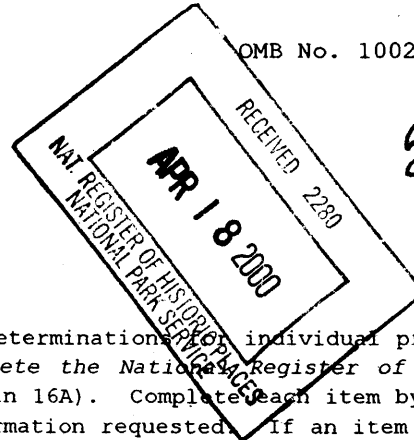


United States Department of Interior  
National Park Service

National Register of Historic Places  
Registration Form



524

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900A). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Steam Locomotive #1385  
other names/site number N/A

2. Location

street & number E8948 Diamond Hill Road N/A not for publication  
city or town North Freedom N/A vicinity  
state Wisconsin code WI county Sauk code 111 zip code 53951

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this X nomination    request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property X meets    does not meet the National Register criteria. I recommend that this property be considered significant nationally    statewide X locally. (   See continuation sheet for additional comments.)

Alicia J. Cook 4/10/2000  
Signature of certifying official/Title Deputy State Historic Preservation Officer-WI Date

State or Federal agency and bureau

In my opinion, the property    meets    does not meet the National Register criteria.  
(   See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State of Federal agency and bureau

Steam Locomotive #1385  
Name of Property

Sauk County, WI  
County and State

**4. National Park Service Certification**

I hereby certify that the property is:

- entered in the National Register.  
    \_\_\_ See continuation sheet.
- determined eligible for the National Register  
    \_\_\_ See continuation sheet.
- determined not eligible for the National Register.  
    \_\_\_ See continuation sheet.
- removed from the National Register.
- other, (explain:)

Signature of the Keeper: Edson H. Beall Date of Action: 5/18/00

**5. Classification**

Ownership of Property (check as many boxes as apply)	Category of Property (Check only one box)	Number of Resources within Property (Do not include listed resources within the count)	
		Contributing	Noncontributing
<input checked="" type="checkbox"/> private	<input type="checkbox"/> building(s)	_____	_____ buildings
<input type="checkbox"/> public-local	<input type="checkbox"/> district	_____	_____ sites
<input type="checkbox"/> public-state	<input type="checkbox"/> site	_____	_____ structures
<input type="checkbox"/> public-federal	<input checked="" type="checkbox"/> 1 structure	_____	_____ objects
	<input type="checkbox"/> object	_____	_____ Total
Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.)		Number of contributing resources previously listed in the National Register	
N/A		0	

**6. Function or Use**

Historic Functions (Enter categories from instructions)	Current Functions (Enter categories from instructions)
Transportation, rail-related	Transportation, rail-related
_____	_____
_____	_____

**7. Description**

Architectural Classification (Enter categories from instructions)	Materials (Enter categories from instruction)
Other: steam locomotive	foundation N/A
_____	walls N/A
_____	roof N/A
_____	other Metal
	Wood

**Narrative Description**

(Describe the historic and current condition of the property on one or more continuation sheets.)

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Continuation Sheet

Steam Locomotive #1385  
North Freedom, Sauk County, WI

Section 7 Page 1

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**DESCRIPTION**

The steam locomotive, former Chicago & North Western #1385, is owned by the Mid-Continent Railway Historical Society, a nonprofit organization located on a former C&NW branch line at North Freedom, Wisconsin. The locomotive is located on existing railroad tracks and until 1998 was operated for a distance of three and one-half miles by the Society. American Locomotive Company (Alco), Schenectady, New York, built the engine.

C&NW #1385, delivered on March 30, 1907 (builder number 42187), was placed by the railroad in Class R-1. According the classification system developed by Frederick M. Whyte, frequently referred to as the Whyte system (Drury, pp. 7-8), the locomotive is a Ten-Wheeler; it has a 4-6-0 wheel arrangement with four wheels for the lead truck, six drive wheels, and no trailing truck. The railroad purchased 325 of the R-1s between 1901 and 1908, making them the railroad's largest single locomotive class.

