OVERVIEW

The numerous rivers and lakes of Wisconsin served as the region's earliest transportation system, used by Indians long before the arrival of white settlers. Beginning in the late seventeenth century and throughout the eighteenth century, European explorers and fur traders traveled almost exclusively by water. The French established fur trading posts at either end of the Fox-Wisconsin route, at Green Bay and Prairie du Chien, and gradually these developed into the first permanent settlements in the region that became Wisconsin.

By the mid-nineteenth century, Wisconsin's river system, which had served the fur trade very well, could no longer effectively serve the pioneer economy. The major problem was transporting products from the developing hinterlands to ports on Lake Michigan and the Mississippi River. Direct federal aid was aggressively sought for the construction of roads, canals, and, later, railroads.

While internal improvements were being planned and built, Wisconsin commerce flourished on the Great Lakes and the Mississippi. The cheapness of water transportation promoted the use of the Great Lakes for the transport of bulky goods; for several years the lakes had little competition for transporting goods or passengers to and from the eastern and northern parts of the state. Not until 1855 did a rail line parallel Lake Michigan (Nesbit 1973:190-191).

Like the Great Lakes, commerce on the upper Mississippi River was well developed in the territorial periods, stimulated by the lead trade. As the lead trade declined during the late 1840s, new users of river transportation emerged in the form of immigrants traveling west into Iowa and Minnesota.

In the 1850 other events shaped traffic on the upper Mississippi: the construction of railroads from Chicago and Milwaukee to the river. The railroad from Chicago reached Galena in 1856, while the Milwaukee and Mississippi Railroad arrived at Prairie du Chien in 1857. Interestingly, railroad construction initially increased river traffic rather than curbing it. With the economic depression of 1857, railroads could not undertake the expensive and difficult task of bridging the river. Until 1865, no bridges crossed the Mississippi between Rock Island and St Paul. Railroads at La Crosse and Prairie du Chien stalled on the east bank until after the Civil War. The result was an increase in commerce on the river, which served as a north-south feeder for the railroads, gathering wheat from Minnesota and Iowa. By the late 1880s, however, there were 15 bridges across the upper Mississippi and river traffic declined drastically (Nesbit 1973:193-194).

The most widely used forms of transportation in nineteenth century Wisconsin, four wheeled vehicles, carried mail, freight, and passengers on roads. The history of road development in the state paralleled settlement patterns. As such, the earliest roads were built across the southern one-third of the region to transport supplies and troops between forts established for frontier defense and to transport agricultural products and lead to market. As settlers began pouring into the territory after the Black Hawk War of 1832, a number of wagon roads, some following the routes of old Indian trails, were established from Lake Michigan to the Wisconsin and Mississippi rivers.

Since even the best of these early roads were often blocked by mud or snow, plank roads came into vogue for a very brief period. One of the most successful of these was the Milwaukee-Watertown Plank Road, built in 1847. During this period stagecoach transportation reached its height of popularity. As the stagecoach system expanded into all areas of the state, hotels and inns sprang up along their routes. Even after they were supplanted by rail networks, stage lines remained an important secondary link to more remote areas of the state until the late nineteenth century.

In contrast to the early roads in Wisconsin, which were built by the military or constructed and maintained by towns and municipalities, road development during the early twentieth century became a primary responsibility of the state. Spurred by the good roads movement of the 1890s, and later by automobile and agricultural lobbyists, the passage of a public roads law in 1911 ushered in a new era of transportation in Wisconsin. Since then the state has embarked on new programs of road improvements, bridge repairs, and state trunk highway construction to provide fast, efficient, and relatively safe means of travel.

An important aspect of road development was the construction of bridges over Wisconsin's many rivers and, in some areas, uneven terrain. Metal truss bridges were by far the most common type of bridge constructed during the last half of the nineteenth century and the first few decades of the twentieth century. These sturdy structures had a great impact on the development of certain communities and, until the concrete bridge usurped it in popularity, rendered truss bridges the "gateposts" to many cities and landmarks on the entire Wisconsin landscape.

Railroads were introduced into the state in 1850 when a modest 10 miles of track were built from Milwaukee to Waukesha. The first phase of railroad construction ended abruptly in 1857, the year that began an economic panic that resulted in every railroad in the state defaulting on its bond. By that time a total of 688 miles of railroad had been constructed and two railroads had reached the Mississippi at Prairie du Chien and La Crosse. (Nesbit 1973:203).

During the Civil War era Wisconsin's railroad companies entered a period of consolidation. The proliferation of companies, and their reappearance under altered names after bankruptcy, reorganization, or consolidation, accounts for the labyrinth of names involved in any account of the state's railroad history. Between 1861 and 1867, 33 new railroad companies were chartered in Wisconsin, yet only 130 miles of new track were built (Nesbit 1973:314-315).

Railroad service reached its peak in Wisconsin in 1916. After that the number of trains and miles of track steadily declined. Reasons for this decline include the depletion of the timber and mineral resources in the northern portion of the state, the emergence of the automobile, the rise of the trucking industry, and changing social and economic patterns following World War II. Railroads operating in the state today play only a minor role in the state's economy.

The expansion of the rail network during the late nineteenth and early twentieth centuries tremendously affected the development of cities and villages. As communities along rail lines flourished and expanded, systems of urban and interurban transportation developed. At first, horse-drawn public transportation of various sorts, including hackney cabs and omnibuses, provided conveyance between depots, hotels, and other centers of urban life. But it was the development of the horse-drawn streetcar lines that revolutionized mass transportation in Wisconsin's cities. Appearing as early as 1860 on the streets of Milwaukee (and in other major communities in the ensuing three decades) horsecar lines provided regular service for thousands of "commuters." The system changed the geography of urban life; traveling time between work and home was reduced, distant neighborhoods were suddenly accessible, and formerly remote "resorts" became convenient recreational parks for city dwellers.

By the turn of the century, electrification provided a new motive power that dramatically expanded the range and impact of the streetcar lines. With speeds and load capacities increased, streetcars easily crossed city limits to provide efficient interurban transportation between downtown areas and surrounding suburbs. By 1900 Milwaukee was the center of one of the most extensive interurban networks in the nation, extending tracks in a spoke-like fashion to western suburbs, the northern cities of the Fox Valley, and southward to Chicago. Smaller (often connected) systems were centered in the Fox Valley, Wausau, Eau Claire, Superior, Janesville-Beloit and elsewhere. While horse-cars changed the geography of particularly cities, the electrified systems had an impact on some region of the state, bringing residents of many cities within easy reach of each other. But despite the far-flung network, electrified streetcars were undermined by the rapid rise of the combustion engine. By 1930, the interurban system was losing passengers to private automobiles, and bus lines replaced streetcars for both city and interurban duty. Within two decades, streetcars and interurbans, already cnsidered archaic, were completely disbanded in favor of a more private, mobile form of transportation, the automobile.

As the automobile increasingly answered the need for individual mobility, air transportation answered the need for greater speed. Begun as early as the 1920s when passengers on air mail flights could land in Milwaukee, Madison and La Crosse, air service remained fitful and primitive until the post-World War II era, when the rapidly developing air network provided Wisconsin residents with more than a dozen commercial airports.

Transportation systems in Wisconsin have been diverse, but were almost always marked by increasing improvement until eclipsed by a more convenient and faster mode. From rivers to highways to air, transportation systems were influenced by private entrepreneurship and local, territorial, state, or federal governments. These study units attempt to summarize the major influences on Wisconsin transportation and, in turn, their impact on the economic and social fabric of the state.

PROTECTION

Threats to Resources

Transportation developments in Wisconsin have undergone numerous changes since the early years of exploration and settlement, and continue to evolve today as technology and economic conditions change. Rivers and lakes were utilized as the area's earliest transportation routes. Road networks and concomitant mass transportation systems began to evolve by the 1830s, while railroads appeared in the state by the mid-nineteenth century.

Over the years these transportation systems have become increasingly threatened and many associated properties have already disappeared. Some threats, such as abandonment and modernization, affect all transportation systems, while others are unique to particular systems. For example, many bridges are replaced because they do not meet state and federal bridge standards.

In Wisconsin, water transportation includes navigation on inland waterways, the Mississippi River, and the Great Lakes. Properties associated with these systems are continually threatened by natural causes. Swift moving currents, changes in channel courses, flooding, and soil erosion, for instance, have destroyed or aided in the destruction of numerous river transportation associated resources, while wave action, land slides, and soil erosion have caused some precariously sited resources on the Great Lakes, such as the Lake Park Lighthouse in Milwaukee, to be moved or rebuilt. Changes in the water level also threaten many Great Lakes navigation resources.

Urban and suburban development in communities located along rivers and lakeshores has destroyed or adversely affected the integrity of many historic waterfront properties. Modernization of harbor facilities, such as docks, piers, and breakwaters, in an attempt to keep abreast of modern harbor and shipping requirements, poses a major threat to historic resources. Construction of navigation pools, locks, and dams has destroyed or inundated many former river landing sites and their associated resources, including archeological sites.

Increasing pressure to develop or expand recreational waterfront facilities, such as campsites, boat ramps, and docks, and to widen, dredge, or clear channels and other waterways, has also placed serious strains on associated historic and archeological resources. In addition, amateur divers continue to destroy valuable archeological evidence by stripping shipwrecks of their artifacts. Conversely, the decline in or termination of commercial usage of some inland waterways has led or is currently leading to their abandonments; this, in turn, has exposed their associated resources to considerable dangers. The proposed abandonment of the United States Government Canal (Oshkosh to Green Bay) poses particular hazards to the locks, dams, and lock-keepers' houses, along its route.

Many resources associated with Wisconsin's railroads, such as depots, roundhouses, and repair shops, have already disappeared. It has been estimated, for example, that only 42% of the depots in southeastern Wisconsin remain extant (Vogel 1976:1). Many have been demolished, while others have been lost to fire and train derailments. Fortunately, numerous railroad associated properties still exist and remain operational. Others, however, have been abandoned and are threatened with neglect and vandalism or have been unsympathetically modernized.

Very few historic roadways, especially those dating from the early nineteenth century, survive in Wisconsin due to their nature: many were no more than crude wagon trails or were built of insubstantial materials. Others have been obliterated by new road construction. Federal and interstate highway systems, for example, extend over some historic routes. others completely bypassed the new routes, leading to their obsolesence and abandonment. Increased traffic and attendant maintenance operations also threaten roadway associated resources. Bridges, in particular, are subject to constant reconditioning or rebuilding due to increased traffic loads. Deterioration is induced by harsh weather, road salting, and stricter sufficiency standards.

Properties associated with mass transportation systems are increasingly threatened with abandonment, neglect, and deterioration. Historic stagecoach inns, particularly those not listed in the National Register or under the auspices of local historic preservaiton ordinances, have fallen into a general state of neglect and disrepair. Often located on "back roads" or in isolated crossroads communities, identification and registration of these structures would increase awareness and concern for their preservation.

In contrast, omnibus lines, interurbans, and electric railways were located in heavily developed urban and suburban areas. Over the years these systems have been abandoned or destroyed in urban redevelopment programs. It is important to identify and preserve any extant resources associated with these mass transportation systems since so few are known to exist today.

Survey Priorities

- Intensive survey of Fond du Lac and North Fond du Lac, with particular attention to harbor and rail facilities.

- Thematic survey of the U.S. Government Canal in the Fox River Valley between Neenah-Menasha and Green Bay.

- Thematic survey of resources associated with the Sturgeon Bay canal, including adjacent industrial properties along its corridor.

- Thematic survey of river transportation realted resources along the Mississippi and St. Croix rivers.

- Thematic surveys of historic port facilities in the communities of Kewaunee, Two Rivers, Port Washington, Sheboygan, Oconto, and Algoma.

- Intensive survey of Lake Superior shoreline to identify water transportation associated resources.

- Thematic survey of historic portage routes.

- Thematic survey of Lake Superior harbor facilities, possibly in conjunction with survey of Great Lakes fishing industry.

- Intensive survey of the railroad repair yards in North Fond du Lac.

- Thematic survey of railroad related resources, probably approached on a regional or railroad company basis.

- Thematic survey of resources associated with the Military Road system.

- Identify resources associated with the short-lived omnibus system.

- Thematic survey of resources related to stagecoach lines.

- Thematic survey of extant resources located along key interurban and electric street car lines, since so few of these resources exist today.

- Identify the historical significance of those bridges identified by the Historic Bridge Advisory Committee to possess engineering significance.

- Completion of the historic truss bridge survey and evaluation project begun by the Historic Bridge Advisory Committee.

- Thematic survey of railroad bridges.

- Thematic survey of early air facilities.

- Thematic survey of highway architecture from the pre-World War II era.

Registration Priorities

Water Transportation

- Sturgeon Bay - Lake Michigan Canal

Railroad Development

- The Burlington Northern Railroad Yards in Superior (Douglas County).

- Historically significant properties (with sufficient integrity) identified in the thematic survey of the Milwaukee Road Railroad Yards in the Menominee

Valley.

Roads

- Texaco Gas Station (Indian Chief Station), Spooner (Washburn County).
- M & C Gas Station, Superior (Douglas County).
- Semeca Service Station (Wadham's Pagoda), West Allis (Milwaukee County).

Mass Transportation

- Resources associated with ombibus, interurban, and electric street car lines, as they are identified.

Bridges

- Nominate or have determined eligible all bridges determined significant by the Historic Bridge Advisory Committee.

Temporal Boundaries: 1673 - present.

Spatial Boundaries: The State of Wisconsin.

Related Study Units: Great Lakes Naviagation, Mississippi River Navigations.

HISTORICAL BACKGROUND

For nearly two centuries following the discovery of the Upper Mississippi River via the Wisconsin-Fox waterway by Marquette and Joliet in 1673, Wisconsin's internal network of rivers and lakes served as important water highways carrying fur traders, explorers, missionaries, and settlers into the region. As settlers began pouring into the region during the 1820s through the 1850s, and as commercial trade grew, Wisconsin settlers looked to the navigable waterways of the state to move lead, agricultural products, timber, and other goods to the newly established commercial centers along Lake Michigan and the Mississippi River. From these points goods were shipped via the Great Lakes or the Mississippi-Ohio Rivers to eastern and southern marketplaces.

The development of waterborne commerce was an important aspect of Wisconsin's pioneer economy. Few, if any, good roads for long-distance hauling existed in the region and the first railroads were not built in the state until the late 1850s. The natural waterways of the state, therefore, afforded the cheapest and most efficient means of getting goods to market.

Not all of Wisconsin's inland waterways proved navigable throughout the year, however. Periodic low water and shifting sandbars in the Wisconsin River, for example, made river traffic hazardous, if not impossible, at times. The portage between the Wisconsin and Fox Rivers and the rapids of the lower Fox also presented serious obstacles to continuous river navigation. During the winter months all river and lake commerce in Wisconsin came to a stop as inland waterways froze over. Massive ice flows during the spring thaw also made travel by water dangerous.

Faced with these conditions, Wisconsin farmers and businessmen began clamoring for river improvements to provide more direct routes for moving agricultural products and other goods to market. Spurred by the success of the Erie Canal which opened for traffic in New York State in 1825, enterprising businesmen, such as Byron Kilbourn of Milwaukee and Daniel Whitney and Morgan L. Martin of Green Bay, began promoting the building of canals in Wisconsin. Although canal construction in the state never reached the peak of activity that occurred in New York, New Jersey, Pennsylvania, Ohio, and Indiana, several projects were undertaken.

The impetus behind Wisconsin's canal projects centered on getting lead from the mines in southwestern Wisconsin to ports on Lake Michigan for shipment to Buffalo, Philadelphia, New York, and other population centers along the Atlantic seaboard. By 1837 two proposed routes to the lead district had emerged, one by way of the Fox-Wisconsin portage and the other by way of the Milwaukee and Rock Rivers. Although work was begun at the Milwaukee end of the latter canal, the project soon collapsed because of funding problems and the withdrawal of legislative support. During the 1880s portions of this canal at Milwaukee were filled along an area that is now Commercial Street.

Green Bay promoters of a canal at the portage between the Wisconsin and Fox Rivers were more successful, however. In 1835 a channel deep enough to float a canoe was dug, but work on the canal was abandoned the following year because of high water. Nothing further was done until fourteen years later when work on a second canal just north of the first was started. Due to problems between the contractor and the state legislature, work on the canal was again abandoned. In 1853 the Fox and Wisconsin River Improvement Company was chartered by the state legislature to complete the canal. By 1856, a navigable canal was completed to the extent that a small steamer, the Aquila, made the voyage from Pittsburgh to the Mississippi via the Ohio, then up the Wisconsin, through the new canal, and down the Fox to Green Bay. In 1872 the federal government took over control of the 2-1/2 mile long canal, finally completing it in June 1876. Water rights remained with the state, however.

Meanwhile, efforts to improve river navigation on the upper and lower Fox were also being made. To accomplish this end, dredging operations and the construction of locks to carry vessels around a series of rapids in the 170 foot drop between Lake Winnebago and Green Bay and to maintain adequate water levels between Oshkosh and Portage were begun. The improvement of the Fox River for navigation was completed in 1856. During the following decades further river improvements and water power projects along the lower Fox were carried out supported by Congressional appropriations. In 1876, for example, navigation locks and a lock tender's house were built at the river port of Eureka on the upper Fox.

Although river navigation between Portage and Green Bay was improved, the Wisconsin-Fox transportation route soon faced stiff competition from the railroads which by 1857 had reached Prairie du Chien and by 1862 extended through the lower Fox River Valley to Green Bay. As the rails expanded across the southern third of the state during the 1850s, 1860s, and 1870s, much of the freight and passenger service was diverted from the Wisconsin-Fox waterway. River traffic and shipping activities along the lower Fox persisted into the early twentieth century, however, as the region's industrial base expanded and water resources were harnessed by grain and woolen mills and wood-related industries.

A less ambitious but certainly more successful project was the Sturgeon Bay and Lake Michigan Ship Canal. Discussed as early as 1856 and promoted by Joseph Harris for over 20 years, this route proposed to cut 100 miles off the trip from Green Bay to Chicago and avoid the dangerous Porte des Morts (Death's Door) passage at the tip of the Door Penninsula, where many ships were wrecked yearly. Construction of the ship canal, which measured 7,300 feet long and 100 feet wide, began in 1872 and was completed in 1878. The ship canal is still in use today.

Commercial activity in Wisconsin during the mid- to late-nineteenth century was not confined to the important Wisconsin-Fox waterway, however. Other waterways, such as the Chippewa, St. Croix, and Wolf rivers, were partially navigable for commercial use with channelization and other improvements funded in part by Congressional appropriation. Some rivers, including the Black, La Crosse, Upper Wisconsin, Menominee, and Rock rivers, played an important role in the economic development of the state. In northern Wisconsin the region's major waterways divided the region into natural lumbering districts before railroads became important and provided sufficient means for floating millions of board feet of timber to sawmills and marketplaces.

As river and canal traffic in Wisconsin grew, the steamboat became the dominant means of transportation on the state's inland waterways. Steamboats were built throughout the state, wherever timber was available. By 1845 steamboats were plying the waters of Lake Winnebago, with freight and passenger service established between towns rimming the lake and along the Wolf and Fox Rivers soon thereafter.

During the 1870s and 1880s excursion boat trips became popular throughout the state. During these years steamboats operated on many of Wisconsin's inland rivers and lakes.

The Lucius Newberry, for example, operated as a passenger and pleasure craft on Lake Geneva from 1875 until it burned and sank in 1891. Other boats operated on Lake Winnebago, Lake Koshkonong, and the Wisconsin, Chippewa, and St. Croix rivers.

After World War I, economic activity along the historic Wisconsin-Fox rivers and other waterways steadily declined as the state's commerce turned to railroads, the automobile, trucks, and planes. Bustling river and lake ports, particularly in the Fox Valley, which had supported active steamboat building industries, sawmills, and other manufacturing concerns, declined in importance. In 1951, the federal government closed of the Upper Fox to river navigation.

Gradually, the remains of Wisconsin's early inland water transportation era have fallen into disrepair or have disappeared. Today, only the Lake Michigan-Sturgeon Bay ship canal, the delapidated canals and locks at Portage, locks along the upper and lower Fox River, a few salvaged shipwrecks, and a scattering of commercial buildings remain from this bygone era.

IDENTIFICATION

Resource Types. Canals (Portage, Sturgeon Bay, Milwaukee), locks (Portage, Eureka, Kaukauna, Combined Locks, Little Chute, Neenah), lock tender's houses (Eureka and Portage), canal warehouses, canal boats, steamboats, shipwrecks, river and lake gauging stations, dams, wharfs, piers, docks, harbors, steamboat company buildings, boathouses, stopping places, ferries.

Locational Patterns of Resource Types. Inland Riverways and lakes throughout the state supported navigational and water transport related resources of various types. In general, significant concentrations of construction activity usually occurred at protected harbors, the outlets of rivers into larger bodies of water, and sites of significant changes in river characteristics. Examples of the latter include falls, sloughs and rapids, which effected the speed and economy of river transportation, or provided significant sources of hydro-power.

The largest concentrations of such activity were located along the much utilized Fox River system and the Rock, Chippewa and Wisconsin Rivers. Smaller rivers and streams were more limited in the number and type of resources they could support.

Previous Surveys. Feasibility study to develop the historic and related resources of the Portage area, Frank and Stein Associates, Inc. 1968; feasibility studies for flood control at Portage, U. S. Army Corps of Engineers, St. Paul District 1977, 1981; historical and standing structure study of the flood control project at Portage, Columbia County, McKay 1981; intensive architectural/historical survey and downtown revitalization study at Sturgeon Bay, Door County, Pfaller Herbst Associates, Inc. 1983. Geneva Lake Intensive Survey, 1985 (Geneva Lake Land Conservancy).

Survey and Research Needs. Up to date information, based on intensive surveys is needed to identify any extant historic resources associated with the state's two most significant remaining canalway systems; the Lower Fox and Sturgeon Bay-Lake Michigan. Any study of the systems should also closely analyze adjacent structures, properties and facilites to address the impact of the waterway on the growth and development of neighboring areas through time.

EVALUATION

National Register Listings and Determinations of Eligibility

Wakeley's Tavern (1837), Wakeley Road, Nekoosa, Wood County (NRHP 1974)
Portage Canal (1835, 1876), between Fox and Wisconsin rivers, Columbia County (NRHP 1977)
Eureka Lock and Lock Tender's House (1876), Town of Rushford, Winnebago County (NRHP 1976)

Context Considerations. The evaluation of waterway systems and their associated resources should involve the careful review of the historic setting of the resource. The nature of original topography, vegetation patterns and/or water-side development are all important contextual features which should be analyzed when evaluating the integrity of a site or property. The relative importance of the specific waterway system or associated resource to the development, settlement or economic growth of an area is an essential factor for consideration. Individual resources should be evaluated in context with any larger overall city-wide or regional system of water usage.

While it is important to address the historic integrity of individual resources, many 20th century additions or alerations may be of a significant nature in and of themselves, and should not simply be dismissed. By their very nature and locational limimtations most waterfront resources are subject to constant wear and modernization in response to local usage demands.

Moveable properties such as ships ferries or barges may be eligible if documentation in support of their historically significant roles can be shown and a basis for evaluation in comparison to other like-vessels can be made.

State Historical Society of Wisconsin

Commerically Navigable Inland Waterways and Canals, 1855-1900

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In addition to the above mentioned bibliographical materials the archives Division of the State Historical Society of Wisconsin possesses numerous maps of several Wisconsin canals, eg. the Sturgeon Bay and Lake Michigan Canal, the Milwaukee and Rock River Canal, and the Fox-Wisconsin River Canal. The Archives Division also posses three manuscript collections relating to the state's canal system: (1) Green Bay and Mississippi Canal Company Records, 1848-1969; (2) Canal Warehouse Company Minutes Book, 1891-1909; and (3) Joseph Harris, Sr. Papers, 1844-1894.

Temporal Boundaries: 1673 - present.

Spatial Boundaries: The Mississippi River and its tributaries, between Cassville and Prescott

Related Study Units: Inland Waterways

HISTORICAL BACKGROUND

For hundreds of years the Mississippi River and its tributaries have been utilized as natural transportation routes by Wisconsin's inhabitants, first by native Americans and later by European explorers and immigrants. For nearly two centuries following the discovery of the Upper Mississippi by Marquette and Joliet in 1673, this river system carried fur traders, missionaries, explorers, and settlers into the region. As military forts and trading posts were established at various points along the river, keel boats and steamboats soon replaced the canoe as the primary means of travel on the river. The first steamboat to ascend the upper reaches of the Mississippi was the Virginia, which arrived at Fort Snelling in 1823. Steamboats carrying troops and supplies under government charter continued to make annual trips upstream as late at 1842, only because there were no boats on the river above Galena and Cassville which were independently engaged in the steamboat river trade (Merrick and Tibbals 1912:110).

