PLANS

OF THE

IRRIGATION OF MESOPOTAMIA.

BY

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NOTICE.

PLATES 3, 4, 4*a*, 5, 13, 14, 15, 17, 21, 23, 24, 29*a*, 33, 34, 35, 36, 37, 39, 44, 45, 46, 47, 49, 50, 51, 54, 55, 56, 57, 58, 59, 61, 64, 66, 67, 68, and 69, included in the original report to the Turkish Government, and therefore on this list, have been omitted by the Author from the Work issued to the General Public, because they are mostly on too large a scale to bear reproduction to portfolio size ; and, moreover, they give information already adequately conveyed by the remaining plates.

(*Willcocks' "Irrigation of Mesopotamia," page* 107.)

LIST OF PLANS.

THOSE MARKED WITH AN ASTERIX HAVE BEEN REPRODUCED BY THE PHOTO-METAL PROCESS ON REDUCED SCALES AND ARE ENCLOSED IN THIS PORTFOLIO.

No.	NAME.
1	Tigris-Euphrates Delta 1 : 1,000,000.*
2	Irrigation works in upper half of Delta 1 : 200,000.*
3	Part of Delta south of Bagdad 1 : 50,000.
4	,, ,, north of Bagdad 1 : 50,000.
4A	,, ,, Hindia and Hilla branch 1 : 50,000.
5	Plan of Dyala 1 : 50,000.
6	Longitudinal section of the Tigris, Bagdad to the sea.*
7	,, ,, ,, Euphrates, Hitt to Shamia.*
8	,, ,, ,, Tigris above Bagdad.*
9	,, ,, ,, Dyala and Nahrwan.*
10	,, ,, ,, Left Euphrates canal system.*
11	,, ,, ,, Right Tigris canal system.*
12	,, ,, ,, Drains.*
13	Cross sections of the Tigris.
14	,, ,, ,, Euphrates.
15	,, ,, ,, Dyala, Nahrwan and Sakhlawia.
16	Proposed diversion of the Dyala river.*
17	Plan of Euphrates at the Hindia Barrage 1 : 2,000.
18	Plan of existing Hindia Barrage 1909, 1 : 500.*
19	Proposed addition Hindia Barrage 1 : 200.*
20	Proposed new Hindia Barrage 1 : 200 *
21	Proposed Hilla branch head 1 : 200.
22	Plan showing Hindia Barrage and subsidiary works 1 : 5,000.*
23	Plan showing proposed spurs above new Hindia Barrage.
24	Plan showing proposed temporary repairs to existing Hindia Barrage.
25	Plan of proposed Habbania escape 1 : 50,000.*
25A	Plan of Euphrates, Hitt to Feluja, and proposed Habbania escape 1 : 50,000.
26	Longitudinal section of proposed Habbania escape.*
27	Proposed head regulator Habbania escape 1 : 200.*
28	,, head regulator for Sakhlawia branch 1 : 200.*
29	,, Feluja Barrage on the Euphrates.*
29A	,, Faluja Barrage site plan.
30	,, Koot Barrage on the Tigris.*
31	,, Chala, Majar Kebir, and Machêra barrages.*
32	,, masonry works, Left Euphrates canal system.*
33	,, typical head regulator for canals.
34	,, Kutha-Babylon canal bifurcation.
35	,, Akkar Kuf drain head.
36	,, Right Tigris canal head.
37	,, Syphon for Right Tigris canal under flood canal.
38	,, Ordinary road bridge Akkar Kuf drain.*
39	,, ,, regulator for ,,
40	Proposed left Euphrates canal head.*
41	,, low level Beled Barrage on the Tigris.*
42	,, Barrage on the Dyala river for the Nahrwan.*
43	,, typical pipe syphons, culverts and bridges.*
44	Longitudinal section of the Hilla branch 1909.
45	Cross sections of the Hilla branch 1909.
46	Cross sections of the Euphrates at the Hindia Barrage.
47	Plan of first 7 kilometres of the Hilla branch 1 : 10,000.
48	Plan of the diversion of the Feluja Barrage 1 : 2,000.*
49	Plan of the Hilla branch to Diwania 1 : 50,000.
50	Plan of the Hindia branch to Shamia 1 : 50,000.
51	Earthwork cross sections, new Hindia Barrage.
52	Possible railway lines in the Delta.*
53	Regulating apparatus for needles.*
54	Lower Nahr Melcha canal head.
55	Longitudinal section of the Sakhlawia branch.
56	Plan of proposed Bagdad navigation canal project 1 : 50,000.
57	Section of proposed Bagdad navigation canal project.
58	Plan of masonry works on proposed Bagdad navigable canal.
59	Plan of tail lock on proposed Bagdad navigable canal.
60	Cross sections of canals, ancient and modern.*
61	Proposed Dijail canal head.
62	Gauge diagram of the Tigris at Bagdad.*
63	,, ,, ,, Euphrates at Hitt.*
64	,, ,, ,, ,, Hindia Barrage.
65	Proposed Hai branch head.*
66	Cross section of the Tigris at Koot.
67	Plan of the Sakhlawia branch 1 : 50,000.
68	Plan of the Kanania head of the Sakhlawia.
69	Discharge diagram of the Tigris and its branches.
70	Proposed Ashik dam on the Tigris.*
71	Proposed barrage and subsidiary barrage at Beled on the Tigris.*
72	Longitudinal section of proposed canals, Beled project.*
73	Proposed fall, Km. 69 Right Tigris canal.*
74	Proposed Basra Barrage on the Euphrates (alternate).*
75	Final plan of existing Hindia Barrage.*
76	Basra reclamation project 1 : 50,000.*
77	,, ,, ,, 1 : 200,000.*
78	Proposed Basra Barrage.*
79	Feluja Barrage scale 1 : 2,000.*
80	Preliminary project Tigris diversion at Kadasia.*
81	Proposed subsidiary barrage to new Hindia Barrage.*

CORRECTION :

Plan No. 78 — Scale for plan should be 1 : 100,000 and not 1 : 200,000.

Plans Reproduced at the Survey Dept. Cairo, 1911.

PROPOSED SYSTEMS OF IRRIGATION

- A. BELED SYSTEM
- B. LEFT EUPHRATES SYSTEM
- C. RIGHT TIGRIS SYSTEM
- D. HINDIA SYSTEM
- E. HAI SYSTEM
- F. BASRA SYSTEM
- G. NAHRWAN SYSTEM
- H. DYALA SYSTEM

DRAWING Nº 1.

REFERENCES.-

CANALS

DRAINS

BANKS

DRAWN BY MUSTAPHA IBRAHIM 2-4-11

TRACED BY 24-6-11

SIGNED: B.T. WATTS.

24/5/11

THE TIGRIS-EUPHRATES DELTA

SHOWING PROPOSED IRRIGATION WORKS

SCALE 1/2,000,000

100 90 80 70 60 50 40 30 20 10 0 200 KILOMETRES

DRAWING Nº 2.

THE TIGRIS-EUPHRATES DELTA

SHOWING PROPOSED IRRIGATION WORKS

SCALE 1/500,000

PLAN COMPILED FROM SURVEYS AND LEVELS OF THE MESOPOTAMIAN IRRIGATION MISSION DEC 1908 – APRIL 1911.

DRAWN BY MESSRS B.T.WATTS & E.C.F.MOORE.

TRACED BY W.Willcocks 11/12 — N.Rowe 1/12

PROPOSED CANALS

PROPOSED DRAINS

ANCIENT CANALS & BRANCHES

RIVER WITH EXISTING CANALS

ALL LEVELS ARE IN METRES ABOVE MEAN SEA LEVEL, AND THOSE VALUES UNDERLINED (345) DENOTE LEVELS ON SOUNDS OR IN BEDS OF ANCIENT CANALS.

LONGITUDINAL SECTION OF THE RIVER TIGRIS FROM BAGDAD TO THE SEA

SCALES { HORIZONTAL 1/1.000 ; VERTICAL 1/1.000.000 }

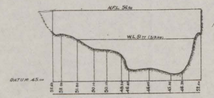
Every Cross-Section has been drawn to the same scale for purposes of comparison.

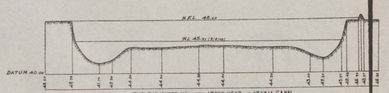
DRAWING Nº 7.

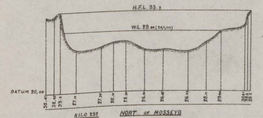
LONGITUDINAL SECTION OF THE EUPHRATES HITT TO SHAMIA

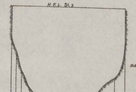
SCALES HORIZONTAL 1/500,000
VERTICAL 1/200

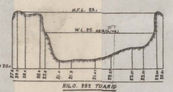
DRAWN BY H.E. WEBER & S.E. SMART

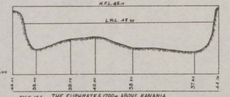


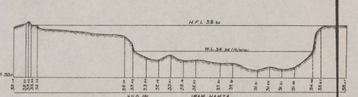


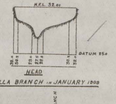


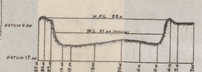


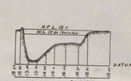


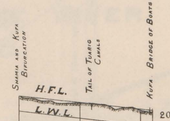


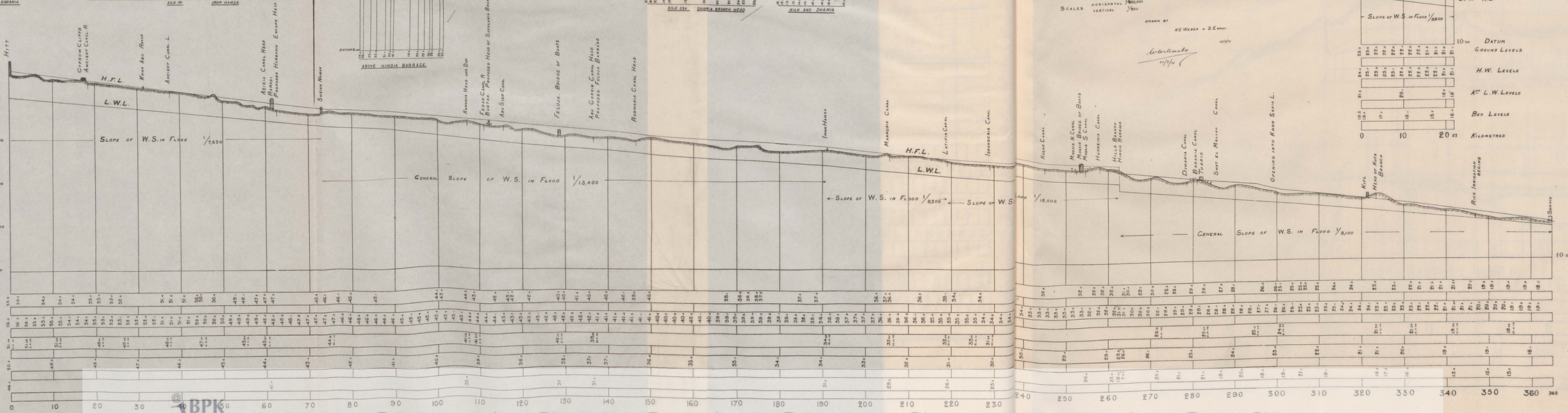


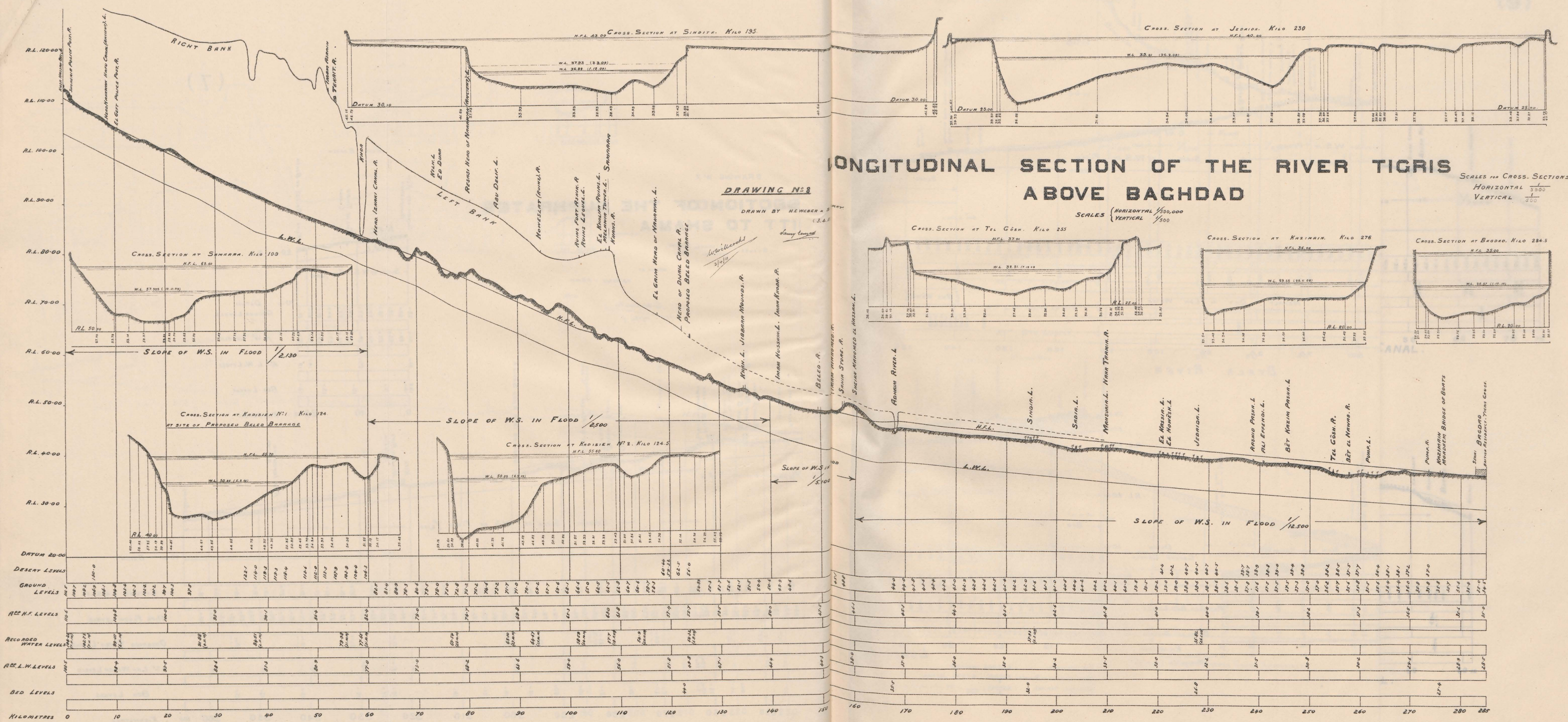












DRAWING Nº 9.

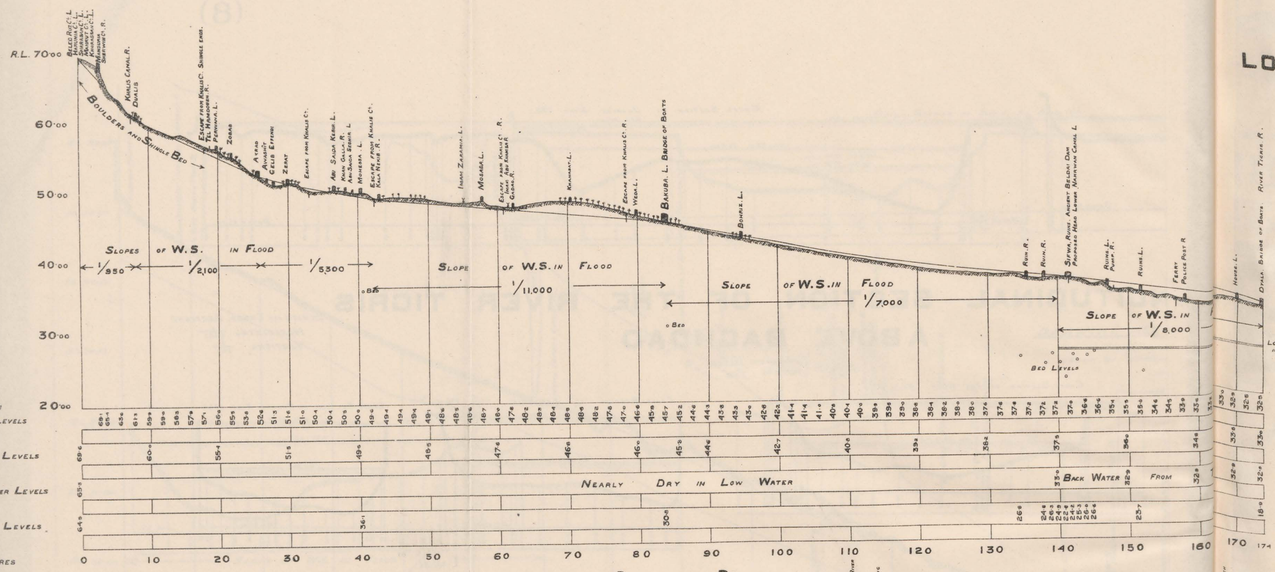
LONGITUDINAL SECTIONS OF THE DYALA AND NAHRWAN

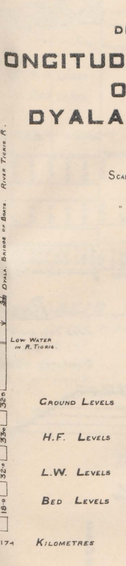
SCALE LONGITUDINAL 1/5000

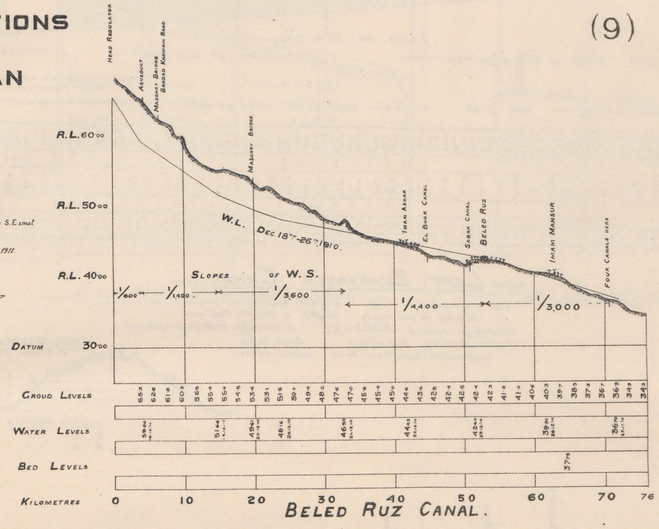
VERTICAL 1/500

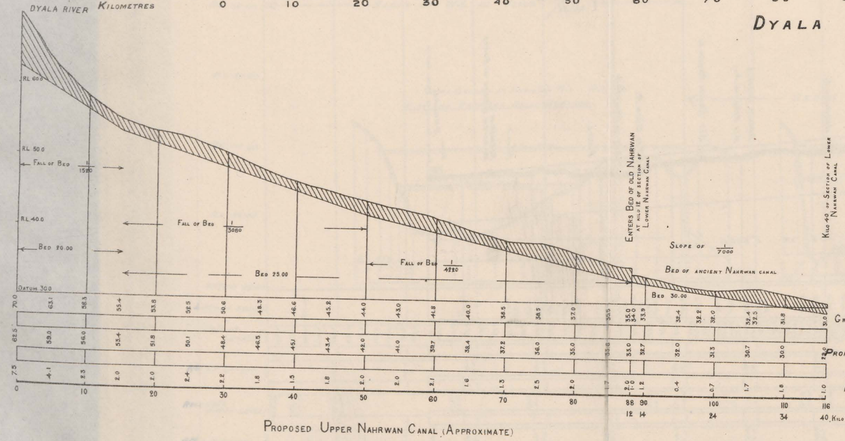
DRAWN BY H.E. Weber & S.E. Smail

8 March 1911.

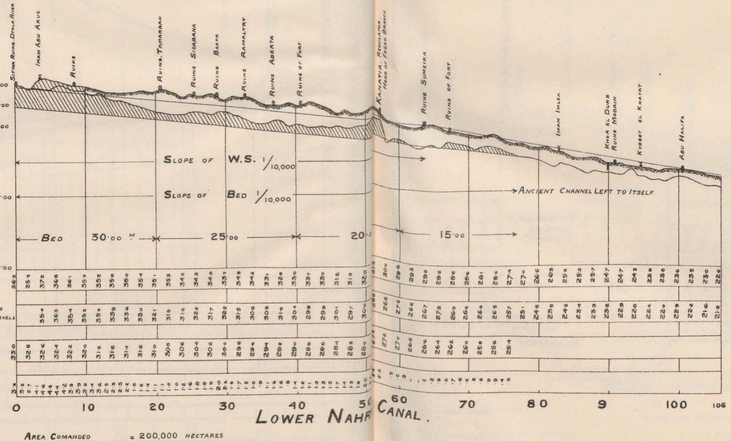








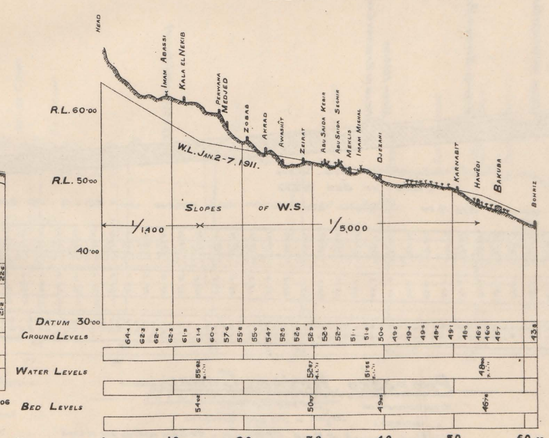
Proposed Upper Nahrwan Canal (Approximate)

