HISTORIC AMERICAN ENGINEERING RECORD

SAULT STE. MARIE INTERNATIONAL RAILROAD BRIDGE

HAER No. MI-324

Location:	Spanning the Soo Locks at the St. Marys Falls Canal Sault Ste. Marie Chippewa County Michigan
UTM:	Zone 16 Northing ~~702426~~ 5152553 Easting ~~5153709~~ 702198
Quad:	Sault Ste. Marie South, Michigan – Ontario 7.5' USGS Quadrangle, 1951
Date of Construction:	1887; 1913; 1959
Present Owner:	Canadian National Railroad
Present Use:	Railroad Bridge
Significance:	The Sault Ste. Marie International Railroad Bridge has nine camelback truss spans crossing the St. Marys River with bascule and vertical lift bridge components crossing the American Locks at the St. Marys Falls Canal. It is the only bridge in the United States known to include these three types of spans in a single structure. In addition, the bridge was noted in 1915 as the first structure to use an interlocking mechanism to connect the leaves of the double-leaf bascule span. It is Michigan's most significant railroad bridge from an engineering history standpoint and is eligible for listing in the National Register of Historic Places.
Project Information:	The bridge was recorded in 2002 by Lena L. Sweeten and Kimberly Starbuck of Gray & Pape, Inc., 1318 Main Street, Cincinnati, Ohio. James C. Pritchard assisted with preparation of the historic narrative of the report.

I. DESCRIPTION

The Setting

The International Railroad Bridge spans the St. Marys River between Sault Ste. Marie, Michigan, and Sault Ste. Marie, Ontario, Canada (Figure 1). The bridge carries the single-track Canadian National Railroad across the river. It is oriented on a generally northeast/southwest axis and crosses the river at a slight diagonal. The bridge is located to the west of the Soo Locks at the St. Marys Falls Canal, which bears the distinction of being both a U. S. National Historic Landmark and a Canadian National Historic Site (Figures 2 and 3). Adjacent to the east side of the railroad bridge is the International Highway Bridge, which opened to traffic in 1962. Consequently, the Sault Ste. Marie twin cities are located at a confluence of three major transportation types: water, rail, and highway. The riverfront continues to be a locus of activity, with several major industrial complexes, including Algoma Steel Corporation's steel mill, St. Marys Paper Mill, Lake Superior Power's riverside plant, two hydroelectric power plants, and cultural amenities such as parks, museums, marinas, and visitors' centers. Sault Ste. Marie, Michigan, also is a popular summer tourist destination and has numerous seasonal commercial enterprises in the downtown area and along the waterfront.

The Bridge

As originally constructed in 1887, from north to south this bridge included ten camelback Warren truss spans (each 240' long) crossing the St. Marys River, two lattice truss spans (each 104' long) over the North Channel of the Soo Locks system, and a single swing span (measuring 398' long) over the two American locks. Changes to the Soo Locks at the St. Marys Falls Canal have necessitated several alterations to the bridge over the past century. The bridge presently has three types of spans (from north to south): nine 240-foot Warren truss spans; a 426-foot double-leaf bascule span; and a 369-foot vertical lift span. It is the only bridge in the United States known to include these three types of spans in a single structure. The bascule span was added in 1913, at which time it was the longest bascule span in the world. Also at this time, the southernmost of the Warren truss spans was removed, along with the two original lattice truss spans. In 1959, the vertical lift span replaced the original swing span at the south end of the bridge.

A through-truss is one that carries its traffic through the interior of the structure with cross-bracing between the parallel top and bottom chords. A Warren truss has diagonal web members inclined to form equilateral triangles. Often the triangles are bisected by vertical members as well. This truss type was one of the most commonly used during the nineteenth century. The Warren truss section of the International Bridge is a single-track, open-deck structure consisting of nine pin-connected, through-truss spans. Each span is supported by masonry piers and abutments. From north to south, the truss spans cross the North Dike, St. Marys Falls, U.S. Power Canal, and the northwest pier of the Soo Locks.

Each Warren truss span has an open floor system with steel stringers and timber beams, the latter of which were installed in 1993. The north portal of the northernmost span features a raised nameplate with cutouts that spell out "1887/Dominion Bridge Co., Lim'd/Lachine, Prov. Que." A quatrefoil cutout decoration is found at either end of the nameplate. On each span, extending between the two top chords are lateral braces composed of eye bars inclined at a diagonal to form an "X." These are pinned to struts with lacing bars. The top sections of the interior posts are further connected by pairs of diagonal eye bars and horizontal braces. In 1933, a number of the pin-connected diagonal eye bars connecting the top and bottom chords were reinforced. In 1975, work was undertaken to repair damage to the concrete and masonry piers and to ameliorate erosion at the base of the piers. No other major alterations of note have been undertaken to the Warren truss spans.

The bascule section of the bridge crosses the North Canal of the Soo Locks, which serves as the approach to the Sabin and Davis Locks. A bascule bridge is defined as a movable span that rotates on a horizontal hinged axis to raise on end vertically; a large counterweight is used to offset the weight of the raised leaf. A bridgeplate located at each portal of the double-leaf structure states that it is a Strauss Trunnion Bascule Bridge and was built in 1913 for the Canadian Pacific Railway. The heel trunnion bridge (also known as a "jackknife bridge") was designed by the Strauss Bascule Bridge Company of Chicago, Illinois, and built by the Pennsylvania Steel Company of Steelton, Pennsylvania. At the time it was erected in 1913, the span was the largest bascule bridge ever constructed, with a length of 336' from trunnion to trunnion. A trunnion is the horizontal hinged axis used to raise the bascule span. The total length of the bascule superstructure is 426', including the counterweight frames. The entire structure contains approximately 1400 tons of structural steel and each bascule leaf with its floor system weighs about 400 tons.

The single-track bascule structure has two riveted through-trusses measuring 168' in length and 23' in width. They are spaced 20' apart on the centers. The floor is an open deck with steel stringers; while the floor beams are original, the deck timbers were replaced in 1983. The truss has vertical, diagonal, and horizontal members with lacing bars and gusset plates that protect the central joints. Lateral bracing and struts with lacing bars connect the two top chords. The trunnions are located at the base of the framing that carries the bearing for the counterweight mechanism. The counterweight frames are mounted on a triangular cross-braced tower at each end of the bridge. The counterweights are coupled by means of a link to the hip joints of the trusses. Each counterweight is a massive rectangular block of concrete. When the bridge is raised, the counterweights drop nearly to the level of the rails and form a barrier to passage. Metal stairways at each end of the bridge provide access to the gears and motors that are located above the portal of each leaf and adjacent to the counterweight frames.

An article published in the January 21, 1915, edition of *Engineering News* includes a large amount of detailed information concerning the bridge's design, engineering, and construction. The bridge was noted as the first structure constructed to use an interlocking mechanism to connect the leaves of the double-leaf bascule span. The feature was described thusly:

> The most interesting detail is the lock uniting the bottom chords, which transmits the full tension stresses and connects the two halves of the chord into one continuous member. This lock . . . consists essentially of a vertically slotted socket on the end of the chord of one leaf and a T-head bar on that of the opposite leaf. As the bridge closes, this bar enters the socket and comes to a bearing against the face of the latter. Vertical flanges or guides bring these interlocking parts into proper position before they engage. Each lock provides for a maximum tension stress of 500 tons.
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> The socket and T-bar are heavy steel castings, with pin connections to the chords to provide for central transmission of the stress. Above the lock are buffers or spacer castings which prevent the leaves from coming so close together as to prevent engagement of the lock.
>
> As the ends of the leaves approach when the bridge is closing, one leaf is kept slightly below the other until the bottom-chord locks engage, and the operating machinery then pushes both leaves down to their normal position, setting up an initial tension in the lock. The normal arrangement is that the sockets close down over the T-bars, and the leaf carrying the sockets is raised first to break the connection in opening the bridge. Above the socket is a stop casting which bears upon the top of the T-bar so that the leaf carrying the T-bars cannot be raised until the other leaf has been raised high enough to disengage the lock …
>
> The top-chord connection is simply a compression joint, each chord having an end casting with finished face. One casting has a tapered tongue fitting a groove in the other casting, so as to hold the chord in line when closed. A hinge is provided in this compression joint to insure proper distribution of stress. For this purpose, there is a horizontal pin in the face of one end casting, which engages a semi-cylindrical recess in that of the opposite casting. This joint is designed for a maximum compression stress of 500 tons and a shear of 160 tons.
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> The interlocking of the operating mechanism and the signal equipment with the moving part of the drawbridge includes a hooked lever pivoted eccentrically to one of the end castings of the top-chord joint, and engaging a pin in the opposite

> casting. Until this hook is in proper position the railway and bridge signals cannot be cleared; and until it is released from the pin the operating mechanism cannot be put in service.