The era of steamboating on the Upper Mississippi that followed the voyage of the Virginia went through several stages of development. Petersen, the noted steamboat historian, divides the history of Upper Mississippi steamboating into six periods (Petersen 1946:289-300).

Lead Period, 1823-1848

The Upper Mississippi lead mines furnished an important downstream cargo to steamboats bringing supplies to the rapidly growing mining populations at Galena, Dubuque, Potosi, Helena, and other communities in the region. During this period, more than 472 million pounds of lead valued at over $14 million were shipped downriver by Mississippi steamboats (Petersen 1946:293). Transportation of lead continued to the Civil War in diminished volume.

Immigration and Settlement, 1849-1870

The impetus given by the opening of Indian lands to settlement and the rise of lumbering interests on the Black, Chippewa, and St. Croix rivers caused a rapid increase in steamboat traffic above the mouth of the Wisconsin River. Hundreds of settlers, both native and foreign born, arrived in the region by steamboat. The period of the 1850s, in particular, witnessed a rush of settlers into the region. Mississippi River steamboats lost this lucrative trade to the railroads in the 1870s.

A unique aspect of the 1840s and 1850s (steamboat traffic) was the development of the "fashionable" and "grand" tours, which were luxury trips by steamboat on the Mississippi River. While short excursions were common, the most popular runs began at St. Louis, New Orleans, and elsewhere and ended at Rock Island, Galena, Dubuque, Prairie du Chien, Lake Pepin, St. Peters, and the Falls of St. Anthony (Blegen 1939:379).

The Grain Period, 1860-1890

During these active years on the river, large shipments of grain were transported downriver by steamboats. The Diamond Jo and Davidson lines of steamboats were established specifically for carrying heavy cargoes of grain southward.

Period of Decline, 1890-1910

The building of the railroad parallel to the river drastically reduced the volume of river trade. During these years, many steamboat operations, unable to compete with the cheaper and faster rail lines, disappeared from the river. The collapse of steamboating on the Mississippi was also brought about by irregular service, unstable rates, poor terminal facilities, and the unusually short life span of a steamboat, which on the Upper Mississippi between 1823 and 1863 averaged only five years due to fires, boiler explosions, and snags in the river (Brown 1919:422-428).

Period of Excursion Boats, 1910-1927

During these years steamboats reappeared on the river carrying tourists on pleasure trips up and down the river, reminiscent of the "fashionable tours" of earlier generations. Only one excursion steamboat line was based on the Mississippi River, the family-operated Streckfus line which began in 1911 in Rock Island, Illinois, with the purchase of the last remaining packets of the Diamond Jo Line (Meyer 1967).

Tow Boat Era, 1927-present

This period was ushered in by the establishment of federal barge line service in 1927 and by the nine-foot commercial navigation channel, including 26 locks and dams, that was constructed on the river during the 1930s as part of the New Deal by the U.S. Army Corps of Engineers.

Many vestiges of the Upper Mississippi steamboat era are located along the river, although no systematic survey of these cultural resources has been conducted. Numerous nineteenth century residences and commercial buildings constructed during the heyday of steamboat river traffic are found in river towns such as Hudson, Prescott, Fountain City, La Crosse, Genoa, De Soto, Ferryville, Lynxville, Prairie du Chien, Bagley, Glen Haven, and Cassville. Several river landing sites, levees, steamboat wrecks, and structural navigation aids, such as wing dams, are also know to exist.

IDENTIFICATION

Resource Types. Mid to late nineteenth century residences and commercial buildings, warehouses, levees, former river landing sites, shipwrecks, wing dams, locks and dams, lockmasters' quarters, steamship line offices and docking facilities, recreational facilities, ferry crossings.

Locational Patterns of Resource Types. Transportation-related resources are located up and down the length of the Mississippi River, but tend to concentrate particularly at: the mouths of tributary streams; in protected inlets; areas of significant river changes (constrictions, lakes, sloughs); and at breaks in the rugged shoreline bluffs.

Previous Surveys. Intensive survey of the city of Alma, Buffalo County (Doyle and Anderson-Sannes 1980); Intensive survey of the village of Trempealeau, Trempealeau County (Pfaller Herbst Associates, Inc. 1981); Upper Mississippi River Literature Search and Records Review (Overstreet 1982); Historical resources evaluation of the U.S. Army Corps of Engineers, St. Paul District locks and dams between the Falls of St. Anthony and Guttenberg, Iowa (Gjerde 1983); Intensive survey of La Crosse, La Crosse County (Rausch 1985).

Survey and Research Needs. Literature and document research to locate the possible location of historic shipwrecks along the Mississippi River corridor should be the first step in a systematic study of such archeological resources in Wisconsin. In addition a concentrated study of extant resources along the Great River Road corridor as it passes through Wisconsin would seem to offer a clear baseline from which to evaluate those resources associated with Mississippi River navigation. Particular attention should be given to the small, often isolated, communities and stopping points along the Wisconsin shoreline such as Genoa, Glenhaven, Lynxville, Ferryville, De Soto, Victory, Stockholm, Hager City, and Diamond Bluff.

Specific historical research relating to the Diamond Jo and Davidson steamship lines may uncover significant details surrounding their business operations and the locational patterns of resources associated with their important efforts in the region.

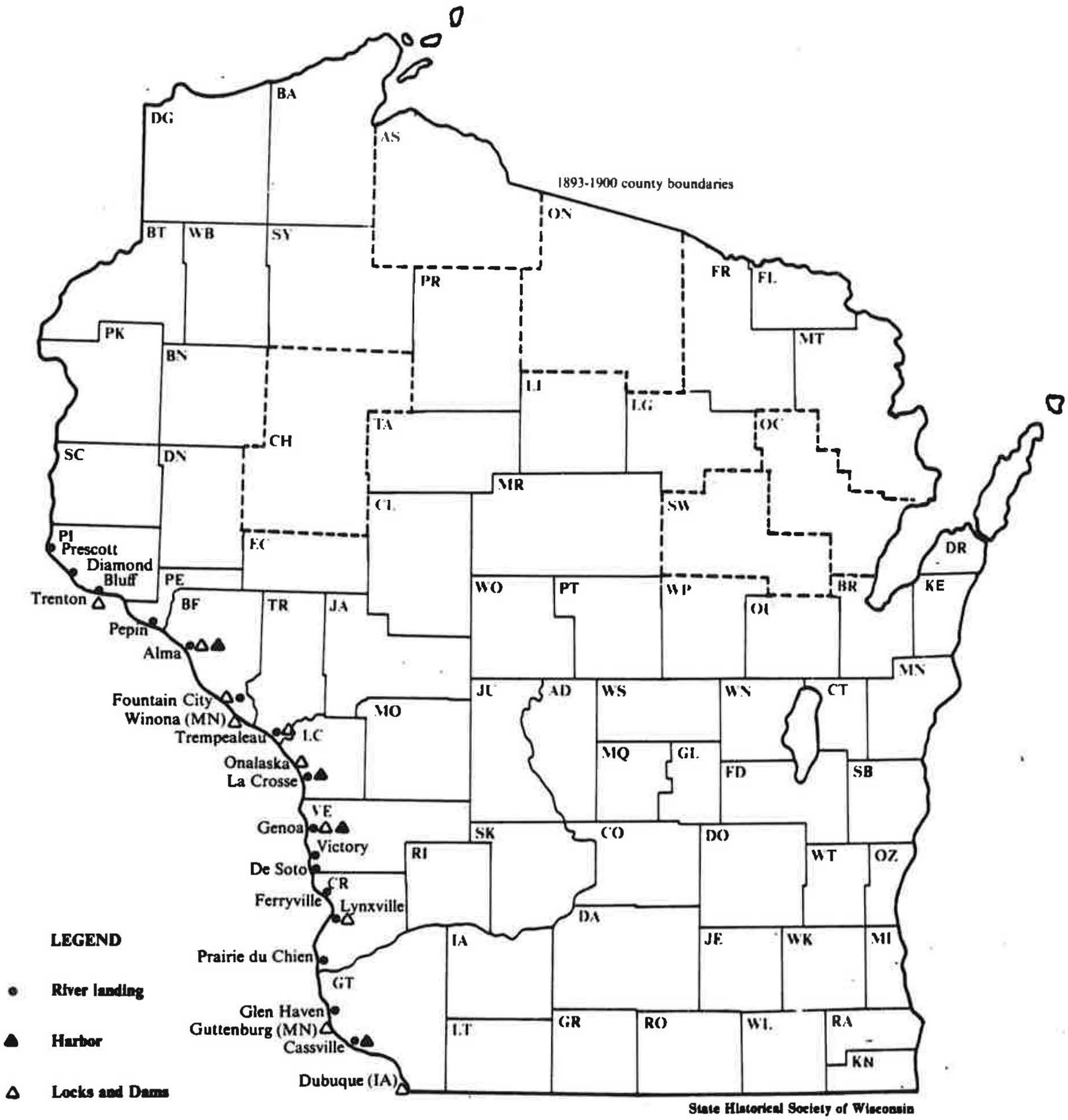
EVALUATION

National Register Listings and Determinations of Eligibility

Alma Historic District (Alma), Buffalo County (NRHP 1982, Alma MRA)
American Fur Company Warehouse (1835), Prairie du Chien, Crawford County (NRHP 1966)
Dousman House Hotel (1864), Prairie du Chien, Crawford County, (NRHP 1966)
Melchoir Hotel and Brewery Ruins, Trempealeau, Trempealeau County, (NRHP 1984, Trempealeau MRA)

Context Considerations. The evaluation of resources associated with navigation on the Mississippi River should involve the careful review of the historic setting of the resource. The nature of original marine and land topography, vegetation patterns and/or riverside development are all important contextual features which should be analyzed when evaluating the integrity of a specific resource or site. The relative importance of the resource to the development, settlement, or economic growth of an area is an essential factor for consideration. Individual resources should be evaluated in context with any larger community or regional systems.

Moveable properties such as steamboats, ferries or barges may be eligible if documentation in support of their historic roles can be shown to be of a significant nature, and a basis for evaluation in comparison to other like-vessels can be made.



Mississippi River Landings, Harbors, and Dams, 1890-1955

Source: Natural Resources Committee of State Agencies, *The Natural Resources of Wisconsin* (Madison, 1956), p. 57; and *Eleventh Census of The United States, 1890: Transportation Business, Part II*, p. 420.

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MAPS

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1894

Temporal Boundaries: 1621 - present.

Spatial Boundaries: The port cities, shorelines, and lake bottoms of Lake Michigan and Lake Superior.

Related Study Units: Shipbuilding, Inland Waterways, Mississippi River Navigation.

HISTORICAL BACKGROUND

Since the GRIFFON first appeared on the Great Lakes in 1679, navigation on the nation's "inland seas" has developed in several stages, reflecting changes in economic interests and activities and technological advances in shipbuilding. For over two centuries the Great Lakes and their tributary river systems were used by explorers and traders to reach the interior of North America. The first European to reach the western Great Lakes region is believed to have been the French trader Etienne Brule, who travelled along the south shore of Lake Superior, possibly as far as Wisconsin, in 1621-1623. The first European to reach Lake Michigan was the French explorer, Jean Nicolet, who landed near Green Bay in 1634 while searching for a passage route to the Orient.

In the years that followed these journeys into the wilderness, birchbark canoes and mackinaw boats, paddled by hardy voyageurs and piled high with European-made goods to supply the trade, plied the waters of the Great Lakes enroute to the major trade centers at La Pointe, Green Bay, and Prairie du Chien. In 1679, the GRIFFON, the first sailing vessel on the Great Lakes, was built by LaSalle for the specific purpose of carrying furs across the lakes in an attempt to establish a monopoly of the trade in the western Great Lakes region. On its return trip to Niagara, the GRIFFON presumably sank off the tip of the Door Peninsula.

Throughout the French regime and the subsequent periods of British and American dominion, the Great Lakes served as the all important link by which the fur trade and its activities were controlled. During the early nineteenth century, as the number of furs began to decline and competition among traders intensified, an attempt was made by the American Fur Company to exploit the freshwater fish resources of Lake Superior. By 1842, however, the company abandoned its fishing and shipbuilding operations on the Great Lakes.

From about 1840 to 1870 larger schooners and steamers were built to bring settlers and immigrants west to Wisconsin and other developing states and to haul grain via the Great Lakes and the Erie Canal to eastern marketplaces. During this period the state's first deep harbor facilities, such as those at Milwaukee, lighthouses, beacons, and other navigational aids were built to guide shipping and commercial activity on the lakes. Construction was often supported by Congressional appropriations.

The primary commodity carried by lake vessels during the late nineteenth and early twentieth centuries was lumber cut from the vast stands of pine in northern Wisconsin. Millions of board feet of cut timber were hauled by schooners and tow barges from port cities such as Oconto, Marinette, and Green Bay. Dry goods and other commodities, including large volumes of iron ore from the mines of northern Minnesota, Wisconsin, and Michigan, were also shipped during these years. The whaleback steamer METEOR, for example, launched in 1896, was built specifically as a cargo vessel to carry iron ore from the Mesabi Range in Minnesota.

Since World War I, tankers with larger storage capacities have been built to modernize and bring new efficiency into cargo transport on the Great Lakes. Much of the transport business today focuses on loading iron ore at the docks in the Duluth-Superior area and transporting it to the steel mills and industrial centers at Cleveland, Detroit, Gary, and Buffalo. Each year lake freighters also carry large volumes of fertilizers, grain, automobiles, furniture, and other products from the region's factories and mills to both domestic and international markets.

IDENTIFICATION

Resource Types. Wharfs, docks, piers, breakwaters, harbors, lighthouses, and other navigational aids; lighthouse keeper's houses and outbuildings, the Sturgeon Bay and Lake Michigan ship canal, sailing vessels, steamers, freighters, car and rail ferries, barges, tugs, shipwrecks, and United States Coast Guard stations.

Locational Patterns of Resource Types. The protected harbor, whether natural or man-made, was an essential feature of Great Lakes port development. While all major port communities along the Great Lakes shoreline may be expected to contain some extant resources, the smaller ports and landing areas may be more likely to contain earlier "unmodernized" resources.

Previous Surveys. Intensive surveys in the communities of Superior, Ashland, Sturgeon Bay, and Kenosha have identified and discussed various resources associated with Great Lakes navigation. In 1979, the Historic American Engineering Record (HAER), under contract to the United State Coast Guard, completed an intensive survey of all existing lighthouse stations and keeper's residences owned by the Coast Guard on the Great Lakes. A more recent study by Thom Holden for the Apostle Islands National Lakeshore (1985) researched the available documentation concerning the possible location of historic shipwrecks in the Apostle Island area.

Survey and Research Needs. Intensive surveys of the industrial port cities of Sheboygan, Kewaunee, and Two Rivers should reveal possible extant resources. In addition, serious consideration should be given to the many smaller communities dotting the Great Lakes shorelines, many of which may retain important remnants of the earlier navigation time periods.

EVALUATION

National Register Listings and Determinations of Eligibility.

Cana Island Lighthouse (1869), Town of Baileys Harbor, Door County (NRHP 1976)
Chambers Island Lighthouse (1868), Town of Gibraltar, Door County (NRHP 1975)
Eagle Bluff Lighthouse (1868), Town of Gibraltar, Door County (NRHP 1970)
Pottawatomie Lighthouse (1839,1858), Town of Washington, Door County (NRHP 1979)
Racine Harbor Lighthouse & Life Saving Station (1866), Racine Harbor North Pier, Racine, Racine County (NRHP 1975)

Apostle Island Lighthouses Thematic Group

Devil's Island Light (1891), Town of La Pointe, Ashland County (NRHP 1977)
Michigan Island Light (1857), Town of La Pointe, Ashland County (NRHP 1977)
Outer Island Light (1874), Town of La Pointe, Ashland County (NRHP 1977)
Sand Island Light (1881), Town of Bayfield, Bayfield County (NRHP 1977)
Raspberry Island Light (1862), Town of Russell, Bayfield County (NRHP 1977)

United States Coast Guard Lighthouses and Light Stations on the Great Lakes Thematic Group

La Pointe Light Station (1897), Town of Sanborn, Ashland County (NRHP 1983)
Sherwood Point Light Station, Town of Nasewaupee, Door County (NRHP 1983)
Sturgeon Bay Canal Lighthouse (1903), Town of Sturgeon Bay, Door County (NRHP 1984)

Plum Island Range Rear Light (1897), Town of Washington, Door County (NRHP 1984)

Rawley Point Light Station (1894), Town of Two Rivers, Manitowoc County (NRHP 1984)

North Point Lighthouse (1913), Milwaukee, Milwaukee County (NRHP 1984)

Wind Point Light Station (1880), Wind Point, Racine County (NRHP 1984)

Great Lakes Tankers

Whaleback Carrier METEOR (1896), NW tip of Barker's Island, Superior, Douglas County (NRHP 1974)

Context Considerations. By their very nature, lakefront resources are subjected to considerable wear. Modernization, in response to new technological advances, also affects many of the resources, thus raising the historical significance of the earlier (eighteenth and nineteenth centuries) sites. In general, most sites must be evaluated as to age, integrity, and significance in context with the body of other like resources extant within both the local harbor and the state in general. Movable properties such as ships, ferries, and barges may be eligible if proof can be shown of their historic role and if a basis for evaluation in comparison to other extant vessels of the same type is made.

Great Lakes Harbors in Wisconsin, 1889-1955

Sources: Natural Resources Committees of State Agencies, *The Natural Resources of Wisconsin* (Madison: 1956), p. 52; and *Eleventh Census of the United States*, 1890: Transportation Business, Part II, p.372.

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In addition to the above mentioned bibliographical materials, the Archives Division of the State Historical Society of Wisconsin possesses numerous maps of Lakes Michigan and Superior as well as charts of the Sturgeon Bay and Lake Michigan Canal and harbor refuge. The Archives Division also possesses two manuscript collections pertaining to the Sturgeon Bay and Lake Michigan Canal: (1) the Canal Warehouse Company Minutes Book, 1891-1909 and (2) Joseph Harris, Sr. Papers, 1844-1894. Important periodicals dealing with Great Lakes navigation include the Annual Report of the Lake Carrier's Association, 1908-1981, and Inland Seas, 1945-1981.

Temporal Boundaries: 1850-1868.

Spatial Boundaries: The southern third of the state.

Related Study Units: Later Rail Lines.

HISTORICAL BACKGROUND

The first railroads in Wisconsin were built across southern Wisconsin from Lake Michigan to the Mississippi river. Although 125 railroad companies were chartered by territorial and state legislatures between 1836 and 1859, only two (the Milwaukee and Mississippi and the La Crosse and Milwaukee) had built east-west lines across the southern third of the state prior to 1860. The first railroad company actually to lay track in Wisconsin was chartered in 1847 and named the Milwaukee and Waukesha. In 1850 the company changed its name to the Milwaukee and Mississippi and began regular train service between Milwaukee and Waukesha the following year. Building westward from Milwaukee, the railroad reached Madison in 1854 and Prairie du Chien in 1857. In 1858 the La Crosse and Milwaukee, using a more northerly route, reached La Crosse. By 1860, some 900 miles of track were in operation in Wisconsin (Raney 1936:388).

The idea of building railroads in the state had been taken up by railroad promoters during the territorial period. Between 1836 and 1846, the territorial legislature chartered six railroad companies to build lines, but none were able to do so (Rice 1951:11). Although numerous bills had been introduced for this purpose, all were defeated because of the intense rivalries which developed among Wisconsin's lakeports and river towns for the honor of becoming terminal points of the proposed routes.

Although lead from southwestern Wisconsin was the first of the economic products of the state to be actively transported overland by rail, it was soon replaced by spring wheat from the prairies of Wisconsin, Iowa, and Minnesota (Merk 1971:278-279). During the 1850s, 1860s, and 1870s the railroads became the grain gatherers of the Northwest. By chance, the closing of the Mississippi River below the mouth of the Ohio during the Civil War came immediately after the completion of the railroads from Milwaukee to Prairie du Chien and La Crosse. As a result, much of the profitable grain trade was directed by rail to Lake Michigan ports for shipment via the Erie Canal to New York and other Eastern markets (Fish 1907:211). Between 1860 and 1865, the volume of freight and grain shipped by rail from Prairie du Chien to Milwaukee, for example, increased over sixteen fold (Fish 1907:212). The establishment of east and west railroad lines during this period, making Chicago and Milwaukee the centers of the grain trade instead of St. Louis and New Orleans, was the primary reason for the decline of steamboat traffic on the upper Mississippi River (Petersen 1946:294).

The decade of the 1860s witnessed the beginning of railroad consolidation in Wisconsin as many railroad companies went bankrupt or into receivership following the devastating financial panic of 1857. By the close of the Civil War, three controlling railway systems had developed in the state, including the Milwaukee and St. Paul Railway Company (the old La Crosse and Milwaukee), its chief rival, the Milwaukee and Prairie du Chien Railway Company (the old Milwaukee and Mississippi), and the Chicago & Northwestern Railway Company (Merk 1971:291). In 1866, the Milwaukee and St. Paul acquired control of the Milwaukee and Prairie du Chien railway operations.

Early railroad development in Wisconsin during the 1850s and 1860s had progressed slowly, however, due to the reluctance of many Eastern capitalists to invest large sums of money in railroad building ventures on the frontier. Railroad expansion in the state during this period was further checked by a major legislative railroad scandal in 1856 and by a devastating nation-wide financial panic the following year. During the panic of 1857, all of the railroads in Wisconsin went bankrupt and a good many farms were lost because many farmers had mortgaged their property to finance the railroad construction.

Although many local papers and politicians agitated for more railroads in the state, railroad development in Wisconsin during the seven years following the outbreak of civil war came practically to a standstill. During these years only 130 miles of new track were laid in the state (Merk 1971:277). The growth of Wisconsin's railroads until 1868 was slowed by railroad indebtedness and increasing crop shortages in the southern part of the state. Faced with these economic burdens and the belief that northern Wisconsin as a forest wilderness would never sustain a sufficient agricultural population to make railroad investments pay, many of Wisconsin's railroad capitalists took an active interest in building and promoting new rail lines in neighboring Minnesota and Iowa (Merk 1971:275-276).

From these beginnings, a scattering of main routes and branch lines were built across southern Wisconsin, hauling lead, lumber, grain, and other agricultural products to market and bringing west-bound settlers and travellers to their destinations. By 1868 Wisconsin contained 1030 miles of railroad--nearly all of which lay within the southern third of its area.

IDENTIFICATION

Resource Types. Historic rail routes, passenger depots, freight depots, freight warehouses, turntables roundhouses, engine houses, repair shops, control sheds, grain warehouses and grain elevators at terminal cities such as Milwaukee, Racine, Kenosha, La Crosse, and Prairie du Chien, bridges, locomotives, equipment, tool houses, maintenance sheds, water towers, railroad construction camps, abandoned townsites such as Dover (c. 1842-56) in Iowa County and Newport (c. 1853) on the Wisconsin River located south of Wisconsin Dells in Columbia County, homes of prominent railroad promoters and executives.

Locational Patterns of Resource Types. Most railroad associated resources, such as depots, roundhouses, and warehouses, will be primarily located adjacent to early industrial corridors and commercial areas of a community; exceptions might include control sheds, bridges, and tunnels. In some cases an actual railroad right of way may be nominated, including the railroad tracks and topographical setting (vista).

Previous Surveys. The only known thematic survey that deals with Wisconsin railroads is John Vogel's "The Railroad Depot in Southeastern Wisconsin," on file at the Historic Preservation Division. The "Transportation" chapters in several intensive survey reports also provide data on railroad development within specific localities; the Lancaster, Dodgeville, Potosi/Tennyson, Belmont, Gratiot Intensive Survey and the Geneva Lake Intensive Survey provide the most information on early railroad development within the state.