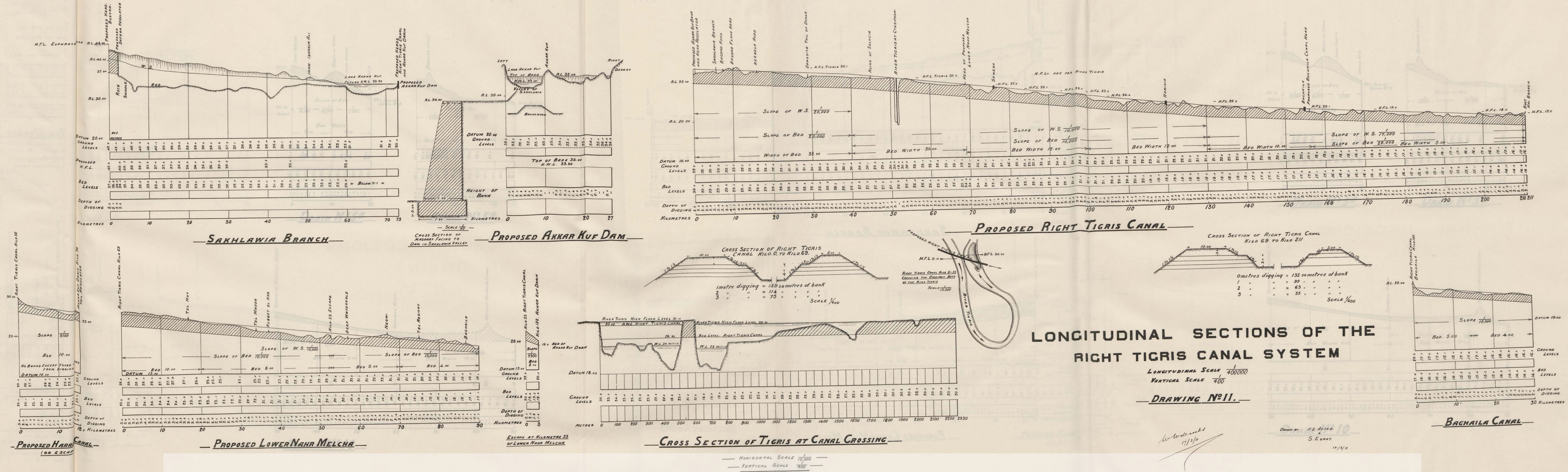


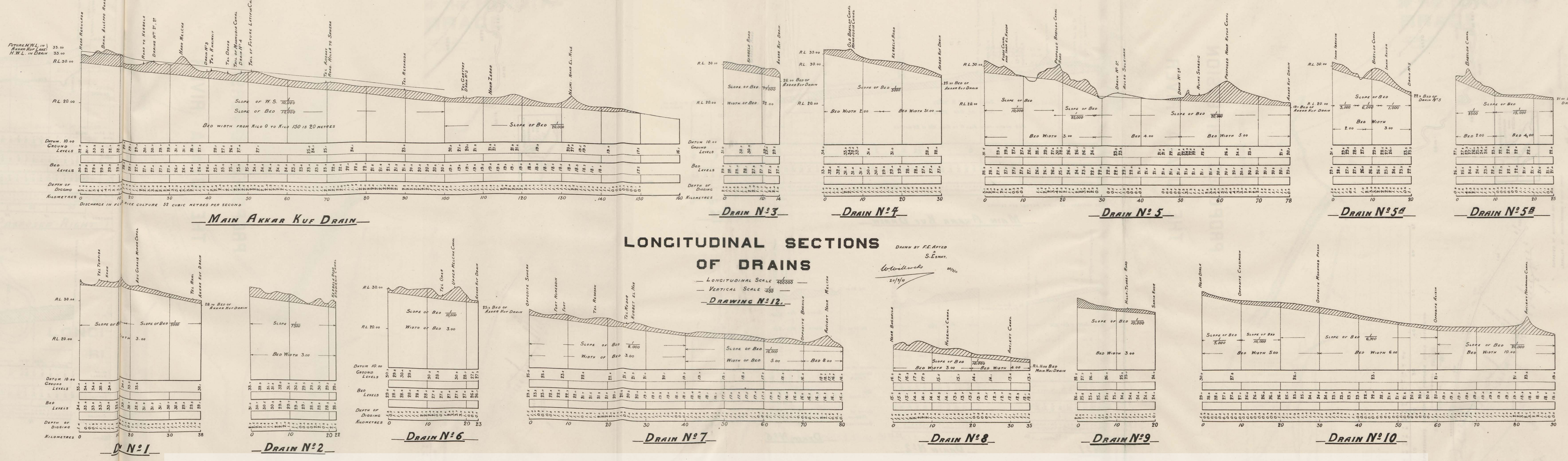
Area Commanded = 200,000 hectares

Area Irrigated in Summer = 200000/3 = 67000 hectares

Discharge Required = 200000/3 × 1/1250 = 80 cubic metres per second



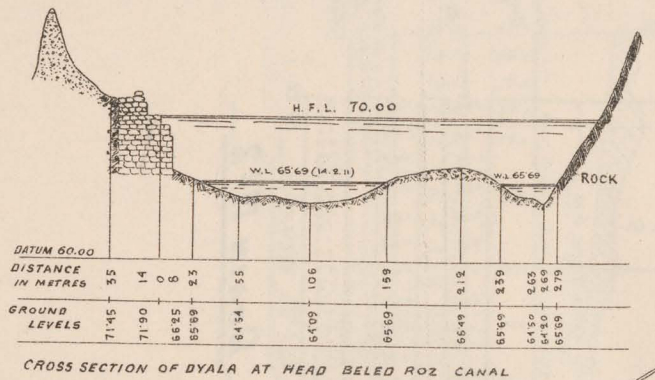




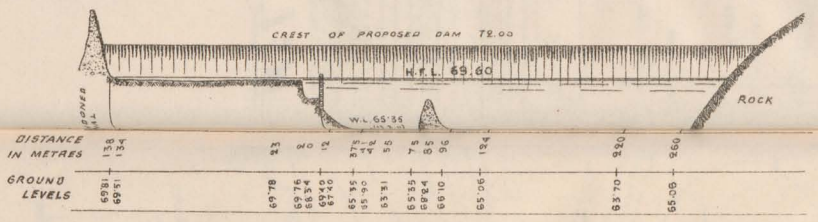
DRAWING Nº 16

PROPOSED DIVERSION OF THE DYALA RIVER

SCALE 1 / 10,000



CROSS SECTION OF DYALA AT HEAD BELED ROZ CANAL

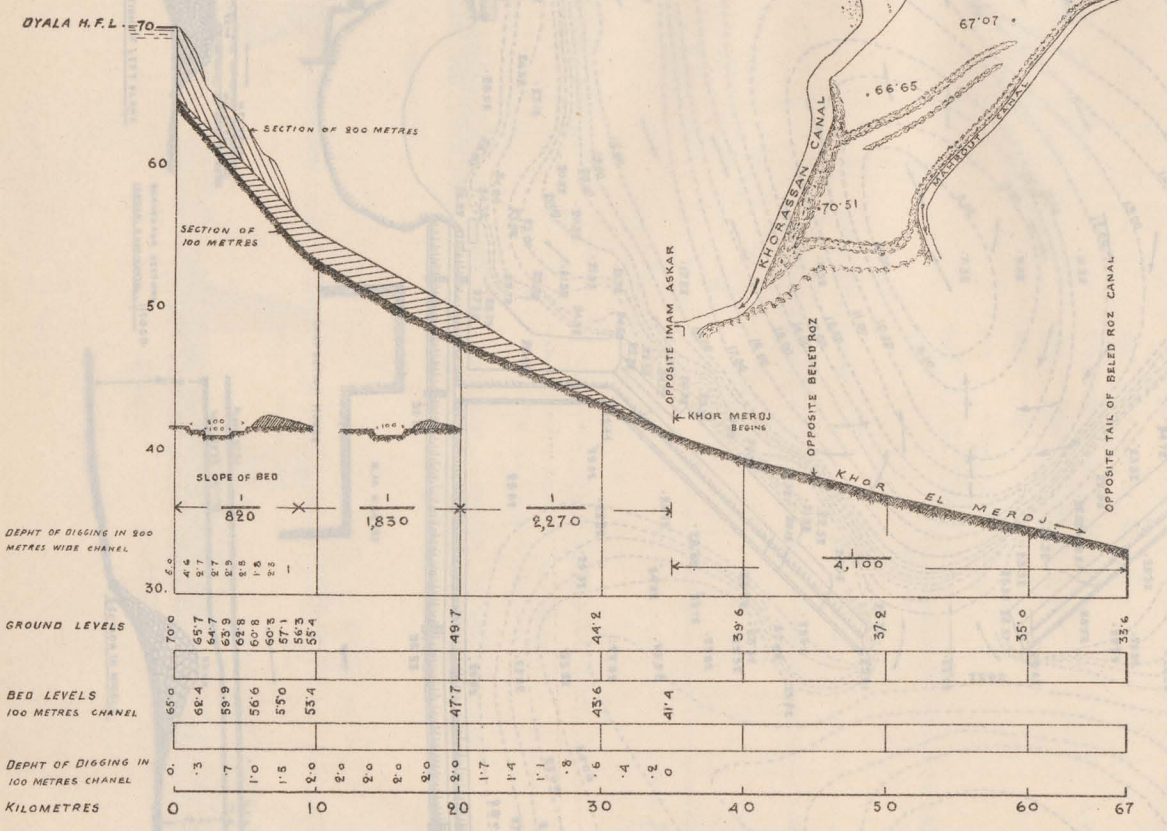


CROSS SECTION OF DYALA NEAR SITE OF DAM

SCALE FOR ABOVE CROSS SECTIONS

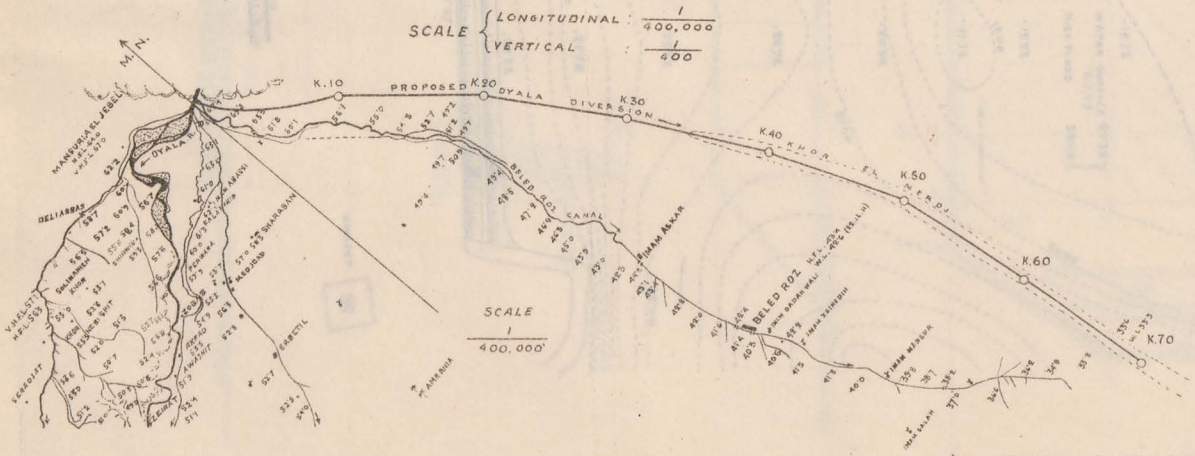
LONGITUDINAL : 1 / 4000

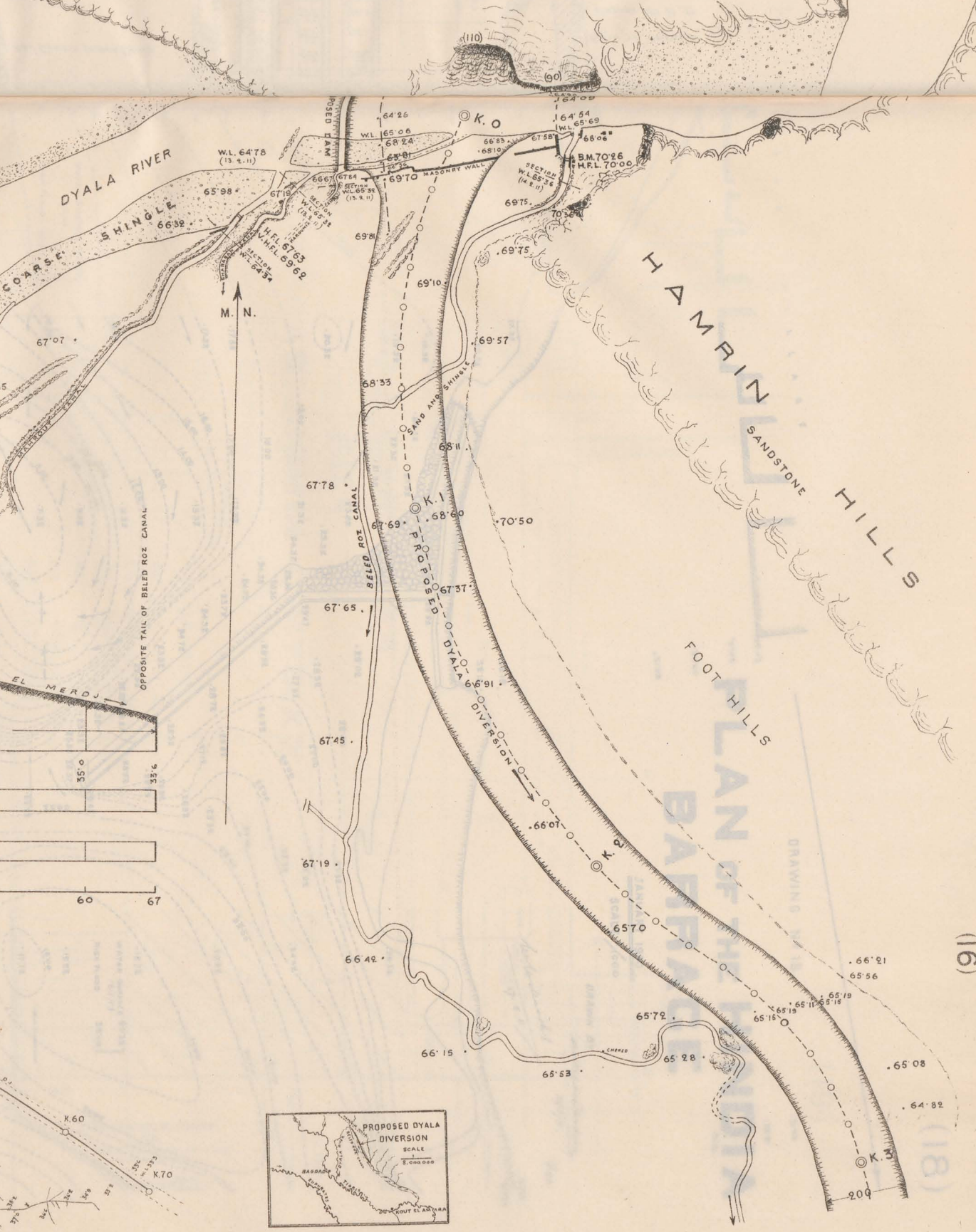
VERTICAL 1 / 400



APPROXIMATE SECTION OF PROPOSED DYALA DIVERSION

SCALE { LONGITUDINAL : 1 / 400,000 ; VERTICAL : 1 / 400





SURVEYED BY MUSTAPHA BEY IBRAHIM

LEVELLED BY AHMED ROUCHDI & SAMY ESMAT

DRAWN BY Mustapha Ibrahim 15.3.11

W. Willcocks 15/3/11

DRAWING Nº 18.

PLAN OF THE HINDIA BARRAGE

JANUARY 1910.

SCALE 1/1000

DRAWN BY

Mustapha Ibrahim
27/3/11.

W. Whitcombe
27. 3. 11

ARAB VILLAGE

WATER SURFACE 27.32
18/1/09.
HIGH FLOOD 31.30

WATER SURFACE 29.32
18/1/09
HIGH FLOOD 32.00

B.M. = 34.157

INSPECTION HOUSE

MINARET

ARAB VILLAGE

H.F.L. 31.30
W.S. 27.32 (18/1/09)
H.F.L. 32.00
W.S. 29.32 (18/1/09)
20.00
SECTION OF LEFT FLANK

SCALES FOR SECTIONS
VERTICAL & HORIZONTAL 1/1000

FLOOD 31.30
W.S. 27.32 (18/1/09)
H.F.L. 32.00
W.S. 29.32 (18/1/09)
23.00
12.00
30.00
SECTION IN MIDDLE

DRAWING Nº 19.

PROPOSED LOCK FOR EXISTING HINDIA BARRAGE

SCALE 1/400.

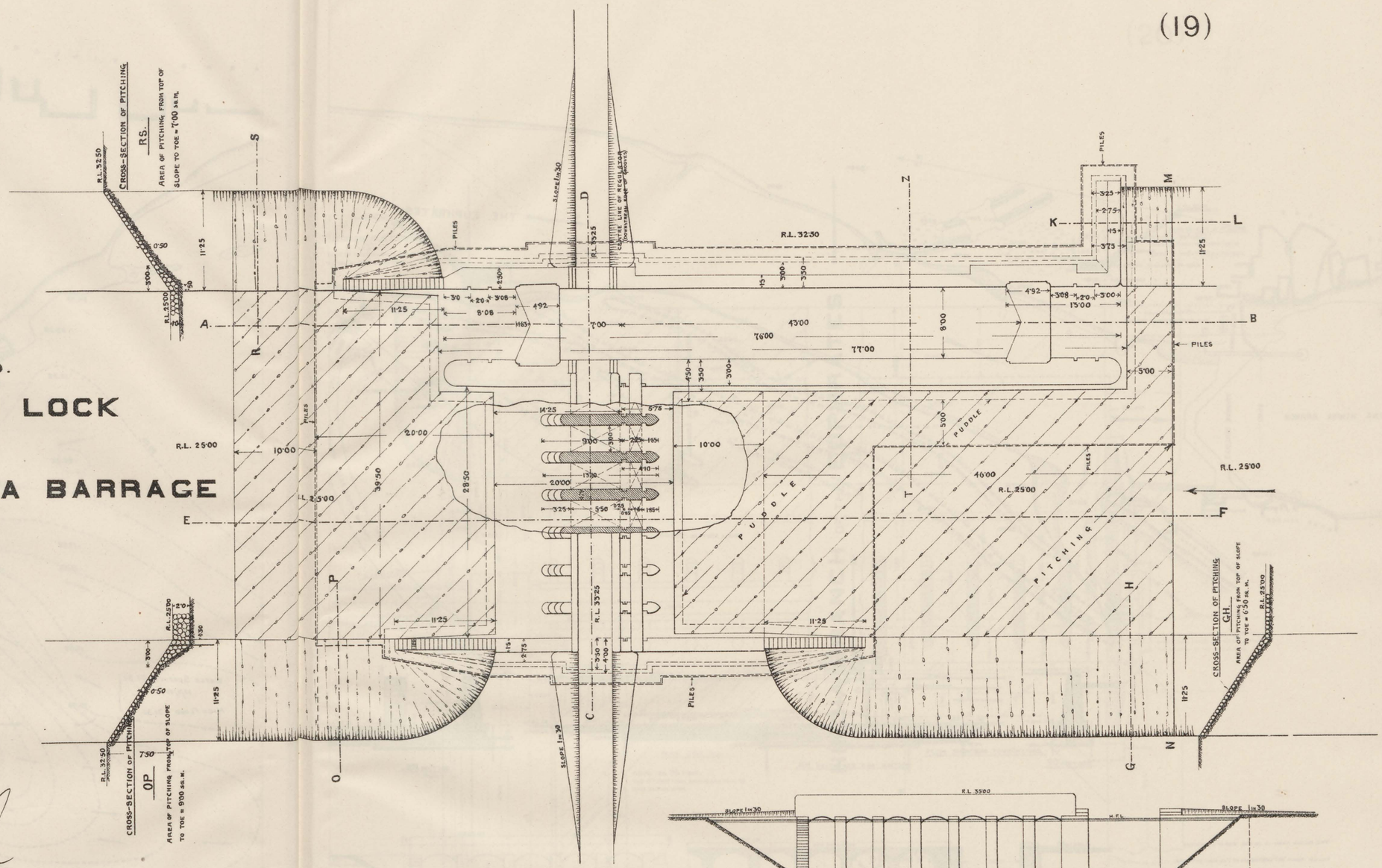
REFERENCES :-

- BRICK MASONRY 2:1 CEMENT MORTAR
- BRICK MASONRY 4:1 CEMENT MORTAR
- BRICK MASONRY - LIME MORTAR
- PITCHING IN SECTION
- PITCHING IN ELEVATION AND PLAN
- CONCRETE { UPPER HALF 6:1 CEMENT / LOWER HALF 4:1 -
- METALLING

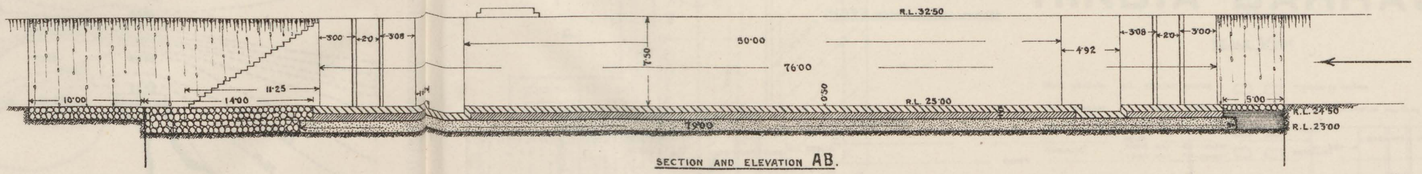
DRAWN BY N.Rao 26/1/11

26/1/11

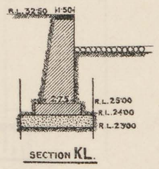
THE BENCH MARK IS ON THE TOP OF A MASONRY PILLAR ABOUT 50ft UPSTREAM OF THE MAIN ENTRANCE TO THE INSPECTION HOUSE. VALUE 34·157.



