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United States Department of the Interior
National Park Service

National Register of Historic Places
Registration Form

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 Ten Mile Creek Bridge No. 01181

other names/site number _____

2. Location

street & number Oregon Coast Highway No. 9 (US 101), MP 171.44 not for publication _____

city or town Yachats vicinity X

state Oregon code OR county Lane code 039

zip code 97498

3. State/Federal/Tribal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this 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 meets does not meet the National Register Criteria. I recommend that this property be considered significant nationally statewide locally. (See continuation sheet for additional comments.)

James Hamrick 14 June 2005
Signature of certifying official / Deputy SHPO Date

Oregon State Historic Preservation Office
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:

entered in the National Register Edson Beall 8/5/05
 See continuation sheet.

determined eligible for the National Register _____
 See continuation sheet.

determined not eligible for the National Register _____

removed from the National Register _____

other (explain): _____

[Signature] _____
Signature of Keeper Date of Action

5. Classification

Ownership of Property

(Check as many boxes as apply)

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

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing _____ _____ <u> 1 </u> _____ _____	Noncontributing _____ buildings _____ sites _____ structures _____ objects _____ Total
--	---

Category of Property

(Check only one box)

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

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)

C. B. McCullough Major Oregon Coast Highway Bridges, 1927-36.

6. Function or Use

Historic Functions

(Enter categories from instructions)

Transportation

Historic Subfunctions

(Enter subcategories from instructions)

Road-related

Current Functions

(Enter categories from instructions)

Transportation

Current Subfunctions

(Enter subcategories from instructions)

Road-related

7. Description

Architectural Classification

(Enter categories from instructions)

Late 19th and 20th Century Revivals
 Classic Revival
 Modern Movement
 Art Deco

Materials

(Enter categories from instructions)

Foundation
 Other
 Concrete
 Steel
 Concrete

Narrative Description

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

See continuation sheets.

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.)

- 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)

Engineering
Transportation.

Period of Significance

1931

Significant Dates

Completed in 1931.

Significant Person

(Complete if Criterion B is marked above)

Cultural Affiliation

Architect/Builder

Conde B. McCullough, designer
Union Bridge Company, Portland, Oregon, contractor

Narrative Statement of Significance

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

See continuation sheets.

9. Major Bibliographical References

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

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 DataAcreage of Property 0.25 acres**UTM References**

(Place additional UTM references on a continuation sheet)

1	10	411460	4897167	3	
	Zone	Easting	Northing		Zone/Easting/Northing
2				4	

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 Byname/title Robert W. Hadlow, Ph.D., Senior Historianorganization Oregon Department of Transportation date June 30, 2004street & number 123 NW Flanders Street telephone (503) 731-8239city or town Portland state OR zip code 97209-4037**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 the SHPO or FPO.)

name Oregon Department of Transportation

street & number 355 Capitol Street NE telephone _____

city or town Salem state OR zip code 97301

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 the 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 Project (1024-0018), Washington, DC 20503

United States Department of the Interior
National Park Service

**NATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEET**

Section 7 Page 6

Ten Mile Creek Bridge No. 01181

Name of Property

Lane County, Oregon

County and State

Narrative Description

Ten Mile Creek Bridge No. 01181 is a reinforced-concrete through tied-arch structure. It spans Ten Mile Creek at milepost 171.44 the Oregon Coast Highway No. 9 (US 101). The bridge is located about seven miles south of Yachats and about seven miles north of Heceta Head Lighthouse, and is in Lane County, Oregon.

The bridge consists of one 30-foot reinforced-concrete deck-girder span on each end of a 120-foot reinforced-concrete tied arch of elliptical shape. Overall length is 180 feet. The roadway, curb-to-curb, is 27 feet, with two travel lanes. Sidewalks are 7 feet wide. Piling for the piers averaged 17 feet deep. Forty piles were driven for pier one and 56 for pier 2. Arch ribs are 3'-6" wide by 2'-8" thick at the crown and 3'-6" thick at the springline. Reinforcing included 1 1/8" square steel bar in the ribs. In addition, 1 1/4" square reinforcing bar was used at the ends of the ribs and fanned out diagonally into the floor of the deck to transmit the thrust of the arch ribs into the 12-inch-thick slab. A temporary "Considère" hinge was used near the crown of each arch rib to aid in construction.¹