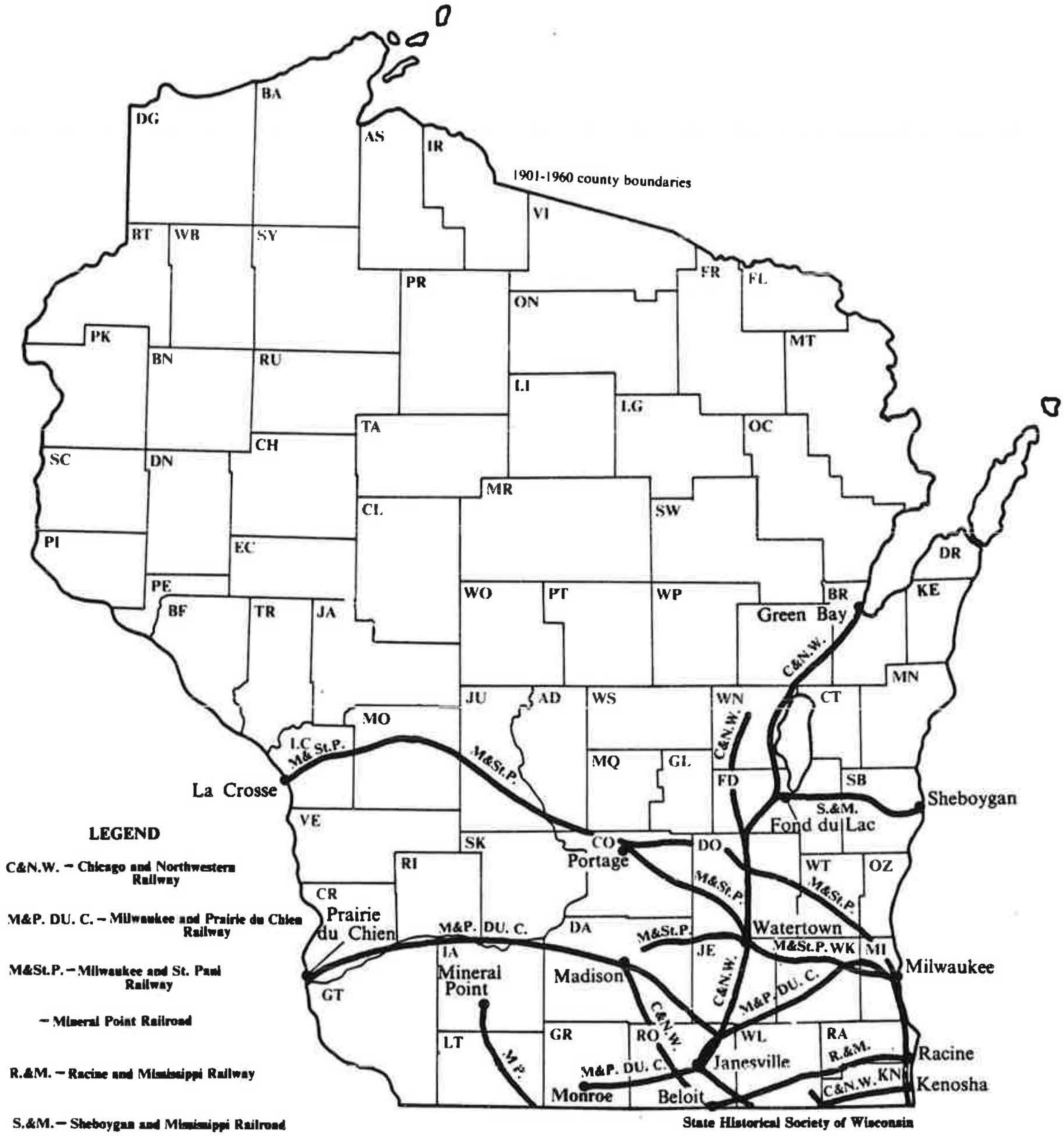
Survey and Research Needs. A survey of Wisconsin's railroad bridges and tunnels should be undertaken; research should focus on the small early rail lines before consolidation of the competing companies began during the late nineteenth century. Architects of railroad associated structures should be identified as well; an attempt should be made to tie specific architects to the railroad companies for whom they designed. Research should also focus on the railroads' effect on community planning and development.

EVALUATION

National Register Listings and Determinations of Eligibility

Old Railroad Depot (1857), Mineral Point, Iowa County (NRHP 1971, Mineral Point Historic District)

Context Considerations. Most railroad associated structures will be evaluated in a local context, particularly in regards to their role in a community's commercial/industiral development. When looking at repair facilities, car shops, and other like structures the integrity of the entire complex is important in the evaluation. The evaluation of ancillary structures should be based on rarity and comparisons with other extant examples in the state. The evaluations of railroad engines and other railroad associated objects hould be based on their own historical significance or comparisons to other like resources.



Wisconsin Rail Lines, 1865

Source: Frederick Merk, *Economic History of Wisconsin During the Civil War Decade* (Madison,1971) , Frontispiece.

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Information on railroad development in Wisconsin can also be found in the annual reports of the presidents and directors of the several railroad companies and in local and county histories.

Temporal Boundaries: 1868-present.

Spatial Boundaries: The entire state with special emphasis on northern Wisconsin

Related Study Units: Early Rail Lines; Metal Truss Bridges.

HISTORICAL BACKGROUND

In 1868 railroad building in Wisconsin revived and thereafter its progress was rapid. By 1873 railroad mileage in the state had more than doubled. The panic of 1873 caused a temporary cessation of building, but between 1875 and 1890 mileage again doubled, reaching nearly 5,600 miles in the latter year (Raney 1936: 388). By 1900, railroad mileage in the state had reached some 6,500 miles.

The extension of rail service into the sparsely populated northern portions of Wisconsin characterizes railroad development in the state during the late nineteenth and early twentieth centuries. Spurred by generous land grants, bestowed by the federal government and distributed by the state legislature, totalling nearly three million acres, the railroad pushed northward to exploit the vast stands of white pine and the rich deposits of copper and iron ore.

Railroad development in Wisconsin during the 1860s, 1870s, and 1880s witnessed a series of corporate mergers and reorganizations as railroad capitalists such as Alexander Mitchell and Byron Kilbourn sought to extend and strengthen their control of passenger and freight service to communities in the state. Three dominant railroad carriers emerged during this consolidation phase: the Chicago, Milwaukee, and St. Paul (CM&STP) (the Milwaukee Road), the Chicago and Northwestern (C&NW), and the Minneapolis, St. Paul and Sault Ste. Marie (the Soo Line).

A good example of this consolidation is the Milwaukee based merger, which resulted in the creation of the Chicago, Milwaukee, and St. Paul (CM & St. Paul), stretching in a westerly direction. In contrast, a Chicago based merger, resulting in the creation of the Chicago and Northwestern Railroad (C & NW), provided rail service primarily to northern Wisconsin. The C & NW absorbed a line from Fond du Lac to Janesville, which cut across rail lines from Milwaukee and Racine to the Mississippi River and also was linked to a line serving the lumber mills on Lake Winnebago. The C & NW also established a route to Green Bay and beyond, into the Upper Penninsula to the lumber mills and iron mines.

Other railroads were built in Wisconsin, but most of them were absorbed by or worked in conjunction with the two larger systems. The West Wisconsin Railroad, for example, began its existence with a federal land grant in the pinery region. It attracted the interest of several lumbermen, who developed it into a line that served their needs in the pineries. In 1882, however, the C & NW bought a majority of its stock, but it continued its separate existence.

The Minneapolis, St. Paul, and Sault St. Maire (the Soo Line) was constructed in conjunction with the Canadian Pacific Line during the 1880s. It became primarily a lumber, pulpwood, and mineral line serving northern Wisconsin and the paper mills on the lower Fox River. The Northern Pacific and Great Northern Railroad reached Chicago from Wisconsin via the Burlington and Northern, which built a line along the Wisconsin side of the Mississippi River during the 1880s. Green Bay achieved an independent connection to the Mississippi by 1873 with the Green Bay and Western Line (Nesbit

1973:318-320).

During the late nineteenth and early twentieth centuries, several smaller, independently operated railroads were also built in the state. Many of these rail lines were constructed in the northern part of the state to haul timber to sawmills and copper and iron ore from the mines to processing centers and lakeports for shipment to Eastern markets. Several short lines were also built in southern Wisconsin to transport livestock, agricultural products, and raw materials such as iron ore (Dodge and Sauk counties) and zinc (Iowa, Lafayette, and Grant counties).

The latter phase of railroad development in Wisconsin also witnessed several important "firsts". During these years the longest independent rail line entirely within the state was built westward from Green Bay to the Mississippi River (1873), the first logging railroad in Wisconsin was constructed (1875-76), the first railroad in Wisconsin reached Lake Superior (1877), and a main line parallel to the Mississippi River from the Illinois border to Prescott was completed (1886).

The first railroad bridges to span the Mississippi River were also built during this period as many of Wisconsin's railroad companies sought to control the movement of wheat from Minnesota and Iowa to Milwaukee for shipment via the Great Lakes and the Erie Canal to Eastern markets. The earliest railroad bridge across the river in Wisconsin was completed at Winona in 1869-70. Later, bridges were also established at Prairie du Chien (1874, 1885, 1899), La Crosse (1875-76), and below the mouth of the Chippewa River (1882). The pontoon railroad bridge-crossing at Prairie du Chien is perhaps the most famous. An estimated one million railroad cars crossed its floating tracks before it was abandoned and removed in 1961 (Donovan 1964: 183).

The rapid expansion of railroads throughout Wisconsin during the late nineteenth century brought economic prosperity to many communities. Prairie du Chien, La Crosse, Milwaukee, Fond du Lac, Superior, Tomah, North Hudson, and Baraboo, in particular, all profited from being part of the rail network. By 1900, the city of La Crosse, for example, was served by four railroads and had developed into the largest railroad center between Chicago and Minneapolis (Miller 1959:4). Several communities in the state owe their existence to the railroad. Villages such as Brodhead (Green County), Mazomanie (Dane County), and Apollonia (Rusk County) were platted alongside the tracks to service the railroads and provide shipping points for area residents.

Since 1916, when railroad construction in Wisconsin reached its peak, the number of trains and miles of track in the state have steadily declined. Reasons for the decline include the depletion of the timber and mineral resources in the north, the development of the automobile, changing social and economic patterns following World War II, and the subsequent rise of the trucking industry. Railroads operating in Wisconsin today play only a small role in the economic development of the region.

IDENTIFICATION

Resource Types. Historic rail routes, passenger depots, freight depots, freight houses, round houses, water towers, maintenance sheds, repair shops, control sheds, tool houses, turntables, engine houses, Great Lakes railroad car ferries and associated land base structures, bridges, tunnels, abandoned rail corridors, railroad construction camps, railroad hotels, homes of prominent railroad promoters and executives, workers' housing, locomotives, engines, railroad cars, and equipment.

Locational Patterns of Resource Types. Most railroad associated resources, such as depots, roundhouses, and repair yards, will be primarly located adjacent to industrial corridors and commercial areas of a community; exceptions might include control sheds, bridges, and tunnels. In some cases an actual railroad rightof way may be nominated, including the railroad tracks and topographical setting.

Previous Surveys. The only known thematic Wisconsin railroad survey is John Vogel's "The Railroad Depot in Southeastern Wisconsin," on file at the Historic Preservation Division. The "Transportation" chapters in several intensive survey reports also provide varying amounts of data on railroad development within specific localities. The Geneva Lake, Reedsburg, Superior, and Chippewa Falls intensive surveys provide especially detailed information on railroad development in those communities.

Survey and Research Needs. Sufficient data exists pertaining to Wisconsin's larger railroad companies. Research should concentrate on the smaller logging railroads that came into existence in the northern part of the state during the late nineteenth and early twentieth centuries.

Surveys should attempt to locate and identify resources, eg., roundhouses and turntables, associated with major repair yards. A survey of Wisconsin's railroad bridges and tunnels should be undertaken. And a typology of ancillary railroad structures should bedeveloped so that these resources can be properly identified. Architects of railroad associated structures should also be identified; an attempt should be made to the specific architects to the railroad companies for whom they designed. Research should also focus on the railroads' effect on community planning and development.

EVALUATION

National Register Listings and Determinations of Eligibility

Depots

Union Depot (1900), 417 Chapple Ave., Ashland, Ashland County (NRHP 1979)
West Madison Depot, Chicago, Milwaukee, and St. Paul Railway (1903), 640 W. Washington Ave., Madison, Dane County (NRHP 1979)
Waunakee Railroad Depot (1871, 1896), South & Main Sts., Waunakee, Dane County (NRHP 1985)
Chicago, Milwaukee & St. Paul Railway Company Depot (1900) [now the Dodge County Historical Museum], 127 S. Spring St., Beaver Dam, Dodge County (NRHP 1981)
Fox Lake Railroad Depot (1884), Cordelia St. & S. College Ave., Fox Lake, Dodge County (NRHP 1978)
Chicago, St. Paul, Minneapolis & Omaha Railroad Depot (1892), 324 Putnam Ave., Eau Claire, Eau Claire County (NRHP 1983, Eau Claire MRA)
Chicago & Northwestern Railroad Passenger Station (1903), 725 W. Main St., Watertown, Jefferson County (NRHP 1979)

Chicago, Milwaukee & St. Paul Railroad Depot (c. 1889-1895), Railroad tracks, west of Washington St., Darlington, Lafayette County (DOE 1978)
South Milwaukee Passenger Station (1893), Milwaukee Ave., Milwaukee, Milwaukee County (NRHP 1978)
Kendall Depot (1900), N. Railroad St., Kendall, Monroe County (NRHP 1981)
Lakeshore Depot (1880), 725S. Oneida St., Appleton, Outagamie County (DOE 1982)
Racine Depot (1901-1902), 1402 Liberty St., Racine, Racine County (DOE 1980)
Lake Geneva Depot (1891), Broad St., Lake Geneva, Walworth County (NRHP 1972)
Oconomow Depot (1896), 115 Collins St., Oconomowoc, Waukesha County (NRHP 1980)

Engine Houses

Chicago, Milwaukee, St. Paul & Pacific Railroad Company Engine House (1880), Fond du Lac, Fond du Lac County (DOE 1978)

Freight Houses

Illinois Central Gulf Railroad Freight Warehouse (1889), Railroad Station Drive, Monroe, Green County (NRHP 1977)
Freight House (1880), 107 Vine St., La Crosse, La Crosse County (NRHP 1982)

Bridges

Pratt Truss Railroad Bridge (1888), over Sugar River, Belleville, Dane County (DOE 1977)
Tiffany Stone Bridge (1869), Turtle, Rock County (DOE 1982)
Soo Line High Bridge (1910-1911), Somerset, St. Croix County (NHRP 1977)

Tunnels

Illinois Central Gulf Railroad Tunnel (1888), Exeter, Green County (NRHP 1977)

Wisconsin Rail Lines, 1936

Source: James P. Kaysen, *The Railroads of Wisconsin, 1927-1937* (Boston, 1937).

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Temporal Boundaries: 1820-1890.

Spatial Boundaries: The entire state of Wisconsin

Related Study Units: Metal Truss Bridges, Early Mass Transportation, Later Road Networks

HISTORICAL BACKGROUND

The earliest overland travel routes in Wisconsin were Indian trails and portage routes. Indian trails were once abundant, linking Indian villages with major waterways as well as hunting and fishing grounds. As such, the trails, together with the region's waterways, served as the earliest corridors of travel, communication, trade, and warfare. Although the locations of many of the old trails are known and recorded (Brown 1930), remnants of only a few trails are still visible. Traces of most trails have been destroyed by agricultural practices, highway construction, and urban development.

Early fur traders, missionaries, and explorers made extensive use of the established network of Indian trails. Settlers arriving in the region during the first decades of the 19th century widened many of the trails into roads suitable for ox carts and wagons. By 1829 lead miners had blazed several meandering wagon roads through southern Wisconsin for hauling lead to the Mississippi River and Milwaukee for shipment to Eastern markets.

During Wisconsin's territorial period the federal government found it expedient to develop a system of military roads to transport supplies between forts established for frontier defense. The first military road in Wisconsin was built between 1835-1838 by garrisons stationed at Forts Howard, Winnebago, and Crawford to link Green Bay and Prairie du Chien. Military roads extended along Lake Michigan as well as through northeastern Wisconsin. During the territorial period and in the years following statehood, other roads branched off the military roads, running from various settlements along Lake Michigan to the Wisconsin River as well as to Mineral Point and the lead region. (See maps in Military Frontier study unit for military road network.)

As the population grew in southern and eastern Wisconsin, public demand for more and better roads for travel and transporting agricultural products to market increased. Between 1836 and 1848, the territorial legislature authorized the establishment of 249 territorial roads (State Highway Commission of Wisconsin 1947:10). Following statehood in 1848, roads laid out and opened by authorization of the legislature were designated "State Roads". Between 1848 and 1891, the legislature enacted 560 separate laws pertaining to the chartering and opening of state roads (State Highway Commission of Wisconsin 1947:14). Responsibility and costs for road care, however, were delegated to local units of government--a condition which was to last until the early twentieth century.

To help finance road construction, private turnpike and plank road companies were chartered and organized in the state. The latter became particularly popular during the 1840s and 1850s. The earliest plank surfaced road in Wisconsin was built between Lisbon and Milwaukee in 1846. Between 1846 and 1871, 135 turnpike and plank road companies were organized and chartered by the legislature (State Highway Commission of Wisconsin 1947:17). Plank roads did not prove to be as profitable as had been expected, however. Stock company dividends were small and irregular, and actual operations of the plank roads revealed that they decayed badly in five or six years, making them hazardous to travel and costly to repair. Although many of Wisconsin's plank roads continued to carry large volumes of traffic until the early 1900s, most were abandoned in the wake of railroad development during the 1860s and 1870s. Although the plank roads themselves have disappeared from the landscape, some of the routes exist as parts of Wisconsin's highway system. The Watertown Plank Road is an example.

The granting of government licenses to operate ferry boats across rivers and streams in the state also helped to establish more direct and efficient lines of travel and communication. Today, the Merrimac Ferry, which began service across the Wisconsin River in 1844, is the lone survivor of upwards of 500 ferries chartered by territorial and state legislatures before the turn of the century.

As road networks were extended from town to town across the state, stagecoach service was begun. (See "Early Mass Transportation" study unit.)

Early overland travel in Wisconsin was far from glamorous. Roundabout routes, lack of sufficient bridges, and the frequently mud-clogged, ruddy conditions of the roads made travelling hazardous and uncomfortable. Crossings by ferry boats were oftentimes prevented, or endangered, by spring ice flows and, in later years, by lumbering operations. Night travel was particularly dangerous with no lighting and was not undertaken except in emergencies. Accidents were common as horses bolted and could not be stopped. Efforts to improve Wisconsin's poor road conditions and establish a state-supported highway program did not begin until the decade of the 1890s as public support for permanent, safe, and efficient roads spread across the state.

IDENTIFICATION

Resource Types. Indian trails, trail marker trees, portage routes, fords, military roads, territorial roads, state roads, U.S. roads, county roads, town roads, turnpikes and plank roads, ferries, ferry landings and crossing sites, bridges, road signs, milestones, abandoned wagon roads, blacksmith shops, toll gates, toll gate keepers' houses.

Locational Patterns of Resource Types. Topographical features were the largest single determing factor concerning the location of early roadway systems. [e.g. swamps, hilly terrain, and dense forests were to be avoided, while highground, stable dry soils, and flat open land were common prerequisits for easy travel and roadway development.]

Previous Surveys. No comprehensive survey of historic road systems has been conducted as of this time.

Survey and Research Needs. Because of the importance of the early military roads to the initial development of many pioneer communities in southern Wisconsin, a study of their routes in relationship to present-day road systems should be undertaken to determine whether any original features remain extant.

Communities which undertake intensive surveys should pay attention to often overlooked features such as road markers, milestones, paving materials, or abandoned roadways if it can be determined that early road systems traversed the area.

EVALUATION

National Register Listings and Determinations of Eligibility

Merrimac Ferry (1844), Town of Merrimac, Columbia County [NRHP 1974]

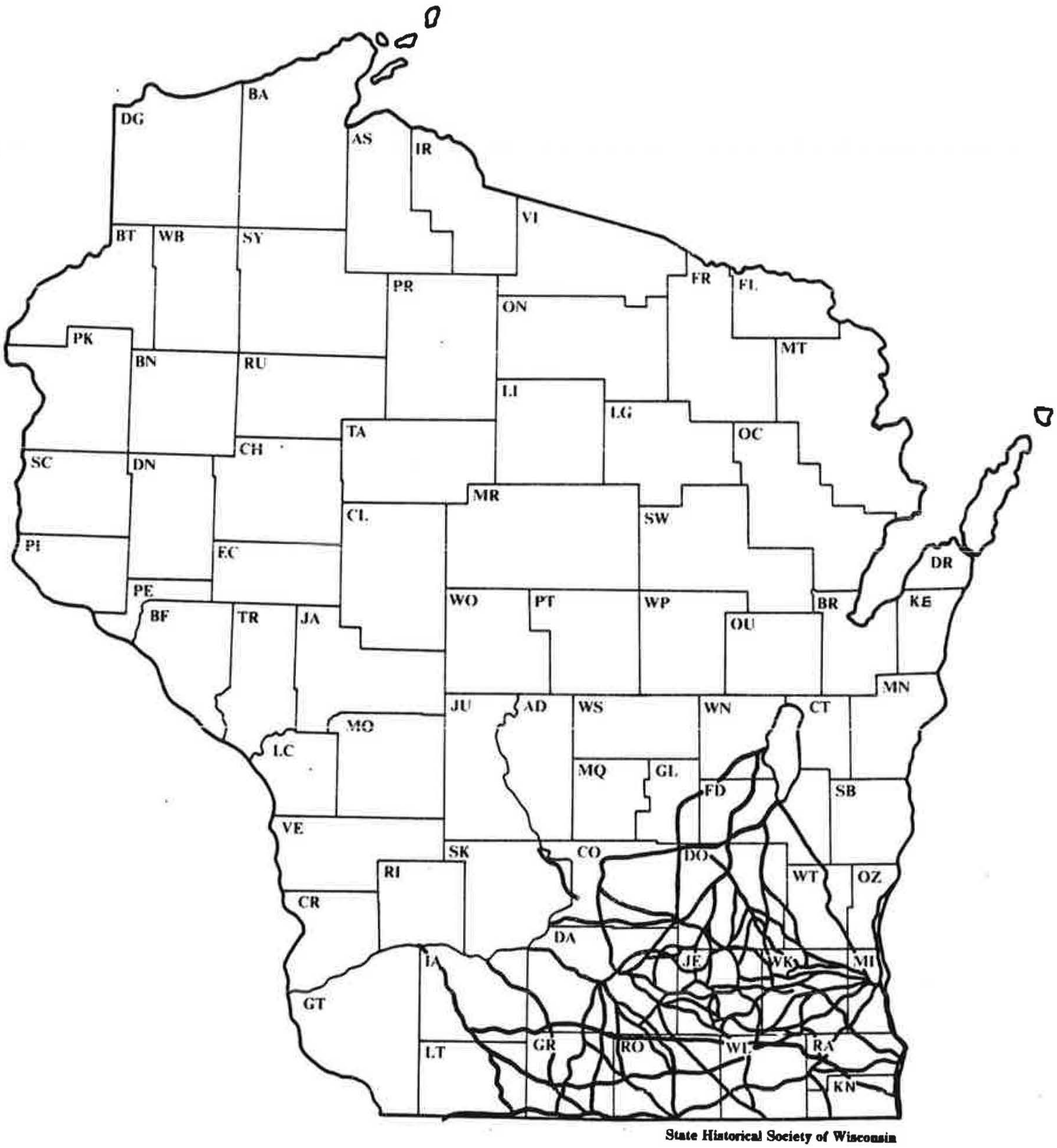
Fox-Wisconsin Portage Site, (Waunona Trail), Columbia County [NRHP 1973]
Brule-St. Croix Portage Site, (1680, 1766, 1832) Town on Solon Springs, Douglas County [NRHP 1970]

Covered Bridge (1876), Town of Cedarburg, Ozaukee County [NRHP 1973]

Context Consideration: The evaluation of early road systems, whether Indian trails or established plank roads, should involve a careful review of the historic setting of the resource. The nature of original materials, vistas, vegetation patterns and roadside development should all be included as important contextual features in the evaluation of the integrity of a site or property. Strictly commemorative associations, sites of original roadways with no visible physical remnants or much-altered surroundings, are to be avoided.