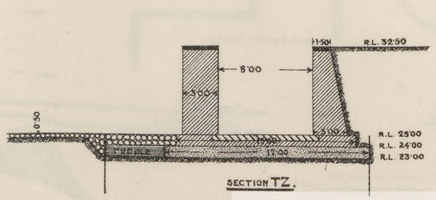
ELEVATION NM.



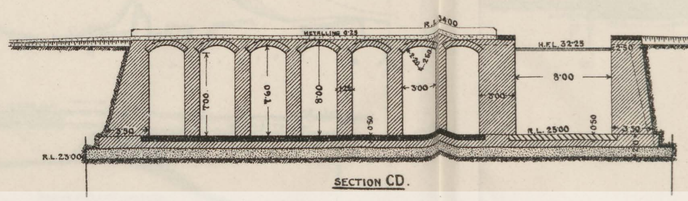
SECTION AND ELEVATION AB.



SECTION KL.



SECTION TZ.



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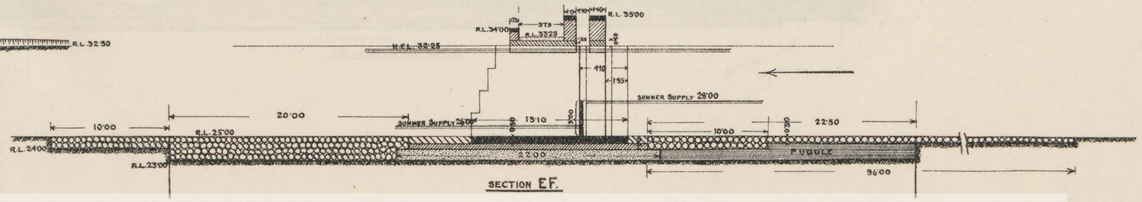

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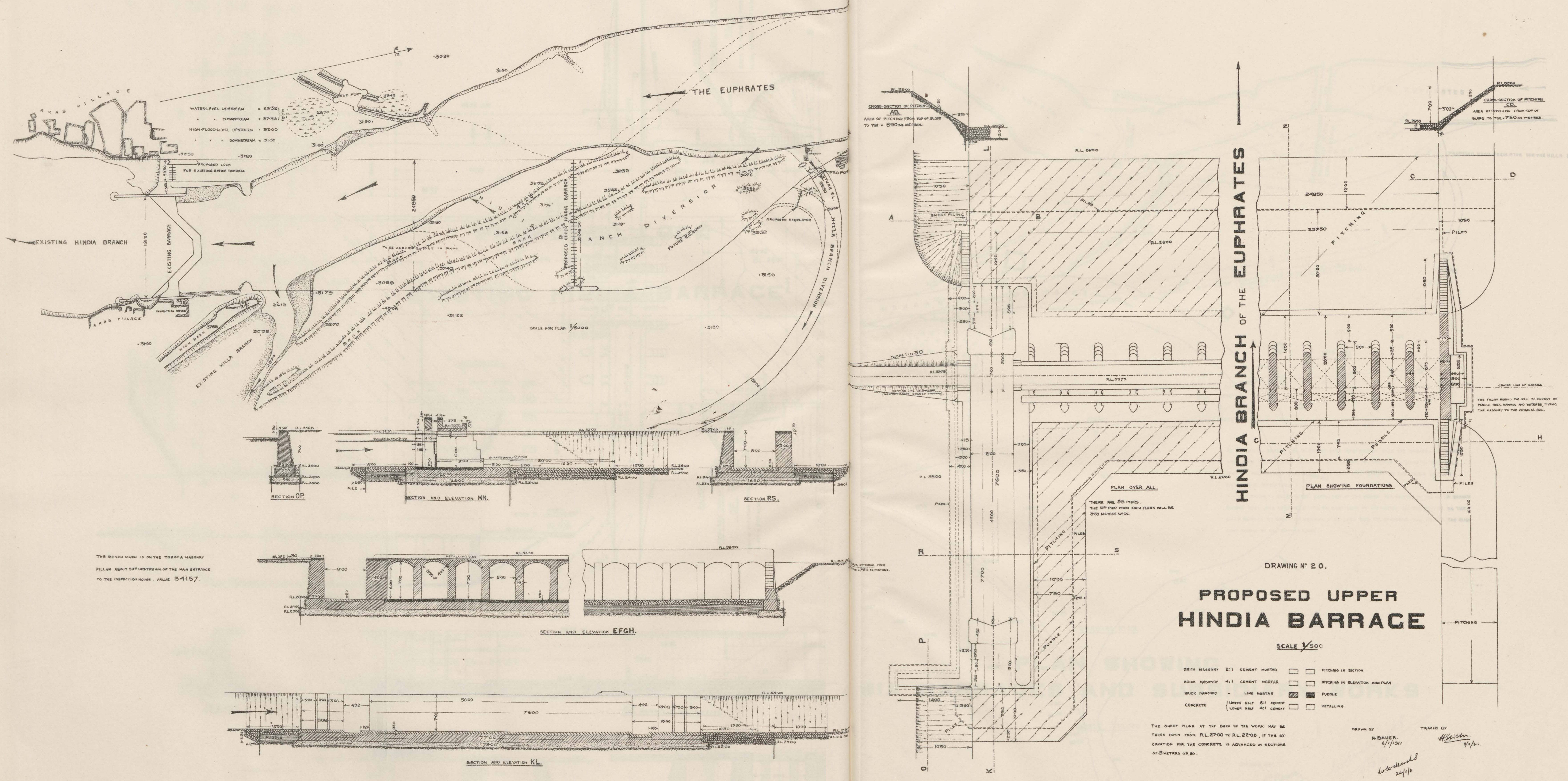
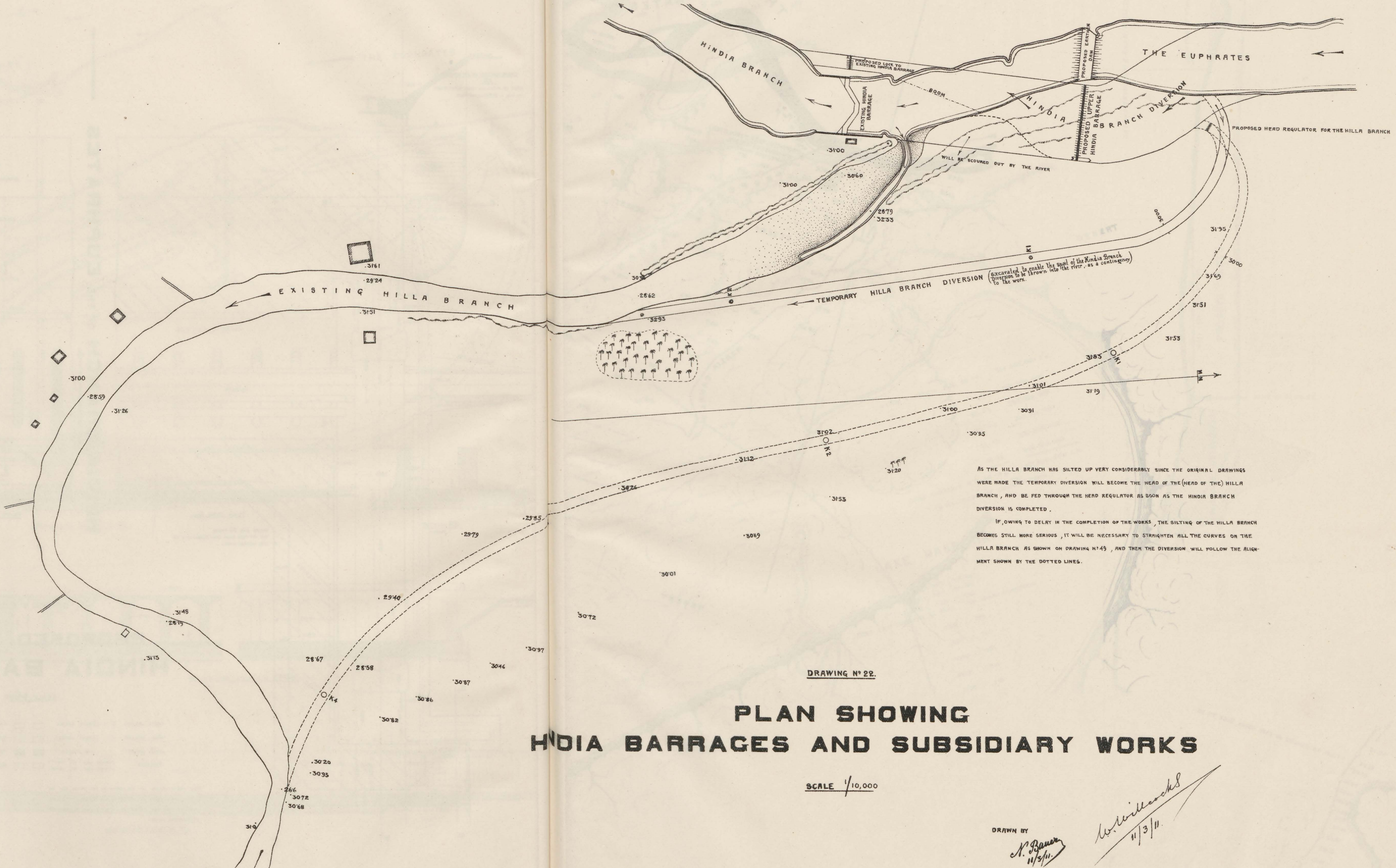




As the Hilla Branch has silted up very considerably since the original drawings were made the temporary diversion will become the head of the (head of the) Hilla Branch, and be fed through the head regulator as soon as the Hindia Branch Diversion is completed.

If, owing to delay in the completion of the works, the silting of the Hilla Branch becomes still more serious, it will be necessary to straighten all the curves on the Hilla Branch as shown on drawing Nº 49, and then the diversion will follow the alignment shown by the dotted lines.

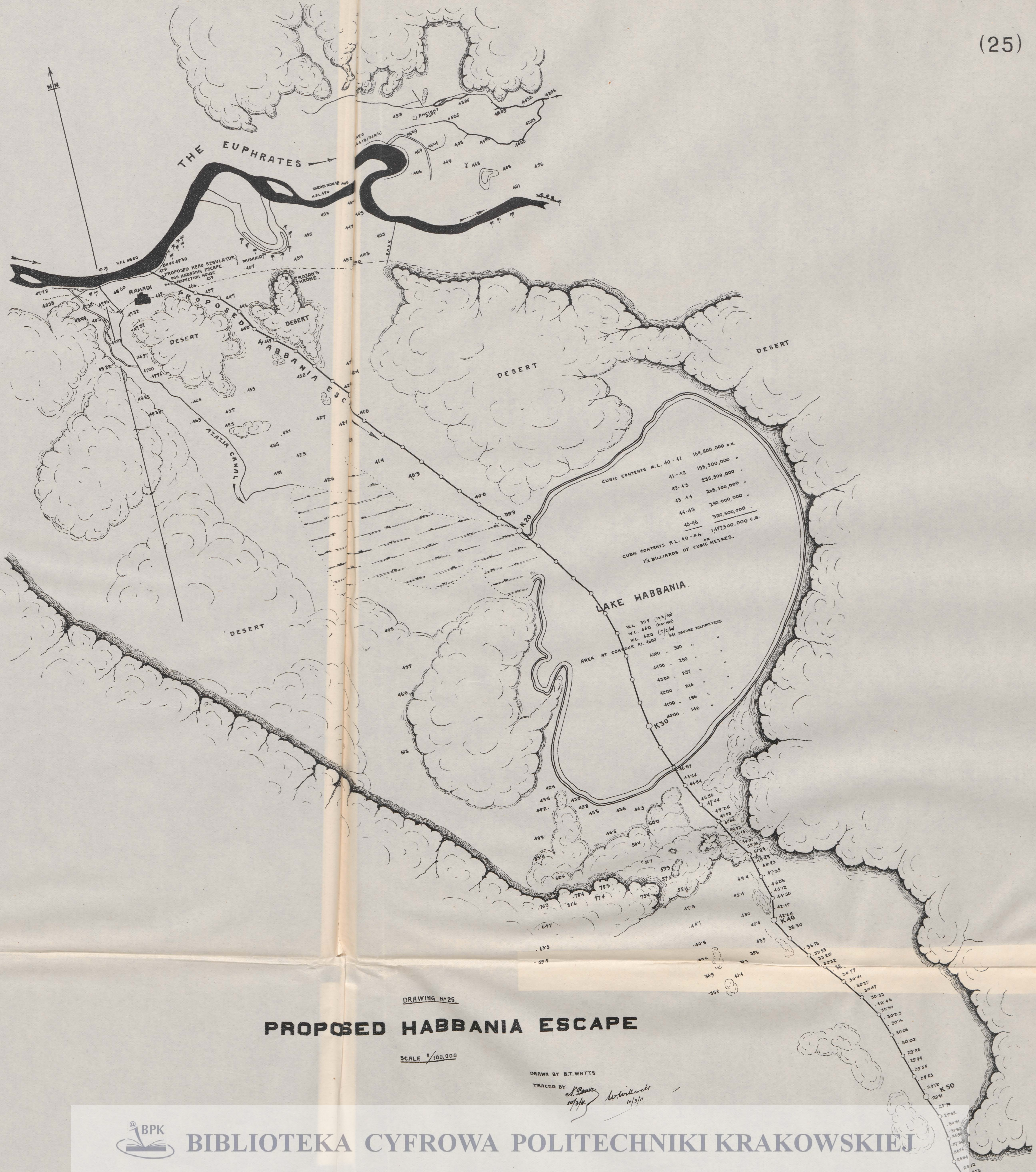
DRAWING Nº 22.

PLAN SHOWING HINDIA BARRAGES AND SUBSIDIARY WORKS

SCALE 1/10,000

DRAWN BY N. Bauer 11/3/11.

W. Willcocks 11/3/11.



DRAWING Nº 25.

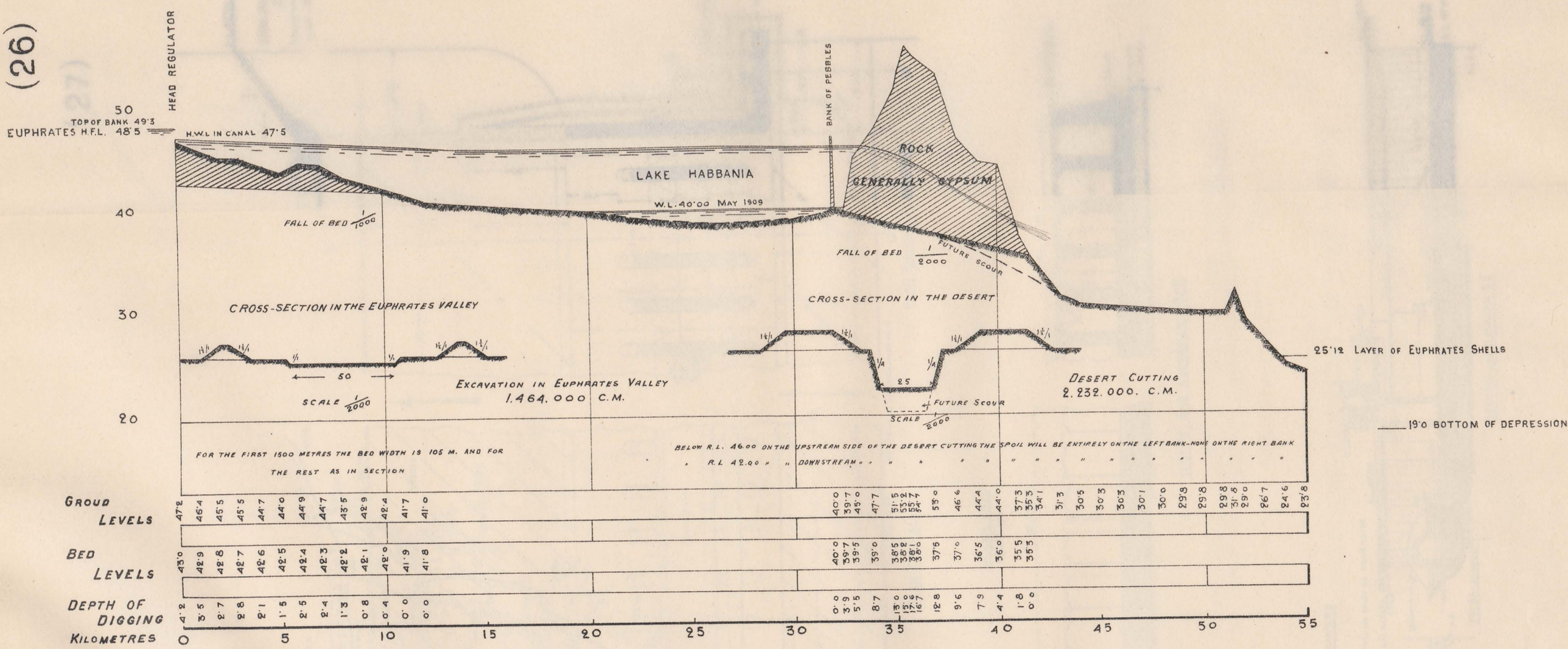
PROPOSED HABBANIA ESCAPE

SCALE 1/100,000

DRAWN BY B.T. WATTS

TRACED BY N. Bauer 10/3/11. W. Willcocks 10/3/11

(26)



DRAWING Nº 26

LONGITUDINAL SECTION OF THE HABBANIA ESCAPE

SCALE HORIZONTAL 1/200.000
VERTICAL 1/400

10. MARCH. 1911
DRAWN BY

PROPOSED HEAD REGULATOR FOR THE HABBANIA ESCAPE

DRAWING No 27

SCALE 1/400

Bench Mark on stone on left upstream waterwing of bridge over the Azizia (or Tash) Canal

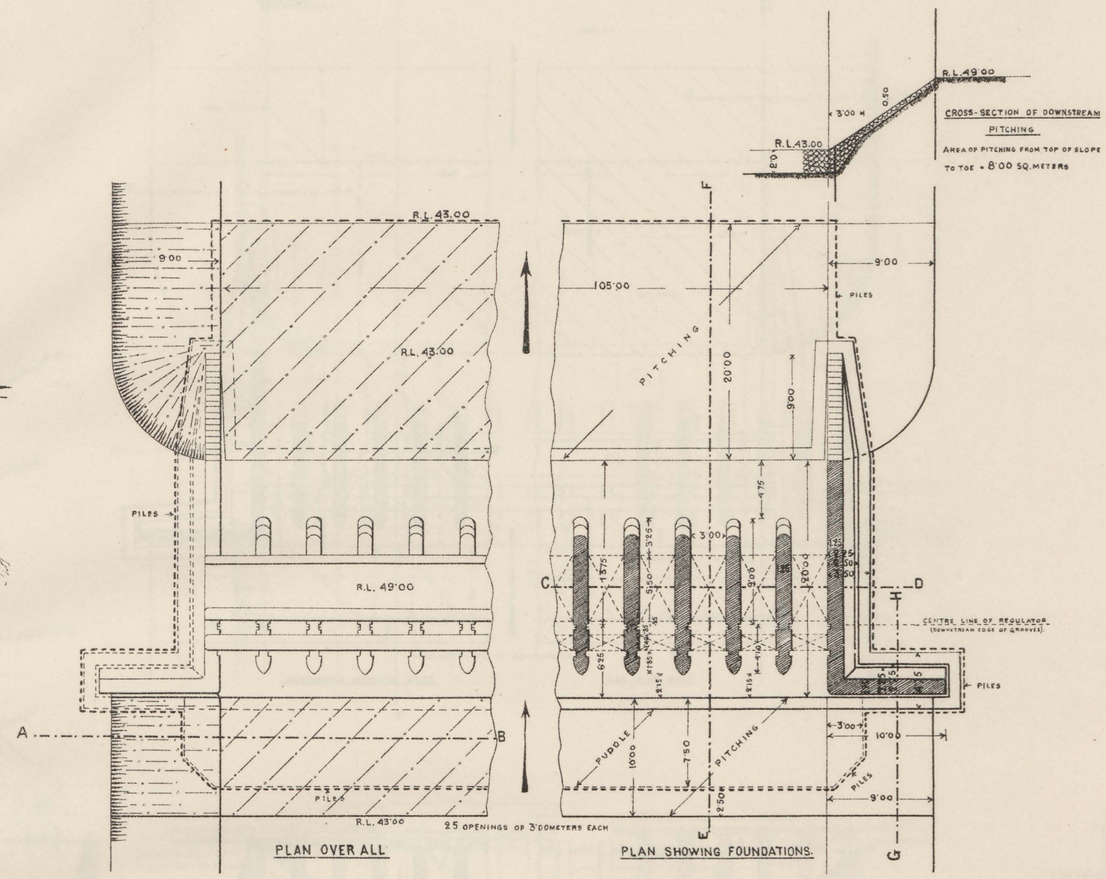
B.M. value: 48·562

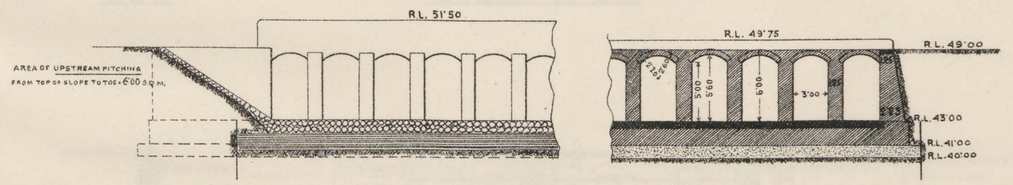
REFERENCES:

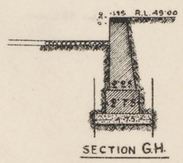
Brick masonry 2:1 cement mortar
" " 4:1 " "
" " lime "
Concrete

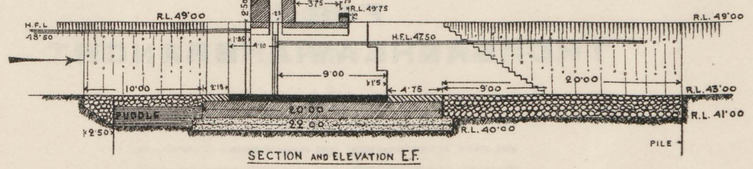
The bottom of the pitching either in contact with the puddle or earth will consist of finely broken stone or brick or lime siftings.