The bridge has an ensemble of architectural elements that combines classical and Art Deco details.. Ornate curved elbow bracketing support the sidewalks. The balustrades are made up of beveled, one-foot-wide concrete railing caps set on pre-cast semicircular-arched panels. Posts are regularly spaced along the balustrade. Slender concrete hangers, with a thickness of 5 inches and placed at 12-foot intervals suspend the road deck from the arch. Reinforced-concrete cross-bracing between arch ribs maintains rigidity of the superstructure. The approach spans have flattened arch curtain walls.

The Union Bridge Company, of Portland, completed the Ten Mile Creek Bride in 1931² It has required minimal maintenance since completion in 1931. A rehabilitation project on Big Creek Bridge in 1998 modified the "X" bracing between the arch ribs, at the portals, to increase vertical clearance above the deck. The same work was completed on Ten Mile Creek Bridge in 2000. In it, the bottom legs of the X's were removed and a horizontal member installed in their place. This effectively altered the X form into a "lazy K" and created uniform vertical clearance from curb to curb. This alteration to the bridge was carried out in consultation with the Oregon State Historic Preservation Office.

¹"Bridge Inspection Report for 14 October 1931," Wilson River Bridge (No. 1499), Maintenance Files, Bridge Section, Highway Division, ODOT.

²Job Records for Wilson River Bridge (No. 1499), Big Creek Bridge (No. 1180), and Ten Mile Creek Bridge (No. 1181), Bridge Section, Highway Division, ODOT.

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National Park ServiceNATIONAL REGISTER OF HISTORIC PLACES
CONTINUATION SHEETSection 8 Page 7Ten Mile Creek Bridge No. 01181

Name of Property

Lane County, Oregon

County and State

Narrative Statement of Significance

The Ten Mile Creek Bridge No. 01181 is being nominated under the C. B. McCullough Major Oregon Coast Highway Bridges Multiple Property Submission. It is significant under National Register criterion C because it embodies the distinctive characteristics of a type, period, and method of construction for mid-twentieth-century reinforced-concrete arch bridge technology. Ten Mile Creek Bridge is one of the first reinforced-concrete tied-arch spans in the Pacific Northwest region of the United States. Just as important, it significant under criterion C as the work of a master, Conde B. McCullough, Oregon state bridge engineer from 1919 to 1936. The bridge has a strong thematic association with the design and construction of several other major steel and reinforced-concrete bridges designed by McCullough and erected along the Oregon Coast Highway No. 9 (US 101) in the 1920s and 1930s. The bridge is also significant under criterion A for its association with construction of the Oregon Coast Highway, which eventually ran the length of Oregon and connected with adjacent segments in California and Washington. The road would not have been completed without eleven major bridges, including the Ten Mile Creek Bridge, and many other spans.³

The reinforced-concrete tied arch is an adaptation of the "bowstring arch-truss" that Squire Whipple developed in 1841. Iowa bridge engineer James B. Marsh first expressed it in a concrete form as one of the variations of the "rainbow arch" bridges that he designed and popularized in the 1910s and 1920s throughout the American prairie states. McCullough worked for Marsh in 1910 when he was first constructing these concrete and angle steel bridges throughout the mid-section of the country.

McCullough chose concrete over other materials for the span because of its proximity to the ocean's corrosive salt air. His experience with Marsh Engineering influenced his decision to use the through tied arch form for the Ten Mile Creek crossing. Previously, he had created an identical span for the Wilson River crossing just north of Tillamook. After designing the Ten Mile Creek Bridge, he chose the same span for Big Creek, four miles to the south on US 101. All three bridges were sited at lowland coastal locations that provided inadequate foundation conditions for laterally-stressed abutments. The high water during flood periods and extreme tidal conditions at these locations required that any bridge have minimum profile supporting piers.

