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Albuquerque, N. M.

April 4, 1914.

Mr. H. P. Robinson,
Supt. of Irrigation,
Albuquerque, N. M.

Sir:

Upon arriving at Tuba, Arizona, to investigate the reconstruction of the dam in the Moencopi Wash, we found a temporary earth embankment had been built on that portion of the old dam yet remaining. This bank diverted the water from the Wash into the ditch that irrigates the school farm and Indian lands below. We were told it was the fourth time this season the bank had been replaced, at a considerable cost and with much delay to farming operations.

This bank or coffer dam was moved up stream so as to keep water in the ditch and allow an inspection of the old dam. It was found that about 45 feet of the central portion of the old dam had been carried away. At this point, the floods had cut the stream bed down four or five feet below the remaining part of the floor of the old dam. On the downstream side of the remainder of the old dam, the floods had cut down the stream bed until a fall was formed. This had undermined and destroyed the downstream wall of the old

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dam. A few more violent floods would probably have destroyed the greater portion of the remainder by this undermining. About 1600 feet down stream, there is a fall in the wash over twelve feet in height. This latter had eaten back a considerable distance in the six years since last visited by myself. Levels were taken at the dam and as far down stream as the lower falls.

The following elevations were noted:

Sill of Headgate ditch heading		90.7
Water surface in ditch at Headgate		92.7
Top of Headgate wall		100.9
" " Wing " near Headgate		100.5
" " Banks of Wash		104.
Floor of Old Dam		90 ⁸ & 913
Channel in destroyed portion of dam		86.
Bottom Pool	50' downstream	84.5
Bed Wash	200' " "	85.7
" "	300' " "	85.5
" " above Falls	1600' " "	84.0
" " below " "	1600' " "	70.5

It measured 120 feet between the abutments of the old dam.

It was reported the floods had once overtopped the

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headgate walls and spilling over, silted up the upper portion of the ditch. For this reason, it was decided to widen the overflow weir to 150 feet between abutments. As the channel below the dam had not much fall between the dam and the falls 1600 feet downstream, the top of the floor of the water cushion was put at the 86 elevation and a 2 foot depth of water in same adopted.

The depth of water in the ditch (2 feet) is about all the normal clear water flow so this fixed the elevation of the weir crest. The headgate sill being at 90.7 the weir crest was placed at the 92.7 elevation.

This gives a fall of 7 feet over the $10\frac{1}{2}$ ^{high} panels of the dam. It was computed that with 7 feet of water above the weir crest, the dam would safely pass a flood of a trifle over 10,000 cu. ft. per second. Two panels adjacent to the headgate will not be built up to the height of the crest but left at the elevation of the headgate floor. This leaves a scouring sluice at the headgate to prevent or at least lessen, the deposit of silt before the gate.

This sluiceway will be filled with earth or sacks of dirt to keep the water diverted into the ditch. At some future time, automatic gates, if suitable ones can be devised, could be installed. It is, however, regarded as

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absolutely necessary that this channel should be left open when a flood is passing over the weir. The floods are extremely heavily laden with silt and will be very troublesome on that account. It is also thought very advisable to construct a sand box, preferably with automatic gates, in the ditch opposite the falls, 1600 feet downstream.

Thus the coming of a sudden rise would take out the diversion of sand bags across the two panels adjacent the headgate opening the sluiceway. If there was no one to close down the headgates, the flood would open the outlets in the sand box and ^{by} maintaining a high velocity in the upper reach of the ditch, prevent the deposit of silt in that portion.

The construction of the weir in panels was adopted for several reasons: To simplify form work and save lumber for forms, to avoid shrinkage cracks or rather to confine same to panel points where the steel will tie the panels together, and as the concrete must be all hand mixed, to have separate units and avoid the stopping of the day's work at any but the completed units as shown.

The former arrangement required the placing of an earthen embankment over the whole length of the dam. The old floor being practically level with the headgates. The present plans require that only 24 feet of the crest will

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have to be replaced with earth after each flood. The part of the ditch that had been silted up is in bad shape. In cleaning the same, the silt was piled up on the side slopes as high and as steep as possible and is slipping back into the water choking the channel. All this deposit should be removed and the ditch thoroughly cleaned at some opportune time.