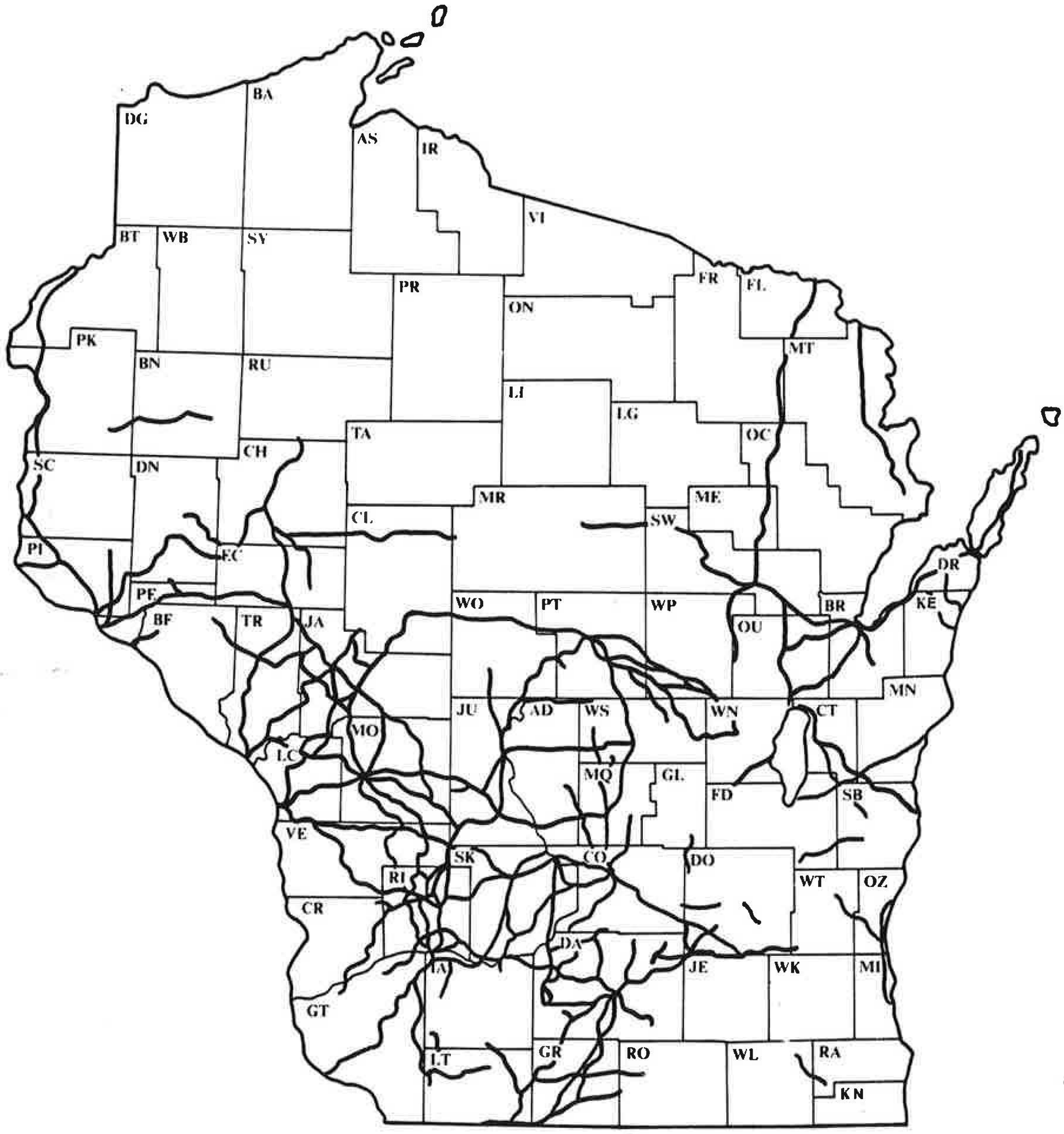
The relative importance of the specific roadway system to development or settlement in an area is also a factor for consideration. The evaluation of the role which a roadway or associated resource played is important in ascertaining the actual historical significance of a property or site.

The level of significance for historic early roadways will normally be at the state level.



Territorial Roads, 1836-1848

Source: State Highway Commission of Wisconsin, *A History of Wisconsin Highway Development, 1835-1945* (Madison, 1947), p.11



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Source: State Highway Commission of Wisconsin, *A History of Wisconsin Highway Development*, 1835-1945 (Madison, 1947), p. 15.

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Temporal Boundaries: 1890-present.

Spatial Boundaries: The entire state of Wisconsin.

Related Study Units: Metal Truss Bridges, Later Mass Transportation.

HISTORICAL BACKGROUND

During the early 1890s, years before the first gasoline-powered automobile appeared in Wisconsin, a movement to transform the state's country roads into decent thoroughfares began. The Good Roads Movement, as it was called, was supported by a25road coalition of urban merchants and businessmen, progressive farm leaders, university and other educators, professional engineers, and, during the cycling craze of the 1880s and 1890s, bicyclists. Influenced by highway movements in eastern states where state-aid for roads had become increasingly popular, the Wisconsin good roads promoters campaigned for improved road conditions and later for a constitutional amendment which would allow a state-financed highway program, administered by a state highway commission.

The major cause for Wisconsin's poor road conditions was the fact that the framers of the state constitution in 1848 inserted a clause which prohibited state appropriations or loans for transportation and internal improvement projects. Since statehood, all responsibility of financing and maintaining roads had been delegated to local government. Much of the work, however, was contracted to local residents. Bound to the tradition of building and caring for their "own" roads, rural residents were reluctant to give up their accustomed highway practices in favor of a system that required payment of road taxes in money. Acceptance of the state-aid-to-roads principle, therefore, came slowly because of rural opposition and the widespread belief that the railroads would continue to provide the bulk of the state's transportation needs.

Education of the rural public was a distinctive feature of the good roads movement in Wisconsin. Advocates of better roads pleaded their cause at public meetings, in campaign literature and posters, and through the state's newspapers and farm journals. Pointing to the social imbalance between rural and urban life which troubled numerous farmers, the road reformers claimed that poor roads put rural families "in the rut" and kept them there, whereas good roads provided opportunities for neighborhood social life, consolidated schools, prompt medical and mail service, and cheaper means for hauling produce to market (Campbell 1966: 283).

During the period that public opinion was being transformed towards the acceptance of state-financed highways, the automobile age dawned in Wisconsin. The first light self-propelled highway vehicle in the United States, and probably the first in the world, was designed and operated in 1873 by Rev. Dr. J. W. Carhart of Racine (State Highway Commission of Wisconsin 1947:19). Gasoline-powered motor cars began to appear regularly in the state in 1899. As the popularity of the automobile increased, so did the number of registered vehicles in the state. In 1905, there were 1,492 registered vehicles in Wisconsin. By 1916 the number of registered vehicles had jumped to 124,603. In 1945 the figure had grown to 693,666 (State Highway Commission of Wisconsin 1947: 127). Motoring became not only a new travel experience for people in the state, but also a boon to the state's economy as Wisconsin developed into a regional center for the automobile industry. By 1906 early automobile assembly and manufacturing plants were established in Kenosha, Hartford, Racine, and Milwaukee.

The passage of a public roads law in 1911 climaxed the campaign for state-aid for roads and ushered in a new era of transportation in Wisconsin. With increasing pressure from automobile and agricultural interests, the good roads movement soon embarked on new programs of road improvements, bridge repairs, and state trunk highway marking. Since 1916, the federal government has extended financial assistance to the states for the development of highway systems.

Today's interwoven network of local, state, and federal roads and bridges allows travellers in the state to reach their destinations in a fast and relatively safe and efficient manner. The establishment of good roads and a powerful automobile industry in the country has brought about revolutionary changes in urban planning and the fabric of American society. It has also spurred the development of several, oftentimes unique, roadside commercial enterprises, ranging from early twentieth century gas stations, motels, and diners to the ubiquitous fast-food restaurant chains of the 1960s, 1970s, and 1980s.

IDENTIFICATION

Resource Types. Federal, state, and local roads and bridges, road signs and markers, gas stations, motels, hotels, restaurants, diners, car ferries, tourist camps, motor courts, WPA related roadway maintenance facilitities, ferries.

Locational Patterns of Resource Types. The development of an extensive highway system seems to have been carried out across the breadth of the state. Topography and population were major determining factors in roadway location, with the largest concentration of resources located in the southern third of the state.

Previous Surveys. No comprehensive survey of historic road systems has been conducted as of this time.

Survey and Research Needs. Research into the role of the tourism industry on roadside architecture and the state's roadway system, particularly in the northern areas of the state, could significantly aid in our understanding of the development of the region in the early 20th century.

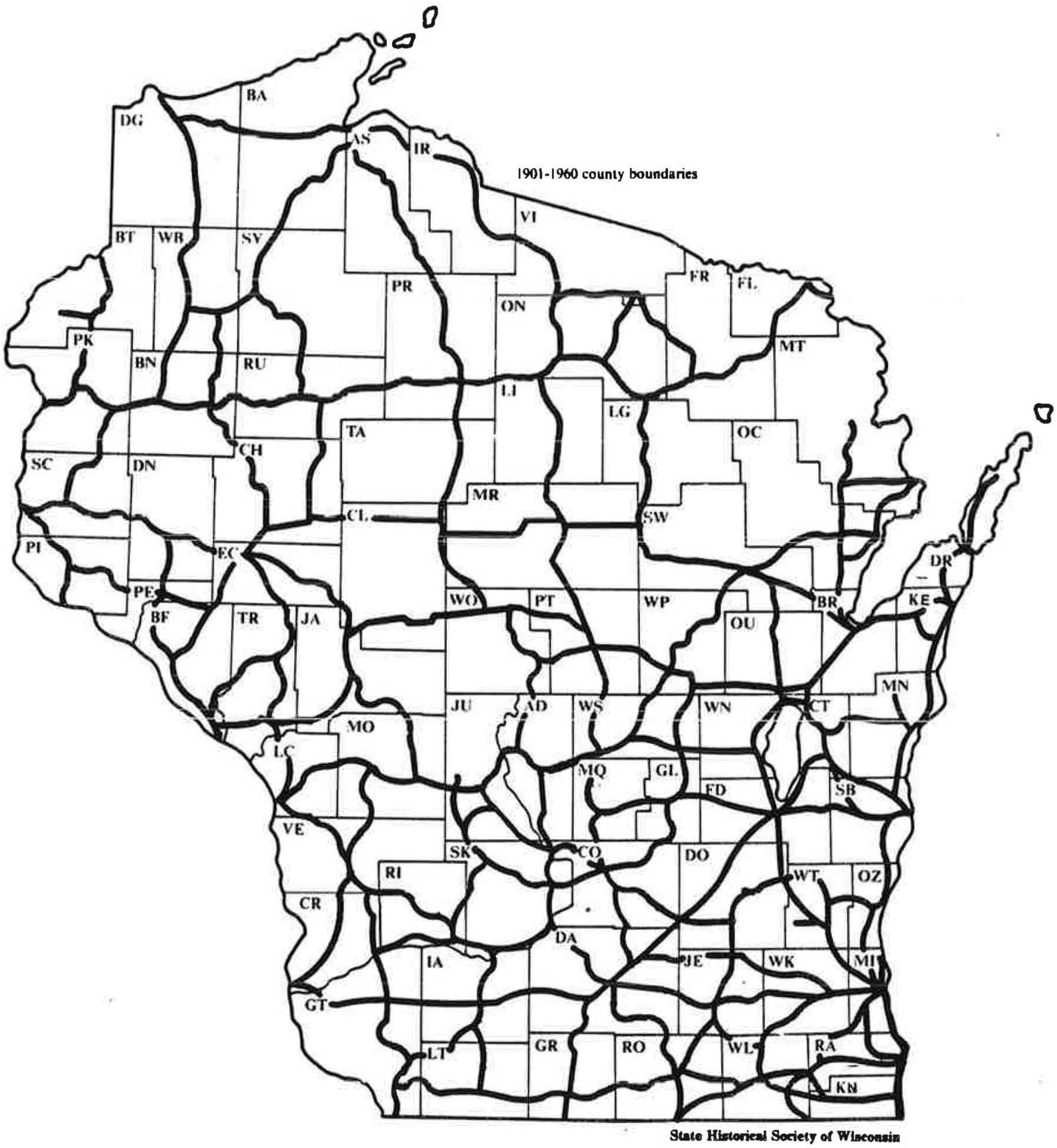
All surveyers should be attuned to the importance of 20th century commercial "roadside" architecture as well as that of the more commonly acknowledged downtown business districts.

EVALUATION

National Register Listings and Determinations of Eligibility

Wadham's Filling Station (1926) Columbia Road, Cedarburg, Ozaukee County (NRHP 1985, Washington Avenue Historic District.)

Context Considerations. The evaluation of road systems and their associated resources should involve the careful review of the historic setting of the resource. The nature of original vistas, materials, vegetation patterns or roadside development should all be included as important contextual features in the evaluation of the integrity of a site or property. The relative importance of the specific roadway system to the development, settlement or economic growth of an area is an essential factor for consideration. The evaluation of the specific role(s) which a roadway or associated resource played is extremely improtant in ascertaining the historical significance attributable to the resource.



The Original State Trunk Highway System, 1918

Source: State Highway Commission of Wisconsin, *A History of Wisconsin Highway Development, 1835-1945* (Madison, 1947), p.42.

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Temporal Boundaries: 1835 - 1900.

Spatial Boundaries: Entire state, with resources concentrated in urban areas.

Related Study Units: Early Road Networks, Later Mass Transportation, Military Frontier

HISTORICAL BACKGROUND

The earliest systems of urban and interurban transportation in Wisconsin developed in the decade before statehood, concurrently with the growth of settlement and the emergence of a rudimentary road network. As early as the mid-1830's, scheduled stage coach service was inaugurated in southwest Wisconsin, and soon expanded with the extension of the military and territorial road systems. By the early 1840's, numerous stage lines (usually recipients of federal mail contracts) transported freight and passengers (6-12 per coach) throughout the settled portions of the territory, "assuring ample transportation almost anywhere in occupied Wisconsin" (Smith 1973:443). Three of the region's largest firms - Frink, Walker, and Co., Chicago; L. P. Sanger, Galena; and Davis and Moore, Milwaukee - joined forces in 1845 to offer four-horse post coach service between Galena and Milwaukee (over a variety of routes), leaving the terminus cities each week day with two overnight stops at inns along the way (Lacher 1915:113). Secondary lines supplemented the service and competitive trans-territorial lines developed immediately; by 1850, frequent service linked Milwaukee, Green Bay, La Crosse, Fond du Lac, Sheboygan, Racine, Kenosha, Chicago, and numerous points in between, while ancillary "feeder lines" provided connections to smaller communities on a regular basis (State Highway Commission, p. 17) (See Military Frontier and Early Road Networks study units for maps of military and territorial road network). After the advent of railroads in the 1850s, stage service was eclipsed but not extinguished. Although stage lines between cities served by railroads were quickly discontinued, feeder lines served as important secondary links in the state's transportation network as late as the 1870s and 1880s (Current 1976:449). The stage lines themselves left behind few built resources, but the transportation corridors they helped create remain the site of numerous stage coach inns, sources of rest and hospitality along the routes. Typically Greek Revival in style, two stories in height, and embraced by a front veranda, the inns functioned both as way-side public houses and incipient community centers.

Within Wisconsin communities, horse-drawn public transportation was a necessity from the earliest years of settlement. Liveries provided coaches, cabs, and drays for rent in most communities until the advent of the automobile, but such private endeavors were neither systematic nor well-regulated (although the City of Milwaukee did institute controls on the operation of hackney cabs by 1847) (Still 1965:246). Better transit service was provided by the horse-drawn omnibuses which appeared on the streets of Milwaukee in the 1840s. Offering regular routes, schedules, and fares, these large coaches jostled with private carriages and freight wagons through the rough streets of the city, congregating at docks to greet travelers and immigrants and transport them to hotels, inns, and other public establishments (Still 1965:246). By the 1850s, the first omnibuses appeared on Madison streets, operated by city hotels, and in 1872 the first omnibus lines began providing regular service to Madison's east and west sides (Mollenhoff 1982:135). The 1880 census reported the continuing presence of omnibus lines in Milwaukee, Madison, and La Crosse (Tenth Census of United States 1880:651, 657, 667), although it is unlikely that horse stables or other structures associated with these companies have survived.

But a more comprehensive transit system had already emerged: in 1859, the City of Milwaukee granted a franchise to the first horse-drawn street railway company in Wisconsin, an important step in easing congestion and facilitating movement in the state's largest city. Inaugurated on Memorial Day, 1860 (thirty years after the world's first system appeared on the streets of New York), the buff and blue cars of George Walker's River and Lake Shore Railway carried passengers between the city's two railroad depots on iron tracks laid over existing streets (McShane 1974:52). Fifteen years later, the lines of three firms transversed Milwaukee: the Milwaukee City Street Railway (successor to the financially troubled River and Lake Shore line), the Cream City Railway, and the West Side Railway (with other lines added in the 1880s). Inevitably, the streetcar lines had an impact on the development of the city. Physical growth in the 1860s, according to one historian, often depended on the speed of getting to work on the streetcars (Still 1965:368). The lines enabled downtown workers to live at a convenient remove from their place of work or business, providing reliable and inexpensive transit to the central city or to outlying parks and cemeteries for recreation. Several lines spurred the development of outlying neighborhoods, providing access to real-estate developments owned by streetcar investors (McShane 1974:53). But if the Milwaukee streetcars of the late 19th century reached the perimeters of the city, they were not truly "interurban" nor did they precipitate "streetcar suburbs." Financial difficulties, low ridership, and poor service to industrial areas limited the impact of the lines on the city's physical development and the choice of routes tended to reinforce pre-existing patterns (McShane, 1974:63). Moreover, horsecar service was slow, sometimes unsafe, and always inhibited by the stamina and spirit of the animals which powered it. When, for example, a devastating equine epidemic swept through the stables of the state in 1873, streetcars in Milwaukee came to a halt. Disruptions stalled service on a daily basis as well: steep hills and fatigued animals routinely limited the effectiveness (and profitability) of the lines. But despite these obstables, streetcar lines were adopted statewide. In the 1880s, at least eighteen companies operated in the state's largest communities, with lines established in Ashland, Eau Claire, Fond du Lac, Janesville, La Crosse (two companies), Madison, Marinette, Milwaukee (five companies), Neenah, Oshkosh, Racine, Sheboygan, and Superior, covering more than 75 miles of street (Eleventh Census of the U.S., 1890:713). By the middle of the decade, streetcar lines had become a permanent part of the urban infrastructure. When electrification dramatically expanded the state's streetcar network in the 1890s (thus ending the first era of mass transit), the original horsecar tracks, cars and routes were often used by the electrified lines even when the animals and cars were discarded. By 1900, no animal-powered streetcars operated anywhere in the State (U.S. Dept. of Commerce 1905:300), but the "muly-jog" system had laid the foundation for the emerging era of interurban railways.

IDENTIFICATION

Resource Types. Stagecoach inns, the best representatives of early interurban transportation, still dot the Wisconsin landscape along the earliest roads and highways, stops and stations may still be found in communities around the state. The livery stables, horse and car barns, offices, and terminals of the omnibus and horsecar lines were utilitarian frame or brick structures located in the central business districts of the state's largest cities. It is unlikely that many have survived.

Locational Patterns of Resource Types. Stage coach inns provided hospitality in communities and at crossroads along early road networks: onmibus lines operated in the state's largest cities, with routes usually running between hotels and railroad depots or harbors; street railways utilized existing roads, and erected barns, offices, and stations in the central city.

Survey and Research Needs. Survey historic roadways for extant stagecoach inns; in surveys of urban areas attempt to identify extant structures associated with animal-powered street railways and amnibus lines.

Previous Surveys. None.

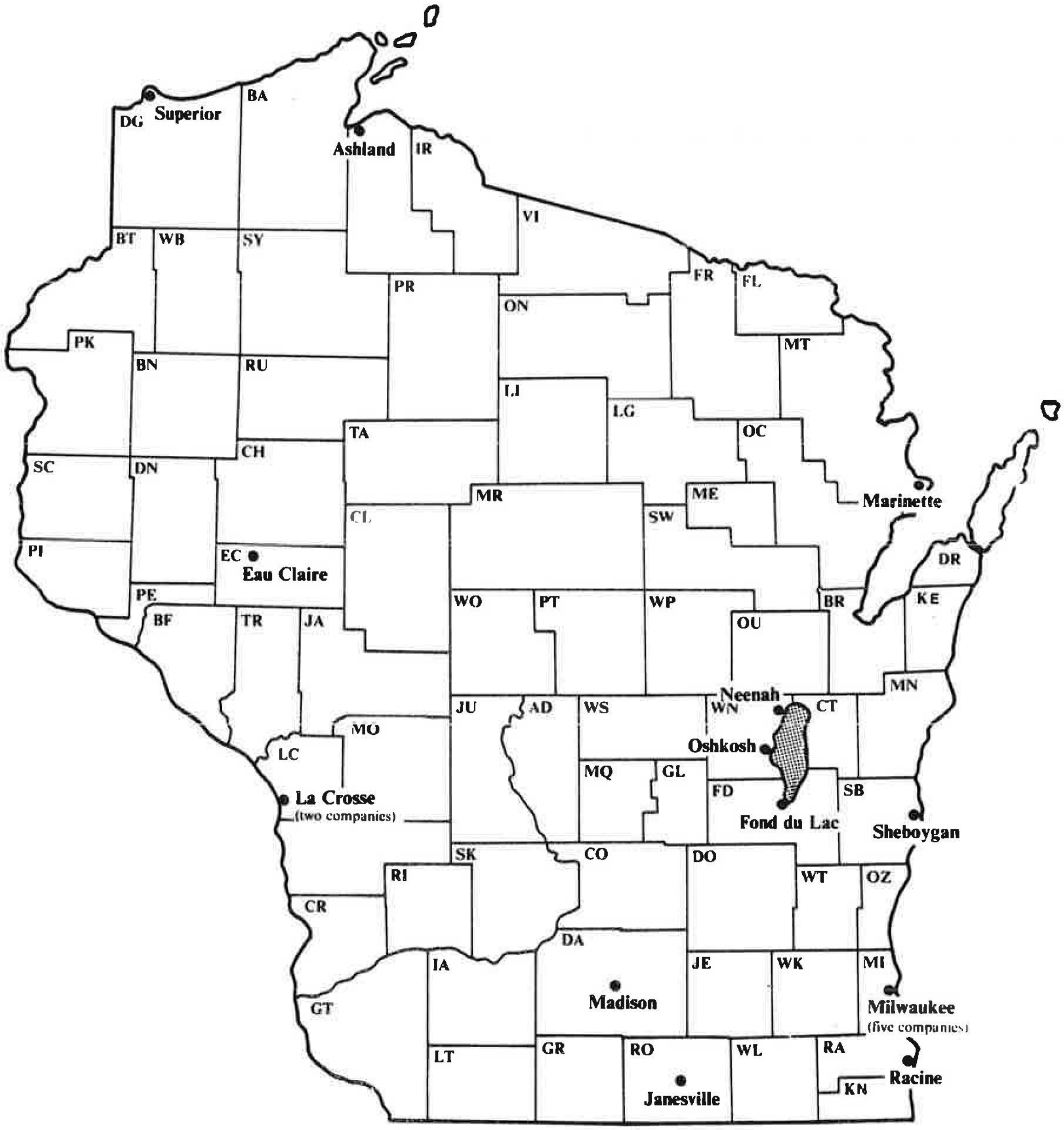
EVALUATION

National Register Listings and Determinations of Eligibility

Old Spring Tavern (1854), 3706 Nakoma Rd., Madison, Dane County (NRHP 1974)
Plough Inn (1853, 1858), 3402 Monroe St., Madison, Dane County (NRHP 1980)
Club Harbor (c. 1846), Town of Calumet, Fond du Lac County (NRHP 1980)
Pipe Site, Town of Camlumet, Fond du Lac County (NRHP 1978)
Wayside House (1846), W61N439 Washington Ave., Cedarburg, Ozaukee County (NRHP 1982)
Kinney Farmstead (Lake House Inn) (1845, 1857), 3889 Hotel Dr., Edgerton, Rock County (NRHP 1978)
Milton House (1844), 18 S. Janesville St., Milton, Rock County (NRHP 1972)
Old Wade House (1847-1851), Town of Greenbush, Sheboygan County (NRHP 1971)
Buena Vista House (Cobblestone Inn) (1846-1849), 2090 Church St., East Troy, Walworth County (NRHP 1978)
Dousman Inn (c. 1857), 15670 Blue Mound Rd., Brookfield, Waukesha County (NRHP 1979)
Hawk's Inn (1846), 428 Wells St., Delafield, Waukesha County (NRHP 1972)
Halfway House (Jones Tavern) (1852), Town of Dayton, Waupaca County (NRHP 1982)
Augustin Grignon Hotel (1843), Town of Winneconne, Winnebago County (NRHP 1975)
Robert Wakeley Tavern (1837), West end of Wakely Rd., Nekoosa, Wood County NRHP 1974)

No structures associated with omnibus or housecar lines are listed in the National Register.

Context Considerations. Stagecoach inns will have been modified for new uses, such as commercial or single family residential. This inevitable change should affect eligiblity little, however, the exterior appearance of the inn should be little altered. Structures associated with animal powered lines are rare and should be evaluated accordingly, with generous allowances for loss of integrity. Setting of these structures have probably altered considerably. Statewide evaluation may be appropriate for resources related to animal powered transportation systems, however, stagecoach inns can usually be evaluated at the local level.



