh’s naval role in the Civil War was anything but minor. Military vessels were constructed within this city for both combat as well as transport. In all, 640 steamboats had been chartered for supply transport during the Civil War, and 143 of them were lost either by snag or artillery fire (Johnson 1979:110). Additionally, 301 steamboats were launched during the Civil War at Pittsburgh alone (Johnson 1979:112).

Change in American Shipbuilding Philosophy

Aside from a change in waterway commerce during the second half of the nineteenth century was also a change in the shipbuilding philosophy of the United States. By the middle of the Civil War the Navy realized it needed an ironclad design of light draft that could penetrate inlets and sounds. They used Swedish engineer, John Ericsson’s design, employed under naval engineer Alban C. Stimers. Stimers had used practically skilled American workers, who were trained in building wooden ironclads, to try and construct 20 of these vessels, but they failed miserably at a
cost of eight million dollars as most of these vessels sat with only three inches of free board and moved at the snail’s pace of just three knots (Thiesen 2006:130).

Another Swedish engineer, John W. Nystrom, had been the sole voice of theoretical shipbuilding during the decade leading up to the Civil War (Thiesen 2006:133). He invented a calculator, called an integrator, which made complex calculations much easier. He also invented a planimeter, which looked like a drafting compass, and could compute the area of most shapes drawn of a draft. It drastically simplified tedious and time consuming naval architecture, but it did not become popular until 1900 (Thiesen 2006:133-134). Nystrom died in 1885 after having spent most of his life advocating for theoretical shipbuilding (Thiesen 2006:137). Beginning in the 1870s technically inclined naval officers and engineers began converting practical warship designs into an occupational system founded upon academics, applied science, experimentation, publication, and professional societies (Thiesen 2006:140).

Naval Historian, Robert G. Albion, characterized the span between the Civil War and 1880 as the Dark Ages of American shipbuilding, as the post war Navy failed to remain a leading innovator in shipbuilding technology due to Congress cutting funding (Thiesen 2006:141). In the two decades following the War, Congress entered into only $5 million dollars of new contracts while France spent $121 million, Great Britain spent $91 million, and Russia spent $84 million (Thiesen 2006:141). Between the 1870s and 1880s, the United States Navy deteriorated into an obsolete and dilapidated fleet that maintained only 142 total vessels, 50 of which were old tugboats and outdated sailing vessels (Thiesen 2006:141). A new naval technological center would be instituted at Annapolis, the United States Naval Institute, in 1873 and the American Society for Mechanical Engineers was instituted in 1880 (Thiesen 2006:144). Here they encouraged officers and engineers to begin dialogue on technical subjects through professional journals and popular
magazines. Qualified officers were sent to Europe to observe methods, and the nation’s shipbuilding industry soon became highly mechanized, although this did not apply so much to Pittsburgh by this point (Thiesen 2006:144).

**Late Nineteenth Century River Improvements**

Some river and canal improvement projects occurred on a limited scale during the second half of the nineteenth century as well, but as discussed, the frequency of these projects was on a rapid decline. In 1845 a river improvement convention was held at Memphis, TN. This was followed by others in 1847, 1851, 1866, and 1867 with the goal of deepening the channel at the mouth of the Mississippi. This finally occurred in 1874 when Congress ordered that an eight to 10 foot channel be maintained in the Lower Mississippi, and five years later they established the Mississippi River Commission to oversee the river’s well-being (Bauer 1988:169). The channel eventually extended from New Orleans all the way up to St. Louis (Bauer 1988:168). In 1863 West Virginia asked Congress to renew river work and argued that the war clearly demonstrated the National defense values of waterways (Johnson 1979:110).

In Gilman vs. Philadelphia in 1865, the Supreme Court finally settled the more than half century debate when they ruled that the United States Constitution gave deferral power to keep rivers open and free of obstructions (Johnson 1979:110). This ruling essentially confirmed that the constitution had intended to give the federal government the power to regulate issues of national defense and that keeping navigable interstate waterways open was one such concern. Richard Delafield, the Chief of Engineers, was directed by Congress to renew projects that same year and was appropriated $55,000 the following year (Johnson 1979:110). Soon western waters saw the introduction of new double hull snag-boats which were able to clear most major streams of snags and wrecks by 1870 (Johnson 1979:111). More attention was paid to the upper Mississippi for its
grain and timber trades, and improvements to these areas occurred between 1867 and 1877 with the building of the Des Moines Rapids Canal (Bauer 1988:169). A 4.5 foot channel was also established at Rock Island, south of St. Paul, MN (Bauer 1988:169). The Kiskiminetas and Conemaugh were surveyed again in 1878, and in 1882 Congress appropriated funds for surveying 16 new rivers never surveyed before (Johnson 1979:113). Among the latest major Pittsburgh waterway improvements to occur within the scope of this research timeline was in 1893 when the Army Corps opened a permanent office in Pittsburgh with the mission of improving navigation on the Allegheny and Monongahela rivers, and today’s Pittsburgh District includes 23 locks and dams on the Allegheny, Monongahela, and Ohio rivers (US Army Corps 2012).

The late nineteenth century also brought about new American methods and techniques for ship construction (Thiesen 2006:169). New power sources and ways to transmit that power were introduced, and new machinery lessened the reliance on workers, both skilled and unskilled (Thiesen 2006:169). More systematic methods were continually introduced to increase efficiency and decrease costs, and this change in technology, which began in the 1880s iron shipyards, would create the “rational shipyard” by the close of the century (Thiesen 2006:170). In the first half of the century, power to these yards were supplied by animals, water, or manpower, but from the 1840s and on, nearly all larger yards had begun the transition to steam (Thiesen 2006:171). The structures in iron shipyards were dominated by brick buildings, gas or oil lighting, steam power, and often dirt floors to guard against fire (Thiesen 2006:171). These yards also saw the development of pneumatic, hydraulic, and electric power by the close of the nineteenth century (Thiesen 2006:172).
Major Post-1850 Watercraft Builders

The major shipbuilders of the mid to late nineteenth century, thus far introduced, were Snowden and Mason, Stackhouse and Tomlinson, and Tomlinson, Hartupee, & Co. These builders were the ones deemed as large enough to contract military vessel to, but other yards were producing vessels as well or, at the very least, different components for steamers. A list of significant mid-nineteenth century watercraft construction yards can be found in Appendix F.

Among the larger well known Pittsburgh shipyards of the later nineteenth century was that of the Duquesne Works operated by James Rees and Sons Company (Figures 71, 72, 73, 74, 75, 76) which had been founded in 1855 by Captain James Rees (Killikelly 1906:254). The first three of these figures show the facility’s location while the latter three give a look at the lot itself. Figure 74 shows the front of the structure looking from the Allegheny, while figure 75 shows two vessels and docking structures in the water looking from the front of the building. Figure 76 shows a look at what construction taking place on the inside of the facility had looked like. These images are all essential for anyone ever looking to excavate the site as it shows where the main features of the yard were in relation to each other and where the artifacts could most likely be found. It was originally named Rees & Thorn Machine Shop and Engine Works (Colton 2011). River boats, light draft vessels, and marine boilers were among the production concentrations of this facility. This yard had initially been the yard of Robert Wightman who built his machine and engine shop in 1840 as discussed previously (Figure 63) (Thurston 1888).

In 1878 the Duquesne Works built the first steel hulled boat in America, the *Francesco Montoya* (Colton 2011). This vessel was built for the Magdalena Steam Navigation Company of South America (Thurston 1888). It was 150 feet long by 30 feet wide and had a three foot deep hold. It was constructed with angle iron frames spaced 18 inches apart, and also angle iron deck
beams and a steel plated hull (Thurston 1888). James Rees and Sons also produced the 157-foot Victoria, the 110 foot Robert Calisto, and the 130 foot Comuta in 1879 for the same company (Thurston 1888). The following year, the Venezuela was constructed entirely of steel, and was the first vessel in which steel was used in place of angle iron (Thurston 1888). The steamer Columbia was also built in 1880 with similar dimensions as the Venezuela, and the 112 foot Irura was built the following year and ran on the San Juan River in Nicaragua (Thurston 1888). The first boat with electric lighting throughout was the Kate Adams, also built at this yard in 1881 (Colton 2011). The yard was also famous for building many knockdown (KD) boats used in South America, and it remained in operation until 1930 (Colton 2011). A more detailed partial list of ships produced by this company can be found in Appendix G.

Figure 71. James Rees & Sons location (same as Robert Wightman’s) (Cramer 2013).
Figure 72. James Rees (Duquesne Engine Works) (Cramer 2013).

Figure 73. James Rees and Sons (Sanborn 1893).
Figure 74. James Rees & Sons building (PLCHC 2012).

Figure 75. Vessels docked at James Rees and Sons (PLCHC 2012).
In 1847 James Laughlin, the organizer of the first National Bank of Pittsburgh, began building the Eliza Furnace and a battery of beehive coke ovens. In 1853 Benjamin F. Jones, John Laughlin, and Samuel Kier built American Iron Works (Figure 77), and Jones and Laughlin steel would soon emerge in 1861 (McCollester 2008:86). They were both known to have produced steamboat parts. However, it is not clear whether whole vessels were constructed there (McCollester 2008:65). Its location on the water makes this seem more probable.
There were several boatyards operating in Pittsburgh in the 1850’s that do not indicate what types of vessels were being built there. These include Gullet & Applegate at the corner of Marbury & Duquesne Way, Joseph Shivenderman and Samuel Vandegriff at 49 Water Street, Slack & Sholes on 44 Water Street, L.F. & L Vandegriff at 5 Pennsylvania Ave, and James Vandegriff on Duquesne Way (Thurston 1856-57:327). The block that 49 Water Street is on is the same one as the original Fort Pitt boatyard, and the 1857-58 directories for Pittsburgh also list 49 Water Street as the Address for G.W. Coffin steamboat yard around this time (Thurston 1857:36). Eshelman, Bunton and Co., steamboat builders and house joiners, would be located on the site of Gullet and Applegate by 1861 (Figure 78) (Thurston 1862:87).
1870s boatyards include Couch & Chilcoat at the foot of 36th Street, G.O. Fawcett on Second Ave at the foot of Brady, and I.A. Reed at 2 Mulberry Ave (Figure 79) (Thurston 1872). It is not clear where Mulberry Ave was or whether it was even in the city of Pittsburgh, but the corresponding maps shows an estimate using Mulberry Way as the possible street referred to. G.O. Fawcett was a confirmed barge-yard while the other two were likely barge-yards based on their location and time period (Figure 80). Robert Young also had a sawmill and boatyard at the foot of 34th Street on the South Side of Pittsburgh in the 1880s (Figure 81) (Thurston 1880:717), and prior to the close of the nineteenth century, Shultz Bridge Company was constructing barges in the vicinity of Pittsburgh, at McKees Rocks (Figure 82). Although now considered part of Pittsburgh, it was not added until 1906 and was not within the scope of this research, but being one of the last watercraft facilities in close proximity to Pittsburgh it was deemed worthy of mention.

Figure 78. 1850s boatyards (Cramer 2013).
Figure 79. 1870s boatyards (Google Maps).

Figure 80. 1870s depiction of G.O. Fawcett Barge Yard (Hayes 1877:48).
Figure 81. Boatyard of Robert Young (Darlington Digital Maps).

Figure 82. Schultz Bridge Company and Vulcan Forge (Google Maps).
By 1908, steamboat building was “almost an industry of the past” (Boucher 1908:372). After 1875, tow boats and barges took over as they were able to carry immense tonnage, and this drastically reduced the need to build steamboats in Pittsburgh (A. Warner 1889:543). By the end of the nineteenth century, certain “boats still continue to be built at and near Pittsburgh, both wooden and iron, and the armor plates for our war vessels are even now preparing at Pittsburgh mills…In the very neighborhood where these boats (steamboats) were built, coal barges are now built” (A. Warner 1889:466). The city of Pittsburgh underwent drastic changes by the last decade of the nineteenth century.

The picture of 1889 Pittsburgh (Figure 83) shows all that remains of Pittsburgh’s watercraft construction industry within the historic boundaries of the city. The last ship chandlers outfit in the triangle is shown present in the exact location of Pittsburgh’s very first boatbuilding yard at Fort Pitt. Figure 84, seen on the following page, provides a look at the level of urban development Pittsburgh has undergone by the beginning of the twentieth century, and thus, a final look at Pittsburgh by the close of this research’s focus. By the turn of this century, Pittsburgh had become a densely packed city of 322,000 residents (The Planpgh Exchange 2012).
Figure 83. 1889 Pittsburgh (Cramer 2013).

Figure 84. 1902 Pittsburgh image showing the extent of urban development (Cramer 2013).
CHAPTER XI

ARCHEOLOGICAL RESOURCES OF PITTSBURGH
AND METHODS FOR SITE EVALUATION

During the course of any archaeological work performed on watercraft construction facilities in Pittsburgh, historical material would unlikely be the only archaeological resources recovered. As data suggests, the area surrounding Pittsburgh has been inhabited for roughly 16,000 years (Minderhout 2013). Native Americans who settled this site did so for many of the same resources and strategic advantages that Europeans were drawn to. Pittsburgh’s earliest resources include an abundance of floral, faunal, and lithic material (Cowin 1985:359). This fact indicates an increased likelihood of uncovering prehistoric artifacts during an excavation, and more than two centuries of fill over the city of Pittsburgh has likely sealed these features intact, preserving them beneath the modern city (Cowin 1985:359).

