Clarendon Bridge
Spanning the White River at U.S. Highway 79
Clarendon
Monroe County
Arkansas

HAER No. AR-49

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, DC 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

CLARENDON BRIDGE

HAER No. AR-49

HAER
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LOCATION:	Spanning the White River on U.S. Highway 79 at Clarendon, Monroe County, Arkansas. UTM: 15/3839610/654230 Quad: Clarendon, Arkansas
DATE OF CONSTRUCTION:	1931
CONTRACTOR:	Austin Bridge Company of Dallas, Texas.
PRESENT OWNER:	Arkansas State Highway and Transportation Department, Little Rock, Arkansas 72203.
PRESENT USE:	Vehicular Bridge
SIGNIFICANCE:	Completed in 1931, the sheer size of the Clarendon Bridge is its most notable feature. When adding the length of the approaches to the double cantilevered main span over the frequently flooded White River, the bridge is more than three miles long. The Clarendon Bridge, one of three double cantilever spans in Arkansas, was designed by respected engineer, Ira G. Hedrick.
HISTORIAN:	Kathryn Steen
DESCRIPTION BY:	Corinne Smith Arkansas Historic Bridge Recording Project, 1988

In east central Arkansas, the White River that winds its way down from the Ozark Mountains acquires a navigable size. Known as La Riviere au Blanc to the early French explorers, the White River had made travel difficult and unpredictable with its frequent flooding into the surrounding delta regions.(1) At Clarendon, Arkansas, a highway bridge was to solve the transportation problem caused by the flooding White River. It was not a task to be taken lightly, for a bridge at Clarendon would require built-up approaches of more than three miles through lowlands and old riverbeds.

TOWN HISTORY

Clarendon is a comparatively old town in Arkansas, acquiring its name in 1824 after the English Earl of Clarendon. The town was destroyed in 1863 during the Civil War(2), but received a boost in development by the completion of a railroad bridge in 1883 belonging to the St. Louis Southwestern Railway.(3) By the late 1920s, there were lumber mills, a wagon manufacturing plant, and a button factory that made its buttons from mussels found in the White River.(4)

Until the bridge was constructed, a ferry was available to shuttle vehicles traveling on Highway 3 across the river. That generally tended to be expensive, costing five or six dollars to cross.(5) The price, coupled with the fact that Highway 3 was in need of improvement, encouraged travelers to use Route 70 which bridged the White River about twenty miles upstream at DeVall's Bluff.(6)

BRIDGE PLANNING

In 1926 plans were afoot to improve Highway 3 (now Highway 79). As an Arkansas newspaper reported, the highway would become a part of the "transcontinental highway" between

North Carolina and California. A franchise to build a bridge near Clarendon was given to Harry E. Bovay, a man who was already engaged in building several other bridges in the region. Perhaps because of his other projects, Bovay never built his bridge and his name soon dropped out of the Clarendon bridge discussions.(7)

The State Highway Department began implementing its plans to improve Highway 3. The Ford, Bacon & Davis, Inc. consulting firm of New York was hired by the department to form estimates on the feasibility of building a state-owned toll bridge near Clarendon. The report considered factors like population and population growth, motor vehicle registration, and competing methods of crossing the river. The firm suggested a net income of $13,200 in the first year, increasing to $20,100 by the fifth. The consultants' report, dated December 31, 1928, made it clear that their estimates depended on an improved Highway 3 running from Memphis to Pine Bluff, Arkansas. Parts of the road near Clarendon were not in very good condition. Even the best sections of the highway were as yet unpaved. December of 1928 was also the month the Clarendon Chamber of Commerce was informed that the Highway Department was having the bridge design drawn up. (9)

Choosing the site for the bridge proved to be difficult. Bovay had originally planned on a site four miles downstream from Clarendon. To cross at Clarendon, upstream from the existing railroad bridge, would certainly be more convenient for the townspeople, but would necessitate the construction of the western approach over Roc Roe Bayou and twice over an old river bed. All in all, the west approach would need to be three-and-a-half miles long.(10) The lobbying efforts of a Clarendon citizen were later credited with having the decision made in March 1930 to cross the river right at Clarendon.(11)

In 1927, the Arkansas legislature had passed a bill proposed by Governor Martineau that would appropriate $52 million over the following four years to use in developing the state highway system.(12) When the bid for the state toll bridge at Clarendon was let, the bridge was the largest project the highway commission had organized under the Martineau funding. The Arkansas Gazette stated:

> The entire project is four miles long and includes a steel and concrete bridge across the stream, approximately one-and-a-half miles of concrete trestlework and two-and-a-half miles of earth dump embankment across the river bottoms opposite Clarendon.

Selling bonds and charging tolls would pay for the estimated $2 million structure.(13)

The Highway Department had in 1927 hired bridge engineer Ira G. Hedrick to design several of the state's new, larger bridges.(14) Hedrick had an impressive credential list by the time he had set up an office in Hot Springs, Arkansas. He had studied in Arkansas for a short time around the turn of the century, and his first wife was from Fayetteville. As a professional engineer, Hedrick was first an assistant and then a junior partner to bridge engineering great J.A.L. Waddell. Over the course of his life, he was a member of several engineering firms and also the American Society of Civil Engineers.(15)

CONSTRUCTION

On May 15, 1930, ten bids were taken for the long bridge. The Austin Bridge Company of Dallas, Texas won the contract with a low bid of $1,532,572.50.(16) The company was in charge of the entire project, but sublet parts of the construction. The Raymond Concrete Pile Company of Chicago was one of the subcontractors. They became famous locally by driving the required number of pre-cast concrete pilings in record time. In fifty-nine days, the pile-driving company covered

three miles--including one day when fifty piles were driven, far above the average of fifteen per day. Part of the reason for the speed attained was the use of ". . . the only steam Whirley derrick ever built south of the Mason Dixon line. . . ." Besides the hammering power of the derrick, Mother Nature lent a hand: the same drought that was hurting so many farmers in 1930 had dried up the lowlands of the bridge site, and even dropped the water level of the White River so low as to allow building one of the main span's piers on dry ground. Locals suggested the September wedding date of the pile driving foreman, Charles E. Malone may have been an added incentive to complete the job early.(17)

Since the Clarendon bridge was designed as a toll bridge, a three-story tollkeeper's residence was placed at the base of the eastern approach. Tolls were to be taken from traffic of both directions from an island that stood between the two lanes. Two men, one from Clarendon and one from Brinkley, were chosen to be overseers of the bridge.(18)

The actual construction process of the bridge was both a blessing and curse to the local community. On the downside, the lives of three workers were lost when two fell from the structure and one drowned while working on a pier.(19) Perhaps more of an impression was made by the economic benefits the building process brought in. The wages of 25 to 30 cents per hour for a bridge worker coaxed men off of their drought-stricken farms.(20) A man who had been in the trucking industry, kept busy by the additional freight, recalled:

> While the rest of the country was experiencing the Great Depression, Clarendon was not aware there was such a thing until later. Everyone who wanted to work could find a job and anyone who had a room or apartments could rent them for, at that time, a good rent.(21)

The piles were not the only part of the job finished ahead of time. The entire structure,

under the direction of engineer S.A. Pinson, was completed and presented to the Highway Department April 23, 1931, with the construction process taking less than a year.(22)

COMPLETION CELEBRATION

The new bridge was welcomed with a wealth of celebratory activities. There was a parade, a senatorial speech, a queen coronation, a dedication speech by Highway Commission Chair Dwight H. Blackwood, the bridge christening by the queen, a baseball game, an aerial circus, boat and swimming races, high dives off the bridge into the White River, a parachutist dropping prizes as he fell, and the Grand Queen's Ball.(23) Notable persons present included the president and vice-president of the Austin Bridge Company, and the president of the Raymond Concrete Pile Company.(24)

The celebration day of June 11, 1931, probably drew the most traffic the bridge had for a good while after. Despite the intentions of the Highway Department to make Highway 3 a first-class road, it remained a gravel road into the early 1950s.(25) Consequently, it is doubtful that the bridge received the traffic that had been predicted for it until after that date.

At least one business person had thought the bridge would bring enough traffic to support an additional establishment. Maude Brown's Log Cabin Restaurant was built especially for the bridge opening. It provided a first-rate dining experience for important personages attending the celebration, but she was unable to make it pay for very long afterwards.(26)

REMOVAL OF TOLLS

The traffic count became less significant in 1938 because that was the year that tolls were

removed from the bridge and earning revenue was no longer an objective of the bridge. Federal legislation in 1937 allowed the state to get reimbursement of half the cost of certain bridges from the Federal Bureau of Public Roads, provided the state would free the toll bridges. After a special session called by Bailey on April 1, 1938, the tolls were lifted from all state-owned bridges in Arkansas.(27)

CURRENTLY

The year 1975 was another date in the bridge's history as the superstructure was painted a bright gold.(28) Thirteen years later, it has just been made silver again. Another notable feature of the Clarendon bridge in 1988 is its deteriorating west approach. One theory is that timber as well as dirt was used for fill over the long three-and-a-half miles, and now the timber has rotted causing the approach to sink in places. Because of vandalism over the years, the original lamp posts have also been removed.(29)

ENGINEERING DESCRIPTION

The Clarendon Bridge is a two-lane, double cantilever truss, with 161-foot anchor-arms. Two cantilever-arms of 120 feet and a suspended span of 160 feet make the main opening 400 feet wide. The top chord of the anchor-arms and cantilever-arms are polygonal, with a slight concave upward curve to a peak at 60 feet above the 24-foot-wide road deck. The suspended span has a horizontal top chord at a constant height of 25 feet.

The truss design uses the philosophy of a Warren truss, where diagonal members carry compressive and tensile forces. The vertical members brace the triangular web system. All panels

are 20 feet wide. Most web members and chord members are one of two basic sections: four angles with lacing or two channels with lacing. The top chord in the two panels to either side of the peak is the exception to this rule because it uses four eyebars. Eyebars are used here to support the tremendous tensile forces imposed by the cantilevered suspension span. Large pins connect the top chord together and to the anchor-arm and the cantilever-arm. Most connections are riveted except for the pin connections of the top chord and the suspension spans.

The suspension span is also hung by pins at U14 and L14 (see Highway Drawing No. 4906) from the cantilever-arms. Member U14-U15 is referred to as an idle member because it carries no force. The suspension span acts as a truss which is supported at L15 and L22. The compression forces in its top chord are transmitted through member L14-U15, which acts as an impost, to the bottom chord. The forces from the suspension span are then distributed to the cantilever-arm by the bottom chord and web members.