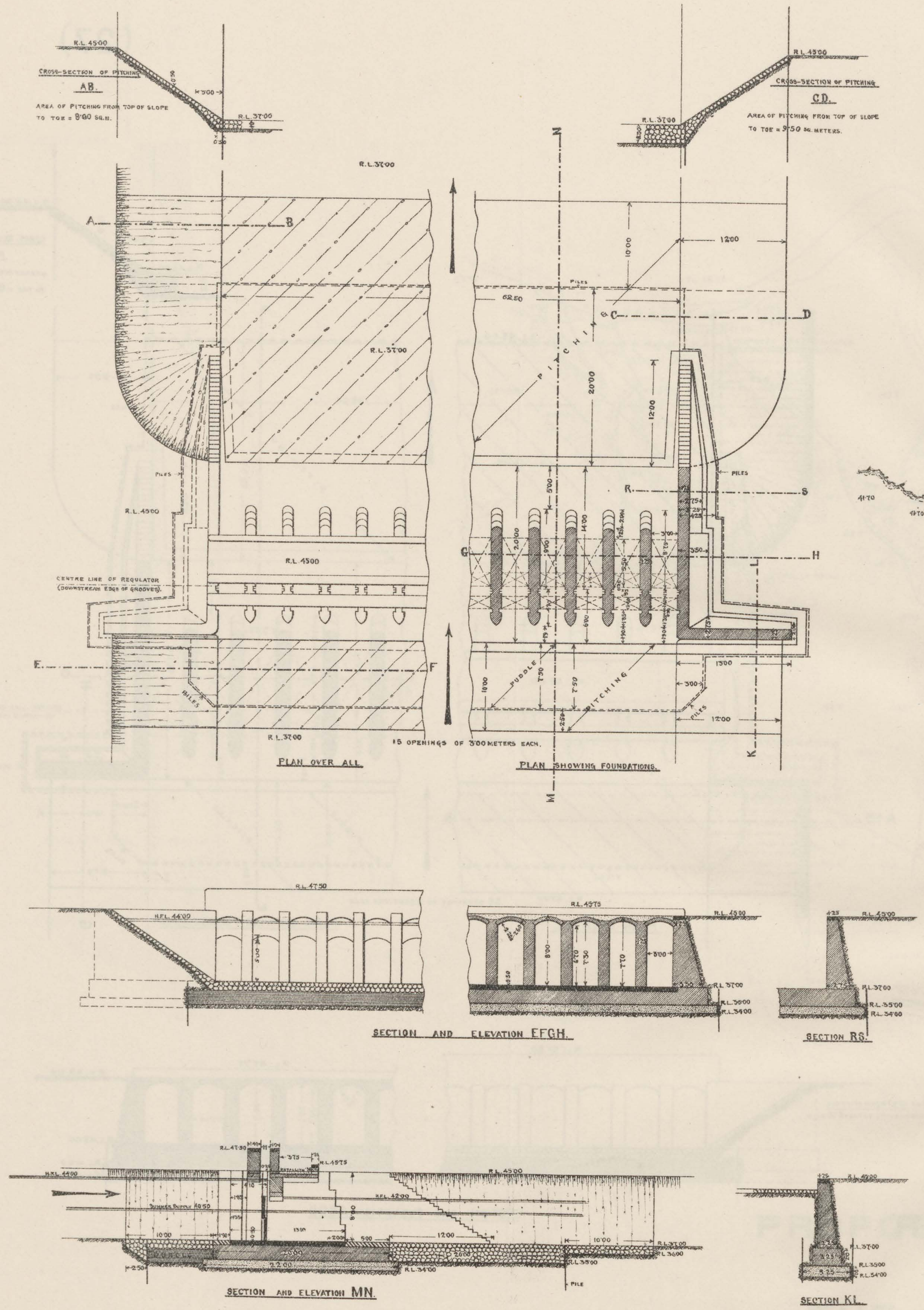
13.3.11











PROPOSED UPPER HEAD FOR THE SAKHLAWIA BRANCH

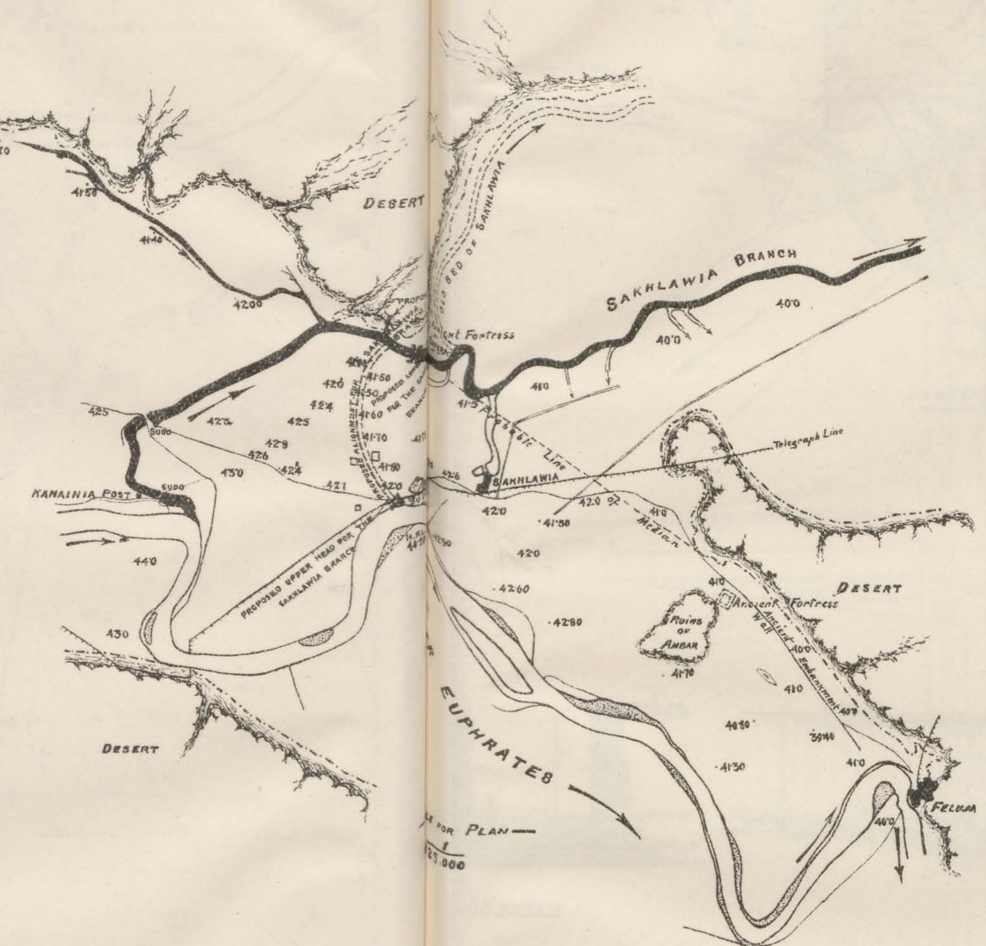
SCALE 1/500

REFERENCES

BRICK MASONRY	2:1 CEMENT MORTAR		PITCHING IN SECTION
BRICK MASONRY	4:1 CEMENT MORTAR		PITCHING IN ELEVATION AND PLAN
BRICK MASONRY	LIME MORTAR		PUDDLE
CONCRETE			METALLING

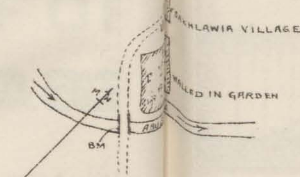
SIGNED: W. WILLCOCKS 4/4/10

DRAWN AND TRACED BY N. Bauer 30/3/10. B. G. Walter 23/5/10

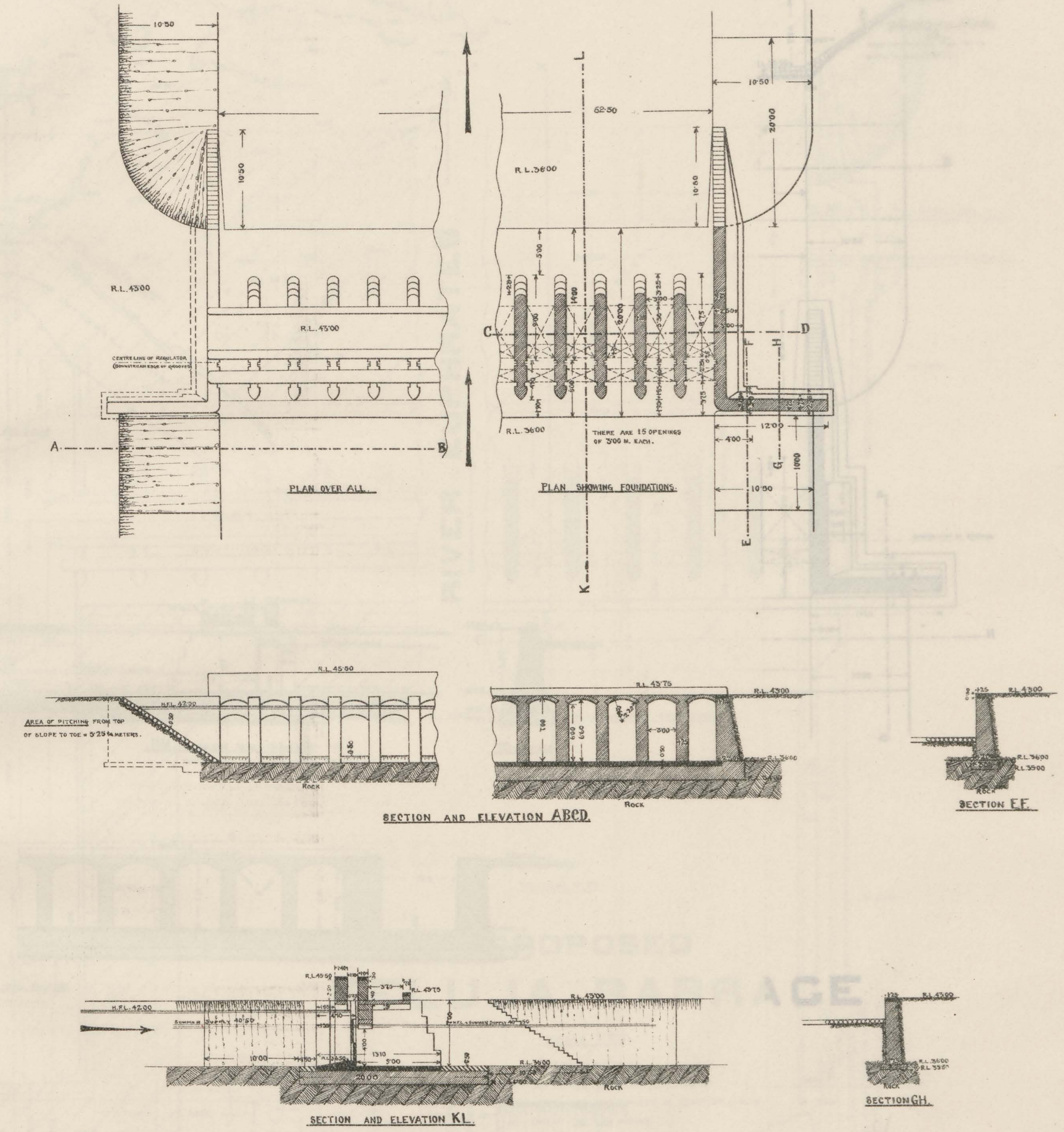


DRAWING No. 28

BENCH MARK ON BRIDGE OVER ABU-SIDER CANAL TO THE SOUTH-WEST OF SAKHLAWIA V... ON STONE MARKED THUS [BM] ON UPSTREAM SIDE OVER RIGHT AB...



B.M. VALUE = 44·184

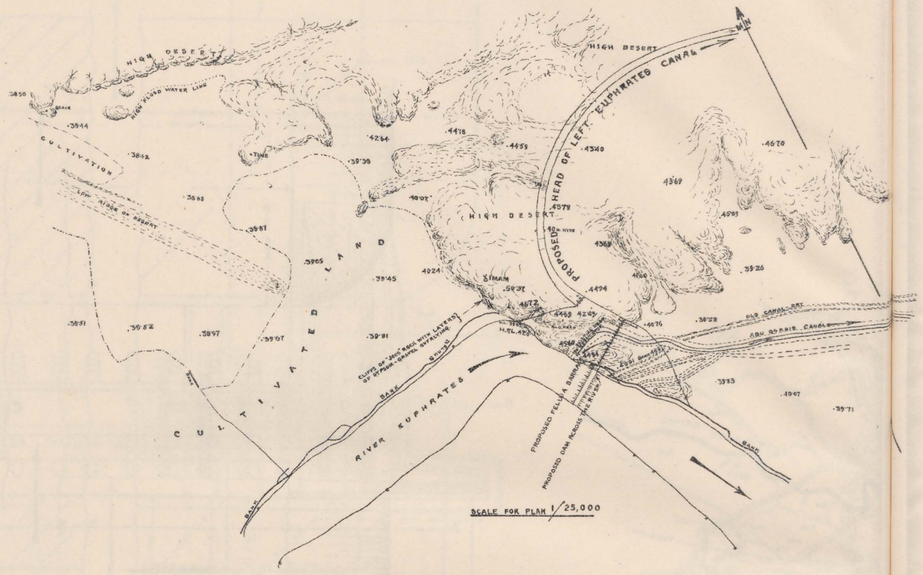


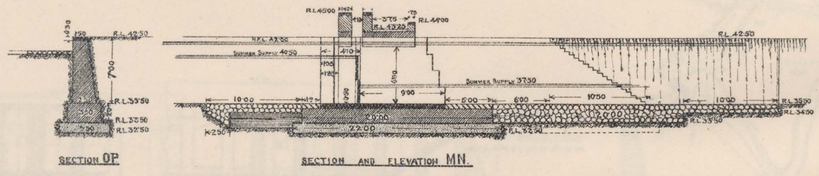
PROPOSED LOWER HEAD FOR THE SAKHLAWIA BRANCH

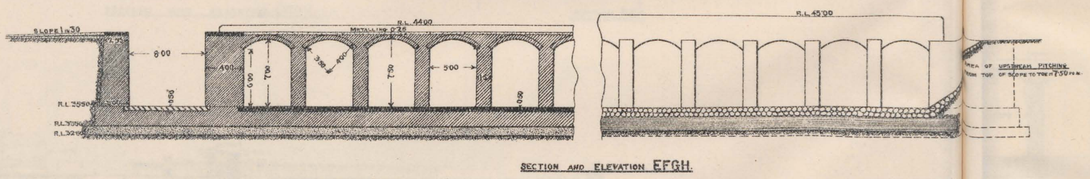
SCALE 1/500

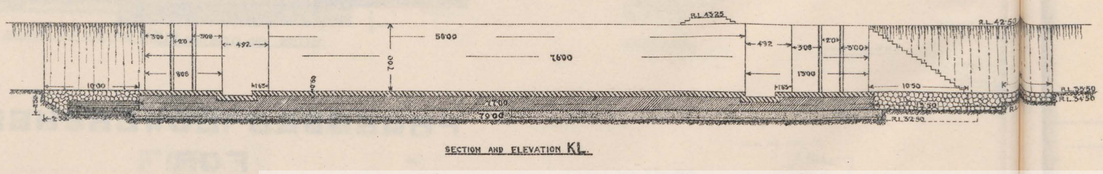
REFERENCES

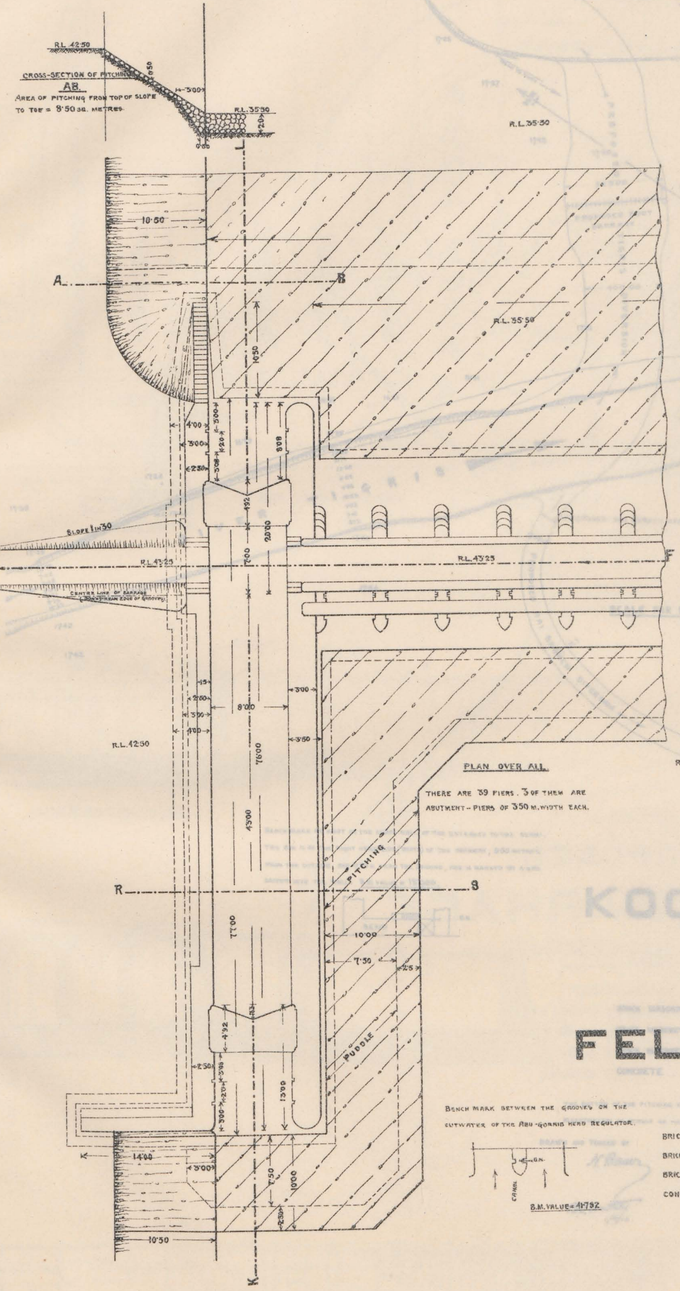
BRICK MASONRY	2:1 CEMENT MORTAR		PITCHING IN SECTION
BRICK MASONRY	4:1 CEMENT MORTAR		PITCHING IN ELEVATION AND PLAN
BRICK MASONRY	LIME MORTAR		

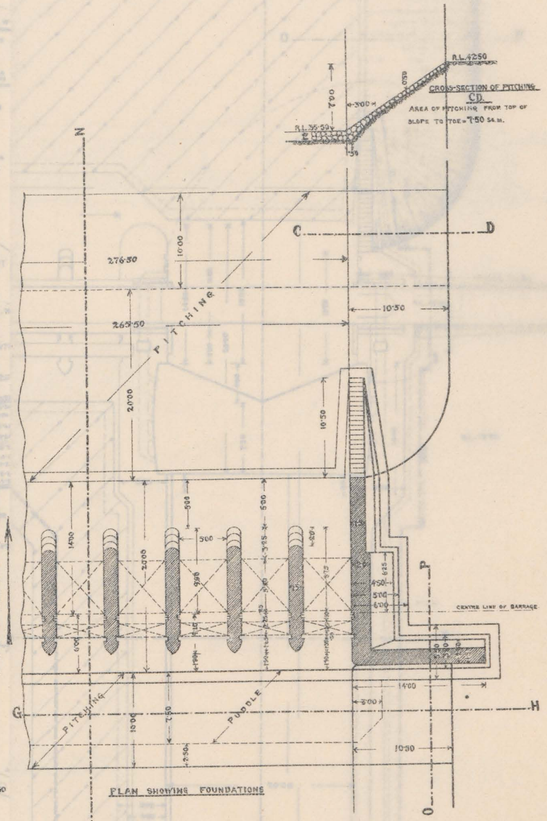












DRAWING N° 29

PROPOSED
FELUJA BARRAGE

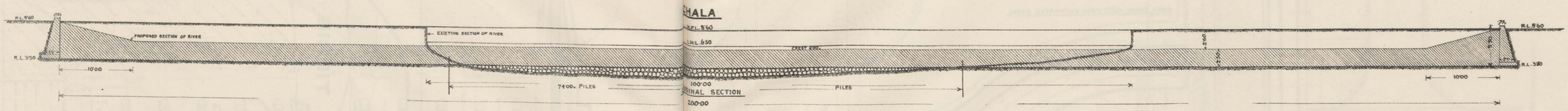
SCALE 1/500

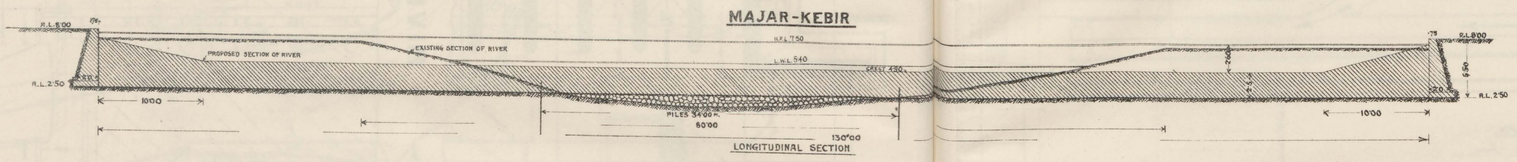
REFERENCES:-

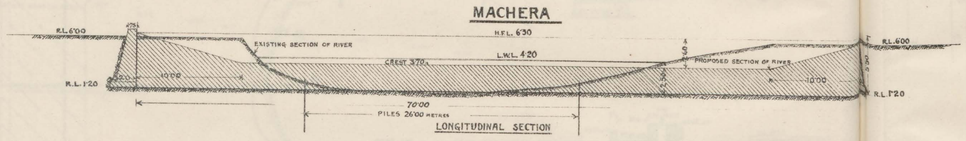
BRICK MASONRY : 2:1 CEMENT MORTAR — PITCHING IN SECTION
BRICK MASONRY : 4:1 CEMENT MORTAR — PITCHING IN ELEVATION and PLAN
BRICK MASONRY : LIME MORTAR — PUDDLE
CONCRETE — METALLING

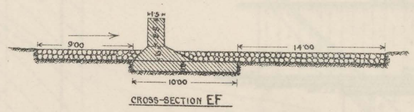
SIGNED: W. WILLCOCKS 4/1/10.