The original land surface of Pittsburgh is buried in 10 to 12 feet of fill over the downtown point and along the north and south sides of the waterfront. This fill was added to protect waterfront properties from flooding. There was a substantial difference in historic waterlines between high and low tide which were roughly 50 feet apart (Cowin 1985:374). On the north side of Pittsburgh, along the Allegheny River between Corry and Chestnut Street, frontier and commercial period sites likely still remain under fill inland of Lacock Street (Cowin 1985:362), and a great deal of charcoal would likely be found during any industrial excavations in Pittsburgh as the result of several great fires having destroyed much of downtown Pittsburgh. Uncovering material evidence from shipyard excavations could contribute to a better understanding of the shipbuilding culture and the process of urbanization. Archaeologists can
study changes in land use, refuse disposal, economic issues, developing transportation, effects of fires and floods, ethnicity in Pittsburgh, and the archaeology of the poor (Cowin 1985:368).

Figure 8. Modern Pittsburgh (Air photo by Jim Wark 2000).
The focus for evaluating sites was concentrated on the pre-twentieth century sites located within the city of Pittsburgh, between the Allegheny and the Monongahela rivers up to the point as well as any historic yards located on the shoreline immediately opposite the downtown area that were established before, and recognized at part of Pittsburgh by, 1900 and which also were significant enough to have left archaeological material present for research. The map below indicates the pre-twentieth century territory belonging to Pittsburgh (Figure 86).

Figure 86. Expansion of Pittsburgh by date (The Plan Exchange 2012).
Dozens of shipyard and company names were uncovered during this research, but many of the names referred to the same location, and as mentioned, there was a strong pattern for newer watercraft construction sites and any associated foundries to be built directly over the sites of previous yards. Reasons for this consistency in location include all the previously discussed reasons, in regards to shipyard placement, such as the proximity to workers and clients, a lot and shoreline suitable for building and launching vessels, and a close proximity to the required raw materials and outsourced finished products from wood and sails to iron and engines.

These factors also explain the pattern of shipyard and boatyard facilities being located in clusters along the shoreline. Of the numerous boatyards found, those outside the pre-twentieth century boundaries of Pittsburgh, those too small to have much archaeological potential, and those whose descriptions are too vague to narrow down to a close enough approximate location sufficient for evaluation were not included. Twenty-two different locations for facilities confirmed to have produced watercraft in historic Pittsburgh are included in this evaluation along with a description for each of these sites’ present circumstances within modern Pittsburgh. Corresponding photographs and satellite images (Appendix H) were also included to help in evaluating these sites. The satellite images included are from Google maps and are centered on the closest approximate location the yards were expected to be located unless otherwise indicated. These images, along with the onsite observations, were used to formulate an idea as to the level of site disturbance and the likelihood of surviving archaeological features from boat and shipyards.

All the sites used for analysis were plotted onto a map (Figure 87) and the map key was created (Table 3). The semi-transparent red dots on the maps represent the closest approximation as to where the facility was located, but the facility’s size, shape, and exact position are unknown
in most cases. The size of the dot is not an indication of the size of the facility and is more indicative of the uncertainty as to the location and the level of zoom the google image is set at. The photographs and an onsite inspection were then performed on all sites where satellite imagery alone could not provide a full picture of the present day conditions. Certain areas which were either blocked off by construction activities or deemed too dangerous to take photographs from were avoided. Street view images using Google Earth were used to substitute for many of these areas as well as provide additional views for analysis from any missed angles. Additionally, buildings, where possible, were checked to see if they had basements. This was dependent upon whether these buildings were accessible or not at the time of inspection and also on the employee’s knowledge of the facility which many did not have full access to themselves. Attempts at making phone calls to a number of these buildings were made, but did not result in acquiring any additional or relevant information regarding the presence of basements or extent of the foundations or substructures.

All 22 sites received ratings both in terms of their preservation potential as well as their accessibility for archaeological research. Each of these two categories were given one of seven ratings consisting of very-low, low, low-moderate, moderate, high-moderate, high, and very high. For determining preservation potential and accessibility, these variables included all factors covering the nineteenth, twentieth, and twenty-first century industrial development of these sites. Such factors were the presence of roads and highways (their size, substructure, level of use), bridges (their density and often unknown depth of pylons), and buildings (their height, width, age, presence of underground parking garages, etc.) These ratings were applied very subjectively as variables were often based on uncertainties which included things like when terrestrial highways covering the sites would no longer be needed, when buildings or roads would need to
be demolished or rebuilt, the exact depth of foundations of the modern structures, the lack of specific building designs for nineteenth and early twentieth century structures and sub structures established prior to the protective layer of fill being added, and also the exact thickness of that fill in relation to each sites’ location. Determinations in differentiating between low, low-mod, mod, etc. were based on a best estimates after taking all the above variables into consideration for both of the evaluation categories.
Locations of 22 Sites Known to have Produced Watercraft in Pre-20th Century Pittsburgh

Figure 87. All located Watercraft Construction Facilities in Pre-20th Century Pittsburgh.
<table>
<thead>
<tr>
<th>ID#</th>
<th>Name</th>
<th>Location</th>
<th>Description</th>
<th>Approx. Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fort Pitt (O’Hara’s yard later)</td>
<td>On the water between First and the feet of Redoubt Alley and Short</td>
<td>Observed by Mathew Clarkson in the 1760s. Yard where the first keelboat was built as well as the Western Experiment. It was operated and/or by James O’Hara during the 1780s and 1790s.</td>
<td>1750s-1790s</td>
</tr>
<tr>
<td>1</td>
<td>Pittsburgh Steam Engine Co</td>
<td>Corner of Redoubt Alley and Front Street, below Ferry Street</td>
<td>Had a yard on the Monongahela.</td>
<td>1810s-1830s</td>
</tr>
<tr>
<td>1</td>
<td>White, Hartupee, and Co.</td>
<td>Corner of First and Short Street</td>
<td>Established in 1847 as White, Hartupee &amp; Co. (Thurston 1888). They would build a large engine and machine works at the corner of First and Short Street, and this firm was soon be succeeded by the better known A. Hartupee &amp; Co.</td>
<td>1847-1850s</td>
</tr>
<tr>
<td>1</td>
<td>Slack &amp; Shorbs</td>
<td>44 Water Street</td>
<td>Boat and/or steamboat builders. May have worked at the G.W. Coffin yard or independent yard just slightly to the east. (relatively the same plot of land)</td>
<td>1850s</td>
</tr>
<tr>
<td>1</td>
<td>G.W. Coffin Steamboat Yard</td>
<td>49 Water Street</td>
<td>Joseph Shivenderman, and Samuel Vandegriff would be employed in this same spot in the 1850s and 1860s possibly for the G.W. Coffin steamboat yard.</td>
<td>1850s-1860s</td>
</tr>
<tr>
<td>n/a</td>
<td>1777 Yard</td>
<td>Near a sawmill 14 miles above Fort Pitt above Turtle Creek and between that and the Youghiogheny</td>
<td>On 2-23-1777, “fourteen carpenters and sawyers arrived at Fort Pitt from Philadelphia and were set at work on the Monongahela, fourteen mile above the Fort, near a saw mill. They built thirty large bateaux, forty feet long, nine feet wide and thirty-two inches deep, which were intended to transport troops.”</td>
<td>1770s</td>
</tr>
</tbody>
</table>
Table 3: List of Watercraft Construction Facility Sites (Map Key), continued.

<table>
<thead>
<tr>
<th>ID#</th>
<th>Name</th>
<th>Location</th>
<th>Description</th>
<th>Approx. Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>John Ormsby's yard</td>
<td>Water Street and the corner of Chancery Lane</td>
<td>Small boatyard operation. Evidence shows that the house and boatyard were rented to Jacob Haymaker in 1783 who immediately began building boats, but the property was up for rent again in 1788.</td>
<td>1780s</td>
</tr>
<tr>
<td>3</td>
<td>Fort Fayette</td>
<td>Straddled Pennsylvania Avenue between Ninth Street and Garrison Way</td>
<td>Built the Lewis and Clark Keelboat in 1803. Supplied much of the naval hardware and ammunition for Commodore Perry on the Great Lakes in 1813. Possibly was the builder of the President Adams and Senator Ross. Launched the <em>Dean</em>, one of the first merchant ship built in Pittsburgh, in 1803.</td>
<td>1790-1813</td>
</tr>
<tr>
<td>4</td>
<td>Tarascon Shipyard</td>
<td>Just above a rivulet on the mouth of Suke’s Run on the Monongahela near the end of Try Street just under Boyd’s Hill where the “Pan Handle” Railroad Bridge now crosses the stream</td>
<td>The largest wooden shipyard ever built in Pittsburgh was the Tarascon yard and was run by Pittsburgh’s most prominent ship contractors, the firm of Tarascon Brothers and James Berthoud and Company. Tarascon, his brother, John A. Anthony, and James Berthoud formed the firm of John A. Tarascon Brothers, James Berthoud, &amp; Co in Pittsburgh where they established a whole sale and retail store and warehouse, a shipyard, a sail and rigging loft, an anchor smith shop, a block manufactory, and all other things needed to build ocean worthy vessels. This shipyard was built on the land of William Greenough and would gain a reputation as the “best equipped shipyard in the first decade of the nineteenth century.” The yard would produce many schooners, brigs, and a variety of other ships.</td>
<td>1801-1805(6)</td>
</tr>
</tbody>
</table>
Table 3. List of Watercraft Construction Facility Sites (Map Key), continued.

<table>
<thead>
<tr>
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<th>Location</th>
<th>Description</th>
<th>Apprx. Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Eagle Foundry, Jackson and Eagle, Kingsland &amp; Lightner</td>
<td>Directly on top of Old Tarascon</td>
<td>Anthony Beelen bought this property between 1806 and 1809 and established Eagle Foundry for the building of the New Orleans. This site would later be absorbed by the Jackson and Eagle Foundry which would eventually be absorbed by the Pittsburgh Foundry under Kingsland &amp; Lightner in 1830.</td>
<td>1809-1830s</td>
</tr>
<tr>
<td>5</td>
<td>Pittsburgh Foundry; McClurg and Co; McClurg and McKnight; Alexander McClurg &amp; Co; Kingsland &amp; Lighter</td>
<td>Smithfield Ave and Fifth Street</td>
<td>This was the first iron foundry in Pittsburgh and was opened in 1803-04 by Joseph McClurg along with Joseph Smith, and John Gormley (Craig 1851:276). It was at this foundry that many of the ammunitions, cannons, and supplies were made for both Commodore Perry’s fleet on Lake Erie and General Andrew Jackson’s troops at New Orleans (Killikelly 1906:130). McClurg continued the business with his son, Alexander, until 1814 when it became owned and operated by McClurg and McKnight and then by Alexander McClurg &amp; Co until 1830 when it was purchased by Kingsland &amp; Lighter who absorbed the Jackson and Eagle Foundry into Pittsburgh Foundry.</td>
<td>1803-1830s</td>
</tr>
<tr>
<td>6</td>
<td>Robinson and Minis</td>
<td>3 Wood Street near Water</td>
<td>Built the Valley Forge.</td>
<td>1810s-1820s</td>
</tr>
<tr>
<td>ID#</td>
<td>Name</td>
<td>Location</td>
<td>Description</td>
<td>Apprx. Period</td>
</tr>
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<td>-----</td>
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<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>7</td>
<td>Messr. Frisbee</td>
<td>On the Point</td>
<td>The Frisbee yard was operated by Ephraim and Samuel Frisbee where they built a number of steamboats, including the 250 Napoleon. This yard was no longer on the map in 1837 as the Messrs. Frisbee moved their yard two miles down the Ohio at the head of Adam’s Island, (Harris 1837:280), but there is another steamboat and lumber yard that takes over operation on this site in the 1840s.</td>
<td>1830s</td>
</tr>
<tr>
<td>7</td>
<td>Thomas Boland's yard</td>
<td>On Point Alley</td>
<td>Either same yard or adjacent to Point boatyard.</td>
<td>1840s</td>
</tr>
<tr>
<td>7</td>
<td>Amberson, S. &amp; Co.</td>
<td>Described as being located on Water and Point</td>
<td></td>
<td>1840s</td>
</tr>
<tr>
<td>8</td>
<td>Point Boatyard (Richard Drummond) (Shiras and Cromwell)</td>
<td>On the Point</td>
<td>On the site of Fort Duquesne and may have built boats in the 1750s.</td>
<td>1810s-1820s</td>
</tr>
<tr>
<td>8</td>
<td>Point Steamboat Company</td>
<td>Penn and Water</td>
<td></td>
<td>1820s-1830s</td>
</tr>
<tr>
<td>8</td>
<td>Robert Walker's</td>
<td>Corner of Water and Pennsylvania Ave</td>
<td></td>
<td>1840s</td>
</tr>
<tr>
<td>9</td>
<td>Neil McNaughton's Boatyard</td>
<td>Corner of Liberty and Water</td>
<td></td>
<td>1840s</td>
</tr>
<tr>
<td>10</td>
<td>Jelly H &amp; J Merchants</td>
<td>Corner of Market and Diamond</td>
<td></td>
<td>1810s-1820s</td>
</tr>
<tr>
<td>11</td>
<td>Stackhouse and Thompson</td>
<td>Liberty and Second</td>
<td>Their engine shop was built next door at Liberty and Third.</td>
<td>1830s</td>
</tr>
<tr>
<td>11</td>
<td>Stackhouse and Tomlinson</td>
<td>Liberty and Second, Liberty and First, Front and Short</td>
<td>Multiple location descriptions all in the same general vicinity.</td>
<td>1830s</td>
</tr>
<tr>
<td>12</td>
<td>Stackhouse and Tomlinson</td>
<td>Corner of Penn and Bell's Alley</td>
<td></td>
<td>1830s</td>
</tr>
</tbody>
</table>
Table 3. List of Watercraft Construction Facility Sites (Map Key), continued.

