

From Job and Office

HINTS THAT CUT COST AND TIME FOR THE CONTRACTOR AND ENGINEER

Work-Record Forms on Drainage Ditching

FOR records of cost of construction work on the Elk Chute Drainage District, in Missouri, done under the cost-plus system, a complete cost-accounting system was devised by the engineers. In addition to the forms for record of materials ordered and for distribution of costs to the several machines and operations, there were three reports as to the field work. Two of these are shown herewith.

The daily report of excavator operation, Fig. 1, is

ENGINEERING AND CONSTRUCTION DEPARTMENT
ELK CHUTE DRAINAGE DISTRICT OF MISSOURI
W. E. CALLAHAN CONSTRUCTION CO. CONTRACTORS ELLIOTT & HARMAN ENGINEERING CO. ENGINEERS

DAILY REPORT OF EXCAVATOR OPERATION

MACHINE NO. _____ REPORT FOR 12 HOURS ENDING _____ M _____ 192 _____
MACHINE OPERATING ON LEVEE _____ DITCH NO. _____ SECTION NO. _____

COMMENCED AT STATION _____ STOPPED AT STATION _____

DAY-NIGHT SHIFT

START	STOP	OPERATION	DELAY

TIME DISTRIBUTION REPORT

SHOW EACH MAN WHO APPEARS ON PAY ROLL WITH STATEMENT OF WORK DONE BY EACH. THIS REPORT MUST AGREE WITH PAY ROLL.

NAME	POSITION	TOTAL HOURS TO BE SHOWN ON PAY ROLL	NATURE OF WORK PERFORMED

CABLE REPORT

COIL	HUB	DRAG	SWING	BOOM	WIRE	LENGTH	REMARKS

SIGNED _____ RUNNER _____

FIG. 1—DAILY REPORT OF EXCAVATOR OPERATION

in duplicate, with sheets 8½x11 in., punched at one side for a three-ring loose-leaf binder. The original (white) is sent by the operator to the accounting office, where it is retained in the loose-leaf binder until the pay-roll is posted, after which it is transferred to a permanent binder. The duplicate (blue) is retained at the machine for reference, these copies being removed from the binder at the end of the month and tied in a bundle. A daily time report for each machine, made out by the

CONSTRUCTION DEPARTMENT
ELK CHUTE DRAINAGE DISTRICT OF MISSOURI
Elliott & Harman Engineering Co. Engineers W. E. Callahan Construction Co. Contractors

DAILY REPORT FOR TEAM OR TRACTOR
(Keep Carbon Copy of Each Report in This Book)

TIME		What Did You Haul or Do?	WHERE HAULING		TIME CHECKED	
From	To		From	To	At Start	At Destination

SIGNATURE OF TEAMSTER OR TRACTOR OPERATOR _____

FIG. 2—DAILY REPORT FOR TEAM OR TRACTOR

inspector or foreman, is of the same size, but punched at the top for a two-ring binder. This has a heading "Daily Time Slip, Machine No. —", and is ruled in three columns for name of operator, number of hours allowed, and nature of work performed. The original (white) goes to the accounting office and the duplicate (blue) is retained at the machine.

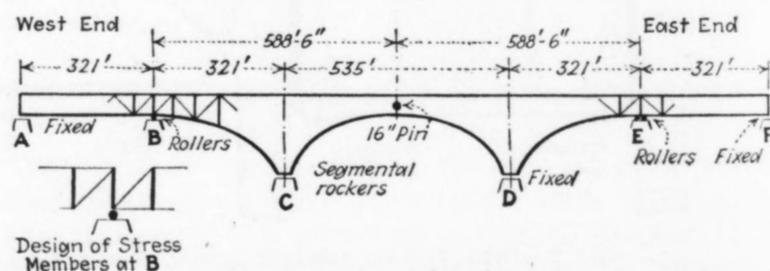
For team and tractor work, there is a report 3½x6 in., Fig. 2, in duplicate, bound in book form for the foreman's use, with about 25 sets to a book. The original (white) is given to the teamster or operator; the carbon copy (yellow) is retained in the book, which is sent to the accounting office when filled.

