MISSOURI PACIFIC RAILROAD BRIDGE HAER No. LA-27

(Bridge Recall No. 049130)
Carries U.S. Route 84 (US 84) over Missouri Pacific Railroad
Tullos
LaSalle Parish
Louisiana

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street, NW
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD
MISSOURI PACIFIC RAILROAD BRIDGE
(Bridge Recall No. 049130)

HAER No. LA-27

Location: Carries U.S. Route 84 (US 84) over the Missouri Pacific Railroad at Tullos in LaSalle Parish, Louisiana.

The Missouri Pacific Railroad Bridge is located at latitude 31.826361 north, longitude -92.326861 west.[1] The coordinate represents the southeast corner of the bridge. It was obtained in 2016 by plotting its location in Google Earth. The location has no restriction on its release to the public.

Present Owner: State of Louisiana.

Present Use: Vehicular traffic.

Significance: This reinforced-concrete deck-girder bridge has significance for its association with important trends or events that have made a significant contribution to the broad patterns of Louisiana history. The significance of this grade separation structure is directly related to early initiatives by the state to provide safe railroad-roadway crossings. Beginning in the 1920s, the state placed increased attention on creating grade separations between railway lines and roads and this bridge is an early example of those efforts. Alterations to the bridge include roadway widening with new railing; however, the bridge continues to convey its significance as an early grade separation structure. This bridge is eligible for the National Register under *Criterion A* in the areas of Politics/Government and Transportation.[2]

Historian: Liz Boyer, Cultural Resource Specialist; Mead & Hunt, Inc. (Mead & Hunt); 2017.

Project Information: This documentation was prepared as mitigation to fulfill Stipulation IX.5 of the *Programmatic Agreement Among the Federal Highway Administration, the Louisiana Department of Transportation and Development, the Advisory Council on Historic Preservation, and the Louisiana State Historic Preservation Officer Regarding Management of Historic Bridges in Louisiana*, dated August 18, 2015, and executed September 21, 2015. The Louisiana Department of Transportation and Development (LADOTD) retained Mead & Hunt to prepare this document. It was prepared by cultural resource specialist Liz Boyer of Mead & Hunt. Dietrich Floeter completed the photography.

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[1] The bridge is also known as Structure No. 0220400901.

[2] Mead & Hunt, Inc., *National Register Eligibility Determination Report, Pre-1971 Louisiana Highway Bridges* (prepared for the Louisiana Department of Transportation, September 2013).

Part I. Historical Information

A. Physical History:

1. **Date(s) of construction:** 1932.

2. **Engineer**: Louisiana Highway Commission (LHC).

3. **Builder/Contractor/Supplier:** B.N. Davis, New Orleans.

4. **Original plans and construction:** Photocopies of the original plan sheets are available in the General Files room at the LADOTD's Baton Rouge headquarters. Due to the poor condition of existing microfilm copies of the original as-built plan sheets, the specific designer of the bridge cannot be determined. According to the final tracings dated May 1931 and June 1931, the 40'-0" long central deck girder span was designed using LHC Standard Plan B-2-333, while the other four 30'-0" long deck girder spans were designed using LHC Standard Plan B-2-334. Substructure elements of the bridge did not follow a standard plan and were designed by an LHC employee with the initials "L.D.B." Plans were approved and sealed by Harry B. Henderlite, the State Highway Engineer. The contract for the Missouri Pacific Railroad Bridge was awarded to builder B.N. Davis of New Orleans in 1931.[3] Construction began in 1931 and the bridge was completed in 1932.[4]

5. **Alterations and additions:** LADOTD records indicate the roadway was widened in the late 1950s or early 1960s, although specific project plans for the widening project are not available. The widening project expanded the deck from 24'-0" to 28'-0" wide and the railings were replaced at that time.[5] In addition, the blast plate underneath the main span was removed and guardrail has been added to each end of the bridge and its approaches, but a specific date for these alterations is not known.

B. Historical Context:

Historical background

The Missouri Pacific Railroad Bridge is best understood as part of the LHC initiative taken to ensure the safe crossing of railroad intersections in the 1930s. In the decades prior, the rise in vehicular traffic

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[3] "Louisiana Bridge Contracts Given to Low Bidders," *The Times-Picayune*, July 2, 1931

[4] Louisiana Highway Commission, *Fifth Biennial Report of the Louisiana Highway Commission*, *1930-1932*, (Baton Rouge, La.), 406.

[5] Joseph T. Smith, Structural and Maintenance Engineer, Louisiana Department of Transportation and Development, "Memorandum to Johnson, M.K., Project Control Engineer, regarding 1950s or 1960s roadway widening project for Bridge No. 049130," April 13, 1989.

coupled with poorly marked train crossings, led to increasing numbers of serious accidents.[6] The Missouri Pacific Railroad Bridge represents the LHC's initiative to address this important safety issue through the elimination of railroad grade crossings.

As part of the growth of American railroads after the Civil War, Louisiana railroad lines expanded significantly, in part a response to the developing regional timber industry.[7] Where roads and railroads met there was a danger of collision between trains and horse-drawn vehicles, and later automobiles. Various means were employed to facilitate safe crossings, including employing a watchman or signage or signals; sometimes no safety measures at all were employed.

The safest crossing was one separated by grade or elevation, with the roadway either above or below the railroad. Because it was far easier and cheaper to elevate a road than a railroad, a grade separation almost always meant constructing a vehicular (or pedestrian) bridge over the rail line. Early grade separation structures in the U.S. were concentrated in large industrial cities such as New York City and Buffalo, New York, where heavy traffic justified the cost of separating the two systems. New York City enacted legislation as early as 1903 to begin addressing the safety issue of grade separation of railroad crossings.

The introduction of affordable automobiles coupled with promotion of auto touring and the success of long-haul trucking during World War I put more vehicles on the road. The increase in automobiles and trucks meant more of both roads and railroad crossings. Accident rates at these crossings soared in the 1920s.[8] Improvements in automobile engineering resulted in higher driving speeds of 50 to 60 miles per hour, causing greater impact upon collision with higher fatality and severe injury rates and increased losses in property damages. These accidents often resulted in gruesome scenes that shocked the average citizen reading a newspaper account. After 1929, when the total deaths from motor vehicle accidents topped 30,000 nationwide, efforts were intensified by highway administrators to make travel safer.[9] In the 1920s and 1930s railroad grade crossing accidents were a growing concern for both highway departments and the public.

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[6] American Road Builders Association, "Proceedings, American Road Builders Association, Report of Committee on Highway Intersections and Grade-Crossing Elimination," New Orleans, La., January 11-15, 1937, 76-79.

[7] R. Christopher Goodwin & Associates, Inc., *Transportation in Louisiana* (prepared for Office of Cultural Development, Department of Culture, Recreation, & Tourism, May 2012), 46. http://www.crt.state.la.us/Assets/OCD/hp/nationalregister/historic_contexts/Transportation_in_Louisiana.pdf (accessed October 7, 2016).

[8] Federal Highway Administration, "FHWA Handbook, Railroad-Highway Grade Crossing Handbook," revised second edition, August 2007, http://safety.fhwa.dot.gov/xings/com_roaduser/07010/sec01.htm (accessed May 7, 2016).

[9] American Association of State Highway Officials, *Historic American Highways* (Washington D.C.: American Association of State Highway Officials), 1953, 123.

Through the 1920s railroad grade crossings were largely managed at a municipal or state level, with a percentage of the cost passed on to the railroad. The percentage of railroad share varied from state to state and could be 50 percent or higher. Urban grade separation projects were funded through city/railroad partnerships or city ordinances. In more rural areas the grade separation issue was dealt with by the state highway departments and the railroads.[10] Prior to the enactment of specific legislation to support grade separation projects, progress on addressing this national safety issue was slow due to the prohibitive costs.