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Whiting and Stackpole</td>
<td>Corner of Penn Street and Cecil Avenue</td>
<td><em>General Jackson</em> and <em>James Madison</em> were built here.</td>
<td>1820s-1820s</td>
</tr>
<tr>
<td>14</td>
<td>J. Tomlinson &amp; Co. (Vulcan Works)</td>
<td>Corner of Duquesne Way and Cecil Avenue</td>
<td>1841 Joseph Tomlinson erected Vulcan works which would later merge with Stackhouse and Thompson to form J. Tomlinson and Co. (Thurston 1888). The <em>Michigan (Wolverine)</em> was built at this yard, but there are conflicting sources as to whether it was J. Tomlinson &amp; Co or Stackhouse and Tomlinson at the time of its construction.</td>
<td>1840s-1860s</td>
</tr>
<tr>
<td>n/a</td>
<td>BRM Morrison</td>
<td>Herr's Island</td>
<td>Unknown details.</td>
<td>1840s</td>
</tr>
<tr>
<td>15</td>
<td>Robert Wightman’s Yard</td>
<td>Fourth and Duquesne</td>
<td>Built a machine shop and engine shop in 1840 to which James Rees succeeded in 1854.</td>
<td>1840s</td>
</tr>
<tr>
<td>15</td>
<td>Rees and Thorn Machine Shop; James Rees and Co (Duquesne Engine Works)</td>
<td>Located at Duquesne Way (now Duquesne Boulevard) and Fancourt Street (later Fourth Street and roughly where Stanwix Street is now)</td>
<td>This yard would build river boats, light draft vessels, and marine boilers, and it would also be connected with the construction of the first steel boats.</td>
<td>1855-1930</td>
</tr>
<tr>
<td>16</td>
<td>Louis and Clark Fashionable boat makers</td>
<td>Ferry and Fourth Street</td>
<td></td>
<td>1830s</td>
</tr>
<tr>
<td>17</td>
<td>William Holland’s</td>
<td>Located on Water Street between Grant and Smithfield</td>
<td></td>
<td>1840s</td>
</tr>
<tr>
<td>17</td>
<td>Geo. Vandegriff’s</td>
<td>Located on Water Street between Grant and Smithfield</td>
<td></td>
<td>1840s</td>
</tr>
</tbody>
</table>
Table 3. List of Watercraft Construction Facility Sites (Map Key), continued.

<table>
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<th>Location</th>
<th>Description</th>
<th>Apprx. Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>Robert Young</td>
<td>Foot of 34th Street, South Side</td>
<td>Saw Mill and boatyard.</td>
<td>1880s</td>
</tr>
<tr>
<td>18</td>
<td>Couch &amp; Chilcoat</td>
<td>Foot of 36th</td>
<td>Present site</td>
<td>1870s</td>
</tr>
<tr>
<td>n/a</td>
<td>Reed I.A.</td>
<td>2 Mulberry Ave</td>
<td></td>
<td>1870s</td>
</tr>
<tr>
<td>19</td>
<td>G.O. Fawcett</td>
<td>Second Ave at foot of Brady</td>
<td>Barge yard</td>
<td>1870s</td>
</tr>
<tr>
<td>20</td>
<td>Gullet and Applegate</td>
<td>Marbury and Duquesne Way</td>
<td></td>
<td>1850s</td>
</tr>
<tr>
<td>20</td>
<td>Eshelman, Bunton and Co.</td>
<td>Marbury and Duquesne Way</td>
<td>Steamboat builders and house joiners.</td>
<td>1860s</td>
</tr>
<tr>
<td>21</td>
<td>Scaife, Atkinson, and Okely</td>
<td>Located on First Street between Wood and Market</td>
<td>Steamboat yard. This yard may be the same one as the earlier Robinson and Minis.</td>
<td>1850s</td>
</tr>
<tr>
<td>22</td>
<td>Snowden &amp; Mason</td>
<td>Across the Monongahela from downtown Pittsburgh 300 yards from Lyon, Shorb, &amp; Co., their iron supplier</td>
<td>Snowden and Mason were formed in the early 1860s when John Snowden and Albert Mason joined together t to bid on the monitor Manayunk (Roberts 2002). They had boatyard facilities at Brownsville, but they were inadequate, as only wooden vessels had been built there previously, and the locks on the Monongahela were too small to manage the passage of steam vessels. After winning the bid they rented land on the Monongahela directly across from Pittsburgh where they built their shipyard/gunboat yard and shop.</td>
<td>1860s</td>
</tr>
<tr>
<td>n/a</td>
<td>Schultz Bridge Company and Vulcan Forge</td>
<td>McKees Rocks</td>
<td>Built mostly tow-barges. One of the last watercraft facilities in the vicinity of Pittsburgh.</td>
<td>1880s-20th century</td>
</tr>
</tbody>
</table>
1. Fort Pitt Yard (later O’Hara’s)

For over a century this location functioned as a watercraft construction facility (Figure 88). Facilities on this lot began with Fort Pitt’s original boatyard beginning operation in the early 1760s, or possibly a few years earlier. The earliest 1764 maps show it only as south of Liberty and east of Ferry streets. It was soon replaced by General James O’Hara’s boatyard by the 1780s-1790s, but it is difficult to say whether it was the exact same yard or merely built in roughly the same location. Seeing as O’Hara was the quartermaster of Fort Pitt beginning in the early 1780s, the former is more likely. The location for O’Hara’s Yard from the 1795 map, (Figure 14), is between First Street and Redoubt Alley on the water.
Pittsburgh Steam Engine Company later occupied this site for watercraft construction, among other industrial pursuits, from the 1810s until the 1830s and records described their location as on the corner of Redoubt Alley and Front Street, below Ferry. These descriptions all describe the same general lot. White, Hartupee, and Co, later A. Hartupee and Company, occupied this location for steamboat building in the late 1840s and 1850s, but Slack & Shorbs, and G.W. Coffin Steamboat yard were also located on this land in the 1850s and 1860s, so it is unclear whether these were different operations, or related operations working together. Slack & Shorbs may have worked out of the G.W. Coffin yard and/or A. Hartupee and Co. may have launched their vessels out of the G.W. Coffin yard. However, this is merely speculation.

Today the facility for this site, most likely located near the water, is occupied by a large office building for First Niagara Bank and the Pennsylvania Department of State. This building has a small parking lot built under it, but based on the photographs, which can be found in Appendix H, and also the US Army Corps of Engineer’s reports from Cowin (1985); it appears this structure was built on top of the fill that is roughly 12 feet or more over the original shoreline. It is unclear as to exactly how far into this fill the parking garage penetrates. According to local residents, the fill was added in the 1920s-1930s, prior to this building being constructed, and was added to prevent flooding from the Monongahela. Prior to this fill being added, as seen in figure 84, there were long, one or two story buildings built on top of this area. Although there is little to no way to confirm this, it is unlikely that these earlier buildings had basements as the Monongahela as it would have made it very difficult to keep such sub-subterranean infrastructure dry or usable, thus rendering it impractical.

Based on visual inspection it does not appear this building’s foundation penetrated much deeper into the ground than the parking garage beneath it, and there was no clear indication from
within the garage as to whether there was any type of basement beneath it. The area in front of the building, closer to the shoreline, is paved with both ground level and raised roadways, not causing too great of an impact on the subsoil, which may well have preserved any launching ways. There does appear to be a moderate-high possibility for significant archaeological material from this site to be preserved beneath it. That said, the size of the building, and its location in downtown Pittsburgh, in a heavily developed area, indicates a relatively low probability of any surviving resources being accessible for archaeological research in the foreseeable future.

2. John Ormsby’s Yard

Figure 89. Site #2.

Site #2, Johns Ormsby’s boatyard, is located a block or two to the east of what was Fort Pitt’s boatyard, depending on the facility’s exact locations, (Figure 89). This boatyard was the second documented boatyard located within downtown Pittsburgh, and records indicated it was in
operation during the 1780s at the corner of Water Street and Chancery Way. Today this site is occupied by one of either two buildings. The western building is the white building seen above, roughly 20 stories tall and occupied presently by PNC, CBS Corporation, Dennis Spyra and Associates, and a number of other companies.

The above mentioned structure, and the black and tan one located just to the east across Chancery Way, indicate similar preservation possibilities as the original Fort Pitt Yard. These buildings both appear to have a shallow basement and foundation likely not penetrating much deeper than the 12 foot layer of fill. Also, the land in front, where the launching way would have been, appears to be undisturbed beneath the fill as it too is covered by both ground level and raised roads. This area was also covered by long one or two story buildings, seen in Figure 84, which do not appear to have any type of substantial foundation. However, Ormsby’s boatyard appeared to be in use for less than a decade on and off, and even if the ground beneath this structure is undisturbed it would be unlikely that much, if any, archaeological remains of a watercraft construction facility are present today as the yard would unlikely have had much fixed infrastructure. Therefore, the archaeological potential of this site appears to be a low-moderate chance for preservation of remaining resources and also a low likelihood for research accessibility in the near future.
3. Fort Fayette’s Yard

Site #3 represents what was the location of Fort Fayette and its associated boatyard, which straddled Pennsylvania Avenue between Ninth Street and Garrison Way (Figure 90). There is no indication as to whether vessels were constructed within the Fort’s boundaries or outside of it, closer to the Allegheny, which is the far more likely probability. The image above is centered on the location of the Fort itself so the likely location of the watercraft facility would be centered toward the upper portion of the image. Today, this location is covered by a half dozen medium sized buildings varying six to 12 stories high. Despite efforts to find information regarding the presence of basements on these buildings or the depth of their foundations, it is unclear as to the level of disturbance these structures have caused beneath the fill. Limitations on gaining this data resulted from a lack of documentary evidence available discussing it, the absence of knowledge
of these businesses employees, and/or a lack of accessibility to the buildings themselves at the time of onsite inspection. This trend was prevalent throughout many of the buildings in Pittsburgh known to be located on top of former watercraft construction facilities. However, should these structures not have deep impacting foundations or substructures, which simply be looking at them up close do not appear to, the US Army Corps reports that the north side of Pittsburgh was covered with the same protective fill as the southern side of Pittsburgh. This would indicate a moderate to high likelihood for resource preservation. Previous pre-fill buildings on the site may appear to be more substantial than those on the previous sites, but they do appear to be of equal or smaller size than those currently present (Figure 84). However, it too has a low probability for near future archaeological accessibility based on the wide extent of development on the immediate area.

4. Tarascon Yard (Eagle Foundry)

Figure 91. Site #4.
Site #4 is undoubtedly the most well-known of the early nineteenth century yards in Pittsburgh (Figure 91). It represents the Tarascon yard, and later, Eagle Foundry, which was located just above a rivulet on the mouth of Suke’s Run on the Monongahela near the end of Try Street, just under Boyd’s Hill, where the Pan Handle railroad Bridge now crosses the stream. This yard constructed wooden ocean-bound sailing vessels from 1801 until 1805(6). It was then purchased by Anthony Beelen, between 1806 and 1809, who quickly built Eagle Foundry, where the *New Orleans* was constructed.

Today, the site is occupied by a flat parking lot on the western side of the lot and a five story parking garage on the eastern side, which does not have a basement or lower level parking structure. Roughly half of the suspected area is now under the garage while roughly 40% is under pavement from the road, sidewalks, and parking lot. The remaining 10% is made up of small plots of grassy land with small shrubs and trees. This site appears to have little subsoil disturbance which would extend past the point of fill, and it is high probability that the material remains from this watercraft construction site are still present. The presence of the parking garage makes that area of the site likely inaccessible for the foreseeable future, but the remainder of the site beneath the pavement may provide the possibility for archaeological excavations should the area need any type of redeveloping in the near future. There is also the possibility that the grassy patches, located closer to the shoreline, may contain archaeological material from this site, and although it is not a large area, there is the present potential for at least some level of archaeological research to be performed. Overall this site has a moderate chance for accessibility in the foreseeable future.
5. Pittsburgh Foundry

Site #5 is located on one of the corners of Fifth and Smithfield streets (Figure 92). This site was once the original Pittsburgh Foundry built in 1802(3). There is a very low to no potential for archaeological features to be present under this site as it lies in the center of downtown Pittsburgh. Additionally, such sites would unlikely ever be accessible (very low potential) so long as Pittsburgh remains an inhabitable city. All four buildings surrounding this site have either deep penetrating basements or sub-structure parking garages. Additionally, construction work occurring only two blocks to the southwest on similar type buildings have indicated that the soils from these buildings are all likely disturbed to an extent close to or deeper than 30 feet (Figure 93, 94). Images of the near adjacent construction site can be found on the following page.
Figure 93. Adjacent construction site facing southwest.

