382

Bradley

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

HYDRAULIC MODEL STUDIES OF THE TURNOUT AND MEASURING STRUCTURES AT STATIONS 105+85 AND 263+50 IN THE CAMINO CONDUIT SLY PARK UNIT--AMERICAN RIVER DIVISION CENTRAL VALLEY PROJECT, CALIFORNIA

Hydraulic Laboratory Report No. Hyd.-382

ENGINEERING LABORATORIES

OFFICE OF THE ASSISTANT COMMISSIONER AND CHIEF ENGINEER
DENVER, COLORADO

April 16, 1954

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Office of the Assistant Commissioner
and Chief Engineer
Engineering Laboratories
Denver, Colorado
April 16, 1954

Laboratory Report No. Hyd 382
Hydraulic Laboratory
Compiled by: W. P. Simmons, Jr.
Checked and
reviewed by: J. W. Ball

Subject: Hydraulic model studies of the turnout and measuring structures at Stations 105+85 and 263+50 in the Camino Conduit--Sly Park Unit--American River Division--Central Valley Project, California

PURPOSE

To investigate the operating characteristics and the flow distribution in two turnout structures and determine any design changes needed to insure quiet flow in the pools above the measuring weirs.

CONCLUSIONS

1. Slatlike baffles in the turnout channels (Figures 6 and 8E) produce flow upstream from the weirs that is sufficiently tranquil for good flow measurements with the turnout gates either fully or partially open, or with flow passing over the emergency (skimming) weirs (Figure 9). Flow quantities in the turnouts will be determined by recording the head on a sharp crested, suppressed, aerated, rectangular weir, and using appropriate standard weir tables.

2. The weir basins can be shortened 3 feet from the original length to lengths of 21 and 19 feet, respectively (Figures 3 and 4).

3. With the turnout gates wide open and only the turnout flow entering the structures, the water surface in the structures will be low enough so that there will be no flow in the main conduit downstream.

4. In the event that the ports of the slat baffles become clogged, approximate flow measurements can still be made (Figure 12). Clogging is not anticipated because the water entering the conduit is clear and the line is closed except at turnouts and vents.

5. The skimming weir crests should be set at the elevation of the energy grade for the normal main conduit discharges rather than at the hydraulic grade in the short open section of the main conduit.

6. The right walls of the open sections of the main conduits should be at least as high as the energy grade for the maximum discharges

with flow occurring over the turnout skimming weir so as to prevent water in the compartment above the turnout gate from flowing back into the main conduit (Figure 13).

RECOMMENDATIONS

1. Use the slatlike baffles and the pool lengths shown on Figures 6 and 8E.

2. Place the turnout skimming weirs at the energy grade for the normal maximum main conduit flows.

3. Raise the right walls of the open sections in the main conduit above the energy line for maximum flow with water passing over the turnout skimming weirs.

ACKNOWLEDGMENT

The recommended designs for the two turnout and measuring structures are the result of cooperative efforts of the Canals Branch and the Engineering Laboratories of the office of the Chief Engineer in Denver.

INTRODUCTION

The Camino Conduit is a concrete pipe line which transports untreated water westward from Sly Park Dam to the town of Camino about 60 miles east of Sacramento, California (Figure 1). Most of the water will be released into an existing irrigation distribution system, and the remainder will be used domestically. The outlet works of Sly Park Dam, which supplies water to the conduit, is discussed in Report Hyd 383.

Two turnout structures with water measuring facilities are located along the conduit at Stations 105+85 and 263+50 to divert water into portions of the existing irrigation system (Figure 2). The first structure receives flows up to 125 cfs and diverts 35 cfs (Figure 3). The second structure receives up to 90 cfs and diverts 20 cfs (Figure 4). The rate of inflow to the conduit is measured by a venturi meter at Station 3+80 and the rate of flow in the main conduit below each turnout structure is determined by subtracting the diverted flow from the conduit inflow. This requires measurement of the diverted flow, and each turnout structure was designed to include water measuring facilities. The rate of diverted flow is determined by measuring the head on a suppressed weir placed at the downstream end of each turnout channel, and using suitable discharge tables. An automatic recording instrument operating in a small stilling well tapped into the side of the weir pool will be used for the head measurement.

Flow into the turnout channel may occur in three ways. In the first and larger structure the inflow at times may not exceed 35 cfs and all this flow might be diverted out of the main line. The water entering the structure would flow down the sloped floor and plunge into the pool in the bottom of the structure (Figures 3 and 11A). It would then pass through the fully opened turnout gate into the turnout channel, and after passing the stilling baffles would go through the weir pool and over the measuring weir to the ditch of the irrigation system.

At flow rates greater than 35 cfs, where part or most of the water continues down the main conduit, flow into the turnout channel occurs through the partly closed gate. The gate must be set to throttle the turnout flow to the desired amount, up to the maximum of 35 cfs, and to hold the water surface in the main structure high enough to pass flow on down the main conduit. In the first structure this imposes a head up to 10.2 feet on the gate (measured from the water surface to the invert of the gate opening).

The main conduit upstream of the turnout is capable of carrying up to 125 cfs, whereas the main conduit downstream has a capacity of about 90 cfs. During routine operation at the maximum flow of 125 cfs, 35 cfs will be diverted through the gate and 90 cfs will continue in the conduit. An abnormal condition could occur, however, if the turnout gate is inadvertently left closed and 125 cfs is released from the dam. To prevent subsequent flooding of this turnout and other structures downstream, a spillway or "skimming weir" is placed above the turnout gate to skim off water when the pool depth exceeds that which will supply 90 cfs to the conduit downstream. The flow over the weir drops into the upstream end of the turnout channel and is measured in the same way as normal releases.

The second turnout and measuring structure (Station 263+50) is generally similar in design and operation, but is smaller (Figure 4). The maximum flow in the main conduit upstream is 90 cfs and the maximum diverted flow 20 cfs. The head on the gate with 70 cfs continuing in the main conduit is 13.5 feet.

Regardless of whether water enters the turnout channel through the full open gate at low heads, through the partly closed gate at higher heads, or over the skimming weir, the rate of flow must be measured before the water leaves the turnout structure. To obtain a reasonably accurate measurement of the head on the weir, the surface of the weir pool must be fairly smooth. And to apply the standard suppressed rectangular weir formulae, the flow must approach the weir with fairly uniform velocities across the channel. This requires effective baffling if the length of the channel is to be kept to a practicable minimum. To assist in designing the baffles and other portions of the structure, and to insure that the general flow within the over-all structure was satisfactory, hydraulic model studies were requested. The 1:4 scale models used in these studies, and the results from tests made on them, are discussed in this report.