State Historical Society of Wisconsin

Wisconsin Communities With Animal-Powered Street Railways, 1880-1890

Source: Compiled by Garfield, 1983

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Temporal Boundaries: 1886 - present.

Spatial Boundaries: Entire state with resources concentrated in the urban southeast and Fox River Valley.

Related Study Units: Early Mass Transportation; Later Road Networks

HISTORICAL BACKGROUND

In 1886, when the first electric trolley in Wisconsin sputtered forth on the streets of Appleton, urban transit in the state was limited to a skeletal system of horse drawn streetcars in a handful of cities. Restricted from the outset by short routes, slow service, and light loads, the animal-powered systems seemed outmoded in an era of rapid urban growth. Indeed, new technologies rendered horsecars obsolete even before most Wisconsin lines were established. In 1880, Thomas Edison developed a dynamo-driven electric locomotive, and by 1885 Charles Van Doeple, a Belgian inventor, applied Edison's theories to an experimental electric streetcar (Hilton 1960:5). The following year, while several Wisconsin communities were initiating horsecar lines, a small group of investors in Appleton acquired a Van Doeple dynamo and inagurated the first electric streetcar service in the state - and perhaps the first in the nation (U.S. Department of Commerce and Labor 1905:163). Running on iron tracks laid over existing streets, the open-sided cars of the Appleton Electric Street Railway were powered by direct current motors which received power from the city's hydroelectric plant via overhead wires. Although the maiden trip - charging and halting according to the uneven flow of electricity - may not have seemed an obvious improvement over the horsecars of other cities, the pioneer Appleton line initiated a new form of technology that dramatically altered urban transportation for the next six decades.

Several years passed before electric streetcars appeared in other Wisconsin cities, but beginning in 1889, with the construction of central power plants across the state, new trolleys suddenly supplanted old horsecars in city after city. Each year, new electric street railways were established: Eau Claire (1889), Merrill (1889), Milwaukee (1890, Washington Becker's West Side Railway, Superior (1890), Marinette (1891), Janesville (1892), Madison (1892), Racine (1892), Ashland (1893), La Crosse (1893), Green Bay (1894), Oshkosh (1894), Sheboygan (c. 1895), Fond du Lac (1899), Waupaca (1899). By the eve of the new century, not a single horsecar remained on the streets of Wisconsin. Amid a proliferation of overhead electric wires, urban transit came to Chippewa Falls (c. 1900), Kaukauna (1902), Manitowoc (1902), Two Rivers (1902), Kenosha (1903), Wausau (1906), Beloit (1907), Wisconsin Rapids (1910), Portage (1913) and Rice Lake and Park Falls (where the Hines Lumber Company operated the lines) (Source: from Central Electric Railfan's Association 1953, 1969).

Although other modes of mass transit enjoyed brief favor in the late 19th century - Milwaukee, for example, flirted with cable cars and steam powered streetcars for a few unprofitable years - the advantages of electric streetcars were undeniable. Carrying twice as many passengers as horsecars, at twice the speed and powered by an inexpensive and apparently limitless power source, trolleys could maneuveur steep hills, travel long distances, and provide frequent service. Compared to the old horsecars, wrote one Milwaukee observer at the time, the new electric cars "slide through the city like a greased pig through a lasso" (Still 1965:370). Not surprisingly, electric streetcars had a more profound impact on urban life than their predecessors: new neighborhoods ("the streetcar suburbs") were suddenly accessible to development, secondary shopping districts sprung up at points along the routes, and passengers were swiftly transported to the central city or to outlying parks.

Electric streetcars had a unique financial attraction as well--providing valuable revenue to central power plants which had few other daytime clients. As a result, streetcar lines were often owned by large utility interests. When, for example, New York financier, railroad promoter, and Edison associate Henry Villard purchased all of Milwaukee's streetcar lines in the early 1890s, he simultaneously acquired the city's lighting utilities, thus creating a powerful monopoly. His firm, the North American Company (which also controlled the Northern Pacific and Wisconsin Central railroads), was the "first electric utility holding company in the United States" (McDonald, 1956:167). By 1892, consolidation of Milwaukee's streetcar system was reflected in the construction of a single car barn complex on Kinnickinnic Street and a central power station on Commerce Street which generated electricity for the entire streetcar system (Central Electric Railfan's Association 1953:9). Despite early financial setbacks and labor strife, the Milwaukee system reorganized in 1896 as the Milwaukee Electric Railway and Light Company (known universally as TMER&L) and was the "first city-wide completely interconnected, and unified streetcar system" in the world (McDonald 1956:168).

The ability of electric streetcars to move passengers rapidly across town quickly led to the development of interurban service, especially in the densely populated metropolitan Milwaukee, Lake Winnebago and Green Bay areas. In December, 1896, TMER&L organized a subsidiary ("The Milwaukee Electric Light, Heat, and Traction Company") to develop interurban connections; within two years service extended to South Milwaukee, Wauwatosa, West Allis, Hales Corners, Cudahy, and other suburbs. For more distant points, the cars left city streets and travelled over private rights of way, thus speeding passengers to Waukesha, Waukesha Beach, St. Martins, Mukwanago, Racine, and Kenosha. By the first decade of the new century, TMER&L (under the management of traction wizard Harry Beggs) provided continuous interurban service throughout southeastern Wisconsin, travelling as far northwest as Watertown and as far southwest as East Troy and Burlington (Central Electric Railfan's Association 1953:13-19). Increasingly sophisticated cars (carrying up to sixty passengers) travelled at speeds of up to sixty miles per hour. When a five-story central terminal was constructed in downtown Milwaukee at 231 W. Michigan St., in 1905, it stood at the heart of one of the nation's most extensive interurban systems.

But TMER&L was not alone: by 1901, 17 electric railway companies operated 446 miles of track in Wisconsin (United States Census Office. Street and Electric Railways, 1902, 274). Ten years later, a web of interurban tracks blanketed the state from Green Bay to the Illinois line. The Milwaukee Northern Line (absorbed by TMER&L in 1928) carried passengers to Sheboygan as early as 1908; the Fox River Valley Railway (later merged with other companies) provided service between Neenah, Menasha, and Appleton in 1898, and reached Kaukauna in 1902; Green Bay Traction ran to Kaukauna in 1904; several electric lines skirted the shores of Lake Winnebago providing interurban service between Fond du Lac, Oshkosh, and Neenah as early at 1902. Elsewhere in the state, interurban lines connected Eau Claire and Chippewa Falls (1898); Superior and Duluth (by 1900); La Crosse and Onalaska (1902); Manitowoc and Two Rivers (1902); Marinette and Menomonie (MI) (1903); and Wausau and Schofield. Three lines entered Wisconsin from Illinois: the Geneva Lake Line travelled from the railroad depot in Harvard, Ill. to the lakeside village of Fontana as early as 1898; the Rockford interurban shuttled between that city, Beloit and Janesville by 1902; and the North Shore line connected Chicago to Milwaukee early in the century (Dates on Milwaukee Northern from Central Electric Railfan's Association 1953:25; dates on North Shore Line from Central Electric Railfan's Association 1962:22; all other dates from Central Electric Railfan's Association 1969). By 1912, electric traction in Wisconsin had reached its apogee: twenty-four electric railway companies carried 175 million passengers over 806 miles of track - 391 miles on city streets; 414 on interurban routes (U.S. Department of Commerce, Bureau of the Census

1915:292). So extensive (and interwined) was the interurban network that one could board a car in Elkhart Lake, and travel over continuous trolley track until arriving in Oneonta, New York (the longest single stretch of track in the country) (Hilton 1960:42).

As electric railways spread, auxillary structures were built to service both cars and passengers. Central power stations and housing generators (often providing electricity for lighting as well as traction) ranged in scale from the massive brick Commerce Street plant (built in 1892 by TMER&L) to distant, and diminutive, substations along the route (like the utilitarian brick plant in East Troy constructed in 1900, now housing the Trolley Museum). Repair shops and car barns ranged from simple gable-roof structures to more imposing buildings like the brick car barn in West Allis built by TMER&L in 1898. Some terminal buildings in downtown locations were as grandiose as a railroad depot (TMER&L's Public Service Building in Milwaukee was reputedly the world's largest such structure); others were simply functional (as the small brick passenger station in Waukesha), or merely waiting rooms in other buildings (as with the interurban facility in Beloit, built in 1905).

Although governed by the functional requirements, the industry spawned a variety of building styles. The TMER&L power stations in Milwaukee at 108 E. Wells Street (constructed 1890) and Commerce Street (constructed 1892) are massive, classically-detailed plants which contrast sharply with the utilitarian and dimunitive power station in East Troy (Walworth Co.), built in 1900. Terminals in Wisconsin cover a stylistic spectrum, ranging from the monumental, classically-styled limestone and brick Public Service Building in Milwaukee (constructed 1905) to a cream brick Victorian commercial block which housed the terminal in Oshkosh (120-124 N. Main Street); to a single room in a smoke shop in Beloit (155 W. Grand Avenue). Car barns displayed fewer variations in style and scale, although detail and ornament varied. The car barn in West Allis (1527 S. 84th Street), built in 1898 by the TMER&L, for example, has some classical influences; other barns are strictly functional gable-roof sheds.

Although electric railways continued to be the dominant mode of mass transportation through the 1920s, further expansion was held in check by the development of yet another, and still more revolutionary, form of transit. By 1920, the rise of the automobile and the bus posed a clear threat to the continued reign of the streetcar; highway improvement and inexpensive gasoline insured the trolley's eventual decline. Nevertheless, the streetcar companies themselves pioneered interurban bus service to supplement their network of rail (and maintain their transit monopoly). As early as 1919, for example, TMER&L ran a bus line from its Burlington terminal to Lake Geneva, and in the 1920s, TMER&L buses provided direct connections from interurban lines to such distant points as Madison, Fond du Lac, and Beloit (where connections could be made to still other bus or rail systems) (Central Electric Railfan's Association 1953:33). In the 1920s and 1930s, TMER&L (and its subsidiary, the Wisconsin Motor Bus Line), developed a "highly coordinated rail-bus system rarely duplicated elsewhere in the country" (Hilton 1960:353). Other traction companies followed suit, integrating buses into their transit networks.

Yet, by the late 1930s, it was apparent to the electric rail companies that the future of mass transit lay in the combustion engine not the trolley wire. As early as 1926, TMER&L replaced a trolley with a bus on a city line; by the late 1920s other Wisconsin streetcar systems were discarding trolleys as well. By 1935, most traction companies had consciously decided to abandon all lines in gradual stages (Central Electric Railfan's Association 1953:33).

Not surprisingly, as electric railways were abandoned, bus service grew. In 1932, 10 bus companies in Wisconsin carried 37 million passengers nearly 10 million miles; five years later, the number of companies had grown 50% and service expanded accordingly. By contrast, the number of trolley companies in 1932 was 60% less than in 1912 (United

States Census Office. Census of Electrical Industries, 1932: Electric Railways and Motor Bus Operations of Affiliates and Succesors, 14, 86; U.S. Census Office. Census of Electrical Industries, 1937: Street Railways and Trolley-Bus and Motorbus Operations, 74).

The last streetcar in the TMER&L system was abandoned in 1953, and the last trolley in the state ran in 1963 on the North Shore line, thus signalling the end of the electric railway era in the state (Central Electric Railfan's Association 195 :33). As electric companies left the transit field to concentrate on the more profitable utility business, mass transportation was provided by a handful of interurban bus companies and in-town bus service. While urban bus lines continued to provide transit service in the state's 20 largest cities through the 1970s, highly integrated mass transportation systems never regained strength and Wisconsin citizens turned to the ubiquitous private automobile for movement within and between the state's cities.

IDENTIFICATION

Resource Types. While the actual tracks of the electric railway system have been mostly destroyed, auxillary structures which housed, powered, and repaired the cars (and serviced the passengers) still stand. These include car barns (or car houses), repair shops, power stations, substations, waiting stations, terminal buildings, and office buildings. Structures associated with urban and interurban bus lines somtimes used these same structures after the electric lines were abandoned; others constructed new bus barns, garages, depots, and waiting stations.

Locational Patterns of Resource Types. Electric streetcar systems built tracks over existing city streets and resources associated with these were located in the central city (with some substations and waiting stations). Because interurban rails travelled over private rights of way, some associated structures - especially power substations - are located in isolated rural areas along the route. Interurban lines, however, were connected with streetcar systems in urban areas and used many of the same facilities.

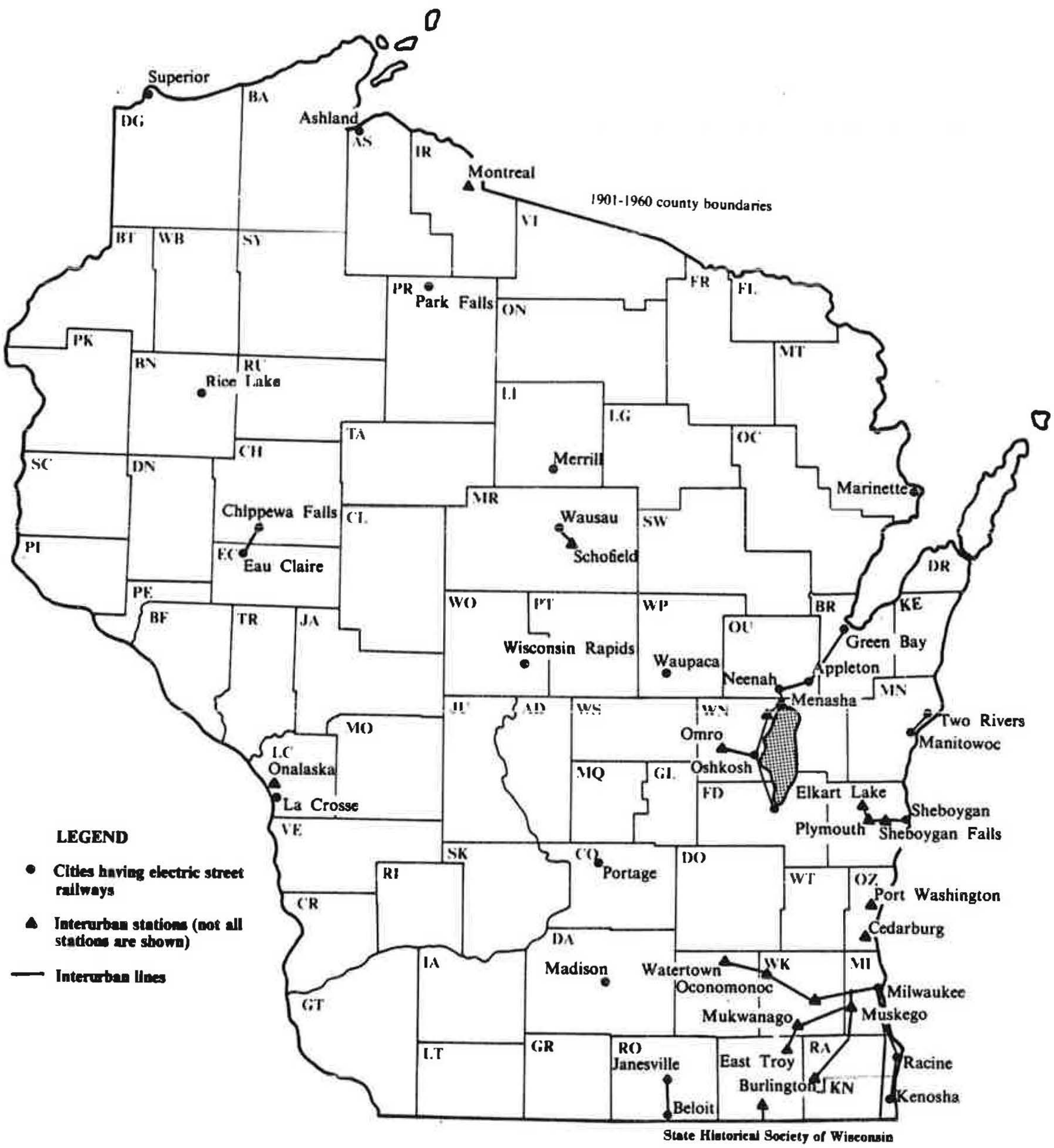
Survey and Research Needs. Although three excellent and highly detailed histories of electric railways in Wisconsin have been published by the Central Electric Railfan's Association (see bibliography), no formal survey has been conducted to identify extant structures associated with those lines. Careful examination of the CERA publications (using the detailed maps and photographs which illustrate each volume) will help identify the location of car barns, repair shops, power stations, and terminals for each of the state's electric railway lines. Surveyors should watch for former trolley and interurban structures that have been converted to new uses.

EVALUATION

National Register Listings and Determinations of Eligibility

None

Context Consideration. Associated structures should almost always be evaluated for local significance, and each property should be considered against other extant resources associated with the transportation system. Because of the relative rarity of properties associated with this study unit, integrity levels may be somewhat lower than with other resources, however, the property should be recognizable from a functional standpoint and the setting should remain appropriate.



Wisconsin Electric Street Railways and Interurban Lines, 1890-1945

Source: Central Electric Railfan's Association, *Badger Traction*, Bulletin III (Chicago, 1969), p. 2.

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Wisconsin Railroad Commission

1907 First Biennial Report of the Railroad Commission. Madison.

Temporal Boundaries: 1909 - present.

Spatial Boundaries: Entire state.

Related Study Units: None

HISTORICAL BACKGROUND

Destined to become the major mode of public transportation in the twentieth century, commercial air travel in Wisconsin, as elsewhere, had obscure origins in the workshops of inventors and the "flying fields" of barnstormers. Only five years after the Wright Brothers' pioneer flight at Kitty Hawk in 1903, Thomas Hamilton of Milwaukee began to design gliders, biplanes, and propellors, eventually testing his products in the field that decades later would become Mitchell Field, Wisconsin's leading airport (Gardner 1925:54). The next year (1909) Beloit manufacturer Arthur Warner piloted a biplane designed by pioneer aviator Glenn Curtiss and assembled by Warner in a field near his home (Hunt 1974:46). For the next two decades, particularly in the aftermath of World War I, experimental flights--many unrecorded, some unsuccessful--took off from fields around the state (United States Bureau of Air Commerce 1937:2). Some of the solo flights were daredevil entertainments, occasionally part of a "flying circus" or a county fair; others, like Jack Vilas' pioneer forest patrol flight in Vilas County in 1915, provided crucial public services (Jordon 1953-54:80).

The advent of World War I precipitated further advances in aviation. Stimulated by wartime demand, New York aviator and publisher Alfred Lawson built a factory in Green Bay in 1917 where he produced fighter planes for the U.S. Government. But Lawson's goal was to build a multi-passenger airship, and in 1918, he acquired production facilities in Milwaukee County for that purpose. The next year, Lawson introduced the precursor to the commercial aircraft of the twentieth century. With a wing span of 96', two engines, seats enough for eighteen passengers in an enclosed cabin, and with Lawson himself at the helm, the "Larson Airliner" took flight from Milwaukee's Currie Field in the summer of 1919. After several well-publicized stops en route, the airliner arrived in Washington, D. C., where political dignitaries boarded for an aerial tour of the nation's capital (Lawson 1946:82,83,36,87,93,103; Gardner 1925:73; Jordon 1953-54:81). Flush with victory, Lawson returned to his South Milwaukee factory and began to produce experimental "Air Pullmans", complete with sleeping berths, showers, and room for 30 passengers. Although several planes were tested in Milwaukee, the venture was unsuccessful and Lawson returned to New York in 1925 (Solberg 1979:102-105; Hatfield 1976:81-84; Gardner 1925:73).

Despite the uneven advances of individuals, a more significant step toward commercial flight came from an unlikely source: the United States Postal Service. In 1918, the federal government established a series of air mail routes between major cities; in 1920, a route between Chicago and Minneapolis was inagurated with an intermediate stop in La Crosse, thus providing the first regularly scheduled air service in the state (Solberg 1979:20). At least one airport - Tri-County Airport in Lone Rock - was established by the federal government as an emergency landing and refueling port for airmail planes in the Chicago-Minneapolis route (Anonymous1983:7). Other such locations are unknown. The final push toward commercial service followed five years later, with the enactment of the Kelly Act, instructing the federal government to franchise air mail service to private carriers (Solberg 1979:40). That year, Charles Dickinson received the Chicago-Twin Cities route, carrying his first mail west in the summer of 1926, with a stop at

Milwaukee's Currie Field. But after four months of operation, Dickinson lost four planes and his route was transferred to the newly-incorporated Northwest Airways of Minneapolis (Whitehouse 1971:111). The next year, Northwest carried passengers as well as mail, between the Twin Cities and Chicago with stops in La Crosse, Madison, and Milwaukee's Hamilton Field, now known as Mitchell (Still 1948:511-512). At year's end, 106 passengers had been served by the first scheduled air service in the state's history (Whitehouse 1971:247; Natural Resources Committee 1956:64). Northwest, which also flew to Green Bay, was soon joined by several short-lived lines. In 1928, Royal Airways carried passengers from Chicago to Milwaukee, reputedly the first Wisconsin-owned scheduled airline, but service ended the next year. A more successful venture began in 1929, when Kohler Aviation Corporation began regular service between Milwaukee's Hamilton Field (later Mitchell Field) and Grand Rapids, Michigan a service which was discontinued in 1934 (Davies 1972:594). In 1940, Pennsylvania Airlines made daily connections between Milwaukee, Detroit, and Washington (Still 1948:512).

Despite the increase in air traffic in the 1920s and 30s, most of the state's "airports" were little more than level fields, almost always devoid of lighting, terminals, hangars, or other amenities. Unregulated by state or federal agencies, "communities and individuals designated many patches of pasture land as airstrip" (Immell 1940:181). No documents systematically record the earliest facilities or their exact locations, but early private "airports" consisting of landing strips and perhaps a shed for pilots and planes were known to have been built by 1920. The Larson Brothers Airport, established in 1926 in Larson (Outagamie County) includes a frame barn-like hangar which may be typical of the era (See NRHP nomination form, "Larson Brothers Airport," 1984). The first publically-owned "airport" in the state (with frame hangar and airfield) was established by the Milwaukee County Park Commission in Currie Park in 1919 where the first airmail service for Milwaukee was initiated in 1936 (Still 1948:512). Six months later, the city of Milwaukee deactivated the airport and purchased Thomas Hamilton's Hamilton Airport (which he established in 1920 and used to test the propellers and all-metal biplane)of his Hamilton Aero Manufacturing Company . The county renamed the airport Mitchell Field in 1941 (in honor of the hometown airforce hero) and saw the field grow to become the state's largest (Jordon 1953-54:81). In 1927, an emergency landing field in Lake Michigan (known as Martland Field) was opened, abandoned in 1930, and turned into a seadrome in 1937 (Still 1948:511).

By 1936, official concern over the status of the state's aviation facilities led to the creation of a state aeronautics board, superceded the next year by the federal Civil Aeronautics Administration. Some basic airport improvement, eg. lengthening landing strips, constructing hangars, took place in the late 1930s (occasionally assisted with WPA-funded labor)--and the CAA offered aviation classes at several of the state campuses (Natural Resources Committee 1956:63; Immell 1940:183). But the situation did not improve dramatically. A survey of airport facilities in 1940 reported that although 55 landing fields, scattered over the state (including the seadrome in Milwaukee which reportedly served 3000 passengers annually) met minimal safety standards, very few of the landing fields had hangars and none of the hangars were heated (Immell 1940:179,181). As late as 1946, according to reports of the state, only two communities (Milwaukee and Madison) were served by regularly scheduled passenger service, and that service was provided by only two airlines (Northwest and Capitol). Wisconsin Central, established in Clintonville by the Four Wheel Drive Auto Company in 1944, began scheduled service in 1948; in 1952, the airline changed its name to North Central, moved its headquarters to Minneapolis, but continued to serve Wisconsin communities. Today, known as Republic, the airline continues to serve most of the state's large commercial airports.

An important landmark in the development of adequate airport facilities came in 1945 with the creation of the State Aeronautics Commission, empowered to aid and assist the development of airports with the goal of establishing one airport in each county. By 1955, the Commission could report real progress. That year, 65 publically owned airports meeting approved standards were scattered across the state, as compared to only 27 in 1947. Meanwhile private airports meeting approved standards had grown from 36 in 1947 to 54 in 1954. The next year, scheduled commercial passenger service was available at airports in 13 Wisconsin communities (see map; Natural Resources Committee 1956:63-64; Wisconsin State Aeronautics Commission, 1956:14). The 13 passenger airports were equipped with terminals, hangars, and other amenities and were served by American, Capitol, Illini, North Central, Northwest, Ozark, and United airlines (Flying Tiger provided air freight service to Milwaukee).