Figure 94. Adjacent construction site facing southeast.
6. Robinson and Minis

Site #6 represents Robinson and Minis (Figure 95), best known for building the Valley Forge. This site was in operation from the 1810s to the 1820s, and it is located on Wood Street near the water. It is not clear which side of the road it was on, but today this site is either occupied by the smaller portion of the West Penn Building, occupied by ICM School of business and located toward the east, or Conestoga Hall on the western side of the road. On-site inspection and photographs indicate that the building’s first floor begins at least 12 feet over what was the original land surface and does not appear to penetrate much, if any, deeper than that. Photographs for this site show the structure and road from the opposite side of the highway.
(Figure A-20). The base of the road sits close to the original land surface level approximately a dozen or so feet below the building’s first floors, as seen in the site #6 photographs located in Appendix H. Like much of the archaeological resources in downtown Pittsburgh along the wharf, this site has a moderate-high potential for preservation under the protective fill, depending on the precise depth of basement/foundation, but it also appears to have a low potential for near future accessibility for research so long as Pittsburgh remains a heavily inhabited city.

7. Fort Duquesne (Frisbee Yard)

Site #7, located, at the very head of the Pittsburgh District now sits Point State Park (Figure 96). This site has been the location to numerous ship and boatbuilding yards over the years as well as a few military forts and trading posts. The US Army Corps of engineers has recommended that this site be set aside as an archaeological preserve, indicating that there was a
12 foot layer of protective fill covering the point and the associated military and boatyard sites. The Pittsburgh Point underwent a steady rate of change during the nineteenth century from residential/commercial to commercial/industrial activity (Cowin 1985:369).

Although documentary evidence is lacking, it is likely that this site was the earliest boatbuilding site in Pittsburgh at what was Fort Duquesne in the 1750s. It was owned by well-known boat builders and former military officers Isaac Craig and Stephen Bayard in the early nineteenth century, but it is not clear whether boats were being built on site at the time. This site was confirmed to be the location of several watercraft construction facilities officially beginning in the second decade of the nineteenth century and remaining in use by different yards throughout the mid-nineteenth. This boatyard was first documented as that of Messrs. Frisbee in the 1830s and may have been owned by Thomas Boland in the early 1840s who was described as having a yard on Point Alley. The Frisbee yard was likely in operation earlier than the 1830s, as Ephraim Frisbee was living in very close proximity to the yard in the 1810s and his brother, Samuel was listed as living with him by 1826 between Liberty, Penn, Marbury, and the water (Cowin 1985:86, 87). It is also possible that they were working at Point Boatyard before opening their own yard in the near vicinity. Amberson S. & Co also had a yard described as being located on Water and Point at some point in the 1840s, and their yard was either that of Messrs. Frisbee or Point Boatyard (Figure 96).

As already indicated in the introduction to this analysis section, nineteenth century sites on the Point are likely preserved under 12 feet of fill, extending from the point down both the Allegheny and Monongahela, and this site is further protected by the fact that the area is now a state park. Archaeological features in this area are likely among the only areas in what was historic downtown Pittsburgh that remain undisturbed from heavy industrial development despite
small structures existing on this location prior to the 1920-30s (Figure 84). There is a fountain at the point in roughly the same spot the boatyard would likely have been, but this fountain is raised above where the original land would have been and likely acts to further preserve the site beneath it. However, the fountain and its surrounding land are currently covered in concrete and not accessible at this time. This site has a very high potential for preservation with a low-moderate rating for near future accessibility.

8. Point Boatyard

![Figure 97. Site #8.](image)

Site #8 was the location of Point Boatyard and later Point Steamboat Company located at the intersection of Penn Ave. and Water Street on the water (Figure 97). This yard was originally owned by Richard Drummond in the 1810s, and it later became Point Steamboat Yard in the 1830s. Robert Walker was also described as having a yard on the corner of Water and Penn; so it would appear he had owned this yard in the 1840s.
This site appears to be preserved fully intact under the fill as the photographs show several feet of fill along its shoreline covered by a sidewalk on the southern portion and no recent construction activity that would have disturbed the soil more than a few feet (Figures A-25, A-26). Although, as stated for sites #1 and #7, this site also once had fairly short pre-twentieth structures, but they do not appear to have made a significantly deep impact into the sub-soil based on their size. The north portion of this site had is currently a park covered with grass and small trees and would be accessible for immediate shipyard excavations. This site likely represents the most preserved and accessible site out of all downtown Pittsburgh’s historic watercraft construction facilities. This site receives a moderate-high rating for preservation and a high rating for accessibility.

9. Neil McNaughton’s Yard
Site #9 was the location of Neil McNaughton’s boatyard (Figure 98), which was definitely in operation by the 1840s. Its location was described as being on the corner of Liberty and Water streets. Today, this site lies under a major highway intersection of overpasses. These overpasses were built on top of the 12 or so feet of fill and do not appear to disturb the subsoil more than a few feet with the possible exception of the pylons used to support the highway, which may penetrate deeper but do not occupy large portion of the site. As previously discussed with other shoreline sites in downtown Pittsburgh, there were fairly short buildings occupying these sites prior to the addition of fill, but they unlikely penetrated deep enough into the sub-soil to have significantly damaged these archaeological resources. That said without actually excavating at least one of these sites there is no way to confirm this speculation (Figure 83). Currently, as seen is the photographs attached in Appendix H under site #9, the surface appears to be covered with pavement and brickwork (Figure A-27, A-28), which would likely have assisted in preserving the material remains beneath. That said, until the advent of flying cars or a major restructuring of what constitutes Pittsburgh’s highway system, it is a low probability that this site will be available for research. Although, much of it would be available for immediate research now with approval to remove, and funding to replace, the substantial brickwork beneath the overpasses. In all, this site receives a moderate-high change for resource preservation and a low-moderate chance for current or near future accessibility.
10. Jelly H. & J Merchants

Site #10 was once the location of Jelly H & J Merchants located at the corner of Market and Diamond streets (Figure 99). This facility was in operation during the 1810s and 1820s, likely producing steamboats and associated components. It was once the location of a mid-nineteenth century courthouse, and the location of the late nineteenth century Market Hall and Market Hall Armory (Figure 100). It is unclear the extent of these structures’ foundations or whether they had basements, but as with more nineteenth century sites in Pittsburgh, they were not very tall structures, and the structures also did not cover the entire area. Today, the site is likely preserved under Market Square, what might be considered a concrete park, fully paved with concrete and brick work, with small trees planted in it and surrounded by numerous
buildings occupied by Diamond Market Bar and Grill, Dunkin Donuts, the Oyster House, a sub shop, and several other businesses. As seen in the photographs (Figures A-30-A-34), all four corners of this intersection have the same level of preservation regardless of which one the yard was built on. Depending upon the unknown factor of if there were basements, and the extent of them on the pre-twentieth century structures, this site has a moderate potential for resource preservation. Any sub-soil disturbance would have been caused prior to the twentieth century. Although the site is not accessible today, it does have a moderate-high accessibility rating.

Figure 100. 1897 intersection of Market and Diamond (Sanborn Map #7) (Sanborn 1893).
Site #11 was once the location of Stackhouse and Thompson, later Stackhouse and Tomlinson (Figure 101). This facility was operational by the 1830s, maybe sooner, and produced some of the best known Pittsburgh steamboats, particularly those for the military. This site was described by several different sources as being located at Liberty and Second, Liberty and First, and Front and Short, with the associated engine shop for their vessels located next door at Liberty and Third. Today, the site of this facility is now occupied by the Pittsburgh Post-Gazette and their associated parking lot. This building is only five stories tall and has no basement. Pre-twentieth century buildings on this site were relatively short structures unlikely with deep foundations. It is high probability that the features of this steamboat yard are fully preserved beneath the protective fill, which appears to be undisturbed at this site. The southern portion of
the site is covered by a parking lot which would be more accessible for research, but the main portion has a low probability of being accessible in the near future.

12. Stackhouse and Tomlinson

Figure 102. Site #12.

A map in Cowin (1985) (Figure 64) shows Stackhouse and Tomlinson, site #12, located between Penn, Bell’s Alley, Brewery Alley, and Marbury (Cowin 1985:89). It is not clear, but this site may be another foundry operated by the same company, or it is possible that this location is the same as the original associated engine foundry for Stackhouse and Thompson located at what was Liberty and Third, prior to Bell’s Alley and Brewery Alley being created in the 1820s. If this is the case, then this engine shop likely remained in use under Stackhouse and
Tomlinson. While the exact location is unclear, as the maps indicate only the block a business was on and not its position, the southern majority of the site is covered by the 25 story Wyndham Grand Hotel (Figure 102). This building does not appear to have a basement but may have a substantial foundation based on its height. It is possible that the site is still preserved under the structure but seeing as it is not on the water there would unlikely be any shipyard components present on this site and certainly not if it was only the engine foundry. Also, as the building is located in a heavily developed area of downtown Pittsburgh, it is unlikely that the previous statement could verified anytime soon through the employment of archaeological research. This site has a low-moderate chance for significant preserved resources and a very low chance for future accessibility.

13. Whiting and Stackpole

![Site #13](image)

Figure 103. Site #13.
Site #13 is the site is that of Whiting & Stackpole (Figure 103). They were a company known to produce steamboats in the 1810s and 1820s, and they were located on the corner of Duquesne Way and Cecil Avenue. This company is known for producing vessels such as the *General Jackson* and the *James Madison*. Today, the site is roughly the location of either a six story building occupied by Rite Aid to the western side of Cecil and Penn, or an eight story building occupied by FU Lai Chinese Restaurant and other businesses to the eastern side of Cecil and Penn. To speculate, these buildings do not likely have deep foundations based on their wide bases and relatively small to medium sized stature and employees in both buildings were unsure if they had any basements at all. It appears more than likely that any archaeological materials from this watercraft facility are likely preserved beneath the fill but again, like in much of Pittsburgh, will unlikely be available for research anytime soon. This site has a high potential for preservation and a low potential for near future accessibility.

14. J. Tomlinson *(Vulcan Works)*
Site #14 was once the site of J. Tomlinson & Company’s Vulcan Works located at Duquesne Way and Cecil Avenue (Figure 104). Either this location, or the other ones listed for Stackhouse and Tomlinson, is where the *Michigan* was built. It is likely that this forge was where much of the hull was assembled and where the vessel was launched, based on its much closer proximity to the water. The other facilities were likely producing the other various components needed for this vessel. Today, the eastern corner of Duquesne and Cecil is occupied by a small parking garage with no substructure, and the western corner is occupied by what was once a carriage factory in the 1890s (Sanborn 1893) and remains in operation for other purposes today. This building does not appear to have a basement, but the lack of public access to this facility prevented confirmation. It is more likely than not that the archaeological materials from this watercraft construction site are still preserved beneath the protective fill as this is another site located near the water on the northern side of Pittsburgh. If the building was on the factory side, as this factory is over a century old, it is possible that in the coming decades the site would be accessible for research if and when a new structure is going to be built. Therefore, this site has a moderate-high potential for preserved resources and a moderate-high potential for near future site accessibility.
Site #15 is the location of what was originally Robert Wightman’s Machine shop in the 1840s and later became the better known James Rees and Son’s Duquesne Works (Figure 105). This facility produced watercraft for close to a century, closing in the 1930s. This was also the last major shipyard to operate in downtown Pittsburgh. Today, this site is the location of an approximately 10 story parking garage with an additional 10 stories of offices built above. This building has no basement, has a wide base, and isn’t very tall, and too speculate based on this, it unlikely has too substantial of a foundation. It seems to be built largely or entirely on top of the protective fill. Based on the present circumstances and the fact that this facility was in operation for so long producing metal parts, there is a high potential for substantial archaeological
materials being well preserved beneath the fill but a low-moderate chance for near future accessibly of where the main structure would have been. However, there is a moderate-high chance for accessibly for features located along the shoreline where a road exists today.

16. Lewis & Clark Fashionable Boat makers

![Site #16 Map]

Figure 106. Site #16.

The location of site #16 (Figure 106) was once the site of Lewis and Clark Fashionable Boat Makers described as being located on Ferry and Fourth Street. It was known to be producing boats during the 1840s. Like most early address descriptions it is unclear which corner of the road this facility was located on. On the western side of what is now Stanwix Street, as well as the northeastern corner of the intersection, there are large skyscrapers, which
undoubtedly have basements with even deeper penetrating foundations to support the height, as seen with the earlier examples from the construction site. If the facility was on either of these locations there would unlikely be much, if any, surviving evidence of archaeological material. However, if it was on the southeastern corner, as it most likely was, then it is likely well preserved under the parking garage, that is also the location of Gold’s Gym, and has no basement. The relatively short height, in relation to other buildings in downtown Pittsburgh, likely indicates a shallower foundation. This site has an overall low-moderate likelihood of preservation, depending on unknown circumstances, and a low chance of near future accessibility.

