Memo to Historical/Architectural File May 14, 1979

05-SB-101 41.1
Arroyo Hondo
05301 - 260501

Subject: Arroyo Hondo Bridge

Arroyo Hondo Bridge, Bridge No. 51-27L, 05-SB-101, P.M. 40.98 is described as reinforced concrete open spandrel arch spans with reinforced concrete slab approach spans on two-column bents, all on spread footings. Its eleven spans (five main arch spans, 6 approach spans) total 530 feet in length; bridge width is 21.2 feet. Railings are concrete baluster-type. The bridge is on a tangent alignment, with no skew. This structure was designed and built in 1918/19 by the California Highway Commission.

Prior to widespread automobile use, the coast road between Santa Barbara and Gaviota Pass was interrupted by a series of canyons, each of which necessitated the alignment to curve inland to a point where an easy crossing was possible. These canyons required major engineering in order to bridge during improvement of this route in the 1917/18 period. One such canyon was Arroyo Hondo, where, in August 1918, construction was begun by Ledbetter & Co. (of 651 Pacific Electric Building, Los Angeles) on plans and specifications prepared by the California Highway Commission. The plans called for an open spandrel reinforced concrete arch bridge, whose five parabolic arches were to be surmounted by columns and round arches (forty-four round arches total) supporting the deck. Because of the isolated job site, it was necessary to ship all materials--cement from the California Portland Cement Company, aggregate from Russell, Greene & Foell of Los Angeles, reinforcing steel from American System of Reinforcing of Los Angeles, expansion joints from Llewellyn Iron Works of San Francisco--via the Southern Pacific Railroad's Coast Line to nearby Tajiguas Siding. From there the materials were hauled two miles by concrete road to Arroyo Hondo. The wooden falsework for the bridge used timbers up to 10" x 10" x 40 feet. Because of World War I and because of the height (70 feet) of the job, labor was scarce and hard to keep on the job. Labor costs at the time saw foremen earning $9.00/day, carpenters $4.80-$5.20/day, teamsters $4.00/day, laborers $4.00/day, and stock $2.00/head/day. Construction proceeded apace, manpower notwithstanding, and the bridge was completed in late 1919, at a total final cost of $87,804.

In concept, this structure shows remarkable similarity to the renowned (even then) Arroyo Seco Bridge at Pasadena (J.A.L. Waddell, engineer, Myron Hunt, architect) which was built in 1913 (see Attachments A and B). Both structures utilize parabolic main arches, surmounted by columns and round arches. In both, the columns rest on a plinth and have simplified Doric capitals,

from which the round arches are sprung. Both use baluster-type rails, though those at Arroyo Seco are much more ornate, being Baroque in style; those at Arroyo Hondo are simplified. It seems likely that the Arroyo Hondo Bridge is a direct descendant of Arroyo Seco, and, because of the topography of the site, achieves a greater overall gracefulness.

The Arroyo Hondo Bridge appears to meet National Register criteria (Attachment E) for local level significance in the areas of engineering and architecture. It possesses integrity of location, design, setting (though this has been somewhat compromised by the addition of parallel Bridge No. 51-27R on high fill in 1949), materials, workmanship, feeling and association. Under criterion C, the structure embodies the following characteristics:

a. Type: multiple-span reinforced concrete open spandrel parabolic arch. In design, it is related to the pace-setting Arroyo Seco Bridge. It utilizes aesthetic design principles which create unity while avoiding duality (or perfect symmetry), a feature which was set forth, as desirable in multiple-span arch bridges as late as ca. 1940, again marking this structure as a prototype in terms of architectural design.

b. Period: the early 20th century (1900-1930) saw the rapid and widespread development of reinforced concrete as the preferred material for bridges. This structure thus is representative of this period in terms of engineering. In terms of its architectural design, the feature of unity, avoiding duality, must also be addressed here, with this structure being among the first to achieve this feature of design. Further, this period in architecture saw the Classical Revival espousing reliance upon ancient Greek and Roman design features for monumental structures. In keeping with this, Arroyo Hondo Bridge's use of superimposed arches is stylistically related to Roman aqueduct design, wherein two or more tiers of arches were superimposed to carry water channels across canyons and valleys. Further, the use of simplified Doric (simple impost block plus abacus) capitals is taken from ancient Greek design, and is thus in keeping with contemporary building architecture.

c. Method of Construction: there were two major methods of construction in use for arch bridges in this period prior to the development of pre-cast, pre-stressed concrete bridges. One was the Thomas Arch, which cast the arch ribs on the ground in

a horizontal position prior to hoisting them into place. The other, used here, was the cast-in-place method utilizing in-place formwork, supported by extensive and often massive falsework, to receive the concrete and hold it until set in its final position. This latter method was the more typical of the two, particularly for bridges of this size.

In terms of local relationships, this bridge is by far the largest reinforced concrete, open spandrel arch bridge in Santa Barbara County. (The others are Arroyo Quemado Bridge, Bridge No. 51-28L on Route 101, a 341 foot structure built in 1917 to a design by Mayberry & Parker (Attachment C) and Rincon Creek Bridge, Bridge No. 51C-39, a 122 foot Thomas Arch built to a design by Thomas & Post ca. 1915 (Attachment D)). While these other bridges predate Arrcyo Hondo, the latter bridge is easily the most architecturally sophisticated of the three, and features greater attention to detail.

JOHN W. SNYDER
Staff Architectural Historian

Attachment

References:

Final Report, Contract 229, Construction of Arroyo Hondo Bridge, dated December 3, 1919.