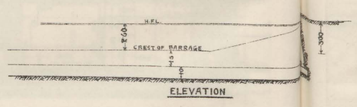
DRAWN AND TRACED BY

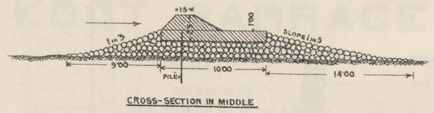


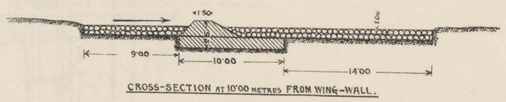


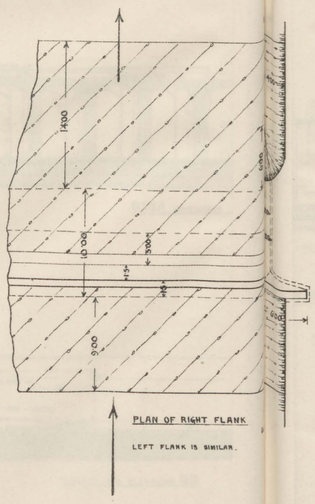


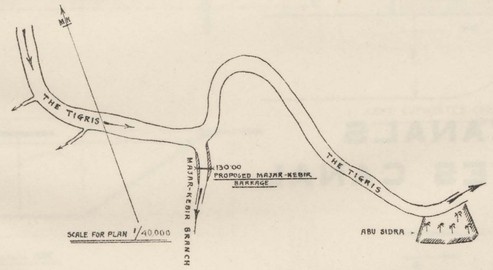


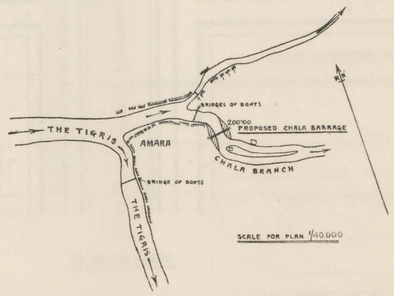


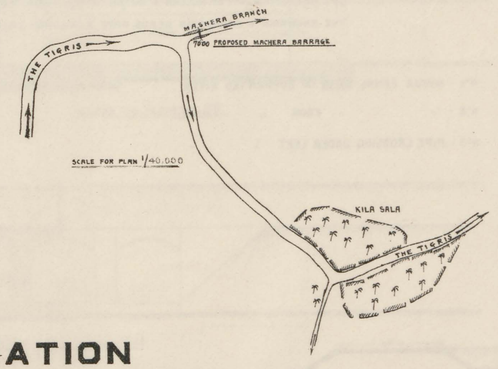






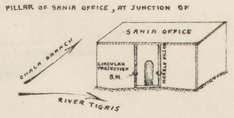






BENCH-MARK AT AMARA FOR PLANS OF CHALA, MAJAR-KEBIR AND MACHERA. STAFF PLACED ON CIRCULAR PROJECTION (1 METRE OFF GROUND) OF UPSTREAM MARBLE PILLAR OF SANIA OFFICE, AT JUNCTION OF TIGRIS AND CHALA

B.M. = 10·110



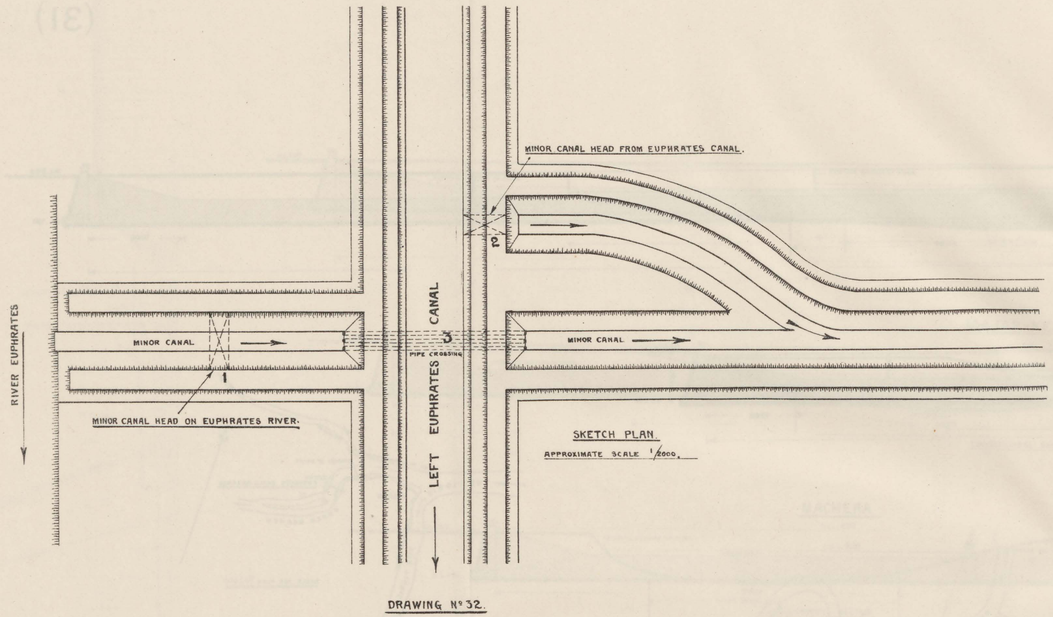
DRAWING Nº 31.

TIGRIS RIVER NAVIGATION
CHALA, MAJAR-KEBIR AND MACHERA BARRAGES

SCALE 1/400

TRACED BY N. Bauer 7/2/11.

W. Willcocks 7/2/11



DRAWING Nº 32.

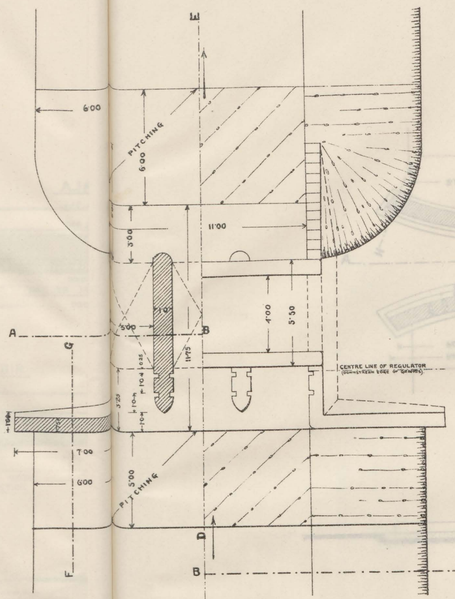
PLAN SHOWING MINOR CANALS CROSSING LEFT EUPHRATES CANAL

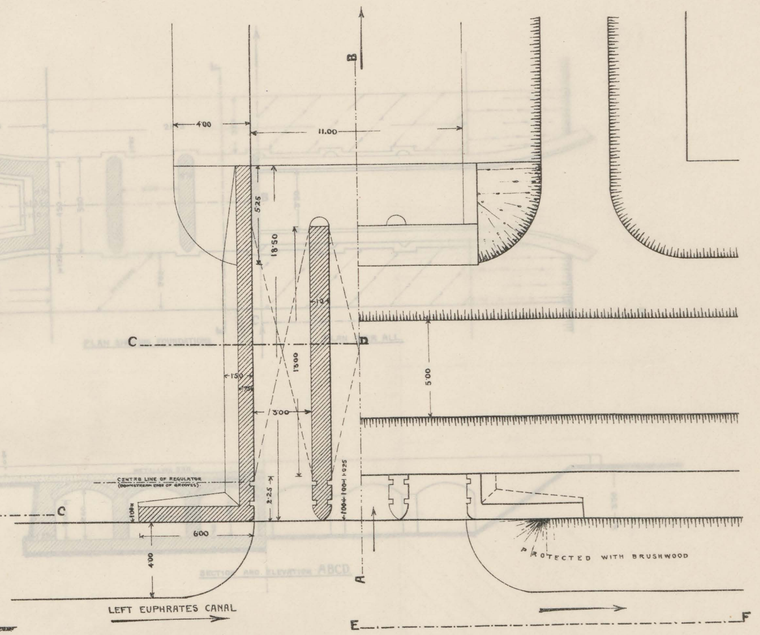
THE ABU-GORAIB, UPPER MELCHA & KUTHA HEADS HAVE 3 OPENINGS EACH
THE RADWANIA & ISCANDERIA HEADS HAVE 2 OPENINGS EACH.

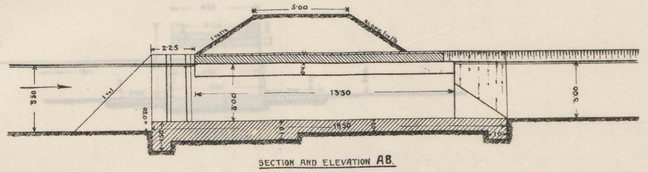
Nº1 - MINOR CANAL HEAD ON EUPHRATES RIVER.
Nº2 - " " " FROM " CANAL.
Nº3 - PIPE CROSSING UNDER LEFT " " .

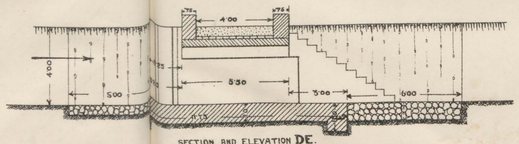
DRAWN BY N. Bauer 14/3/11

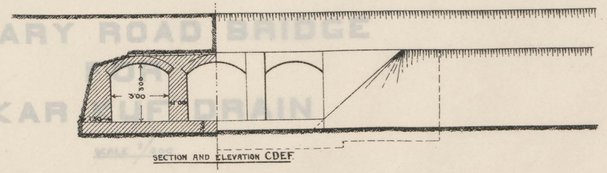
W. Willcocks 14/3/11









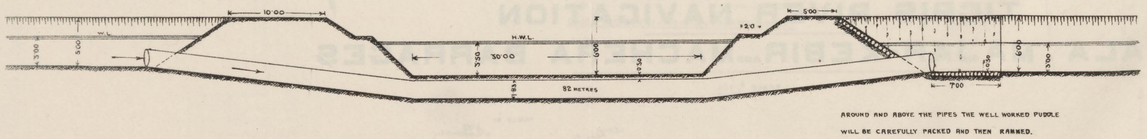


1- MINOR CANAL HEAD ON EUPHRATES RIVER.

SCALE 1/200.

2 - MINOR CANAL HEAD FROM EUPHRATES CANAL.

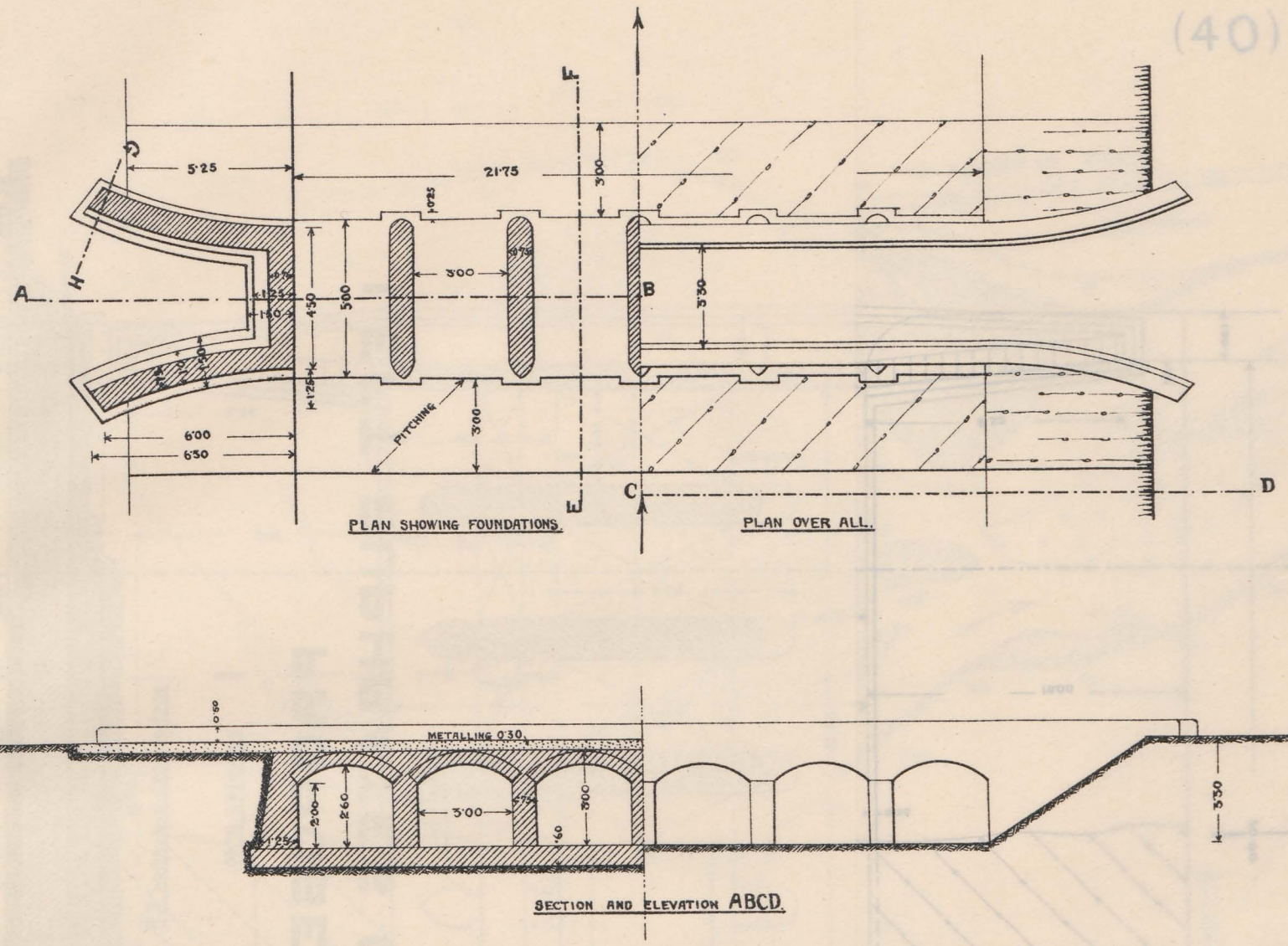
SCALE 1/200.



AROUND AND ABOVE THE PIPES THE WELL WORKED PUDDLE WILL BE CAREFULLY PACKED AND THEN RAMMED.

3.- PIPE CROSSING UNDER LEFT EUPHRATES CANAL.

SCALE 1/400.



DRAWING Nº 38.

ORDINARY ROAD BRIDGE
FOR
AKKAR KUF DRAIN

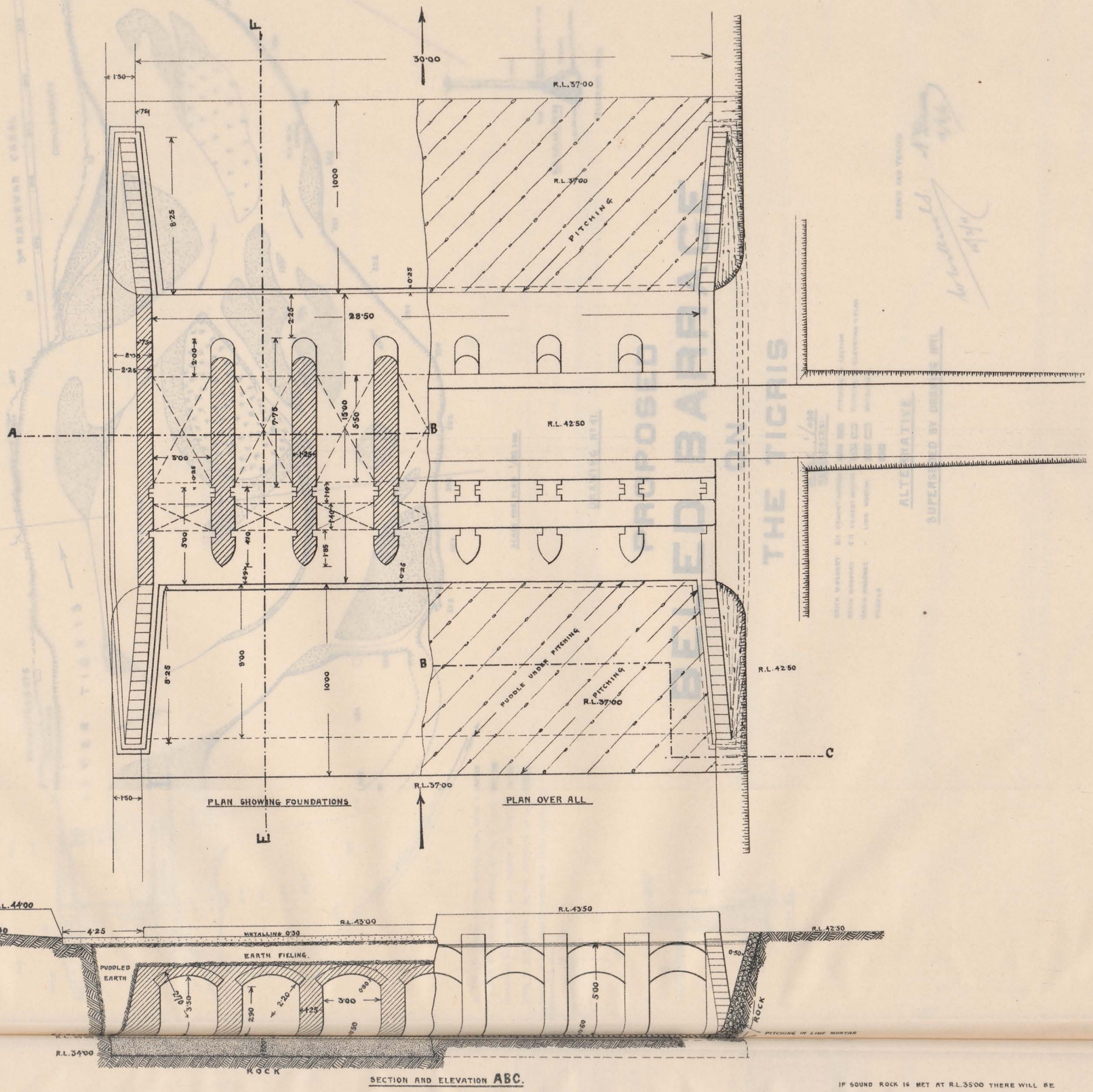
SCALE 1/200

DRAWN BY

W. Willcocks 15/3/11

N. Bauer 15/3/11.

(40)



IF SOUND ROCK IS MET AT R.L. 35·00 THERE WILL BE NO NECESSITY TO TAKE THE FLOOR DOWN TO R.L. 34·00 AS THE REGULATOR WILL HAVE TO BE COMPLETELY CLOSED WHEN THE EUPHRATES WATER IS HEAVILY CHARGED WITH DEPOSIT.

DRAWING No 40.