Louisiana's naturally flat topography and the established network of rail lines traversing the landscape resulted in a high incidence of railroad grade crossings. The high ground water level throughout the state precluded underpasses as a viable grade separation option. Overpass grade separation structures presented a different kind of challenge, as they required extensive site preparation which resulted in a much higher construction cost. The added expense of earthen embankments, which were engineered to provide the required 23'-0" clearance over the tracks, translated to an almost prohibitive cost of $75,000 per grade separation overpass in the 1920s.[11] Grade separation structures were built in limited numbers in Louisiana in the 1920s due to cost. One example is the Kansas City Southern (KCS) Bridge (1927) that carries US 80 over the KCS railway line in Caddo Parish.[12]

The LHC observed some reduction in railroad at-grade crossing accidents through participation in a safety campaign that educated the public on the dangers of crossings and promoted more effective warning signs at crossings. The LHC also promoted the elimination of grade crossings through cooperation among the LHC, the national Bureau of Public Roads, the parishes, and the railroad companies.[13] The LHC was reorganized in 1928, soon after the election of Huey Long as governor. Long was a vocal supporter of infrastructure who envisioned an ambitious program of road and bridge construction within Louisiana. Long's programs became increasingly popular for the employment opportunities they afforded as the Great Depression began.[14]

Long's emphasis on road and bridge construction did not initially translate into railroad grade separation bridges. The LHC's fifth biennial report (1928-1930) states that despite the obvious need for grade separation structures, none were completed in the report period. The state highway engineer stressed the need, with emphasis on eliminating grade crossings along State Trunk Highways. The LHC responded to this call during the 1930-1932 biennium. During that period 14 grade separation structures were surveyed, designed, and placed under contract or near contract finalization, a number greater than

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[10] American Road Builders Association, 76-79.

[11] Louisiana Highway Commission, *Fourth Biennial Report of the Louisiana Highway Commission*, *1926-1928*, (Baton Rouge, La.), 35.

[12] Bridge Recall No. 013480.

[13] Louisiana Highway Commission, *Fourth Biennial Report of the Louisiana Highway Commission* (Baton Rouge, La.: Louisiana Highway Commission, 1928), 133.

[14] Mead & Hunt, *Historic Context for Louisiana Bridges*, 21-22.

all grade separation structures in the state up to that point.[15] The Missouri Pacific Railroad Bridge is an example of one such early grade separation example under Long's administration.

Despite Long's efforts, the Depression took its toll on Louisiana and projects slowed. Many of Louisiana's stalled capital improvement projects were picked up by the new federal relief programs of the New Deal beginning with the National Industrial Recovery Act (NIRA) in 1933.[16] New Deal relief programs allowed the LHC to complete bridge building and grade separation projects during the Depression, and by 1939, 27 grade separation projects had been completed utilizing federal relief funds.[17] New Deal programs began to wind down at this time and came to an end as America became involved in World War II.[18]

Construction of the Missouri Pacific Railroad Bridge

The Missouri Pacific Railroad Bridge at Tullos in LaSalle Parish was one of 14 grade separation structures undertaken during the LHC's 1930-1932 biennium. Plans for the bridge were completed by December 1931. The contract to construct the bridge was awarded on July 7, 1931, in the amount of $9,137.[19] That same month the *New Orleans Times Picayune* reported "Louisiana Bridge Contracts Given to Low Bidders" with the local builder B.N. Davis of New Orleans winning the Missouri Pacific Bridge contract at $15,580.[20] Construction began later in 1931, and the bridge was completed in 1932.

Engineering background

Grade separation structures were engineered to overcome challenges specific to each site. Within flat terrain it was necessary to attain a minimum clearance of 23'-0" of the bridge over the tracks.[21] To accomplish this, earthen embankments were designed with a specific footprint and carefully calculated slopes. The as-built plans for the Missouri Pacific Railroad Bridge suggest that the earthen embankments were allowed to settle for a period of time before construction began.[22] A different system of reinforced concrete piling bents was developed for use in grade separation structures, instead of traditional abutments. The square pilings were designed so the top portions of the bents could remain visible above ground, as in bents 2 and 5 of the Missouri Pacific Railroad Bridge at Tullos, while only the cap is visible

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[15] Louisiana Highway Commission, Sixth *Biennial Report of the Louisiana Highway Commission*, *193-1932*, (Baton Rouge, La.), 371.

[16] Louisiana Highway Commission, *Seventh Biennial Report*, *1932-1934*, 22.

[17] Louisiana Highway Commission, *Ninth Biennial Report, 1936-37*, 84, and Louisiana Highway Commission, Tenth Biennial Report of the Louisiana Highway Commission, 1938-39, 14.

[18] Mead & Hunt, *Louisiana Bridge Historic Context,* 27.

[19] Louisiana Highway Commission, *Sixth Biennial Report, 1930-1932*, 406.

[20] "Louisiana Bridge Contracts Given to Low Bidders."

[21] R. Fresen, "Union Pacific Railroad – BNSF Railway Guidelines for Railroad Grade Separation Projects," Union Pacific Railroad – BNSF Railway Bridge Standards, 1/5/2016. https://www.up.com/cs/groups/public/documents/document/pdf_rr_grade_sep_projects.pdf (accessed September 12, 2016)

[22] Louisiana Department of Highways, "*Final Tracings for Missouri Pacific Railroad Overpass, Tullos-Winnfield Highway, LaSalle Parish."*

above the end bents, 1 and 6.[23] This bridge was constructed from predominantly standard plans that were adapted in a very custom way to meet the challenges presented by this site, which is a reflection of the industry's engineering response to separating railroad and vehicular traffic within flat terrain.[24]

Another design consideration for grade separation structures constructed during the age of steam locomotives (1820s through 1950s), including the Missouri Pacific Railroad Bridge, was protection of the steel-beam main span from the blast of locomotive smoke below. According to a 1914 *Engineering News* article, "One of the greatest problems in the design of steel grade crossing bridges is the protection of the floor systems and lower chords against the sand blast action of the locomotive exhaust and the corrosive effect of the locomotive gases."[25] If bridges were not protected, the locomotive blasts caused damage. Engineers addressed the blast problem in a variety of ways, such as ceramic or concrete coatings, special paint, and the installation of protective wrought-iron plates. Studies carried out in the early twentieth century concluded that wrought iron withstood the corrosive blasts better than any other material.[26] Further, it was concluded that the plates were needed only in the direct path of the locomotive exhaust stack. Consequently, wrought- or cast-iron blast plates were designed to be installed in a narrow path directly over the tracks. The plates could extend up the sides of any fascia girders or exterior structure to protect the sides of the bridge. The Missouri Pacific Railroad Bridge at Tullos was constructed with blast plates of structural steel installed over the path of the tracks below.

Part II. Structural/Design Information

A. General Statement:

1. Character: The Missouri Pacific Railroad Bridge is a reinforced-concrete deck girder bridge and is a representative example of a grade separation bridge project.

2. Condition of fabric: Good.

B. Description: The Missouri Pacific Railroad Bridge carries US 84 on a southeast-northwest alignment over the Missouri Pacific Railroad main line and utility lines. The railroad tracks are aligned southwest-northeast at the crossing, and the bridge has a 75-degree skew. As a grade separation structure erected on flat terrain, the bridge is engineered to achieve a 23'-0" clearance between the top of the rail and the

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[23] Louisiana Department of Highways, "*Final Tracings for Missouri Pacific Railroad Overpass, Tullos-Winnfield Highway, LaSalle Parish.*"

[24] The Missouri Pacific Railroad Bridge is designed by combining a complicated series of features and details from plan sheets that, in almost every case, are clearly labeled "Standard Plan." However, the final combination is a custom-designed bridge for a grade separation at this location.

[25] A.W. Earl and Thomas Chance, "Protecting Steelwork Against Locomotive Blasts," *Engineering News* 72, no. 16 (1914): 764.

[26] Earl and Chance, "Protecting Steelwork Against Locomotive Blasts," 764.

low steel of the main span. Since the terrain is open, the structure height is gained largely by building up fill to a depth of approximately 25' to meet the height of the two end bents that take place of abutments in this bridge. The east and west roadway approaches on the fill from ground line to the end bents are designed on a five-percent grade.

The Missouri Pacific Railroad Bridge has five reinforced-concrete deck girder spans including a main span and four approach spans, two on each side of the main span. The main span is comprised of a reinforced-concrete deck slab with five t-beams cast integrally with the deck.[27] The bridge's main span is 40'-0" long. The deck girder approach spans are comprised of a reinforced-concrete deck slab with five t-beams cast integrally with the deck and each measure 30'-0" in length. Two concrete approach slabs provide transition between the end bents and the roadway, and each measure 10'-5.25" in length. The overall structure length is 210'-10.5" . The roadway width is 28'-0", accommodating two lanes of vehicular traffic.

The as-built plans specify five structural steel plates to be spliced together and mounted on the underside of the main span to form a protective blast plate. The plans called for blast plate components (plates, nuts, anchor bolts, and washers) to receive red lead and graphite coatings to further protect against corrosive engine blasts.