INVESTIGATION

Description of the Models

Station 105+85 Turnout

A 1:4 scale model was built of the Station 105+85 turnout structure (Figure 5). A 100-inch long section of 18-inch horseshoe conduit, preceded by a 30-inch long transition from the horseshoe shape to a 12-inch circular pipe, carried water from the supply system to the turnout structure. The main portion of the model was formed of waterproofed plywood. Sheet metal was used for the transition sections and for the 12-inch diameter section of downstream main conduit. A lightweight metal slide gate on the end of the main conduit section permitted regulation of the conduit flow. A heavy gage, 9- by 12-inch sheet-metal gate regulated the flow into the turnout channel. A 16-gage, sheet-metal blade formed the skimming weir on the wall above the turnout gate, and a machined 1/4-inch thick blade was used for the measuring weir near the end of the turnout channel. Wood was used for the weir basin stilling baffles.

Water was supplied to the model through the permanent laboratory system and the rate of flow was measured by calibrated venturi meters. Piezometer stations were provided at appropriate points in the model to enable measurement of the water depth and head. The water was regulated to correspond to the calculated hydraulic grades by partly closing the gate on the downstream conduit section and by creating slow velocity flow in the horseshoe inlet by means of a gridlike obstruction near the upsteam end. After passing through the model, the water returned to the laboratory reservoir for recirculation.

Station 263+50 Turnout

The studies on the Station 105+85 structure showed the turnout channel and weir basin to be the places where the design was critical. Model studies for the Station 263+50 structure were therefore limited to the channel and basin of a 1:4 scale section built into the existing Station 105+85 model turnout channel (Figures 6 and 14). The height of the gate was reduced from 9 to 7-1/2-inches by a filler block at the top of the opening, and the height of the skimming weir above the channel floor was raised by a bulkhead. The true equivalent height of the prototype weir could not be easily represented because it would have been higher than the sidewalls of the model. A height equivalent to 12 feet was obtained, and this was considered adequate because the maximum prototype water depth with no flow over the skimming weir will not exceed 13.5 feet.

Tests on the Station 105+85 Turnout Structure

Diversion into Turnout Channel--35 cfs

In the initial design, water entered the compartment above the turnout gate with a clockwise swirl, and thereby induced a sideward

component to the flow going through the gate (Figure 7, A and B). Thus the flow did not enter the turnout channel along the channel axis, but tended to flow along the right wall and to create a counterclockwise eddy in the basin. Cut-off walls were placed in the lower opening from the main conduit to direct the flow more squarely into the gate opening. The walls extended 14, 17, and 19 inches upstream from the gate wall. The 17-inch wall was the shortest that would perform adequately (Figure 7, C and D). An 18-inch-long wall (72 inches prototype) was selected by the designers and all subsequent tests were made with this length wall in place.

The concentrated stream from the 12-inch wide gate created large disturbances in the relatively short, 32-inch wide weir basin. Dispersion of this stream could be accomplished by increasing the length of the basin, but such a basin would be uneconomical and difficult to fit to the field terrain. A short and more economical structure was sought which used baffles in the path of the flow to force the dispersion. The first model baffles were blocks 12 inches high and triangular in cross section with 4-inch sides (Figure 8A). The blocks were moved about in the area just downstream from the gate until an arrangement was found that was fairly effective in spreading the flow when the gate was fully open (Figure 8A). No arrangement was found that was satisfactory for partial gate openings where the head on the gate was increased. The addition of a vertical curtain wall 15 inches downstream from the blocks improved the flow. The bottom of the wall was 7 inches above the pool floor and its apparent effect was to confine the choppy waves to the upstream part of the channel. A second wall 12 inches downstream from the first and with the bottom 6 inches above the floor further improved the flow. However, the flow was still not satisfactory at partial gate openings when the water ahead of the gate was at or near the elevation of the skimming weir.

The two curtain walls were removed and a baffle with a draft tube-like passage installed (Figure 8B). The triangular blocks were retained. The flow conditions resembled those with the single curtain wall and were not satisfactory at partial gate openings. In addition, when flow occurred over the skimming weir, the plunging nappe entrained air which passed under the baffle and surfaced in the weir pool. Considerable wave action resulted.

The triangular blocks were replaced with four vertical 2-7/8-inch wide slats set 3/4 inch apart with the center opening on the channel center line (Figure 8C). The baffle with the draft tube-like flow passage was lowered to a point 7 inches above the floor. Heavy currents occurred around the ends of this slat baffle thereby necessitating an additional slat on each side. The smaller currents that still persisted were largely eliminated by 3/4-inch square slats attached to the sidewalls (Figure 8C). Good distribution was obtained at full open gate, but when the gate was partially closed too much water went through the center portion of the slat baffle. Better flow at partial openings resulted when the center

opening was closed. Air entrainment continued to be a problem at the downstream end of the baffle with the draft tube-like flow passage and a curtain wall was placed 3 inches downstream from it and 7 inches above the floor. Improved flow resulted at the weir.

Because the baffle with the draft tube flow passage appeared expensive to build and because its length occupied valuable space in the basin, it was removed and replaced by a vertical curtain wall directly above the slat baffle openings (Figure 8D). A second curtain wall was placed 12 inches downstream and 8 inches above the floor. Good flow resulted in the basin for all types of operation, and little or no air passed the second wall when the skimming weir operated. The best flow at partial gate openings was obtained with the center baffle slot closed. At full-open gate the best flow was obtained with the slot open. In general, the flow at all operating conditions was considered quite satisfactory with the center slot closed, and there was a possibility that the weir pool could be shortened 3 feet.

The model was changed to represent the shorter basin and the skimming weir was raised the equivalent of 6 inches to conform with the computed energy elevation in this portion of the aqueduct (Figure 5). Refinements were made in the design of the baffles to ease their construction and to obtain a low loss of head so that at 35 cfs the pool upstream from the turnout entrance would not rise high enough to pass water on down the main conduit. The baffles and basin recommended for use in the field structure are shown in Figure 8E. The flow in the weir pool with 35 cfs flowing and with the gate fully opened, or partially closed with the upstream water surface at the elevation of the skimming weir, or fully closed with all flow over the skimming weir, is shown in Figure 9, A, B, and C. Good flow exists for the normal operating condition of full or partial gate openings and reasonably accurate determination of flow is expected by means of the head recorder and standard tables for suppressed, aerated, sharp bladed weirs. At the infrequently expected emergency operating condition where flow occurs over the skimming weir, the pool is not so quiet, but should permit an approximate measurement of the flow. This is considered adequate by the designers.

The action in the region of the baffles is shown in Figure 10, A, B, and C. The water surface and hydraulic jump within the turnout structure entrance with a flow of 35 cfs, all diverted to the turnout channel through the fully opened gate, is shown in Figure 11A. The water surface for a flow of 125 cfs with about 90 cfs passing on down the main conduit and the remaining 35 cfs over the skimming weir, is shown in Figure 11B.

Flow with Clogged Baffle Ports

Little or no debris is expected in the Camino Conduit, and there should be little chance of the baffle ports becoming clogged once construction debris has been removed. However, it was believed wise to determine

the flow conditions that could be expected if the baffles did get clogged. The flow is shown in Figure 12 for the gate fully and partially opened, and for flow over the skimming weir. Approximate measurement of flow will still be possible.