The bridge is supported by reinforced concrete piers at the ends and underneath the two peaks. The concrete approaches are on 14-inch-square concrete pilings, extending an average of 50 feet into the ground. The east approach is three blocks long, and electric lamps once lined this approach from Clarendon. The west approach reaches nearly three miles across the Old River and the Roc Roe Bayou with concrete trestles and dirt fill.

The Clarendon Bridge is almost identical to twin bridges over the White River at Augusta and Newport. The Clarendon differs in that it has two more anchor arm-panels.

ENDNOTES

1. Virgil H. Holder, "Historical Geography of the Lower White River," The Arkansas Historical Quarterly Vol. XXVII, No. 2 (Summer 1968), p. 133.

2. Holder, pp. 136,140.

3. Steven E. Wood, "The Development of Arkansas Railroads," The Arkansas Historical Quarterly Vol. 7, No. 3 (Autumn 1948), p. 160.

4. Ford, Bacon & Davis, Inc., consultants, "Report: Estimated Traffic and Revenue; Proposed Toll Bridge Across the White River Near Clarendon, Arkansas," December 31, 1928, p. 10.

5. Clarendon Chamber of Commerce Minutes, June 25, 1928.

6. Ford, Bacon & Davis, p. 8.

7. "White River Bridge Franchise is Given," Arkansas Gazette Vol. 102, No. 226 (July 10, 1926), p. 12

8. Ford, Bacon & Davis, pp. 7, 20.

9. Chamber minutes, December 10, 1928.

10. "What East Bound Traffic will Ride On, Approaching Our New Highway Bridge," Monroe County Sun Vol. 55 (June 11, 1931), p. 1.

11. "Hats off to this Man," Monroe County Sun Vol. 55 (June 11, 1931), p. 1.

12. "White River Bridge at Newport will Be Major Highway Project in 1928," Newport Weekly Independent Vol. XXVII, No. 38 (December 23, 1927), p. 1.

13. "Bids on 35 Road Projects to Be Received Today," Arkansas Gazette Vol. III, No. 175 (May 14, 1930), p. 22.

14. "Graduate Engineers Praised for Work on Massive Span," [Memphis] Commercial Appeal (September 20, 1930).

15. John William Leonard, Who's Who in Engineering, 1925, 2nd ed. (New York: Who's Who Publications, Inc., 1925), p. 937.

16. "Bids Received on Highway Projects," Arkansas Gazette Vol. III, No. 176 (May 15, 1930), p. 11.

17. "Records Smashed on this Bridge Job," Monroe County Sun Vol. 55 (June 11, 1931), p. 1.

18. "Clarendon Man One of Big Bridge Custodians," Brinkley Argus Vol. 54, No. 14 (June 4, 1931), p. 1.

19. "Bridge Job Claimed Three Lives," Monroe County Sun Vol. 55 (June 11, 1931).

20. Interview by JoClair English, Clarendon Historical Society. Pat Dyer, bridge construction worker. June 4, 1981.

21. Paul McKay, handwritten recollections for Clarendon Historical Society, June 3, 1981.

22. "Records Smashed," Monroe County Sun Vol. 55 (June 11, 1931).

23. Official Program, Monroe County Sun Vol. 55 (June 11, 1931).

24. "Eight Towns to Join Fete at Clarendon," Commercial Appeal (May 23, 1931).

25. JoClair English, Clarendon Historical Society. Interview by Kathy Steen, HAER, June 28, 1988.

26. "Clarendon's Big Bridge Celebration was a Grand Success in Every Way," Brinkley Argus Vol. 54, No. 16 (June 18, 1931), p. 1; JoClair English, Interview, June 28, 1988.

27. "What the Special Session Did and Didn't" Brinkley Argus Vol. 61, No. 2 (March 31, 1938), p. 1.

28. "Gateway to the Southwest," Monroe County Sun (June 12, 1975), p. 8.

29. JoClair English, Interview, June 28, 1988.

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CHAIRMAN

JUSTIN MATTHEWS   J. LAN WILLIAMS
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COMMISSIONERS

HIGHWAY BRIDGE OVER WHITE RIVER

AT

CLARENDON, ARKANSAS

(MONROE COUNTY)

C. S. CHRISTIAN, HIGHWAY ENGINEER
N. B. GARVER, BRIDGE ENGINEER

JOB NO. 199
U.S.R. 79 S-13&14

IRA G. HEDRICK, INC.
CONSULTING ENGINEERS
HOT SPRINGS, ARKANSAS

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Details of Revised East Approach Girders, Columns and Footings
Revised East Retaining Wall 1st Two-00 Ft. Sections

WHEEL CONCENTRATIONS CLASS A LOADING

2 - 15 TON TRUCKS

EQUIVALENT UNIFORM LIVE LOADS

SPAN LENGTH	LOAD
0' TO 30'	150 # PER SQ. FT.
50'	130 - - - -
100' AND OVER	80 - - - -
INTERMEDIATE POINTS PROPORTIONAL	

IMPACT: 25% — CONCRETE; $\frac{100}{L+300}$ - STEEL

GENERAL NOTES

ALL HOOKS ON REINFORCING BARS TO HAVE A RADIUS OF 4D AND A RETURN OF 12D WHERE D=DIAMETER OF ROUND BAR OR SIDE OF SQUARE BAR. LENGTHS OF HOOKED BARS ARE GIVEN TO STARTING POINT OF HOOK. THUS: ——D. ALL BENDS SUCH AS ON GIRDER BARS MUST HAVE A RADIUS OF NOT LESS THAN 12D.

CENTERS OF BARS IN FLOOR SLAB TO BE NOT LESS THAN 1½" FROM FACE OF CONCRETE. CENTERS OF BARS TO BE 4" FROM FACE OF CONCRETE ON PIERS AND ABUTMENT SHAFTS AND 3" ON GIRDERS AND COLUMNS UNLESS OTHERWISE NOTED.

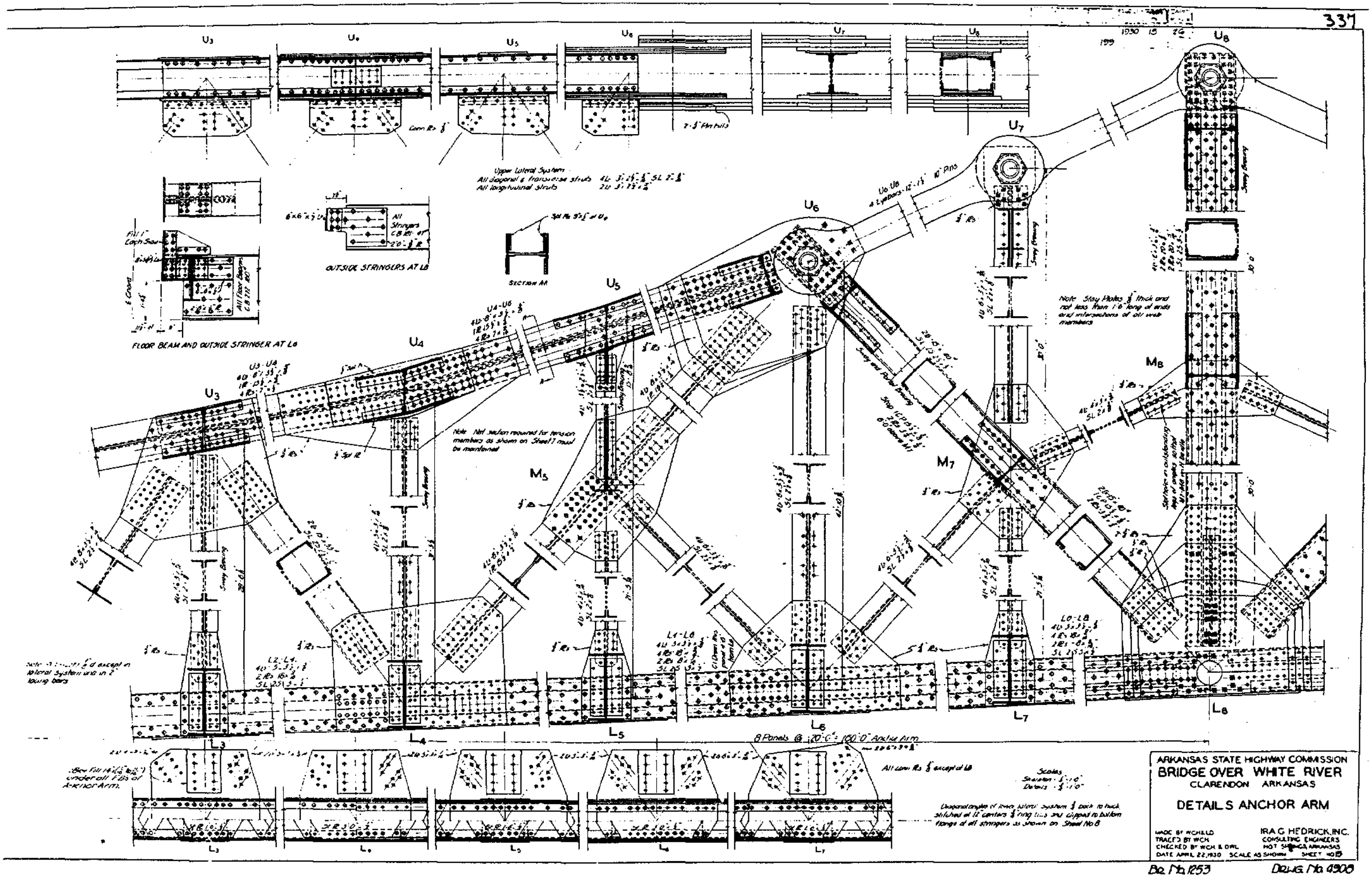
CHAMFERS TO BE 2" THROUGHOUT UNLESS OTHERWISE NOTED.

AT ALL SPLICES, BARS TO BE LAPPED NOT LESS THAN 40D.