The theory behind the tied arch is that, unlike more traditional fixed through arches, the ends of the ribs were not integral parts of the piers, where their horizontal thrust action was contained by the mass of the piers. The tied arch configuration removed lateral stresses from the arch ends, so there was no need for the usual massive abutment structures. In McCullough's spans, the ends of the arch ribs were connected to the deck by hinged shoes and rebar, much like a bow is pulled taught and tied off with a string. The deck, like the string with the bow, holds the arch's thrust. Lateral forces were balanced within the structure itself, with the bridge loads transmitted vertically through the piers. This allowed for the narrow, low mass pier design that was ideal for the flood-prone area at the bridge site.

McCullough differed from his mentor, Marsh, in that he used reinforcing bar instead of steel plate in his arches. His particular adaptation of the tied arch design was credited in the technical literature as having the unique feature of using the bridge deck slab itself as the "tie" structural member, rather than steel girders. Another key to the success of McCullough's reinforce-concrete through tied arch was his use of French engineer Armand Considère's hinge, or articulation point, in the arch ribs. It consisted of bent reinforcing bar bundled with steel hoops to resemble an hour glass. Considère's

³A Historic American Engineering Record inventory of bridges in the state of Washington, completed in 1980, suggested that there are reinforced-concrete tied-arch spans in that state that date from the mid-1920s. In particular, the report mentioned the 1923 Indian Timothy Memorial Bridge, the 1923 Goldsborough Creek Bridge, and the 1924 North and South Hamma Hamma River bridges. Contact by the author of this nomination with Al Mix, a structural engineer with the Bridge and Structures Section of the Washington State Department of Transportation, in Olympia, confirmed assumptions that the Duckabush River Bridge, in Jefferson County is that state's oldest reinforced-concrete tied arch. It was completed in 1934, three years after the Wilson River Bridge at Tillamook. See also, Lisa Soderberg, "Historic Bridges and Tunnels in Washington State," National Register of Historic Places Thematic Nomination (Lacey: Washington State Office of Archaeology and Historic Preservation, 1980).

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CONTINUATION SHEETSection 8 Page 8Ten Mile Creek Bridge No. 01181

Name of Property

Lane County, Oregon

County and State

hinges, placed near the crown of each arch rib eliminated stresses on the span due to shrinkage and dead load during construction. The hinges were encased in high-strength concrete once the ribs bore the span's full weight.⁴

McCullough considered his design and use of a tied arch configuration as an approach to solving the problems of lowland coastal locations to be rare and innovative in the United States. A few years later, he created reinforced-concrete through tied arches using the same design for the main spans for the Alsea Bay Bridge and the side spans for the Siuslaw River Bridge and the Umpqua River Bridge, all on the Oregon Coast Highway.

McCullough's pioneering use of the reinforced-concrete through tied arch has not gone unnoticed. In 1999, in honor of its one hundred twenty-fifth anniversary, the periodical *ENR*, once known as *Engineering News-Record*, published a list of the top people who had made outstanding contributions to the construction industry since 1874. "Their efforts," *ENR* believed, "helped shape this nation and the world . . . by developing new analytical tools, equipment, engineering or architectural design." Ten bridge engineers made the list, and among them was C. B. McCullough. "These leading designers dared to span great lengths," wrote *ENR*, "with the most elegant, constructible and economical solutions possible." The periodical cited McCullough's use of the reinforced-concrete tied arch as his most innovative contribution. He was listed among such engineering greats as Othmar H. Ammann, designer of the George Washington, Bayonne, Triborough, Bronx-Whitestone, Throgs Neck, and Verrazano-Narrows bridges in New York; James Eads, designer of the Eads Bridge over the Mississippi River in St. Louis; Robert Maillart, designer of many early-20th-century reinforced-concrete arch bridges in Switzerland; and David B. Steinman, designer of many significant American suspension bridges, including the St. Johns in Portland, Oregon, the Waldo-Hancock in Maine, and the Mackinac in Michigan.⁵

Ten Mile Creek Bridge is also significant under criterion C as the work of a master, Oregon State Bridge Engineer, Conde B. McCullough, and due to its thematic association with several other major steel and reinforced-concrete bridges designed by McCullough and erected along the Oregon Coast Highway in the 1920s and 1930s. During his years as State Bridge Engineer, and later as Assistant State Highway Engineer, McCullough authored several books and many technical articles on bridge design and construction. He is significant for his use of innovative bridge technology, and for his visually appealing designs. He attained international recognition for the large-scale structures he designed to span the major rivers and estuaries, and several other thematically-similar concrete arch, beam and girder structures, along the Oregon Coast Highway.