17. William Holland, Geo. Vandegriff’s

Figure 107. Site #17.
Site #17 was the location, or locations, of two known 1840s boat builders (Figure 107). It is not clear whether they were working out of the same yard, or had different adjacent yards, but both their locations were described as on the water between Grant and Smithfield streets. Presently, this site is located under what is now McCullough Electric Company, surrounding small to medium sized buildings, and approximately 1/3 of the site is made up of two small parking lots. Although they were not open to confirm, their small size and close proximity to the Monongahela likely indicates they do not have a basement or a substantial substructure. These facilities appear to have little impact on the subsoil and mostly likely do not penetrate beneath the layer of protective fill along the river. The site is not immediately accessible for research, although should this lot be redeveloped in the future, it would more than likely reveal boatyard archaeological resources. Overall this site has a high potential for preservation and a moderate-high potential for near future accessibility.
Site #18 was the location of Couch & Chilcoat (Figure 108). Records do not specify what kinds of vessels this shop was producing; however, its location so far from the downtown area indicates that it was unlikely producing small wooden boats for retail in the late nineteenth century as it would have been difficult to attract sufficient business to make smaller vessel production profitable. Also, the fact that it is presently a Pittsburgh Foundry and Machine shop would lead one to speculate as to it producing steamboats or tow-barges on this location, as a number of foundries known to produce such vessels were absorbed into this company. It is possible that this building is the original building used by this company as the satellite images indicate a fairly old structure. This shop was opened in 1901, but records do not indicate whether that is when the building was constructed or if the company had taken over this building from Couch & Chilcoat. This site appears to be fully intact, and the small yard surrounding the facility would be available for immediate archaeological research. That said this site has a high potential for archaeological resources and a high potential for current or near future accessibility.
Site #19 was the location of G.O. Fawcett (Figure 109). It was in operation during the 1870s and was a documented barge yard. Today, the site is located under a raised highway, and the majority of the site is now used as a sand and gravel storage yard for construction companies. There are only a few very small single story structures on the site, which do not penetrate into the subsoil, and although there are a few pylons for the highway overpass, they would have only disturbed a small portion of the site, if any at all. This site appears to be well preserved and near fully intact. It would be available for immediate archaeological research should the company decide to adjust its placement of the sand, dirt, or gravel piles. Overall this site has a very high preservation potential and a very high potential for immediate or very near future accessibility.
Site was the location of Gullet, Applegate, and Co. during the 1840s and was later the location of Eshelman, Bunton, and Co. during the 1850s. These companies were both known to produce steamboats. The site is located at the intersection of a significant system of highway overpasses similar to that seen in site #9. Much of the site closer to the water is covered with pavement and brickwork while more than half of the site is covered with grass. This is because it is located on the edges of Point State Park. The foundation and pylons for the highway may have disturbed roughly 10 to 20 percent of the site, as the foundations appear to be wide and built on top of what was the original surface before being surrounded by fill. This site has a high potential for preserved resources under the protective fill, and more than half of the area that the structure would have been located on or near is presently accessible for immediate research, while the remainder would be inaccessible until a major restructuring of Pittsburgh highway system takes place. Based on this it received a moderate overall rating for accessibility.
Site #21, located somewhere on First between Wood and Market streets, was the steamboat yard of Scaife, Atkinson, and Okely. This yard was in operation during the 1850s. It is not clear if this yard was on the north or south side of First Street but probably was closer to the water. Today, the site is composed of numerous small buildings located along the water. These buildings likely do not have basements due to the high likelihood of flooding, but this was not able to be confirmed. Also, their wide bases and relatively short heights indicate they do not likely have deep foundations. The buildings on the north side of First Street are slightly larger, and it is unknown whether they have any basement or substructure that would have penetrated the protective fill layer. If the building was located nearer to the water, as it is suspected it would be, then the site has a high potential for preserved resources under the road system and these smaller structures, but it remains inaccessible to archaeological excavation as of today and has a low-moderate chance for near future associability overall.
22. Snowden & Mason

Figure 112. Site # 22.

Site # 22 is the last Pittsburgh watercraft construction site evaluated in this research. It was the location of Snowden and Mason (Figure 112), which was one of the most well-known shipyards in Pittsburgh’s history. This yard was in operation during the 1860s and was built specifically to fulfill government contracts for steamboat ironclads to be used during the American Civil War. Today, this site is the location of GSP Consulting Corporation and several small bars and restaurants. These buildings are all very flat and likely have little foundation.

After Snowden and Mason this property was taken over by Sligo Rolling Mills which may likely have been the same facility to exist prior to the current structures. None of these sites have basements according to their employees, and although documentation was not found to indicate a protective layer of fill over this area, the shoreline does appear to be approximately 10
feet or so higher than what would have naturally occurred there. This indicates a high potential for archaeological resources still being preserved beneath these structures. This site also, however, has a low potential for near future accessibility.

Figure 113. Sligo Rolling Mills (former location of Snowden & Mason).
CHAPTER XII

ANALYSIS

As discussed in the previous section, each yard was individually rated in terms of both preservation potential and current or near future accessibility for archaeological research. The ratings for both of these categories were given on a scale that varied from very low/no potential to very high potential. With regards to preservation, the sizes of current and nineteenth century buildings and depths of their substructures, where possible, were taken into consideration. With regards to their research accessibility, factors such as the type of infrastructure covering the site (roads, bridges, buildings, parking lots, etc.), the size of these structures, the age of these structures, and the likelihood for these areas to be open and clear for excavation work in the “foreseeable future” were all taken into consideration. The term “foreseeable future” was used very arbitrarily in this evaluation, roughly referring to within the next century or so.

Most of the former watercraft facilities in downtown Pittsburgh, and in most historic cities for that matter, currently reside under substantial urban development. This has caused several of the sites to have lost some or much of their archaeological potential and the majority of the sites to become inaccessible for the foreseeable future. Only sites #8, #18, and #19 are primarily accessible and preserved enough for current research today, and the only site to have completely lost its archaeological potential is site #5. The remainder of these sites fall between these ratings, as shown in Table 4. Of the 22 sites examined, one received a very low rating for preservation, three were given a low-moderate rating, one was given a moderate rating, six were given moderate-high ratings, nine were given high ratings, and two were given very high ratings (Figure 114). As for accessibility, two were deemed to have very low potential, eight received low ratings, four received low-moderate ratings, two were given moderate rating, three received
moderate-high ratings, two got high ratings, and one got a very high rating for overall current or near future accessibility (Figure 115). Without detailed blueprints for each modern building occupying these sites, exact depths of the fill on each lot, and an extensive knowledge of the nineteenth century landscape and previous structures occupying these areas, it is difficult or impossible to say with certainty as to the preservation of these sites. Only with an opportunity to excavate these areas will the survival of watercraft construction facility features become known. To date, no archaeological work performed in Pittsburgh has revealed any boat or shipyard components for any of the sites evaluated in this research.

Table 4. Site Preservation and Accessibility Rating

<table>
<thead>
<tr>
<th>Site Number</th>
<th>Site Name</th>
<th>Preservation Potential</th>
<th>Current or near future Accessibility</th>
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<tr>
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<td>Fort Pitt</td>
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</tr>
<tr>
<td>2</td>
<td>Ormsby's</td>
<td>low-moderate</td>
<td>low</td>
</tr>
<tr>
<td>3</td>
<td>Fort Fayette</td>
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<td>5</td>
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<td>very low</td>
</tr>
<tr>
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<td>Robinson and Minis</td>
<td>moderate-high</td>
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<td>7</td>
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<td>McNaughton's</td>
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<td>10</td>
<td>Jelly H. &amp; J. Merchants</td>
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</tr>
<tr>
<td>11</td>
<td>Stackhouse &amp; Thompson</td>
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<td>12</td>
<td>Stackhouse &amp; Tomlinson</td>
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<td>Whiting &amp; Stackpole</td>
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<td>Lewis and Clark Fashionable Boat Makers</td>
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<td>22</td>
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Figure 114. Site Preservation Potential

Site Preservation Ratings

- Very Low
- Low
- Low-Moderate
- Moderate
- Moderate-High
- High
- Very High

Figure 115. Site Accessibility Potential

Site Accessibility Ratings

- Very Low
- Low
- Low-Moderate
- Moderate
- Moderate-High
- High
- Very High
CHAPTER XIII

CONCLUSION

This research began with a discussion of both shipyards, and the shipbuilders employed at them, followed by a discussion of maritime history and archaeology. The background history of Pittsburgh outlined the origins and the development of the boatbuilding industry within the city. The environmental context of Pittsburgh was first introduced, followed by the early European occupancy and rivalries leading to the settlement of this region. It introduced Pittsburgh’s early involvement with the construction of bateaux, flat boats, the development of the first known keelboats, occurring at Fort Pitt, as well as the construction of galleys by the last decade of the eighteenth century. Although documented evidence is lacking, it also discussed the likelihood that boats would have been constructed even earlier at Fort Duquesne on the Point, as its position on the confluence of the Monongahela, Allegheny, and Ohio rivers would grant it almost unavoidable waterway accessibility and potential. Pittsburgh’s participation in what quickly became known as the triangle trade and the development of western riverine commerce was further addressed in detail.

This research went on to discuss how Pittsburgh’s watercraft varieties changed from simple boat production into a short lived shipbuilding industry. The evolution of their intended markets was also discussed as was the military’s role in shaping this industry, and this was followed by a discussion regarding the transition of the industry from wood and wind to iron and steam. Pittsburgh, and its nearby competition, played crucial roles in the development and evolution of steamboat technology as well as the later construction of iron vessels. This research also covered Pittsburgh’s major role in early waterway navigation improvement projects, and it later discussed how Pittsburgh watercraft were utilized during the American Civil War. It further
mentioned many of the larger and better known yards operating in surrounding towns as well as some of the early yards located several miles up or down river from Pittsburgh that have been attributed to the city prior to separate towns being formed in their locations. However, not all of these additional sites were evaluated and were merely mentioned for their significance to the local industry.

The extensive background history and evolution of Pittsburgh’s shipping and watercraft industries is followed by the primary portion of this research which was to locate as many watercraft construction facilities as possible within the pre-twentieth century historic boundaries of Pittsburgh and to address their level of disturbance, the sites’ contemporary usages, and the likelihood of the archaeological features of shipyards and boatbuilding sites surviving intact beneath the modern city. Aside from the evaluation of these sites’ archaeological preservation potentials, it also discusses the level of accessibility that these sites have for current research as well as the likelihood of those preserved resources becoming accessible anytime in the near future. Based on the results of this research, nearly ¾ of the watercraft construction sites in Pittsburgh have at least a moderate or higher rating of preservation potential for archaeological research, but as anticipated, most of the downtown area’s watercraft construction sites currently reside under modern commercial and industrial development. That said, almost half of these sites received at least a moderate or higher rating in terms of foreseeable future accessibility.