The bascule bridge is operated by motor-driven gears mounted above the portal of each leaf. The main pinions engage with racks on horizontal operating struts hinged to the end towers. All operations are controlled from a tower adjacent to the south leaf. To provide for expansion and contraction, the south end of the bridge is mounted on rollers that allow for a maximum movement of 4-½". A hydraulic mechanism can be used to move the span. Four horizontal cylinders measuring 17" x 28" are mounted on the pier beneath the south leaf and the piston rods are connected to brackets on the bottom of the operating tower. A hand pump in the operating house provides the 200 pounds of pressure required to move the span.[1]

The operator's house for the bascule span is located adjacent to the west side of the south leaf. It is a square, three-story brick tower with an asphalt-shingled pyramidal roof. Most of the windows have original wood-frame sashes with multiple lights. On the south wall, the second-story window opening appears to have been altered with brick infill and a smaller two-part sash. A section of the third-story windows on the south and west sides has been covered with wood board and batten siding. On the interior, the original electrical equipment for operating the bascule bridge is extant.

The 800-ton vertical lift span of the bridge crosses the South Canal of the Soo Locks, which is the approach to the Poe Lock and the MacArthur Lock. The minimum clearance above water level is approximately 23' when the bridge is closed and 125' when it is open. This lift span replaced the original swing span in 1959. Portions of the swing span's original masonry abutments were removed and the abutments were then modified and extended with the addition of reinforced concrete sections to accommodate the new lift span and towers. The superstructure for the bridge consists of a through-truss vertical lift span that measures 369' in length and has two towers, each of which is 177' tall. The lift span has an open floor system with steel stringers and timber beams. It is a Pratt through-truss design, which is the most common type of truss. The riveted truss has fourteen panels with diagonal tension and vertical compression members that connect the top and bottom chords. Lateral bracing and struts connect the two top chords. The lift span is operated electrically.

The towers themselves are constructed of a framework of steel members. The legs are braced on each side by steel members in an "X" pattern, although certain transverse bracing was omitted in the north tower to permit passage of the bascule span counterweight. A machinery house is located at the top of each tower. The west side of each tower is occupied by an elevator shaft created of I-beams. Small elevators operating from track level to the machinery house level provide access to the operating machinery that is located near the top of each tower. Each

[1] "Bascule Bridge Acting as a Simple Truss Span," *Engineering News* 73 (January 21, 1915), 108-110.

machine house contains a 550 RPM electric motor that powers the lift's operation. The motor powers a series of gears and couplings that connect to two sheaves located at the outside corners of the machine house. No machinery is located on the lift span proper and there is no mechanical interconnection between the two towers. The lift span is suspended from wire ropes that pass over the 17.5-foot sheaves at the tops of the towers and connect to four steel-encased 200-ton concrete counterweights.

A three-story operator's house is located adjacent to the west side of the north tower near the track level. Operation of the vertical lift span is controlled from this location. The operator's house is of brick construction and has an asphalt-shingled hip roof. A large window opening on the third story's south side permits the bridge operator an expansive view of the span as it is being raised or lowered. Remaining windows are small, narrow openings, many featuring opaque glass block. The north wall is punctuated with doorways on the first and third stories. Both entrances are accessed via metal stairways that lead from the track level.

Removed in 1959, the original swing span was of a span type designed for horizontal rotation, mounted upon a central pivot pier. In the majority of designs, the wings to each side of the pier are identical and the span is self-balancing, as was the case with the original swing span. The appearance of this span was documented in a number of historic photographs. It was a steel, single-track, pin-connected, camelback Pratt through-truss, rim-bearing swing span that measured 398' in length. "Camelback" refers to the fact that the top chords were not parallel with the bottom chords, thus creating a lighter structure without sacrificing strength. The span's pivot pier was a rim-bearing rotatable mechanism that supported the weight of the span upon a series of wheels, which were mounted on a circular runway. The pivot pier was situated on a long, narrow island in the middle of the South Canal. This man-made island, built of ledge rock and concrete, was entirely removed after construction of the vertical lift span was completed. The pin-connected truss had fifteen panels with diagonal tension and vertical compression members that connected the top and bottom chords. Lateral bracing in the form of an "X" spanned between the two top chords. An elevated operations house was located at the center of the span and was connected to two pairs of interior posts. This entire section was replaced by the vertical lift span.

II. HISTORIC CONTEXT

Exploration of the Upper Peninsula

Sault Ste. Marie is located at the northeastern tip of Michigan's Upper Peninsula and is on the south side of the St. Marys River, opposite its sister city, Sault Ste. Marie, Ontario, Canada. The St. Marys River connects Lake Huron (to the southeast) and Lake Superior (to the northwest). During the period of European exploration and settlement, this location was part of territory contested by the French and British empires. In the seventeenth century, prior to the establishment of the first permanent mission at Sault Ste. Marie, French explorers Etienne Brule (between 1615 and 1623) and Jean Nicolet (1634) visited the Sault Ste. Marie area. Recollect Missionaries (1615), Jesuits (1625), and Sulpitians (1657) followed these earliest European explorers. Later, in 1658 and 1659, Groseillier and Radisson traveled through the Sault during their expedition into the territories to the northwest of Lake Superior. Following the Ojibwe defeat of the Iroquois in 1653 and once again in 1662, Fathers Jacques Marquette and Louis Nicholas established the first permanent mission in 1668. Sieur de Saint Lusson claimed possession of the upper country, including Sault Ste. Marie, by order of King Louis XIV of France in 1671.[2]

By 1751, Ensign Louis le Gardeur, Sieur de Repentigney completed the construction and establishment of a fort at Sault Ste. Marie. England took control of this fort, along with all of France's possessions in the region, following the termination of the Seven Years War (the French and Indian War) at the signing of the Treaty of Paris in 1763. Sault Ste. Marie became central to the international fur trade, as flotillas of canoes passed over the Sault portage with millions of dollars worth of furs annually. At the close of the American Revolution in 1782, the United States took possession of all British claims south of a line through the Great Lakes, including the settlement at Sault Ste. Marie. All of this area became known as the Northwest Territory. In 1800, the U. S. Congress approved the division of the Northwest Territory into the territories of Ohio and Indiana. Indiana Territory encompassed an area bounded on the east by the Northwest (later Ohio) Territory, on the south by the Ohio River, on the west by the Mississippi River, and on the north by the Canadian border. Vincennes was designated the territorial capital.[3] This demarcation of boundaries was made in accordance with the terms of the 1783 Treaty of Paris.

The question of American hegemony over the Northwest Territory, however, was not fully resolved until more than thirty years later. Tensions between the United States and Great Britain erupted into armed conflict with the War of 1812. During the hostilities, many Indian tribes allied with the British undertook raids on frontier settlements. The United States suffered a series of military defeats during 1812, including the loss of Detroit and Fort Dearborn. William Henry Harrison resigned his commission as governor of the Indiana Territory and took command of the northwestern American army. In October 1813, his forces achieved the first major American defeat of the British and their Indian allies at the Battle of the Thames.[4] The war continued for two more years, culminating in a United States victory against the British at the Battle of New Orleans. In negotiating the peace treaty, the United States and Great Britain agreed to restoration of the status quo antebellum with regard to territorial relations.

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[2] Joseph E. and Estelle L. Bayliss in collaboration with Milo M. Quaife, *River of Destiny: The Saint Marys* (Detroit: Wayne University Press, 1955), 11-15.
[3] James H. Madison, *The Indiana Way: A State History* (Bloomington: Indiana University Press, 1990), 34.
[4] Madison, *Indiana Way*, 44-45.

Longstanding matters of dispute concerning claims to territory that dated back to the 1780s also were resolved, thus securing American rights to exploit the Northwest Territory without interference from European powers.[5]

Indian resistance to white encroachments in the region also began to disintegrate. On 16 June 1820, the Ojibwe signed a treaty at Sault Ste. Marie ceding to the United States sixteen square miles of land on the coast of the peninsula in exchange for securing a perpetual right of fishing at the falls of St. Marys River. The treaty also provided for "a place of encampment upon the tract hereby ceded, convenient to the fishing ground, which place shall not interfere with the defences [sic] of any military work which may be erected, nor with any private rights."[6] In 1822, the United States established Fort Brady on the site of the former Fort Repentigney. Sault Ste. Marie's strategic position on the St. Marys River assured that it would continue to host a garrison of military troops for the remainder of the nineteenth century.