Flow Confined to Main Conduit

In the preliminary design the elevation of the skimming weir crest was set to the hydraulic grade line at the open section of the main conduit for a flow of 90 cfs. The hydraulic grade was lower than the energy grade by the amount of the velocity head in the main conduit section. The water in the compartment upstream from the skimming weir is brought essentially to rest and its water surface approaches the elevation of the energy line, thereby exceeding by the main conduit velocity head the hydraulic grade and hence the weir crest. Water therefore overtopped the skimming weir before the desired flow of 90 cfs could be put down the main conduit. It was necessary to raise the weir 6 inches so that it was at the elevation of the energy line (elevation 3321.37) for a 90 cfs flow (Figure 5).

Similarly, in the preliminary design, the top of the right wall of the passage leading to the main conduit was set to the hydraulic grade. With the weir raised to the energy grade, flow occurred across this wall and into the stream flowing in the open section of the main conduit (Figure 13A). The undesirable cross flow was stopped and the flow conditions improved by extending the wall above the energy line (Figure 13B). Some turbulence still occurred in the model at the conduit entrance because of the sharp corner in the model. Little or no turbulence should occur in the prototype structure because this joint will be well rounded. (Figure 3).

Flow in Main Conduit with Diversion to Turnout Channel

No unusual conditions occurred when part of the flow passed down the main conduit and the remainder was diverted through the partly opened turnout gate. The flow into the main conduit downstream occurs as though no flow were being diverted, and likewise the diversion occurs as though no water were passing in the main conduit.

Emergency Spills Over Skimming Weir

The 35 cfs emergency spills, which must occur when 125 cfs enters the structure and the turnout gate is partially or completely closed, are adequately handled by the skimming weir (Figure 11B and 9C). The head required to create flow over the weir is communicated to the open section of the main conduit and this produces a flow slightly greater than the 90 cfs for which the conduit is nominally designed. The slightly increased flow is not expected to cause trouble.

Tests on the Station 263+50 Turnout Structure

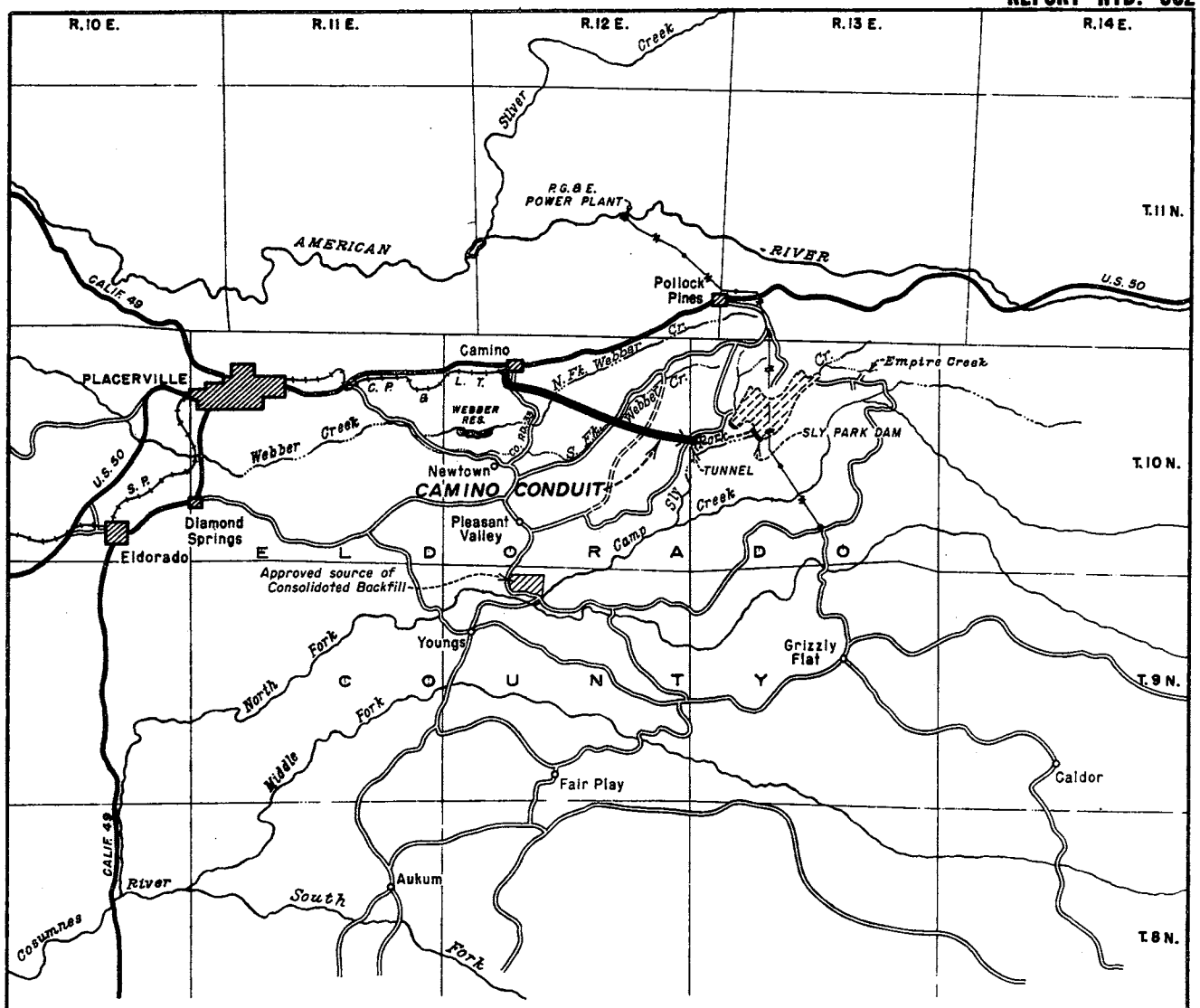
Diversion into Turnout Channel--20 cfs

On the basis of the information obtained in the studies of the Station 105+85 structure, it was believed that only the turnout channel of the Station 263+50 structure required model studies. For convenience and economy the 1:4 model channel was built inside the existing Station 105+85 model turnout channel (Figures 6 and 14). The initial baffle design was patterned after the one developed for the first structure, and similar curtain walls were used (Figure 6).

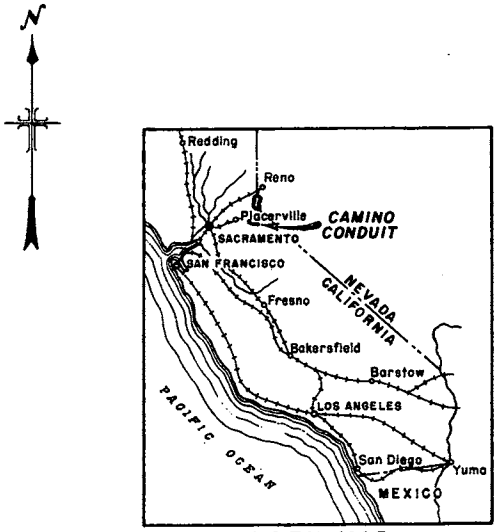
The flow conditions in the weir pool were good with the turnout gate full-open, but were rougher than desired at partial gate openings due to excessive flow through the two middle ports of the slat baffle. Good flow at partial openings was obtained by reducing the width of these two center slots from 0.94 inches to 0.50 inches and by widening the center slat to 6.63 inches. The improved flow at partial openings came at the expense of slightly rougher flow at the full gate opening. As in the first structure, this compromise is satisfactory because most of the field operation will be at partial openings, and because even at full opening the pool is adequately quiet (Figure 14, A and B). The pool should remain sufficiently quiet for an approximate measurement of discharge even when emergency flows occur over the skimming weir. No model studies were made for this condition. Some air will probably be carried into the weir pool, but not so much as to cause serious difficulty. No further alterations or testing were believed necessary and the program was terminated.