CONSTANTS

	CONCRETE 1-1-2 MIX	STEEL
FLOOR SLABS, CROSS GIRDERS, GIRDERS, ETC.	975 # PER SQ. IN.	
BEAMS CONTINUOUS OVER SUPPORTS: AT CENTER OF BEAMS	975 - - - -	
BEAMS CONTINUOUS OVER SUPPORTS: OVER SUPPORTS	1125 - - - -	
BOND FOR STEEL IN CONCRETE	150 - - - -	
COLUMNS IN DIRECT COMPRESSION	900 - 22L/D - - - -	
NOTE FOR 1-2-4 CONCRETE DECREASE ABOVE STRESSES 33⅓ %		
TENSION NET SECTION		16000 # PER SQ. IN.
COMP. IN COLS. & OTHER COMP. MEMBERS. FIXED ENDS	900 - 22L/D - - - -	
MODULUS OF ELASTICITY. STEEL		30000000 - - - -
MODULUS OF ELASTICITY. CONCRETE 1-2-4	2000000 - - - -	
MODULUS OF ELASTICITY. CONCRETE 1-1-2	3000000 - - - -	
VARIATION IN TEMPERATURE	±50°	
COEFFICIENT OF EXPANSION	.0000060	.0000067

Br. No. 1253   Drwg. No. 4901


337
FLOOR BEAM AND OUTSIDE STRINGER AT L8
OUTSIDE STRINGERS AT L8
SECTION M
Upper Lateral System
All diagonal & transverse struts
All longitudinal struts
Note Net section required for tension members as shown on Sheet 7 must be maintained
Note Stay Plates thick and not less than 1'-6" long at ends and intersections of all web members
8 Panels @ 20'-0" = 160'-0" Anchor Arm
Scales
Skeleton - 1/8" - 1'-0"
Details - 1/2" - 1'-0"
ARKANSAS STATE HIGHWAY COMMISSION
BRIDGE OVER WHITE RIVER
CLARENDON ARKANSAS
DETAILS ANCHOR ARM
IRA G. HEDRICK, INC.
CONSULTING ENGINEERS
HOT SPRINGS, ARKANSAS
DATE APRIL 22, 1930
Br. No. 1253
Drwg. No. 4908

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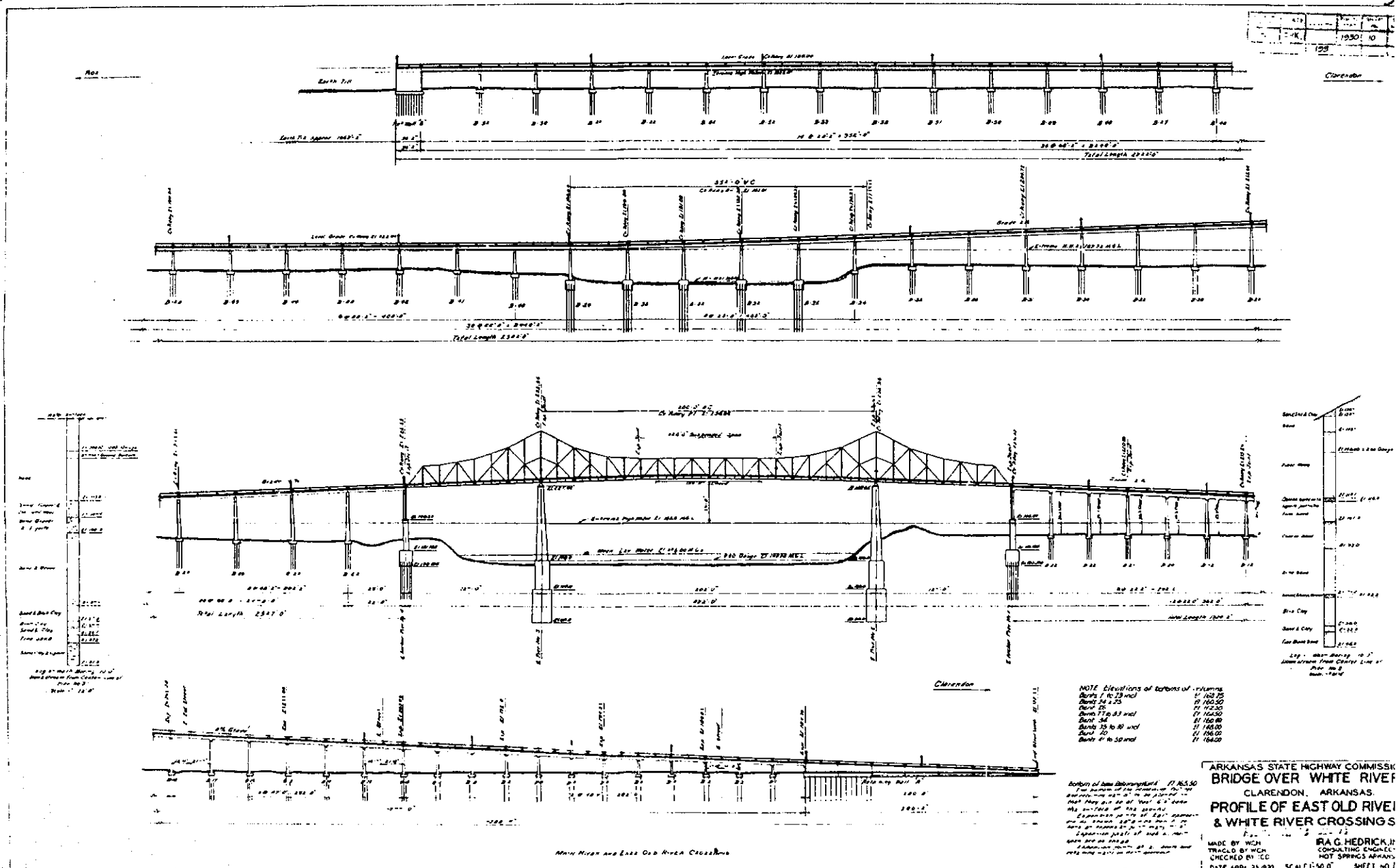