This drainage work was done by the W. E. Callahan Construction Co., Dallas, Tex. The accounting system was devised by the Elliott & Harman Engineering Co., Peoria, Ill., as engineers in charge for the Elk Chute Drainage District.

Steel Arch Closure Effected with Aid of Temperature Changes

CLOSURE of the central steel arch span, 535 ft. long, in the Ross Island bridge across the Willamette River at Portland, Ore., was recently effected without the use of jacks, the required 2½-in. movement at the crown being made by taking advantage of the daily temperature changes. The main arch in this bridge is flanked on either side by a 321-ft. span continuous with the arch over the main piers, having expansion and fixed bearings as shown in the accompanying sketch.

On account of the necessity of keeping a clear channel the arch was erected without falsework by cantilever-



SKETCH SHOWING DIMENSIONS OF ROSS ISLAND BRIDGE STEELWORK

ing out from both approaches. When erection was started, in anticipation of the problem of making the final closure, the erectors set back the steel at B and C about 2½ in. so that the closing piece at the crown would be short by that length. This was done with the idea of using daily temperature changes to make possible the insertion of the pin at the crown. Final connection was made with the use of a 16-in. hollow, cast-steel pin.

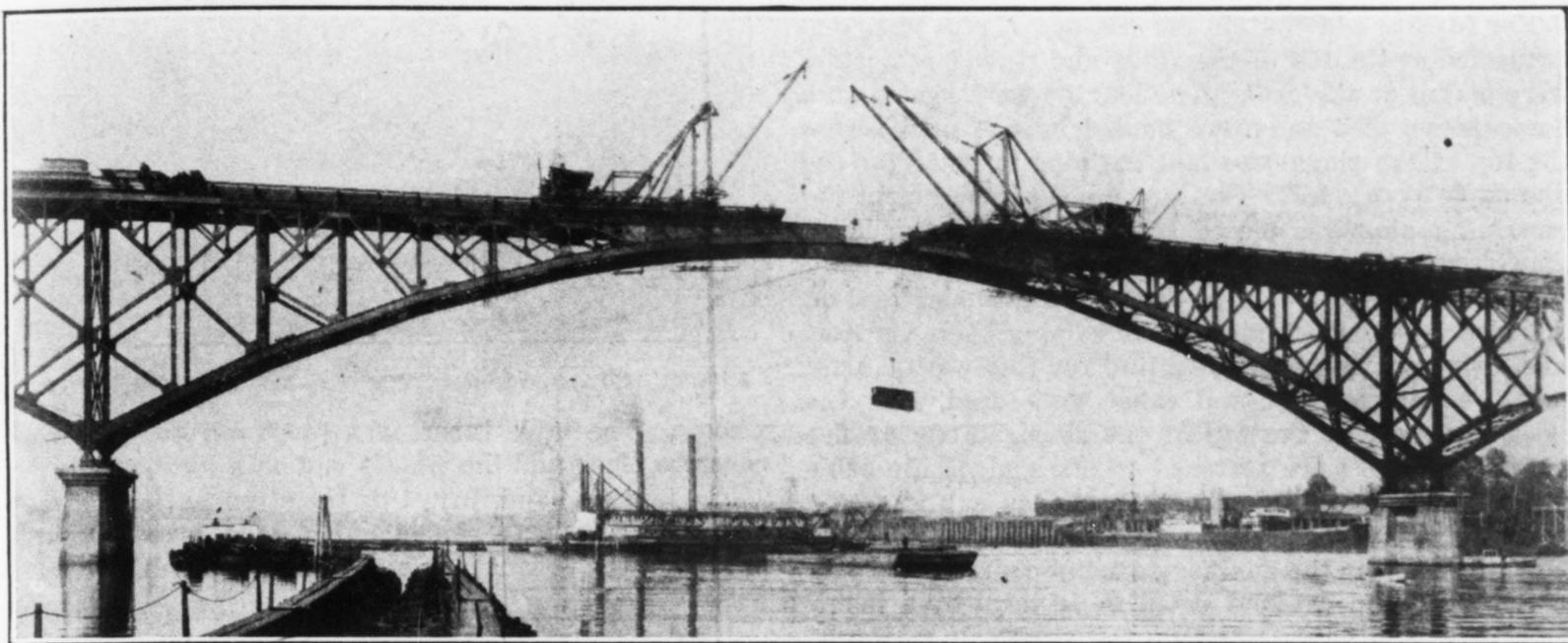
When the time for final closure came the free end at B was blocked so that all the expansion over the length of half the arch plus the side span, a total of 588 ft., 6 in., would be toward the crown of the arch.