Final Report, Contract 379, Construction of Highway Between Canada De Las Llagas and Los Chiqueros Creek, dated July 26, 1923.

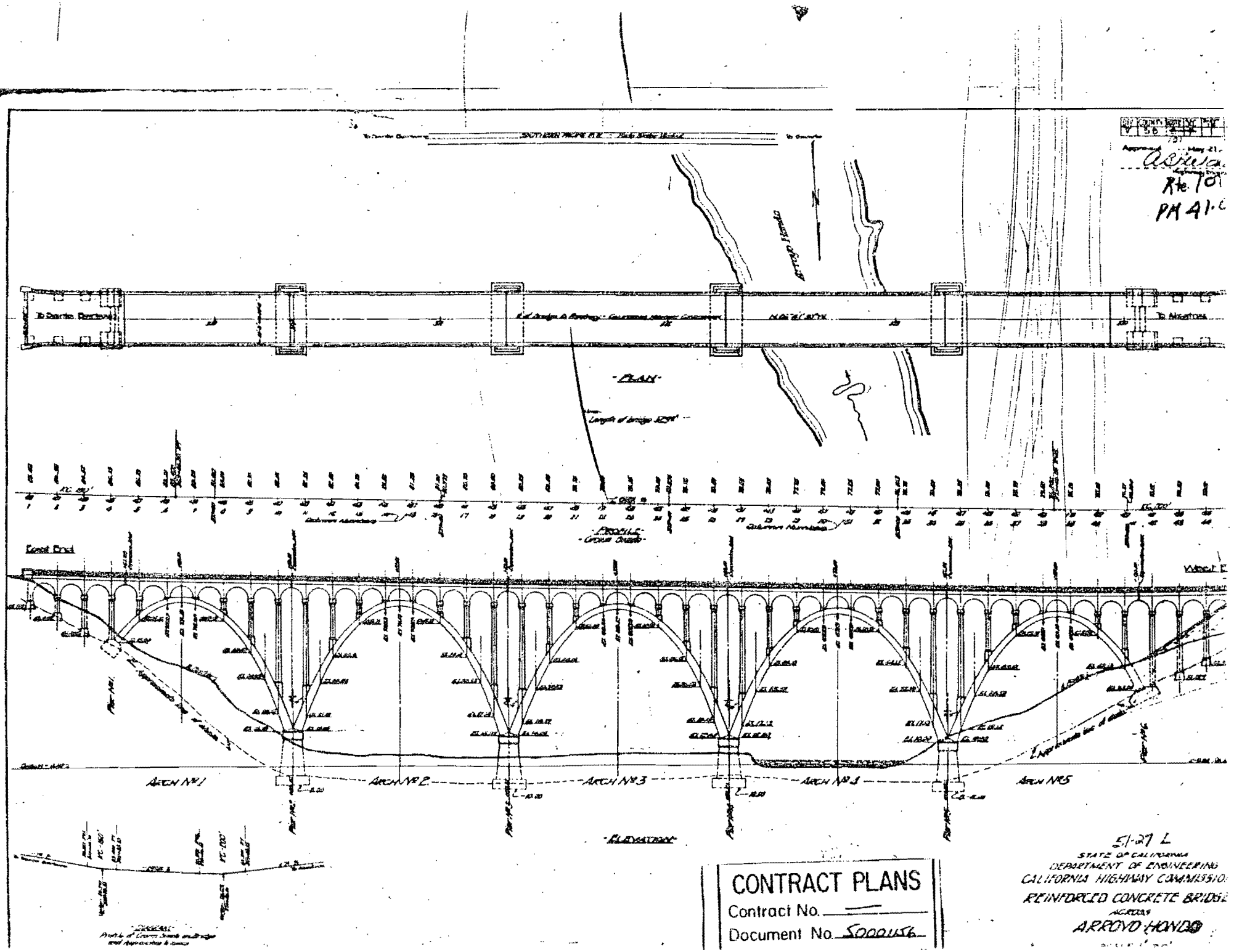
Revised Original Report, Bridge No. 51-27L, dated April 2, 1975.