Interior - Reclamation - Denver, Colo.

FIGURE 1
REPORT HYD. 382



SCALE OF MILES



INDEX MAP

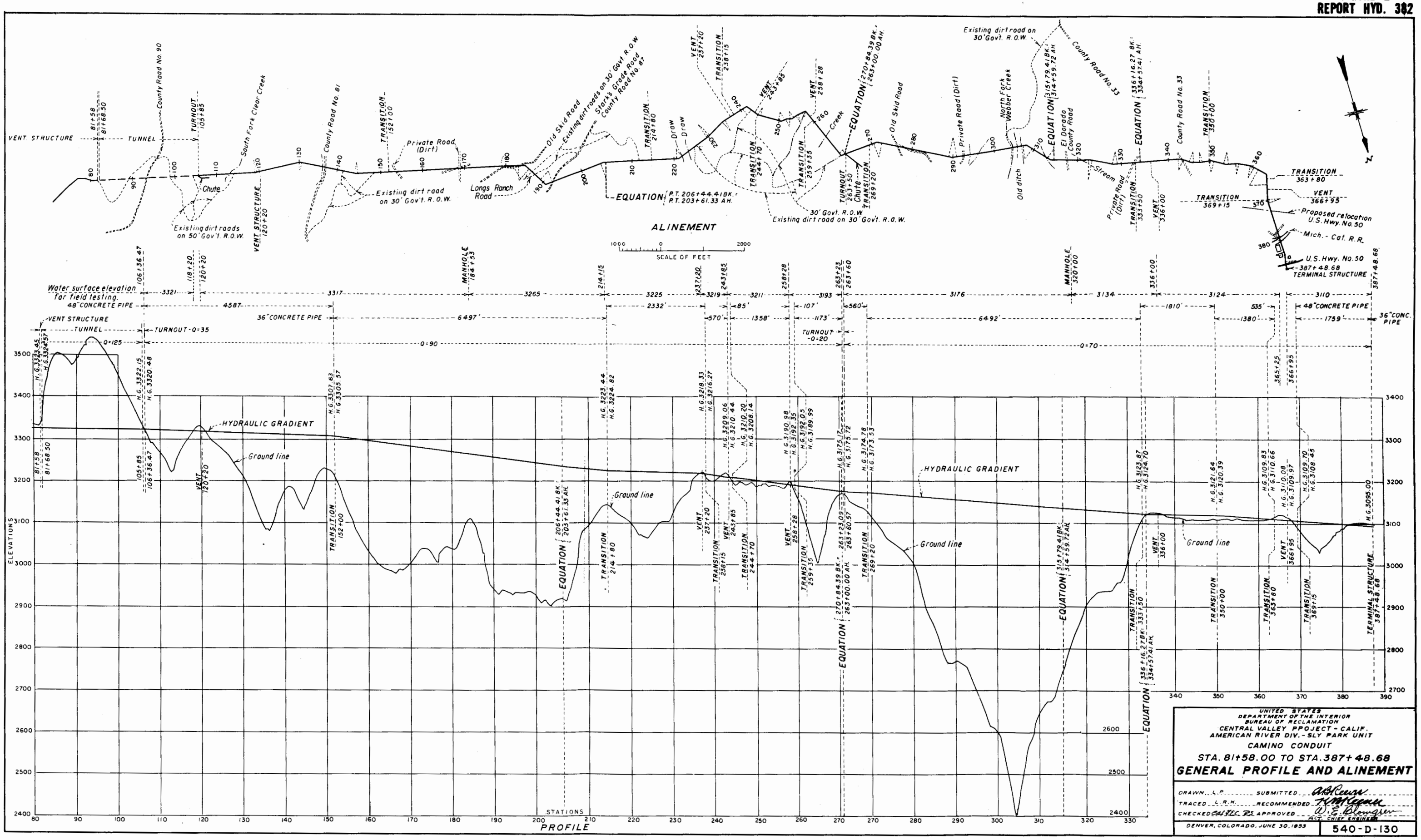
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIFORNIA
AMERICAN RIVER DIVISION-SLY PARK UNIT

CAMINO CONDUIT
LOCATION MAP

DRAWN W.A.K. SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED CHIEF ENGINEER

DENVER, COLORADO — JUNE 30, 1963 | 540-D-129

FIGURE 2
REPORT HYD. 382



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT - CALIF.
AMERICAN RIVER DIV. - SLY PARK UNIT