The diameter of the drive wheels is 63 inches. The total weight of the engine and tender light (empty) is 206,000 pounds, as built. The engine alone weighs 144,500 pounds. The total engine and tender weight (full) is 306,500 pounds, with a tractive effort (hauling power) of 30,900 pounds. Its coal-fired boiler generates a pressure of 200 pounds per square inch (reduced to 150 psi for Mid-Continent operation). The boiler is equipped with 280 two-inch boiler tubes, through which the hot gasses pass. Locomotive 1385 has two steel and cast iron 21 by 26 cylinders (diameter, stroke, in inches). Pistons are actuated by Stephenson valve gear, which allows steam to enter and exit the cylinders. The tender carries 10 tons of coal and 7,500 gallons of water. The locomotive does not have a stoker; coal is shoveled into the firebox by hand (C&NW locomotive diagrams, December 18, 1913). In 1931 at Ashland, Wisconsin, #1385 was equipped with a superheater, which boosts the temperature of the steam and the power of the locomotive. With this change, #1385 has 148 two-inch diameter tubes and 24 five and three-eighths-inch superheater flues.

The cab retains almost all of its original instruments and controls, including valves, gauges, brakes, throttle, and whistle and bell

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

Section 7 Page 2

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cords. Two sections of corrugated side sheets in the firebox, installed when the engine was built, remain; others have been replaced with flat side sheets. As is common with steam locomotives, the tender is not original; the original tender is in storage at Mid-Continent. The locomotive and tender are painted black, in the style used by the C&NW in the 1920s and 1930s.

Designed for fast freight service, #1385 and the other locomotives also were used for secondary passenger trains and local switching. #1385 pulled trains until the end of C&NW steam operations in 1956. Later it was used to steam ore and as a stationary boiler. Mid-Continent members purchased it for \$2,800 in 1961. It operated Mid-Continent's first train at North Freedom on May 27, 1963.

Steam Locomotive #1385  
Name of Property

Sauk County, WI  
County and State

**8. Statement of Significance**

Applicable National Register Criteria  
(Mark "x" in one or more boxes for the  
criteria qualifying the property for the  
National Register listing.)

- A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- B Property is associated with the lives of persons significant in our past.
- C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- D Property has yielded, or is likely to yield, information important in prehistory or history.

Areas of Significance  
(Enter categories from instructions)

Engineering  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Period of Significance  
1907  
\_\_\_\_\_  
\_\_\_\_\_

Significant Dates  
1907  
\_\_\_\_\_  
\_\_\_\_\_

Significant Person  
(Complete if Criterion B is marked above)

N/A  
\_\_\_\_\_

**Criteria Considerations**

(Mark "x" in all the boxes that apply.)

- A owned by a religious institution or used for religious purposes.
- B removed from its original location.
- C a birthplace or grave.
- D a cemetery.
- E a reconstructed building, object, or structure.
- F a commemorative property.
- G less than 50 years of age achieved significance within the past 50 years.

Cultural Affiliation  
N/A  
\_\_\_\_\_  
\_\_\_\_\_

Architect/Builder

American Locomotive  
Company  
\_\_\_\_\_

**Narrative Statement of Significance**

(Explain the significance of the property on one or more continuation sheets.)

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Steam Locomotive #1385  
North Freedom, Sauk County, WI

Section 8 Page 1

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### STATEMENT OF SIGNIFICANCE

The Chicago and North Western Steam Locomotive #1385 is one of only eight preserved locomotives of the C&NW, a railroad once serving nine states. Under Criterion C, it has significance as a representative example of railroad engineering. It is also associated with the C&NW, a company remembered for its contributions to the railroad industry nationally.

No. 1385 is a rare survivor, a representative of the locomotives seen in almost all large and small communities during the golden age of railroading. The period of significance is 1907, the year of construction. It retains its integrity as a locomotive, since it always has been associated with railroad operations.