At an unknown date in the late 1950s or early 1960s, the original 24'-0" roadway width was increased to 28'-0" by widening the reinforced-concrete fascia girders and reconfiguring the curb and railing base above. The two-rail concrete railing was replaced with a single rail configuration. The railing, which is composed of precast rectangular concrete posts and a precast rectangular concrete rail, is mounted on a concrete rail base. Curved concrete end posts terminate the bridge railings at each corner of the bridge. Each of the end posts have had a large poured concrete addition, creating large rectangular end blocks. Segments of steel guardrail have been installed at both ends of the bridge. The segments are bolted through wood blocks and into the second rail post in from each endpost, and extend out along each approach where they are bolted to wood posts.

The bridge's substructure consists of six reinforced-concrete bents that are numbered from 1 to 6 from west to east. Bents 3 and 4 each support the main span and consist of five square, reinforced-concrete columns with a simple reinforced-concrete cap. The caps have risers to accommodate the difference in girder depth between the main span and the approach spans. The columns of bents 3 and 4 have a rectangular concrete footing that rests on ten 12" square concrete pilings. These bents also feature a 12'-0"-high collision wall between columns.

Bents 1, 2, 5, and 6 consist of five square reinforced-concrete pilings, each located directly beneath a girder, and simple reinforced-concrete cap. Bents 1 and 6, also identified as the end bents, function as abutments. The reinforced-concrete pilings are completely driven into fill with only the caps exposed.

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[27] A reinforced-concrete deck girder is also called a t-beam. The design consists of rectangular concrete t-shaped beams and an integral deck slab that is used for the roadway surface.

Beneath the two end spans is slope paving comprised of rectangular precast concrete slabs. A utility pipe is mounted on the edge of the concrete deck on the south side of the bridge.

Since constructed, the Missouri Pacific Railroad Bridge has undergone periodic inspections and routine maintenance, such as cleaning or painting. In addition, the deck has been widened and the rails replaced, concrete has been added to each endpost, the blast plate assembly has been removed, and segments of guardrail have been installed at the ends of the bridge and its approaches.

C. Site Information: The Missouri Pacific Railroad Bridge carries US 84, which runs northwest-southeast, across the Missouri Pacific Railroad bed in Tullos, LaSalle Parish, Louisiana. With a mild climate and generally flat terrain, early industry in the area included farming. Although the bridge is located within the city limits, property to the west consists of farmland, which gives the locale a rural feel. Today the agricultural town of Tullos has a population of 383.[28] At the bridge's location, the Missouri Pacific Railroad right-of-way consists of a single track on a 30'-0" wide gravel base spanned by the bridge. The right-of-way has a relatively shallow slope and features scattered rocks, grass, bushes, deciduous and evergreen trees. At this location, US 84 carries two lanes of vehicular traffic, one in each direction.

Part III. Sources of Information

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[28] United States Census Bureau, "Tullos town, Louisiana," http://www.census.gov/ (accessed August 18, 2016).

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HISTORIC AMERICAN ENGINEERING RECORD

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(Bridge Recall No. 049130)
Carries U.S. Route 84 (US 84) over Missouri Pacific Railroad
Tullos
LaSalle Parish
Louisiana

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Dietrich G. Floeter, photographer, February and March 2016
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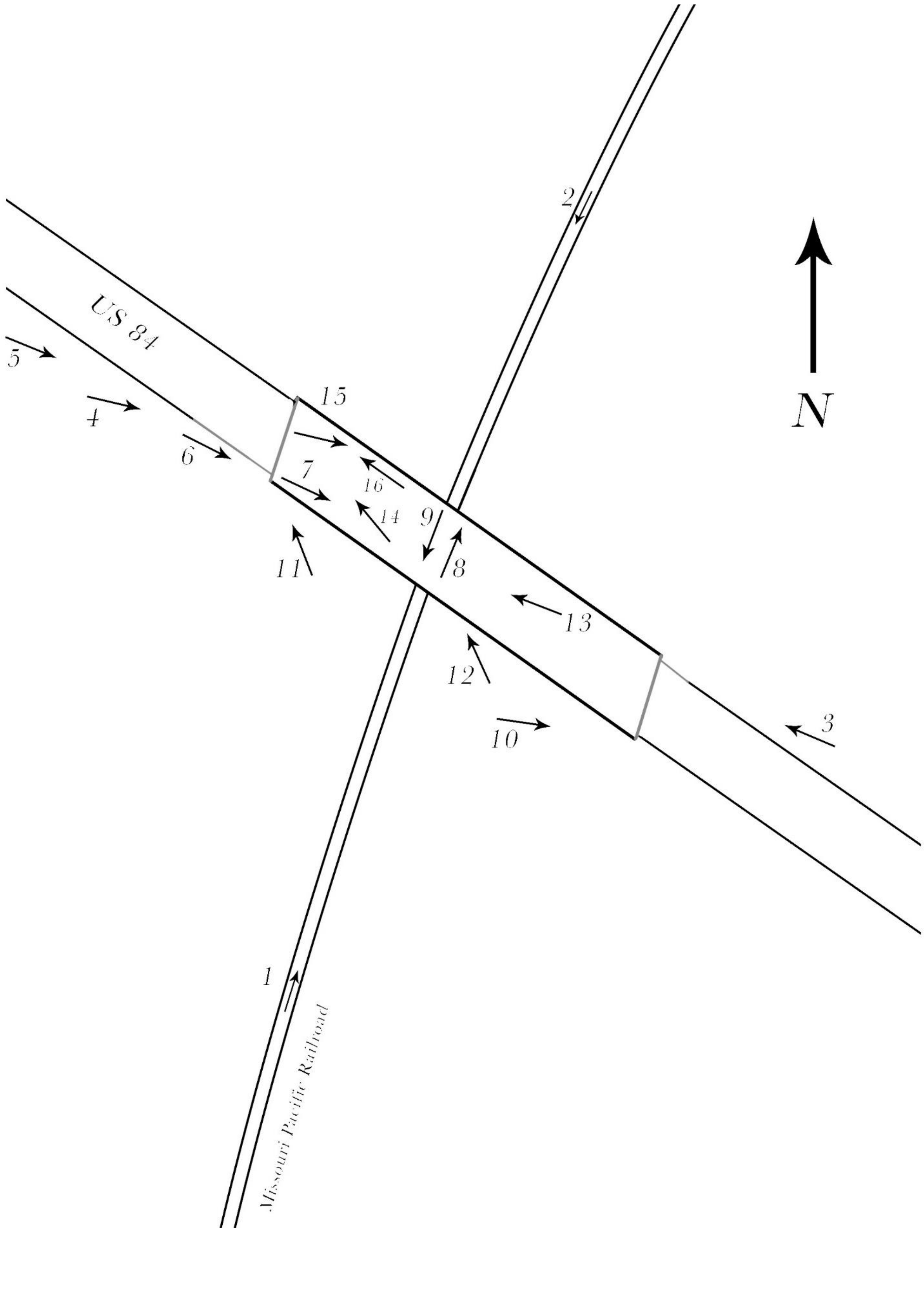
LA-27-14	Detail view of underside and skewed bent, from southeast
LA-27-15	Detail view of concrete rail, from west
LA-27-16	View of concrete roadbed, from east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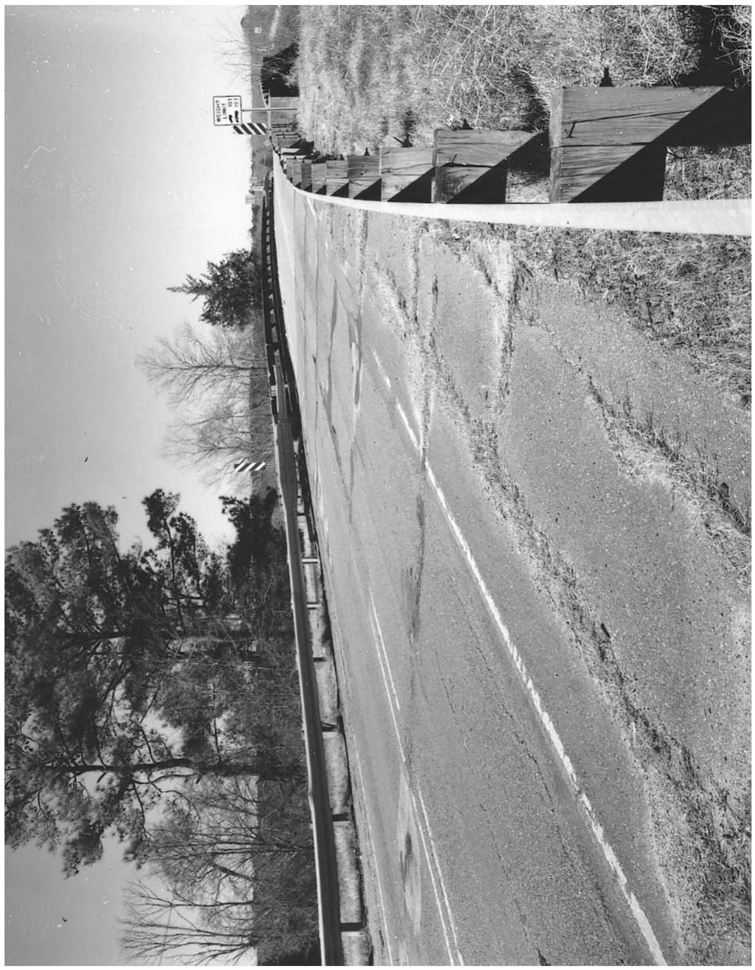