Political Organization and Settlement

Like the rest of the Northwest Territory, settlement in Michigan was governed by a series of federal land laws, including the Land Ordinance of 1785, the Northwest Ordinance of 1787, the Land Acts of 1800 and 1804, the Land Act of 1820, and the Credit Relief Act of 1821. The remote and untamed character of Michigan's Upper Peninsula impeded large-scale settlement for several decades, but this federal legislation played a critical role in the evolution of the frontier communities, such as Sault Ste. Marie, that predated the American Revolution. The land laws were written to meet the twin objectives of encouraging settlement in the Northwest Territory and maintaining a democratic process for land distribution. The laws established procedures for systematically surveying land to allow the creation of clear titles, to make land available at public sales, and to register claims at federal land offices. According to Cayton, the cumulative effect of these laws was the completion of a remarkably egalitarian process of transferring land from one group (Indians) to another through the intermediary action of a government on a scale "unmatched anywhere else in the history of the world."[7]

Michigan originally was part of the vast Indiana Territory, which was organized in 1798, when a sufficient population was achieved to divide the original Northwest Territory into two territories. The eastern division ultimately became the State of Ohio in 1803. The western division was the Indiana Territory, and extended from the west boundary of Ohio to the

[5] Madison, *Indiana Way*, 45; D. W. Meinig, *The Shaping of America: A Geographical Perspective on 500 Years of History, Volume 2: Continental America, 1800-1867* (New Haven: Yale University Press, 1993), 48.
[6] Charles J. Kappler, ed., *Indian Affairs: Laws and Treaties*, Vol. 2, *Treaties* (Washington: Government Printing Office, 1904), 187-188. It should be noted, however, that during the construction of the original Soo Locks canal system in 1853, workmen drove the Ojibwe from their homes and destroyed their gardens and cabins. Ojibwe demands for reparations resulted in the Treaty of 1855 between the United States and the Ojibwe and Ottawa tribes.
[7] Andrew R. L. Cayton, *Frontier Indiana* (Bloomington: Indiana University Press, 1996), 267.

Mississippi River, and north from the Ohio River to the Canadian border.[8] In 1805, the Michigan Territory was further separated from the Indiana Territory due to the latter's rapidly increasing population. Following the end of the War of 1812, the rate of settlement throughout the Northwest increased at an exponential rate. With Indian resistance broken and conflicting land claims by Great Britain resolved, what has been termed the "greatest westward migration" in the history of the United States took place.[9]

In 1826, the Michigan Territorial Legislature created Chippewa County, with Sault Ste. Marie designated as the county seat. At this time, Chippewa County extended far beyond its present boundaries and included the Mesaba iron ranges of Minnesota, the sites of Duluth, Superior, Marquette, and Houghton, and all of the Copper Country.[10] As Michigan became more densely settled, subsequent creations of additional counties eventually winnowed Chippewa County to its present boundaries. Finally, in 1836, the Wisconsin Territory was created from the western reaches of the Michigan Territory. The following year, the present boundaries of the Upper and Lower Peninsulas of Michigan were established and the territory made a successful petition for statehood.

Transportation Development in the Upper Peninsula

As soon as Michigan attained statehood in 1837, the state sought to develop an adequate transportation system. In the early to mid-nineteenth century, cheap, flexible, and dependable transportation was essential for the rapid development of the state. Many of Michigan's resources, chiefly agricultural products and raw materials, could not be exploited profitably until a suitable transportation network had been developed.

The St. Marys River posed both an opportunity and an obstacle to enhancing transportation in the Upper Peninsula. The river connects Lake Superior to Lake Huron, providing an important conduit in linking the far Northwestern territory to the Great Lakes system. Lake Superior, however, is approximately 21' higher than the level of Lake Huron, and an enormous rapids existed on the St. Marys at Sault Ste. Marie. The rapids were approximately one-quarter of a mile wide and three-quarters of a mile long. Reportedly, it was possible to hear the roar of rushing water from more than a mile distant. Of necessity, the Ojibwe Indians who lived nearby and early pioneers portaged their canoes around the rapids in order to reach Lake Superior from the St. Marys River. As settlement of the Northwest Territory increased, larger

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[8] Madison, *Indiana Way*, 34; Cayton, *Frontier Indiana*, 120-121, 236; R. Carlyle Buley, *The Old Northwest: Pioneer Period, 1815-1840*, 2 vols. (Bloomington: Indiana University Press, 1950), 1:68-69.
[9] Malcolm J. Rohrbough, *The Land Office Business: The Settlement and Administration of American Public Lands, 1789-1837* (New York: Oxford University Press, 1968), 89.
[10] Stanley Newton, *The Story of Sault Ste. Marie* (Sault Ste. Marie: Sault News Printing Company, 1923), 139; Bayliss, *et al.*, *River of Destiny*, 216.

boats had to be unloaded and their cargoes hauled around the rapids in wagons to be reloaded in other boats. To circumvent the rapids, in 1797, the Northwest Fur Company constructed a navigation lock measuring 38' in length on the Canadian side of the river. This structure was destroyed, however, during the War of 1812 and the practice of portaging freight and passengers resumed.[11]

By the mid-nineteenth century, the discovery of vast mineral deposits in the western end of Michigan's Upper Peninsula triggered an economic boom in Sault Ste. Marie. Copper and iron ore had to be transported by ship, thus catalyzing commercial development along the shores of the St. Marys River.[12] The rapids continued to pose a major obstacle, necessitating portage of ships and cargo. The cargo and crew typically were off-loaded and the vessels rolled overland on greased logs and, later, on railroad tracks. This process could take up to a month for large, heavily laden vessels. Consequently, support facilities were constructed to house, feed, and entertain the crews. Saloons, hotels, stores, liveries, and ship-related commerce cropped up along the shore, primarily in the vicinity of Water Street.

The demand for Michigan's mineral deposits created an imperative need to overcome the navigation obstacle at the St. Marys Falls. In 1852, the U. S. Congress granted 750,000 acres of public land to the State of Michigan for use as compensation to a company to construct a new canal and lock system at the rapids. The Fairbanks Scale Company began the project the following year. On May 31, 1855, two 350-foot locks and a 1½-mile long canal were turned over to the State of Michigan and designated as the State Lock.[13] The completion of the lock and canal allowed for larger vessels and a wider variety of cargoes to pass through the waterway, which opened the Sault to technological and industrial growth.

Less than a decade later, shipments made through the Soo Locks had a direct bearing on the Union's success in the Civil War. By the late 1870s, the amount of commercial traffic began to exceed the capacity of the original locks. Michigan lacked the funds to pay the construction costs for new locks and, in 1881, the locks were transferred to the federal government under the jurisdiction of the U. S. Army Corps of Engineers, which has operated the American lock system since that time.[14] Named after construction supervisor General Godfrey Weitzel, the newly constructed Weitzel Lock opened to traffic in 1881 and measured 515' long and 80' wide. Six years later, construction began on the Poe Lock, which was completed in 1896. This lock was 704' long and 100' wide. Between 1908 and 1914, the Davis Lock was built, while the Sabin Lock opened to traffic in 1919. Each of these locks is 1,350' long and 80' wide, and they are fed

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[11] Joseph Scott Mendinghall, "Soo Locks, Sault Ste. Marie, Michigan," National Register of Historic Places Nomination Form. U.S. Department of the Interior, National Park Service, 1975.

[12] Susan M. Schacher, "Cultural Resource Investigation at the Sault Ste. Marie Marina Site, Chippewa County, Michigan" (1996), 23.

[13] Mendinghall, "Soo Locks," Sault Ste. Marie, Michigan.

[14] Mendinghall, "Soo Locks," Sault Ste. Marie, Michigan.

by the North Canal.[15] Although still extant, neither currently is operable. Upon securing funding, the Corps plans to replace these two locks with a new facility.

The Weitzel and Poe locks were replaced during the mid-twentieth century by two new, larger locks. In 1942, the MacArthur Lock was constructed and is 800' long and 80' wide. The last lock to have been constructed is the new Poe Lock, which was completed in 1968. This lock is 1,200' long and 110' wide. The South Canal supplies these two newer locks, both of which remain in operation.[16]

The Canadian Lock of the Sault Ste. Marie Canal was constructed between 1889 and 1895, and its original dimensions were 899' long x 59' wide. The lock officially opened on 7 September 1895. It was cut through the bedrock of St. Marys Island, and the excavated red sandstone was used for the construction of buildings on the site. These included an administration building, a superintendent's residence, and a powerhouse. The latter building sits adjacent to the lower end of the lock. Power generated here operated the electric gates and valves that controlled the flow of water into and out of the lock. In 1896, an emergency swing bridge dam was built on the north side of the upper entrance to the lock. This mechanism functioned to reduce the flow of water in the event of gate failure. It now is the last structure of its type in the world.[17]

The lock was intended to provide an all-Canadian waterway from the Atlantic Ocean to Lake Superior. It functioned as a primary means of transporting mineral and iron ore from Lake Superior and grain from the Canadian West. A failure in the lock wall in 1987 caused the closure of the lock. In 1997, a smaller lock was constructed within the original lock to accommodate recreational vehicles. The site now is operated by Parks Canada and includes a small visitor center/museum, walking trails, and several historic buildings.[18]