### HISTORICAL BACKGROUND

#### The Railroad

The North Western, the nation's eighth largest railroad when purchased by the Union Pacific in 1995, once served nine states from Lake Michigan to Wyoming. A predecessor company operated the first train out of Chicago in 1848. Among its many accomplishments are: the "safety first" movement on U.S. railroads in 1910; magnificent, architect-designed passenger stations; and, the first high speed passenger train, the 400, on the Chicago-Twin Cities route in 1935. The C&NW's centennial in 1948 provided the impetus for the Chicago Railroad Fair, the last great railroad sponsored display of vintage equipment; the Fair was repeated in 1949. Unlike most U.S. railroads, the C&NW on double track operated its trains on the left side, similar to British practice. The railroad (and its subsidiary, the Chicago, St. Paul, Minneapolis, and Omaha) operated 9,362 miles in 1947, boosted in 1968 to 11,577 miles of main line following several mergers (including the Omaha, incorporated into the C&NW in 1957). When purchased by the Union Pacific, the C&NW was the last of the Midwest's railroads.

In his book, *the North Western*, H. Roger Grant develops several themes. "Foremost is the greatness of the company," he writes in the preface. "The North Western grew into a robust carrier that truly

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

Section 8 Page 2

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could boast the 'Best of Everything.' Enormously profitable from the mid-nineteenth century until the early twentieth century, it fashioned a major rail network in the Midwest and Great Plains during these years, creating an excellent physical plant and providing quality service. At times the North Western was an innovator, and often it set standards for the industry," according to Grant, professor of history and chair of the department at Clemson University.

The railroad started buying diesel passenger locomotives for the 400 in 1939. The transition to all diesel power was completed in 1956, bringing vast changes to the railroad landscape as water tanks, coaling towers, and machine shops were retired. Unlike railroads such as the Soo Line, the C&NW did not donate locomotives for display in parks, and quickly scrapped its large, modern steam power [the H-1 Northerns (4-8-4s) and E-4 Hudsons (4-6-4s) referred to by Morgan].

#### **The Locomotive Company**

No. 1385 was built at the Schenectady (New York) Works of American Locomotive Company, an important steam locomotive manufacturer. Alco was created in 1901 when eight companies merged to better compete in the expanding marketplace. Two firms joined soon after the merger, bringing the total to ten. In 1917, when *Forbes* published its first list of the top 100 U.S. companies, American Locomotive was the largest locomotive builder, followed by Baldwin Locomotive Works, Philadelphia (*Railway Age*, *Forbes*).

Schenectady Locomotive Works, the oldest of the Alco companies, was founded in 1848, but did not become a major builder until the 1880s. Gradually, the merged company closed plants until in 1928 all production was concentrated at Schenectady. Alco built its last steam locomotive there in 1948. The company started in the diesel business early, in 1926, but it never was as successful as it had been in the steam days. It changed its name to Alco Products in 1955, and built its last diesel locomotive in 1969 (Drury, pp. 12-13).

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

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**C&NW Class R-1 Locomotives**

As they were being delivered, trade journals covered the C&NW's Class R-1 locomotives, an indication of their importance to the railroad industry. "In addition to handling heavy freight trains they are also available for fast freight or passenger trains, and are largely used for these services," wrote the *American Engineer and Railroad Journal* (June 1907). Both the *Journal* and *Railway Age* (December 13, 1907) told about the corrugated side sheets in the firebox, which the C&NW had used for three or four years "with very satisfactory results." The C&NW believed the corrugated sheets lasted longer, but later replaced them with flat sheets when patching fireboxes.

The R-1s had a pivotal role in the development of C&NW steam locomotive power. When the R-1s were purchased, the railroad had to rebuild tracks, bridges, turntables, and engine houses to accommodate them (*North Western Lines*, Winter 1995). The new locomotives were bigger, heavier, and longer than their predecessors.

**ENGINEERING**

**Steam Locomotive Engineering Historic Overview**

The commercial railway developed in Great Britain in the 1820s. The U.S. is "enormously indebted to the British builders" for the basic design of the steam locomotive and for fundamental features that remained with the locomotive until production ended, according to John H. White Jr. (p. 7). While the first locomotives were imported from Britain, they were not suited to the light bridges and rails of the U.S. railroads. Our nation quickly started building its own locomotives—the first in 1830 by the West Point Foundry Association of New York City for the South Carolina Railroad (White, p. 13).