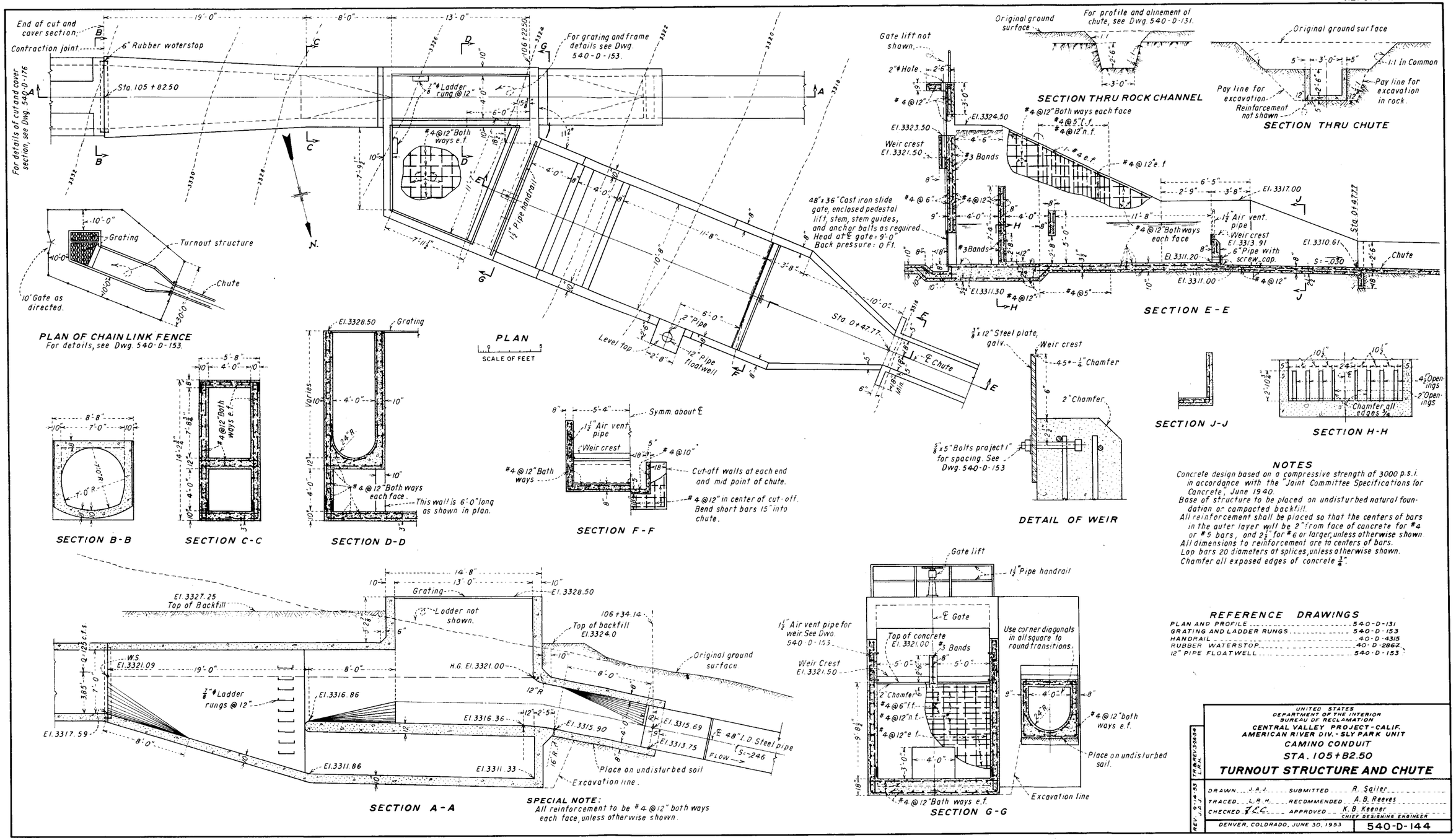
CAMINO CONDUIT

STA. 81+58.00 TO STA. 387+48.68

GENERAL PROFILE AND ALINEMENT

DRAWN L.P. SUBMITTED A.B. Keim
TRACED L.R.H. RECOMMENDED K.M. Regan
CHECKED CH. SEC. R.S. APPROVED W.E. Blomgren
ASST. CHIEF ENGINEER

DENVER, COLORADO, JUNE 30, 1953 | 540-D-130



NOTES

Concrete design based on a compressive strength of 3000 p.s.i. in accordance with the "Joint Committee Specifications for Concrete," June 1940.
Base of structure to be placed on undisturbed natural foundation or compacted backfill.
All reinforcement shall be placed so that the centers of bars in the outer layer will be 2" from face of concrete for #4 or #5 bars, and 2½" for #6 or larger, unless otherwise shown.
All dimensions to reinforcement are to centers of bars.
Lap bars 20 diameters at splices, unless otherwise shown.
Chamfer all exposed edges of concrete ¼".

REFERENCE DRAWINGS

PLAN AND PROFILE	540-D-131
GRATING AND LADDER RUNGS	540-D-153
HANDRAIL	40-D-4315
RUBBER WATERSTOP	40-D-2867
12" PIPE FLOATWELL	540-D-153

SPECIAL NOTE: All reinforcement to be #4 @ 12" both ways each face, unless otherwise shown.

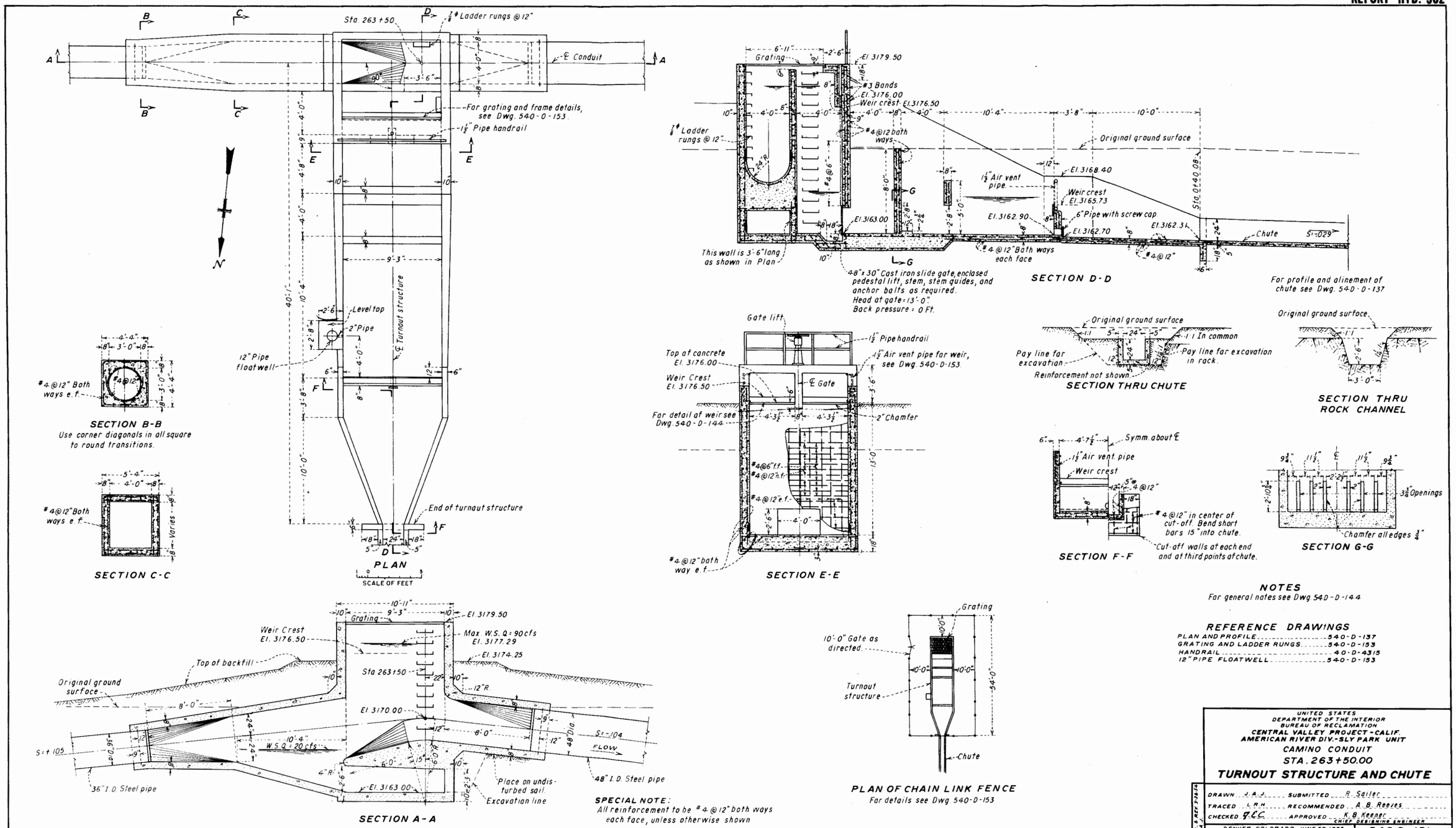
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
CENTRAL VALLEY PROJECT-CALIF.
AMERICAN RIVER DIV.-SLY PARK UNIT
CAMINO CONDUIT
STA. 105+82.50

TURNOUT STRUCTURE AND CHUTE

DRAWN J.A.J. SUBMITTED R. Sailer
TRACED L.R.H. RECOMMENDED A.B. Reeves
CHECKED J.E.C. APPROVED K.B. Keener, CHIEF DESIGNING ENGINEER

REV. 9-14-53 J.A.J. TR. & REV. 12-4-54 L.R.H.