It also should be noted that construction of the Canadian lock necessitated the addition of a bridge on the nearby railroad line that served the International Railroad Bridge. The Canadian span is separated from the International Bridge by approximately 840' of tracks that cross the south side of the Canadian lock's grade. Built in 1899, the bridge is a steel, single-track, pin-connected, through-truss, rim-bearing swing span and remains fully operable. The floor is an open deck with steel stringers; while the floor beams are original, the deck timbers were replaced in 1997. The pivot pier is situated on the north side of the lock, and the south half of the span extends across the lock while the north half connects to a single set of grade level tracks. This swing span is a variation of the camelback Pratt truss. The pin-connected truss has thirteen

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[15] Mendinghall, "Soo Locks," Sault Ste. Marie, Michigan; Bayliss *et al.*, *River of Destiny*, 108.
[16] Mendinghall, "Soo Locks," Sault Ste. Marie, Michigan; Bayliss *et al.*, *River of Destiny*, 108-109.
[17] Parks Canada, "History: Sault Ste. Marie Canal National Historic Site of Canada," (http://parkscanada.pch.gc.ca/parks/ontario).
[18] Parks Canada, "Sault Ste. Marie Canal National Historic Site" (undated brochure).

panels with diagonal tension and vertical compression members that connect the top and bottom chords. Additional diagonal counter braces also are present. Each pair of end posts is yoked together at the top by a pair of diagonal braces forming an "X." Lateral members and struts with lacing bars span the top two chords. An elevated operations house is located at the center of the span and is connected to two pairs of interior posts.

Railroad Development in the Upper Peninsula

Although the St. Marys Falls canal system played a vital role in Michigan's economic development, as well as in the growth of Sault Ste. Marie, exclusive reliance upon the Great Lakes waterways was problematic for several reasons. First, the Great Lakes were icebound for approximately one-quarter of each year. Many of the rivers used to reach the lakes were prone to freezing in the winter, flooding in the spring, and drying up during summer. Snags, sandbars, and other obstructions were frequent and difficult to remove. Second, the economic benefits of water transportation were limited to coastal communities. Extensive trade in the hinterlands of Michigan was not feasible using only waterways. Due to primitive paving technologies and the high costs of construction and maintenance, good roads were virtually unheard of in Michigan until the early twentieth century. Third, many of the state's resources could not be profitably exploited without a faster, more reliable system of transportation. This was particularly true of agricultural products. In order to move beyond subsistence farming, farmers needed cash crops, which have a large bulk in proportion to their value. Consequently, shipping via water or overland often absorbed all of a farmer's profits. The few products that were sufficiently valuable to withstand the high costs associated with an inadequate transportation system, such as furs and copper, were too scarce and available to a too limited population to allow for effective statewide economic development.[19]

Faced with the daunting task of developing effective and widespread trade networks, the drafters of Michigan's first state constitution provided the legal basis for publicly funded internal improvements. This measure was especially critical given that federal funds for such endeavors were not available at the time, and efforts to force local banking institutions to help finance projects had been ineffective. The Public Improvements Act of 1837 provided for borrowing up to $5 million at 5.25 percent interest to finance the construction of three railroads and two canals.[20]

Unfortunately, the state government's ambitions far exceeded their ability to finance these projects. By 1840, only 104 miles of railroad had been constructed and, by 1845, Michigan's financial resources seemed exhausted. The following year, the state sold much of the

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[19] Frank N. Elliott, *When the Railroad was King: The Nineteenth-Century Railroad Era in Michigan* (Lansing: Michigan Historical Commission, 1966), 2-3.
[20] Elliott, *When the Railroad was King*, 4.

rail network to private concerns and a year later was out of the railroad business altogether.[21] As previously noted, however, changes in administrative policy allowed for federal assistance with construction of the first St. Marys Falls Canal during the early 1850s. The canal played a critical role in the Upper Peninsula's development during the mid-nineteenth century. The economic infrastructure that developed as a result also played a role in subsequent efforts to build a viable rail network.

Furthermore, the use of federal land grants to finance internal improvements, as was the case with the St. Marys Falls Canal, also became a common practice with regard to railroad construction. Alternate sections of land along a proposed railroad route were given to the railroad company, which then was free to sell the land outright or use it as security for bonds that were sold to finance construction. The system had several advantages: previously inaccessible areas were opened to settlement by the presence of the railroad; the federal government easily disposed of excess land holdings; and the land served as collateral to enhance the financial solvency of railroad construction endeavors. In practice, however, delays in construction often meant that settlers along unfinished railroad routes faced isolation and economic blight. Further development was hindered by two factors: the railroad company could not claim and develop its lands until the route actually was in operation, and public land immediately adjacent to the railroad was priced at $2.50 per acre, or double the cost of public lands located away from railroads.[22] Local aid to railroads in the form of county and municipal tax revenues became common during the Civil War years. Between 1863 and 1869, Michigan communities provided more than $1 million in aid to railroad construction. Construction necessarily lagged during the Civil War, but between 1869 and 1873, almost two thousand miles of track were laid.[23]

Michigan received its first railroad land grant in 1856. Among the companies that received a land grant in the Upper Peninsula was the Detroit, Mackinac, and Marquette Railroad. Many of Chippewa County's settlers purchased their land at $4 per acre from this railroad. The majority of rail construction occurred in the Lower Peninsula and, until 1887, it was not possible to travel by rail from one end of the Upper Peninsula to the other. During the 1880s, the Michigan Central Railroad purchased the Detroit and Bay City Railroad and began work on extending the route to Mackinac. At the same time, the Canadian Pacific started constructing a branch line to the Sault, and a route also was added from St. Ignace to Marquette, with plans to extend on to the Sault as well. In 1887, all of these routes were completed. Furthermore, four railroads joined forces to erect the first railroad bridge across the St. Marys River to connect the twin cities of Sault Ste. Marie.[24]

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[21] Elliott, *When the Railroad was King*, 9-10.
[22] Elliott, *When the Railroad was King*, 22, 24.
[23] Elliott, *When the Railroad was King*, 43.
[24] Elliott, *When the Railroad was King*, 22; Bayliss, *et al.*, *River of Destiny*, 222; William C. Sauer, *Illustrated Atlas of Sault Ste. Marie, Michigan and Ontario* (Detroit: William C. Sauer, 1888), 64.

Sault Ste. Marie International Railroad Bridge

The St. Marys Falls Bridge Company was established during the early 1880s for the purpose of constructing a bridge to connect Sault Ste. Marie, Michigan, to its counterpart in Canada. Four railroad companies owned equal shares of stock in the company. These were the Duluth, South Shores and Atlantic; the Minneapolis, Sault Ste. Marie and Atlantic; the Canadian Pacific; and the Grand Trunk Western Railway.[25] The contractors for the original 1887 bridge included R.G. Reid of Lachine, Quebec Province, Canada for the masonry portion, while Dominion Bridge Company, Ltd., also of Lachine, built the iron work for the main bridge. The drawbridge was constructed by Detroit Bridge and Iron Works of Detroit, Michigan. G.H. Massey served as engineer for the project, assisted by J.W. Moffatt and Thomas Henderson.

A wealth of information concerning the original bridge is contained in an article published in the *Sault Ste. Marie Democrat* on 19 January 1888:

> In the fall of 1886, in order to decide upon a location and obtain the surroundings preparatory to calling for bids, J. W. Moffat, C.E., who was then acting as assistant engineer in charge of the Lachine bridge, at Montreal, was sent to the Soo, to make the preliminary surveys. These being done, the specifications were drawn up and the contract let; the masonry, to R. G. Reid, of Lachine; the iron work of [the] main bridge, to the Dominion Bridge Co., and the draw to the Detroit Bridge Co. In May, 1887, G. H. Massey, the engineer in charge of construction, arrived in the Sault, J. W. Moffat and Thomas Henderson, his two assistants having preceded him a few days.
>
> The surveys were made, and everything put in readiness for the construction. The last of the same month, Mr. Reid landed in the Canadian Sault with his engines and tools, and started in with the work. The first stone of the masonry was placed in position early in June, on the Canadian side, (the work was started from that side in order to escape duties on the material), and the last of the masonry work was completed Nov. 23d. Before the masonry work was entirely completed, the iron had begun to arrive, and on Sept. 27, the erection of the false work was begun, and the work of laying the iron was begun some ten days later. The work was completed, all but a little riveting and batting, so as to receive the first train, on the last day of last year. The material for the draw bridge [swing span] arrived on Nov. 12, Mr. Staughton, the engineer in charge, arriving the day before, and the mammoth draw was swung on Dec. 26 for the first time, and was ready to

[25] "The Bridge," *Sault Ste. Marie Democrat*, January 19, 1888; C. S. Osborn, *The New Metropolis: Sault Ste. Marie, Michigan* (n.p.: n.d), 27.