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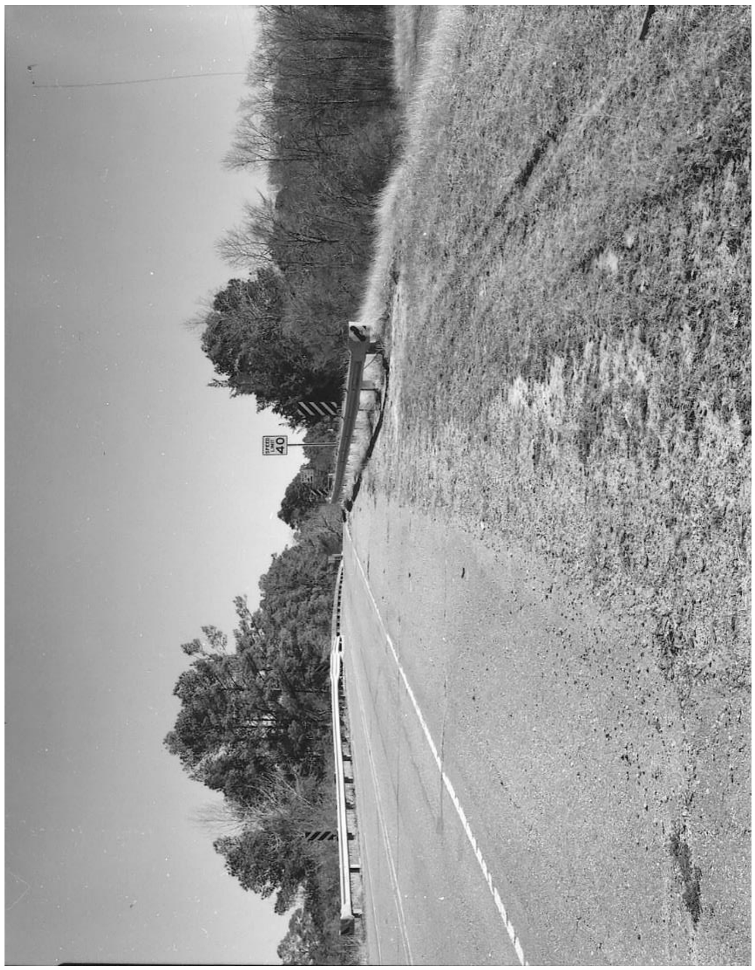

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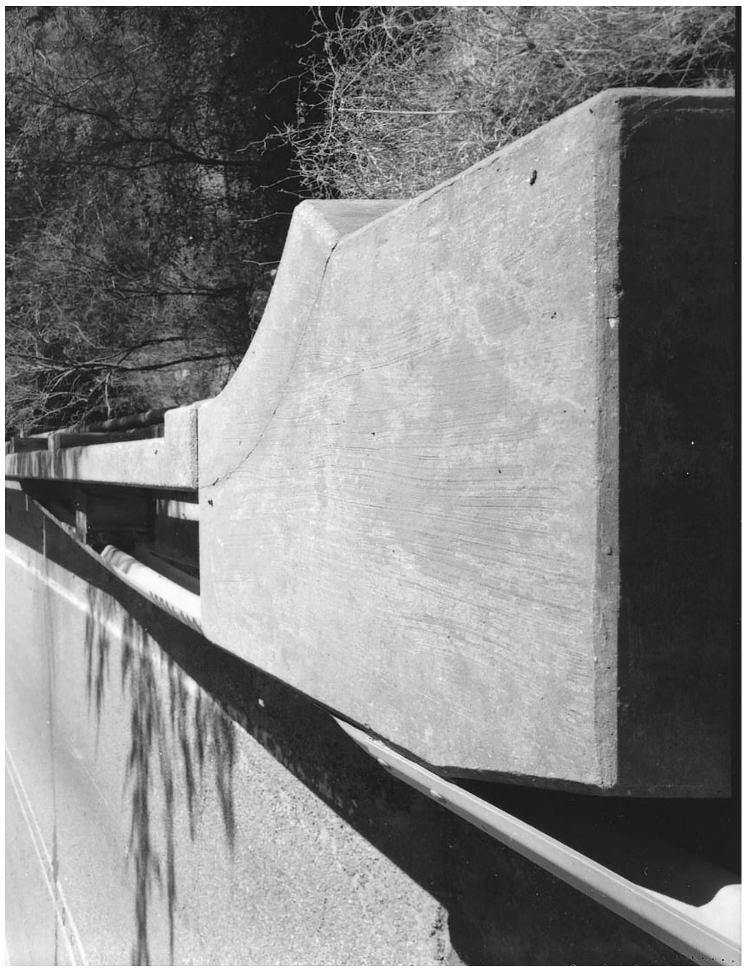

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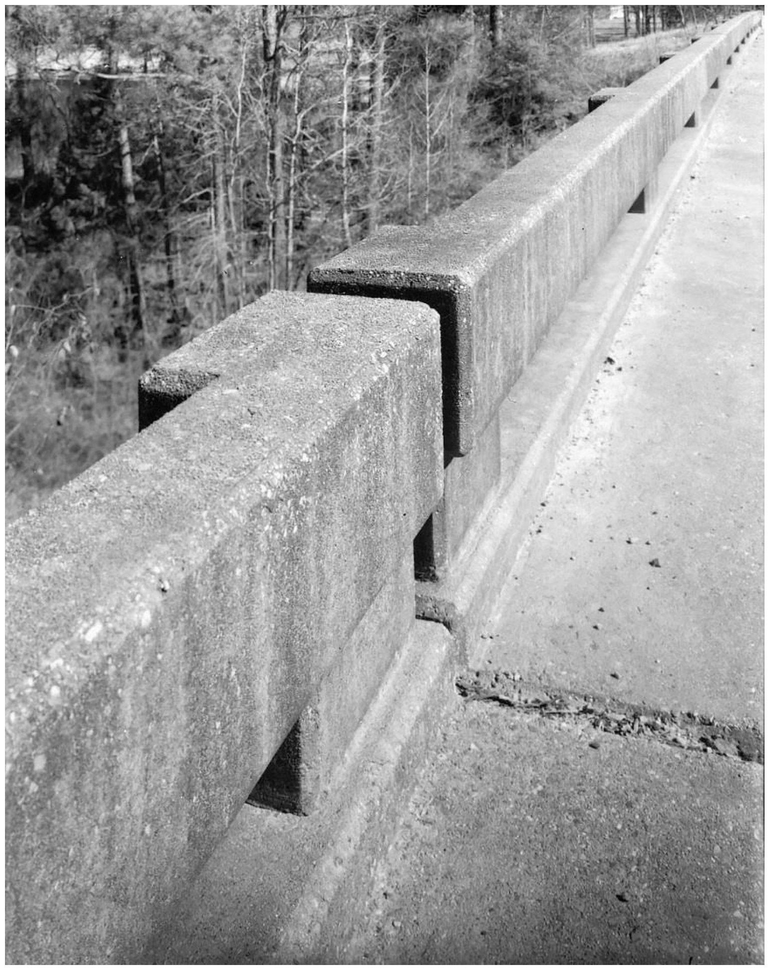