Estimated Cost of Reconstruction.

Preliminary work, removing debris and moving coffer dam upstream, etc.	\$ 800.
Cement,	3300.
Lumber,	600.
Tools and Supplies,	750.
Excavating stream bed to subgrade	
550 cu. yds. @ \$2.00	1100.
75 cords stone @ \$6.00	450.
Laying 160 cu.yds. dry wall	300.
Laying 125 " " masonry side wall @ \$4.00 (exclusive of stone and cement)	500.
250 cu.yds. Concrete @ \$14.00	3500.
exclusive of steel, cement and lumber for forms.	
Cleaning up, riprapping and placing fill behind wing walls	500.
Sand box in ditch	250.
Cleaning ditch	<u>250.</u>
	\$ 12300.

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There were about 6 sec. feet of water flowing in the ditch, enough for about 600 acres of land. About 260 acres were under cultivation in the school farm in the wash. The remainder can be utilized by Indians. The excess water was mainly wasted while we were there as most of the Indians did not care to risk a crop when the water supply was not assured, there being a likelihood of the diversion going out at any minute.

The cost on a basis of 600 acres is over \$20. per acre. There is far more land in the wash than there is water for irrigation. Prices of hay and grain are so high at Tuba that most any expenditure is justified to raise a supply of the same.

It is thought if the water can be assured, the Indians will take up all the land for which water is available.

The preparatory work has been started and bids received for the necessary materials, supplies and tools. It will require, however, the utmost diligence in prosecuting the work to complete the same before the summer rains begin.

Respectfully,

Rollin Rider

Engineer.

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Detailed List of Re-enforcing Steel required.

Transverse Bars.

For 6½ "X" Panels	162 pcs. ½" sq. bars 16' long
" 6 "0" "	168 " ½" " " 12' "

No transverse bars require bending

Longitudinal Bars

Floor - All 12½ panels	150 pcs. ½" sq. bars 16' long
(one bend in above angle about 13½°)	
Floor - 12½ panels	150 pcs. ½" " " 4' "
(one bend, angle 90°)	
Weir and Curtain Walls	150 pcs. ½" " " 16' "
(2 bends to conform to weir crest)	

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Approximate Quantities Required.