McCullough's bridges also had in common design themes and elements executed in classical, Gothic, and Art Deco/Moderne styles. They are evident on sidewalk railing balustrades; bracketing; arched curtain walls, entrance pylons, columns, stringers, piers, staircases, and other structural members. Eric N. DeLony, chief of the Historic American Engineering Record, remarked in his book, *Landmark American Bridges*, that this family of spans on the Oregon Coast Highway "represents some of the best and most innovative concrete and steel bridges in the world." The Yaquina Bay Bridge represents the pinnacle of McCullough's use of Gothic and Art Deco/Moderne architectural elements. The Gothic arch forms seen in the handrails and piers complement the Art Deco verticalness seen in the pier legs, entry pylons, and flowing staircases to create a streamlined elegance.⁶

Ten Mile Creek Bridge is significant under criterion A because of its association with construction of the Oregon Coast Highway in the 1930s. Completion of the Oregon Coast Highway was a major public works effort in the early and mid-1930s that sought to establish an uninterrupted coastal transportation route from California to Washington. The effort was aided in

⁴Conde B. McCullough, "Design of a Concrete Bowstring-Arch Bridge, Including Analysis of Theory," *Engineering News-Record*, 27 August 1931, 337.

⁵See "Top People of the Past 125 Years," *ENR*, 30 August 1999, 27 (quote), 47-48.

⁶Eric DeLony, *Landmark American Bridges*, (New York: American Society of Civil Engineers and Bulfinch Press, 1993), 125-35 (quote, 125); Elizabeth Shellin Atly, "C. B. McCullough and the Oregon Coastal Bridges Project," TMs, 1977, 12-14, copy held by author.

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Section 8 Page 9

Ten Mile Creek Bridge No. 01181
Name of Property

Lane County, Oregon
County and State

the years after completion of Ten Mile Creek Bridge by the Oregon Coast Bridges Project in which the federal Public Works Administration provided funds for the construction of five modern bridges to replace the existing slow, cumbersome ferries which serviced the crossings of the larger bays, rivers and estuaries. An immediate accomplishment of the route's completion was the construction jobs that it provided to many unemployed workers. In more long lasting terms, the Oregon Coast Highway became a major factor in the development of commerce and tourism in Oregon's coastal regions, and has since become one of the most notable scenic routes in the United States, and has been designated a National Scenic Byway.

The Ten Mile Creek Bridge meets the property type and registration requirements for the C. B. McCullough Major Oregon Coast Highway Bridges Multiple Property Submission. It was completed during the period of significance (1927-36) on the then current alignment of the Oregon Coast Highway. It was designed by Oregon State Highway Department bridge engineers under the direction of Conde B. McCullough. Its primary or secondary main spans are reinforced-concrete arches. It possesses a high degree of original integrity of design and materials.

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Ten Mile Creek Bridge No. 01181
Name of Property

Lane County, Oregon
County and State

Major Bibliographic References

DeLony, Eric. *Landmark American Bridges*. New York: American Society of Civil Engineers and Bulfinch Press, 1993.

Hadlow, Robert W. *Elegant Arches, Soaring Spans: C. B. McCullough, Oregon's Master Bridge Builder*. Corvallis: Oregon State University Press, 2001.

----- "Wilson River Bridge, HAER No. OR-39, Report." Historic American Engineering Record, National Park Service, 1990.

McArthur, Lewis A.. *Oregon Geographic Names*. fifth edition. Portland: Oregon Historical Society Press, 1982.

McCullough, Conde B. "Design of a Concrete Bowstring-Arch Bridge, Including Analysis of Theory," *Engineering News-Record*, 27 August 1931.

Oregon Department of Transportation. Bridge Section. Job Record Cards. Wilson River Bridge No. 1499, Big Creek Bridge No. 1180, and Ten Mile Creek Bridge No. 1181.

----- Bridge Section Maintenance File #1181.

Smith, Dwight A., James B. Norman, and Pieter T. Dykman. *Historic Highway Bridges of Oregon*. Portland: Oregon Historical Society Press, 1989.