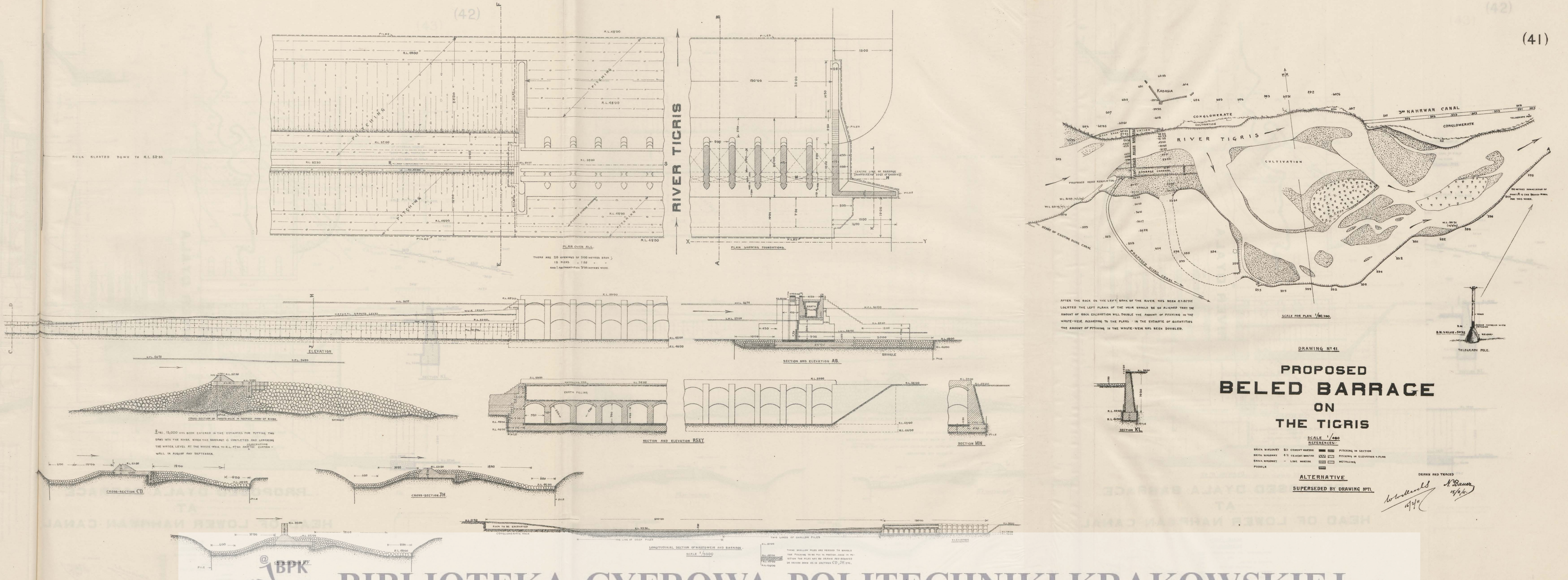
PROPOSED
LEFT EUPHRATES CANAL HEAD

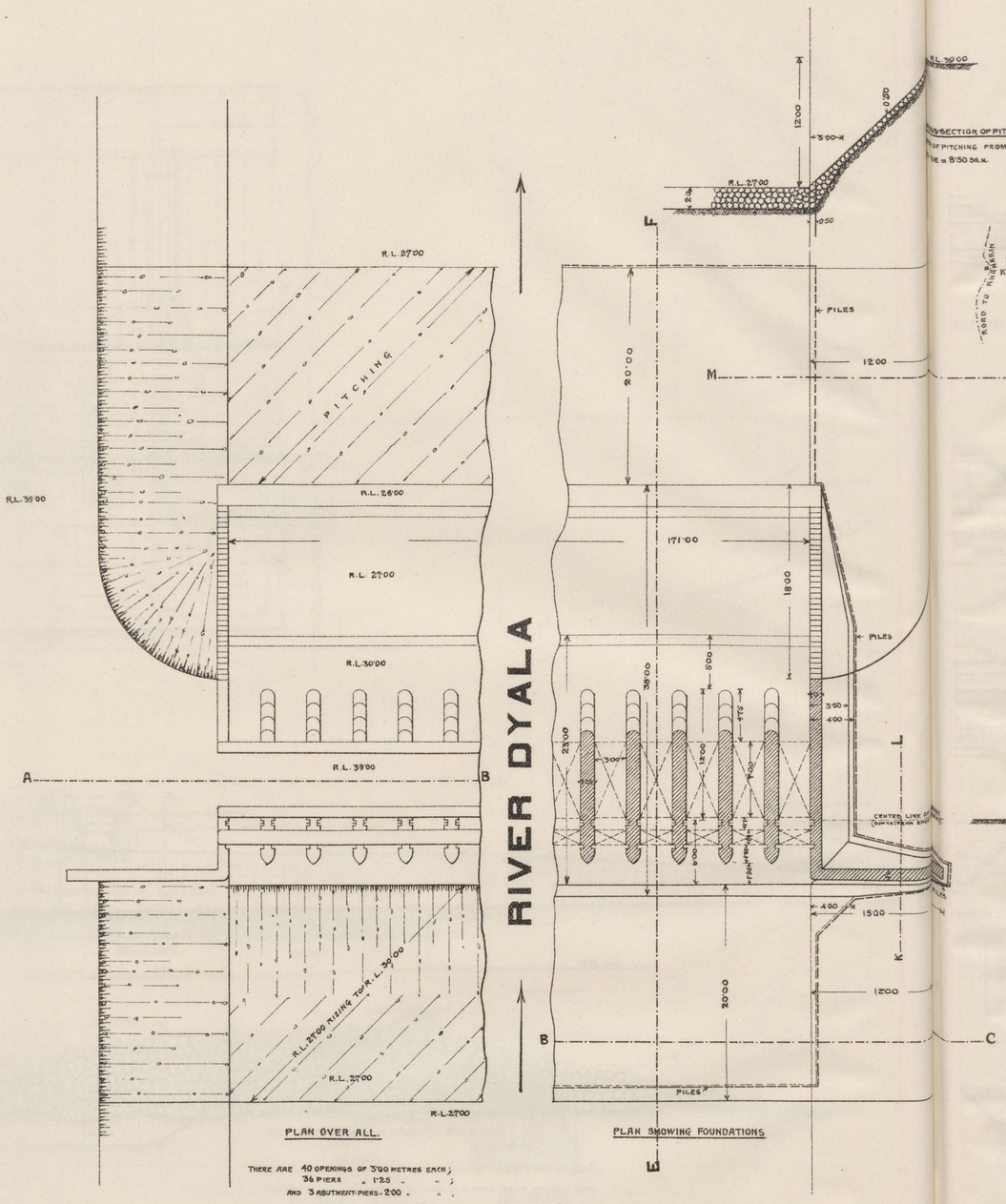
SCALE 1/200.

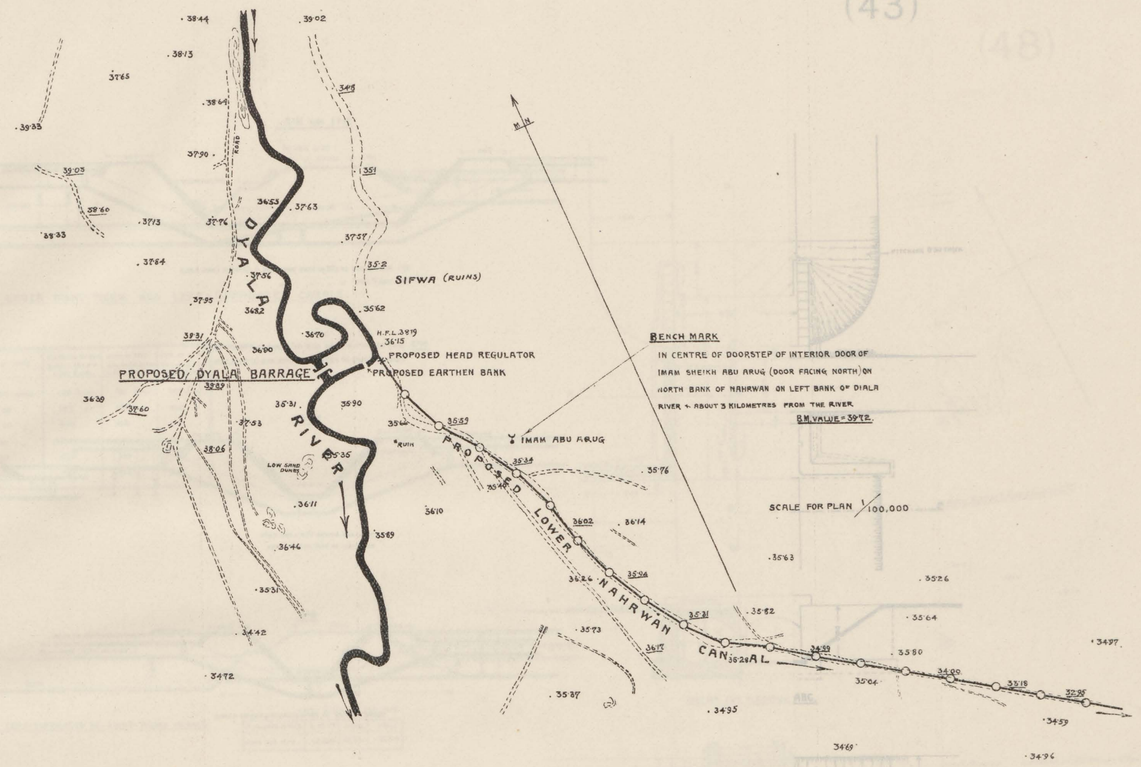
DRAWN BY

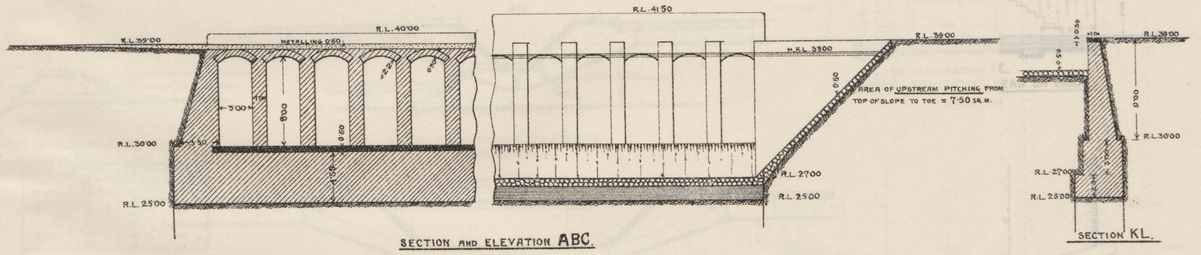
W. Willcocks 23/2/11

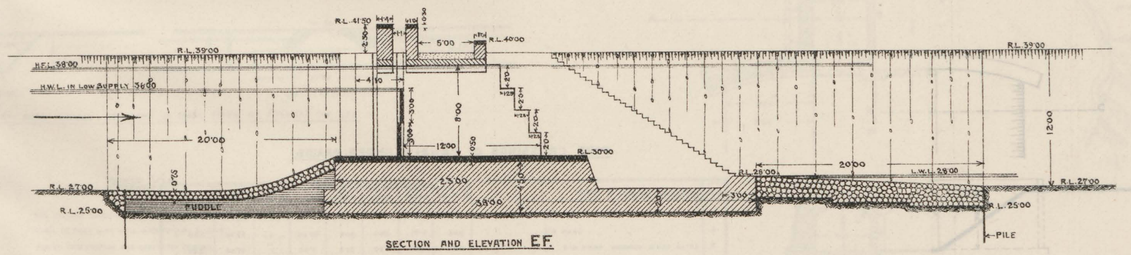
N. Bower 23/2/11











THE BOTTOM OF THE PITCHING EITHER IN CONTACT WITH THE PUDDLE OR EARTH WILL CONSIST OF 10 CENTIMETRES OF FINELY BROKEN STONE OR BRICK OR LIME SIFTINGS OR SHINGLE.

IN FLOOR ABUTMENTS AND WING-WALLS RUBBLE MASONRY MAY REPLACE BRICK MASONRY IN LIME.

DRAWING Nº 42.

PROPOSED DYALA BARRAGE AT HEAD OF LOWER NAHRWAN CANAL

SCALE 1/400

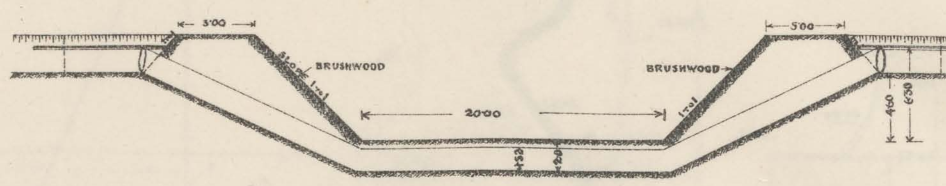
REFERENCES:-

BRICK MASONRY 2:1 CEMENT MORTAR
" " - LIME "
PITCHING IN SECTION
" " ELEVATION AND PLAN
PUDDLE
METALLING

DRAWN BY N. Bauer 29/3/11

W. Willcocks 29/3/11

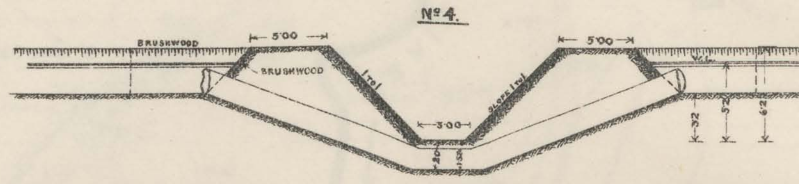
No 1 and No 2.



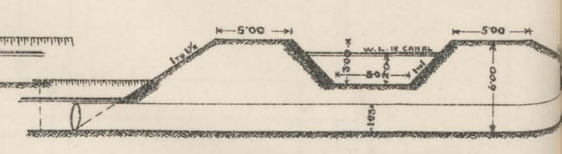
No 1 has 2 pipes of 1·52 metres diameter + 52·00 m. long each
No 2 has 1 pipe " " " " " " "

No 3: Same as Nos 1 & 2, only bed of drain is 5·00 mtrs wide.
There is 1 pipe of 1·52 m. diameter and 37·00 m. long

No 4.



There are 2 pipes 33 m. long each
Diameter of pipe = 1·52 metres.



PIPE-CROSSING OF DRAINS UNDER CANALS.

Alternative to Nos 3, 4, 5 & 6.

Length of pipe 40·00 m.; diameter 1·83 metres; cost £tqs. per pipe.

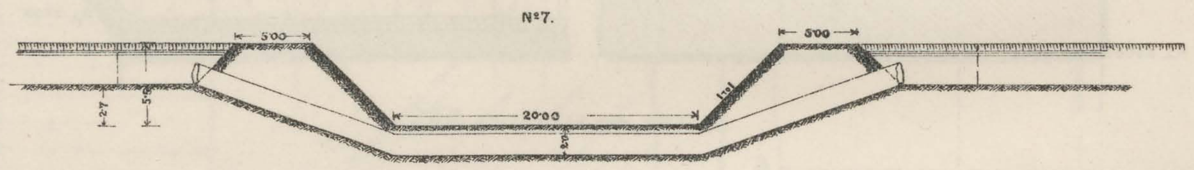
No 5.

There is 1 pipe of 1·52 m. diameter + 28·00 m. long.

No 6.

There is 1 pipe of 1·52 m. diameter and 28·00 m. long.

No 7.



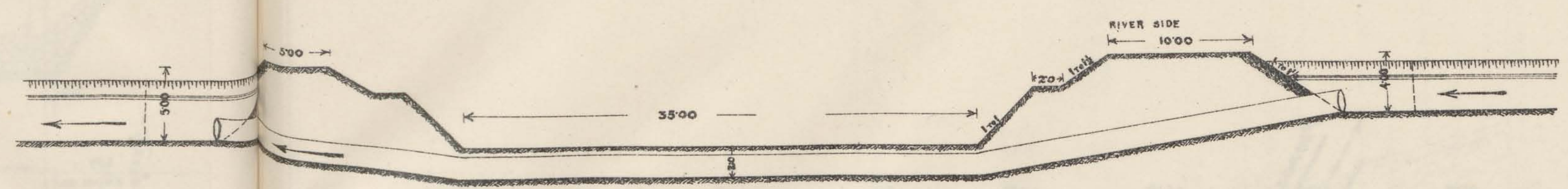
There is 1 pipe 48·00 m. long and of 1·52 m. diameter.

SCALE 1/500

PIPE CROSSINGS OF CANALS UNDER DRAINS.

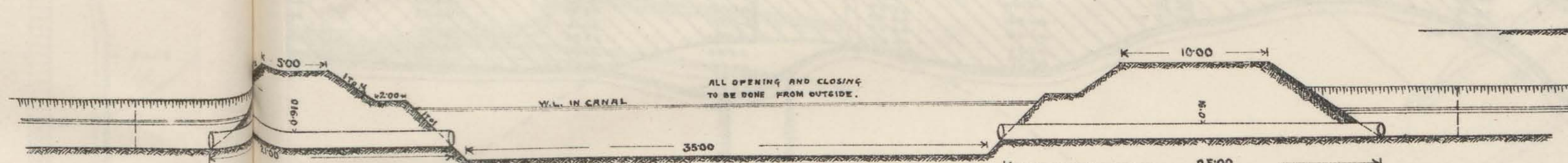
No	Name of canals and drains	R.L. of bed of canal	W.L. of canal	Width of canal	R.L. of bed of drain	Width of drain	Number of pipes	Length of pipe	Cost £tqs.
1.	Upper Melcha canal crossing Akkar-Kuf drain	31·3	33·0	5·00	26·7	20·00	2	52·00	780 £tqs.
2.	" " " " drain No 6	30·5	31·75	3·00	26·0	20·00	1	52·00	390 "
3.	Kutha canal crossing drain No 5	25·4	27·4	3·00	20·8	5·00	1	37·00	280 "
4.	Babylon " " " No 5	29·2	31·2	6·00	26·0	3·00	2	33·00	500 "
5.	" " " " No 5A	28·6	30·1	5·00	26·2	3·00	1	29·00	220 "
6.	" " " " No 5B	28·0	29·5	3·00	25·2	2·00	1	28·00	210 "
7.	Lower Right Abu-Gorais canal crossing Akkar-Kuf drain	32·1	34·6	3·00	29·4	20·00	1	48·00	360 "

Corrugated Acme pipes in position.					
Diameter of pipe		Price per mtr run in position in £tqs.	Discharge in cc. mtrs per sec fall 1/100.	Weight in kilogrammes per metre run	Thickness in inches
Feet	Metres				
1·5	0·45	1·8 £tqs.	0·35	23·5	1/16
2·0	0·61	2·5 "	0·76	34·2	9/128
3·0	0·91	4·2 "	2·30	55·5	5/64
4·0	1·22	5·5 "	5·0	100·1	7/64
5·0	1·52	7·5 "	9·0	124·9	7/64
6·0	1·83	10·0 "	14·5	190·7	9/64



PIPE CROSSINGS FOR WATERCOURSES UNDER RIGHT-TIGRIS AND LEFT-EUPHRATES CANALS.

Width of canal	Length of pipe	Diameter of pipe 5 feet = 1·52 mtrs cost £tqs.	Diam. of pipe 4 ft. = 1·22 metres cost £tqs.	Diam. of pipe 3 ft. = 0·91 mtrs. cost £tqs.
35·00 mtres.	82·00 metres	620 £tqs.	460 £tqs.	350 £tqs.
30·00 "	77·00 "	580 "	430 "	330 "
25·00 "	72·00 "	540 "	400 "	310 "
20·00 "	67·00 "	510 "	370 "	290 "
15·00 "	62·00 "	470 "	350 "	260 "
10·00 "	57·00 "	430 "	320 "	240 "



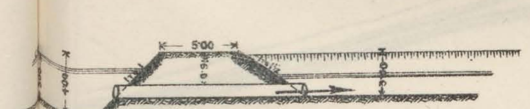
Cost £tqs. 90 per pipe.

Diameter of pipe	0·45 metres	0·61 m.	0·91 m.
Cost per pipe	40 £tqs	55 £tqs.	90 £tqs

IRRIGATION PIPES ON LEFT-EUPHRATES OR RIGHT-TIGRIS CANALS.

Cost £tqs. 105 per pipe.

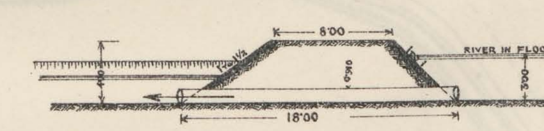
Diameter of pipe	0·45 mtrs	0·61 m.	0·91 m.
Cost per pipe	45 £tqs	65 £tqs	105 £tqs



IRRIGATION PIPE ON ORDINARY CANAL.

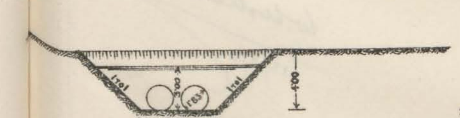
Length of pipe 10 to 15 mtrs.; diam. 3 feet (0·91 mtrs)

Length of pipe	Diam. 0·91 m. cost per pipe	Diam. 0·61 m. cost per pipe	Diam. 0·45 m. cost per pipe
10 metres	42 £tqs.	25 £tqs.	18 £tqs.
11 "	46 "	28 "	20 "
12 "	50 "	30 "	22 "
13 "	55 "	33 "	24 "
14 "	59 "	35 "	26 "
15 "	63 "	39 "	27 "

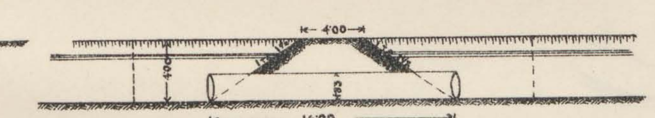


ORDINARY FLOOD-BANK AND PIPE-CROSSING UNDER FLOOD-BANK.

Diameter of pipe	0·45 mtrs	0·61 m.	0·91 m.
Cost per pipe £tqs	35 £tqs.	45 £tqs.	80 £tqs.



CROSS-SECTION.



LONGITUDINAL SECTION.

ORDINARY ROAD-BRIDGE. ONE, TWO OR MORE PIPES AT £tqs. 160 PER PIPE.