The research conducted for this thesis has discussed Pittsburgh’s role in the development and evolution of riverine watercraft as well as in the western expansion of the United States. Its boat and shipyards have played a key role in this discussion, and researching them may offer an even greater contribution to this area of study. This research has identified and located the major watercraft construction sites in Pittsburgh, and this will allow for future maritime archaeologists
and historical researchers to expand the knowledge regarding the importance of historic watercraft construction in this region. This research has provided a best estimate evaluation rating as to which sites have the greatest likelihood of contributing new data and which sites are likely too disturbed be worthy of study. It has also provided an opportunity for future archaeologists to more easily recognize which sites may become available for study in the near future, and it will specifically allow for cultural resource managers to recognize which locations in Pittsburgh should have special attention paid to them as this city’s infrastructure progressively becomes ready for redevelopment. Pittsburgh’s impact on the westward expansion of the United States as well as its role in the development of industry and commerce was substantial, and its strategic location and resulting watercraft and shipping industries have undoubtedly proved to be the key component to its success.
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Appendix A:
Partial List of Nineteenth Century Boat and Shipbuilders employed in Pittsburgh
<table>
<thead>
<tr>
<th>Time Period</th>
<th>Ship Carpenters</th>
<th>Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800s</td>
<td>John Tarascon, his brother, James Berthoud.</td>
<td></td>
</tr>
<tr>
<td>1810s</td>
<td>Richard Drummond, Thomas Bell (Ship and Boat), Ephraim Frisbee, Joseph Wasson, Alexander Bushnell, Basil Mullakm, William Whightman, Samuel Frisbee, Asborne Coats, Horace Squires, James B. Probe (Ship joiner), Robert Parmer, G.W. Helm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horace Squires, Neil McNatten, Christopher Dougherty, Andrew Lent, William Whightman (Ship and Boat), Thomas Bell (Ship and Boat), Hyman Styles, Moses Pitchell, Thomas Kelly, John Banton, Samuel Kinzey, Robert Lindle, Thomas Pooley, Daniel McAfee, Robert Parmer, Jas Hostard, Jesse McCoy, William Sprague, Chris Douty, John McCloud, Nimrod Grace, Charles Douty, Thomas Cunningham, John Linton</td>
<td></td>
</tr>
<tr>
<td>1820s</td>
<td>Robert Wilson, John Dilworth, Emphraim Frisbee, Robert Price, Sammuel Frisbee, Andrew Lent, William Whightman, John St. Clair, Peter Perchment, Michael Miller, Abel Coffin, Richard Taylor, William Barry, Augustus Harsley</td>
<td></td>
</tr>
<tr>
<td></td>
<td>William Berry, Jas Donnelly, Robert Walker, Henry Pinkney, Samuel Kinsey, Neal McNaughton, Jas Kendal</td>
<td></td>
</tr>
<tr>
<td>1830s</td>
<td>Andrew Lent</td>
<td>George Vandergal, Neal McNaughton.</td>
</tr>
<tr>
<td>1840s</td>
<td>2 ship carpenters</td>
<td>5 boat builders</td>
</tr>
<tr>
<td>1870s</td>
<td>William Evans, Henry Gunning, George W. Coffin, Henry Eckert, Henry Jones, Joile Kerr, WM Kennedy, Thomas Thompson, Phillip Grimin, Sargeant Elliot, Samuel White, Peter Sprague, Theodore McClure, John T Woolf</td>
<td></td>
</tr>
<tr>
<td>Boat Builders</td>
<td>1880s</td>
<td>Ship Carpenters</td>
</tr>
<tr>
<td>--------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
Appendix B:
Steamboat Timeline of Significant Events and Accomplishments
<table>
<thead>
<tr>
<th>Year</th>
<th>Innovation and Accomplishments</th>
<th>Vessel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1707</td>
<td>Denis Papin builds first paddlewheel boat design</td>
<td>n/a</td>
</tr>
<tr>
<td>1711</td>
<td>Thomas Newcomen develops working model of first practical &quot;atmospheric&quot; (low-pressure, condensing) steam engine, using steam to produce partial vacuum in cylinder to move piston, for pumping water out of tin mines</td>
<td>n/a</td>
</tr>
<tr>
<td>1761</td>
<td>William Ramsey joined two keelboats together at Fort Pitt and propelled it by powering paddlewheels with men running on trendles</td>
<td>n/a</td>
</tr>
<tr>
<td>1763</td>
<td>James Watt starts development of improved &quot;non-atmospheric&quot; engine using low-pressure steam as actual propulsion agent, with external condenser replacing Newcomen's method of condensing steam by injection of water into main cylinder; eventually establishes firm of Boulton &amp; Watt to market engines</td>
<td>n/a</td>
</tr>
<tr>
<td>1782</td>
<td>James Watt invented double acting, condensing engine</td>
<td>n/a</td>
</tr>
<tr>
<td>1787</td>
<td>John Fitch builds first commercially employed steamer on the Delaware. A 12 oared paddleboat</td>
<td>n/a</td>
</tr>
<tr>
<td>1787</td>
<td>John Rumsey builds first commercially employed steamer on the Potomac</td>
<td>n/a</td>
</tr>
<tr>
<td>1793</td>
<td>Jacob Meyers opened first weekly keelboat passenger service between Cincinnati and Pittsburgh.</td>
<td>n/a</td>
</tr>
<tr>
<td>1795</td>
<td>Patented horse powered ferry flats which were two boats placed parallel, decked over, and powered by horses or oxen turning a shaft geared to paddlewheels</td>
<td>?</td>
</tr>
<tr>
<td>1801</td>
<td>Oliver Evans invents Columbian Engine (Grasshopper) making idea of steamboats practical</td>
<td>n/a</td>
</tr>
<tr>
<td>1802</td>
<td>William Symington built first British steamer</td>
<td>n/a</td>
</tr>
<tr>
<td>1803</td>
<td>Robert Fulton demonstrates a steam powered boat to Robert Livingston in France</td>
<td>n/a</td>
</tr>
<tr>
<td>1807</td>
<td>Fulton employs the first commercial steamboat using Boulton and Watt design and returning a 5% profit on its round trip to Albany</td>
<td>Steamboat (Clermont)</td>
</tr>
<tr>
<td>1808</td>
<td>John Steven builds second practical steamer immediately after Fulton's and was the first to sail in open water</td>
<td>Phoenix</td>
</tr>
<tr>
<td>1810</td>
<td>Robert Livingston uses political connections to renew steamboat patent in New York for Fulton</td>
<td>n/a</td>
</tr>
<tr>
<td>1811</td>
<td>Fulton launches first steamboat on western waters of North America makes voyage to New Orleans</td>
<td>New Orleans</td>
</tr>
<tr>
<td>1811</td>
<td>Keelboats made the voyage from Cincinnati to New Orleans in 78 days. Passage was $160.</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Innovation and Accomplishments</td>
<td>Vessel</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>1813</td>
<td>Fulton launches first Mississippi steamboat to be powered by a lightweight and efficient high-pressure engine turning a stern paddle wheel</td>
<td>Comet</td>
</tr>
<tr>
<td>1814</td>
<td>Henry Shreve made it from New Orleans to Louisville in just 34 days</td>
<td>Dispatch</td>
</tr>
<tr>
<td>1814(15)</td>
<td>Fulton’s group built the <em>Vesuvius, Aetna, 2nd New Orleans</em></td>
<td>Vesuvius, Aetna, 2nd New Orleans</td>
</tr>
<tr>
<td>1814</td>
<td>Henry Shreve and Daniel French built fourth steamboat on western waters. First vessel to make the complete round trip from Pittsburgh to New Orleans and back, the first to ascend the ascend the Mississippi, Ohio and Monongahela rivers, the first vessel to tow other boats, the first to make it to the mouth of the Mississippi, the first to navigate the Red River, the first steamboat to be used in combat, and most importantly, the first to challenge Fulton’s monopoly</td>
<td>Enterprise</td>
</tr>
<tr>
<td>1815</td>
<td>Robert Fulton dies in New York of pleurisy</td>
<td>n/a</td>
</tr>
<tr>
<td>1816</td>
<td>Shreve builds first side-wheel steamer on western waters to use “high pressure, non-condensing, direct-acting, horizontal cylinder affair with a cam actuated value gear engine” (Hunter 1943). It was also the first double-decked steamer, the first to have its cylinders connected by pitman to the paddlewheels, and the first to have its boilers on the deck. These features would all become standard for steamboat construction. It was also known as the first great steamboat on western waters and played a role in the ruling that steamships could not be kept out of Louisiana waters.</td>
<td>Washington</td>
</tr>
<tr>
<td>1817</td>
<td><em>Shreve’s Washington</em> makes it to Louisville from New Orleans in record 25 days</td>
<td>Washington</td>
</tr>
<tr>
<td>1819</td>
<td>Major Stephen Long designs cam cut off switch which was a device by which steam was used expansively by shutting off the flow of steam into the cylinder before the stroke was completed, and it had an immediate impact in reducing fuel consumption by 60%. Also the first steamer to ascend the Missouri River</td>
<td>Western Engineer</td>
</tr>
<tr>
<td>1818(19)</td>
<td>Fulton’s heirs withdraw steamboat monopoly claim</td>
<td>n/a</td>
</tr>
<tr>
<td>1822</td>
<td>First iron boat was built on the Thames River</td>
<td>Aaron</td>
</tr>
<tr>
<td>1822</td>
<td>Walking bean engine was invented featuring a piston rod driving a crossbeam pivoted at the center, which in turn was connected to the crank-shaft.</td>
<td>n/a</td>
</tr>
<tr>
<td>Year</td>
<td>Innovation and Accomplishments</td>
<td>Vessel</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1824</td>
<td>Gibbens vs. Ogden determine that the federal government had the power to regulate interstate commerce and not the states</td>
<td>n/a</td>
</tr>
<tr>
<td>1824</td>
<td><em>Aetna</em> explodes on Hudson resulting in a push for steamboat licensing laws</td>
<td><em>Aetna</em></td>
</tr>
<tr>
<td>1825</td>
<td>Shreve designed a vessel featuring twin engines that allowed for paddlewheels on either side of the vessel to be turned independently of one another. This design innovation would offer much greater maneuverability and efficiency than seen on previous steam vessels. It has been described as the first western boat with an upper cabin after it was removed to the second deck.</td>
<td><em>George Washington</em></td>
</tr>
<tr>
<td>1825</td>
<td>First iron hulled steamboat built in the United States was launched on the Susquehanna River</td>
<td><em>Cordus</em></td>
</tr>
<tr>
<td>1826</td>
<td>Robinson and Minis build first side-wheel steamer on the Ohio</td>
<td><em>Beaver</em></td>
</tr>
<tr>
<td>1826</td>
<td>Henry M. Shreve is appointed as Superintendent of Western River Improvements, under War Department, inaugurating program for removal of snags on western rivers</td>
<td></td>
</tr>
<tr>
<td>1827</td>
<td>First steamboat to ascend the Allegheny</td>
<td><em>Albion</em></td>
</tr>
<tr>
<td>1829</td>
<td>Shreve invented an effective snag boat, or &quot;Tooth Puller&quot;</td>
<td><em>Heliopolis</em></td>
</tr>
<tr>
<td>1830s(40s)</td>
<td>Steam cut-off system is developed for engine pistons, improving efficiency and quieting steam exhaust by allowing steam to expand for rest of stroke</td>
<td></td>
</tr>
<tr>
<td>1832</td>
<td>Henry M. Shreve clears &quot;great raft of the Red River,&quot; opening service to newly-founded Shreveport, Louisiana</td>
<td></td>
</tr>
<tr>
<td>1834</td>
<td>By this date, 304 steamboats have been built at Pittsburgh, 221 at Cincinnati and Covington, and 103 at Louisville.</td>
<td>n/a</td>
</tr>
<tr>
<td>1838</td>
<td>Navigation dams are begun on Monongahela River above Pittsburgh</td>
<td>n/a</td>
</tr>
<tr>
<td>1838</td>
<td>First all iron steamer built on western waters</td>
<td><em>Valley Forge</em></td>
</tr>
<tr>
<td>1839</td>
<td>First iron canal boat</td>
<td><em>Kentucky</em></td>
</tr>
<tr>
<td>1839</td>
<td>Stackhouse and Tomlinson build first iron hulled vessel built on western waters for the U.S. Navy</td>
<td><em>Michigan</em> (Wolverine)</td>
</tr>
<tr>
<td>1840-45</td>
<td>Introduction of separate steam &quot;doctor pumps&quot; to supply water to boilers independently of main engines, significantly reducing risk of explosions on steamboats</td>
<td>n/a</td>
</tr>
<tr>
<td>1841</td>
<td>Completion of shift to private staterooms for first class passengers</td>
<td>n/a</td>
</tr>
<tr>
<td>Year</td>
<td>Innovation and Accomplishments</td>
<td>Vessel</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>1852</td>
<td>Steamboat Inspection Act of 1852 finally puts teeth into steamboat safety regulation by establishing inspection districts at Pittsburgh, Cincinnati, Louisville, St. Louis, Memphis and New Orleans, and requiring inspection of hulls and boilers, licensing of pilots and engineers, use of steam pressure gauges, etc.</td>
<td>n/a</td>
</tr>
<tr>
<td>1860</td>
<td>Robert Stevens introduction of forced draft boiler, which allowed for coal to be used for fuel</td>
<td>North America</td>
</tr>
<tr>
<td>1861</td>
<td>The Civil War suspended traffic on the Mississippi. Shipyards converted steamboats to ironclad gunboats.</td>
<td>n/a</td>
</tr>
<tr>
<td>1871</td>
<td>Steamboat Act of 1871 requires licensing of captains as well as pilots and engineers</td>
<td>n/a</td>
</tr>
<tr>
<td>1878</td>
<td>James Rees builds first steel hulled boat in America</td>
<td>Francesco Montoya</td>
</tr>
<tr>
<td>1881</td>
<td>James Rees builds first steamer with electric lighting</td>
<td>Kate Adams</td>
</tr>
</tbody>
</table>
Appendix C:
Significant vessels discussed in this research
<table>
<thead>
<tr>
<th>Ship Name</th>
<th>Builder or yard</th>
<th>Year built</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wooden Sailing Vessels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>The Three Friends</em></td>
<td>George Mason at Fort Pitt</td>
<td>1768</td>
<td>First known keelboat</td>
</tr>
<tr>
<td>Lewis and Clark's Keelboat</td>
<td>Fort Fayette</td>
<td>1803</td>
<td>Used on the Lewis and Clark expedition</td>
</tr>
<tr>
<td>Western Experiment</td>
<td>O'Hara's yard</td>
<td>1792</td>
<td>Two-masted, 30-oared galley</td>
</tr>
<tr>
<td><em>President Adams</em></td>
<td>Isaac Craig at O'Hara's</td>
<td>1798</td>
<td>Two-masted, 30-oared galley</td>
</tr>
<tr>
<td><em>Senator Ross</em></td>
<td>Isaac Craig at O'Hara's</td>
<td>1799</td>
<td>Two-masted, 30-oared galley</td>
</tr>
<tr>
<td><em>Amity</em></td>
<td>Eliphant Beebe at Tarascon</td>
<td>1801</td>
<td>This schooner was Pittsburgh’s first ocean bound vessel. Loaded with flour and sent to Philadelphia where it was then sent to Bordeaux, France. From there it brought back a cargo of wine, brandy, and other French goods.</td>
</tr>
<tr>
<td><em>Pittsburgh</em></td>
<td>Eliphant Beebe at Tarascon</td>
<td>1801</td>
<td>This was Pittsburgh second ocean bound ship</td>
</tr>
<tr>
<td><em>Nanina</em></td>
<td>Abraham Marpole at Tarascon</td>
<td>1803</td>
<td>Took cargo to Liverpool from the mouth of the Cumberland</td>
</tr>
<tr>
<td><em>Louisiana</em></td>
<td>Abraham Marpole at Tarascon</td>
<td>1804</td>
<td>One of largest sailing vessels ever built in Pittsburgh</td>
</tr>
<tr>
<td><em>Western Trader</em></td>
<td>Tarascon</td>
<td>1805</td>
<td>This vessel was to take cargo at Natchez intended for Liverpool, and then it was to return to either Philadelphia or New Orleans with goods for either market. It made another trip from New Orleans to Greenock with a load of cotton, but on October 3, 1807 it was captured by a Spanish schooner.</td>
</tr>
<tr>
<td><em>General Butler</em></td>
<td>Eliphant Beebe at O'Hara's</td>
<td>1805</td>
<td></td>
</tr>
<tr>
<td><em>Black Walnut</em></td>
<td>?</td>
<td>1802-1805</td>
<td></td>
</tr>
<tr>
<td>Ship Name</td>
<td>Builder or yard</td>
<td>Year built</td>
<td>History or accomplishment</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------</td>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dean</td>
<td>Fort Fayette</td>
<td>1803</td>
<td>One of, if not, Pittsburgh’s first merchant ship (depending on which sources are accurate)</td>
</tr>
<tr>
<td>Allegheny</td>
<td>Beebe at Tarascon</td>
<td>1802-1805</td>
<td></td>
</tr>
<tr>
<td>Conquest</td>
<td>Beebe at Tarascon</td>
<td>1802-1805</td>
<td></td>
</tr>
<tr>
<td><strong>Steam Vessels</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phoenix</td>
<td>John Stevens</td>
<td>1809</td>
<td>Second Practical steamer. The Phoenix was sent to the Delaware in 1809 which would make it the first steamer to sail in open water</td>
</tr>
<tr>
<td>New Orleans</td>
<td>Eagle Foundry (Old Tarascon Site)</td>
<td>1811</td>
<td>First steamboat constructed in western waters making the voyage to New Orleans</td>
</tr>
<tr>
<td>Vesuvius</td>
<td>Robert Fulton</td>
<td>1813(14)</td>
<td></td>
</tr>
<tr>
<td>Etna</td>
<td>Robert Fulton</td>
<td>1813(14)</td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td>Latrobe</td>
<td>1815?</td>
<td></td>
</tr>
<tr>
<td>James Monroe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second New Orleans</td>
<td></td>
<td>1816?</td>
<td></td>
</tr>
<tr>
<td>Comet</td>
<td>Daniel French</td>
<td>1813</td>
<td>First Mississippi steamboat to be powered by a lightweight and efficient high-pressure engine turning a stern paddle wheel</td>
</tr>
<tr>
<td>Dispatch</td>
<td>Fulton, Gregg, French</td>
<td>1814</td>
<td>Made it from New Orleans to Louisville in just 34 days</td>
</tr>
<tr>
<td>Enterprise</td>
<td>Henry Shreve</td>
<td>1814</td>
<td>First vessel to make the complete round trip from Pittsburgh to New Orleans and Back, the first to ascend the Mississippi, Ohio and Monongahela rivers, the first vessel to tow other boats, the first to make it to the mouth of the Mississippi, the first to navigate the Red River, the first steamboat to be used in combat, and most importantly, the first to challenge Fulton’s monopoly.</td>
</tr>
<tr>
<td>Ship Name</td>
<td>Builder or yard</td>
<td>Year built</td>
<td>History</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------</td>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Washington</td>
<td>Henry Shreve</td>
<td></td>
<td>Side paddlewheel steamer and the first on western waters to use a high pressure engine which became standard equipment on western river boats. The Washington was the first double-decked steamer, the first to have its cylinders connected by pitman to the paddlewheels, and the first to have its boilers on the deck.</td>
</tr>
<tr>
<td>George Washington</td>
<td>Henry Shreve</td>
<td></td>
<td>Featured twin engines that allowed for paddlewheels on either side of the vessel to be turned independently of one another which would offer much greater maneuverability and efficiency. It has been described as the first western boat with an upper cabin after it was removed to the second deck.</td>
</tr>
<tr>
<td>Franklin</td>
<td>Shiras &amp; Cromwell</td>
<td>1816</td>
<td></td>
</tr>
<tr>
<td>Oliver Evans</td>
<td>George Evans</td>
<td>1816</td>
<td></td>
</tr>
<tr>
<td>Harriet</td>
<td></td>
<td>1816</td>
<td></td>
</tr>
<tr>
<td>Expedition</td>
<td>?</td>
<td>1818</td>
<td></td>
</tr>
<tr>
<td>Independence</td>
<td>?</td>
<td>1818</td>
<td></td>
</tr>
<tr>
<td>Western Engineer</td>
<td>Allegheny Arsenal</td>
<td>1819</td>
<td>Used cam-cut off switch, placed wheels in a house to prevent snags</td>
</tr>
<tr>
<td>Albion</td>
<td>Benjamin Henry Latrobe</td>
<td>1826</td>
<td>First steamboat to ascend the Allegheny</td>
</tr>
<tr>
<td></td>
<td>(Tarascon?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncle Sam</td>
<td></td>
<td>1829</td>
<td>Largest boat afloat on western waters, registering at 550 tons, and she was capable of carrying 500 passengers.</td>
</tr>
<tr>
<td>General Jackson</td>
<td>Whiting &amp; Stackpole</td>
<td>circa 1829</td>
<td></td>
</tr>
<tr>
<td>James Madison</td>
<td>Whiting &amp; Stackpole</td>
<td>circa 1829</td>
<td></td>
</tr>
<tr>
<td>Frankfort</td>
<td></td>
<td>circa 1829</td>
<td></td>
</tr>
<tr>
<td>Tamerlane</td>
<td></td>
<td>circa 1829</td>
<td></td>
</tr>
<tr>
<td>Beaver</td>
<td></td>
<td>1826</td>
<td>First side wheel steamer on the Ohio</td>
</tr>
<tr>
<td>Ship Name</td>
<td>Builder or yard</td>
<td>Year built</td>
<td>History</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Allegheny</td>
<td>Thomas Blanchard</td>
<td>1830</td>
<td>First twin paddle wheel steamer ever built</td>
</tr>
<tr>
<td>Valley Forge</td>
<td>Robinson and Minis</td>
<td>1838</td>
<td>First iron steamer on western waters</td>
</tr>
<tr>
<td>New Castle</td>
<td></td>
<td>1837</td>
<td>Further proved the Allegheny could be successfully navigated by steam, and its success convinced Congress to survey the river in preparation for it being cleared</td>
</tr>
<tr>
<td>Michigan</td>
<td>J. Tomlinson &amp; Co or Stackhouse and Tomlinson</td>
<td>1841-1843</td>
<td>1841 Fortification Act authorized its construction to patrol the Great Lakes. In the 1850s the <em>Michigan</em> was used to quell civil disturbances in the Great Lakes region, which would include the Wisconsin and Michigan timber rebellions. During her service she engaged in battle with lumber pirates, the Mormon tyrant (King) Jesse James Strang of Beaver Island, and some minor conflicts associated with the Civil War. It was also used more for rescuing distressed American and Canadian ships than keeping the British in check.</td>
</tr>
<tr>
<td>Francesco Montoya</td>
<td>James Rees</td>
<td>1878</td>
<td>First steel hulled boat in America. This 150 foot long vessel had been built for the Magdalena Steam Navigation Company of South America.</td>
</tr>
<tr>
<td>Kate Adams</td>
<td>James Rees</td>
<td>1881</td>
<td>First steamer with electric lighting</td>
</tr>
</tbody>
</table>
Appendix D:
Steamers built in Pittsburgh 1811-1888