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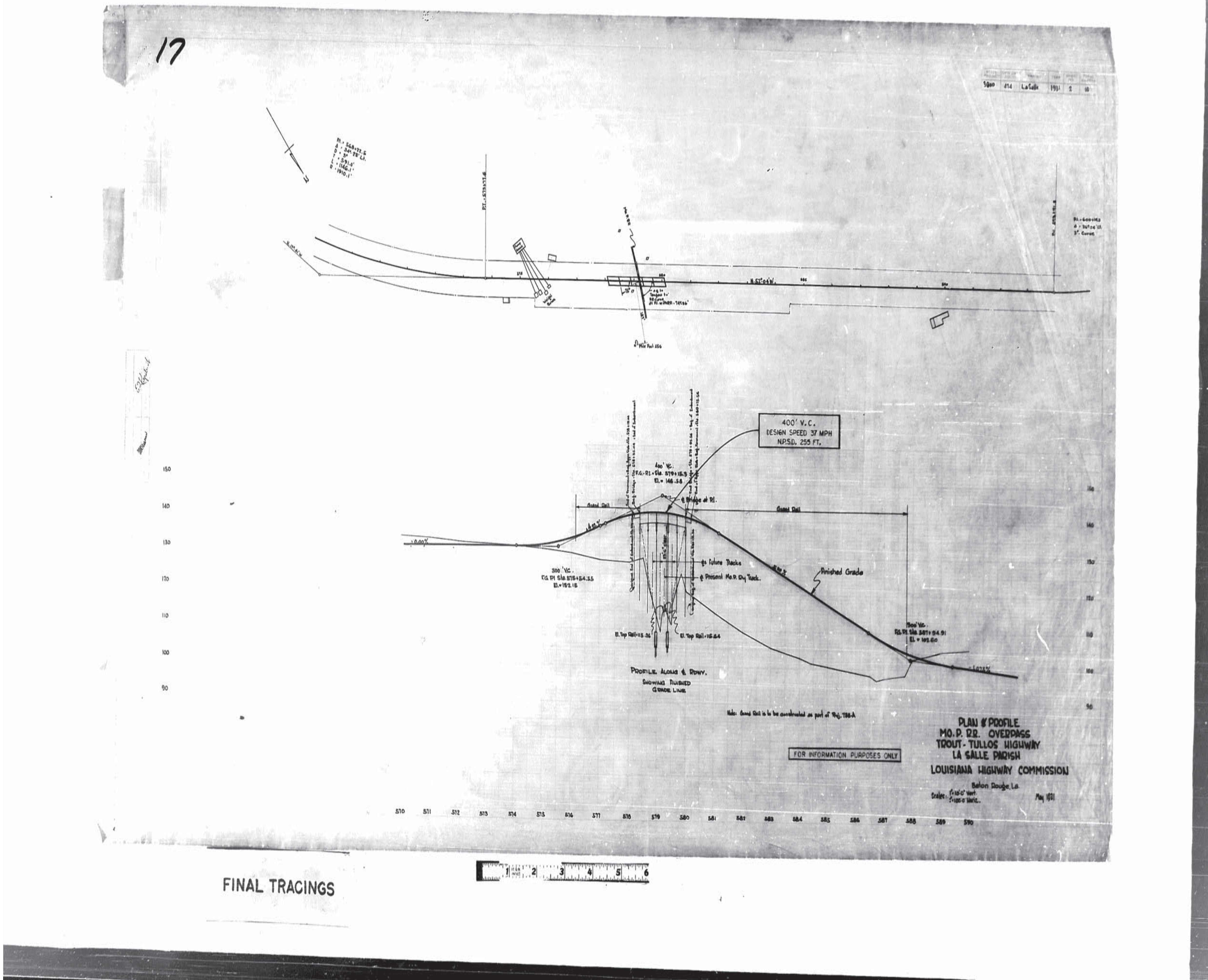
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400' V.C.
DESIGN SPEED 37 MPH
N.P.S.D. 255 FT.
Guard Rail
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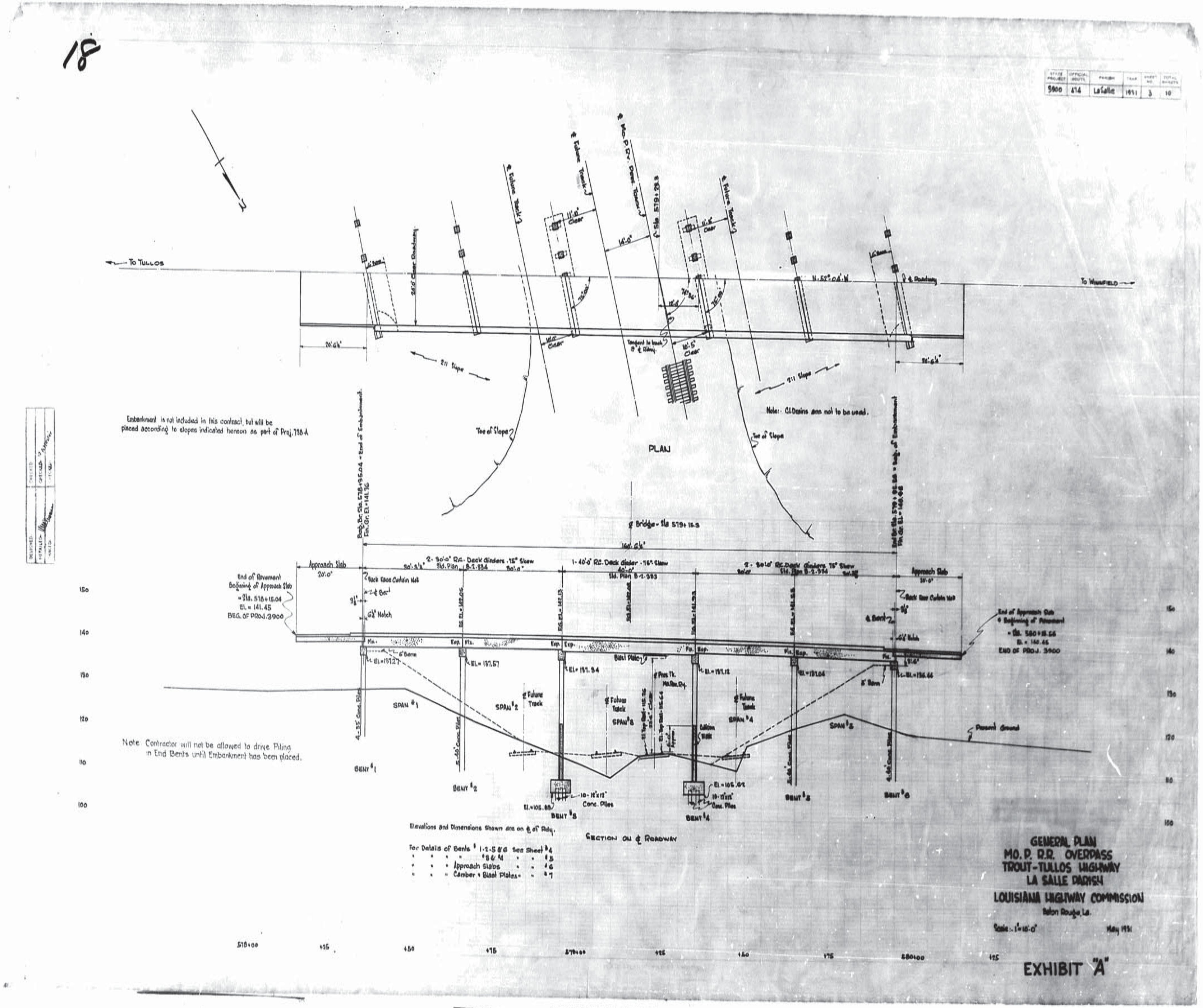
Profile Along ℄ Rdwy.
Showing Finished Grade Line
Note: Guard Rail is to be constructed as part of Proj. 738-A
FOR INFORMATION PURPOSES ONLY
PLAN & PROFILE
MO. P. R.R. OVERPASS
TROUT - TULLOS HIGHWAY
LA SALLE PARISH
LOUISIANA HIGHWAY COMMISSION
Baton Rouge, La.
Scales: 1" = 10'-0" Vert. 1" = 100'-0" Horiz.
May 1931
FINAL TRACINGS