Soderberg, Lisa. "Historic Bridges and Tunnels in Washington State." National Register of Historic Places Thematic Nomination. Lacey: Washington State Office of Archaeology and Historic Preservation, 1980.

"Top People of the Past 125 Years," *ENR*, 30 August 1999.

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**NATIONAL REGISTER OF HISTORIC PLACES
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Section 10 Page 11

 Ten Mile Creek Bridge No. 01181
Name of Property

 Lane County, Oregon
County and State

Verbal Boundary Description

The property is described as beginning at the north end of the Ten Mile Creek Bridge, at mile post 171.44 on the Oregon Coast Highway No. 9, and running 180 feet to the south end of the bridge. It is 60 feet wide (30 feet either side of center line on the bridge).

Boundary Justification

The boundary includes property associated historically with the Ten Mile Creek Bridge.

**United States Department of the Interior
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**NATIONAL REGISTER OF HISTORIC PLACES
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Ten Mile Creek Bridge No. 01181
Name of Property

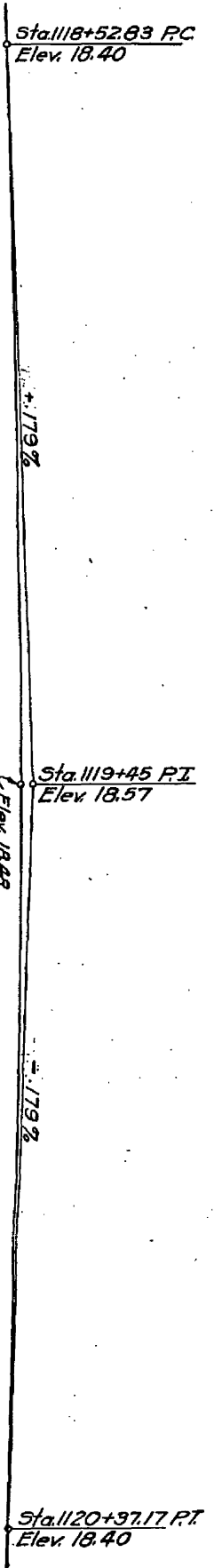
Lane County, Oregon
County and State

Photographs

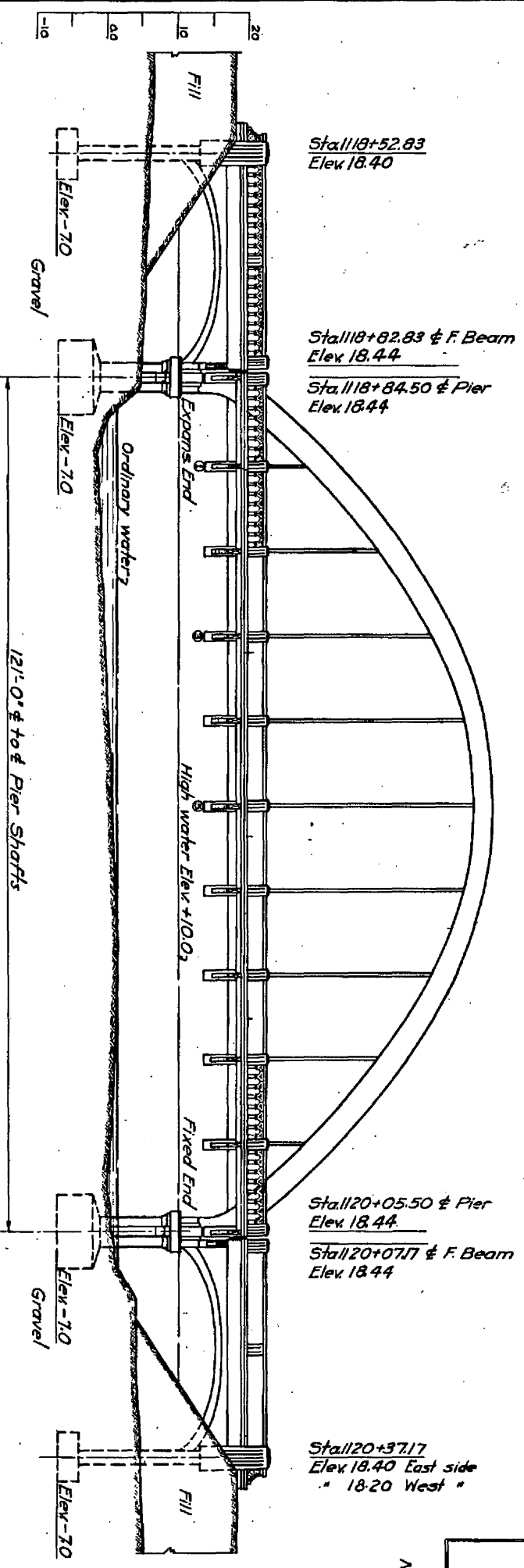
Leslie Schwab, Photographer, July 2004
(Original negatives housed at Oregon Department of Transportation, Salem, Oregon)