> receive the first train on the completion of the main bridge on the last day of 1887.
>
> The main bridge consists of ten spans, each 242 feet in length, and weighing 250 tons. The draw is next to the largest in the country, only one we believe (the one at St. Paul) exceeding it. It weighs over 300 tons and is 396 feet in length.
>
> Between the last span on the Canadian side and the spans of the north channel, each of which is 105 feet in length, is 2,000 feet of trestling over the islands between this channel and the rapids. . . [26]

The bridge was highly anticipated to act as a catalyst for commercial and industrial development. An undated late nineteenth century advertising circular for Sault Ste. Marie pointed out that the Minneapolis, St. Paul and Duluth route via Sault Ste. Marie to New York was more than 200 miles shorter than any line in operation around Chicago; the route to Boston was about 300 miles shorter; to Portland, Maine, was 350 miles shorter; and to Montreal was over 400 miles shorter. As the American terminus for these routes, Sault Ste. Marie was poised to become a locus for round-houses, machine shops, and railroad company division headquarters.[27]

Economic Development in Sault Ste. Marie

Prior to the 1880s, Sault Ste. Marie was still a somewhat isolated community. Although the St. Marys Falls canal system was a vital transportation link for the shipment of raw materials and minerals to eastern markets, the Great Lakes were icebound for at least one-quarter of every year. Not until 1874, or nearly a century after the United States gained possession of the area, did Sault Ste. Marie organize itself as a village. By the mid-1880s, however, the community appeared to be on the brink of an unprecedented boom, largely due to its advantageous location in close proximity to prime agricultural and timber land and its shipping capabilities. Sawmills ranked among the earliest and most successful industries in the Sault. The earliest mill was established in 1822 by the United States Army when Fort Brady was constructed. Privately owned concerns soon followed and, by the 1880s, sawmills lined both sides of the St. Marys River. Among the largest was the plant owned by James Norris and Company (later known as Hall and Munson). The facility encompassed more than 160 acres and reportedly was the largest sash and door factory in the world, cutting about 40 million feet of lumber annually. Meanwhile, improvements to increase the capacity of the Soo Locks were taking place, with construction of the Poe and Canadian locks begun by the late 1880s, and railroad construction continuing at a rapid rate throughout the Upper Peninsula. The sense of momentum in Sault Ste. Marie was not

[26] "The Bridge," *Sault Ste. Marie Democrat*, January 19, 1888.
[27] Osborn, *The New Metropolis*, 28.

hindered even when a fire broke out in a saloon and destroyed over half of the village's commercial buildings in 1886. The fire resulted in the relocation of the business center from Water Street to the Portage Avenue and Ashmun Street area (Figure 2). A 1923 history of the community went so far as to call the fire a "blessing in disguise," since it resulted in new and more substantial construction in the downtown district.[28]

In 1887, Sault Ste. Marie applied for and received a city charter from the state legislature. Three years later, it ranked as the fastest growing city in Michigan, with a population of 5,800. The city began to prosper. Amenities included an electric streetcar system, stable water and sewer system, gas lines, electricity to commercial, industrial, and residential buildings in the city, and streetlights. Given the proximity of the St. Marys rapids, Sault Ste. Marie was especially well-positioned to take advantage of rapidly emerging technology for generating electricity. Westinghouse's development of the transformer in 1885 allowed for the reduction of electric voltage so that electricity was safe for commercial and residential use. Subsequently, generating stations could distribute power over long distances and to various types of customers. By 1887, Michigan approved the diversion of water from the St. Marys River for the purpose of creating a hydroelectric power plant. Residents of Sault Ste. Marie approved construction of a power canal and hydroelectric milling center in the river rapids. In 1888, the Edison Sault Light Company erected its first power house at the rapid's edge near the Canadian lock. This location, however, was prone to frequent clogging with ice and the forebay was too narrow to allow sufficient generation of power. In 1905, the reorganized Edison Sault Electric Company built a new power house with a larger capacity and greater forebay.[29]

At this juncture, Hector Clergue arrived in Sault Ste. Marie, Ontario, on an exploratory mission to establish hydroelectric sites in the Saint Lawrence Basin. In 1898, Clergue organized the Lake Superior Power Company and purchased the title to the Canadian canal. Over the next four years the company expanded the canal to 200' in width, 24' in depth, and 2.25 miles in length. Soon after, he established the Sault Sainte Marie Pulp and Paper Company, the first of many enterprises upon which Clergue embarked. He founded the Helen mine on a hematite outcrop in the Michipicoten country 100 miles to the west of the Sault. Here he commenced a ferro-nickel plant and opened the Elsie, Josephine, and Eleanor mines. He also built a sulfite mill at Sudbury. As the iron ore and timber required railroads for transportation, Clergue founded the Algoma Central and Hudson Bay Railroad and constructed a rail line to connect the mines with Michipicoten Harbor. Later, he built a steel mill beside the St. Marys above the head of the canal and the International Railroad Bridge.[30]

Clergue's efforts laid the groundwork for the industrial growth of both the Canadian and the American sides of the St. Marys. Since then, the Abitibi Power and Paper Company Limited,

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[28] Newton, *The Story of Sault Ste. Marie*, 168.
[29] Newton, *The Story of Sault Ste. Marie*, 173.
[30] Bayliss, *et al.*, *River of Destiny*, 141-145.

Chromium Mining and Smelting Corporation Limited, and the Krisp Laundry Company, among others, joined the Algoma Steel Corporation on the Canadian side of the St. Marys. Union Carbide was the earliest industrial concern founded on the American side following the completion of the power canal. In subsequent years, the Lake Superior Carbide Company, the Northwestern Leather Company, the Lock City Marine and Machine Company, and Soo Woolen Mills, among others, also joined them.[31]

During this period of industrial expansion, rail service increased steadily through the Sault. A major source of this intensive rail development was the effort to transport grain to the markets of Boston and New York at a cheaper rate than through Chicago.[32] The Minneapolis, St. Paul and Sault Ste. Marie Railroad, founded in 1883 by Minnesota flour mill interests, took advantage of the route via the International Railroad Bridge and the shortened distances to east coast markets that the rail route through Sault Ste. Marie and Ontario provided. The alternative route through Canada challenged the primacy of the longer route through Chicago and opened the area to greater competition. By 1914, the "Soo Line" extended from the wheat producing regions to the flour mills of Minneapolis and terminated on the Atlantic coast. Numerous mergers of smaller railroad companies in the early to mid-twentieth century resulted in the Soo Line's coast-to-coast service. This service eventually connected the Pacific Coast cities of Portland, Oregon, and Vancouver, British Columbia, with the eastern cities of Montreal, Quebec, Boston and New York. At the center of this international network were the twin cities of Sault Ste. Marie.[33]

The history of agricultural development in Chippewa County also illustrates the significant role played by rail transportation. An 1860 census showed that the county had only forty-three occupied farms totaling 1,479 improved acres, most of which were located along the St. Marys River or on its islands. Settlement continued at a slow rate for two more decades, with just seventy-five farms listed in the county by 1880. Over the next forty years, however, after the construction of the International Railroad Bridge, growth accelerated at an explosive rate, reaching 1,569 farms totaling 185,000 improved acres in Chippewa County by 1920. Local farmers relied heavily upon rail transportation to ship their surplus production. Among the favored crops were hay, oats, barley, wheat, root crops, and peas. Hay was the most profitable cash crop, as it was greatly in demand for use at lumber camps. As much as 2,500 carloads of hay were shipped annually by rail to lumber camps located throughout the great forests of the Upper Peninsula and Ontario, Canada. Surplus supplies of oats and barley also found a ready market at the lumber camps. Field peas grown for seed houses and canneries were another reliable cash crop until the 1940s, when pests and diseases rendered production unprofitable.[34]

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[31] Bayliss, *et al.*, *River of Destiny*, 266-268.
[32] "From the Beginning, a Proud Heritage," *Soo Liner* (May-June 1976), n.p.
[33] "From the Beginning, a Proud Heritage," *Soo Liner* (May-June 1976), n.p.
[34] Bayliss *et al.*, *River of Destiny*, 222-224.

Conclusion

As there were limited alternatives, railroads continued to dominate Michigan's inland transportation until the early twentieth century. The railroad's zenith came in 1910, at which time a total of 9,100 miles was in operation.[35] Beginning in 1904, Michigan increasingly turned to building and improving highways to accommodate the increasing number of trucks and automobiles, while the market share for rail transportation began a rapid decline. Between 1890 and 1920, interurban streetcars also siphoned business away from the heavy rail lines. Long-distance passenger and freight service dwindled following the advent of commercial air travel after World War II. Railroads increasingly began to rely on shipping heavy, bulk freight items, and maintained their competitive positions largely by improving their equipment and operating techniques.[36]

Concomitant to the decline of rail service had been a steady rate of deindustrialization in Sault Ste. Marie, particularly on the American side of the St. Marys River. Many of the heavy industrial plants closed as corporations moved their manufacturing operations offshore. This trend particularly was apparent on the Michigan side of the river. Census returns for the two Saults clarify their respective progress. In 1880, almost 2,000 people lived in the American Sault, while only 800 lived on the Canadian side. By 1910, the populations of the two cities were nearly equal: 12,000 for the American Sault and 11,000 for the Canadian. By 1930, however, the Canadian side surpassed the American and the population divide has increased since. Today, over 80,000 people live in the Canadian Sault and less than 10,000 live in the American Sault.

