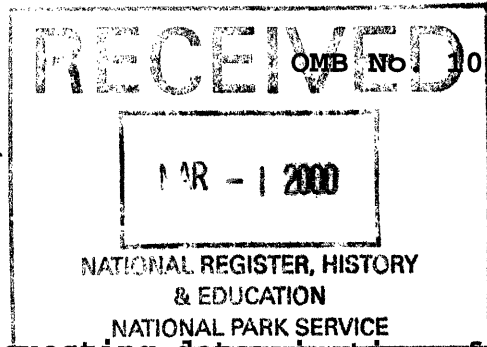


United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM



OMB No. 1024-0018

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 any 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 Million Dollar Bridge

other names/site number Miles Glacier Bridge
AHRS Site No. COR-00005

=====
2. Location
=====

street & number Mile 48, Copper River Highway

not for publication n/a

city or town Cordova vicinity X

state Alaska code AK county Valdez-Cordova code 261

zip code 99574

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Million Dollar Bridge

Valdez-Cordova, Alaska

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, 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 [X] statewide [] locally. ([] See continuation sheet for additional comments.)

[Signature]
Signature of certifying official

2-16-00
Date

Alaska
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 commenting or other official

Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:

- [X] entered in the National Register [] See continuation sheet.
[] determined eligible for the National Register [] See continuation sheet.
[] determined not eligible for the National Register
[] removed from the National Register

[Signature] 3/31/00

other (explain):

[Signature]
Signature of Keeper Date of Action

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Million Dollar Bridge
Valdez-Cordova, Alaska

=====

5. Classification

=====

Ownership of Property (Check as many boxes as apply)

- private
- public-local
- public-State
- public-Federal

Category of Property (Check only one box)

- building(s)
- district
- site
- structure
- object

Number of Resources within Property

Contributing	Noncontributing
<input type="checkbox"/>	<input type="checkbox"/> buildings
<input type="checkbox"/>	<input type="checkbox"/> sites
<input type="checkbox"/>	<input type="checkbox"/> structures
<input type="checkbox"/>	<input type="checkbox"/> objects
<input type="checkbox"/>	<input type="checkbox"/> Total

Number of contributing resources previously listed in the National Register 0

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.) n/a

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Million Dollar Bridge
Valdez-Cordova, Alaska

=====
6. Function or Use
=====

Historic Functions (Enter categories from instructions)

Cat: Transportation Sub: rail-related

Current Functions (Enter categories from instructions)

Cat: Transportation Sub: road-related (vehicular)

=====
7. Description
=====

Architectural Classification (Enter categories from instructions)

Other: Pennsylvania Through Truss

Materials (Enter categories from instructions)

foundation concrete
roof n/a
walls n/a

other iron, steel

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

The Million Dollar Bridge, constructed in 1909 and 1910, consists of four spans of Pennsylvania through trusses. The bridge spans the Copper River at mile 48 of the Copper River Highway, formerly at mile 49 of the Copper River and Northwestern Railway. The 196-mile long railroad followed the Copper River from Cordova (mile 0) to Chitina (mile 130), then turned east to the Kennecott Copper Corporation's townsite (mile 196) in the Wrangell Mountains. The bridge is at the northern end of the Copper River delta, where the Copper River is one channel in a relatively flat floodplain. The northern bank of the Copper River at this location is the face of Childs Glacier. At an oblique angle above the face of Childs Glacier, along the opposite river bank, is the 300-foot high face of Miles Glacier. The engineers selected a route that would run along the banks of the Copper River opposite the face of each of the glaciers. They designed the Million Dollar Bridge to span the river in front of the glaciers.

Beginning in August 1907, engineers studied the air, water, and riverbed temperatures, ice conditions, river levels, size of icebergs calving from Miles Glacier, and the weather, to help develop engineering standards and construction plans to bridge the Copper River. Chief Engineer E.C. Hawkins designed the bridge with four steel spans, set upon piers constructed on caissons sunk deep into the river bed to a stable layer of boulders and cemented sand. The engineers designed detached icebreakers to be anchored in the riverbed in the channel above piers 1 and 2. They would provide the piers maximum protection from battering by icebergs.

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8. Statement of Significance

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

Criteria Considerations (Mark "X" in all the boxes that apply.) n/a

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

Areas of Significance (Enter categories from instructions)

Transportation
Engineering

Period of Significance 1910-1938

Significant Dates 1910

Significant Person (Complete if Criterion B is marked above)

n/a

Cultural Affiliation n/a

Architect/Builder

Katalla Corporation, contractor-builder;
O'Neel, A.C., bridge engineer; Hawkins, Erastus
Corning, chief engineer; Carnegie Steel Com-
Pany, steel producer; American Bridge Company,
steel fabricator

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Million Dollar Bridge
Valdez-Cordova, Alaska

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9. Major Bibliographical References
=====

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

Alaska Department of Transportation and Public Facilities. Files of the bridge design section, 1960 to present. Juneau, Alaska.