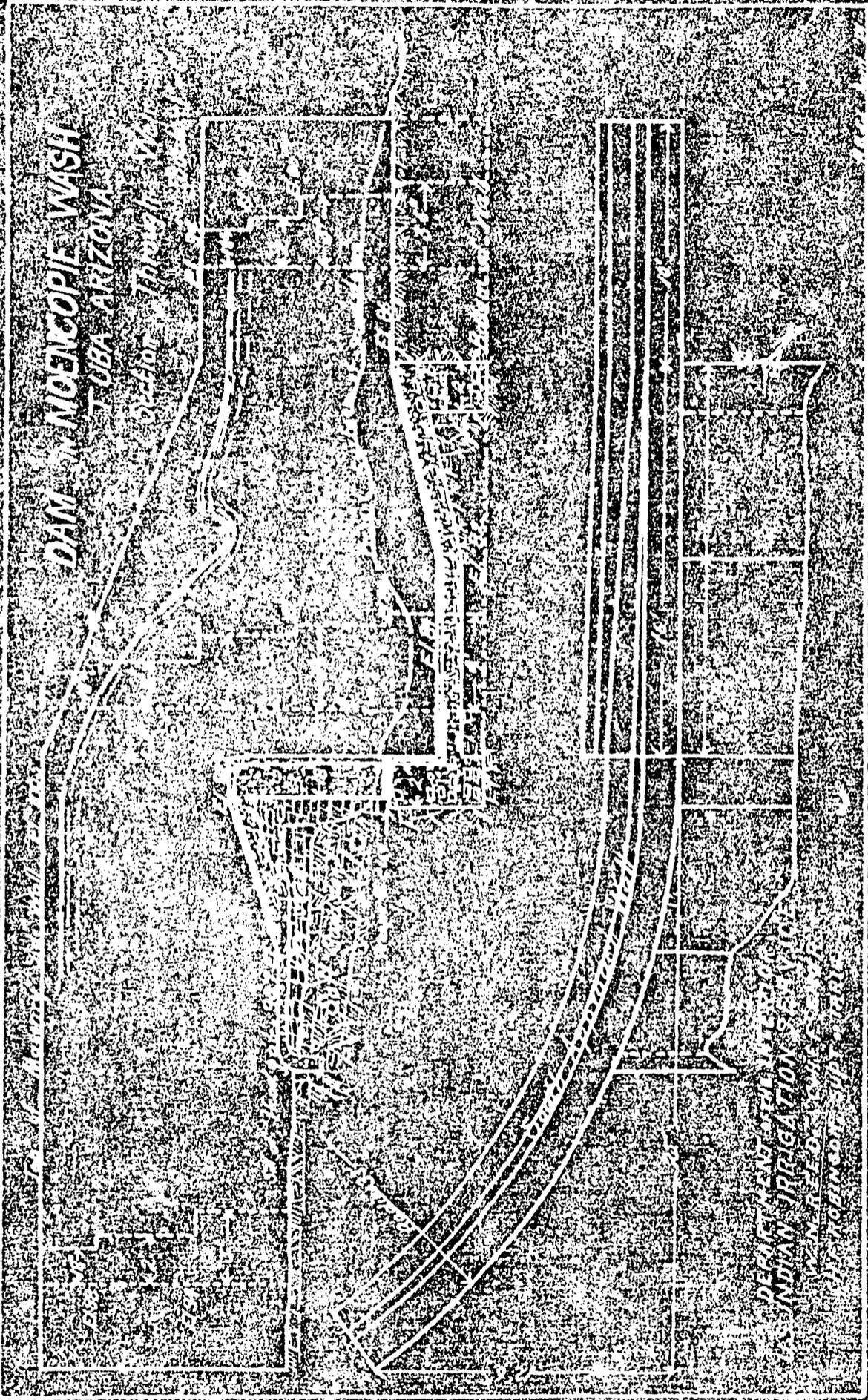
Concrete using "Plums" or "Fillers"	100 cu.yds.
Concrete without " " "	175 " "
Dry Wall	160 " "
Masonry Wall, south side wash	80 " "
" " , north " "	45 " "

Total stone required 315 cu.yds. or about 95 cords
245 cu.yds. concrete (estimating "Fillers" as 30% of concrete)

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DAM IN INDIAN WASH
TUBA ARIZONA

Location of Tubu Wash



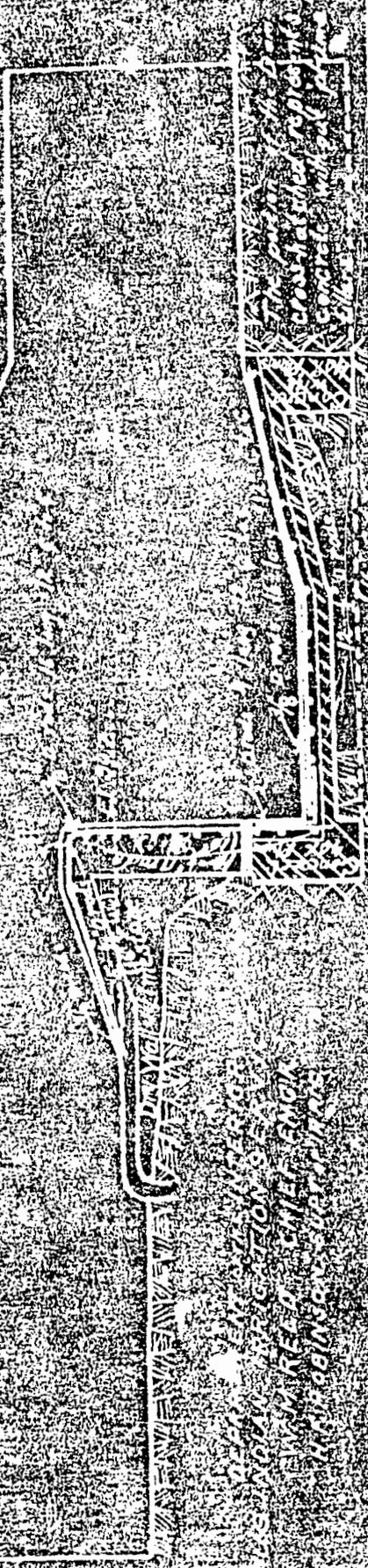
DESIGN AND CONSTRUCTION SERVICE
INDIAN IRRIGATION SERVICE
WASHINGTON, D.C.