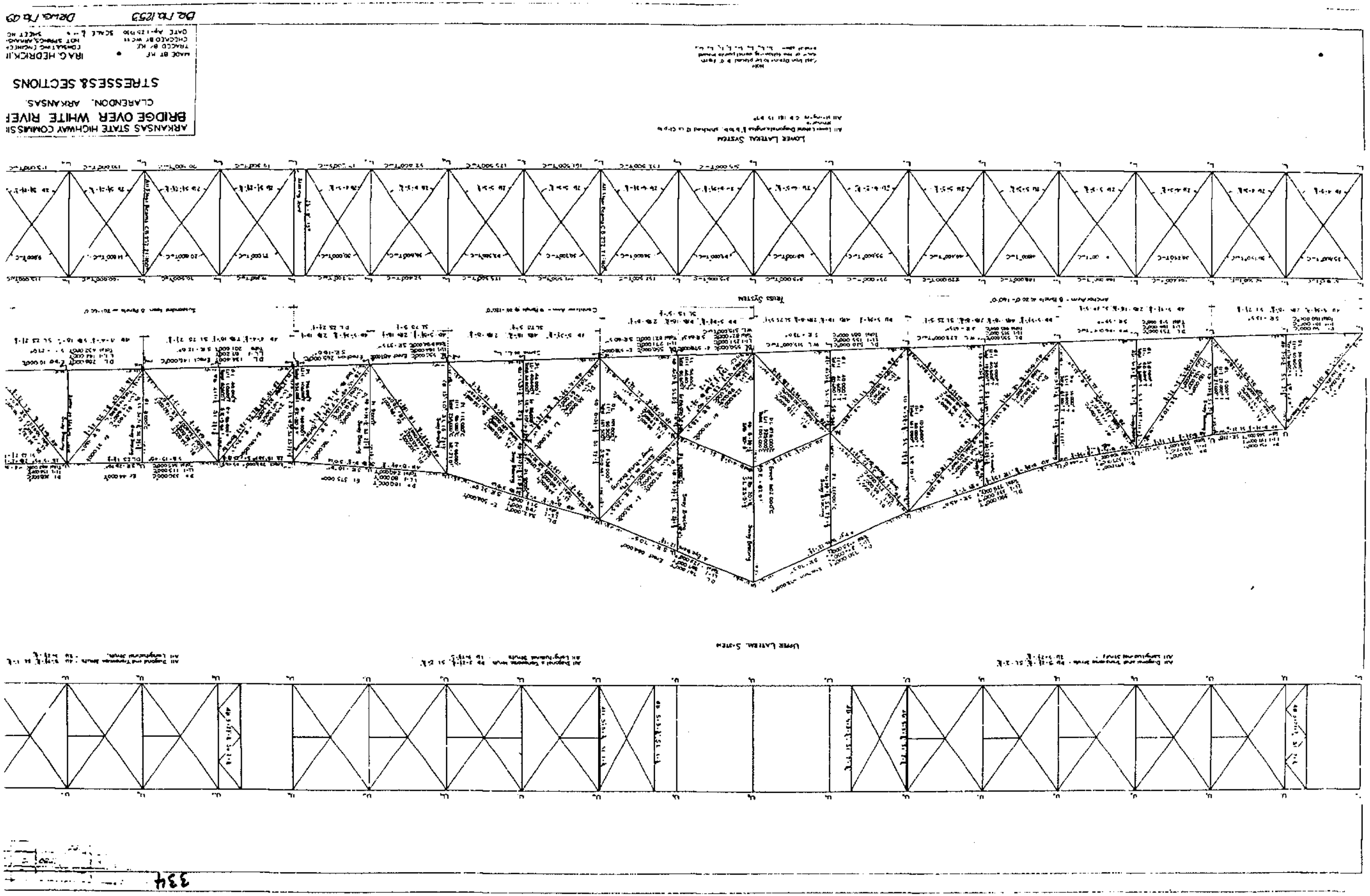
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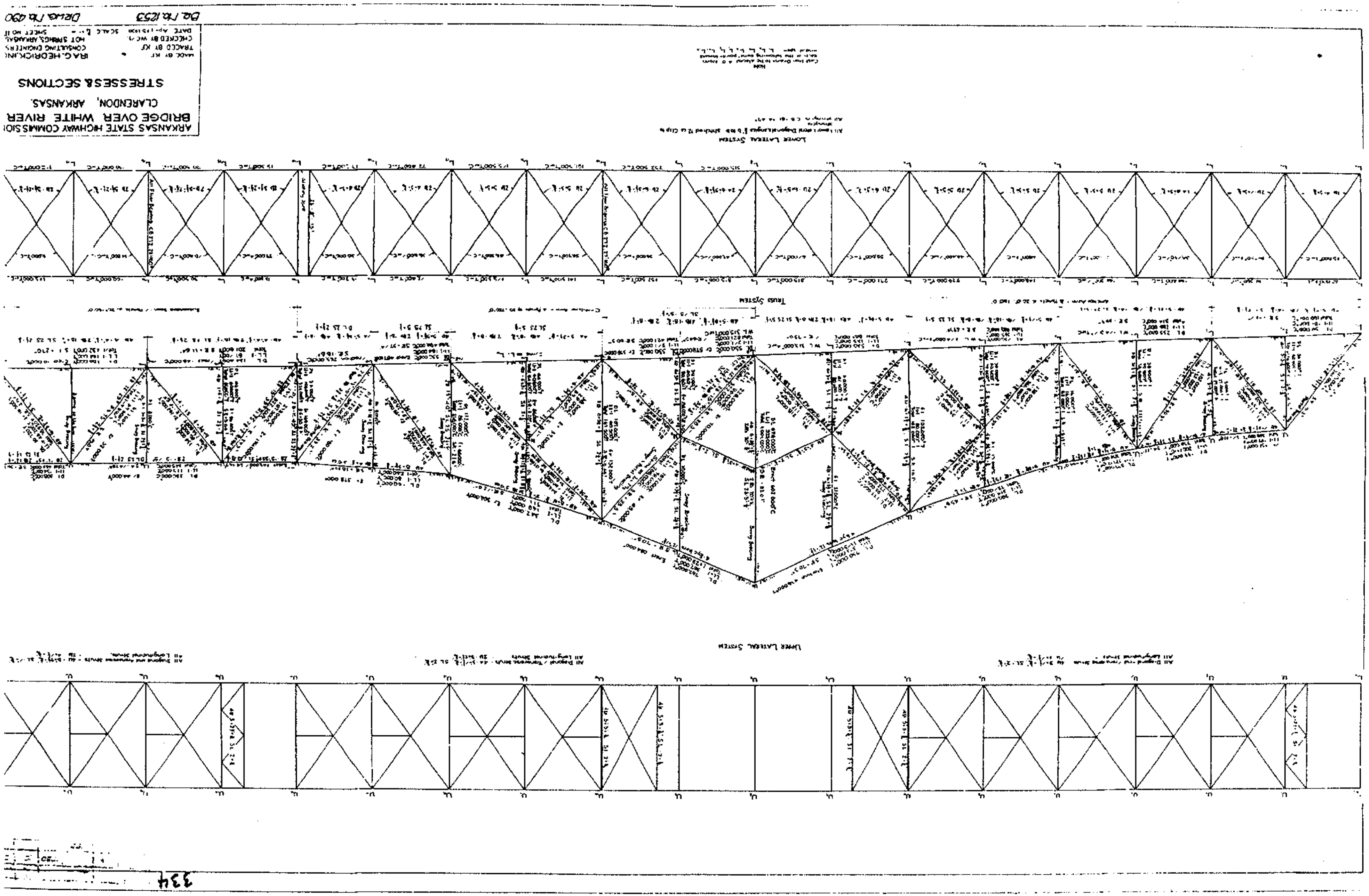
CLARENDON, ARKANSAS.
STRESSES & SECTIONS
IRA G. HEDRICK
Upper Lateral System
Truss System
Lower Lateral System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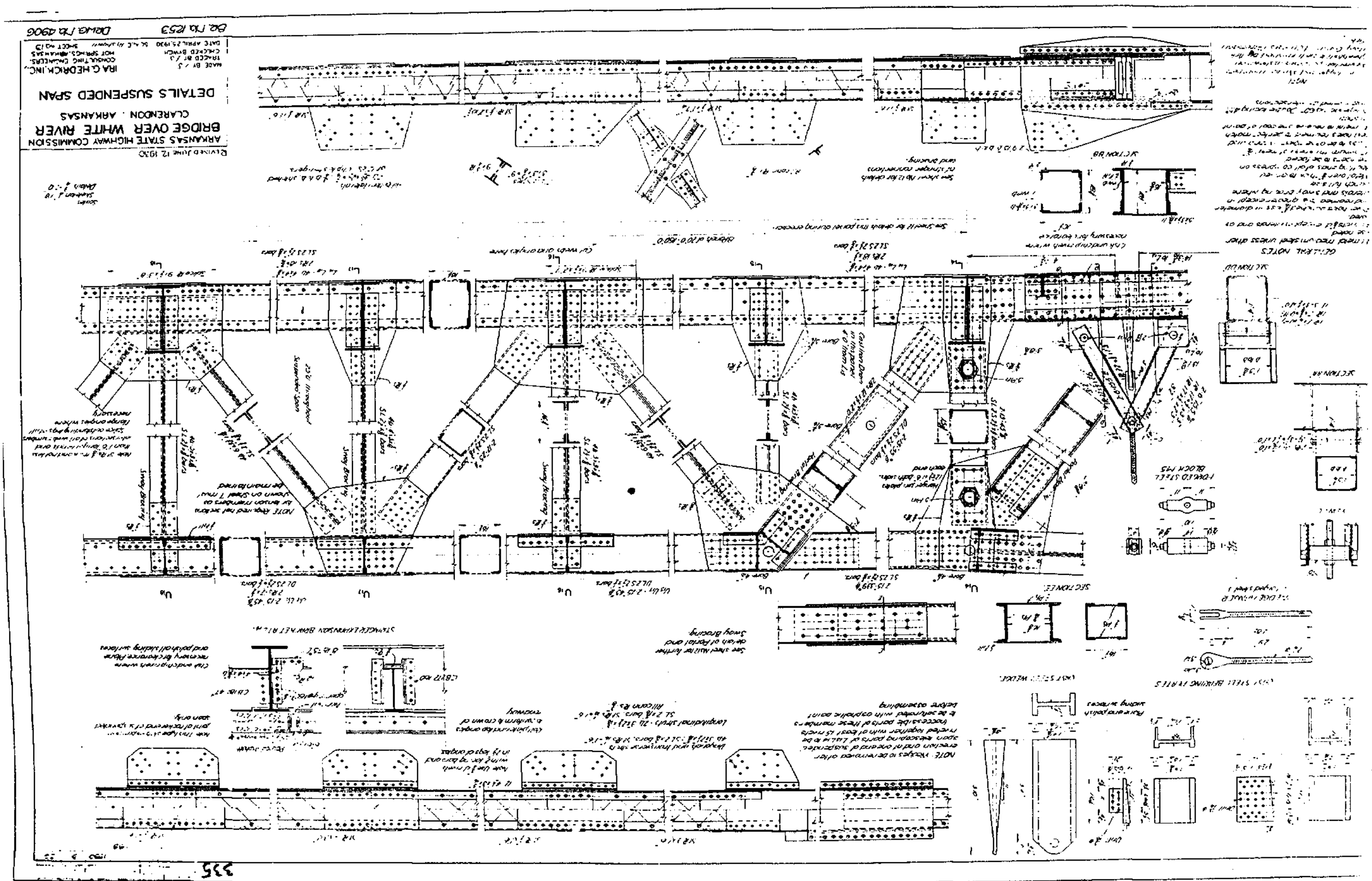
Br. No. 1253
Drwg. No. 490
LOWER LATERAL SYSTEM
TRUSS SYSTEM