Photographic Description

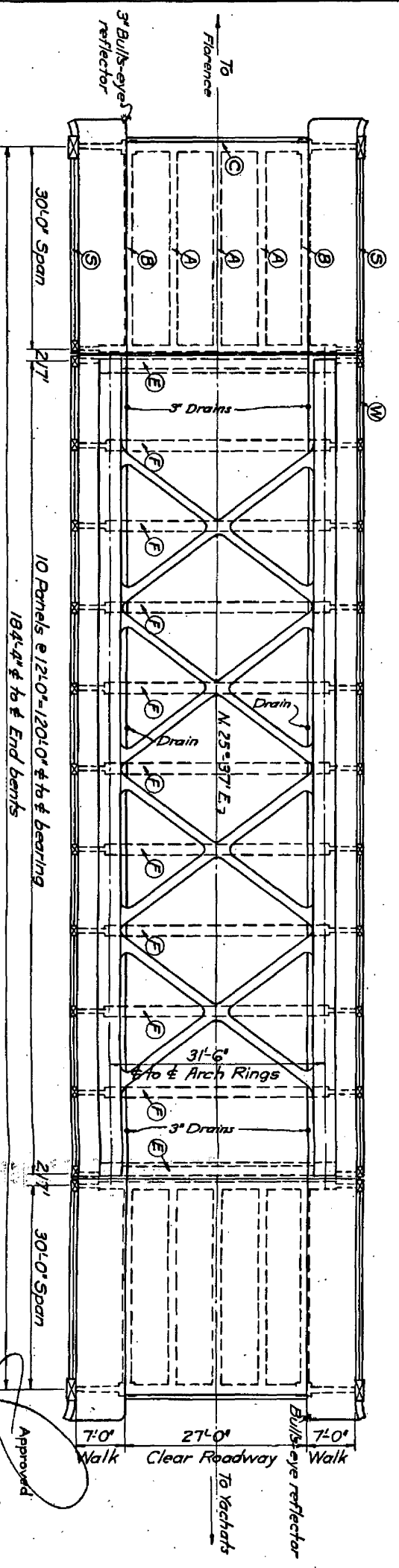
View No.	Description
1	General perspective view of the Ten Mile Creek Bridge, view looking north.
2	Detail view of the Ten Mile Creek Bridge, view looking northeast at the modified "X" bracing and concrete hangers.
3	Detail view of the arch crown.
4	Detail view of the cantilevered deck and transverse beams.
5	Detail view of the decorative concrete arched balustrade railing.
6	Detail view of joint between tied arch span and approach span.