DAM IN MOUNGOPIE WASH

TUBA ARIZONA

Section - Profile

Masonry Slab Walls
W. H. Gensell, Metcher

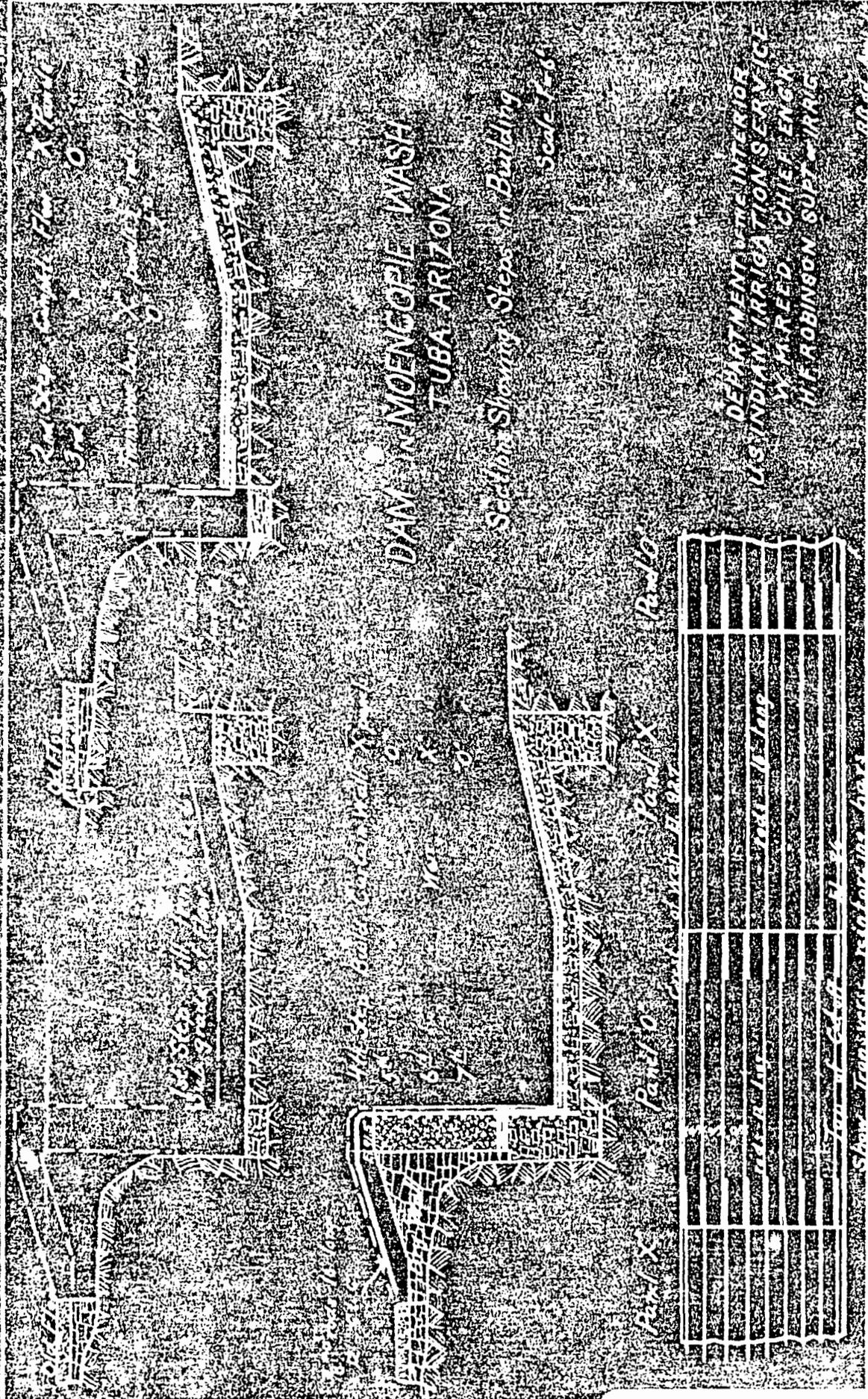


Vertical Profile of DAM

Vertical Section - Profile

Section - Profile