After early experiments with vertical boilers were not successful, railroads adopted a horizontal boiler. Initially, mechanical officers believed the boiler had to be between the drive wheels, to maintain a low balance of gravity. But larger locomotives needed more steam, made faster, so the boiler was raised to the top of the



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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

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frame and firebox extended to the full width between the drive wheels. "This made possible a substantial increase of grate area and heating surface and consequently in the steaming capacity of the boiler," according to the *Locomotive Cyclopedia* (Wright, pp. 96, 101). The wider firebox first was used for locomotives burning anthracite (hard) coal in 1877; for soft coal, the most common type of fuel, the wider firebox did not come into use until 1895.

Companies initially built quantities of the 4-4-0 type locomotive, the most popular wheel arrangement in the 19th century. "It was the national engine, a machine without peer in this country, because it answered every need," White said (p. 46).

The Ten-Wheeler or 4-6-0 (#1385 has this wheel arrangement) was introduced in March 1847 by Norris Locomotive Works for the Philadelphia and Reading. More railroads found it useful for heavier work after 1860, but "prejudiced motive-power officials" kept the 4-4-0 in the forefront until at least 1870 (White, p. 62). The 4-6-0 was the logical successor of the 4-4-0, as it permitted a 50 percent increase in starting tractive force with no increase in axle loading," Paul T. Warner (page 14) says in a history of the locomotive type. A C&NW 4-6-0, an earlier C&NW design, was displayed at the World's Columbian Exposition in Chicago in 1893 (Warner, page 15). "It is safe to say that, looking back over the past 80 years, no type of locomotive—with the exception of the 4-4-0—has had such a wide field of usefulness as has the 4-6-0," concludes Warner (page 24), librarian for the Baldwin Locomotive Works in Philadelphia.

The 4-6-0 was superceded by the Pacific, or 4-6-2 type, introduced in 1886 and used for a short time on the Lehigh Valley (Wright, p.103). More 4-6-2 types were built for the Chicago, Milwaukee and St. Paul in 1889 and 1893. By 1910, the more powerful 4-6-2s had replaced 4-6-0s in fast passenger and freight service. Development continued until 1950 when the Norfolk and Western built the last steam passenger locomotives for a U.S. common carrier (Drury, p. 305).

### 1385 Engineering

The 4-6-0 type was at its peak on American railroads at the time #1385 was built in 1907. When the C&NW introduced its class R-1, the

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Steam Locomotive #1385  
North Freedom, Sauk County, WI

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locomotives were described as "monster freight engines... To look at one of these engines one would think that there are not enough cars in the country to stall them," the *Baraboo Republic* reported (August 19, 1903, p. 7). Yet the locomotives had an equally important impact on the railroad itself—forcing the company to rebuild the tracks, bridges, and structures. The C&NW even prepared a map to show "the portion of the road upon which class R-1 engines can run." (Follmar, Jorgensen, p. 46)

An illustration, using a C&NW diagram for a class R-1 locomotive as a base, shows how a steam locomotive works (*Gazette*, June 1997, p.8-9). The text explains how "when heated, water turns into an invisible vapor know as steam. The volume of water expands as it turns to steam. The expansion of steam pushes the pistons that connect to the driving wheels that operate the locomotive."

#### Current Use

On a second main-line career from 1982 through 1992, #1385 visited many Midwestern communities on good-will tours for the C&NW, pulled the circus train for three years, and operated excursions on C&NW, Wisconsin and Southern, Wisconsin and Calumet, and Wisconsin Central railroads. Chris Burger, then C&NW's Wisconsin Division manager in Milwaukee, received a local history award in November 1982 from the State Historical Society of Wisconsin for the "ambitious and innovative project of routing a historic steam locomotive across Wisconsin."

When writing about "The \$1-A-Day Extravaganza" and C&NW's Prosperity Special, Editor/Publisher David P. Morgan of *Trains* said in August 1982 that the R-1s "are really quintessential system engines... more symbolic of their owner than an H-1 Northern or an E-4 Hudson, even if such had been available." Later, Steve Glischinski called #1385 the "Midwest's steam ambassador" in a cover story (*Trains*, December 1993).

As is common with steam locomotives, maintenance is continual. No.1385 has been out of service since June 30, 1998, waiting for major repairs to its firebox. These repairs commonly were done by the railroads about every 20 to 30 years, depending upon water quality.