Alaska Sportsman. "March in Alaska's History" (March 1965).

Beach, Rex. *The Iron Trail*. New York: Burt Company, 1913.

Brooks, Alfred H. Railway Routes in Alaska. Paper presented at the annual meeting of the Association of American Geographers, New York, January 1, 1907. Later published in *National Geographic*.

Ellis, Carlye. "It Had to be Done," *The Technical World Magazine*, XVII (March 12, 1912).

Engineering Record. "The Copper and Northwestern Railway," 61:4 (January 23, 1910); "Pneumatic Caisson Piers in Alaska," 61:17 (April 23, 1910); "The Copper River Bridge Piers," 61:20 (May 1910), "Perilous Bridge Erection," 62:3 (July 10, 1910); "The Miles Glacier Bridge," 62:6 (August 10, 1910); "Incidents in the construction of the Miles Glacier Bridge," 62:27 (December 31, 1910).

Janson, Lone E. *The Copper Spike*. Anchorage: Alaska Northwest Publishing Company, 1975.

Johansen, Woodrow. "The Copper River and Northwestern Railroad," *Northern Engineer*, 7:2 (Summer 1975).

Know, Robert G. "The Epic Copper River Highway Drama," *Alaska Construction and Oil Report* (June 1967).

O'Neel, A.C. and E.C. Hawkins, Copper River Bridge Near Miles Glacier: Engineers Report 1019, 1910. On file at Alaska Department of Transportation and Public Facilities, Juneau, Alaska.

Quinn, Alfred O. *Iron Rails to Alaskan Copper: The Epic Triumph of Erastus Corning Hawkins*. Whiteface, New York: D'Aloquin Publishing Company, 1995.

Railway Ages Gazette, "Construction of the Copper River & Northwestern" (February 12, 1912): 191-197.

Secretary of the Army. *Copper River and Gulf Coast, Alaska*. Interim Report by the Chief of Engineers, July 29, 1952. House Document No. 182. Washington, D.C.: U.S. Government Printing Office, 1953.

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Million Dollar Bridge

Valdez-Cordova, Alaska

Storey, Christine A. *American Historic Engineering Report: Million Dollar Bridge.* Fairbanks: Alaska Department of Transportation and Public Facilities and the Federal Highway Administration, 1996.

Storm, L.W. "Copper River and Northwestern Railroad, Alaska," *Engineering and Mining Journal* (July 9, 1910).

Tower, Elizabeth A. *Big Mike Heney: Irish Prince of the Iron Trails.* Anchorage, Alaska: Privately printed, 1988.

Willey, Day Allen. Railroad Building in Alaska: A Remarkable Railway Engineering Feat," *Scientific America*, supplement (July 13, 1917).

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 # AK-10

Primary Location of Additional Data

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other

Name of repository: Bridge Design, Alaska Department of Transportation and Public Facilities, Juneau

10. Geographical Data

Acreege of Property less than one

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

	Zone	Easting	Northing	Zone	Easting	Northing
1	<u>06</u>	<u>623299</u>	<u>6728324</u>	3	_____	_____
2	_____	_____	_____	4	_____	_____
	<u>See continuation sheet.</u>					

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Million Dollar Bridge

Valdez-Cordova, Alaska

Verbal Boundary Description (Describe the boundaries of the property.)

The Million Dollar Bridge is in the northeast quarter of the southwest quarter of Section 7, Township 14S, Range 4E, Copper River Meridian.

Boundary Justification (Explain why the boundaries were selected.)

The boundaries include the four spans of the bridge and the icebreakers that have historically been associated with the bridge.

11. Form Prepared By

name/title Christine A. Storey, Environmental Analyst

organization Alaska Department of Transportation and Public Facilities

date July 30, 1999

street & number 2301 Peger Road

telephone 907-451-5293

city or town Fairbanks **state** AK **zip code** 99709-5399

Additional Documentation

Submit the following items with the completed form:

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 the SHPO or FPO.)

name State of Alaska, Department of Transportation and Public Facilities

street & number 3132 Channel Drive

telephone 907-465-3900

city or town Juneau **state** AK **zip code** 99801-7898

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Million Dollar Bridge
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The bridge, the longest of the Copper River and Northwestern Railway bridges, is 1,550 feet long and rises thirty feet above high water. The four Pennsylvania through trusses measure, from south to north, 400 feet, 300 feet, 450 feet, and 400 feet. Three concrete piers support the trusses. The piers have pneumatic caisson foundations sunk forty to sixty feet. They, along with the icebreakers, are reinforced with 56-pound armor rail on 24-inch centers. Each pier is a solid six-sided mass of reinforced concrete and is 55 feet high. Each is 64 feet long and 21 feet wide at the base and 45 feet long and 13 feet wide at the coping. The icebreakers, resembling pyramids, are upstream from piers 1 and 2. Each is 58 feet long, 33 feet wide, and 28 feet high.

