HYD-161

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

HYD 161

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HYDRAULIC LABORATORY REPORT NO. 161

SUBJECT: HYDRAULIC MODEL STUDIES OF 2.5-FOOT DROPS
FOR THE TUNNEL NO. 2 WASTEWAY

PAYETTE DIVISION - BOISE PROJECT, IDAHO

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Under Direction of

R. F. BLANKS, SENIOR ENGINEER

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Denver, Colorado,
Nov. 27, 1944.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Branch of Design and Construction
Engineering and Geological Control
and Research Division

Laboratory Report No. 161
Hydraulic Laboratory

Denver, Colorado
November 27, 1944

Compiled by: J. E. Warnock

Subject: Hydraulic model studies of 2.5-foot drops for the tunnel No. 2 wasteway - Payette Division - Boise project, Idaho.

1. Introduction. In November 1938, a model of a proposed drop for the tunnel No. 2 wasteway on the Payette Division of the Boise project was tested in the hydraulic laboratory of the Bureau of Reclamation at Denver. A number of low-head drops were required to control the velocity at maximum discharge, drops of about 2.5 feet being selected to fit the topographic conditions at the wasteway. Each drop (figure 1) was placed in a concrete section of channel on a 2:1 slope. A weir, five feet high and located two feet upstream from the drop, was used to control the water surface in the channel upstream. To provide passage of drainage water, a rectangular opening 3 feet high by 5 feet 6 inches wide was provided at the bottom of this weir.

2. Model tests to determine adequacy of design. The design of the drop, although simple, was without precedent, so model tests were considered advisable to ascertain that no adverse conditions would occur. A 1:15 scale model of the drop and a suitable length of channel at each end were built in one of the channels in the hydraulic laboratory. This model, of lumber covered with sheet metal, was of such simple construction that model drawings were not necessary, the carpenters being able to frame the channels from a prototype drawing scaled to model dimensions.

A testing procedure was outlined which involved measuring the discharge, the water surface upstream from the drop, and the water surface downstream. A number of runs were to be made by setting given dis-

charges, changing the height of the water surface downstream from the drop, and measuring the resulting change in the water surface upstream. Special emphasis was to be placed on the measurements at maximum discharge of 1,000 second-feet, for the resistance of the weir had to be such that the drop in water surface should be nearly 2.5 feet at maximum discharge.

Detailed tests were never made, for when the model was completed a number of tentative runs were made in which measurements were taken, but not recorded, which so clearly demonstrated that the design was completely adequate, no further model studies were necessary.

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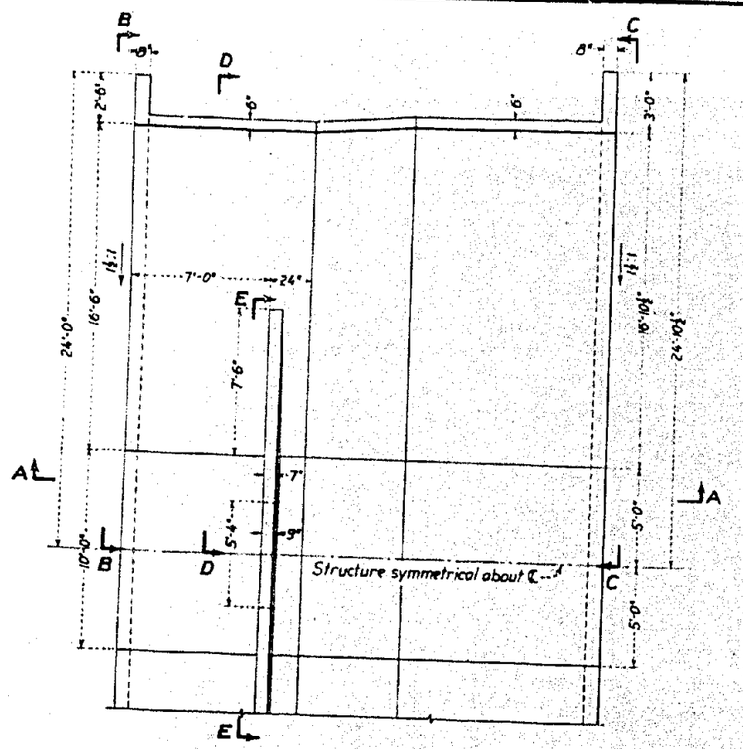
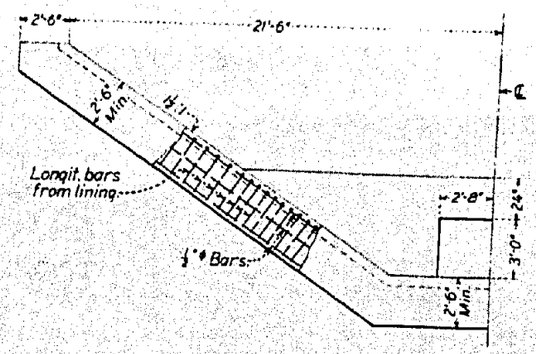
FIGURE 1