DENVER, COLORADO, JUNE 30, 1953 — 540-D-144


Sta. 263+50
⅞" ϕ Ladder rungs @ 12"
℄ Conduit
Far grating and frame details, see Dwg. 540-D-153.
1½" Pipe handrail
Level top
2" Pipe
12" Pipe floatwell
℄ Turnout structure
End of turnout structure
PLAN
SCALE OF FEET
SECTION B-B
Use corner diagonals in all square to round transitions.
#4@12" Both ways e.f.
SECTION C-C
#4@12" Both ways e.f.
Grating
El. 3179.50
#3 Bands
El. 3176.00
Weir crest El. 3176.50
⅞" ϕ Ladder rungs @ 12"
#4@12 both ways
Original ground surface
1½" Air vent pipe.
El. 3168.40
Weir crest El. 3165.73
6" Pipe with screw cap.
El. 3162.90
El. 3162.70
El. 3162.31
El. 3163.00
Sta. 0+40.08
Chute
S=-.029
This wall is 3'-6" long as shown in Plan
#4@12" Both ways each face
#4@12"
4'-8" x 30" Cast iron slide gate, enclosed pedestal lift, stem, stem guides, and anchor bolts as required.
Head at gate = 13'-0"
Back pressure = 0 Ft.
SECTION D-D
For profile and alinement of chute see Dwg. 540-D-137
Gate lift
Top of concrete El. 3176.00
Weir Crest El. 3176.50
℄ Gate
1½" Pipe handrail
1½" Air vent pipe far weir, see Dwg. 540-D-153
Far detail of weir see Dwg. 540-D-144
2" Chamfer
#4@6" t.f.
#4@12" n.f.
#4@12" e.f.
#4@12" bath way e.f.
SECTION E-E
Original ground surface
1:1 In common
Pay line for excavation
Pay line for excavation in rock.
Reinforcement not shown
SECTION THRU CHUTE
Original ground surface
SECTION THRU ROCK CHANNEL
Symm. about ℄
1½" Air vent pipe
Weir crest
#4@12"
#4@12" in center of cut-off. Bend short bars 15" into chute.
Cut-off walls at each end and at third points of chute.
SECTION F-F
Openings
Chamfer all edges ¼"
SECTION G-G
Grating
Weir Crest El. 3176.50
Max. W.S. Q = 90 cfs El. 3177.29
El. 3174.25
Top of backfill
Original ground surface
Sta. 263+50
12" R.
El. 3170.00
W.S. Q = 20 cfs
S=+.105
S=-.104
FLOW
48" Dia.
36" I.D. Steel pipe
48" I.D. Steel pipe
El. 3163.00
Place on undisturbed soil
Excavation line
SECTION A-A
SPECIAL NOTE:
All reinforcement to be #4 @ 12" both ways each face, unless otherwise shown
Grating
10'-0" Gate as directed
Turnout structure
Chute
PLAN OF CHAIN LINK FENCE
For details see Dwg. 540-D-153
NOTES
For general notes see Dwg. 540-D-144
REFERENCE DRAWINGS
PLAN AND PROFILE 540-D-137
GRATING AND LADDER RUNGS 540-D-153
HANDRAIL 40-D-431S
12" PIPE FLOATWELL 540-D-153
UNITED STATES
DEPARTMENT OF THE INTERIOR
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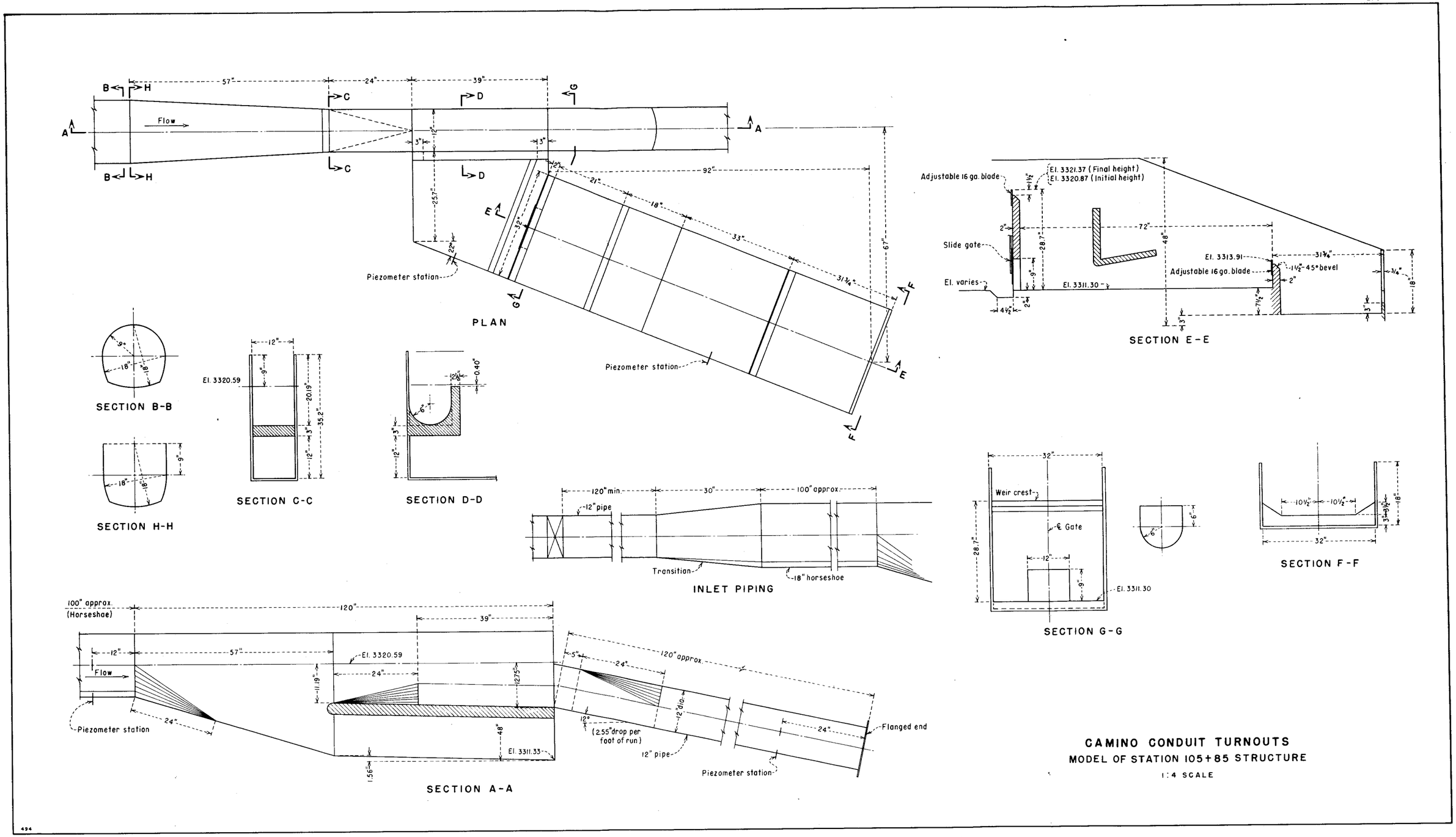
CENTRAL VALLEY PROJECT - CALIF.
AMERICAN RIVER DIV. - SLY PARK UNIT
CAMINO CONDUIT
STA. 263+50.00
TURNOUT STRUCTURE AND CHUTE
DRAWN J.A.J. SUBMITTED R. Seiler
TRACED L.R.H. RECOMMENDED A.B. Reeves
CHECKED F.C.C. APPROVED K.B. Keener
CHIEF DESIGNING ENGINEER
DENVER, COLORADO, JUNE 30, 1953
540-D-151