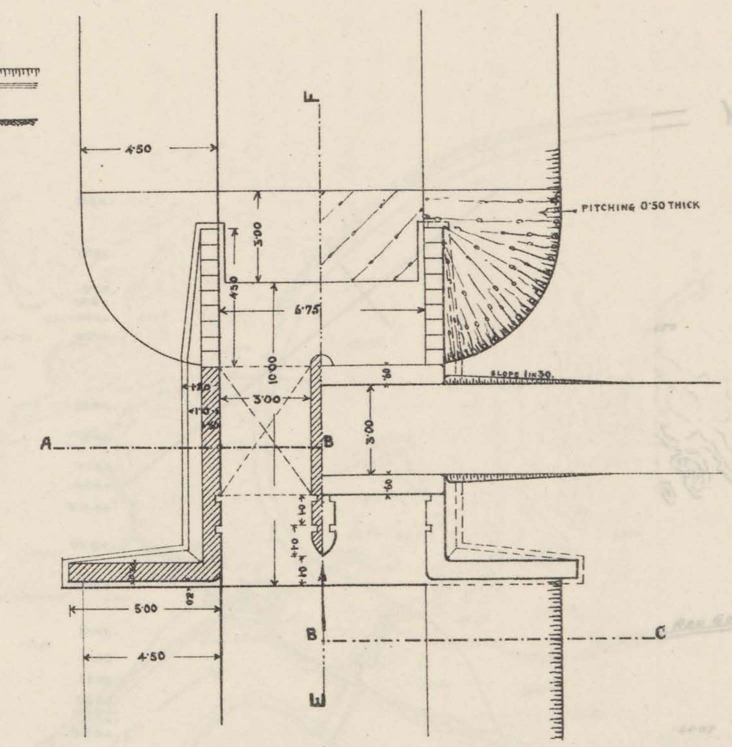
SCALE 1/500.

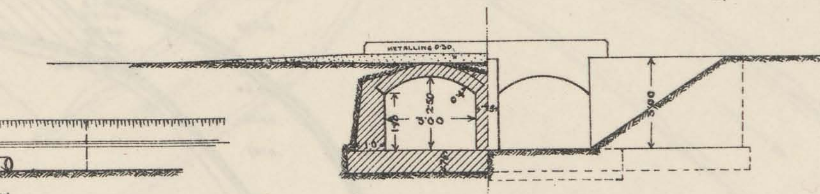
The filling round the pipes and above them shall be done with well worked stiff puddle, forced into position and carefully rammed.

DRAWING No 43.

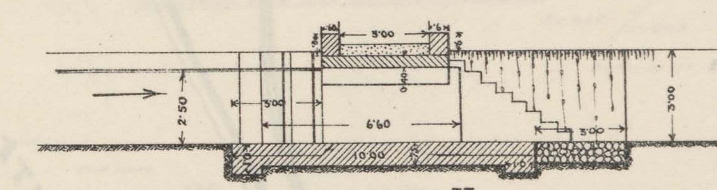
TYPICAL PIPE SYPHONS, CULVERTS AND BRIDGES

Drawn by





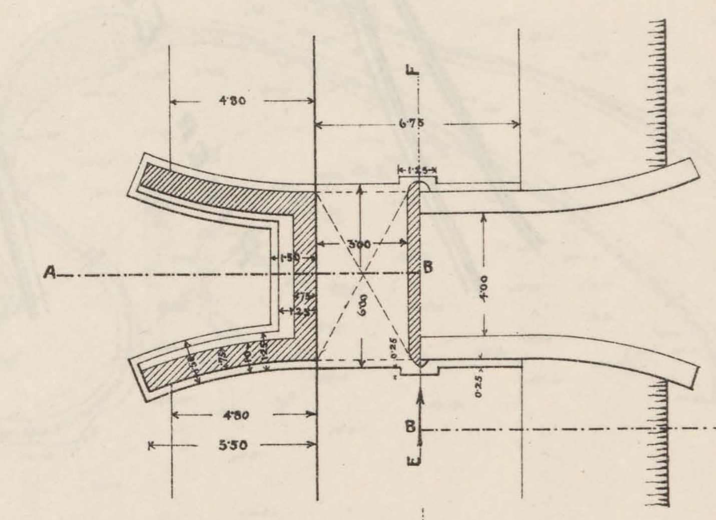
SECTION AND ELEVATION ABC.

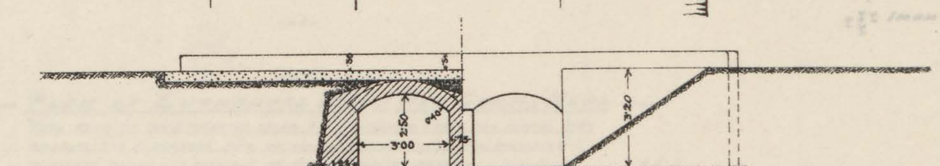


SECTION AND ELEVATION EF.

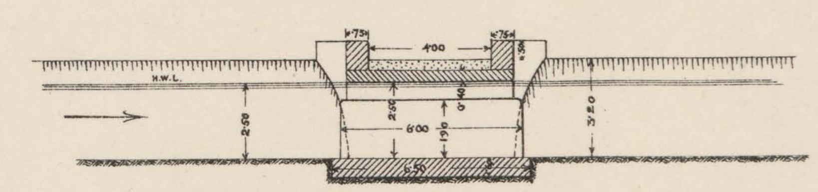
ORDINARY REGULATING HEAD ON CANAL.

SCALE 1/250





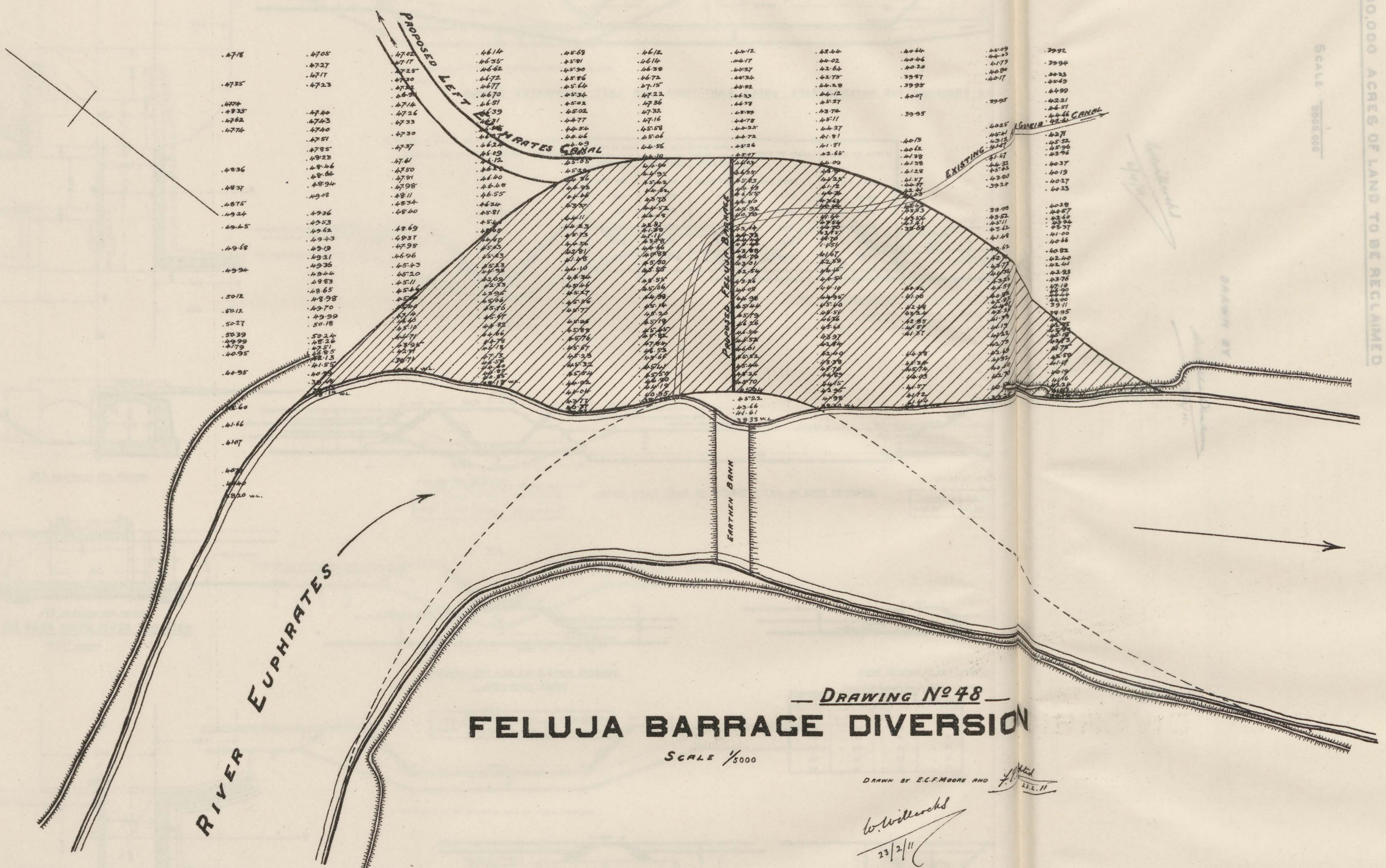
SECTION AND ELEVATION ABC.



SECTION EF.

ORDINARY ROAD-BRIDGE ON CANALS.

SCALE 1/250

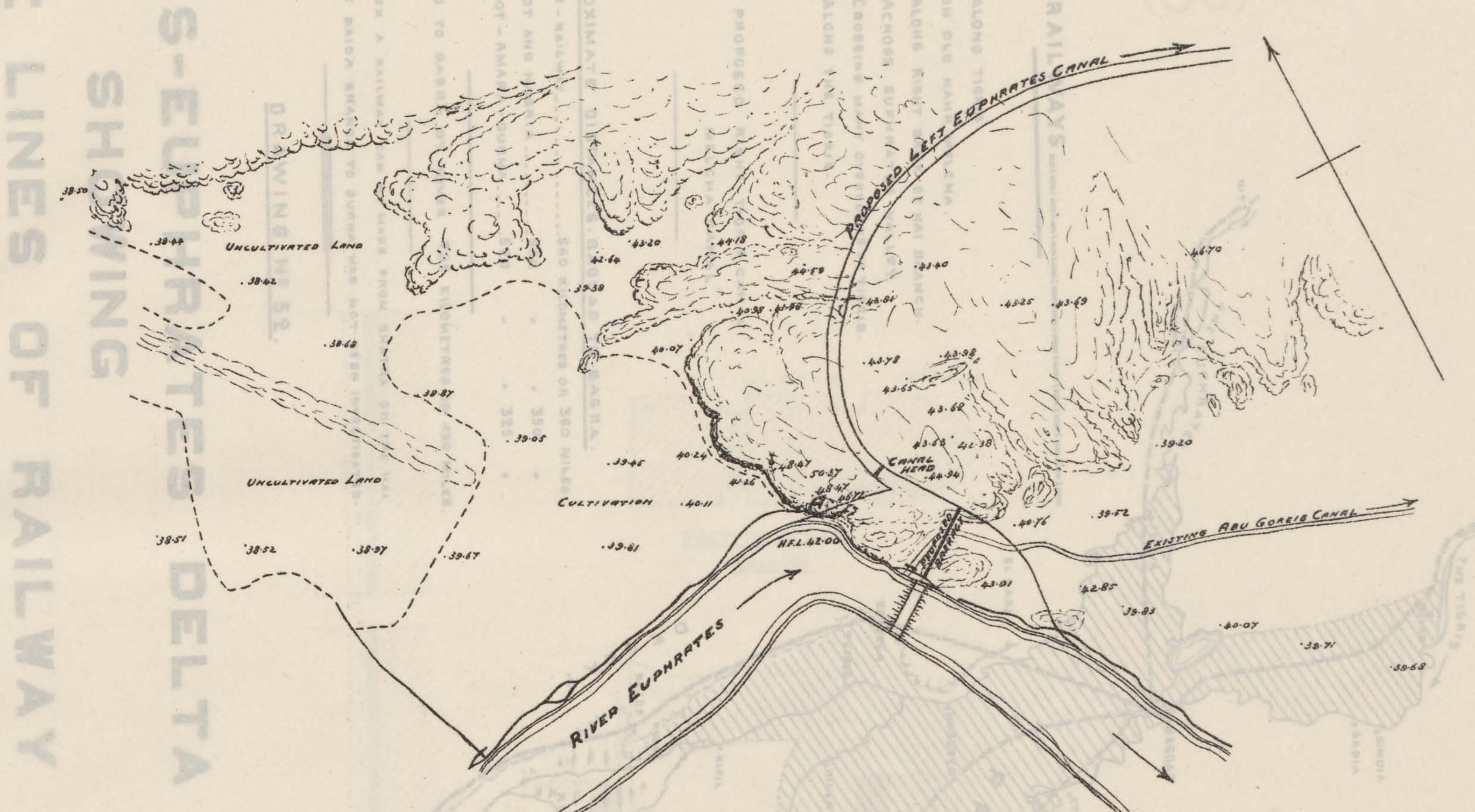


Drawing No 48

FELUJA BARRAGE DIVERSION

Scale 1/5000

Drawn by E.C.F. Moore and

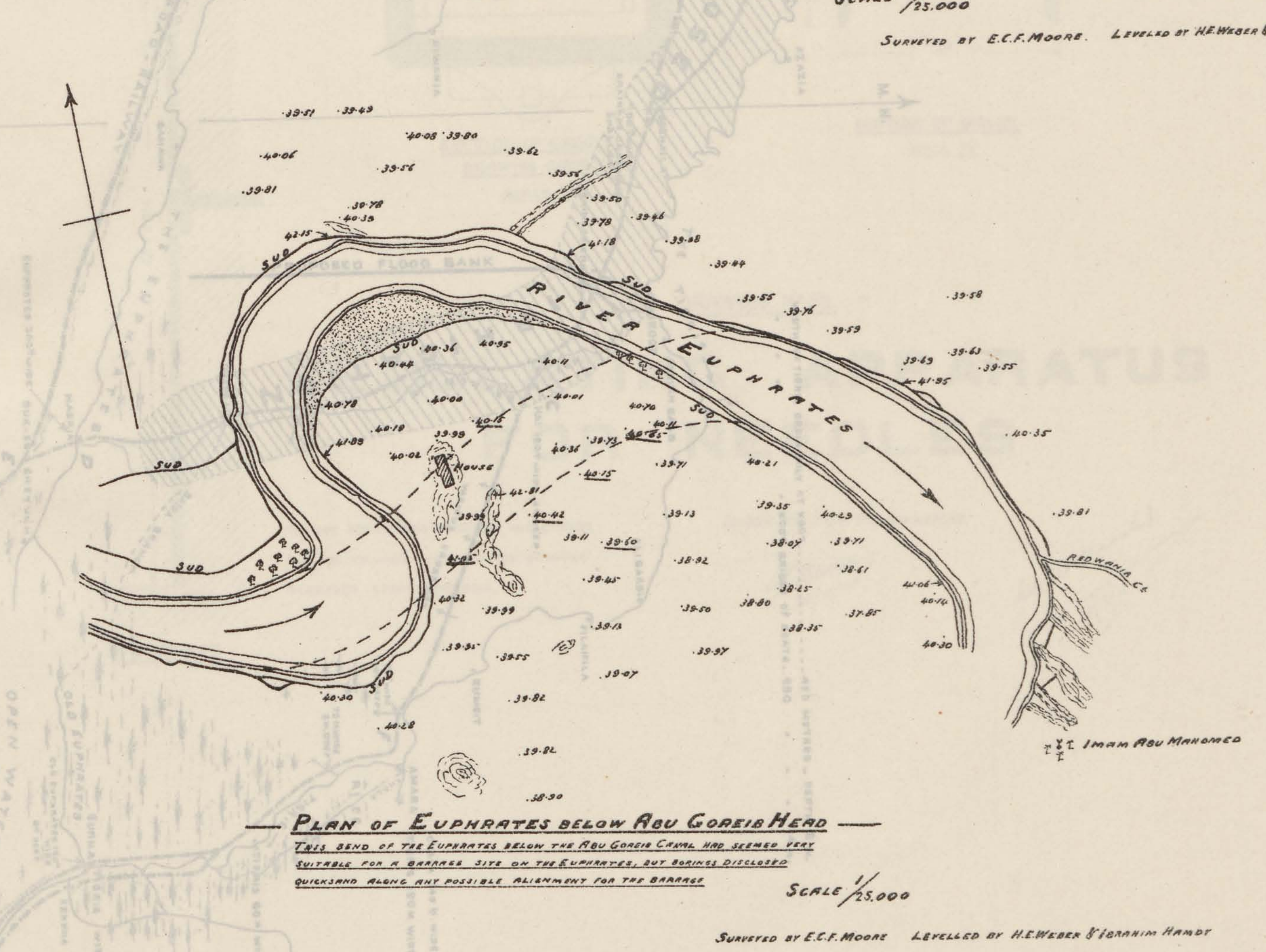


Feluja Barrage Site Plan

The Natural Spur at A will help to keep the swift current of the river away from the Canal Head

Scale 1/25,000

Surveyed by E.C.F. Moore. Leveled by H.E. Weber & Ibrahim Hamdy



Plan of Euphrates below Abu Goreib Head

This bend of the Euphrates below the Abu Goreib Canal had seemed very suitable for a barrage site on the Euphrates, but borings disclosed quicksand along any possible alignment for the barrage

Scale 1/25,000

Surveyed by E.C.F. Moore Levelled by H.E. Weber & Ibrahim Hamdy

(52)

(53)

POSSIBLE RAILWAYS

A_B. ALONG TIGRIS.
B_C. ON OLD NAHR MELCHA.
C_D. ALONG RIGHT BANK OF HAI BRANCH.
D_E. ACROSS EUPHRATES VALLEY.
C_F. CROSSING MANY OVERFLOWS OF TIGRIS.
F_G. ALONG THE TIGRIS.

A_B. PROPOSED RIGHT TIGRIS CANAL
B_C. " MELCHA CANAL

APPROXIMATE DISTANCES. BAGDAD TO BASRA.

BAGDAD - RAILWAY.....560 KILOMETRES OR 350 MILES.
VIA KOOT AND NASRIA.....560 " " 350 "
VIA KOOT - AMARA - GURNA.....520 " " 325 "

BAGDAD TO BASRA BY RIVER 785 KILOMETRES OR 490 MILES.

WHETHER A RAILWAY CAN BY MADE FROM SHATRA ON THE HAI VIA THE BAIDA BRANCH TO GURNA HAS NOT BEEN INVESTIGATED.

DRAWING Nº 52.

THE TIGRIS-EUPHRATES DELTA SHOWING POSSIBLE LINES OF RAILWAY

FOR THE FIRST 3,000,000 ACRES OF LAND TO BE RECLAIMED

SCALE 1/2,000,000

DRAWN BY:

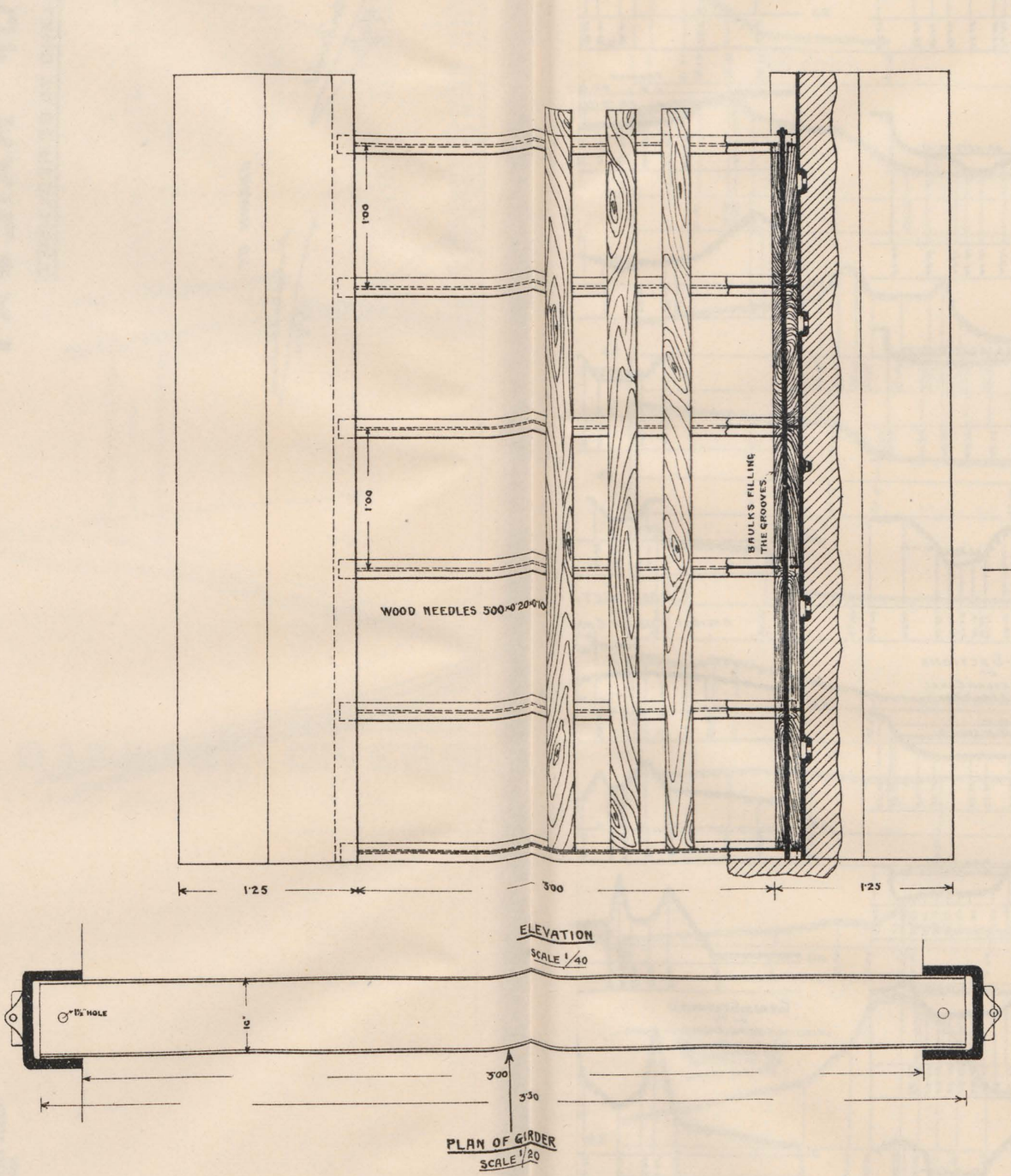
Mustapha Ibrahim 2/4/11.