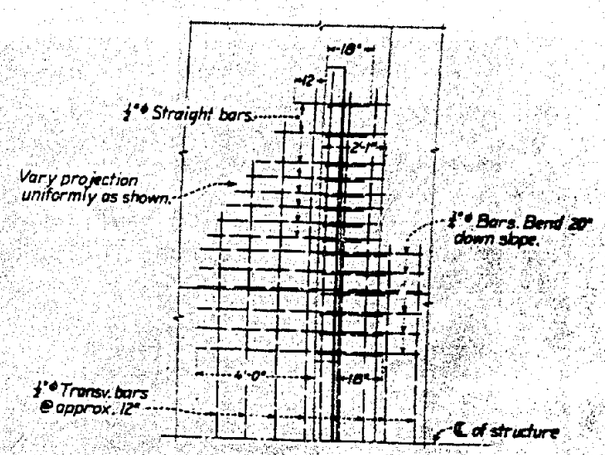


PART PLAN

SCALE OF FEET



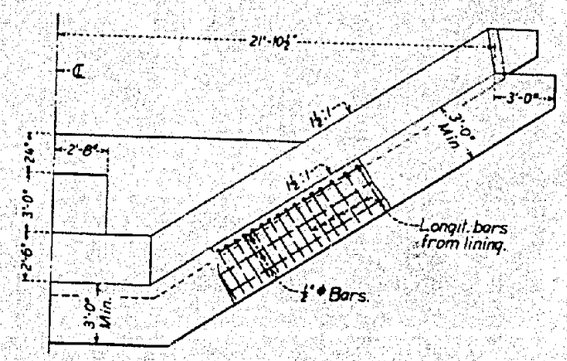
ELEVATION B-B



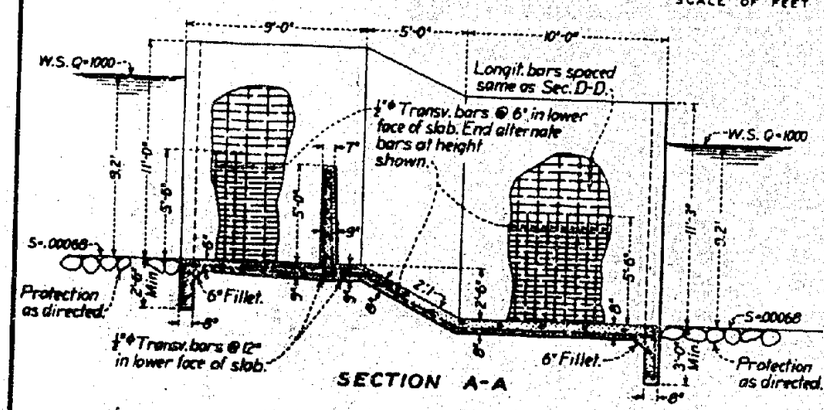
REINFORCEMENT DETAIL

Note: Bars in upper face of floor and lining and upstream face of wall only are shown. For spacing of longitudinal bars see Sec. E-E.

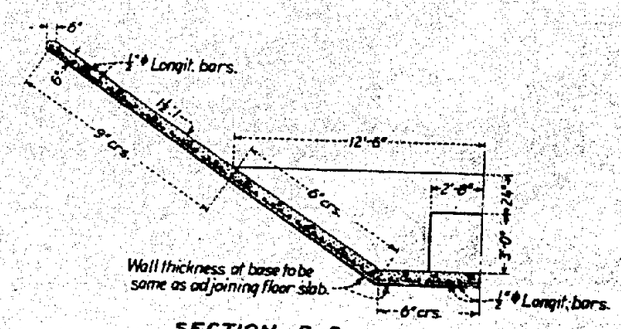
SCALE OF FEET



ELEVATION C-C



SECTION A-A



SECTION D-D

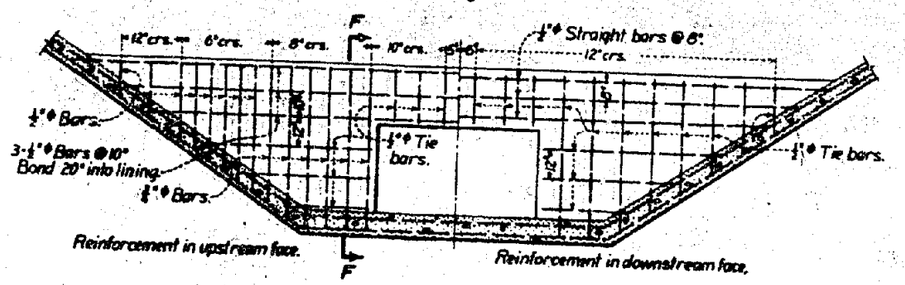
ESTIMATED QUANTITIES

Concrete ..... 35 Cu. Yds.
Reinforcement steel ..... 3,200 Lbs.

Quantities are for one structure only.

NOTES

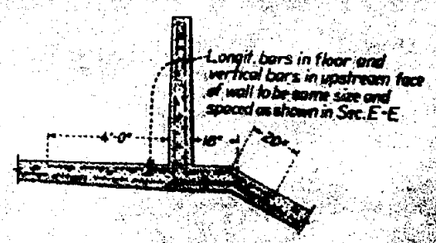
All reinforcement shall be placed so that the centers of bars in the outer layer will be 2" from face of concrete.
Lap all bars 40 diameters at splices. Stagger splices.
Thickness of concrete to vary uniformly between dimensions shown.



SECTION E-E

Longitudinal bars in floor and lining not shown.

SCALE OF FEET



SECTION F-F