(Thurston 1888:107-116)
From 1811 to 1835 there were constructed at Pittsburgh and vicinity:

1811. — New Orleans.
1812. — Comet.
1814. — Aetna, Buffalo, Vesuvius.
1816. — James Monroe.
1818. — Allegheny, Expedition, Independence, James Ross, St. Louis, Tamerlane, Thomas Jefferson.
1819. — Balise Packet, Car of Commerce, Cumberland, Dolphin, Olive Branch Rapids, Telegraph.
1824. — American, Herald, President
1829. — Citizen, Cora, Corsair, Huron, Home, Huntsman, Hudson, Hatches, Industry, Kentuckian, Lark, Mohican, Monticello, Nile, Packet, Red Rover, Ruhama, Talma, Trenton, Tallyho, Tarriff, Uncle Sam, Uncas, Victory.
1830. — Allegheny, Abeona, Enterprise, Eagle, Gondola, Gleaner, Mobile, New Jersey, Ohio, Olive, Peruvan, Sam Patch.
1831. — Argus, Antelope, Boston, Baltic, Carrollton, Columbus, Courier, Choctaw, Dove, Henry Clay, Louisville, Mohawk, Napoleon, Pittsburgh, Planter, Scout, Woodsman.
1834. — Aid, Commerce, Claiborne, Galiman, Huntress, Hunter, Ivanhoe.
1835. — Alert, Algonquin, Arabian, Adventure, Big Black, Detroit, Dover, Dayton, Flora, Marion, Madison, Pawnee, Pioneer, Robert Morris, Rover, Slam, Selima, Tempest, Tuskinda.

In 1836 there were 61 steamboats built at Pittsburgh and vicinity, making 197 boats built in the period embraced in the table. There were built at Brownsville in the same period, 22, and at Beaver, seven. In that year the Alton, Asia,

From 1836 to 1857 there were constructed at Pittsburgh and vicinity:


1838. — Arabian, Delaware, Express, Flora, Favorite, Gratiot, Havana, Julia, Lady of the Lake, Oconee, Pioneer, Rhine, Thames, Trident.


1840. — Algonquin, Massachusetts.

From 1837 to 1841, the records were destroyed by fire, so that the list between those dates is incomplete.


1846 — Billow, Cyrus, Chamberlin, Colorado, Dominion, John I. Hardin, South America, Wakendah.


1853. — Australia, Adelia, Alice, Alvin Adams, Alida, Altoona, Augusta, Admiral, Argyle, Advance, A. Mason, Ben Bolt, Crystal Palace, Col. Morgan, Cheviot, Caroline, Clara Dean, Cuba, Castle Garden, Eclipse of Texas, F. X. Aubrey, Fanny Fern, Garden City, Golden State, Henrietta, Hurricane, John Herron, James Lyon, Jean Weble,
James Park, Look Out, Latrobe, Michigan, Magnolia, Montauk, Mary L. Dougherty, Oakland, Oswichee, Quaker City, Ranger No. 2, Tampa, Sam Snowden, Tornado, South Carolina, Time and Tide, Tropic, Unicorn, Vienna, Young America, Yorktown.


From 1858 to 1875, there was constructed in the vicinity of and enrolled in the district of Pittsburgh, 649 steamboats, the aggregate tonnage of which was 155,253 and whose value was $21,886,073. In the same period there was constructed 518 barges, whose tonnage was 100,883 tons; also 496 keel and flat boats, having a tonnage 21,662, and 26 ferry boats, with a tonnage of 2,681 tons; being an aggregate tonnage construction of 280,479 tons, having an aggregate value of over 22 million dollars.


From 1864 to 1887, the river traffic having suffered from the multiplication of railroads, the boat-building industry decreased in its volume. There were, however, the following steamboats built:


1867. — Elizabeth, Ida Stockdale, Elisha Bennett, Diamond, Great Republic, Dubuque Boaz, Linton, Success, Active, James Gilmore, Clipper, City of McGregor, Glenwood No. 2, J. N. McCullough, Rapidan No. 2, Abe Hays, J. F. Bravo, Selma, Mary Alice,


1883.—Alabama, Clifton, Chicassaw, Eugene, Frank Gilmore, Frank Stain, Fred, Wilson, Gondola, Gayooe, Joe Peters, Little Ike, Monterey, Minnie Ray, R. A. Speer, Robert Jenkins, Phoenix.


1885.—Adam Jacobs, Geo. Kaplan, Josie W., Jim Wood, John Moren, Laura May, Mary Disston, T. P. Leathers, Vanguard, Venus, Voyager.

1886.—Beaver, City of Charters, George R. Ford, Hudson, H. B, Sinclair Nellie Hudson.

1887.—Batterore, Eugene, Geo. Wood, Ralph.

1888.—Elizabeth, Harmony.
Appendix E:
Contract of 1824 between John W. Bruce and Major General Alexander Macomb for snag removal on the Mississippi and Ohio rivers

(Johnson 1979)
THE CONTRACT OF 1824

[Doc. No. 14.] [Doc. No. 14.]

Articles of Agreement, made and concluded the 12th day of October, in the year of our Lord one thousand one hundred and twenty-four, by and between Alexander Macomb, Major General and Chief Engineer in the Army of the United States, on behalf of the Department of War, of the first part, and John Bruce, of the second part, to wit:

Article the first. It is hereby agreed, by and between the parties aforesaid, that the said party of the first part, and by these presents doth covenant and agree, to improve the navigation of that portion of the River Mississippi, extending from the mouth of the River Missouri to New Orleans, and of the whole extent of the River Ohio, from Pittsburgh to its junction with the Mississippi river: according to the provisions of the act of Congress of the twenty-fourth of May, one thousand eight hundred and twenty-four, by removing all trees, limbs, and roots of trees, and logs, commonly called planters, sawyers, and snags, that may be found in those rivers, respectively, which impede the navigation of the same, by extracting them from their positions, or cutting them off at the bottom of the river, or at least ten feet below extreme low water mark; and disposing of them in such manner upon the shore, or otherwise, as will effectually prevent their becoming afterwards injuries to their navigation.

Article the second. It is further agreed, by and between the parties aforesaid, that the said party of the second part, shall complete the abovementioned improvement of the navigation of the Rivers Mississippi and Ohio, on or before the first day of January, in the year of our Lord one thousand eight hundred and twenty-seven. The whole to be done under the inspection, and to the satisfaction of an officer of the Corps of Engineers, or some other person, to be appointed by the Department of War to inspect the same.