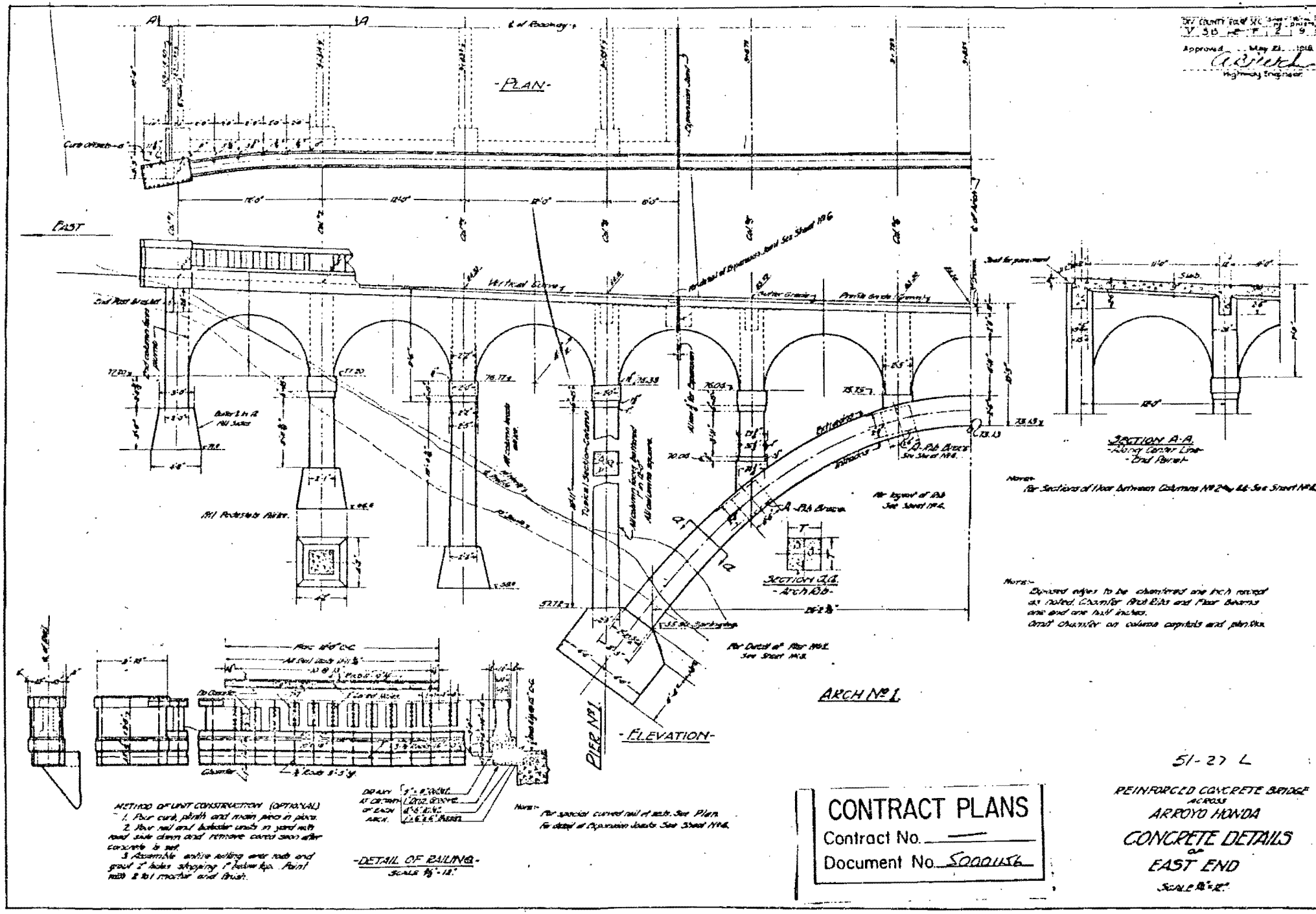
_____, Architectural Design of Concrete Bridges: Concrete For Permanence, Chicago, Portland Cement Association, n.d.

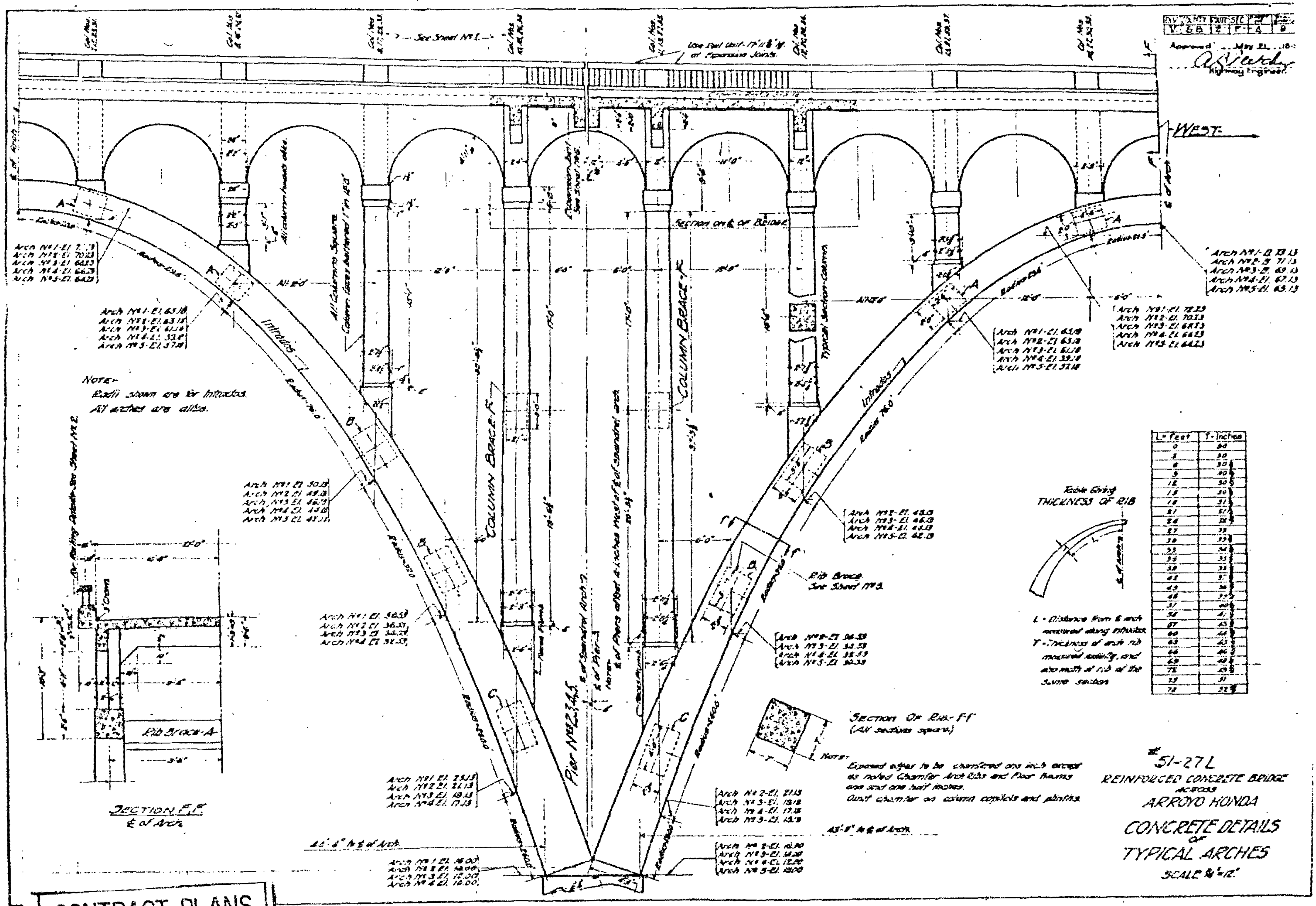
Tompkins, Walter A., "Hondo Bridge, 1918", Santa Barbara News-Press, January 20, 1974.