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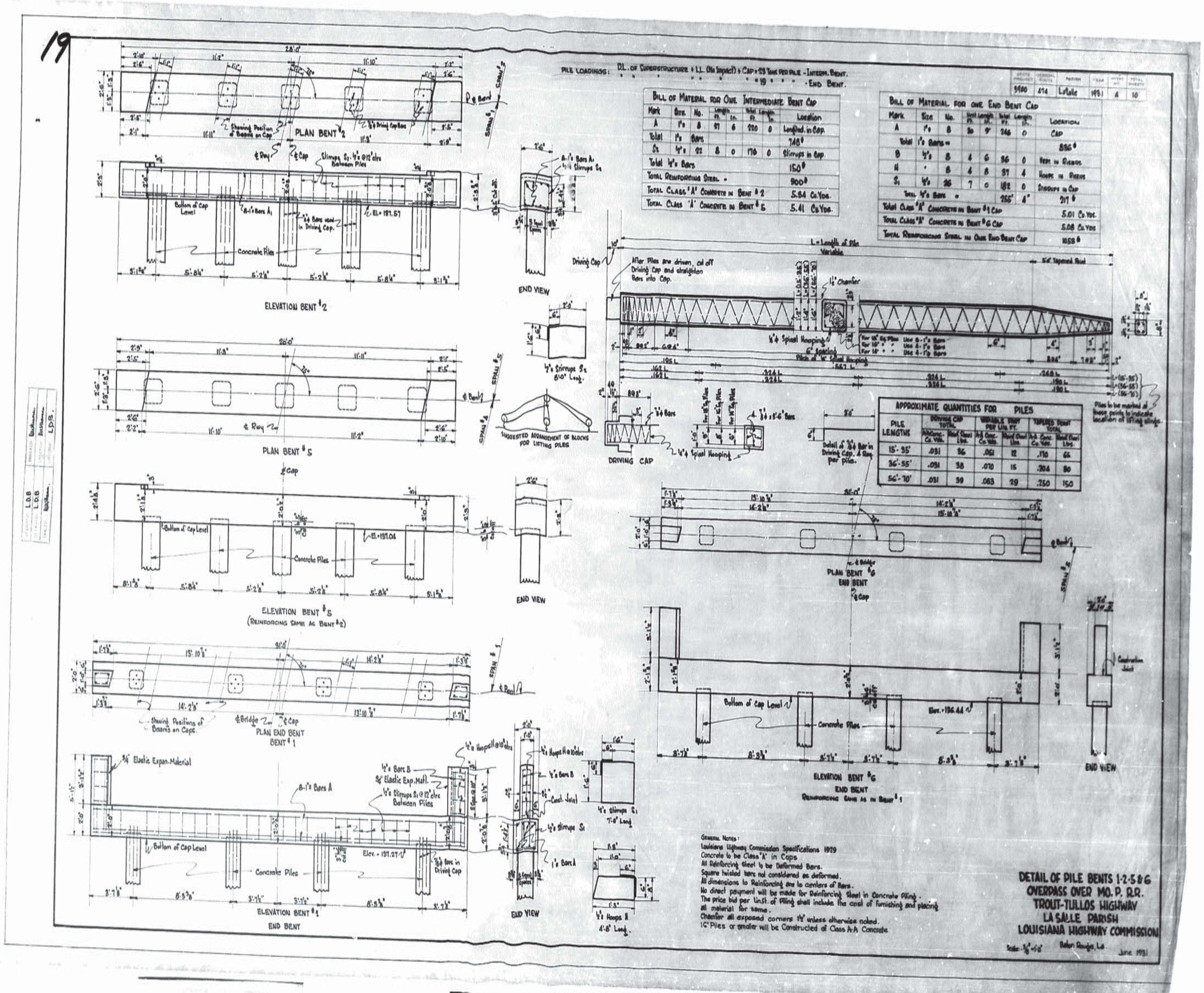
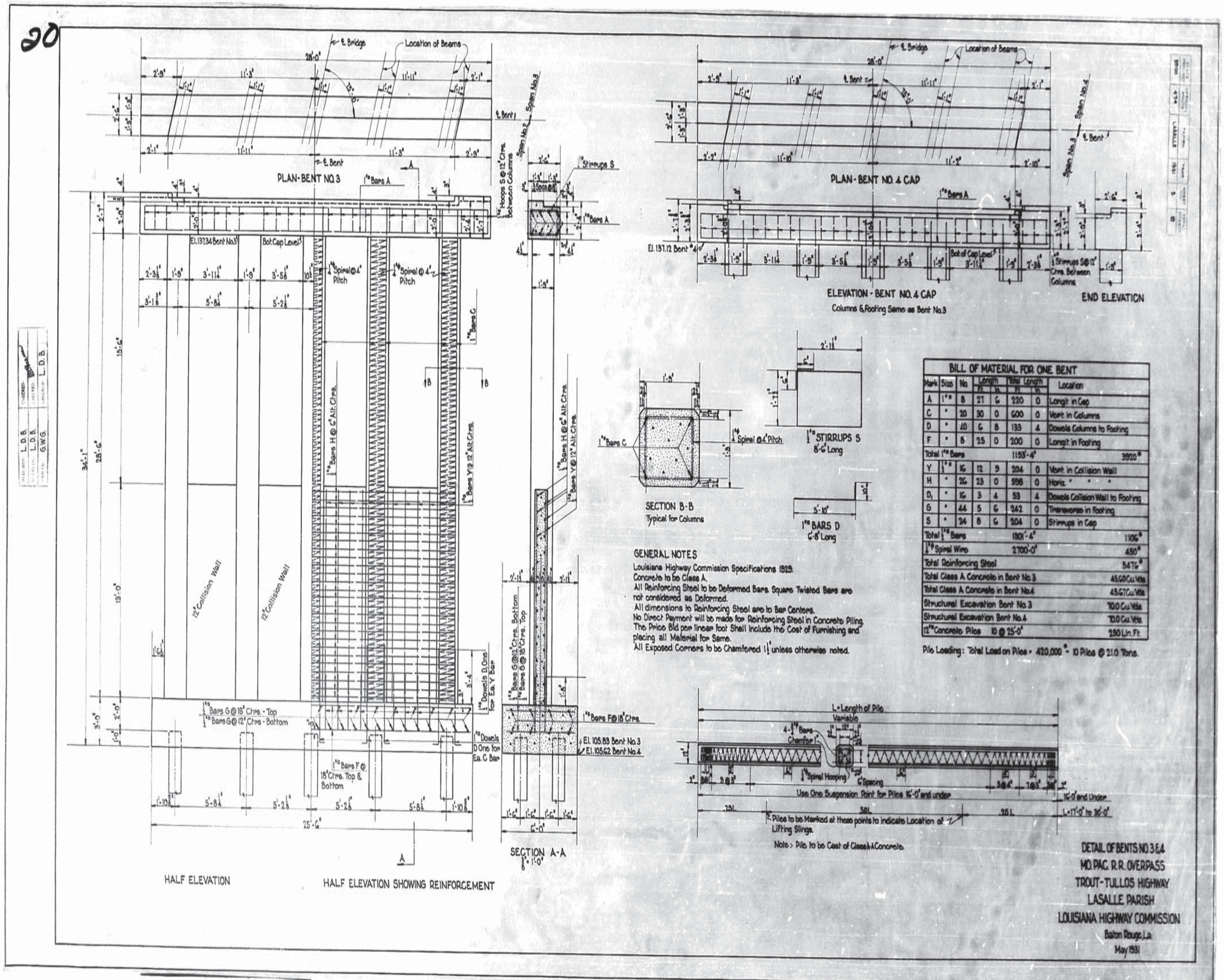
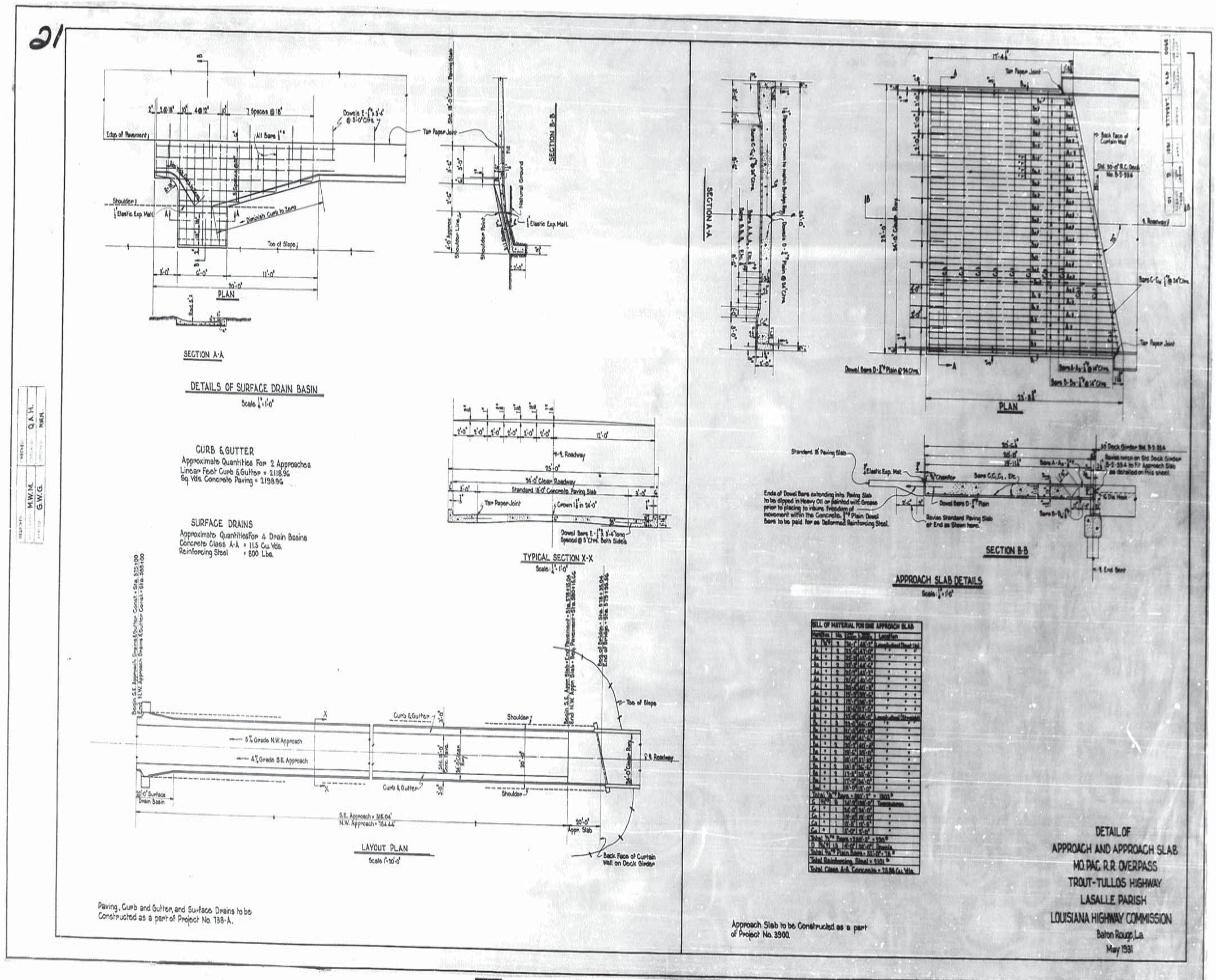