UPPER LATERAL SYSTEM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BRIDGE OVER WHITE RIVER
CLARENDON, ARKANSAS
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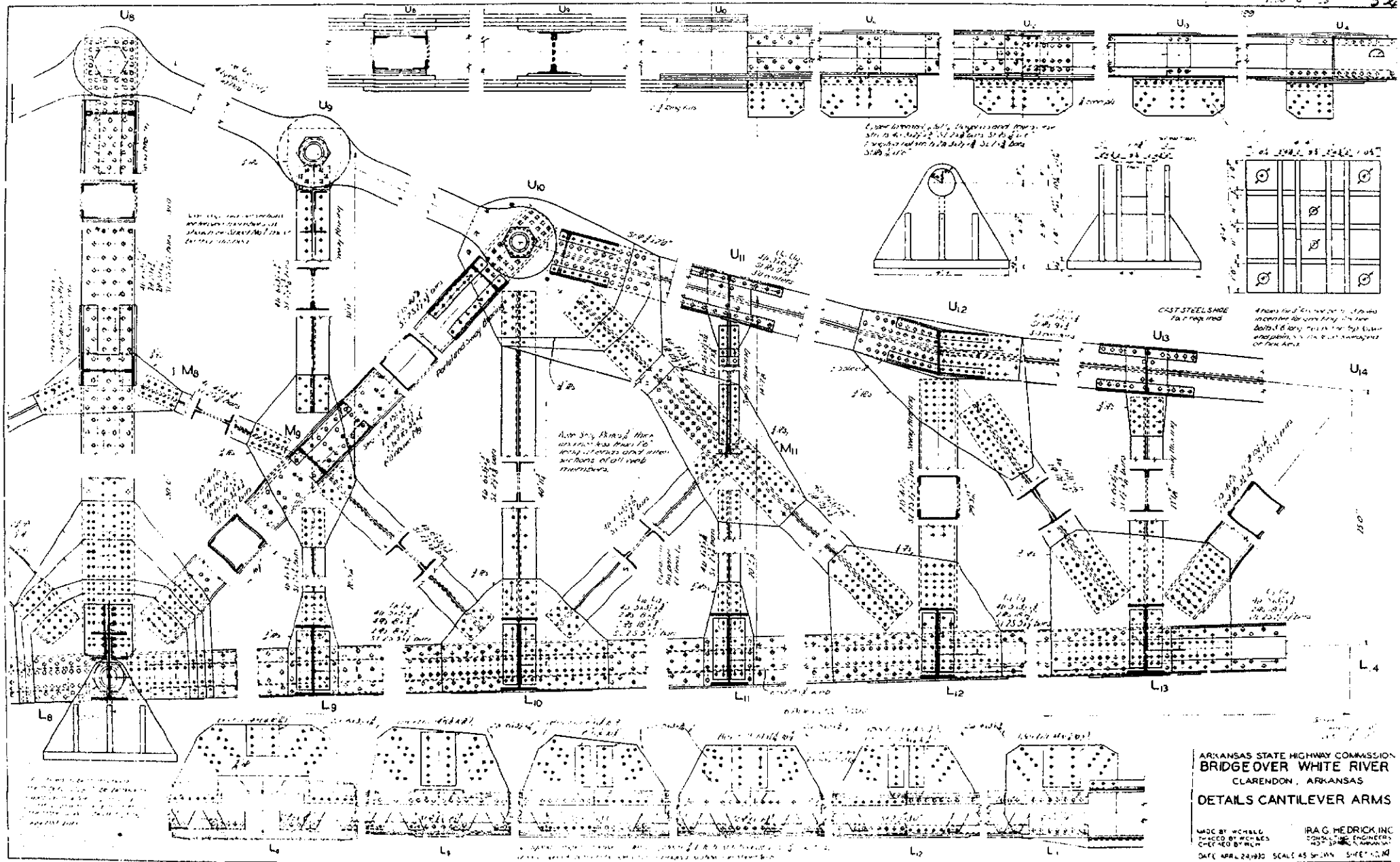
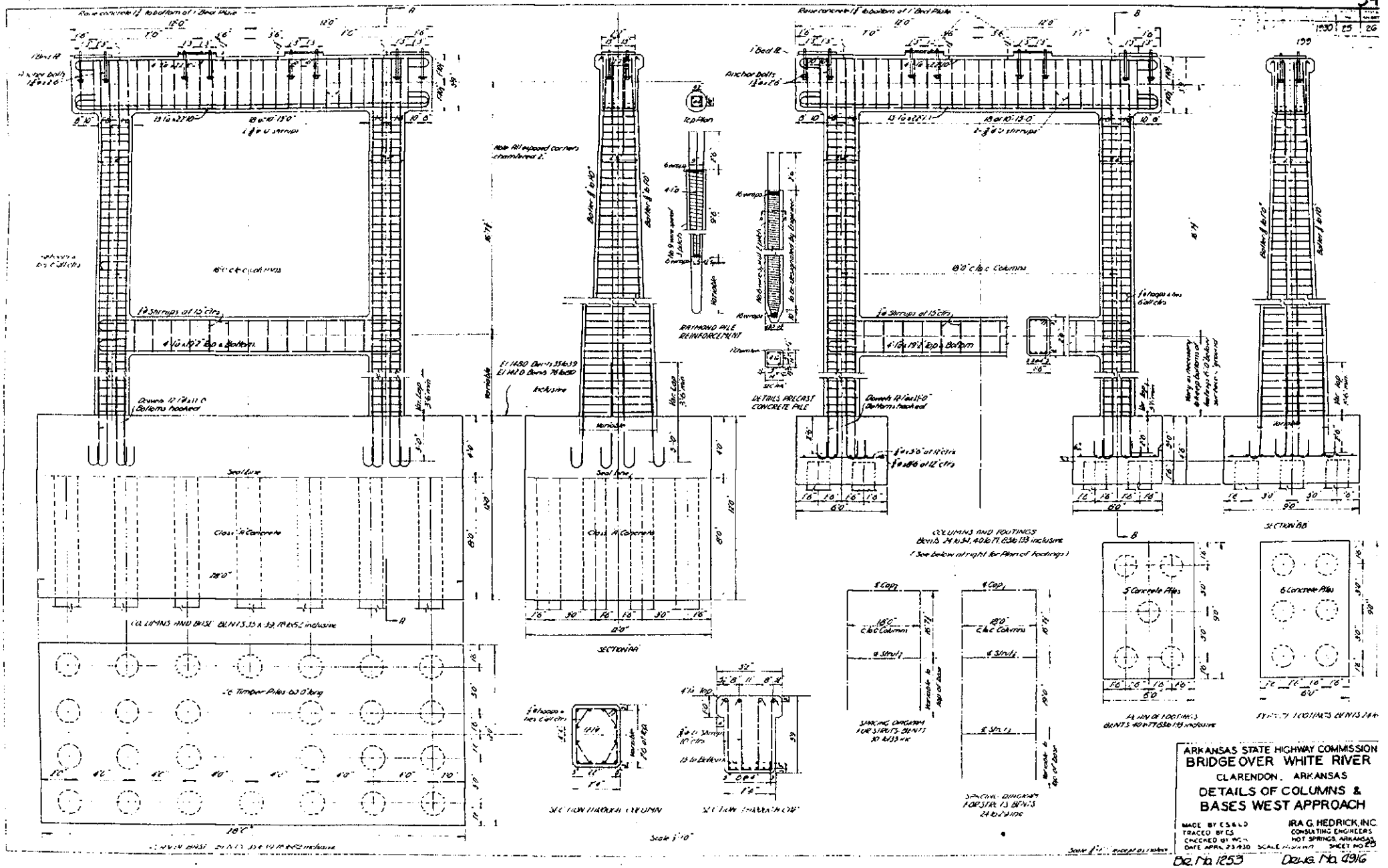
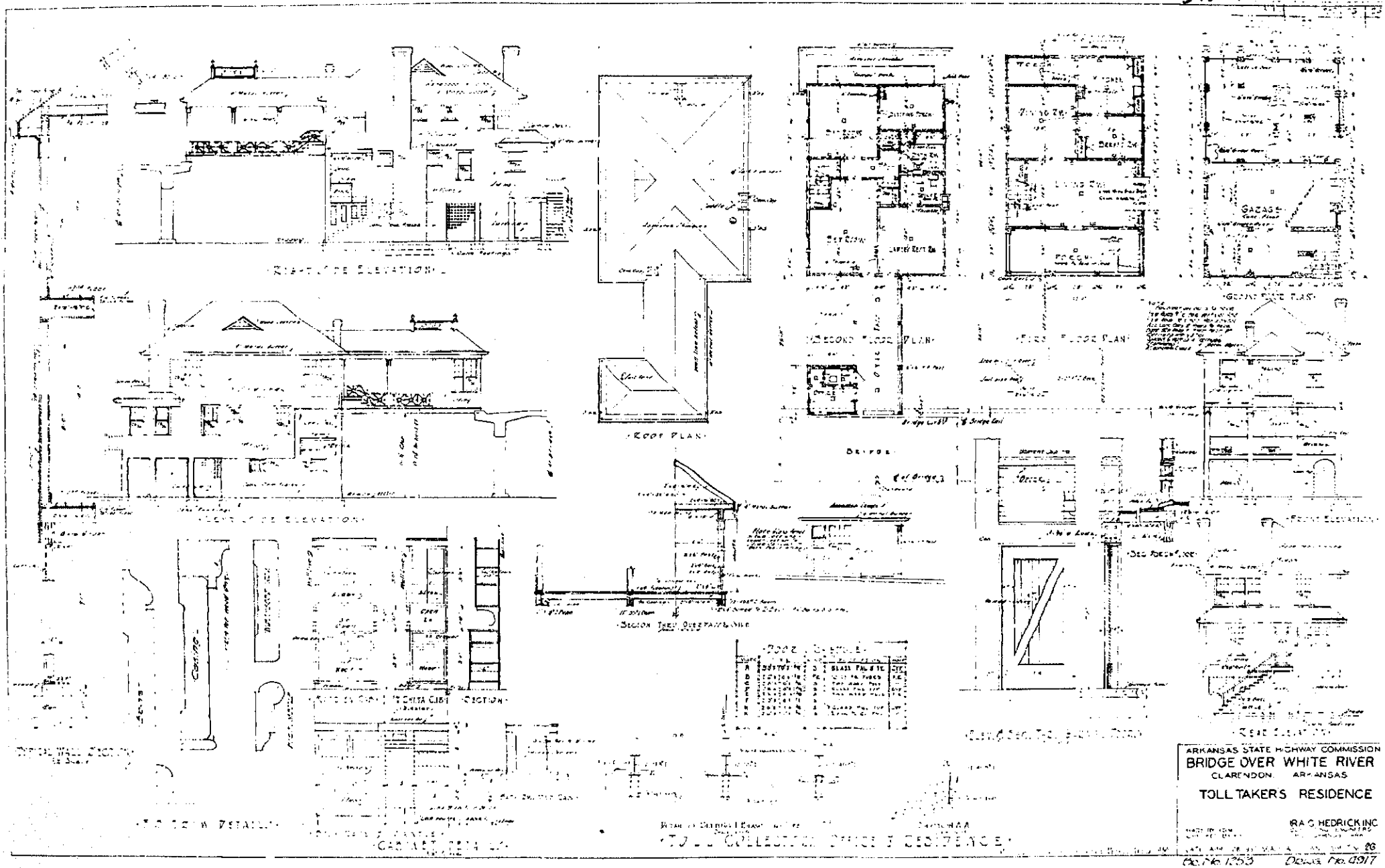
HOT SPRINGS, ARKANSAS
Br. No 1253
Dwg. No 4906
GENERAL NOTES
CAST STEEL BEARING PLATES
CAST STEEL WEDGE
FORGED STEEL BLOCK