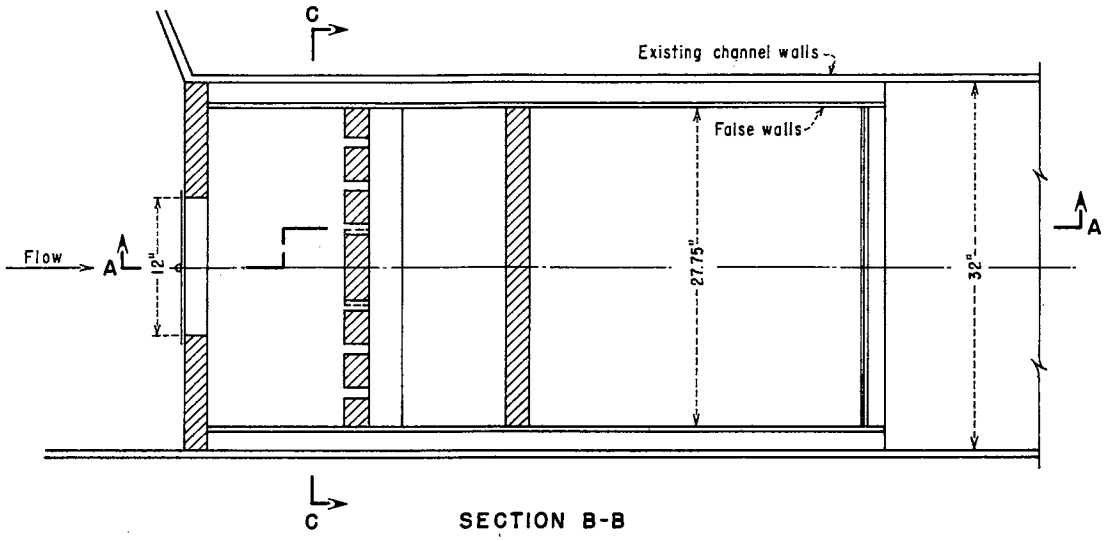


CAMINO CONDUIT TURNOUTS

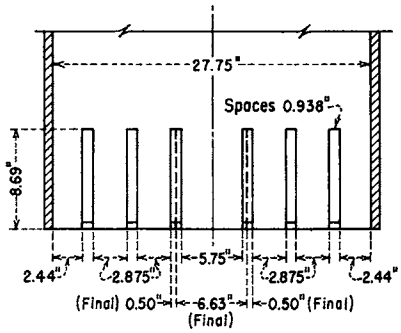
MODEL OF STATION 105+85 STRUCTURE

1:4 SCALE

494



SECTION B-B



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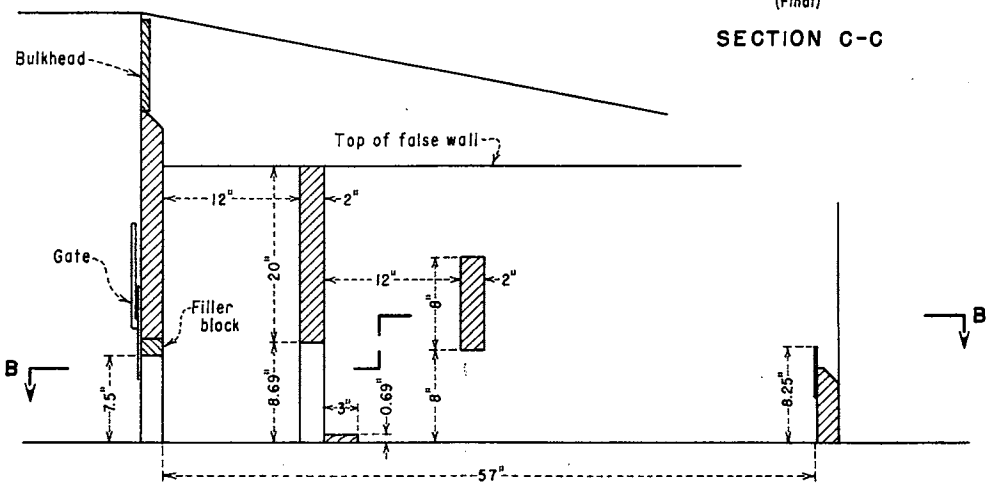


SECTION A-A

CAMINO CONDUIT TURNOUTS

MODEL OF TURNOUT CHANNEL FOR STATION 263+50 STRUCTURE

1:4 SCALE

494

A. Compartment above turnout gate - preliminary design

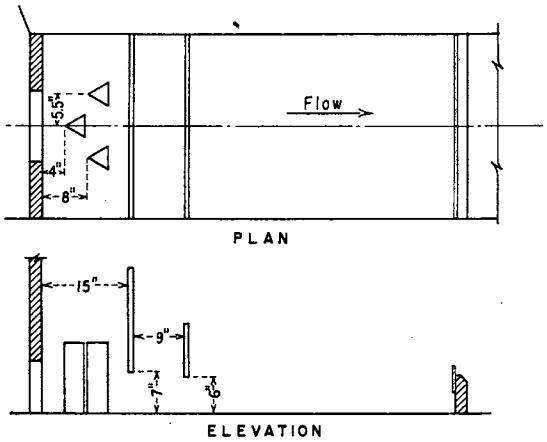
B. Flow moves to right along gate wall and passes through gate with sideward component