III. PROJECT INFORMATION

Past Alterations to the International Railroad Bridge

Alterations to the Soo Locks system have resulted in several major modifications to the railroad bridge over the years. The extant swing span at the north end of the bridge was erected during the mid-1890s, when the Canadian Lock was constructed. During the 1910s, two new locks were constructed, the Davis (opened in 1914) and the Sabin (opened in 1919). The two lattice truss spans and one of the Warren truss spans were removed and replaced with a Strauss Trunnion Bascule Bridge.[37] This trunnion bridge was discussed extensively in an article published in the January 21, 1915, edition of *Engineering News*. The bridge was noted for three aspects: 1) chord locks that handled live-load stresses and converted the two leaves into a fixed truss span when the bridge was closed; 2) its length, at 336' from center to center of trunnions, making it the longest bascule span yet built; and 3) a hydraulic mechanism that allowed the

[35] Elliott, *When the Railroad was King*, 45.
[36] Elliott, *When the Railroad was King*, 66.
[37] Charles K. Hyde, *The Upper Peninsula of Michigan: An Inventory of Historic Engineering and Industrial Sites* (Washington, D.C.: U. S. Department of the Interior, 1978), 201.

bridge to be moved longitudinally to provide for expansion and contraction of the bridge elements.[38]

On October 7, 1941, the north wing of the bascule bridge at the west approach to the locks collapsed beneath the weight of a freight locomotive. The fallen engine and bridge blocked traffic for two days on both the bridge and through the two largest locks of the canal. Restoring traffic was of critical importance as, by this time, the United States increasingly was on a wartime footing. Within four days, the wreckage had been cleared and traffic through the canal was restored.[39]

In 1959, the original swing span at the south end of the bridge was replaced with the extant vertical lift bridge. The American Bridge Company, a division of the United States Steel Corporation, submitted the winning bid for the construction project, at a cost of $3.35 million. During construction, the swing span remained in service and rail traffic was maintained for much of this period. The swing span was "bobbed" by removing a portion of each end panel and providing new supports on each bank to carry the end reactions. Bobbing the swing span allowed opening and closing of the span without interfering with construction of the towers. After the substructure was completed, the new towers were erected, the machinery installed, and the electrical equipment was tested prior to placement of the counterweight ropes. The lift span was erected in a raised position, "piggybacked" over the swing span. When the lift span was completed, the swing span was swung into an open position and a portion of its mid-section was removed to allow the lift span to be lowered into position for the first time. Ultimately, the swing span and pivot pier were removed entirely. The lift span was on the same alignment as the swing span, requiring no changes to the grade level of the tracks at the south end of the span. The refurbished bridge was placed in service in mid-August 1959.[40]

Contractors

1913 Bascule Bridge:

Designed by Strauss Bascule Bridge Company, Chicago, Illinois
Built by Pennsylvania Steel Company
Design and construction supervision by P. B. Motley, Bridge Engineer, Canadian Pacific Railway

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[38] "Bascule Bridge Acting as a Simple Truss Span," *Engineering News*, 108-109.
[39] "This was the Biggest Story of the Year in Sault Ste. Marie," *Sault Ste. Marie Evening News* (January 2, 1942), n.p.
[40] Sault Ste. Marie Bridge Company, "Reconstruction of Bridge over South Canal, St. Mary's River, Sault Ste. Marie, Michigan, Specifications, Contract Documents," June 1957; "Lift Bridge in Operation," *Sault Ste. Marie Evening News* (August 17, 1959), 2.

1959 Vertical Lift Bridge:

Designed by Howard, Needles, Tammen and Bergendoff, Consulting Engineers, Kansas City, Missouri
Constructed by American Bridge Company, United States Steel Corporation
Subcontractors:
Straits Engineering Company, Sault Ste. Marie, Michigan
Industrial Construction Company, Minneapolis, Minnesota
Operator's house – Proksch Construction Company, Iron River, Michigan
Signal system – Union Switch and Signal Division of Westinghouse

Current Change and Documentation

Further rehabilitation of the International Railroad Bridge is required because tension members of the Warren truss spans are fatigued to their limit, pin connections are considerably worn, and the bridge does not meet current horizontal and vertical clearance standards. On-site inspections found loose eye-bars at every span. Spans 2, 4, 6, and 8 were assessed to be in poor condition, with many loose eye-bars, and Spans 1, 3, 7, and 9 were found to be even more deteriorated. Only Span 5 was judged to be in fair condition.

At the North Dike between St. Marys Falls and the U.S. Power Canal, Span 9 will be removed. An abutment already exists on the south side of the island. A new abutment is proposed to be constructed on the north side. Between the abutments, approximately 4,900 yards of fill will be added at this location and a railroad bed will be constructed on the fill. Roadway access will be extended over the new tracks instead of under the bridge, which would allow for high equipment access in the future. A crossing with stop signs will be installed on each side of the tracks.

Beneath the remaining eight 240' truss spans, a total of twenty-four drilled piers will be added, with three additional piers placed between each existing pier. The trusses will be supported on the new piers to reduce the loads in some of the truss members. The placement of the new piers also will require reinforcement of some of the truss tension members. Drilling for new pier shafts will take place in the waterway. On the west center pier, two power cable lines and a pad mount transformer with underground power lines will be installed. Six existing transformers will be removed. This project is considered to be the first step toward converting the bridge to a pier and girder system over a period of time. Eventually, all of the truss spans will be removed. No alterations presently are planned for the vertical lift and bascule bridge spans.

In its present condition, the International Railroad Bridge represents a nationally significant engineering structure. The proposed alterations will result in the demolition of much of the bridge and will alter the historic environment of the St. Marys Falls Canal. As a result, the

International Railroad Bridge was documented according to the standards of the Historic American Engineering Record (HAER) prior to the beginning of these alterations to the Warren truss spans. The purpose of the documentation was to create a permanent record of the bridge's engineering and appearance as it existed before the construction project began. The documentation effort was undertaken as part of a Memorandum of Agreement between the Department of the Army, Corps of Engineers, Detroit District, and the Michigan State Historic Preservation Office. In April 2002, Lena L. Sweeten and Kimberly Starbuck of Gray & Pape, Inc., completed the fieldwork for the bridge's documentation. Ms. Sweeten served as the project's Field Director and Principal Investigator, while Ms. Starbuck photographically documented the bridge according to HAER standards. James C. Pritchard assisted with preparation of the historic narrative of the report.