_____, "Arroyo Hondo Bridge Progress--1919", Santa Barbara Morning Press, January 19, 1919.

Personal Communication with Professor Carroll Pursell, California H.A.E.R. Survey Coordinator, U.C. Santa Barbara, May 9, 1979.


Rte. 101
PM 41.0
"PLAN"
Length of Bridge 824'
"PROFILE"
Grade Curve
Forest Blvd.
ARCH No 1
ARCH No 2
ARCH No 3
ARCH No 4
ARCH No 5
"ELEVATION"
CONTRACT PLANS
Contract No. ——
Document No. 500016
51-27 L
STATE OF CALIFORNIA
DEPARTMENT OF ENGINEERING
CALIFORNIA HIGHWAY COMMISSION
REINFORCED CONCRETE BRIDGE
ARROYO HONDO


-PLAN-
EAST
-ELEVATION-
PIER No1.
ARCH No 1.
SECTION A-A
SECTION B-B
-DETAIL OF RAILING-
METHOD OF UNIT CONSTRUCTION (OPTIONAL)
CONTRACT PLANS
Contract No.
Document No. 5000156
REINFORCED CONCRETE BRIDGE
ACROSS
ARROYO HONDA
CONCRETE DETAILS
OF
EAST END
51-27 L

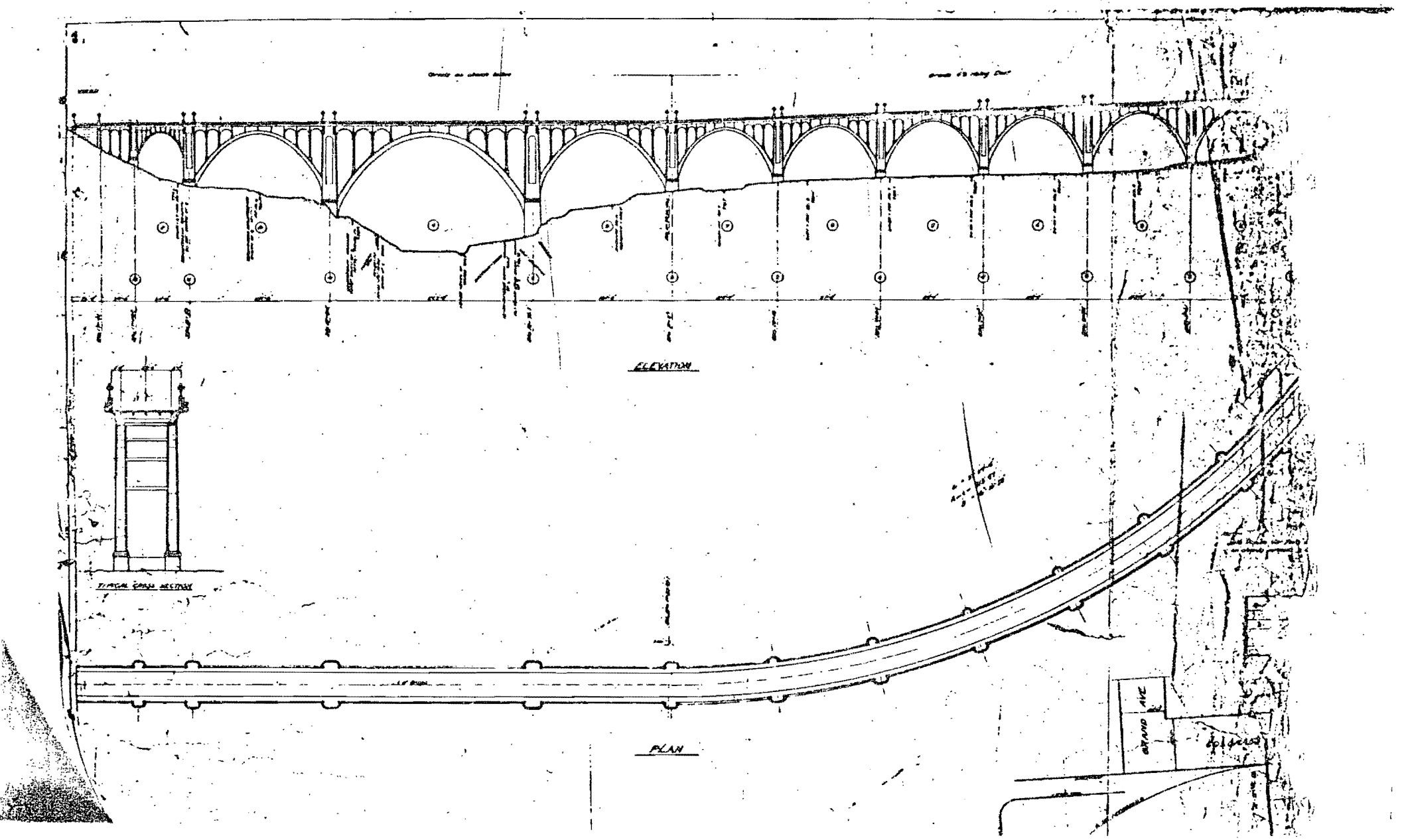

WEST-
See Sheet No 1.
COLUMN BRACE-F
COLUMN BRACE-F
Intrados
Intrados
Section on ℄ of Bridge
Typical Section-Column
All Columns Square
Column faces battered 1" in 12'0
Rib Brace. See Sheet No 3.
Pier No 2,3,4,5.
Note-
Radii shown are for Intrados.
All arches are alike.
Section F-F
℄ of Arch
Rib Brace-A-
Section of Rib-F-F
(All sections square)
Note-
Exposed edges to be chamfered one inch except as noted Chamfer Arch Ribs and Floor Beams one and one half inches.
Omit chamfer on column capitols and plinths.
Table Giving THICKNESS OF RIB
L = Distance from ℄ arch measured along Intrados
T = Thickness of arch rib measured radially, and also width of rib at the same section
Arch No 1-El. 72.13
Arch No 2-El. 70.13
Arch No 3-El. 68.13
Arch No 4-El. 66.13
Arch No 5-El. 64.13
Arch No 1-El. 63.18
Arch No 2-El. 63.18
Arch No 3-El. 61.18
Arch No 4-El. 59.18
Arch No 5-El. 57.18

L = Feet	T = Inches
0	30
3	30
6	30
9	30
12	30
15	30
18	31
21	31
24	32
27	33
30	33
33	34
36	35
39	36
42	37
45	38
48	39
51	40
54	41
57	43
60	44
63	45
66	46
69	48
72	49
75	51
78	52