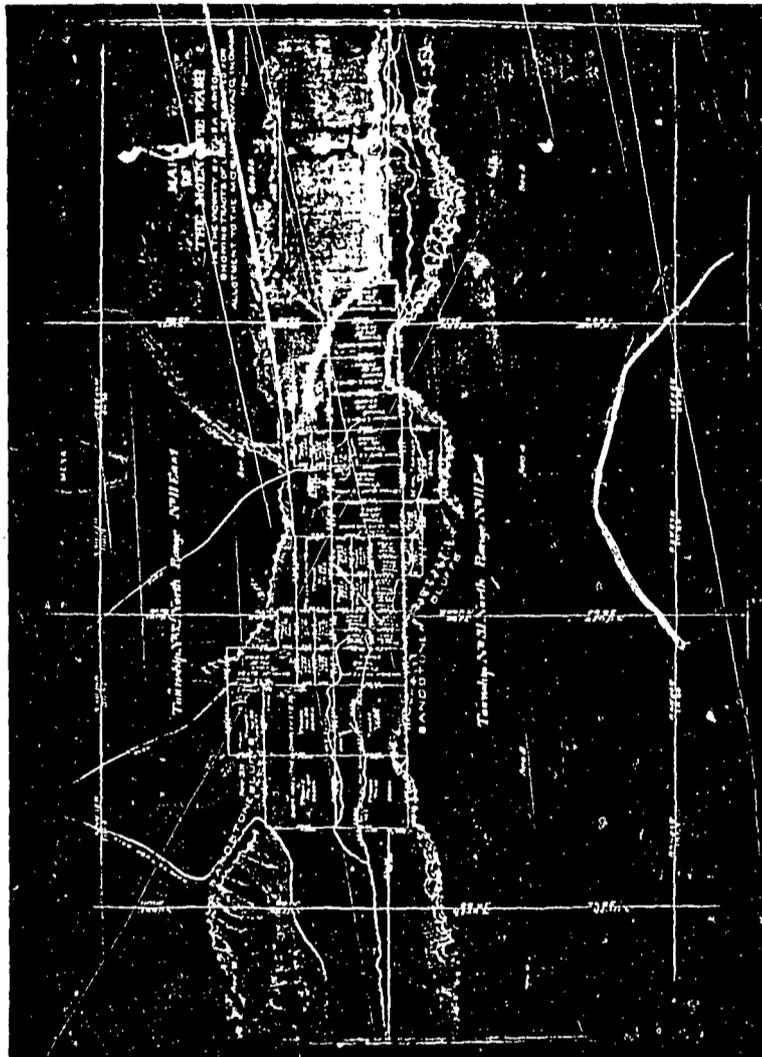




DAM IN MOENGOPIE WASH TUBA ARIZONA

DEPARTMENT OF THE INTERIOR
 U.S. INDIAN IRRIGATION SERVICE
 W. M. REED, CHIEF ENGR.
 H. F. ROBINSON, SUPT. IRRIG.