In 1938, the Kennecott copper mines closed and the corporation abandoned the railroad. The railbed was stripped of its rails and used as a pioneer road. In 1961, the state transportation department decked the Million Dollar Bridge with a reinforced concrete slab. The March 27, 1964 earthquake caused heavy damage to the bridge. Span 3 unbolted and shifted north 12.5 feet and east 4.5 feet, damaging the bottom chord. The upper portion of pier 3 was offset three feet from the bottom portion. Span 4 sheared and fell into the river at its riverbank end. The rivet heads on abutment 2 were sheared, breaking the concrete.

In 1973, the Alaska Department of Highways constructed a ramp from span 3 to span 4. Several members, sway bearings between the upper chords, and two panels of top laterals were removed from the southern end of span 4 so vehicles could clear the span. Flood waters took out the eastern false bent of span 3 in fall 1995, and the Alaska Department of Transportation and Public Facilities repaired it the following year.

Although no longer a railroad bridge, the Million Dollar Bridge retains its location and setting and much of its original material. One still gets a sense of the scale of the Copper River and Northwestern Railway project and an understanding of the challenge bridging the river between two active glaciers presented to the engineers.

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Million Dollar Bridge
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Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

The Million Dollar Bridge was constructed in 1909-1910. It is the longest of the steel bridges on the 196-mile Copper River and Northwestern Railway constructed from tidewater to access the rich Kennecott copper deposits in the Wrangell Mountains. The bridge and the railroad were significant engineering accomplishments, overcoming topographic, geologic, and hydrologic barriers. Construction of the railroad began in 1908. It took three years to complete the project, at a cost of \$23,500,000. The builders spent \$1,424,775 to construct the Million Dollar Bridge, which explains the bridge's name. Bridging the Copper River at the mouth of Miles Lake required a structure that could withstand battering from icebergs calving off nearby Miles Glacier and a hostile environment that included high velocity winds and thick river ice. The bridge has four spans of Pennsylvania through trusses, designed for the heavy weight of trains. The railroad maintained the bridge until the Kennecott Copper Corporation ceased operations in 1938 and abandoned the railway route.

Historic background

Daniel Guggenheim and J.P. Morgan acquired controlling interests in the Bonanza Ridge copper deposits in the Wrangell Mountains in 1905. They organized under the name Alaska Syndicate to extract the ore. The Syndicate's plans included building a railroad from tidewater to a mill site near the copper mines, developing the Bering River coal fields, and building a smelter on the Copper River delta. The Syndicate eventually chose Cordova as the railroad terminus. Prior to choosing Cordova, the Syndicate abandoned Valdez as the railroad head in favor of Katalla because it was closer to the Bering River coal. In 1906, President Theodore Roosevelt closed the coal fields to entry as part of a national debate over development of federal lands. The company never built the smelter.

Alaska Syndicate crews surveyed the Copper River route in 1904, but did not file for right-of-way because they believed that the Childs and Miles glacier choke point was impassable. Michael J. Heney, builder of the White Pass and Yukon Railway from Skagway to Whitehorse, determined otherwise. His surveys in 1905 ascertained that the Copper River slowed between the two glaciers on a S type curve, and that the glacial moraines were skewed somewhat. He believed a bridge could span the river at the midpoint of the S curve. Beyond this section and through the canyon, the route provided flatter grades and lesser curves than other proposed routes to the copper deposits.

Heney filed for the right-of-way with the General Land Office in Juneau and began constructing a railroad from Cordova. He gambled that the Alaska Syndicate would buy him out, and insured his investment by wiring Abercrombie Canyon with dynamite to ward off competitors. The Syndicate paid Heney \$250,000 for the right-of-way through the canyon, and resumed construction from Katalla. In November 1906, President Theodore Roosevelt closed the Bering River coal fields to entry and a winter storm destroyed the Katalla sea wall, dooming Katalla as a reliable port. The Alaska

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Syndicate moved its terminus to Cordova. It hired Heney as general contractor, and his chief engineer, E.C. Hawkins. Hawkins supervised construction of the steel bridges for the Katalla Corporation, a subsidiary of the Alaska Syndicate, and A.C. O'Neel was the Bridge Engineer responsible for construction of the steel bridges. Assistant Bridge Engineer A.O. Johnson selected the site for the Million Dollar Bridge crossing near Miles and Childs glaciers in 1907.

The engineers designed the Million Dollar Bridge to withstand the weight of two fully-loaded ore trains meeting on the bridge. It was also designed to withstand the high velocity winds tunneling down the Copper River, the huge icebergs calving from Miles Glacier, and the river ice that was generally eight to nine feet thick. They elected to build a truss bridge.