AR-49

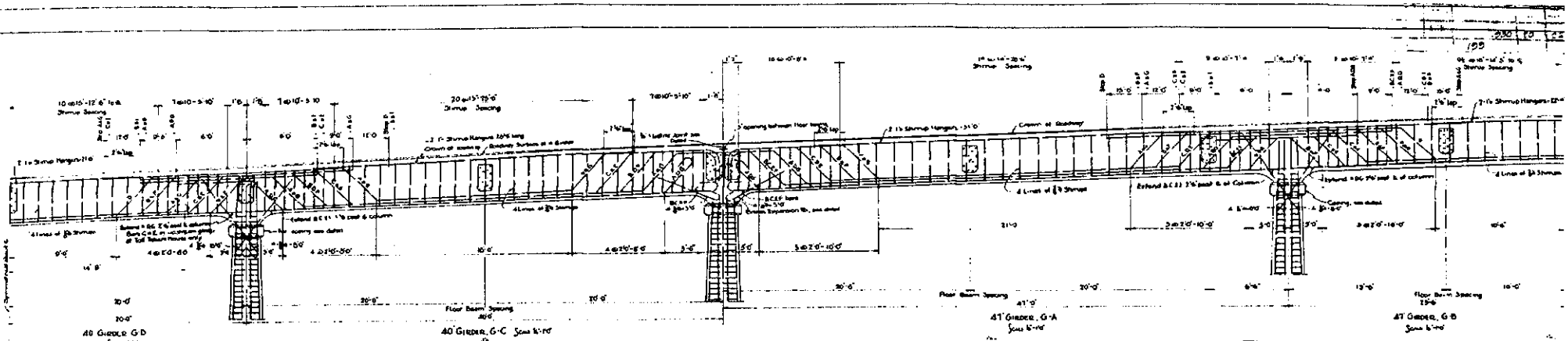


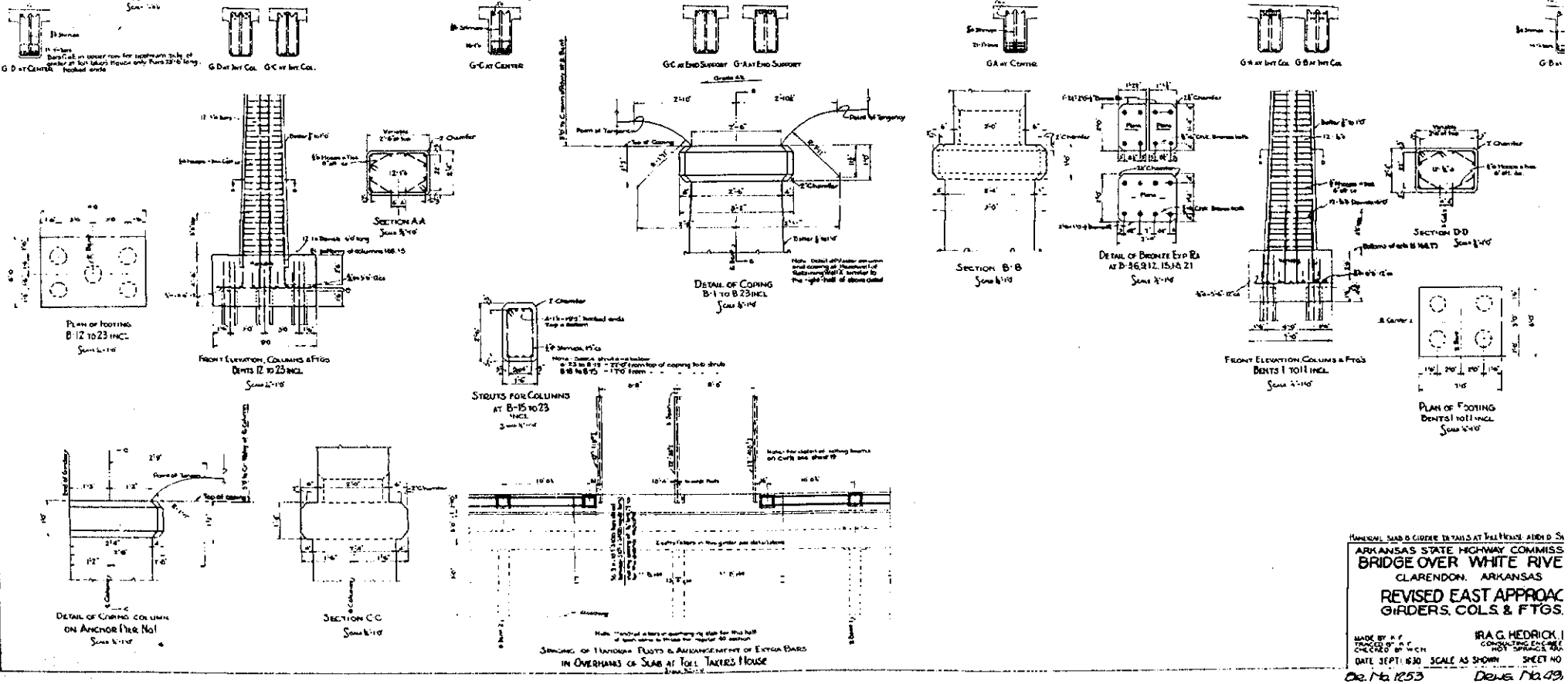




ARKANSAS STATE HIGHWAY COMMISSION
BRIDGE OVER WHITE RIVER
CLARENDON ARKANSAS
TOLL TAKERS RESIDENCE
IRA G. HEDRICK INC
Dg. No. 1253 Drwg. No. 4917

AR-49





ARKANSAS STATE HIGHWAY COMMISS
BRIDGE OVER WHITE RIVE
CLARENDON, ARKANSAS
REVISED EAST APPROAC
GIRDERS, COLS. & FTGS.

IRA G. HEDRICK
CONSULTING ENGINEER
HOT SPRINGS, ARK.