Between 1955 and 1975, the state's commercial airports expanded with the increase in air passenger traffic and the growth in plane size and were located within commuting distance of most of the state's population. Systematically upgraded and enlarged (and sometimes replaced), the state had first-class facilities in 11 communities in 1975: Milwaukee, Janesville, Madison, La Crosse, Oshkosh, Manitowoc, Green Bay, Eau Claire, Rhinelander, Marinette and Central Wisconsin (Marathon County). Nearby service was available by airports in border cities of Duluth, Rockford, Dubuque, Ironwood, Iron Mountain, and nearby Chicago and Twin Cities (Wisconsin Department of Transportation 1975: figure 1).

IDENTIFICATION

Resource Types. As late as the 1930s, when aviation was largely unregulated by state or federal law, "communities and individuals rapidly designated many relatively level patches of pasture land as air strips" (Immell 1940:181). By the early 1940s (especially after the establishment in 1945 of the State Aeronautics Commission), regulations required larger and longer strips, and disallowed the mere "glorification of cow pastures" (Immell 1940:181). For many of those primitive fields, no structures or only the most rudimentary sheds were included as part of the airport. More substantial structures, eg. terminals, hangars, control towers, and smaller utilitarian structures, gradually appeared at the state's largest fields by the 1940s, and facilities were continually expanded and upgraded during the ensuing decades. The 13 airports that offered commercial passenger service by the mid-1950s were the first airports in the state to offer first-class terminal facilities. Little is written, however, discussing the extent of early airport structures and other aviation-related buildings like the Milwaukee seadrome of the 1940s.

Locational Patterns of Resource Types. The earliest airports in Wisconsin were widely scattered over the state, located in fields, parks, and pastures. Known locations range from rural areas to the centers of cities. Not surprisingly, later airports serving large private or commercial service were routinely located on the outskirts of the state's largest population centers.

Previous Surveys. None

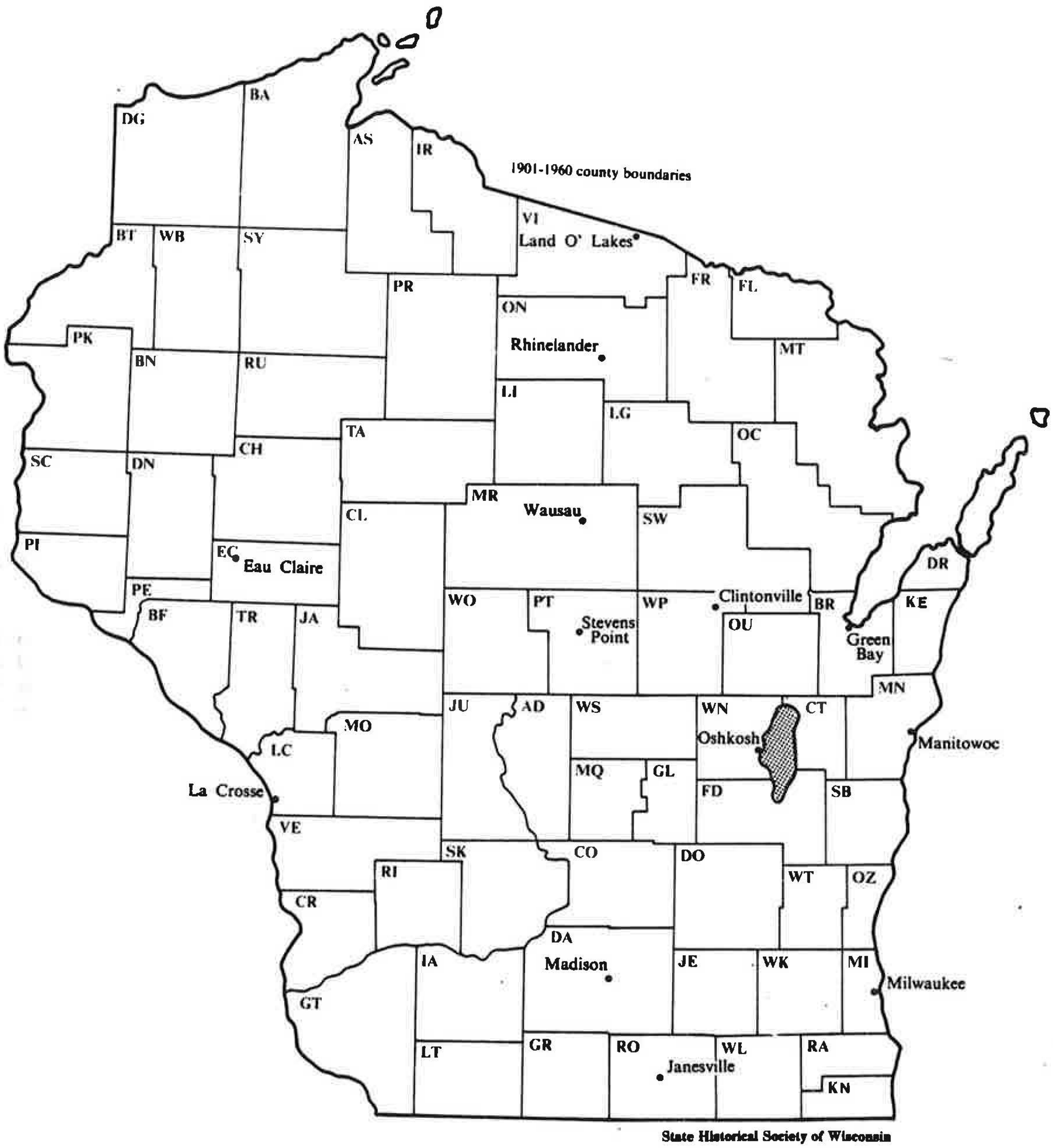
Survey and Research Needs. Almost no research has focused on the contribution of the earliest "airports" and landing strips to local development. Likewise, little research has focused on the role of the early barnstormers who often mixed public service with sportsmanship in their pioneer solo flights. Finally, the role of air service in remote or rural areas of the state may yield new insights on the history of air transportation in Wisconsin. No survey data has been collected on the location of airports or the range of their physical configuration.

EVALUATION

National Register Listings and Determinations of Eligibility

Larson Brothers Airport (1922), Town of Clayton, Winnebago County (NRHP 1984)

Context Considerations. The site of early airports may be more important, or at least as important, as any associated buildings. Integrity of the setting is critical in the case of early airports.



Wisconsin Airports With Scheduled Passenger Service, 1955

Source: Natural Resources Committee of State Agencies, *The Natural Resources of Wisconsin* (Madison, 1956), p. 65

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Temporal Boundaries: 1848-1934.

Spatial Boundaries: Entire state.

Related Study Units: Early Road Networks and Late Road Networks.

HISTORICAL BACKGROUND

The era of the iron truss bridge represents a period in the evolution of American bridges which is distinctive for the use of iron as the primary bridge building material and the maturity of the truss bridge design. In the early nineteenth century, wood was the primary building material and simple span beams the prevailing bridge design. Wood had several advantages over other materials of that day. First and foremost, it was locally available and cheap, it could be worked with simple hand tools at the building site, and finally there was a locally available skilled labor force (Cooper 1879:263-4). Nevertheless, it was the disadvantages of wood that motivated a change. Wood was only available in limited lengths of varying quality and strength, and was subject to destruction from decay and fire. These factors limited the useful life expectancy of wood bridges to only 10 or 12 years (Cooper 1889:5). Thus bridge builders were confronted with difficult problems. There was a demand for greater load capacity and a desire for longer span lengths, at a time when the means and economics of bridge building was dictated by the availability of wood on a regional basis. The solutions to these problems focused on improvements in materials and designs.

Iron promised all the advantages desired in a bridge building material, with the possible exception of cost. Although initially more expensive, iron proved to be a more durable and ultimately less expensive material than wood which required frequent maintenance and replacement. When iron was first introduced as a bridge building material, it was already available as cast iron and wrought iron. Each material possessed distinctly different properties of strength, hardness, and ductility as the result of the iron refining process. In the first phase of refining, iron ore was reduced to crude pig iron by smelting in a blast furnace. In the second phase, the pig iron was either remelted in a cupola or air-furnace to produce cast iron or refined through the puddling process to produce wrought iron. The high carbon content of pig iron produced cast iron of great crushing strength and durability. But unfortunately, at the limit of its material strength, cast iron failed in a brittle fashion much like glass. This brittleness, attributed to the carbon impurities, was an undesirable property of cast iron which contributed to sudden and unexpected failures. The puddling process removed most of the impurities from the pig iron, in particular the three-four percent of carbon, producing a wrought iron composition that was nearly pure iron (Withey 1919:545). Wrought iron was a ductile material which yielded prior to failure, and thus provided some warning of imminent danger. Both cast iron and wrought iron had their proponents and attempts were made to build bridges totally of one material or the other. Most early iron truss bridges contained both types of iron, where each material was used to its best advantage: cast iron in compression and wrought iron in tension.

Cast iron was first used in bridge building in 1776 when Abraham Darby construct4d a 100 foot arch over the Severn River at Coalbrookdale, England (Tyrrell 1911:151-152). This bridge was very successful and survived into the twentieth century. However, some cast iron bridges experienced catastrophic failures, culminating with the collapse of a 154 foot Howe truss bridge in 1876 at Ashtabula, Ohio in which 90 people died (Tyrrell 1911:180). The railroads discarded cast iron immediately and within four or five years it was also abandoned for highway bridge use.

Wrought iron was first used in France by M. Califfe in 1779 in an arch with an unprecedented span on 656 feet (Tyrrell 1911:309). The use of wrought iron on a large scale was made possible by the invention of the puddling process in 1784 by Cort and later improved by Hall in 1830. The puddling process, although slow, was adequate for mass production. The wrought iron produced was in demand because of its good welding properties and resistance to corrosion. It was an ideal material for the looped eye bars used extensively in early iron trusses. As a bridge building material wrought iron experienced fewer problems than cast iron, but it suffered from a limited tensile capacity.

Attempts were made to produce new materials that combined the strength of cast iron and the workability of wrought iron. Improvements in the refining process were introduced with the crucible process in 1840, the Bessemer process in 1856, and the open-hearth process in 1862. These new methods produced products of iron alloys that were called "steel." Iron and steel products were originally distinguished on the basis of material properties. With improvements in the refining process, the combinations of material properties became so numerous that the distinction was blurred. Since there was a marketing value attached to the name "steel," all materials produced by the Bessemer and open-hearth processes were subsequently called steel (Withey 1919:585). The first extensive use of steel was by J. B. Eads in a bridge consisting of three steel arches over the Mississippi River at St. Louis, Missouri, in 1869 (Tyrrell 1911:312-313). Later, advances in production capabilities of the open-hearth process further promoted the use of steel. By 1894, it was practially impossible to obtain wrought iron shapes from the rolling mills (Schneider 1905:222).

Cast iron, wrought iron, and steel all contain iron and are thus classified as ferrous metals. Steel and wrought iron contain 90 percent iron, while cast iron contains 91 to 96 percent iron. Scientists and engineers disagree over the ability to distinguish between wrought iron and steel by an evaluation of chemical composition. Each contains small amounts of carbon, silicon, phosphorous, sulpher, and manganese. Different manufacturing processes, however, give the two metals special qualities. The rapid cooling of steel makes it harder than wrought iron. Cast iron is distinguished by a higher carbon content than wrought iron and steel, which makes it identifiable through chemical testing although not usually through superficial observation. Because of the uncertainty of the identity of the metals used to manufacture bridges, throughout this report the terms "iron" and "metal" are used interchangeably to indicate use of one of the three ferrous metals: cast iron, wrought iron, and steel.

In addition to improvements in the materials used to fabricate bridges in the nineteenth century was the introduction and refinement of the concept of the truss design. The truss was an ingenious means of utilizing short pieces of material configured in triangles to create a beam which could span longer distances than was possible with post and beam construction. The truss was the replacement for beam elements in bridge building in the 1800s. The underlying principle of the truss design was the triangle, a very simple but stable geometric shape. The structural triangle required only that its members resist forces in tension and compression and not that the vertices or joints resist rotation. By contrast, the joints of a rectangle had to resist rotation as well or deform to the shape of a parallelogram. The advantages of the triangular configuration then were simplified joint construction and members in tension or compression only. Thus, the truss was a very simple configuration to design and build. In the truss, compression members were designed for strength and stability and therefore appeared quite massive. Truss members resisting tension forces only were more efficient and therefore very slender. Since truss joints were not required to resist rotation, they often consisted simply of a pin through the intersecting members.

The variety of geometric patterns that evolved in truss designs resulted from the need to use available materials efficiently in both tension and compression. The first truss designs were typically all wood construction. But connections at the joints were a problem. Iron pins and straps provided a partial solution to joint problems. Later, threaded iron bars replaced wood tension members. Finally, all members and joints were constructed of iron. By this time, the design of trusses had become an art-form that was truly an American engineering innovation (Kemp 1980:727).

The combination of the use of iron with the truss bridge design was patented in the United States by August Canfield in 1833. Patents provided some protection to design rights for a specified period of years, while encouraging the dissemination of ideas and knowledge. A fire in the U.S. Patent Office destroyed early records of patents, some of which were bridge patents that were never restored. It is believed, however, that the first iron truss bridge actually built was erected by Earl Trumbull over the Erie Canal at Frankford, New York, in 1840. Later in the same year of 1840, Squire Wipple also built a metal truss bridge (Cooper 1889:12-13). Both designs were conceived with cast iron and wrought iron as the principle materials. The successful construction of these bridges heralded the introduction of iron as a bridge building material in America.

The use of iron in truss bridges created a new technology and industry. The construction of iron truss bridges required large investments in specialized workshops in manufacturing plants, generated new demands for wrought iron, developed a class of skilled laborers, and identified bridge building as a special branch of engineering science (Cooper 1879:265). The early innovators of iron truss bridges were usually associated with the railroads. Many of these men, such as Bollman, Fink, Latrobe, and Post, were the chief engineers for their respective railroads. In these positions, they acquired practical experience and knowledge in the design, manufacturing, and construction of iron truss bridges. After 1860, several of these men left the employ of the railroads, joined existing bridge companies or formed new ones, and pursued the profitable business of bridge contracting (Schneider 1905:219). The developing transportation system required not only better bridges but affordable bridges. Iron bridges, manufactured under shop conditions with quality control and repetitive designs, met these requirements. The unassembled truss could be transported to the bridge site over the existing road system by horse-drawn wagon. Once at the bridge site, the iron truss could be erected by unskilled local labor with minimal equipment. This promoted the popularity of the iron truss bridge and spawned a large number of local and regional bridge companies manufacturing iron truss bridges.

Increased competition among bridge companies exposed problems in the existing bridge building process. Town board members, inexperienced in bridge building practices, found it difficult to make wise decisions in a competitive market. Simply selecting a bridge by the lowest bid from interested parties did not always result in a satisfactory bridge. In 1905, the Wisconsin Legislature passed a resolution to amend the state constitution to permit the state to aid the towns and counties with highway improvements (Hotchkiss 1909:7). The Highway Division of the Geological Survey was created in 1907 to assist local units of government with road and bridge problems by providing engineering expertise. A 1911 Wisconsin law established the State Highway Commission and also required that all bridges built with state aid must conform to State Highway Commission plans (Torkelson 1915:287). The standardized bridge plans of the State Highway Commission eliminated some bad practices but it also eliminated competition and the innovation of the bridge companies specializing in iron trusses. The State Highway Commission plans in 1914 specified two types of trusses: Warren pony trusses and Pratt overhead trusses. This apparently eliminated other truss designs from consideration. The State Highway Commission, meanwhile, promoted alternate designs of concrete and steel beam. Within a short period of time, many bridge companies were either forced to pursue entirely new endeavors or risk going out of business.

In Wisconsin, the advances in material technology and adaptation to iron truss bridge design, as well as the influence of the State Highway Commission, can be traced through several periods. The dates shown below are only approximations of time periods since there was considerable overlapping in the use of materials and technology. Although iron and steel trusses came to predominate, at no time were they used exclusively. Similarly, bridges with features that were ahead or behind their times can be found beyond the boundary dates given below.

Pre-1880: Material - both cast iron and wrought iron.
Design - compression members of cast iron and tension members of wrought iron.

1880-1894 Material - wrought iron.
Design - compression members of built-up sections (sections riveted together from plates and angles); tension members of round and rectangular bars; members pin-connected at the joints.

1894-1911 Material - steel.
Design - compression and tension members of built-up sections (plates and angles); members pin-connected at the joints.

1911-1934 Material - steel.
Design - standardized designs of State Highway Commission; members built of heavier rolled sections; riveted connections at gusset plates; concrete decks.

Post-1934: Material - concrete and steel.
Design - standardized designs of State Highway Commission replaced the shorter span steel truss with alternate designs of concrete and steel bridges.

IDENTIFICATION

In April of 1981, the Historic Bridge Advisory Committee (HBAC) was formed by the Wisconsin Department of Transportation (WISDOT). The committee was to complete a study of historic bridges in Wisconsin with a stated purpose that was twofold: to meet the requirements of the federal historic preservation legislation and to preserve a significant element of Wisconsin's history. The HBAC membership consisted of representatives from the WISDOT-Bureau of Environmental Analysis and Review, the Design Section, and the Bridge Section; the Federal Highway Administration; the University of Wisconsin-College of Engineering; and the State Historical Society of Wisconsin-Historic Preservation Division.

The work of the HBAC first focused primarily on the inventory and evaluation of iron truss bridges on the public road system in Wisconsin. Information for the HBAC inventory was taken from two WISDOT data sources: the computerized data base compiled from the Bridge Sufficiency Rating reports, and the Bridge Section card file. The Bridge Section card file also contained photographs of each bridge. The HBAC inventory did not include railroad bridges or bridges on private driveways and in public parks. Members of the committee field reviewed as many bridges as possible, but time and distance constraints made visits to all bridges, particularly those in the north, unfeasible.

Bridges were identified for inventory purposes by category and type of truss design. The categories delineated the location of the truss within the bridge and defined the following configurations:

Pony truss: A low truss, approximately five to seven feet in depth, located alongside and above the roadway surface; range of span lengths from 20 feet to about 100 feet.

Overhead truss: A deep truss, approximately 16 to 24 feet in depth, located alongside the roadway surface but with lateral bracing of the top chord over the roadway between trusses; range of span lengths from 80 feet to about 250 feet.

Deck truss: The trusses are located below the roadway surface and are generally associated with a large vertical clearance; although rare in Wisconsin, span lengths range from 20 feet to 250 feet.

Cantilever truss: The cantilever truss is extremely rare in Wisconsin and was not studied by the HBAC. It is basically a type of through truss that is balanced on a center support rather than on either end as the overhead truss.

Each category was further divided by type of truss: the design configuration of the truss itself such as Pratt, Warren, Parker, Camelback, etc. (Comp and Jackson 1977). The HBAC inventory identified many of the common truss types, but not all of the known truss types were found in Wisconsin. In the Identification section that follows, descriptions of the bridges classified below as "final selections" of the HBAC are provided. However, in several cases bridges selected by the committee had been demolished since 1983. Descriptions of demolished bridges are not provided.

TRUSS BRIDGES EXAMINED BY THE HISTORIC BRIDGE ADVISORY COMMITTEE
(September 30, 1983)

PONY TRUSSES

Category	Number Known	Number Field Reviewed	Number Evaluated	Number Considered Further	Final Selection
Bedstead	8	8	8	2	2
Bowstring	8	8	8	8	8
King Post	3	3	3	3	3
Lattice Truss	1	1	1	1	1
Parker	1	1	1	1	1
Pratt Half-Hip	130	26	16	8	4
Pratt Standard	69	25	15	5	5
Warren Double Intersection	12	12	12	6	4
Warren Standard	483	59	24	6	5

OVERHEAD TRUSSES

Category	Number Known	Number Field Reviewed	Number Evaluated	Number Considered Further	Final Selection
Pratt					
Pre-1895	5	5	5	4	4
1895-1910	32	23	23	11	10
1911-1925	49	13	9	2	2
1926-193	20	6	7	1	1
1932-1936	17	6	6	2	2
Parker	36	0	10	3	3
Camelback	5	3	4	3	3
Pennsylvania	5	5	4	4	4
Warren	3	3	3	3	3

DECK TRUSSES

Category	Number Known	Number Field Reviewed	Number Evaluated	Number Considered Further	Final Selection
All Types	22	0	22	2	2

The HBAC system of classification of iron truss bridges proved to be a logical and consistent method of identification and is used throughout this study.

The bridges listed in this section generally represent the selection of the HBAC as the best examples of each truss type. The selection criteria used by the HBAC is explained in the Evaluation Section of this study unit. This listing differs from the HBAC selection in two situations: 1) When the total number of bridges of a particular truss type is relatively small, all bridges known to exist are listed. This listing represents a more complete list than the HBAC selections; 2) If a bridge selected by the HBAC was removed prior to 1984, a replacement was added to the list and the original selection was deleted.

Resource Types. Wisconsin has examples of bridges from all the metal truss categories: pony truss, overhead truss, deck truss, and cantilever truss. The design decision of which category of truss was appropriate at a given location was primarily a function of the required span length. The shorter span bridges, 20 feet to 100 feet, were usually pony trusses or deck trusses. The deck trusses required additional vertical clearance, since the trusses were located below the bridge deck, and were not as common as pony trusses. As the span length and depth of the truss increased, the truss was likely to buckle in a lateral direction. To prevent lateral buckling, bracing was added between trusses at the top chord, hence the overhead truss. Medium span truss bridges, 80 feet to 250 feet, were usually overhead trusses but in a few instances deck trusses. The longest span truss bridges were cantilevered trusses supported on center piers. Because cantilevered trusses required long span lengths to be economically feasible, few were constructed in Wisconsin.

1. Pony or Low Truss

a. King Post. This truss, also called an "A truss", is an all-metal version of the earlier combination wood and iron king post truss design. There are two of the combination wood and iron bridges in the Town of Port Wing in Bayfield County. The span length for a king post pony truss would typically range from 20 feet to 60 feet. Only one all-metal king post truss is known to exist in Wisconsin.

   1. The bridge located on Meyer Lane over Sauk Creek in the city of Port Washington, Ozaukee County (S28,T11N,R22E). This bridge is a single 40 foot span king post truss constructed in 1925. The manufacturer is unknown. The truss consists of built-up members and pin-connected joints. DOT designation: P-45-714.

b. Lattice Truss. This truss is an iron version of the earlier wood town lattice truss patented in 1820. The span langth for a lattice truss would typically range from 20 feet to 60 feet. Only one all-metal lattice pony truss is known to exist in Wisconsin.

   1. The bridge located on Spring Road over Warner Creek in the Town of Woodman, Grant County (S6,T6N,R4W). The bridge is a single 23 foot span lattice truss. It is not a particularly good example of the lattice design because of its very open and minimal design of the lattice in the web. The bridge was built around 1920 (est.). The manufacturer is unknown. The truss consists of built-up members and riveted joints. DOT designation: P-22-162.

c. Bowstring Arch-Truss. In 1841, Squire Wipple patented an iron truss bridge which was to become the predecessor of the bowstring truss. This type of truss was apparently very successful, since the patent was extended for seven years in 1855 (Brock 1882). The span length for a bowstring truss would typically range from 50 feet to 175 feet. There are only seven bowstring arch-trusses known to exist in Wisconsin.

   1. The bridge located on McGilvray Bottoms Road in the Van Loon Wildlife Area, La Crosse County (S23,T18N,R8W). This bridge is a two-span 134 foot long bowstring arch-truss built in 1891-1892 by the Clinton Bridge Company of Clinton, Iowa. The truss consists of built-up members and pin-connected joints. (Added to the National Register of Historic Places on 2/27/80). DOT designation: None (park bridge).

   2. The bridge located on McGilvray Bottoms Road in the Van Loon Wildlife Area, La Crosse County (S22-23,T18N,R8W). This bridge is a two-span 141 foot long bowstring arch-truss built in 1891-1892 by the Clinton Bridge Company of Clinton, Iowa. The truss consists of built-up members and pin-connected joints. (Added to the National Register of Historic Places on 2/27/80). DOT designation: None (park bridge).

   3. The bridge located on McGilvray Bottoms Road in the Van Loon Wildlife Area, La Crosse County (S22,T18N,R8W). This bridge is a single 110 foot span bowstring arch-truss built in 1891-1892 by the Clinton Bridge Company of Clinton, Iowa. The truss consists of built-up members and pin-connected joints. (Added to the National Register of Historic Places on 2/27/80). DOT designation: None (park bridge).