Two inches was the total expansion that could be obtained in this manner due to the small variation in daily temperature. The remaining ½ in. was obtained as

follows: Heavy links were temporarily bolted into place at the crown fastening the free end of the arch span to the half fixed at point *B*, making it impossible for the gap to open when the span shortened in lower temperature at night.

This changed the position of the free span and the next day additional shims were put in at point *B* and the daily temperature rise forced closure. Two traveling derricks were moved up close to the gap so that the

standard black pipe with a valve at a convenient point for controlling the air flow was laid in place up the side of the ridge. The air hose was then disconnected and the section screwed in its place on the vertical opening of the T-joint, the air hose being placed on the line again at the end of this section. The remainder of the 250 lengths of 3-in. pipe (approximately 20 ft. to each length) which were to compose the auxiliary line was made into loosely joined sections of four lengths



CENTRAL ARCH OF THE ROSS ISLAND BRIDGE AT PORTLAND, ORE.

deflection due to their combined weight of 200 tons helped in making the closure.

The contract for the construction of this bridge was carried out by Booth & Pomeroy, Inc., Portland, Ore., under the direction of J. H. Pomeroy, who worked out the method described in the foregoing.

Placing Air-Hose Line in Steep Mountainous Country

BY DANIEL MCFARLAND
Storrie, Calif.

IN BUILDING the tunnel from Adit to Grizzly Camp for the Feather River Power Co. located at Storrie, Plumas County, Calif., it was necessary to lay an auxiliary air line from the main line on the Adit side to the Grizzly side of the ridge in order that work might be carried on at both ends of the tunnel. The main air line is located just above the railroad grade on the Adit side at the level of the tunnel. Immediately above this track the ridge rises at an angle that averages about 40 deg. to a height of 800 ft. above the tunnel level. The Adit side of the ridge was thickly covered by brush and rock.

In preparation a T-joint was placed on the end of the main air pipe line and next to this joint an air driven tigger-hoist was anchored on the side of the ridge just above the railroad grade. A plug was placed in the horizontal opening of the T-joint for draining any water from the pipe. Four hundred feet above the tigger-hoist a snatch block was anchored to a tree and 700 ft. of six-strand, 19-ply plough-steel cable was passed through the block and placed on the drum of the hoist. A 150-ft. air hose was connected to the vertical opening of the T-joint to feed the hoist and by means of the hoist a 100-ft. section made up of five lengths of 3-in.

each. Each of these sections was in turn fastened to the hoist cable by placing a 3-in. to 1-in. bell-shaped reducer on the end of the section and fastening the cable to the inside of the reducer by means of a cable clamp, the purpose of the reducer being to eliminate sharp corners that might catch on brush and rocks. In this manner each section was hauled to the snatch block by the tigger hoist and laid at a slant on the hillside to keep it from sliding back to the starting point. This being completed, it was necessary to raise the hoist itself to a new position.

To accomplish this, the end of the cable was anchored to a tree near the hoist, and the hoist was made to pull itself up the slope as far as the length of the hose would allow. Before it could be moved farther, it was necessary to take off the air hose, screw a section of pipe on the first 100-ft. section of the auxiliary line, and replace the air hose on the air line at the end of this new section. This gave sufficient play in the air line for the hoist to be raised as far as the snatch block would permit. After anchoring the hoist again and moving the snatch block to a new position 400 ft. above the hoist on the slope, the sections of pipe were ready to be moved to a new position on the slope.

This process was carried out until the sections were within 400 or 500 ft. of the top of the ridge where the process was changed. At this point the hoist was raised as before to the top of the ridge and anchored, and the snatch block was placed in a tree near the hoist in order that the pipe might clear the top of the hill when drawn up by the cable. For this distance, then, the sections were pulled straight up the slope to the hoist with the cable passing through the raised snatch block to form a high line.

In this manner, the pipe for the auxiliary line were laid in position up the slope and the remainder placed