DATE SEPT. 1930 SCALE AS SHOWN SHEET NO

Dr. No. 1253 Dwg. No. 49

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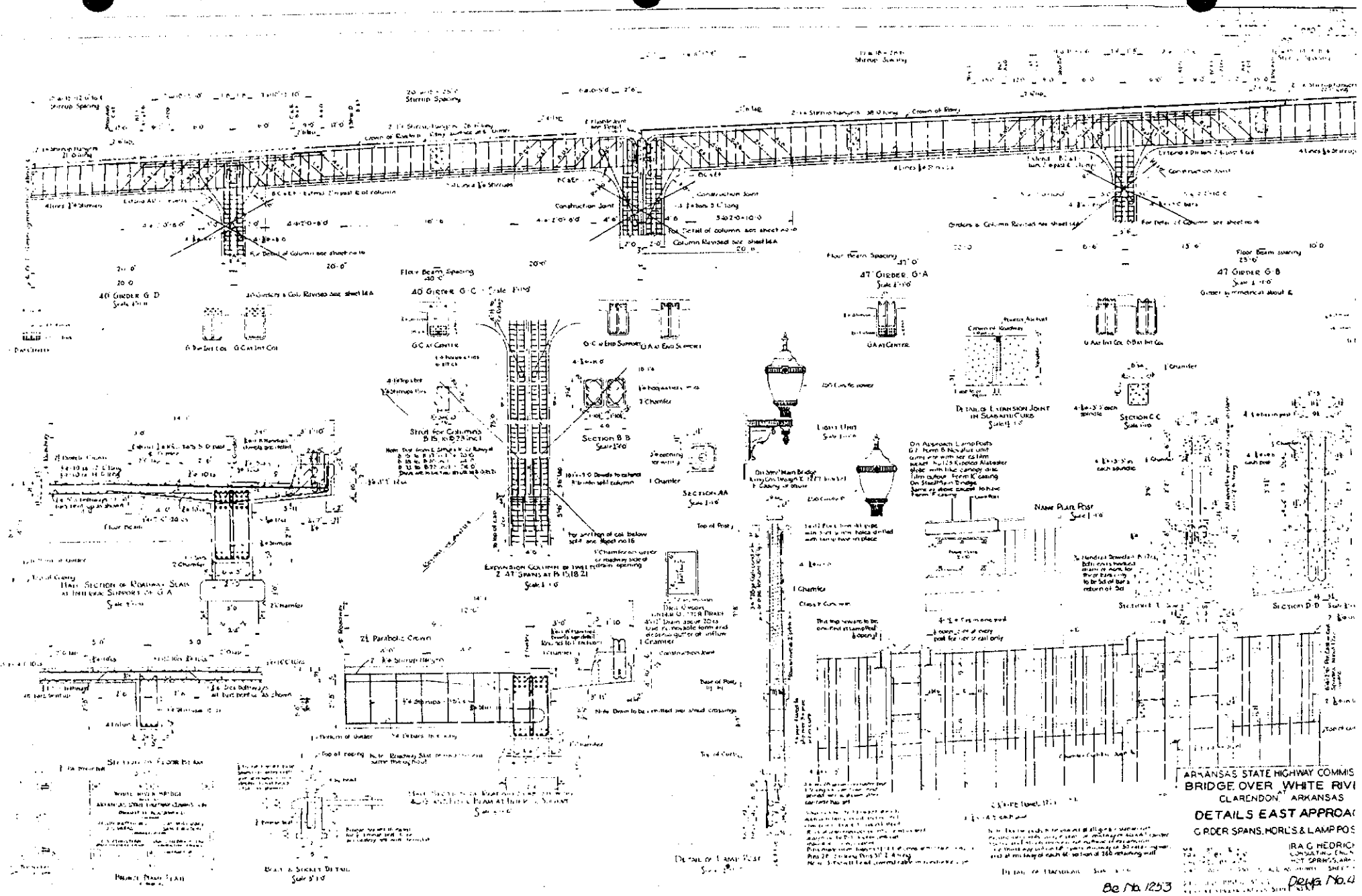
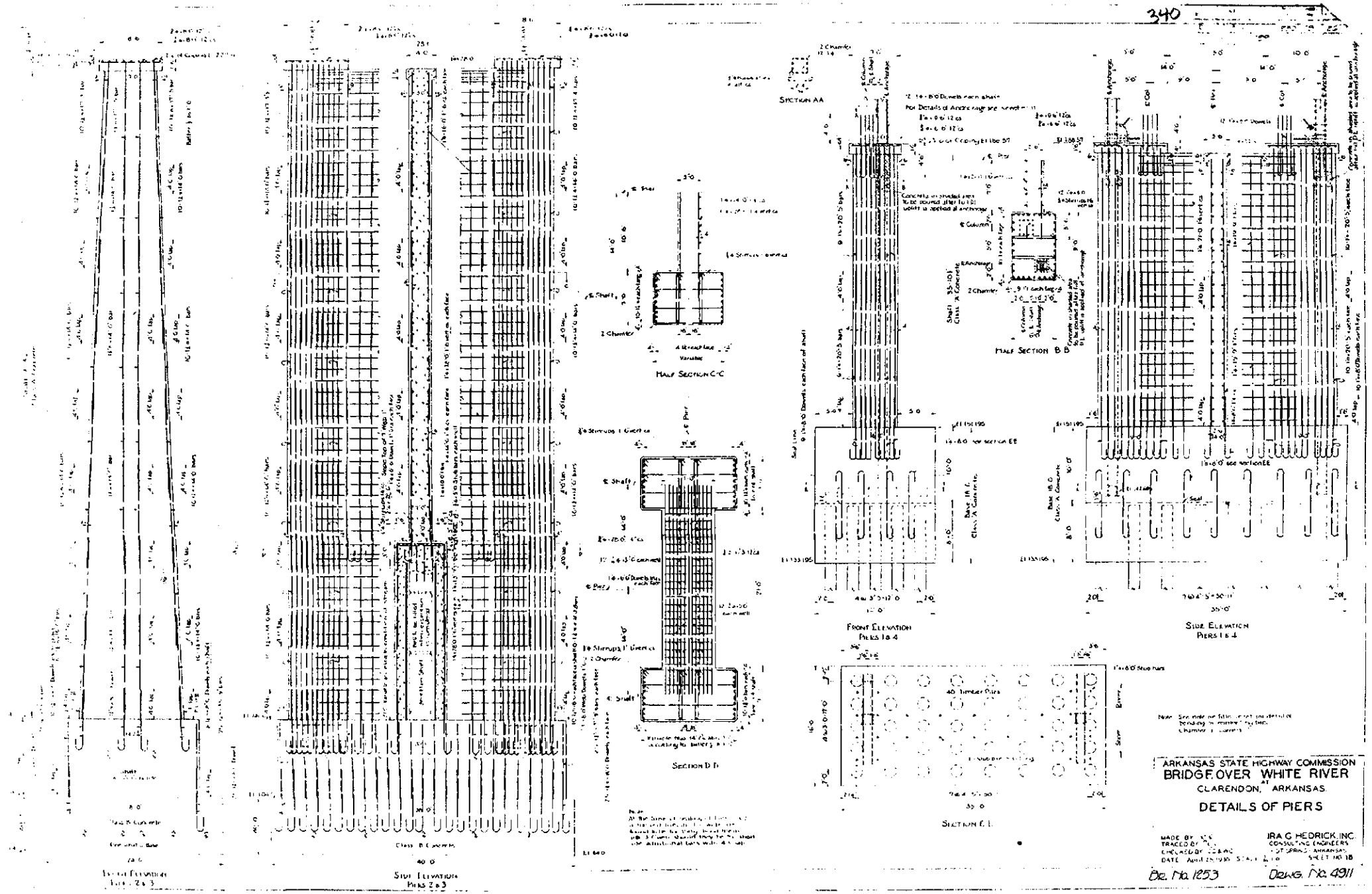
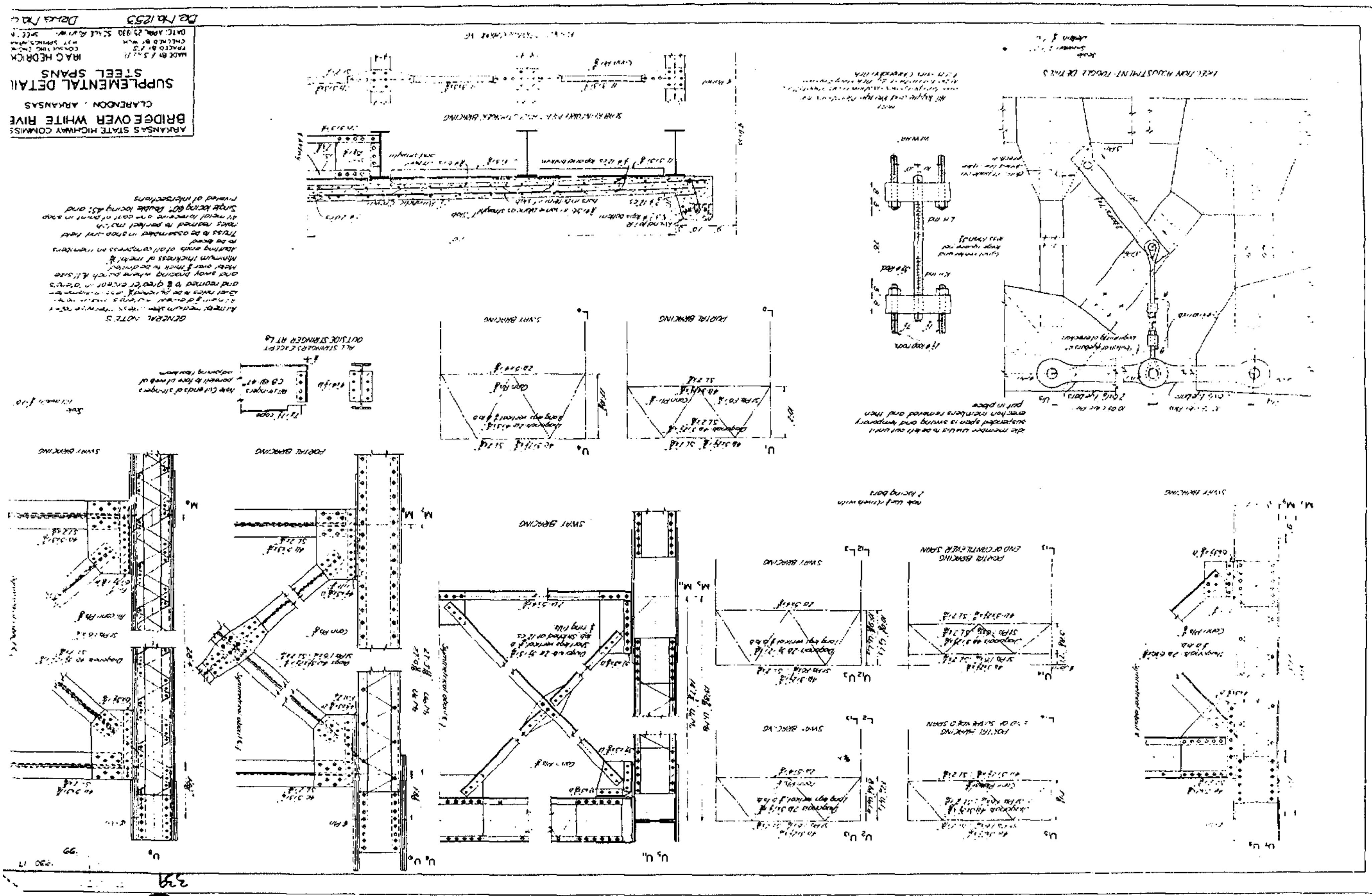
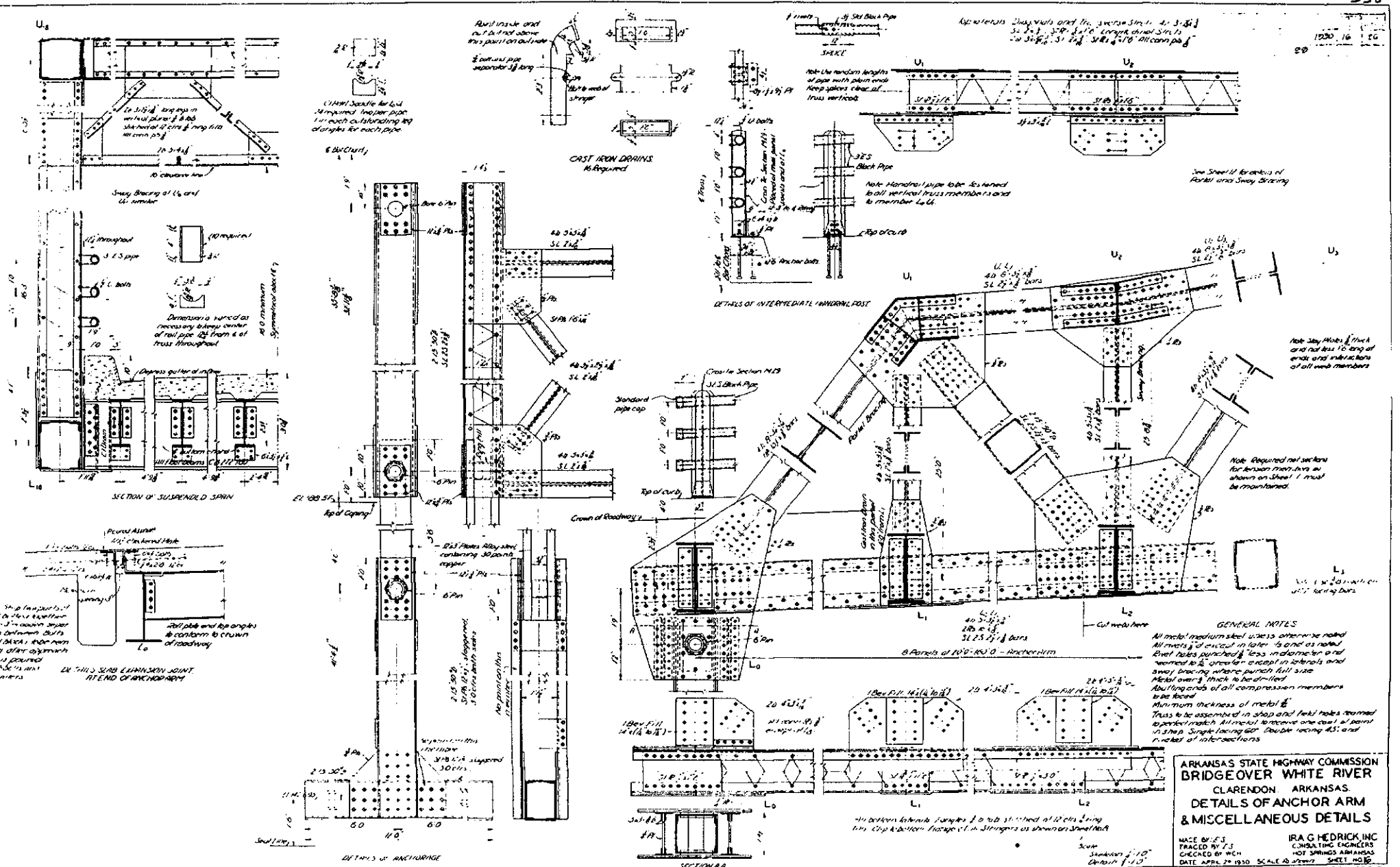
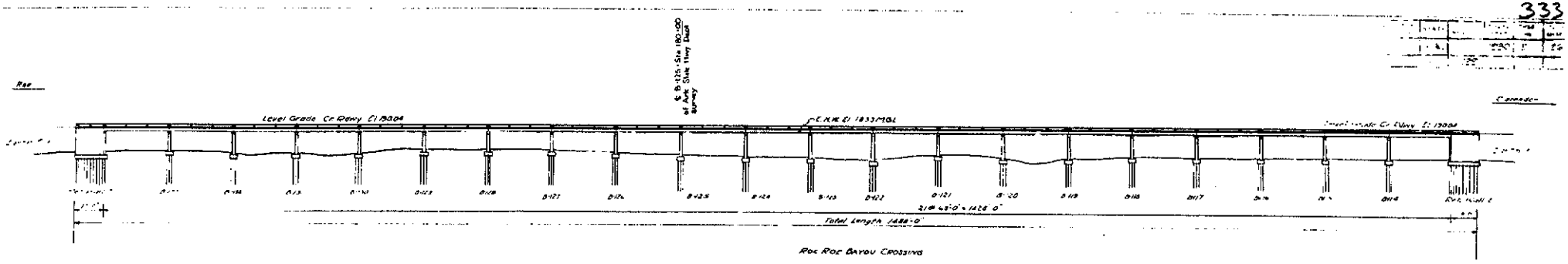