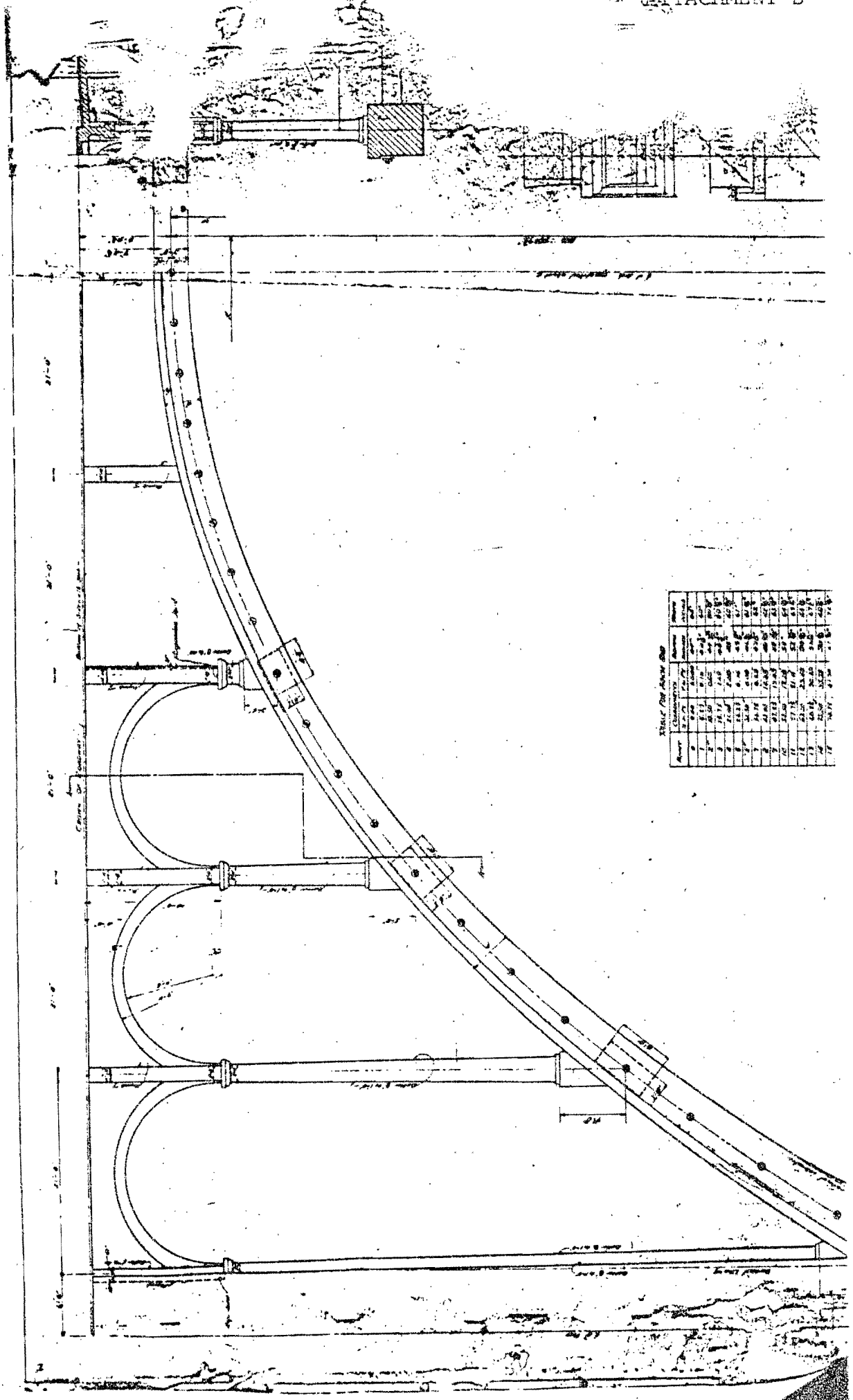
Approved May 21, 19..
Highway Engineer

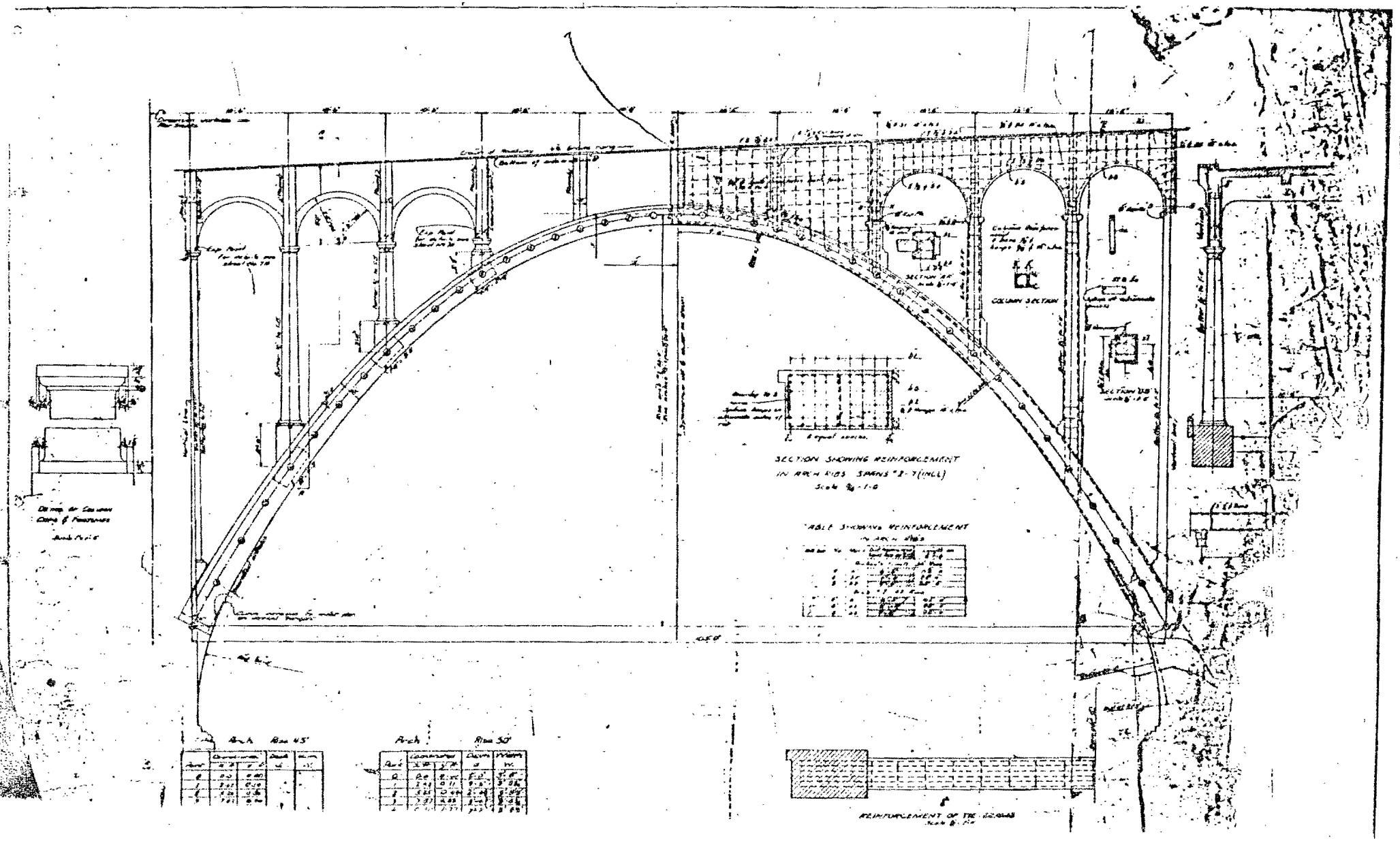
51-27L
REINFORCED CONCRETE BRIDGE
ACROSS
ARROYO HONDA
CONCRETE DETAILS
OF
TYPICAL ARCHES
SCALE ⅛"=1'