FINAL TRACINGS

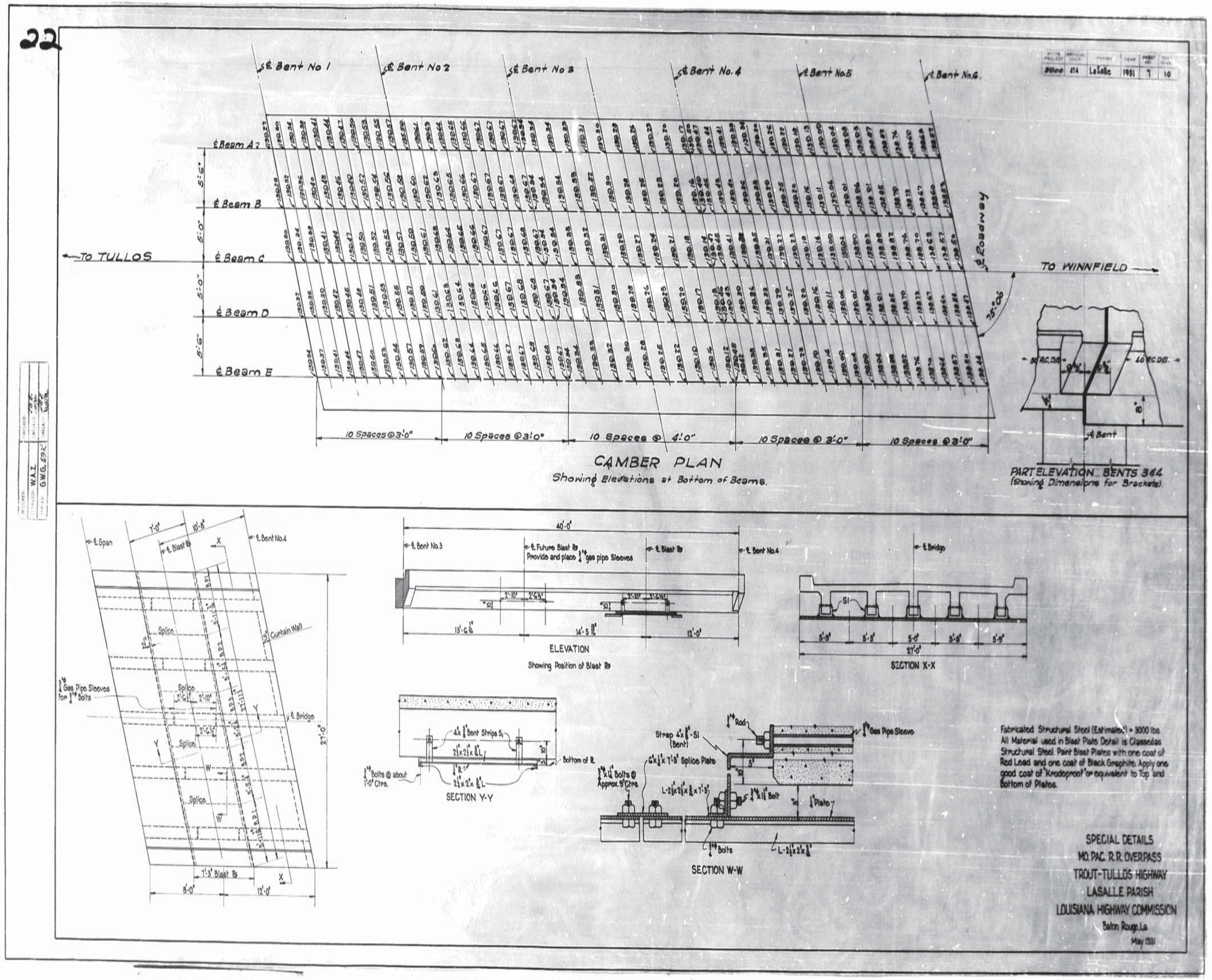


Mark	Size	No.	Length Ft.	Length In.	Total Length Ft.	Total Length In.	Location
A	1" □	8	27	6	220	0	Longit. in Cap
C	"	20	30	0	600	0	Vert. in Columns
D	"	20	6	8	133	4	Dowels Columns to Footing
F	"	8	25	0	200	0	Longit. in Footing
Total 1" □ Bars					1153'-4"		3920 #
Y	½" □	16	12	9	204	0	Vert. in Collision Wall
H	"	26	23	0	598	0	Horiz. " " "
D_1	"	16	3	4	53	4	Dowels Collision Wall to Footing
G	"	44	5	6	242	0	Transverse in Footing
S	"	24	8	6	204	0	Stirrups in Cap
Total ½" □ Bars					1301'-4"		1106 #
¼" ϕ Spiral Wire					2700'-0"		450 #
Total Reinforcing Steel							5476 #
Total Class A Concrete in Bent No. 3							45.60 Cu. Yds.
Total Class A Concrete in Bent No. 4							45.67 Cu. Yds.
Structural Excavation Bent No. 3							70.0 Cu. Yds.
Structural Excavation Bent No. 4							70.0 Cu. Yds.
12" □ Concrete Piles 10 @ 25'-0"							250 Lin. Ft.