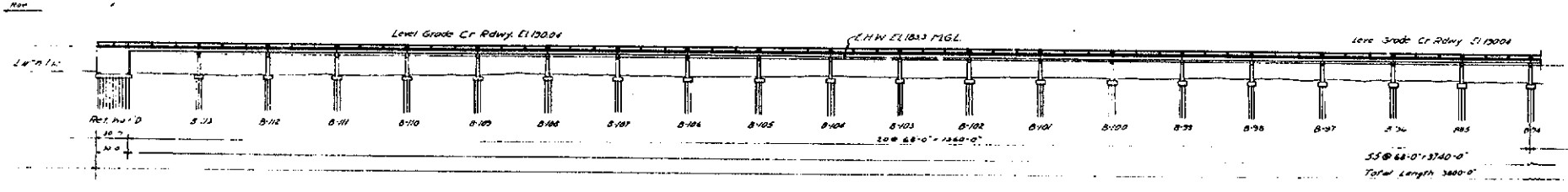

Section AA
Half Section C-C
Half Section B-B
Section D-D
Front Elevation
Piers 1 & 4
Side Elevation
Piers 1 & 4
Side Elevation
Piers 2 & 3
Section E-E
ARKANSAS STATE HIGHWAY COMMISSION
BRIDGE OVER WHITE RIVER
AT
CLARENDON, ARKANSAS
DETAILS OF PIERS
IRA G. HEDRICK, INC.
CONSULTING ENGINEERS
HOT SPRINGS, ARKANSAS
Br. No. 1853
Drwg. No. 4911

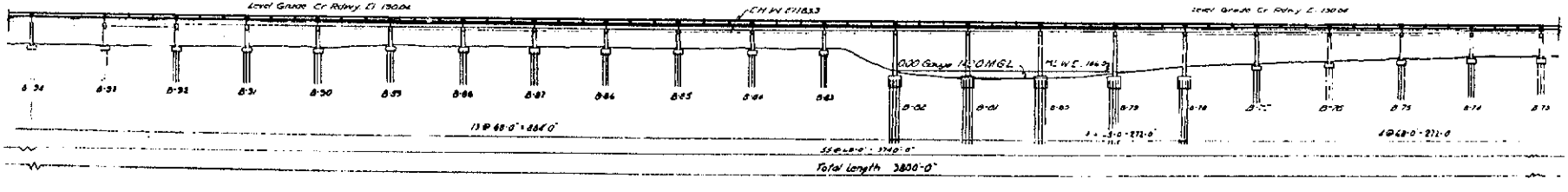

ARKANSAS STATE HIGHWAY COMMISS
BRIDGE OVER WHITE RIVE
CLARENDON, ARKANSAS
SUPPLEMENTAL DETAI
STEEL SPANS
IRA G HEDRICK
GENERAL NOTES
SWAY BRACING
PORTAL BRACING
ERECTION ADJUSTMENT-TOGGLE DETAILS
ALL STRINGERS EXCEPT OUTSIDE STRINGER AT L0

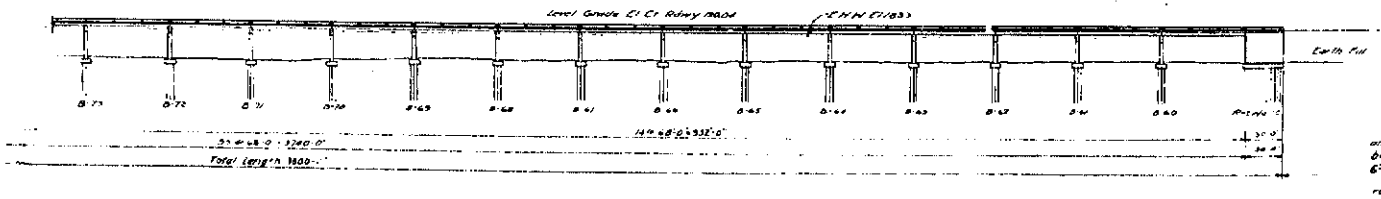

SECTION OF SUSPENDED SPAN
DETAILS OF EXPANSION JOINT AT END OF ANCHOR ARM
DETAILS OF ANCHORAGE
CAST IRON DRAINS
DETAILS OF INTERMEDIATE HANDRAIL POST
SECTION A-A
GENERAL NOTES
ARKANSAS STATE HIGHWAY COMMISSION
BRIDGE OVER WHITE RIVER
CLARENDON, ARKANSAS.
DETAILS OF ANCHOR ARM
& MISCELLANEOUS DETAILS
IRA G. HEDRICK, INC
CONSULTING ENGINEERS
HOT SPRINGS ARKANSAS
Be. No. 1253
DRWG. No. 4909

333









WEST OLD RIVER CROSSING

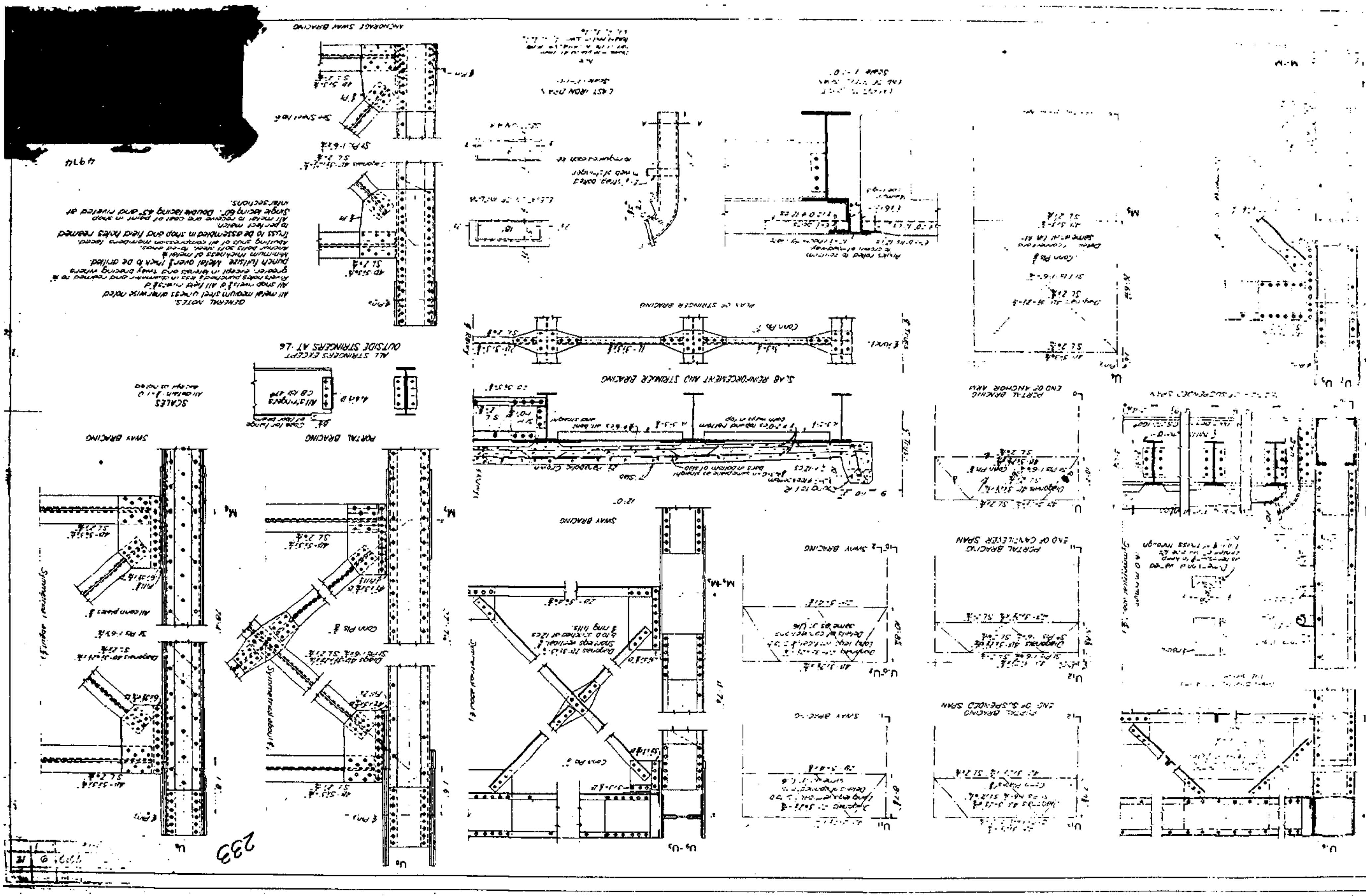
Note: Elevations, bottoms of Caissons:
Bents 60 to 76 incl El 1545
Bents 77 to 77 incl El 1560
Bents 78 to 82 incl El 1430
Bents 83 to 115 incl El 1645
Bents 116 to 135 incl El 1600
Bents 136 to 139 incl El 1640

The bottom of the remaining footings and retaining walls C.L.D. & T. to be placed so that they will be at least 6'-0 below the surface of the ground. Expansion joints at abutments and retaining walls on west approach

Revised West Old River Crossing Aug 20 30
Revised July 10 30 E.I.

ARKANSAS STATE HIGHWAY COMMISSION
BRIDGE OVER WHITE RIVER
CLARENDON, ARKANSAS
PROFILE OF ROC ROE BAYOU
& WEST OLD RIVER CROSSINGS
Route No. 79 Sec. 19
MADE BY W.C.H.
TRACED BY I.C.D.
CHECKED BY W.C.H.
DATE APRIL 22 1930 SCALE 1"=50'-0" SHEET NO. 11
IRA G. HEDRICK, INC.
CONSULTING ENGINEERS
HOT SPRINGS, ARKANSAS
Br. No. 1553 Dwg. No. 490X

[redacted]


SWAY BRACING
PORTAL BRACING
SCALES
ALL STRINGERS EXCEPT
OUTSIDE STRINGERS AT L6
GENERAL NOTES.
SLAB REINFORCEMENT AND STRINGER BRACING
PLAN OF STRINGER BRACING
ANCHORAGE SWAY BRACING
CAST IRON DRAIN
PORTAL BRACING
END OF ANCHOR ARM
PORTAL BRACING
END OF CANTILEVER SPAN
PORTAL BRACING
END OF SUSPENDED SPAN
4974
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