Article the third. It is further agreed, by and between the parties aforesaid, that no advance of money shall be made by the party of the first part, on account of work to be performed under this agreement, but that the sum stipulated to be paid, shall be paid, in proportion as the work advances; and, on the inspection and certificate of the officer of the Corps of Engineers, or person designated for that purpose, setting forth the extent of work done, and that it is completed in conformity to the stipulations of the first article of this Agreement; and, also, certifying the value of the same, in his opinion, compared with the entire amount which the party of the second part is to receive on the completion of the work: Provided always, that the said party of the second part, shall have no right to claim the inspection and certificate, aforesaid, to entitle him to receive payment for a log value than one thousand dollars, to be estimated, as above, by the officer or person designated to inspect the work in its progress.

fastened in the bed of the river, 20, 30, and 40 feet below the surface of the water, was not easily to be overcome. The agency of some machinery, not before in use, for the improvement of our water courses, was deemed indispensable. Much of the time, and a great portion of the money was expended in the necessary experiments and preparation to commence the work.

The Lessons of 1824 While the contest and contract of 1824 were unproductive of the goals set by the first appropriation for inland rivers, Congress and the Corps of Engineers learned lessons that had nationwide application. The tools and machinery necessary to improve waterways could only be developed by men with intimate knowledge of the special problems of river navigation and extensive on-the-job experience. There were no “prompt” methods to establish safe and reliable channels; new snags and bars were formed by every flood and river projects would perforce be continuing efforts. Work on rivers was so variable that the Engineers would have to develop firm contract specifications and standard evaluation procedures before performing such work by contract could be successful.

These lessons were reflected in the “Rivers and Harbors” Act of March 3, 1827, first of a series of annual appropriations, that directed removal of obstructions of every description that endangered navigation at any river stage and that required a “practical agent” with long experience on inland rivers be placed in charge of the project. Under the capable direction of that “practical agent,” Captain Henry M. Shreve, the snaggling project on the Ohio and Mississippi rivers resumed in 1827 and was expanded to include several tributary streams.
Appendix F:
Major Mid-19th Century Steamboat Yards in Pittsburgh and Vicinity
<table>
<thead>
<tr>
<th>Facility</th>
<th>Location</th>
<th>Vessel</th>
<th>Branch</th>
<th>Type</th>
<th>Weight</th>
<th>Built</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fort Pitt Foundry</td>
<td>Pittsburgh PA</td>
<td><em>George M. Bibb</em></td>
<td>U.S. Coast Guard</td>
<td>Revenue Cutter</td>
<td>409</td>
<td>1845</td>
<td></td>
</tr>
<tr>
<td>Fort Pitt Foundry</td>
<td>Pittsburgh PA</td>
<td><em>Jefferson</em></td>
<td>U.S. Coast Guard</td>
<td>Revenue Cutter</td>
<td>343</td>
<td>1845</td>
<td>Sunk 1851</td>
</tr>
<tr>
<td>Schultz Bridge</td>
<td>Pittsburgh PA</td>
<td><em>James Y. Lockwood</em></td>
<td></td>
<td></td>
<td>390</td>
<td>1896</td>
<td></td>
</tr>
<tr>
<td>Schultz Bridge</td>
<td>Pittsburgh PA</td>
<td><em>Kennard</em></td>
<td>Barge</td>
<td></td>
<td>479</td>
<td>1896</td>
<td></td>
</tr>
<tr>
<td>Schultz Bridge</td>
<td>Pittsburgh PA</td>
<td><em>Kellogg</em></td>
<td></td>
<td></td>
<td>1,178</td>
<td>1898</td>
<td></td>
</tr>
<tr>
<td>Stackhouse &amp; Tomlinson</td>
<td>Pittsburgh PA</td>
<td><em>Michigan</em></td>
<td>U.S. Navy</td>
<td>Gunboat</td>
<td>498</td>
<td>1843</td>
<td></td>
</tr>
<tr>
<td>Stackhouse &amp; Tomlinson</td>
<td>Pittsburgh PA</td>
<td><em>Hunter</em></td>
<td></td>
<td>Steamboat</td>
<td>96</td>
<td>1845</td>
<td></td>
</tr>
<tr>
<td>Stackhouse &amp; Tomlinson</td>
<td>Pittsburgh PA</td>
<td><em>Alleghany</em></td>
<td>U.S. Navy</td>
<td>Gunboat</td>
<td>989</td>
<td>1847</td>
<td>Rebuilt as a screw steamer 1852, sold 1869</td>
</tr>
<tr>
<td>Stackhouse &amp; Tomlinson</td>
<td>Pittsburgh PA</td>
<td><em>Robert J. Walker</em></td>
<td>U.S. Coast Guard</td>
<td>Revenue Cutter</td>
<td>400</td>
<td>1847</td>
<td></td>
</tr>
<tr>
<td>Snowden Mason Snowden Mason</td>
<td>Pittsburgh PA</td>
<td><em>Manayunk</em></td>
<td>U.S. Navy</td>
<td>Monitor</td>
<td>2,100</td>
<td>1865</td>
<td>Later Ajax 1869, sold 1899</td>
</tr>
<tr>
<td>Tomlinson Hartupee</td>
<td>Pittsburgh PA</td>
<td><em>Umpqua</em></td>
<td>U.S. Navy</td>
<td>Monitor</td>
<td>1,175</td>
<td>1866</td>
<td>Later Fury 1869, Umpqua 1869, sold 1874</td>
</tr>
<tr>
<td>Tomlinson Hartupee</td>
<td>Pittsburgh PA</td>
<td><em>Marietta</em></td>
<td>U.S. Navy</td>
<td>Gunboat</td>
<td>479</td>
<td>1865</td>
<td>Later Circe 1869, Marietta 1869, sold 1873</td>
</tr>
<tr>
<td>Tomlinson Hartupee</td>
<td>Pittsburgh PA</td>
<td><em>Sandusky</em></td>
<td>U.S. Navy</td>
<td>Gunboat</td>
<td>479</td>
<td>1865</td>
<td>Later Minerva 1869, Sandusky 1869, sold 1873</td>
</tr>
</tbody>
</table>
Appendix G:
Partial list of steamers produced
by James Rees and Sons

(Coltin 2011)
James Rees, a Welshman, established this shipyard, which was originally a machine shop and engine works called Rees & Thorn. In 1878, they began building ships. It is claimed that they built not only the first steel-hulled boat in America - the *Francisco Montoya*, in 1878 - but also the first boat with electric light throughout - the *Kate Adams*, in 1882. It is also notable for building many knockdown (KD) boats for service in South America. The yard closed in 1930. It was located at Duquesne Way (now Fort Duquesne Boulevard) and Fancourt Street (later Fourth Street and roughly where Stanwix Street is now).

<table>
<thead>
<tr>
<th>Original Name</th>
<th>Original Owner</th>
<th>Vessel Type</th>
<th>Weight in tons</th>
<th>Built</th>
<th>Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benton</td>
<td>Fort Benton Tptn. Co.</td>
<td>Steamship</td>
<td>1875</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helena</td>
<td>Fort Benton Tptn. Co.</td>
<td>Steamship</td>
<td>1878</td>
<td></td>
<td>Sank 1891</td>
</tr>
<tr>
<td>Francisco Montoya</td>
<td>Magdalena Steam Nav. Co.</td>
<td>Steamship</td>
<td>1878</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>Victoria</td>
<td>Zulia River Navigation</td>
<td>Steamship</td>
<td>1880</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>Venezuela</td>
<td>Zulia River Navigation</td>
<td>Steamship</td>
<td>1880</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>Benner</td>
<td>U.S. Government</td>
<td>Medical Boat</td>
<td>1880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rober Carliator</td>
<td>Saratoga Lake</td>
<td>Steam Catamaran</td>
<td>1880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>De Castro</td>
<td>U.S. Government</td>
<td>Tug</td>
<td>1881</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Government</td>
<td>U.S. Government</td>
<td>Tug</td>
<td>1881</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. Government</td>
<td>U.S. Government</td>
<td>Tug</td>
<td>1881</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rober Carliator</td>
<td>Saratoga Lake</td>
<td>Steamship</td>
<td>1882</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>De Castro</td>
<td>Steamship</td>
<td>Steamship</td>
<td>1882</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>Chattahooche</td>
<td>Memphis &amp; Arkansas Packet Co.</td>
<td>Steam Packet</td>
<td>436</td>
<td>1882</td>
<td></td>
</tr>
<tr>
<td>Kate Adams</td>
<td>Memphis &amp; Arkansas Packet Co.</td>
<td>Steam Packet</td>
<td>1882</td>
<td></td>
<td>Burnt 1888</td>
</tr>
<tr>
<td>Tenafly</td>
<td></td>
<td>Steamship</td>
<td>1885</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tres Hermanso</td>
<td>Thebaud Brothers</td>
<td>Steamship</td>
<td>1885</td>
<td></td>
<td>For South America</td>
</tr>
<tr>
<td>Charles R. Suter</td>
<td>U.S. Army Corps of Engineers</td>
<td>Towboat</td>
<td>1886</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Original Name</strong></td>
<td><strong>Original Owner</strong></td>
<td><strong>Vessel Type</strong></td>
<td><strong>Weight in tons</strong></td>
<td><strong>Built</strong></td>
<td><strong>Disposition</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>-----------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Lize</td>
<td>Kranewski and Peasant</td>
<td>Steamship</td>
<td>35</td>
<td>1893</td>
<td></td>
</tr>
<tr>
<td>Vesta</td>
<td>Jones &amp; Laughlin Steel</td>
<td>Sternwheel Towboat</td>
<td>142</td>
<td>1902</td>
<td></td>
</tr>
<tr>
<td>Hidalgo</td>
<td>Thebaud Brothers</td>
<td>Steamship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Henry A. Laughlin</td>
<td>Jones &amp; Laughlin Steel</td>
<td>Sternwheel Towboat</td>
<td>151</td>
<td>1905</td>
<td>For South America</td>
</tr>
<tr>
<td>S. S. Brown</td>
<td></td>
<td>Steamship</td>
<td>643</td>
<td>1906</td>
<td></td>
</tr>
<tr>
<td>B. F. Jones, Jr.</td>
<td>Jones &amp; Laughlin Steel</td>
<td>Sternwheel Towboat</td>
<td>91</td>
<td>1908</td>
<td></td>
</tr>
<tr>
<td>aiOregon</td>
<td></td>
<td>Mission Steamer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olivia</td>
<td>Brazilian Owners</td>
<td>KD Riverboat</td>
<td>160</td>
<td>1912</td>
<td>For South America</td>
</tr>
<tr>
<td>Itacoatiara</td>
<td>Brazilian Owners</td>
<td>KD Riverboat</td>
<td>160</td>
<td>1913</td>
<td>For South America</td>
</tr>
<tr>
<td>Campinas</td>
<td>Brazilian Owners</td>
<td>KD Riverboat</td>
<td>160</td>
<td>1913</td>
<td>For South America</td>
</tr>
<tr>
<td>Aracaju</td>
<td>Brazilian Owners</td>
<td>KD Riverboat</td>
<td>160</td>
<td>1913</td>
<td>For South America</td>
</tr>
<tr>
<td>Gaiola</td>
<td>Julio Guimaraes</td>
<td>Riverboat</td>
<td>160</td>
<td>1913</td>
<td>Now Benjamin Guimaraes, still active</td>
</tr>
<tr>
<td>Idlewild</td>
<td>West Memphis Packet Co.</td>
<td>Steamboat</td>
<td>260</td>
<td>1914</td>
<td>Now Belle of Louisville, museum in Louisville KY</td>
</tr>
<tr>
<td>Aliquippa</td>
<td>Jones &amp; Laughlin Steel</td>
<td>Sternwheel Towboat</td>
<td>1915</td>
<td></td>
<td>Scrapped 1952</td>
</tr>
<tr>
<td>Parahyba</td>
<td>Brazilian Owners</td>
<td>KD Riverboat</td>
<td>160</td>
<td>1916</td>
<td>For South America</td>
</tr>
<tr>
<td>W. H. Clingerman</td>
<td>Carnegie Steel</td>
<td>Sternwheel Towboat</td>
<td>234</td>
<td>1918</td>
<td>Now W. P. Snyder, Jr., museum in Marietta OH</td>
</tr>
<tr>
<td>Homestead</td>
<td>Carnegie Steel</td>
<td>Sternwheel Towboat</td>
<td>234</td>
<td>1919</td>
<td></td>
</tr>
<tr>
<td>Ayacucho</td>
<td>Soc. Colombiana de Transportes</td>
<td>Steamboat</td>
<td></td>
<td></td>
<td>Burnt and sank 1961</td>
</tr>
</tbody>
</table>
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1: Figure A-2. Fort Pitt Yard (O’Hara’s): East view
1: Figure A-3. Fort Pitt Yard (O’Hara’s): Southeast view

1: Figure A-4. Fort Pitt Yard (O’Hara’s): Southwest view (front)
1: Figure A-5. Fort Pitt Yard (O’Hara’s) Northwest view

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3: Figure A-10. Fort Fayette: Northeast view
3: Figure A-11. Fort Fayette: Southeast view

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4: Figure A-13. Tarascon Yard: Northeast view

4: Figure A-14. Tarascon Yard: Northwest view
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5: Figure A-16. Pittsburgh Foundry: Southeast view
5: Figure A-17. Pittsburgh Foundry: Southwest view

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6: Figure A-22. Robinson & Minis: West view
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