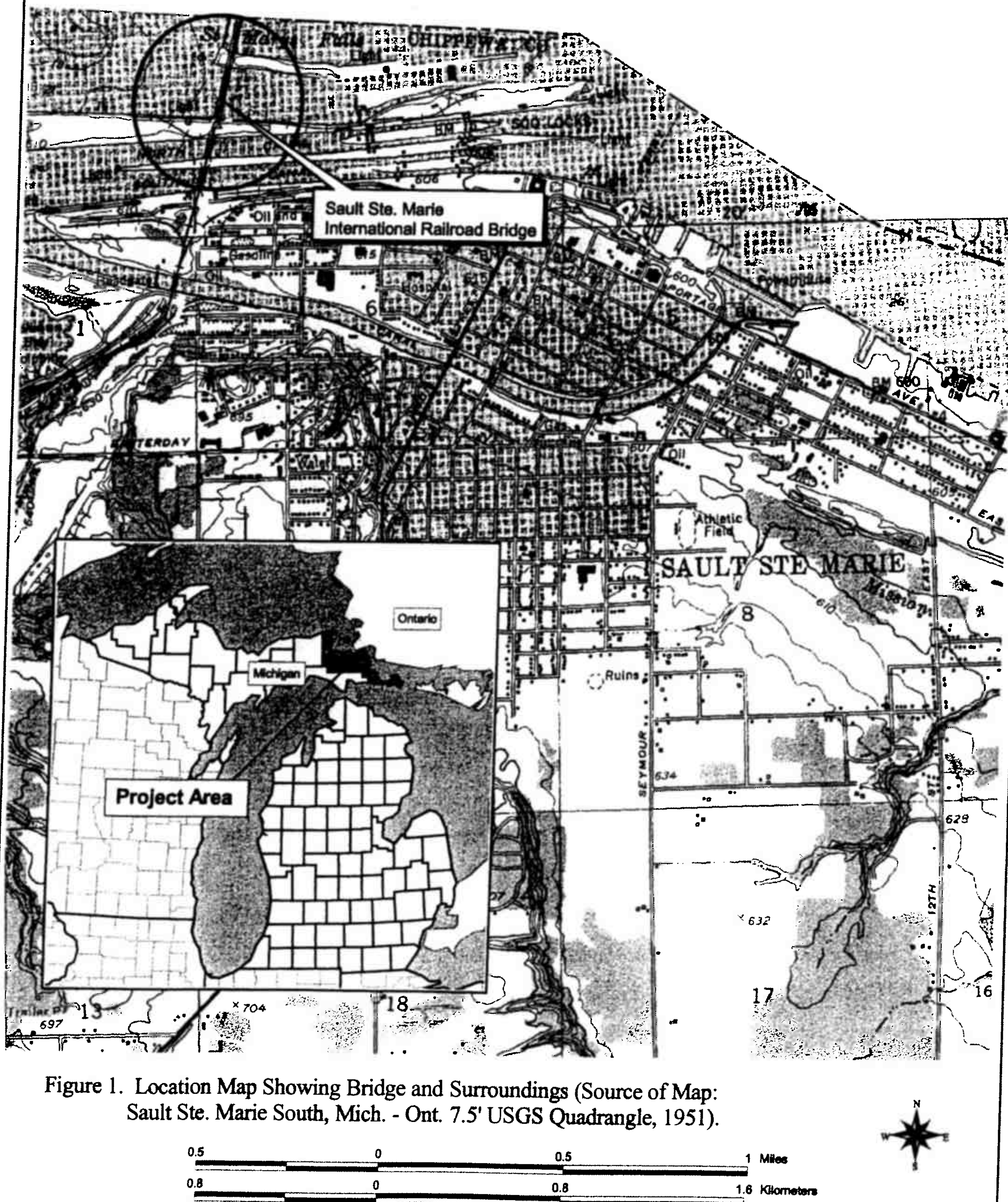

Figure 1. Location Map Showing Bridge and Surroundings (Source of Map: Sault Ste. Marie South, Mich. - Ont. 7.5' USGS Quadrangle, 1951).

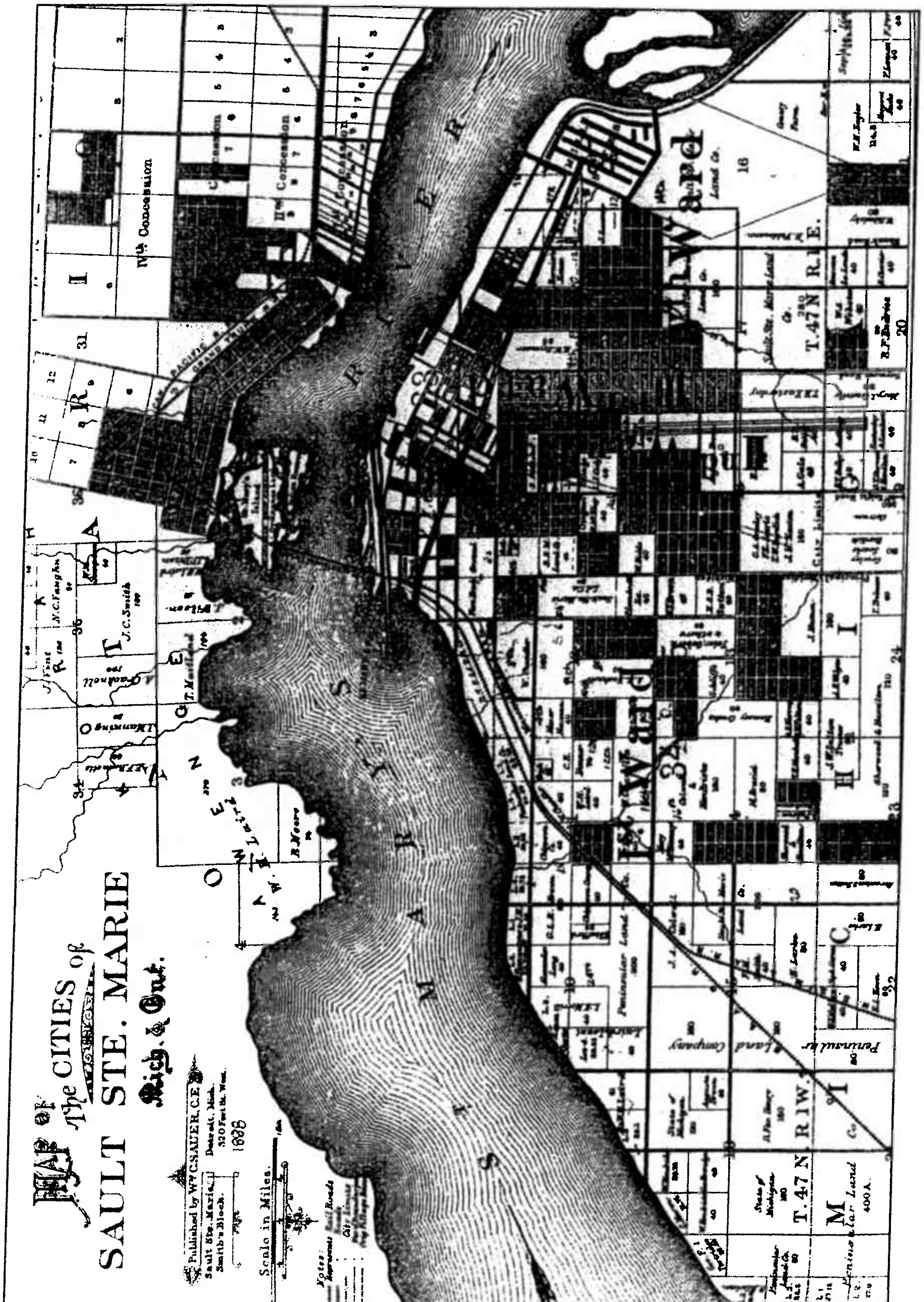

Figure 2. Site plan depicting original International Railroad Bridge (adapted from Wm. C. Sauer, "Map of the Cities of Sault Ste. Marie, Michigan and Ontario," 1888).