During construction, the advancement of Miles Glacier was calculated at 48 inches per day (most glaciers advance at one to two inches per day). This constricted the river's channel and raised the level of the water in the river. In the spring, crews chipped ice to keep the piers free of ice. The average wind speed during construction was 59.4 miles per hour. Temperatures were often below zero, and rain and snow were frequent. To ensure the curing of the concrete for the piers and icebreakers, water was heated to 110° F. and the sand and gravel mixture to 100° F., so that it could be poured at about 70° F.

A national magazine, the *Engineering Record*, ran articles throughout 1910 describing construction of the bridge. One article reported that while working on caisson 3 the river began to rise and glacial calving increased. The working chamber was sealed and crews hooked up the air hose and began to lower the caisson. Simultaneously, calving from Miles Glacier caused wave action three miles away that washed the caisson off its crib and carried it eighteen feet. Fortunately, cables anchored on shore saved the caisson from being completely lost. Construction of the Million Dollar Bridge was so hazardous the company gave each worker a \$100 bonus and the foreman \$1,000 upon its completion. Daily supply trains began using the Million Dollar Bridge on June 1, 1910.

The U.S. Government engineers used some of the techniques pioneered for construction of the Million Dollar Bridge when it built the Alaska Railroad from Seward to Fairbanks between 1915 and 1923. Other engineering concepts and practices used today in construction throughout Alaska came out of the experience of constructing the Million Dollar Bridge. They include the practice of setting foundations in frozen ground, pouring heated concrete using steam coils to control setting temperatures, and continuing construction through the subarctic winter.

The Copper River and Northwestern Railway used the bridge until operations ceased in 1938. It was modified to serve as a highway bridge in the 1940s. The 1964 earthquake caused substantial damage to the bridge, but it still stands and continues to be used to cross the Copper River. It stands as a testament to early twentieth century transportation development to tap Alaska's mineral wealth.

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Valdez-Cordova, Alaska

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NPS Form 10-900-a
(8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET

Section Photograph identification

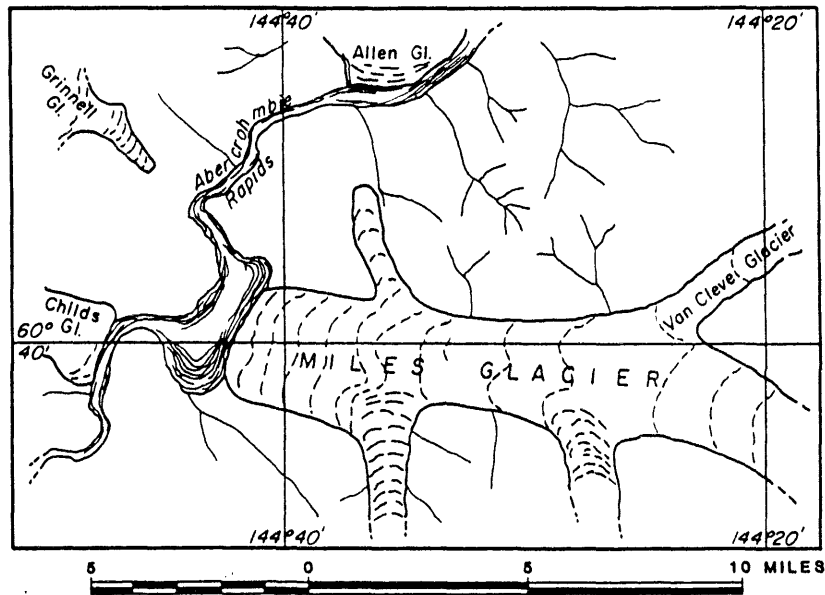
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1. Million Dollar Bridge
Valdez-Cordova, Alaska
Christine A. Storey
1997
Alaska Department of Transportation and Public Facilities, 2301 Peger
Road, Fairbanks, AK 99709-5399
Looking north at the bridge

2. Million Dollar Bridge
Valdez-Cordova, Alaska
Christine A. Storey
1997
Alaska Department of Transportation and Public Facilities, 2301 Peger
Road, Fairbanks, AK 99709-5399
Looking southwest at the bridge

3. Million Dollar Bridge
Valdez-Cordova, Alaska
Christine A. Storey
1997
Alaska Department of Transportation and Public Facilities, 2301 Peger
Road, Fairbanks, AK 99709-5399
Detail of reinforced pier 3

4. Million Dollar Bridge
Valdez-Cordova, Alaska
Christine A. Storey
1997
Alaska Department of Transportation and Public Facilities, 2301 Peger
Road, Fairbanks, AK 99709-5399
Detail of treaded tension bar on the bottom chord of span 3



Glacial Choke-point on Copper River
-before 1949-