4. The bridge located on McGilvray Bottoms Road in the Van Loon Wildlife Area, La Crosse County (S22,T18N,R8W). This bridge is a two-span 131 foot long bowstring arch-truss built in 1891-1892 by the Clinton Bridge Company of Clinton, Iowa. The truss consists of built-up members and pin-connected joints. (Added to the National Register of Historic Places on 2/27/80). DOT designation: None (park bridge).

5. The bridge located on McGilvray Bottoms Road in the Van Loon Wildlife Area, La Crosse County (S21,T18N,R8W). This bridge is a single span 50 foot long bowstring arch-truss built in 1891-1892 by the Clinton Bridge Company of Clinton, Iowa. The truss consists of built-up members and pin-connected joints. (Added to the National Register of Historic Places on 2/27/80). DOT designation: None (park bridge).

6. The bridge located in Lakeside Park in the City of Fond du Lac, Fond du Lac County (S3,T16N,R17E). This bridge is a single span bowstring arch-truss. The manufacturer is unknown. The truss consists of built-up members and pin-connected joints. The bridge is currently being used for pedestrian crossing. DOT designation: unknown.

7. The two-span bridge is located in a city park in the City of Watertown.

d. Pratt. The Pratt design was the predecessor of a variety of designs of iron trusses, many of which survived into the twentieth century. Nearly all the Pratt pony trusses in Wisconsin are one of two variations: the Pratt standard and the Pratt half-hip. According to the 1981 HBAC, there were about 200 Pratt pony trusses in Wisconsin.

Pratt Standard. This pony truss design has the same basic geometry as the truss patented by Thomas and Caleb Pratt in 1844. The span length for a Pratt standard pony truss would typically range from 40 feet to 90 feet. There were 69 Pratt standard pony trusses identified in the 1981 HBAC survey of Wisconsin bridges. The following two trusses represent the selection of the HBAC as the best examples of Pratt standard pony trusses.

1. The bridge located on TenEyck Road over the Sugar River in the Town of Decatur, Green County (S26,T2N,R9E). This bridge has two spans of 88 feet each. It was built in 1907 by Elkhart Bridge and Iron Company of Elkhart, Indiana, with Willis E. Gifford of Madison as the agent. The truss has pin-connected joints and built-up members. DOT designation: P-23-124.

2. The bridge located on Mullberry Road over the Black River in the Town of Medford, Taylor County (S4,T31N,R1E). This bridge is a single 50 foot span Pratt standard pony truss built around 1900. The manufacturer is unknown. The truss has pin-connected joints and built-up members. Originally located on the county line about one-half mile north, it was moved here in 1957. DOT designation: P-07-117.

Pratt Half-Hip. This pony truss is a slight variation of the standard design; there is no hip vertical in the first panel of the truss. The span length for a Pratt half-hip pony truss would typically range from 25 feet to 80 feet. There were 130 Pratt half-hip pony trusses identified in the 1981 HBAC survey of Wisconsin bridges. The following four bridges represent the selection of the HBAC as the best examples of Pratt half-hip pony trusses.

3. The bridge located on Klein Road over Seeley Creek in the Town of

Freedom, Sauk County (S17,T11N,R5E). This bridge is a 37 foot span built in 1894 by Wisconsin Bridge and Iron Company of North Milwaukee. The truss has pin-connected joints, built-up members, and floor beams above the bottom chord. DOT designation: P-56-147.

4. The bridge located on Nachtwey Road over the Neshota River in the Town of Gibson, Manitowoc County (S7,T21N,R23E). This bridge is a 75 foot span built in 1903 by Wisconsin Bridge and Iron Company of Milwaukee. The truss has pin-connected joints. DOT designation: P-36-088.

5. The bridge located on St. Killiam Road over Bear Creek in the Town of Buena Vista, Richland County (S1,T9N,R2E). This bridge is a 41 foot span built in 1886 by Pennsylvania Bridge Works of Beaver Falls, Pennsylvania. The truss has pin-connected joints. DOT designation: P-52-224.

6. The bridge located on Milbrandt Road over the Little Sugar River in the Town of Necedah, Green County (S2,T19N,R3E). This bridge consists of two simple spans of 59 foot each built in 1913 by Elkhart Bridge and Iron Company of Elkhart, Indiana. The truss has pin-connected joints. DOT designation: P-29-092.

e. Warren. The original Warren truss, patented in 1848 by two British engineers, was a design of equilateral triangles with no vertical members. The diagonal members carried both tension and compression and were usually rather heavy, stiff members. The span length of a Warren pony truss would typically range from 25 feet to 100 feet. The 1981 HBAC survey of Wisconsin bridges identified nearly 500 Warren pony trusses. Most were one of the two basic designs: the Warren standard or the Warren double-intersection.

Warren Standard. In Wisconsin, the standard Warren pony truss was built with vertical members to stiffen the structure. The Warren standard design may be further distinguished by two variations on the design of the hip-joint (the joint at the intersection to the horizontal top chord and inclined end post). In the more common design, the top chord and inclined end post are two distinct members either connected with a pinned joint or riveted gusset plate. In the second variation, the inclined end post is continuous through the hip-joint and becomes the top chord of the truss. The 1981 HBAC survey of Wisconsin bridges identified about 440 examples of the former and only 43 examples of the latter. The latter design, continuous through the hip-joint, appears to have been exclusively the work of two Milwaukee bridge companies: Wisconsin Bridge and Iron and Worden-Allen Company. The following trusses represent the selection of the HBAC as the best examples of Warren standard pony trusses.

1. The bridge located on Iron Bridge Road over the Oconto River in the Town of Armstrong, Oconto County (S4,T31N,R16E). This bridge is a single 55 foot span Warren standard pony truss built in 1906, probably by Wisconsin Bridge and Iron Company (bridge plate outline). This bridge is an example of the variation described above, where the end post is continuous through the hip-joint. DOT designation: P-42-901.

2. The bridge located on Range Line Road over the West Branch of the Eau Claire River in the Town of Ackley, Langlade County (S9,T31N,R10E). This bridge is a single 59 foot span Warren standard

pony truss built in 1908 by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). This bridge is an example of the variation described above, where the end post is continuous through the hip-joint. DOT designation: P-34-060.

3. The bridge located on old S.T.H. 70 over the Flambeau River in the Town of Draper, Sawyer County (S14,T39N,R3W). This bridge, also known as the "Oxbo" bridge, is a Warren standard pony truss consisting of three 75 foot spans. The bridge was constructed in 1915 by Wausau Iron Works of Wausau. It is currently closed to traffic. DOT designation: P-57-007.

4. The bridge located on Horseshoe Bend Road over the Fever River in the Town of New Diggings/Benton, Lafayette County (S10,T1N,RlE). This bridge, also known as the "Coltman" bridge, is a single 65 foot span Warren standard pony truss built in 1917 from State Highway Commission plans by Decker and Hague of Benton, Wisconsin. The bridge abutments are skewed rather than perpendicular to the center line of the bridge as was the usual practice. DOT designation: P-33-217.

5. The bridge located on S.T.H. 64 over the Little Peshtigo River in the Town of Grover, Marinette County (S2,T30N,R21E). This bridge is a single 70 foot span Warren standard pony truss built in 1929 from State Highway Commission plans by Wausau Iron Works of Wausau. DOT designation: B-38-901.

Warren Double-Intersection. There are two variations of the Warren double-intersection pony truss found in Wisconsin. The first is the usual pony truss configuration with inclined end posts. The second has end posts that are vertical, not inclined. The 1981 HBAC survey identified only five and seven respectively of these two types. The following four trusses represent the selection of the HBAC as the best examples of the Warren double-intersection pony truss.

6. The bridge located off the park road over a branch of Duncan Creek in Irvine Park in the City of Chippewa Falls, Chippewa County (S30,T29N,R8W). This bridge consists of three spans: 41 feet, 60 feet, and 41 feet. It is a Warren double-intersection pony truss with the center span arched and slender steel columns for piers. The bridge was built in 1907 by the Wisconsin Bridge and Iron Company of Milwaukee. The truss consists of built-up members and riveted joints. DOT designation: None (park bridge).

7. The bridge located on Canary Drive over Allen Creek in the Town of Oakdale, Monroe County (S2,T17N,R1E). This bridge is a single 30 foot span Warren double-intersection pony truss with square ends. The bridge was built in 1900 (est.) by the Wisconsin Bridge and Iron Company of Milwaukee. DOT designation: P-41-938.

8. The bridge located on Poplar Grove Road over the Chicago & Northwestern railroad tracks in the Town of Lebanon, Dodge County (Sl5,T9N,R16E). This bridge is a single 84 foot span Warren double-intersection pony truss of rather heavy construction. The bridge was built in 1910 (est.), probably by the railroad. DOT designation: P-14-126.

9. The bridge located on Schofield Road over the Chicago & Northwestern railroad tracks in the Town of Lebanon, Dodge County (S7,T9N,R16E). This bridge is a single 63 foot span Warren double-intersection pony truss of rather heavy construction. The bridge was built in 1910 (est.), probably by the railroad. DOT designation: P-14-126.

f. Bedstead (Truss Leg). The Bedstead truss design attempted to use an extended vertical end post of the truss as part of the abutment construction. This design was noted for its problems with abutments during the life of the bridge. The span length for a Bedstead truss would typically range from 20 feet to 70 feet. There are only eight Bedstead trusses known to exist in Wisconsin. The following two trusses represent the selection of the HBAC as the best examples of the Bedstead pony trusses.

1. The bridge located on Rock River Drive over the Rock River in a city park in the Village of Allenton, Washington County (S16,T11N,R18E). It probably originally carried the main road into town, but the park was established when the new bridge was built on a different alignment. This bridge is a 41 foot span truss leg built in 1896 by Milwaukee Bridge and Iron Works of Milwaukee. The truss has pin-connected joints and built-up members. The bridge is closed to vehicular traffic. DOT designation: None (park bridge).

2. The bridge located on Beaver Dam Road over the East Branch of the Rock River in the Town of Addison, Washington County (S5,T11N,R18E). This bridge is a 41 foot span truss leg built in 1910 (est.). The manufacturer is unknown. The truss has pin-connected joints and built-up members. DOT designation: P-66-055.

g. Parker. The Parker truss is simply a Pratt design with a polygonal top chord. Although this design was intended to save material, the use of the Parker design for pony trusses is quite rare since the material savings would be minimal in small trusses. There is only one Parker pony truss extant in Wisconsin.

1. The bridge located on U.S.H. 51 (Business) over the Eau Claire River in the City of Schofield, Marathon County (Sl,T28N,R7E). This Parker pony truss consists of two spans of 91 feet each. It was constructed in 1931 from State Highway Commission plans by Wausau Iron Works of Wausau and originally had streetcar tracks in the center. The truss has riveted joints and rolled section members. DOT designation: B-37-537.

2. Through or Overhead Truss

a. Pratt. The Pratt truss was patented by Thomas and Caleb Pratt in 1844. Although initially the design did not compete well with the Howe truss (Cooper 1889:11), which was a combination wood and metal truss design, the Pratt truss became the standard design in iron trusses by the late 1800s. The range of span lengths for a Pratt overhead truss is from 60 feet to 160 feet. The 1981 HBAC survey identified 123 Pratt overhead trusses in Wisconsin. Since this design was so popular, there are several bridges extant from the following time periods.

Pre-1895. This period can be characterized by truss elements that appear very light and slender. The compression members are built-up sections of plates and angles riveted together and tension members are round or rectangular bars. The joints are pin-connected. The floor beams are also built-up riveted sections with plates and angles for the web and flanges respectively. In many cases, the floor beams have a variable cross-section. Perhaps the most significant feature of this period is that the metal is probably wrought iron. The 1981 HBAC survey of Wisconsin bridges identified only a few bridges extant from this period. Because of the dwindling number, all should be considered significant.

1. The bridge located on Bienemann Lane over Honey Creek in the City of Burlington, Racine County (S30,T3N,R19E). This bridge, also known as the "Bienemann" bridge, is a single span 106 foot Pratt overhead truss built in 1877 by Milwaukee Bridge and Iron Works of Milwaukee (bridge plate). The "Bienemann" bridge is probably the oldest iron truss bridge in Wisconsin and exhibits some unique features of that early construction period (reviewed by Danko 1977:87). DOT designation: private drive.

2. The bridge located on Riverside Drive over the North Branch of the Milwaukee River in the Town of Fredonia, Ozaukee County (S30,T12N,R12E). This bridge is a single 101 foot span Pratt overhead truss built in 1886 (Danko 1977:85) by the Wisconsin Bridge and Iron Company of Milwaukee. (Several details of this bridge suggest that the date of construction may be incorrect; the bridge plate is now missing.) DOT designation: P-45-66-025.

3. The bridge located on Mill Road over the Manitowoc River in the Town of Manitowoc Rapids, Manitowoc County (S23,T19N,R23E). This bridge is a single 150 foot span Pratt overhead truss built in 1887 by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). DOT designation: P-36-022.

4. The bridge located on Lathers Road over Turtle Creek in the Town of Turtle, Rock County (S9,T1N,R13E). This bridge, also known as the "Turtleville Iron Bridge," is a single 141 foot Pratt overhead truss built in 1886 by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). (Added to the National Register of Historic Places on l/27/77). DOT designation: P-53-162.

5. The bridge located on Bridge Street over the Milwaukee River in the Village of Grafton, Ozaukee County (S24,T10N,R21E). This bridge is a single 109 foot span Pratt overhead truss built in 1888 by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). DOT designation: P-45-700.

6. The bridge located on Grand Avenue over O'Neills Creek in the City of Neillsville, Clark County (S14,T24N,R2W). This bridge, also known as the "Grand Avenue" bridge, is a single 90 foot span Pratt overhead truss built in 1894 by the Wisconsin Bridge and Iron Company (bridge plate). The distinctive feature of this bridge is the ornate iron work around the portal. It is scheduled to be removed in 1986. DOT designation: P-10-709.

<u>1895-1910</u>. This period is also characterized by truss elements that appear very light and slender. The compression members are built-up sections and the tension members may be round or rectangular bars or angles. Members are pin-connected at the joints. The floor beams, however, are usually rolled sections rather than built-up sections and the metal is probably steel. The 1981 HBAC survey of Wisconsin bridges identified 32 bridges extant from

this period. The following ten bridges represent the selection of the HBAC as the best examples of Pratt overhead trusses from this period.

7. The bridge located on East Dyreson Road over the Yahara River in the Town of Dunn, Dane County (S14,T6N,R10E). This bridge is a single 125 foot span Pratt overhead truss built in 1897 by Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). The road is designated as a rustic road. DOT designation: P-13-190.

8. The bridge located on State Street over the South Branch of the Manitowoc River in the City of Chilton, Calumet County (S13,T8N,R19E). This bridge is a single 80 foot span Pratt overhead truss built in 1900 (Bridge Section card file). The manufacturer is unknown. DOT designation: P-08-703.

9. The bridge located on Van Laenen Road over the Octonto River in the Town of Stiles, Oconto County (S34,T28N,R20E). The bridge is closed to traffic and used as a "fishing bridge." This bridge is a single 140 foot span Pratt overhead truss built in 1906 (Bridge Section card file). The manufacturer is unknown. DOT designation: P-42-081.

10. The bridge located on park road over Duncan Creek in Irvine Park in the City of Chippewa Falls, Chippewa County (S31,T39N,R8W). This bridge is a single 90 foot span Pratt overhead truss built in 1907 by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). DOT designation: P-09-708.

11. The bridge located on park road over Duncan Creek in Irvine Park in the City of Chippewa Falls, Chippewa County (S31,T39N,R8W). This bridge is a single 100 foot span Pratt overhead truss built by the Wisconsin Bridge and Iron Company of Milwaukee (bridge plate). DOT designation: P-09-709.

12. The bridge located on C.T.H. "AA" over the Pine River in the Town of Richland, Richland County (S4,T10N,R1E). This bridge is a single 115 foot span Pratt overhead truss. The manufacturer is unknown. DOT designation: P-52-049.

13. The bridge located on a Wagon Trail Road over the Eau Galle River in the Village of Spring Valley, Pierce County (S8,T27N,R15W). This bridge is a single 138 foot span Pratt overhead truss built in 1909 by the Worden-Allen Company of Milwaukee (bridge plate). Based on the DOT designation, it may have been moved to this site from a state trunk highway. DOT designation: B-47-006.

14. The bridge located on a Ferndale Road over the Peshtigo River in the Town of Lake/Grover, Marinette County (S25,T31N,R21E). This bridge is a single 151 foot span Pratt overhead truss built in 1910 by the Elkhart Bridge and Iron Company of Indiana (bridge plate). DOT designation: P-38-096.

1911-1925. This period is characterized by standard designs from State Highway Commission plans. The compression and tension members are generally built-up members from larger angles. The members are connected at riveted gusset plates. The 1981 HBAC survey of Wisconsin bridges identified 49 bridges from this period. The following two bridges represent the selection of the HBAC as the best examples of Pratt overhead trusses from this period.

15. The bridge located on Blomberg Road over the Chippewa River in the Town of Weirgor, Sawyer County (S14,T37N,R7W). This bridge consists of two 113 foot spans of Pratt overhead trusses built in 1914 by the Worden-Allen Company of Milwaukee (bridge plate). The pier is a steel tube and diaphragm. DOT designation: P-57-068.

16. The bridge located on Leedle Mills Road over Badfish Creek in the Town of Union, Rock County (Sl,T4N,R10E). This bridge is a single 90 foot span Pratt overhead truss constructed in 1916 (est.) by E. C. Sherwin and Son of Brandon. (Added to the National Register of Historic Places as part of the Multiple Resources of Cooksville, 9/17/80.). DOT designation: P-53-066.

<u>1926-1931</u>. This period is characterized by heavier truss elements. The compression and tension members are built-up members connected at the joints with riveted gusset plates. The 1981 HBAC survey of Wisconsin bridges identified 20 bridges from this period. The following bridge represents the selection of the HBAC as the best example of a Pratt overhead truss from this period.

17. The bridge located on Smyth Road over the North Branch of the Oconto River in the Town of Lakeland, Oconto County. This bridge, also known as the "Beyer" bridge, is a single 90 foot span Pratt overhead truss fabricated by Milwaukee Bridge Company in 1928 and constructed by Garvey-Weyenberg Construction Company. DOT designation: P-42-042.

<u>1932-1936</u>. This period is characterized by compression and tension members of rolled sections in the web of the truss. The 1981 HBAC survey of Wisconsin bridges identified 17 bridges from this period. The following two bridges represent the selection of the HBAC as the best examples of Pratt overhead trusses from this period.

18. The bridge located on Central Street over Duncan Creek in the City of Chippewa Falls, Chippewa County. This bridge is a single 130 foot span Pratt overhead truss fabricated in 1934 by Clinton Bridge Works and constructed by A. F. Wagner Iron Works from State Highway Commission plans. DOT designation: P-09-715.

19. The bridge located on S.T.H. 11 over the Galena River in the Town of New Diggings, Lafayette County. This bridge consists of two 100 foot spans of Pratt overhead trusses. The bridge was fabricated in 1935 by Wausau Iron Works and constructed by Eau Claire Engineering Company from State Highway Commission plans. DOT designation: B-33-204.

b. <u>Parker</u>. The Parker truss is simply a Pratt design with a polygonal top chord. A typical span length for a Parker truss would range from about 100 feet to 250 feet. There are about 35 Parker overhead trusses extant in Wisconsin. The following three bridges represent the selection of the HBAC as the best examples of Parker overhead trusses.

   1. The bridge located on C.T.H. "S" over Lake Wissota in the Town of Eagle Point/Anson, Chippewa County (S22,T29N,R8W). This Parker overhead truss bridge, also known as the "Lake Wissota Bridge," consists of four spans of 185 feet each. The bridge was built in 1916 by

the Toledo Bridge and Crane Company of Toledo, Ohio. The truss has riveted joints and built-up members. This bridge will be demolished in 1987. DOT designation: P-09-082.

2. The bridge located on S.T.H. 107 over the Big Rib River in the Village of Marathon City, Marathon County (S6,T28N,R6E). This bridge consists of two Parker overhead truss spans of 151 feet each separated by 13 deck girder spans of 32 feet each. The bridge was built in 1930 from State Highway Commission plans. The manufacturer is unknown. The truss has riveted joints and built-up members. DOT designation: B-37-549.

3. The bridge located on C.T.H. over Elk Creek in the Town of Spring Brook, Dunn County (S24/13,T27N,R11W). This Parker overhead truss is a single 151 foot span built in 1934 from State Highway Commission plans by the Worden-Allen Company of Milwaukee, Wisconsin. The truss has riveted joints and rolled section members. DOT designation: B-17-957.

c. Camelback. The camelback truss has a polygonal top chord, similar to a Parker truss, but with exactly five slopes. The span length of a camelback truss would typically range from about 100 feet to 300 feet. There are only two camelback overhead trusses extant in Wisconsin in 1986.

1. The bridge located on Manchester Street over the Baraboo River in the City of Baraboo, Sauk County (Sl,T11N,R6E). This bridge is a 128 foot span camelback overhead truss built in 1884 by Milwaukee Bridge and Iron Works of Milwaukee. The truss has pin-connected joints. This bridge will be moved to another location in 1986. DOT designation: P-56-713.

2. The bridge located on C.T.H. "N" over the South Fork of the Jump River in the Town of Kennan, Price County (S27/28,T34N,R2W). This bridge is a 140 foot span camelback overhead truss built in 1924 from State Highway Commission plans. The manufacturer is unknown. The truss has riveted joints. This bridge is scheduled to be demolished in 1987. DOT designation: P-50-90.

d. Pennsylvania. The Pennsylvania truss is also a descendant of the Pratt truss, with some modifications to the basic design. This truss has a polygonal top-chord similar to a Parker truss, but the distinguishing features of the Pennsylvania truss are the sub-struts and sub-ties. The span length for a Pennsylvania truss would typically range from about 200 feet to 600 feet. There are only four Pennsylvania overhead truss bridges extant in Wisconsin in 1986.

1. The bridge located on C.T.H. "T" over the Chippewa River in the Town of Arthur, Chippewa County (S2,T30N,R7W). This bridge, also known as the Cobban Bridge, consists of two spans of 241 feet each. These Pennsylvania overhead trusses were built in 1908 and were moved to their present location in 1917. The contractor was Modern Steel Structures Company. DOT designation: B-9-965.

2. The bridge located on River Road over the Black River in the Town of Lewis, Clark County (S4,T23N,R2W). This bridge is a 200 foot span Pennsylvania overhead truss built in 1930 (est.). The manufacturer is unknown. DOT designation: P-10-266.

3. The bridge located on U.S.H. 18/S.T.H. 35 over a slough branch of the Wisconsin River in the Town of Wyalusing, Grant County (S14,T6N,R6W). This bridge is a 231 foot span Pennsylvania overhead truss built in 1931 from State Highway Commission plans. The contractor is unknown. This bridge has been determined eligible for the National Register of Historic Places. It is scheduled to be replaced in 1988-1989. DOT designation: B-22-829.

4. The bridge located on U.S.H. 18/S.T.H. 35 over the Wisconsin River in the Town of Wyalusing, Grant County (S14/11,T6N,R6W). This bridge consists of nine spans, six of which are 232 foot spans of Pennsylvania overhead trusses. They were built in 1931 from State Highway Commission plans and have been determined eligible for the National Register. The bridge is scheduled to be replaced in 1988-1989. The contractor is unknown. DOT designation: B-12/22-850.

e. Warren. The Warren truss, patented in 1848 by two British engineers, is easily recognized by its triangular outline. The diagonal members of this truss support both tension and compression, and are usually rather heavy, stiff members. Although there are a few examples of Warren overhead trusses built prior to 1936, almost all of the overhead trusses built after 1936 are standard State Highway Commission plans of the Warren design. There are only three Warren overhead trusses from the pre-1936 era extant in Wisconsin in 1986.

1. The bridge located on old S.T.H. 131 over the Kickapoo River in the Town of Stark, Vernon County (S20,T13N,R2W). This bridge is a 136 foot span Warren overhead truss built in 1912 by the Central States Bridge Company of Indiana. C.A.P. Turner was involved in the design of this bridge at its original location over the Red Cedar River in Menomonie. The bridge was moved to its present location in 1953 and is now owned by the Corps of Engineers. It is scheduled to be replaced. DOT designation: B-6-007 (Kickapoo #18).

2. The bridge located on old S.T.H. 131 over the Kickapoo River in the Town of Stark, Vernon County (S9,T13N,R2W). This bridge is a 145 foot span Warren overhead truss built in 1905 by the Minneapolis Steel and Machinery Company of Minnesota. The bridge was originally located near Hudson, over the St. Croix River and was moved to its present location in 1953. Now owned by the Corps of Engineers, it is scheduled to be replaced. DOT designation: B-62-08 (Kickapoo #16).