C. Cut-off wall extending 17 inches upstream from gate wall

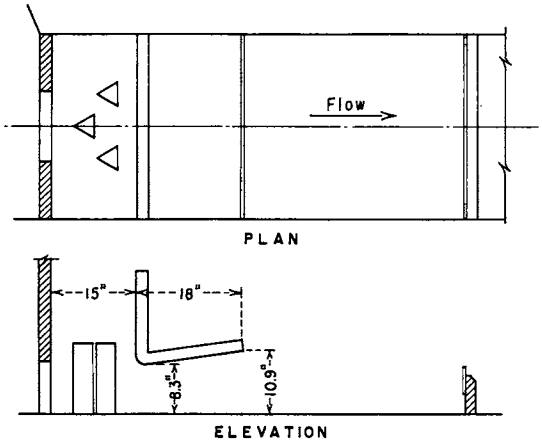
D. Flow is directed more squarely toward gate by 17 inch cut-off wall

Note: In final design model wall extension is 18 inches

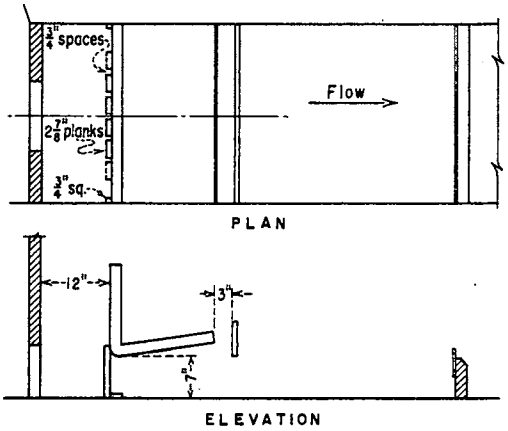
CAMINO CONDUIT TURNOUTS
Station 105+85
Cut-off Wall to Direct Flow Into Turnout Gate
1:4 Scale



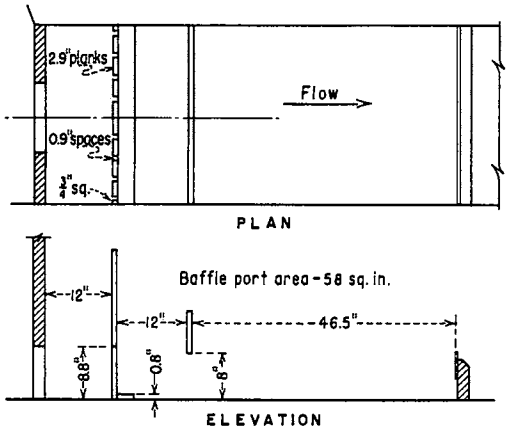
A. THREE TRIANGULAR BAFFLE BLOCKS WITH TWO CURTAIN WALLS.



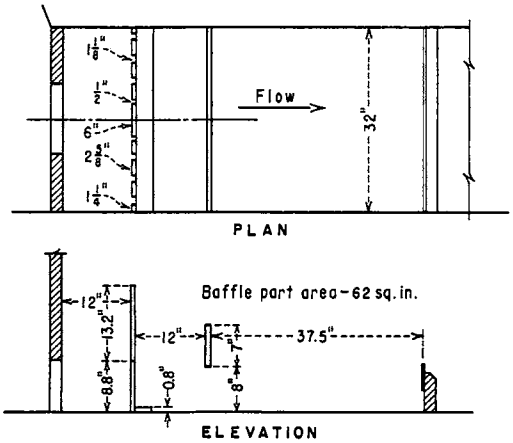
B. THREE TRIANGULAR BAFFLE BLOCKS AND BAFFLE WITH DRAFT TUBE-LIKE FLOW PASSAGE.



C. SLATS AND BAFFLE WITH DRAFT TUBE-LIKE FLOW PASSAGE AND CURTAIN WALL.



D. SLATS WITH TWO CURTAIN WALLS.



E. FINAL DESIGN OF SLAT BAFFLE AND TWO CURTAIN WALLS.

CAMINO CONDUIT TURNOUTS

BAFFLES IN TURNOUT CHANNEL - STATION 105+85

1:4 SCALE MODEL

A. Gate fully open. Upstream w.s. elev. 3315.68

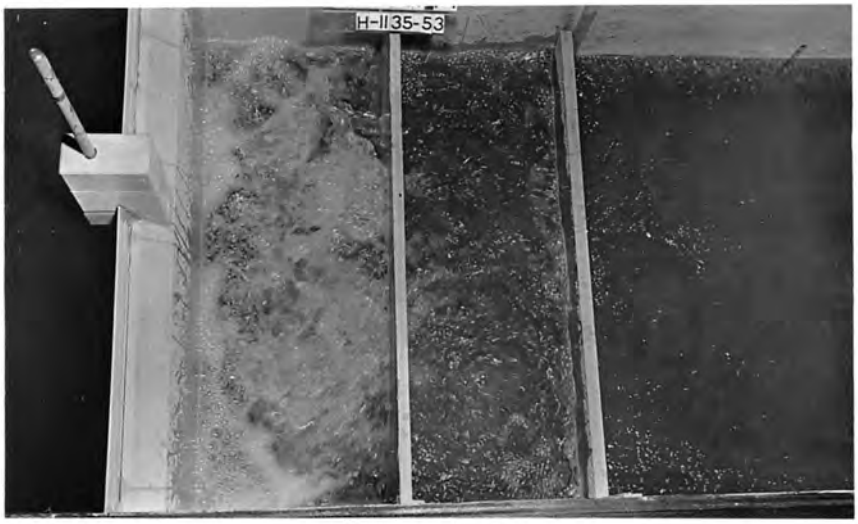
B. Gate partially closed. Upstream w.s. elev. 3321.37

C. Gate closed. Flow over skimming weir. Upstream w.s. elev. 3322.40

CAMINO CONDUIT TURNOUTS
Station 105+85
35 cfs Flow in Weir Basin With Recommend Baffles & Pool Length

Figure 10
Report Hyd. 382

A. Gate fully open. Upstream w. s. elev. 3315.68



B. Gate partially closed. Upstream w. s. elev. approx. 3321.37

C. Gate closed. Flow over skimming weir. Upstream w. s. elev. 3322.40

CAMINO CONDUIT TURNOUT
Station 105+85
35 cfs Flow in Region of Recommended Baffles.

A. Hydraulic jump in turnout structure with 35 cfs and turnout gate full open. w.s. elev. 3315.68. (No flow to main conduit downstream)

B. Maximum flow of 125 cfs. 90 cfs continuing in downstream main conduit, and 35 cfs passing over turnout skimming weir. w.s. elev. 3322.40

CAMINO CONDUIT TURNOUTS
Station 105+85
Flows of 35 and 125 cfs in Turnout Structure

A. Gate fully open.

B. Gate partially closed

C. Gate closed. Flow over skimming weir

CAMINO CONDUIT TURNOUTS
Station 105+85
35 cfs Flow in Weir Basin with Clogged Baffles

A. Flow across the right wall of the passage to open section of main conduit. Preliminary design.
Q = 90 cfs

B. Improved flow with raised wall
Recommended Design
Q = 90 cfs

CAMINO CONDUIT TURNOUTS
Station 105+85
Flow in Open Section of Main Conduit

A. Gate fully open

B. Gate partially closed

CAMINO CONDUIT TURNOUTS
Station 263+50
20 cfs Flow in Weir Basin With Recommended Baffles