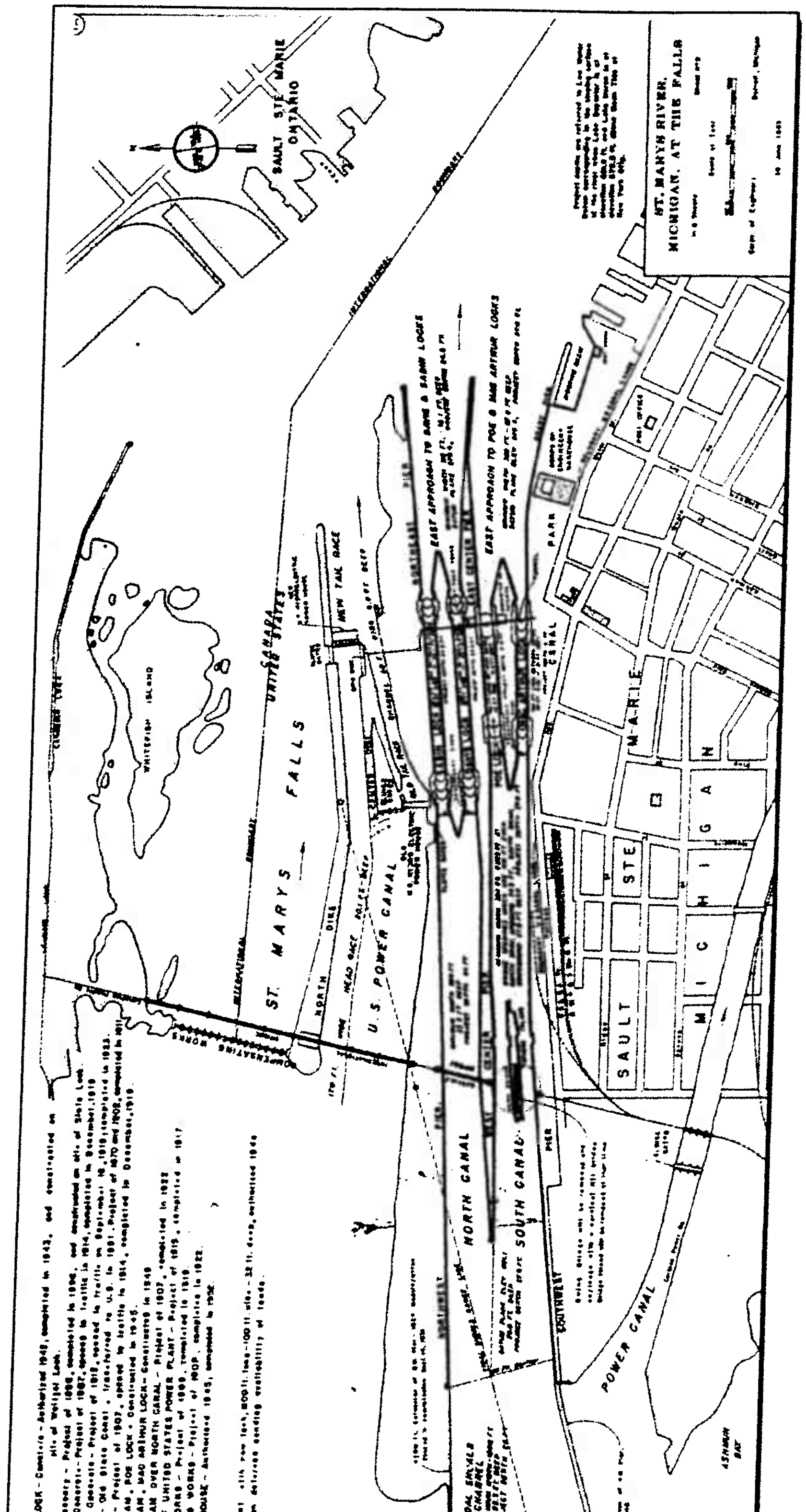

Figure 3. Site plan of St. Marys Falls Canal System, c. 1955 (adapted from U.S. Army Corps of Engineers, Detroit District brochure, 'St. Marys Falls Canal," c.1955).

BIBLIOGRAPHY

1. ENGINEERING DRAWINGS. (Originals located at Canadian National Railroad office, Sault Ste. Marie, Michigan)

Drawing no. 3. C. P. R. Soo St. Marie Bascule Bridge. November 5, 1941.

Drawing no. 6. Contract No. 161. Sault Ste. Marie Bridge. 10 240-ft. Spans. Bottom Chord and End Post Strut. Undated drawing.

Drawing no. 9. Contract No. 161. Sault Ste. Marie Bridge. 10 240-ft. Spans. End Floor Beam and Shoes. Undated drawing.

Drawing no. 43554-6. Pier No. 6. Undated drawing.

Drawing no. 43554-22. Centre Pier Canal. Undated drawing.

Drawing no. 43554-35. South Abutment, North Channel. Undated drawing.

Drawing no. 57535-2. C. P. R. International Bridge Sault Ste. Marie. Pier No. 2 Showing Protection Wall (as constructed). January 30, 1913.

Drawing no. B-2-645-1. C. P. R. Algoma District – Thessalon Subdivision. Bridge No. 134.06. St. Mary's River Crossing. Rating 240 ft. Thro' Pin Truss Spans (9). January 9, 1933.

Drawing no. B-2-645-2. C. P. R. Algoma District – Thessalon Subdivision. Bridge No. 134.06 – International Bridge at Sault Ste. Marie. Details for Reinforcing $L^5 - C^{5-6}$ Span 6. January 9, 1933.

Drawing no. B-2-718. C. P. R. Algoma District Thessalon Subdivision. Strauss Bascule Bridge over U. S. Ship Canal, Sault Ste. Marie, Michigan. December 14, 1939.

Drawing no. 1033-690-3. Sault Ste. Marie Bridge Company. Bridge over South Canal. Perspectives. May 16, 1960.

Drawing no. 1033-690-4. Sault Ste. Marie Bridge Company. Bridge over South Canal. Existing Conditions. January 11, 1960.

Drawing no. 1033-690-5. Sault Ste. Marie Bridge Company. Bridge over South Canal. Substructure, General Arrangement. May 16, 1960.

Drawing no. 1033-690-23. Sault Ste. Marie Bridge Company. Bridge over South Canal. Machinery Beams and Sheave Bearing Supports. May 19, 1960.

Drawing no. 1033-690-27. Sault Ste. Marie Bridge Company. Bridge over South Canal. Machinery House – Elevations. January 26, 1960.

Drawing no. 1033-690-32. Sault Ste. Marie Bridge Company. Bridge over South Canal. Lift Span Trusses. May 19, 1960.

Drawing no. 1033-690-33. Sault Ste. Marie Bridge Company. Bridge over South Canal. Lift Span Trusses. May 19, 1960.

Drawing no. 1033-690-39. Sault Ste. Marie Bridge Company. Bridge over South Canal. General Machinery Layout. May 16, 1960.

Drawing no. 1033-690-40. Sault Ste. Marie Bridge Company. Bridge over South Canal. Plan of Operating Machinery. January 27, 1960.

Drawing no. 1033-690-45. Sault Ste. Marie Bridge Company. Bridge over South Canal. Rail Joint Details. May 16, 1960.

Drawing no. 1033-690-57. Sault Ste. Marie Bridge Company. Bridge over South Canal. General Plan, Vicinity of Swing Bridge. 1956.

Drawing no. 1033-690-__. Sault Ste. Marie Bridge Company. Bridge over South Canal. General Plan and Elevation. May 16, 1960.

(No drawing number). Sault St. Marie Bridge Company. Steel Truss Bridge. Plan B. Undated drawing.

(No drawing number). Contract No. 161. Sault Ste. Marie Bridge. 10 240-ft. Spans. Floor Beams and Stringers. Undated drawing.

(No drawing number). Contract No. 161. Sault Ste. Marie Bridge. 10 240-ft. Spans. Portal, Struts, and Guardrail. Undated drawing.

2. UNPUBLISHED DOCUMENTS

Mendinghall, Joseph Scott. "Soo Locks, Sault Ste. Marie, Michigan." National Register of Historic Places Nomination. U.S. Department of the Interior, National Park Service, 1975.

Sault Ste. Marie Bridge Company. "Reconstruction of Bridge over South Canal, St. Mary's River, Sault Ste. Marie, Michigan, Specifications, Contract Documents." June 1957. Located in the Canadian National Railroad office, Sault Ste. Marie, Michigan.

Schacher, Susan M. "Cultural Resource Investigation at the Sault Ste. Marie Marina Site, Chippewa County, Michigan." 1996. Prepared for Le Sault de Sainte Marie Historical Sites, Inc., 501 E. Water Street, Sault Ste. Marie, Michigan.

3. PUBLISHED SOURCES

"Bascule Bridge Acting as a Simple Truss Span." *Engineering News* 73 (January 21, 1915): 108-110.

Bayliss, Joseph E. and Estelle L., in collaboration with Milo M. Quaife. *River of Destiny: The Saint Marys*. Detroit: Wayne University Press, 1955.

"The Bridge." *Sault Ste. Marie Democrat*. January 19, 1888.

Buley, R. Carlyle. *The Old Northwest: Pioneer Period, 1815-1840*. 2 Vols. Bloomington: Indiana University Press, 1950.

Cayton, Andrew R. L. *Frontier Indiana*. Bloomington: Indiana University Press, 1996.

Elliott, Frank N. *When the Railroad was King: The Nineteenth-Century Railroad Era in Michigan*. Lansing: Michigan Historical Commission, 1966.

"From the Beginning, a Proud Heritage." *Soo Liner*. May-June 1976.

Hyde, Charles K. *The Upper Peninsula of Michigan: An Inventory of Historic Engineering and Industrial Sites*. Washington, D.C.: U. S. Department of the Interior, 1978.

Kappler, Charles J., ed. *Indian Affairs: Laws and Treaties*. Vol. 2: *Treaties*. Washington, D.C.: Government Printing Office, 1904.

"Lift Bridge in Operation." *Sault Ste. Marie Evening News*. August 17, 1959.

Madison, James H. *The Indiana Way: A State History*. Bloomington: Indiana University Press, 1990.

Meinig, D. W. *The Shaping of America: A Geographical Perspective on 500 Years of History, Volume 2: Continental America, 1800-1867*. New Haven: Yale University Press, 1993.

Newton, Stanley. *The Story of Sault Ste. Marie*. Sault Ste. Marie: Sault News Printing Company, 1923.

Osborn, C. S. *The New Metropolis: Sault Ste. Marie, Michigan*. N.p.: n.d.

Parks Canada. "History: Sault Ste. Marie Canal National Historic Site of Canada." http://parkscanada.pch.gc.ca/parks/ontario.

Parks Canada. "Sault Ste. Marie Canal National Historic Site." Undated brochure.

Rohrbough, Malcolm J. *The Land Office Business: The Settlement and Administration of American Public Lands, 1789-1837*. New York: Oxford University Press, 1968.

Sauer, William C. *Illustrated Atlas of Sault Ste. Marie, Michigan and Ontario*. Detroit: William C. Sauer, 1888.

"Soo Locks, Sault Ste. Marie, Michigan." N.p.: U. S. Army Corps of Engineers, Detroit District, n.d.

"This was the Biggest Story of the Year in Sault Ste. Marie." *Sault Ste. Marie Evening News*. January 2, 1942.