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

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### Conclusion

Chicago and North Western locomotive #1385 is significant for its engineering features and for its association with a major Midwestern railroad company. It has maintained its integrity as an operating steam locomotive since its construction in 1907, today running at a nonprofit museum in North Freedom, Wisconsin, known for its early 20th century railroad atmosphere. "Scheduled operations can add to thoroughgoing historic authenticity, by bringing history to life," says William L. Withuhn, curator of transportation at the Smithsonian Institution, Washington, D.C. "Witness the wonderful Mid-Continent Railway Museum." (Withuhn to JG, July 1997)

The period of significance is 1907, the year of construction. While at the time of its construction and delivery, this type of locomotive was the railroad's largest locomotive class, today there are only eight preserved locomotives of the Chicago and North Western. Two other class R-1 locomotives, also sold after steam operations ended, exist today but do not operate: No. 175 (1908) in Upper Michigan and No. 444 (1906) in Denver. The other five locomotives, preserved earlier, are: Pioneer (4-2-0, 1843?), Chicago's first locomotive, Chicago Historical Society; No. 274 (4-4-0, 1873) and No. 1015 (4-4-2, 1900), Museum of Transportation, Kirkwood, Missouri; No. 279 (2-6-0, 1912), 3-foot gauge, Pioche, Nevada; and No. 100 (0-4-0, 1915), 24-1/2"-gauge for tie treatment plant, stored in Connecticut (Conrad, *Steam Locomotive Directory*). In addition, No.1385 is the only Chicago & North Western steam locomotive to operate in the each of the last four decades.

The engineering features—especially the R-1's larger firebox and boiler—created "a next generation of locomotive" for the C&NW (Follmar and Jorgensen, p. 49). After experimenting with passenger locomotives, the C&NW developed a design in 1900 that applied the wider, 65-inch firebox and longer, 16-foot boiler to 4-6-0 freight locomotives, soon to be designated class R-1. "The boiler was lifted to carry the wide firebox above the smaller freight engine drivers. The R-1 boiler was configured as an 'extended wagon top' boiler in the trade jargon of the day. That term means the top of the boiler section just ahead of the firebox is at the same elevation at the

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

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firebox section, with taper sections forward of that section," according to Follmar and Jorgensen (pp. 49, 51). In addition, the boiler pressure was increased to 200 pounds per square inch, and more efficient piston valves used.

As the largest class of locomotives owned by the C&NW, the R-1 types served communities all across the system in a variety of transportation roles. They are representative of a time before World War I when railroad services were essential for contact with the outside world, when passengers, freight, mail, and milk traveled by rail (Stover, p. 98).

Steam Locomotives, such as #1385, marked the transition to bigger, heavier, longer, and more powerful locomotives. As an intact, and as one of the few remaining, C&NW locomotives, #1385 is an important example of its type.

Steam Locomotive #1385  
Name of Property

Sauk County, WI  
County and State

**9. Major Bibliographic References**

**Bibliography**

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

See Continuation Sheet

Previous Documentation on File (NPS):  
 preliminary determination of individual listing (36 CFR 67) has been requested  
 previously listed in the National Register  
 previously determined eligible by the National Register  
 designated a National Historic Landmark  
 recorded by Historic American Buildings Survey #  
 recorded by Historic American Engineering Record #

Primary location of additional data:  
 State Historic Preservation Office  
 Other State Agency  
 Federal Agency  
 Local government  
 University  
 Other  
Name of repository:  
\_\_\_\_\_

**10. Geographical Data**

Acreage of Property \_\_\_\_\_ less than one acre

UTM References (Place additional UTM references on a continuation sheet.)