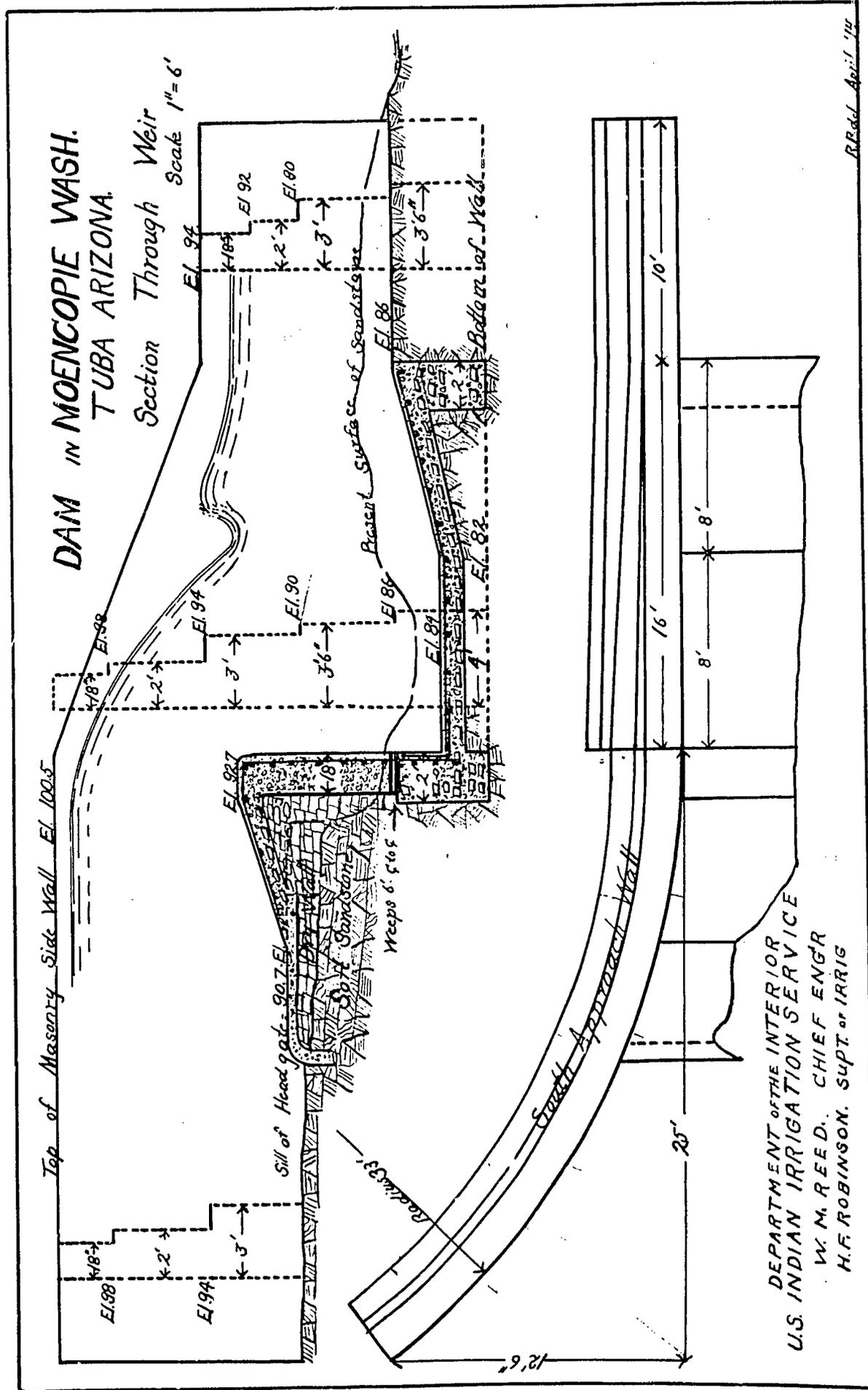
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DAM IN MOENCOPIE WASH. TUBA ARIZONA.

Section Through Weir
Scale 1"=6'



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RP.d.d. April 14