3. The bridge located on C.T.H. "H" over the Yellow River in the Town of Ruby, Chippewa County (S25/36,T31N,R5W). This bridge is a 135 foot span Warren overhead truss built in 1923. Based on a field examination, this bridge appears to have been moved to the present site and slightly modified. The contractor is unknown. DOT designation: B-9-848.

3. Deck Truss

In the deck truss configuration, the deck trusses are located alongside but below the roadway surface. The truss itself may be shallow or deep with parallel top and bottom chords or polygonal bottom chords. The deck truss is used primarily in locations with a large verticle clearance above the waterway to avoid floating debris from becoming entangled in the truss and thus collapsing the bridge. The

1981 HBAC survey identified approximately 80 deck trusses in Wisconsin, but most of them are approach spans to an overhead or pony truss bridge. These bridges have been classified by the truss of the main span. Twenty-two were classified as deck truss bridges. The following bridge is Wisconsin's best example:

a. The bridge located on STH 54 over the Embarass River in New London, Outagamie County (S6/7,T22N,R15E). Built in 1933, the bridge is composed of five spans that total 595 feet in length. DOT designation: B--44/68-900.

<u>Locational Patterns of Resource Types</u>. Truss bridges in general, and particularly overhead truss bridges, were more common in the southwestern part of the state where the hilly terrain necessitated more and longer bridges than the eastern part of the state. Of the entire state, the southeast has the fewest number of truss bridges. Fewer bridges were needed and the flat terrain probably resulted in the construction of fewer overhead trusses and more pony trusses. But because of the intensity of urbanization in this area, it is difficult to assess the occurrence of truss bridges in this region. Today, the northern part of the state has by far the highest number of truss bridges, and examples are better than in the south. Limited urbanization has resulted in more retention and less modification of truss bridges in the north, and the practice of scraping rather than salting roads in the winter has resulted in better overall preservation of the bridges.

<u>Previous Surveys</u>. In 1977 George M. Danko undertook a survey of metal truss bridges for the Historic Preservation Division. The resulting publication is "A Selective Survey of Metal Truss Bridges in Wisconsin," which is on file at the Historic Preservation Division, State Historical Society of Wisconsin. In 1981 Robert Newbery of the Wisconsin Department of Transportation (WISDOT) collected the notes of the Historic Bridge Advisory Committee in a report entitled "A Survey of Metal Truss Bridges in Wisconsin." The Wisconsin Department of Transportation maintains an inventory of bridges located on the public road system. The Department of Transportation designation numbers in this report refer to that inventory.

<u>Survey and Research Needs</u>. Surveys of Wisconsin bridges are needed in the following categories because no survey or only partial surveys of these bridges have been completed.

1. <u>Cantilever Truss Bridges</u>: No survey completed.

2. <u>Overhead Truss Bridge</u>: The HBAC only partially surveyed this truss category. Since this category represents the largest and perhaps most significant iron trusses in Wisconsin, a complete survey with field review should be conducted to facilitate effective evaluation of this category of bridge.

3. <u>Railroad Truss Bridges</u>: No survey completed.

4. <u>Bridges Outside Jurisdiction of WISDOT</u>: Bridges that do not receive federal funds, such as those on private land, are generally not reviewed by WISDOT or the State Historical Society. These bridges, of all types, may warrant being surveyed simply because their preservation potential is high, probably by a county, regional, or thematic approach.

5. <u>Railroad Bridges</u>: Little is known about the many railroad bridges in Wisconsin. A survey of these bridges should probably be approached from a thematic basis, based on railroad company.

Research is needed on the following topics related to Wisconsin bridge history.

1. Bridge Patents: Patents were granted to individuals by the United States Patent Office for original and significant ideas or innovations. A history of bridge patents would not only document the advances in bridge technology but also identify the contributions of Wisconsin residents.

2. Bridge Companies: Many bridge companies were founded in Wisconsin and some expanded beyond local to regional markets. Very little of the history of the numerous Wisconsin bridge companies has been recorded. Also, the types of bridges they manufactured and the extent of their markets has not been studied.

3. General research on bridge manufacturing in Wisconsin, particularly the influence the following individuals had on the development of the iron truss in Wisconsin through their associations with various bridge companies:
   Friedrich Weinhagen (Wisconsin Bridge & Iron Company)
   Beverley L. Worden (Worden-Allen Company)
   Willis E. Gifford (Elkhart Bridge & Iron Company)
   A.D. Burnett (Burnett Bridge Company)

4. The local history of bridges selected as the best examples of their truss type.

5. The significance of the Pratt pony trusses that have a continuous top chord and inclined end post through the joint at the hip vertical. How were the angles bent through a curve without distorting the compression leg? It has been speculated that this was the work of skilled blacksmiths who had left rural areas and gone to Milwaukee to seek employment at the turn of the century. This bridge design appears to have been almost exclusively the work of Milwaukee Bridge & Iron Company.

EVALUATION

National Register Listings and Determinations of Eligibility

	Name, Location	County	Category/Type	NR Date
E	Lake Wissota Bridge(1916), Eagle Point	Chippewa	Overhead-Parker	5/12/83
E	Longwood Bridge(1901), Town of Longwood	Clark	Overhead-Camelback	09/26/80
E	Hemlock Bridge(1915), Town of Warner	Clark	Overhead-Pennsylvania	7/10/80
	Grand Ave. Bridge (1894), Neillsville	Clark	Overhead-Pratt	12/06/84
E	Pratt Truss Railroad Bridge (1888), Belleville	Dane	Overhead-Pratt	9/22/77
E	Black River Bridge(1922), Town of Melrose	Jackson	Overhead-Pennsylvania	10/25/78
	VanLoon Wildlife Area Truss Bridge Group (1891-92), Town of Holland	La Crosse	Pony-Bowstring	2/27/80
E	Prescott Bridge, Prescott	Pierce	Overhead-Pratt	12/31/84
E	Cunningham Lane Bridge, Town of Rockbridge	Richland	Pratt-Pony	7/16/85
	Turtleville Iron Bridge (1887), Town of Turtle	Rock	Overhead-Pratt	9/15/77

	Leedle Mill Truss Bridge (1916), Town of Union	Rock	Overhead-Pratt	9/17/80
E	7th St. Bridge, Hudson	St. Croix	Pony-Howe	3/18/85
E	Manchester St. Bridge, Baraboo	Sauk	Overhead-Camelback	3/18/85
E	Chippewa River Bridge(1908), Town of Radisson	Sawyer	Overhead-Parker	9/17/81
E	Polley Lane Bridge, Town of Aurora	Taylor	Overhead-Pratt	10/9/85
	Second St. Bridge, Galesville	Trempealeau	Overhead-Pratt	12/12/84
E	Hudson Toll Bridge (Bridge No. 18), Town of Stark	Vernon	Overhead-Warren	1/24/85
E	Riverside Park Bridge (Bridge No. 16), Town of Stark	Veronon	Overhead-Warren	1/24/85

E = Determined Eligible.

Context Considerations. The different attributes of integrity listed below are a summary of the discussion contained in Chamberlin (1983:16). These points should be considered in evaluating integrity of a structure and its setting.

1. Integrity of location simply indicates whether the bridge is located at its original site or has been moved. Iron trusses are somewhat unique in this respect in that they were designed for easy transportation and erection and thus were very mobile structures. Such mobility should be viewed as proof of the intrinsic engineering value of iron trusses.

2. Integrity of design relates to whether the bridge retains the essential elements of the original design. Bridge decks, for example, are considered to be wearing surfaces of the structure, and periodic replacement with different or additional material is not a compromise of design integrity.

3. Integrity of setting addresses the relationship between a bridge and its immediate surroundings. Obvious changes, such as railroad abandonments at the bridge crossing, adversely affect the setting, whereas subtle changes in the topography, foliage, and land use are more difficult to assess in terms of impact on the setting.

4. Integrity of materials assesses the impact of replaced materials required with deterioration over time. Some new materials may be equivalent or compatible with the original materials while others are not. Replacement of wrought iron members with steel would be very difficult to detect in the field and therefore probably represents no significant change of integrity.

5. Integrity of workmanship relates to the material and the technology used to combine materials in various forms. For example, replacing built-up riveted members in trusses with bolted sections is a detrimental compromise of workmanship.

6. Integrity of feeling and association communicates to an informed observer theessential elements of an historic period. This is perhaps best described as an iron truss bridge on an unpaved road in a rural setting.

Data Needed to Evaluate Eligibility

The bridges listed in the IDENTIFICATION section of this study unit represent the best examples of iron truss bridges selected by the HBAC with some minor exceptions as noted. The evaluation procedure followed by the HBAC consisted of two phases. In the first phase, the 1981 HBAC inventory was reviewed by truss type. If the total number of bridges of a truss type was not too large, all bridges were considered for further evaluation. Otherwise, only a representative sample was selected for further evaluation. The three common truss types: Pratt pony, Warren pony, and Pratt overhead, which together comprise 75 percent of the total number of metal trusses extant in Wisconsin, were evaluated in this manner by selecting a representative sample. In some cases, this resulted in only a small fraction of the total number of bridges of a truss type being considered for further evaluation.

In the second phase, information was gathered on each bridge considered for evaluation. Again, the primary sources of information were the WISDOT computerized bridge data base and the Bridge Section card file which both provided good descriptive information but little historical information about the bridge. In many cases, field investigations of the bridge were conducted by members of the HBAC to corroborate existing information and gather new information about condition, integrity, and documentation. The field investigations proved to be extremely valuable since they were able to establish the existance of a bridge plate, which generally provided information about the manufacturer and date of construction. Following the gathering of information, the bridges were scored on the criteria shown below. (Bridges were not scored on "Context," because little information was available on the local "History" and no guidelines were established to rate "Integrity of Location" or "Aesthetics.") Those bridges scoring the highest were selected as the best examples of that truss type.

HBAC CRITERIA FOR EVALUATING SIGNIFICANCE

	Points	Totals
A. Technology		
1. Span length	10	
2. Number of spans	10	
3. Distinctive features	10	
Total Possible Points		30
B. Integrity		
1. Top and bottom chords	6	
2. Intermediate posts 6		
3. Bracing (diagonals, counters, top and bottom laterals, ties, struts, etc.)	6	
4. Abutments	2	
Total Possible Points		20
C. Condition		
1. Top and bottom chords	6	
2. Intermediate posts	6	
3. Bracing	6	
4. Abutments	2	
Total Possible Points		20
D. Documentation		

1. Date	5	
2. Manufacturer	10	
a. Known, unusual designer or prolific builder, or	10	
b. Known, local builder, or	6	
c. Known, contribution unknown	3	
Total Possible Points		15

E. Context

1. History	7	
2. Integrity of location	4	
3. Aesthetics	4	
Total Possible Points		15
TOTAL POSSIBLE SCORE	—	100

Since most iron truss bridges in Wisconsin are part of the functional transportation system, they are continually subject to review for maintenance and replacement purposes. As part of the replacement process, it is necessary and desirable to be able to ascertain which bridges are of historical significance in a reasonably efficient and uniform manner. Although the HBAC evaluation represents a significant accomplishment, it should not be viewed as a final or complete evaluation of iron truss bridges in Wisconsin for several reasons. First and foremost, not all bridges were evaluated, so potentially significant bridges may have been overlooked. In the case of Warren pony trusses, the number not evaluated by the above criteria represents several hundred bridges. Of the bridges that were scored, no consideration was given to the bridges' significance in local history which could be the determining factor for many bridges. Also, the scoring criteria was not detailed enough in some instances to provide adequate guidelines to assure uniform scoring. In addition, the relative weighting of points may have emphasized information that was easily obtained rather than historically significant. Finally, the rating system was designated to be used for comparisons of extant bridges. No ideal score has been established for any truss types since not all bridges were examined, and as bridges are demolished the relative scores may change.

The following rating system is a suggested expansion of the criteria developed by the HBAC. It is provided as a means to better evaluate the historical significance of bridges and to produce greater variation in numerical scores. This criteria is not meant to replace the above criteria, but to elaborate upon it.

SUGGESTED EXPANDED CRITERIA FOR EVALUATING SIGNIFICANCE

	Points	Totals
A. Documentation		
1. Period of Construction		
a. Early	8	
b. Middle	5	
c. Late	2	

Further research is needed to establish the parameters for each bridge type.

2. Builder

a. Known prolific Wisconsin builder 8

- Milwaukee Bridge & Iron Company (Milwaukee)
- Wausau Iron Works (Wausau)
- Wisconsin Bridge & Iron Company (Milwaukee)
- Worden-Allen Company (Milwaukee)

b. Known prolific out-of-state builder 6

- American Bridge Company (New York)
- Bellefontaine Bridge and Iron Company (Ohio)
- Brackett Bridge Company (Ohio)
- Canton Bridge Company (Ohio)
- Capitol Bridge Company (Ohio)
- Central States Bridge Company (Indiana)
- Champion Bridge Company (Ohio)
- Clinton Bridge Company (Iowa)
- Columbia Bridge Company (Ohio)
- Continental Bridge Company (Illinois)
- Elkhart Bridge & Iron Company (Indiana)
- Hennepin Bridge Company (Minnesota)
- Keystone Bridge Company (Pennsylvania)
- King Bridge Company (Ohio)
- Luten Bridge Company (Indiana)
- Massillon Bridge Company (Ohio)
- New Castle Bridge Company (Indiana)
- New Columbus Bridge Company (Ohio)
- Mt. Vernon Bridge Company (Ohio)
- Penn Bridge Works (Pennsylvania)
- Smith bridge Company (Ohio)
- Toledo Bridge Company (Ohio)
- Wrought Iron Bridge Company (Ohio)

c. Known Wisconsin builder 4

- Burnett Bridge Company (Galesville)
- Lakeside Bridge & Steel Company (North Milwaukee)
- Milwaukee Bridge & Iron Works (Milwaukee)
- Northwestern Bridge & Iron Company (Milwaukee)

d. Possible Wisconsin builder 4

- Bark River Bridge & Culvert Company (Eau Claire)
- Chippewa Bridge Company (Durand)
- Federal Bridge and Structural Company (Milwaukee)
- Joliet Bridge & Iron Company (Milwaukee)
- Lancaster Bridge Works (Lancaster)
- LaCrosse Bridge & Steel Company (LaCrosse)
- LaFayette Bridge Company (Milwaukee)
- Milwaukee Bridge Company (Milwaukee)
- Ontario Iron Bridge Company (Ontario)
- Sturgeon Bay Bridge Company (Sturgeon Bay)
- Wisconsin Bridge Company (Prairie du Sac)

e. Known out-of-state builder 2

f. Unknown builder 0

Total Possible Points 16

B. Physical Description

1. Span length

a. Pony Truss	
King Post, Lattice, Bedstead	
greater than 60'	8
45-60	6
30-45'	4
15-30'	2
Bowstring, Pratt, Parker, Warren	
greater than 80'	8
60-80'	6
45-60'	4
30-45'	2
b. Through Truss	
Pratt	
greater than 150'	8
125-150'	6
100-125'	4
75-100'	2
All Others	
greater than 175'	8
150-175'	6
120-150'	4
90-120'	2
c. Deck Truss	
greater than 175'	8
150-175'	6
120-150'	4
90-120'	2

2. Number of spans

a. one span	0
b. two or more spans (two points per span)	

3. Technological Features

a. Patented features	6
b. Cast or wrought iron structural elements	2
c. Builder's distinctive structural elements	2
d. Abutment/pier design	2
e. Skewed abutments/pier(s) (before 1910)	2

4. Unusual Detail

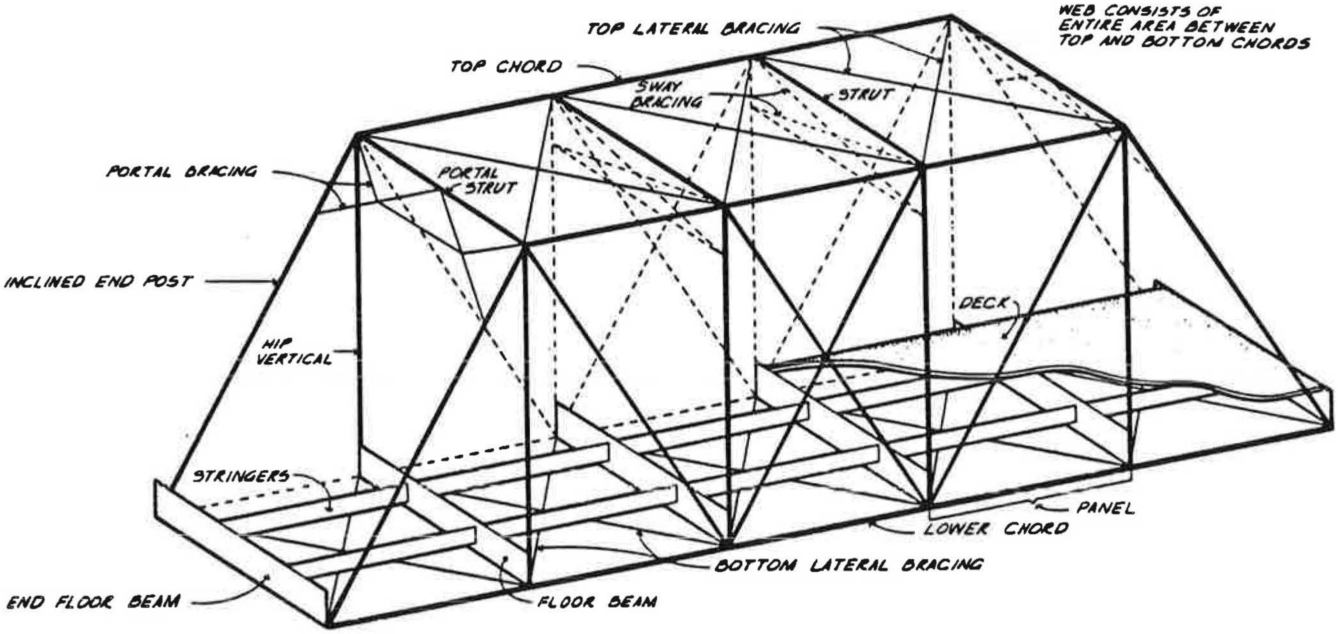
a. Artistic treatment of structural elements	2	
b. Decorative elements (non-structural)	2	
c. Pedestrian walkways	2	
Total Possible Points		34

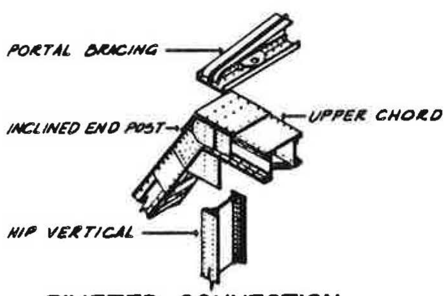
C. General Significance

1. Integrity of structure

a. Excellent (Only minor repairs to original members)	8
b. Good (Minor repairs, only minor members replaced)	6
c. Fair (Considerable repairs, few members replaced)	4
d. Poor (Major repairs, several members replaced)	2

2. Integrity of setting		
a. Good	4	
b. Fair	2	
c. Poor	0	
3. History (Association with Significant Event or Person)		
a. National significance	16	
b. State significance	12	
c. Local significance	8	
Significance undetermined	0	
Total Possible Points		28
D. Preservation Potential		
1. Bypass Potential		
a. Excellent (Bypassed; located in 4f lands)	6	
b. Good (alternate crossing exists, adjacent crossing possible)	4	
c. Fair (other alternate crossing possible)	2	
d. Poor (no alternate crossing)	0	
2. Condition (based on WISDOT Sufficiency Rating)		
a. 60-100	6	
b. 40-59	4	
c. 20-39	2	
d. less than 20	0	
3. Maintenance Demands (based on Average Daily Traffic)		
a. Few (less than 200 ADT)	4	
b. Moderate (200-1000 ADT)	2	
c. Many (greater than 1000 ADT)	0	
4. Interested Constituency		
a. Identified constituency group	2	
b. Identified "acceptable" location for bridge	2	
c. Identified interested owner	2	
Total Possible Points		22
TOTAL POSSIBLE SCORE		100





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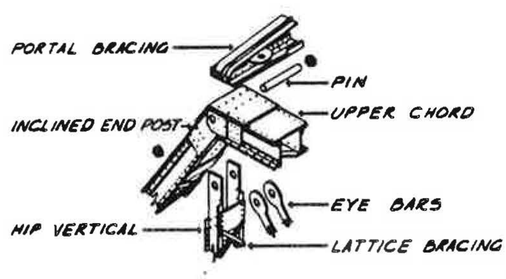
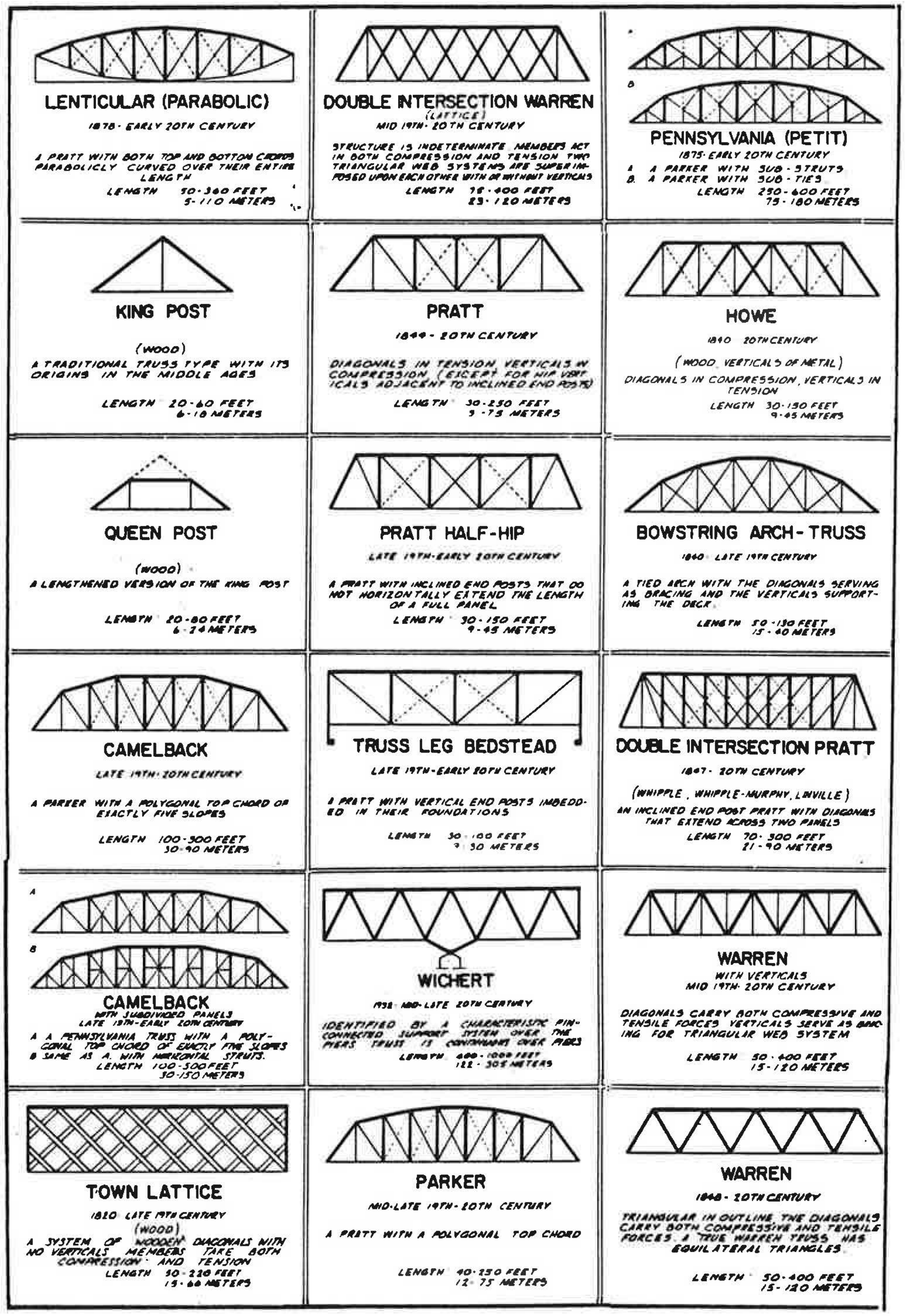


PINNED CONNECTION

TRUSSES

A STUDY BY THE
HISTORIC AMERICAN ENGINEERING RECORD



TRUSSES

A STUDY BY THE
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