1 16 267420 4815560 3 / / / / / / / / / / /  
Zone Easting Northing Zone Easting Northing  
2 / / / / / / / / / / / 4 / / / / / / / / / / /  
Zone Easting Northing Zone Easting Northing  
\_\_\_\_ see continuation sheet

**Verbal Boundary Description** (Describe the boundaries of the property on a continuation sheet)

**Boundary Justification** (Explain why the boundaries were selected on a continuation sheet)

**11. Form Prepared By**

name/title John Gruber  
organization Mid-Continent Ry Historical Society date March 1, 1999  
street & number 1430 Drake St. telephone 608-255-7713  
city or town Madison state WI zip code 53711

e-mail: jgruber@execpc.com

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National Park Service

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Continuation Sheet**

**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

Section 9 Page 1

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NPS Form 10-900-a  
(Rev. 8-86)  
Wisconsin Word Processing Format  
(Approved 1/92)

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National Park Service

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Steam Locomotive #1385  
North Freedom, Sauk County, WI

Section 9 Page 2

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**National Register of Historic Places  
Continuation Sheet**

Section 10      Page 1      Steam Locomotive #1385  
North Freedom, Sauk County, WI

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**10. Geographic Data**

Verbal Boundary Description

Steam Locomotive #1385 is housed in the engine house located on the grounds of the Mid-Continent Railway Historical Society museum. The locomotive sits on the tracks located on the east side of the engine house. The boundary is defined as a box extending five feet around the locomotive as it sits on the tracks within the engine house.

Verbal Boundary Justification

When not in operation, the locomotive is housed at this location for protection and safekeeping.



Steam Locomotive #1385

Sauk County, WI

Name of Property

County and State

**Additional Documentation**

Submit the following items with the completed form:

Continuation Sheets

Maps A USGS map (7.5 or 15 minute series) indicating the property's location.

A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs Representative black and white photographs of the property.

Additional Items (Check with the SHPO or FPO for any additional items)

**Property Owner**

Complete this item at the request of SHPO or FPO.)

name Mid-Continent Railway Historical Society

street & number E8948 Diamond Hill Road telephone 608-522-4261

City or town North Freedom state WI zip code 53578

**Paperwork Reduction Act Statement:** This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

**Estimated Burden Statement:** Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects, (1024-0018), Washington, DC 20503.

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**Steam Locomotive #1385  
North Freedom, Sauk County, WI**

Photos  
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**PHOTOGRAPHS**

1. C&NW Steam Locomotive #1385  
Mid-Continent Railway Historical Society  
North Freedom, Sauk County, Wisconsin  
Photo by John Gruber  
February 1998  
Negative at the State Historical Society of Wisconsin  
View of front of locomotive at North Freedom

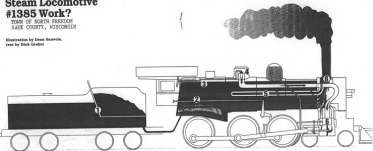
2. C&NW Steam Locomotive #1385  
Mid-Continent Railway Historical Society  
North Freedom, Sauk County, Wisconsin  
Photo by John Gruber  
February 1998  
Negative at the State Historical Society of Wisconsin  
View on station platform at North Freedom

3. C&NW Steam Locomotive #1385  
Mid-Continent Railway Historical Society  
North Freedom, Sauk County, Wisconsin  
Photo by John Gruber  
February 1998  
Negative at the State Historical Society of Wisconsin  
View of tender of locomotive near La Rue, Wisconsin

# What Makes Steam Locomotive #1385 Work?

TOWN OF NORTH FREEDOM  
SAKE COUNTY, WISCONSIN

Illustration by Dean Searns,  
text by Dick Gember



When heated, water turns to an invisible vapor known as steam. The volume of water expands as it turns to steam. The expansion of steam pushes the pistons that connect to the driving wheels that operate the locomotive.

**1** Coal is the fuel used for heating the water. Coal is carried in the tender of the locomotive and shovelled by the fireman into the firebox. Water is carried in the tender in a tank surrounding the coal. The water passes to the locomotive boiler through the injector.

**2** By spreading the coal evenly through the firebox, the fireman creates a hot fire above the grate. Air flows up

through the grate, allowing the coal to burn. Water surrounds the firebox. The hot gases released from the coal flow up around the ashtray and forward through a series of flues and tubes.

**3** Water surrounds the outside of the firebox and is heated to extreme temperatures. As water turns to steam it rises to top of the boiler. The entire firebox and tubes are the steam generator.

**4** The steam gallery of the steam chest, the regulator regulates the amount of steam being used with the throttle. A throttle lever in the cab opens and closes the throttle valve in the steam chest. The steam is released into the regulator valve and then on to the piston valves.