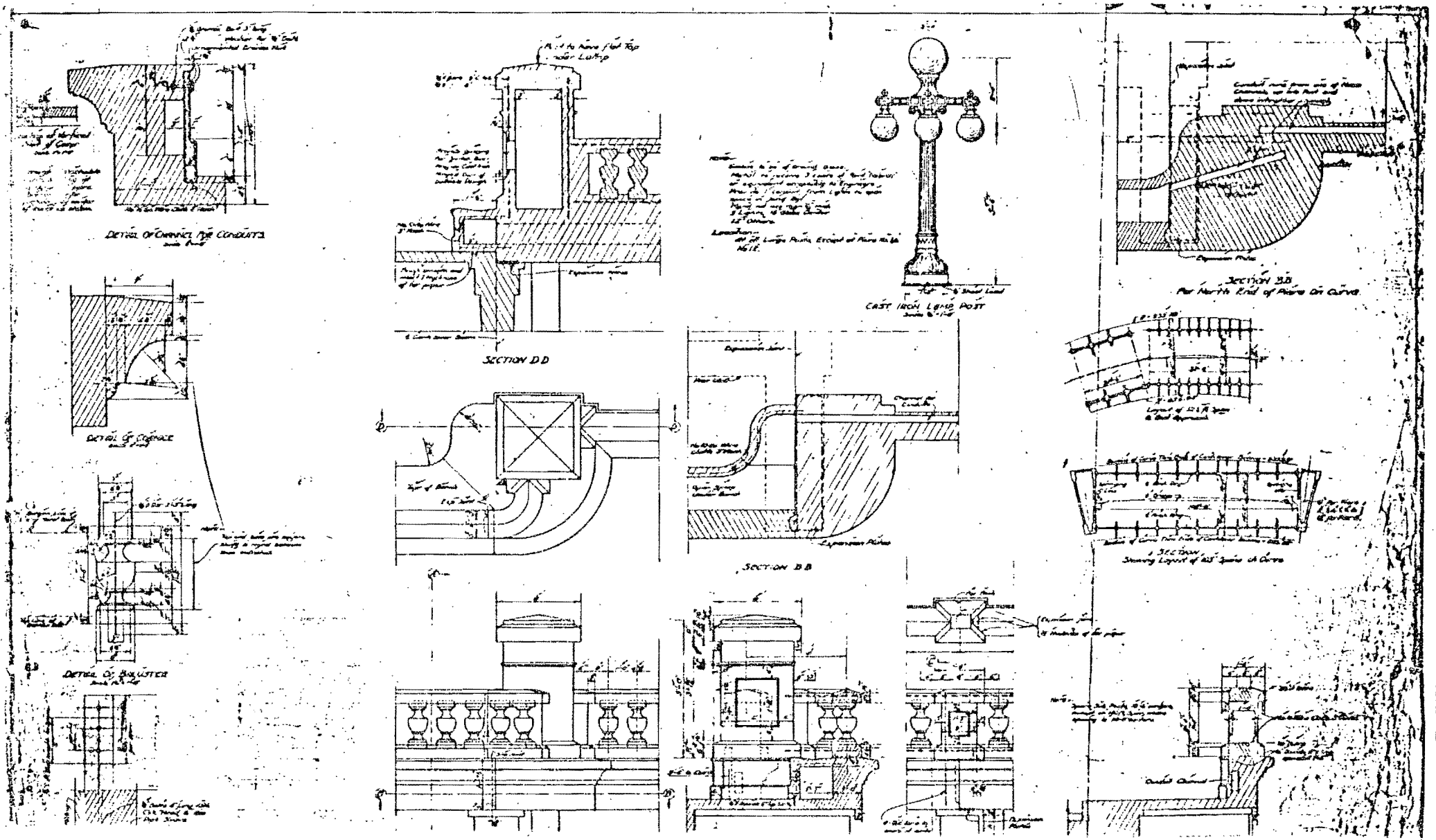
CONTRACT PLANS
Contract No.