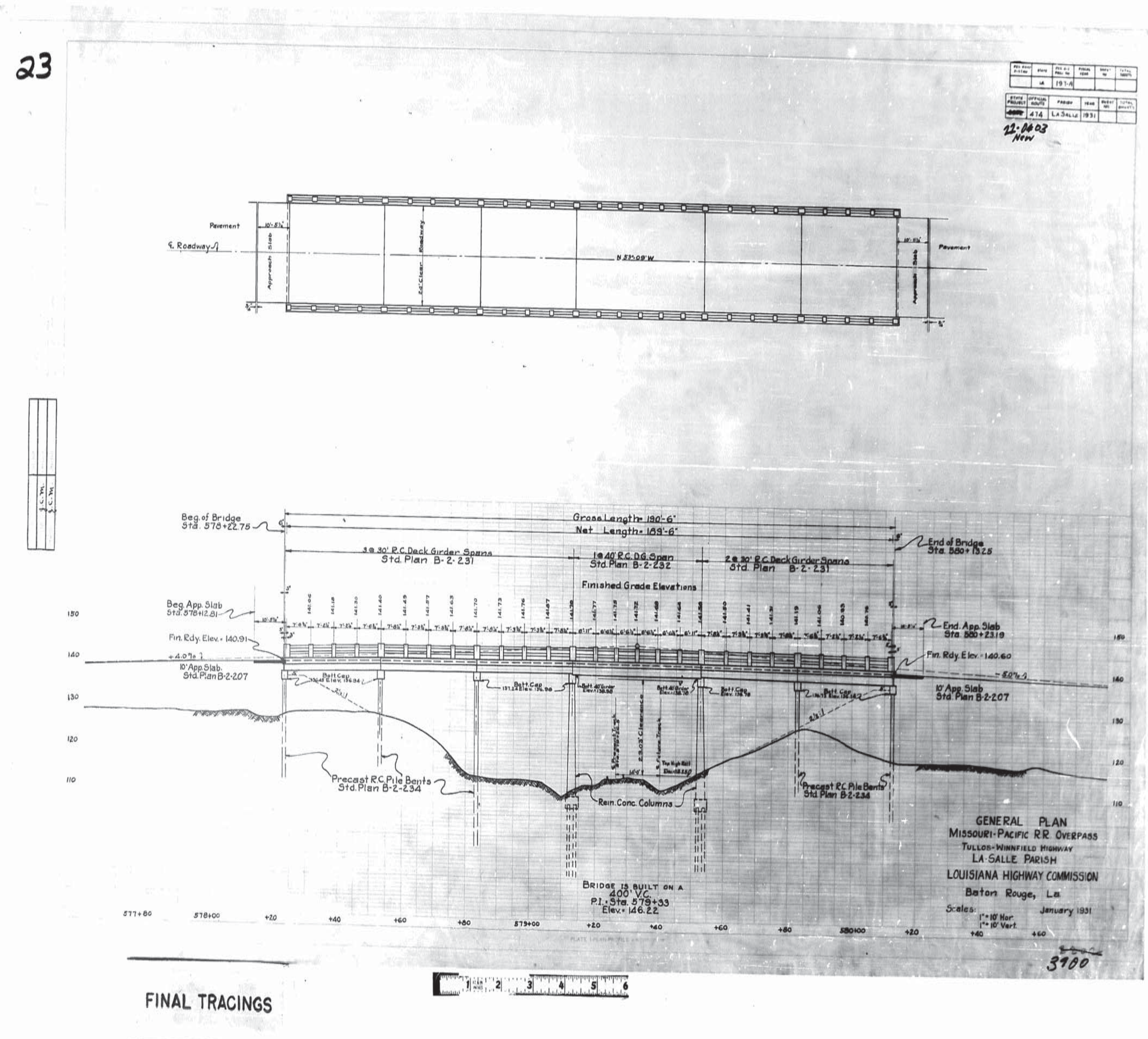
FINAL TRACINGS



FINAL TRACINGS



FINAL TRACINGS


23
Gross Length = 190'-6"
Net Length = 189'-6"
Beg. of Bridge Sta. 578+22.75
End of Bridge Sta. 580+13.25
3 @ 30' R.C. Deck Girder Spans Std. Plan B-2-231
1 @ 40' R.C. D.G. Span Std. Plan B-2-232
2 @ 30' R.C. Deck Girder Spans Std. Plan B-2-231
Finished Grade Elevations
Beg. App. Slab Sta. 578+12.81
End. App. Slab Sta. 580+23.19
Fin. Rdy. Elev. = 140.91
Fin. Rdy. Elev. = 140.60
10' App. Slab Std. Plan B-2-207
10' App. Slab Std. Plan B-2-207
Precast R.C. Pile Bents Std. Plan B-2-234
Rein. Conc. Columns
Precast R.C. Pile Bents Std. Plan B-2-234
Bridge is built on a 400' V.C.
P.I. = Sta. 579+33
Elev. = 146.22
GENERAL PLAN
MISSOURI-PACIFIC R.R. OVERPASS
TULLOS-WINNFIELD HIGHWAY
LA-SALLE PARISH
LOUISIANA HIGHWAY COMMISSION
Baton Rouge, La.
Scales:
1" = 10' Hor.
1" = 10' Vert.
January 1931
3900
FINAL TRACINGS

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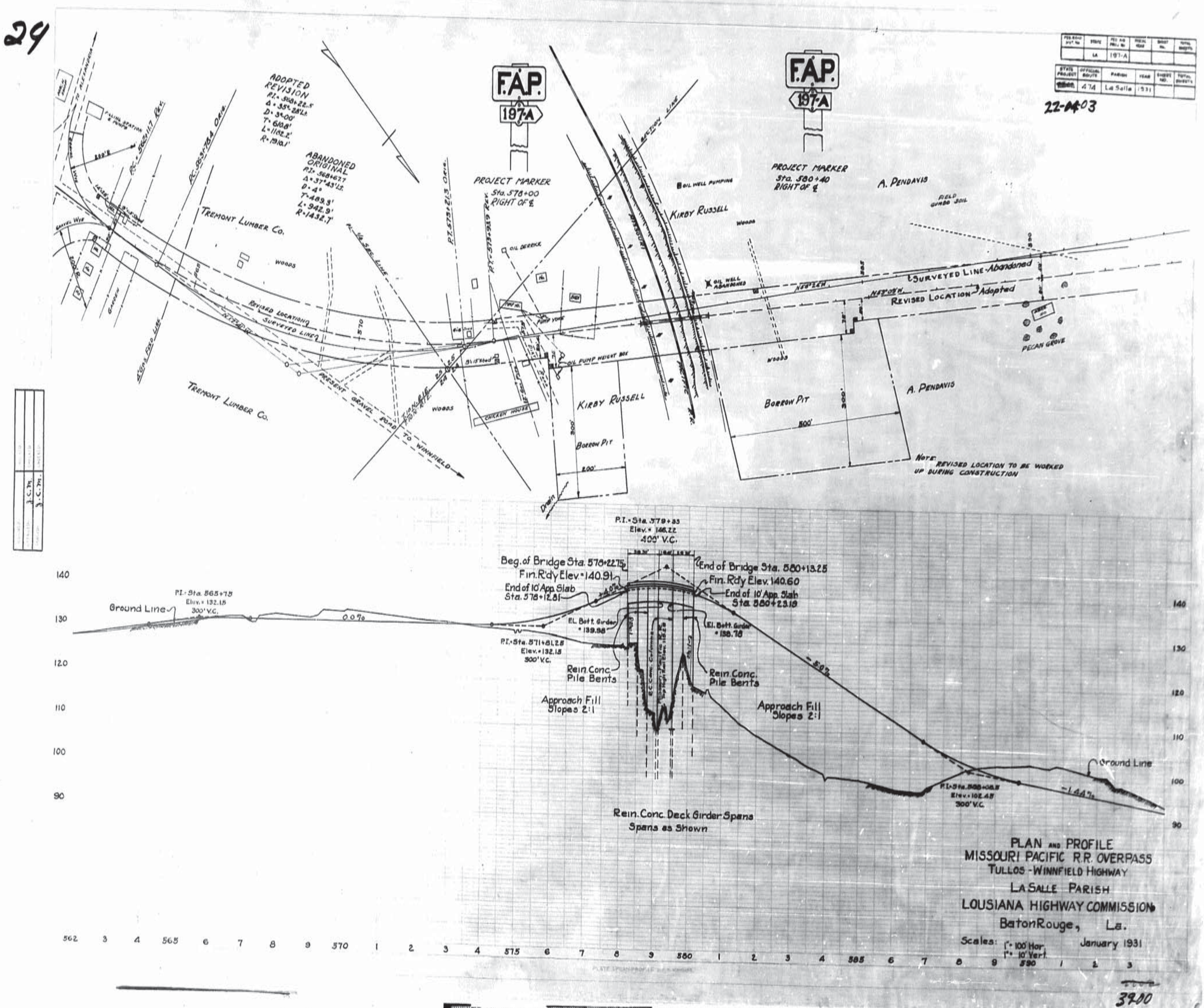

FINAL TRACINGS