**5** The boiler contains small tubes and larger flues surrounded by water. Inside the tubes and flues carry hot gas from the firebox in the combustion. The steam on its way from the steam chest to the pistons is moved through the superheating tubes. The superheater tubes run back into the boiler within the larger flues and the additional exposure to the hot gas heats the steam even farther. The boiler or "superheater" steam has greater expansion and is more powerful.

**6** Superheated steam leaves the boiler and travels to the piston valves where it is admitted into the pistons. The regulator controls the direction of piston travel from the cab. Steam is admitted from either side of the piston.

**7** As the steam is admitted from the piston valve to the cylinder, it expands pushing the piston the other direction. At the end of the piston stroke, an exhaust port opens and the steam is allowed to escape. From the piston it is reversed and expanded. Pistons push the rods connected to the drive wheels, allowing the locomotive to move.

**8** The steam is exhausted through a stack and up through the smokebox into the stack. The steam exhaust creates a draft or vacuum that pulls the hot gas from the firebox through the tubes and flues. Both exhausted steam and coal smoke travel up through the stack.

STEAM LOCOMOTIVE #1385  
 TOWN OF NORTH FREEDOM, SAUK COUNTY, WI  
 FORM NO. \_\_\_\_\_

**DIMENSIONS AND CLASSIFICATION**

OF

**LOCOMOTIVES**

OF THE

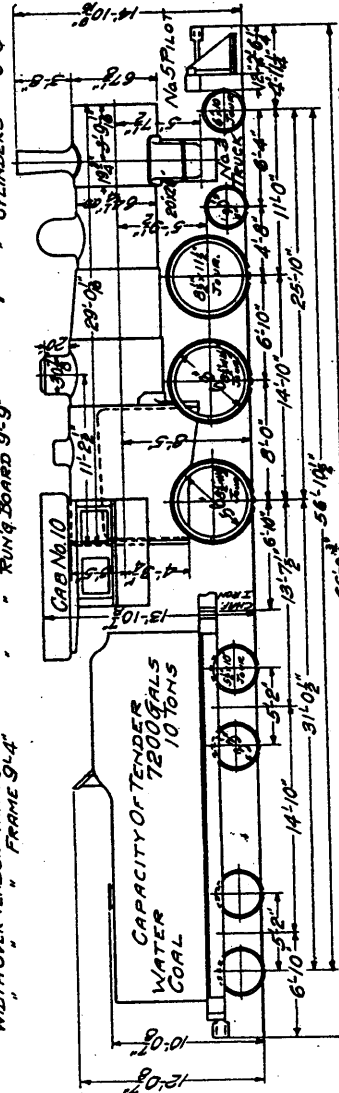
**CHICAGO AND NORTH WESTERN  
 RAILWAY CO.**

ISSUED DECEMBER 18, 1913

**CLASS 'R'**

TRACTIVE POWER 85 PERCENT 20,600 LBS. FACTOR OF ADHESION 4.57  
 WIDTH OVER BUMPER BEAM 10'-0" CYLINDERS 9 1/2"  
 WIDTH OVER CAB 9'-8" RUN & BOARD 9'-9"

WIDTH OVER TENDER TANK 9'-4" FRAME 9'-4"  
 CAPACITY OF TENDER 7200 GALS  
 WATER 10 TONS  
 COAL



STEAM PRESSURE	190 LBS.	HEATING SURFACE	66'-0"	WEIGHT OVERDRIVERS LOADED	121,750 LBS.
FIRE-BOX LENGTH INSIDE	102 1/8"	TUBES	2086 sq. ft.	" TRUCK	34,950 "
FIRE-BOX WIDTH	40 1/4"	ARCH TUBES	1331	" ENGINE	156,700 "
TUBES NUMBER	289	FIRE-BOX	15641	" TENDER	133,810 "
LENGTH	14'-2"	TOTAL	2286 sq.	" ENGINE & TEN.	290,510 "
" DIAMETER	2"	GRATE AREA	2004	" ENGINE LIGHT	136,350 "
ENGINE WILL TAKE CURVE OF 19° OR 30 FT. RADIUS [MINIMUM]				" TENDER	53,810 "

STEAM LOCOMOTIVE #1385  
TOWN OF NORTH FREEDOM  
SALE COUNTY, WISCONSIN