ELEVATION
PLAN
GRAND AVE

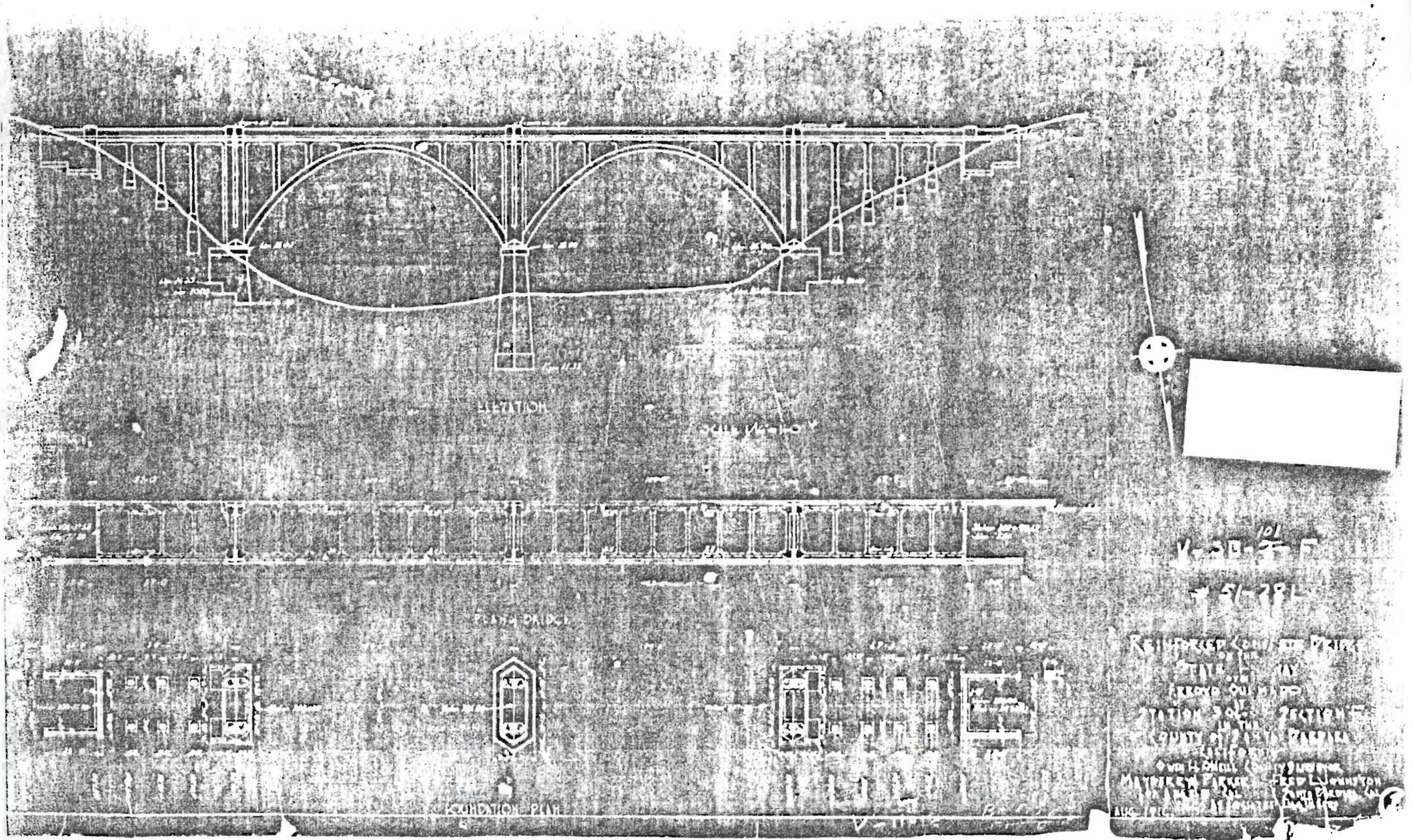
ATTACHMENT B

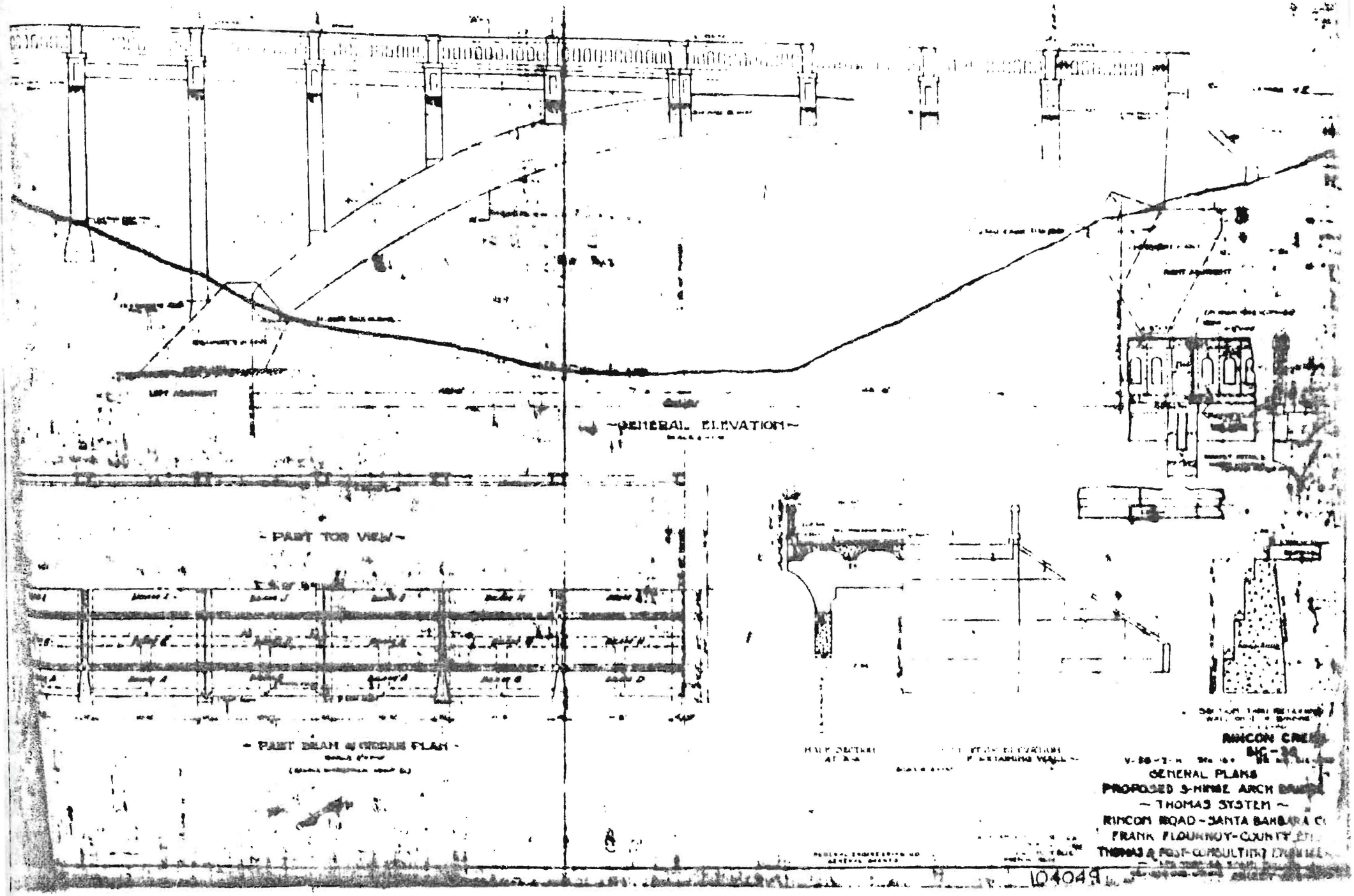



COLUMN SECTION
SECTION SHOWING REINFORCEMENT
IN ARCH RIBS SPANS "2-7(INCL)
TABLE SHOWING REINFORCEMENT
REINFORCEMENT OF THE



ATTACHMENT B


ELEVATION
PLAN OF BRIDGE
FOUNDATION PLAN


GENERAL ELEVATION
PART TOP VIEW
PART PLAN & CROSS PLAN
RINCON CREEK
GENERAL PLANS
PROPOSED 3-HINGE ARCH
— THOMAS SYSTEM —
RINCON ROAD - SANTA BARBARA
FRANK FLOURNOY - COUNTY
104049