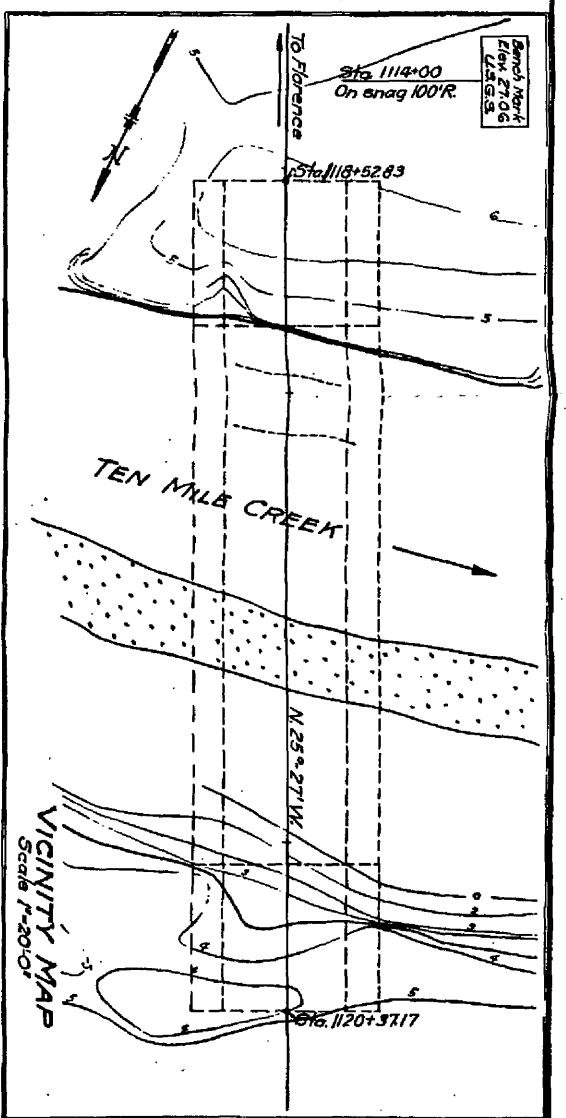
GRADE DIAGRAM — 184.34' VERTICAL CURVE



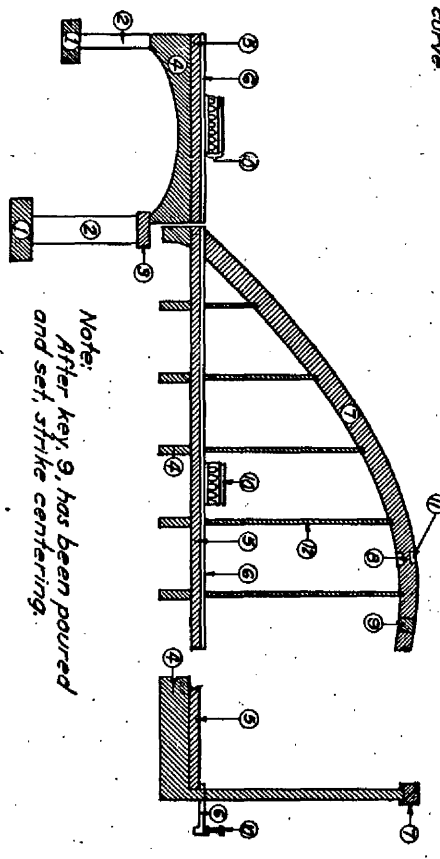
ELEVATION
Scale 1"=10'-0"



PLAN
Scale 1"=10'-0"



Note: Drop slab 2' for runoff on west side as shown. Keep sidewalk and handrail on vertical curve.



POURING DIAGRAM

Note: After key, 9, has been poured and set, strike centering.

GENERAL NOTES:

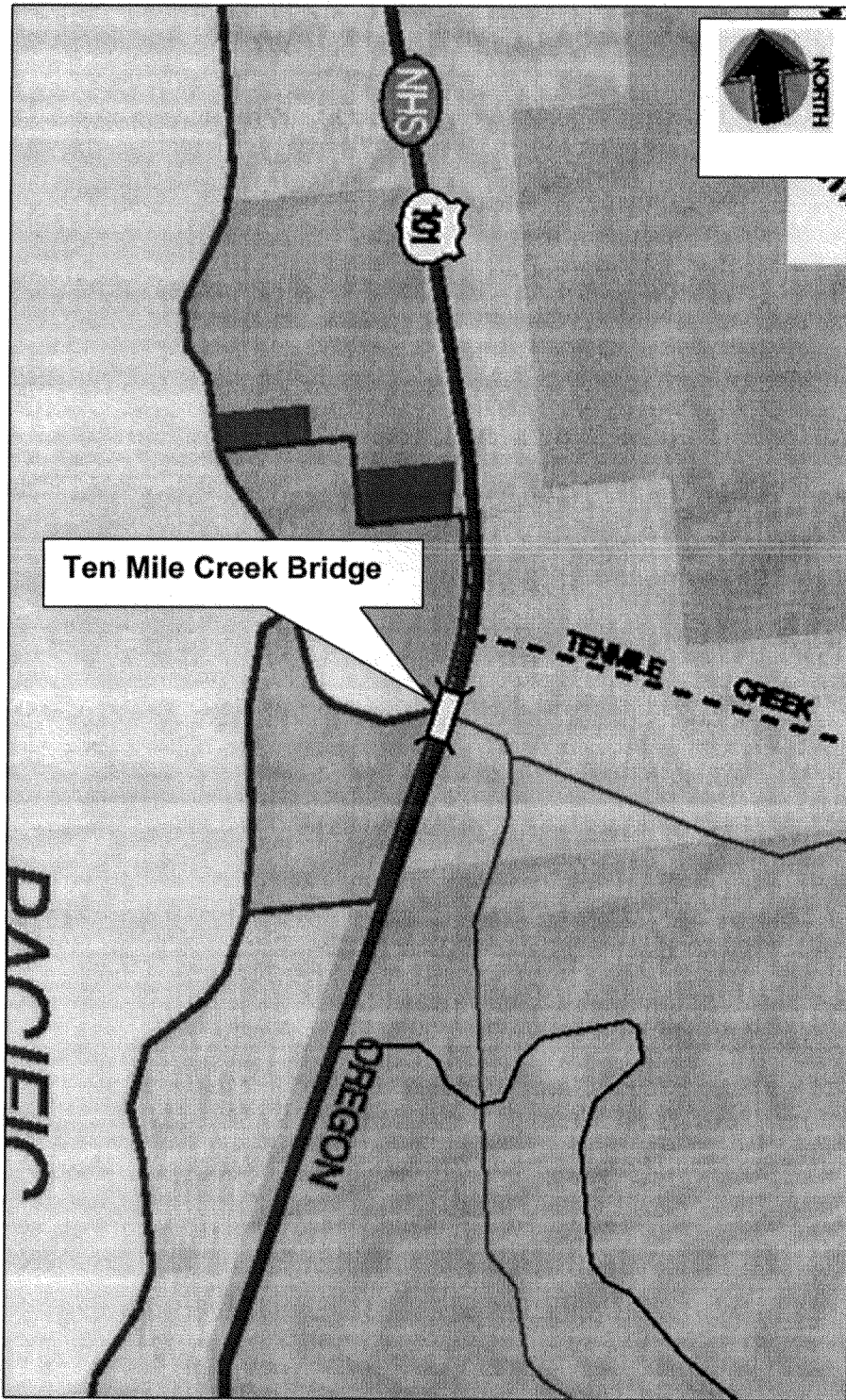
Pier and column footing to be class B concrete. Roadway slab and curb, walk slab and rail base, posts and cop, to be class D concrete. Handrail precast to be as shown on dwg no. 4050. All other concrete to be class A. Footings may be carried deeper than shown if required by the Engineer. All construction joints to be provided with #20ga copper water stops as required by the Engineer. All exposed corners shall have a bevel, unless otherwise noted. All exposed surfaces shall have a carborundum stone finish. All materials and workmanship shall conform to the specifications for the bridges of the Oregon State Highway Commission.

STATE HIGHWAY COMMISSION
OREGON
TEN MILE CREEK BRIDGE
LOCATED AT MILE 9-186.44
ROOSEVELT COAST HWY.
IN
LANE COUNTY

PLAN AND ELEVATION
SCALE AS NOTED
DRAWN BY L.S.S.
DEC. 9, 1930
TRACED BY "
CHECKED BY
ACCOMPANIED BY DWGS. NO. 4146-47-48-49-50 & 4050
SHEET 1 OF 7
BRIDGE NO. 1181
DRAWING NO. 4145

7-27-79 Deck joints raised 1870 @ Pier 1 & 2 (See Dwg No. 33079).
7-79 Deck protection; Asphalt-rubber chip seal (Widened) membrane placed May '79.
Revised Jan. 21, 1931.

Approved: _____
State Highway Engineer



**Ten Mile Creek Bridge No. 01181
MP 171.44, Oregon Coast Highway No. 9
Vicinity of Yachats, Lane County, Oregon**