W. Willcocks 2/4/11

SAMARRA · THE TIGRIS · BELED · SINDIA · SADIA · HIT · THE EUPHRATES · RAMADI · FELUJA · BAGDAD · CTESIPHON · EL BADJ · AZAZIA · SAWERA · MOSSEYB · KERBELA · NUJEF · HILLA · KIFIL · KUFA · DIWANIA · SHAMIA · RICE · SHINAFIA · DESERT · PROPOSED IRRIGATION · PROPOSED FLOOD BANK · M. N.

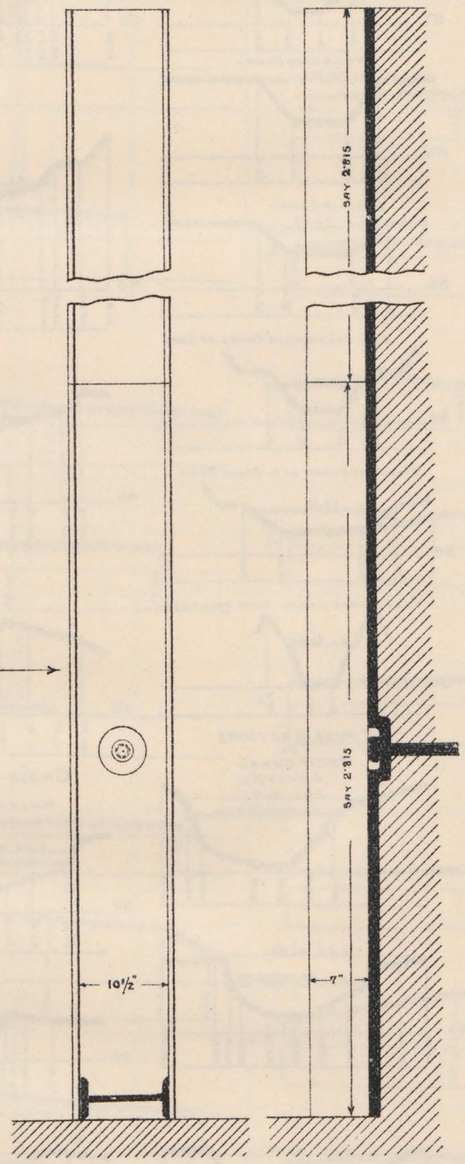
WIDTH OF TIGRIS ORDINARILY AT KOOT.....450 METRES_ DEPTH 8 M.
" " " " KOOT BRIDGE OF BOATS..250 " " 14 M.

THE TIGRIS · SHEIKH SAAD · KOOT · ALIGARBI · FILAIFILA · HAI 120M WIDE. 4M DEEP. · KUMEIT · VARIOUS CROSSINGS · AMARA · CHALA 140 M. WIDE_ DEPTH 7M. · TIGRIS 190M. WIDE (SHALLOW)_ DEPTH 4'50 M. · 75M WIDE 10M DEEP · 70 M. WIDE 5M. DEEP · KERKHA · TIGRIS 60 M. WIDE_ 4 M. DEEP. · TIGRIS WIDTH 180 M._ DEPTH 6 M. · KERKHA 90 M. WIDE_ 6 M. DEEP · THE KARUN · SHATRA · BAIDA BRANCH · BAGDAD RAILWAY · SAMAWA · THE EUPHRATES · GURNA · OLD EUPHRATES · OLD EUPHRATES 120M WIDE 6M DEEP · NASRIA · EUPHRATES 300M WIDE · SUK-ESH SHEYUKH · KHAMASIA · OPEN WATER · NEW EUPHRATES · GENTLY UNDULATING DESERT · NEW EUPHRATES 200M WIDE 20M DEEP · SHATT EL ARAB 500M WIDE 6M DEEP · BASRA · MOHAMMERA · ZOBEIR · VERY AMPLE PROVISION TO BE MADE FOR EUPHRATES FLOODS ESCAPING TO KHOR ABDALLAH · KHOR ABDALLAH · FAO · BUBIAN IS · 3 FATHOM LINE · PERSIAN GULF · KOWEIT

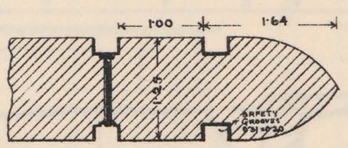


ELEVATION
SCALE 1/40

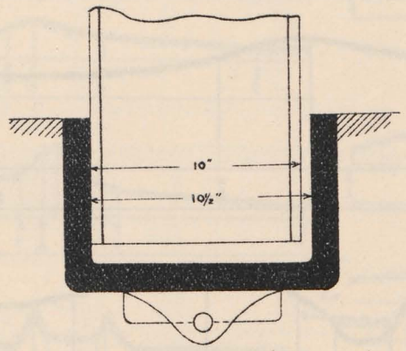
PLAN OF GIRDER
SCALE 1/20



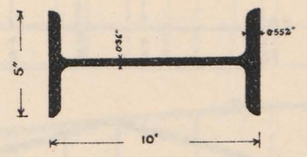
ELEVATION AND SECTION OF GROOVE
SCALE 1/20



SECTION OF PIER
SCALE 1/80



SECTION OF GROOVE SHOWING GIRDER
SCALE 1/8



SECTION OF GIRDER
SCALE 1/8

DRAWING Nº 53.

REGULATING APPARATUS FOR NEEDLES

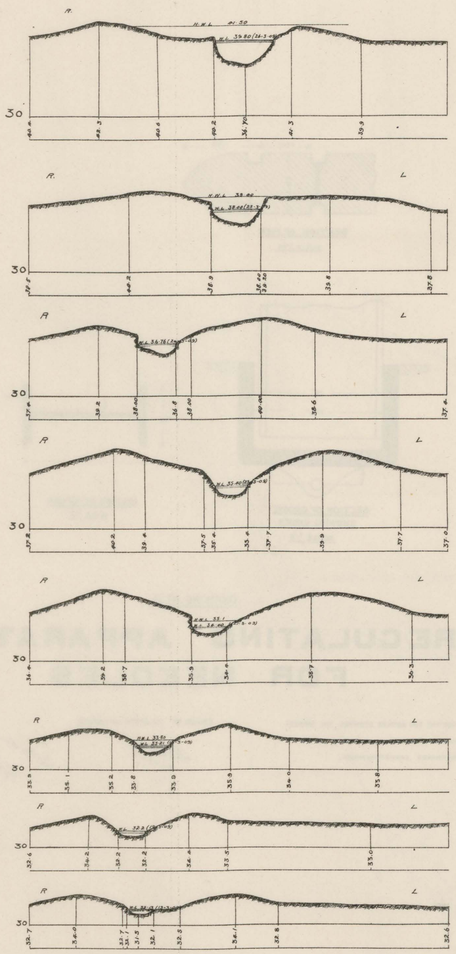
FOR THE 500 METRES OPENINGS, THE GIRDERS WILL BE 12 INCHES WIDE, AND THE GROOVES INCREASED CORRESPONDINGLY.

DRAWN BY F.E.APTED AND N.BAUER

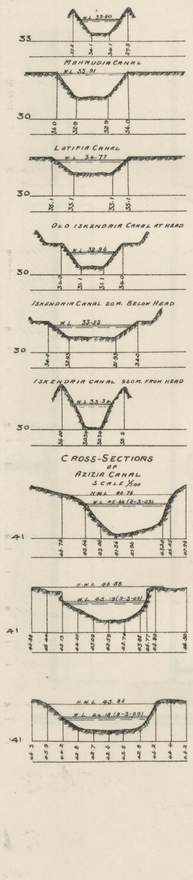
N. Bauer 31/3/11

W. Willcocks 31/3/11

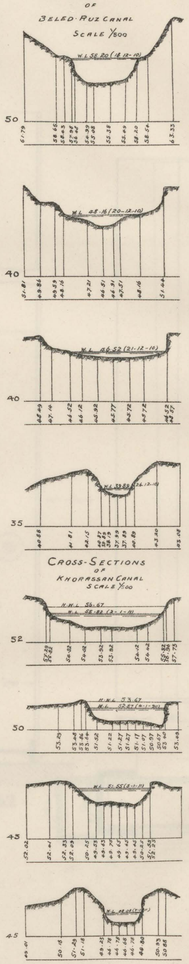
CROSS-SECTIONS of ABU-GOREIB CANAL
SCALE 1/800



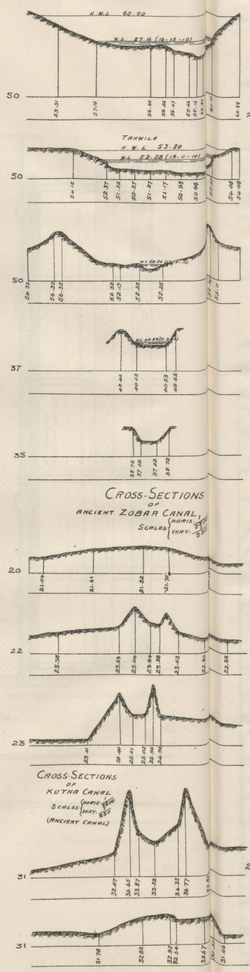
CROSS-SECTIONS
SCALE 1/800



CROSS-SECTIONS
OF
BELED-RUZ CANAL
SCALE 1/800



CROSS-SECTIONS
OF
KHALIS CANAL
SCALE 1/800

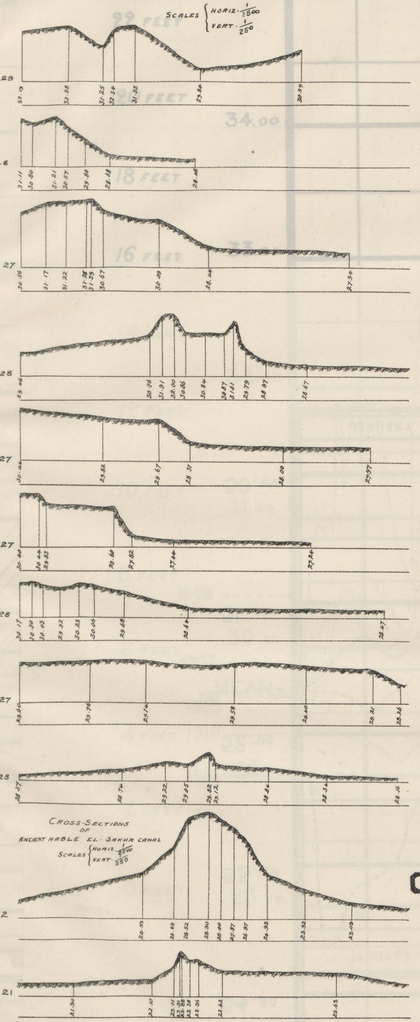


CROSS-SECTIONS
OF
ANCIENT ZOBAR CANAL
SCALES { HORIZ. 1/800 VERT. 1/80

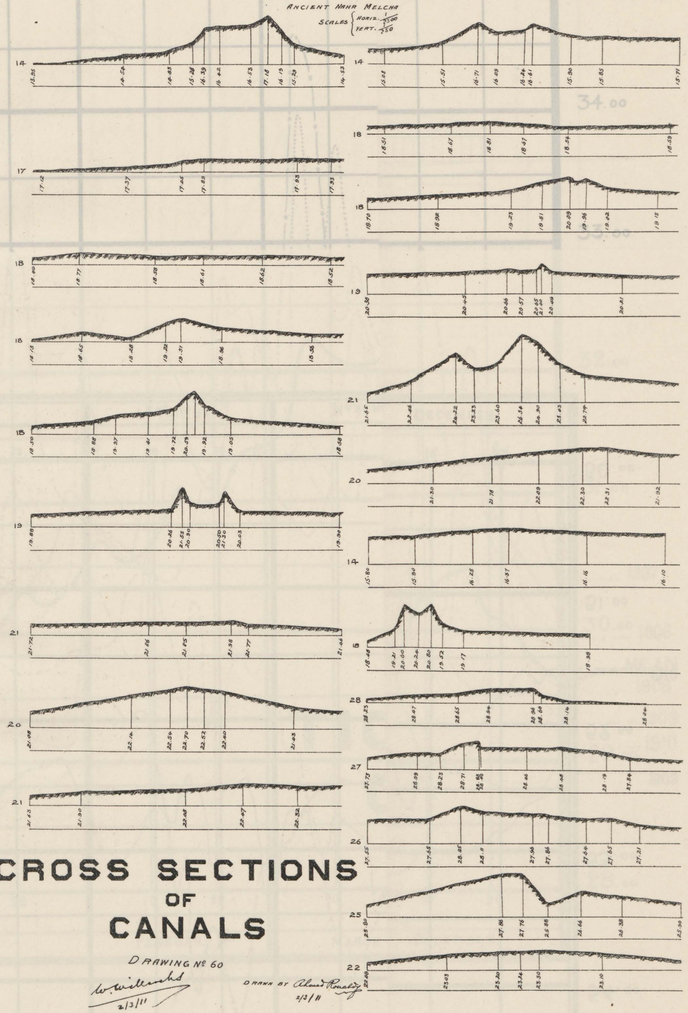
CROSS-SECTIONS
OF
KHORASAN CANAL
SCALE 1/100

CROSS-SECTIONS
OF
KUTHA CANAL
SCALES { HORIZ. 1/800 VERT. 1/80
(ANCIENT CANAL)

CROSS-SECTIONS
OF
ANCIENT NAHR MELCHA BELOW CTESIPHON BEND
SCALES { HORIZ. 1/1800 VERT. 1/250



CROSS-SECTIONS
OF
ANCIENT NAHR MELCHA
SCALES { HORIZ. 1/1800 VERT. 1/250



CROSS-SECTIONS
OF
ANCIENT HABLE EL-SAKHR CANAL
SCALES { HORIZ. 1/800 VERT. 1/80

CROSS SECTIONS OF CANALS

DRAWING Nº 60

W. Willcocks 6/3/11

DRAWN BY Edward Purcell 4/3/11

BRITISH RESIDENCY GAUGE IN METRES ABOVE MEAN SEA.

24 FEET 35.00 22 FEET 20 FEET 34.00 18 FEET 16 FEET 33.00 14 FEET 32.00 12 FEET 10 FEET 31.00 8 FEET 1908 6 FEET 30.00 1907 MEAN 1909 4 FEET 1910 1911 29.00 2 FEET 0 FEET 28.00

DRAWING Nº 62

TIGRIS AT BAGDAD GAUGE DIAGRAM

Lang Esmond 22/3/11

W. Willcocks 24/3/11

JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER

35.00 34.00 33.00 32.00 31.00 1907 30.00 1906 MEAN 1908 1909 29.00 1910 28.00

57.00 56.00 55.00 54.00 53.00 1910 52.00 1911 51.00 50.00

DRAWING Nº 63

EUPHRATES AT HITT GAUGE DIAGRAM

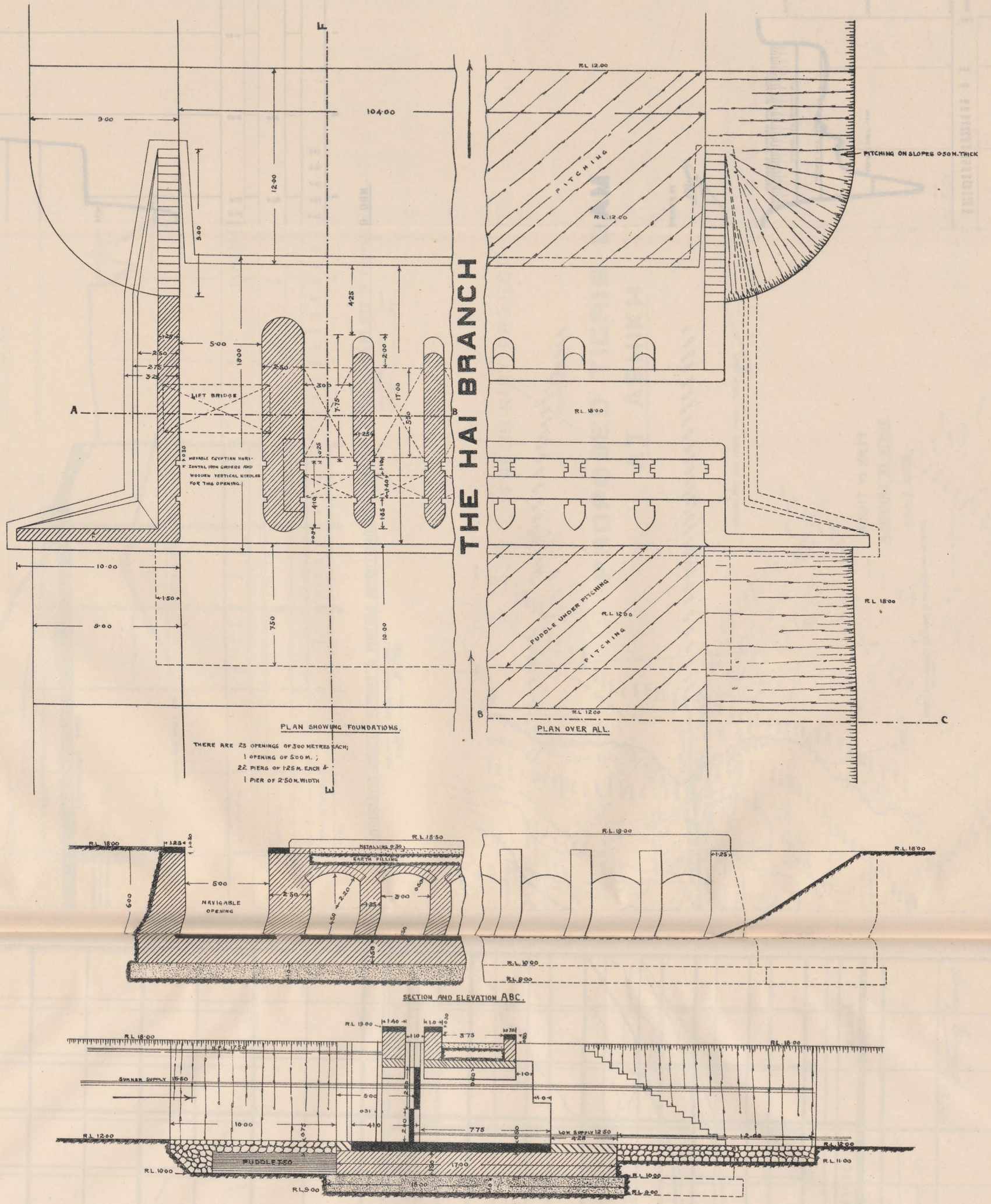
Lang Esmond 23/3/11

W. Willcocks 25/3/11

JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER

57.00 56.00 55.00 54.00 53.00 1909 52.00 1910 51.00 50.00

(65)



ACCORDING TO OUR EXPERIMENTS CONCRETE COMPOSED OF 15 SHINGLE, 2 LIME AND 4 HOMER IS NOT MUCH DEARER THAN PITCHING AND MUCH CHEAPER THAN LIME MASONRY. IT SHOULD REPLACE BOTH WHENEVER POSSIBLE.

DRAWING No 65.

PROPOSED
HAI BRANCH HEAD

SCALE 1/200

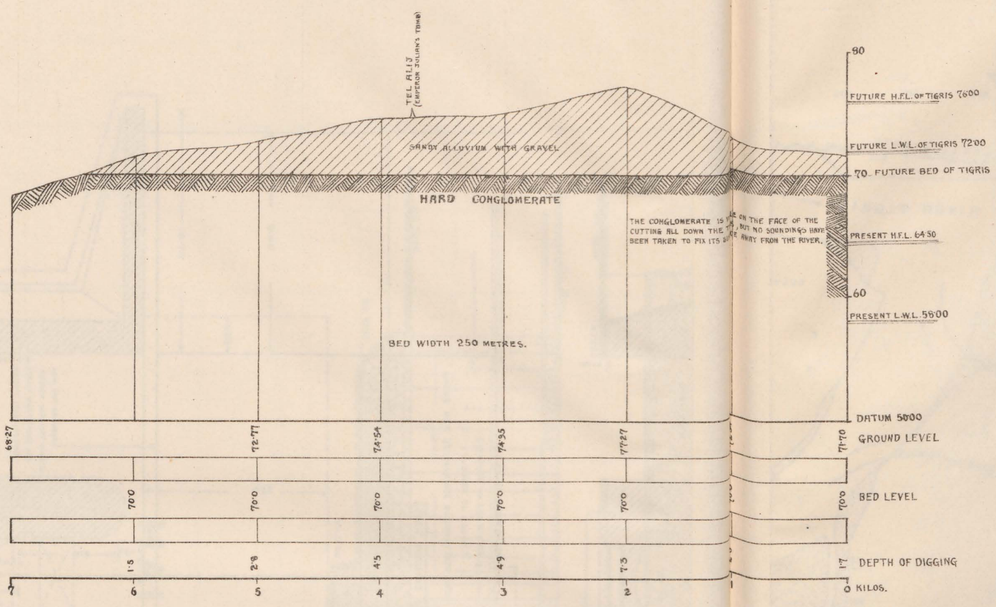
REFERENCES:-

- BRICK MASONRY · 2:1 CEMENT MORTAR
- " " 4:1 " "
- " " - LIME "
- PITCHING IN SECTION
- " " ELEVATION AND PLAN
- PUDDLE
- CONCRETE
- METALLING

DRAWN BY: N. BAUER

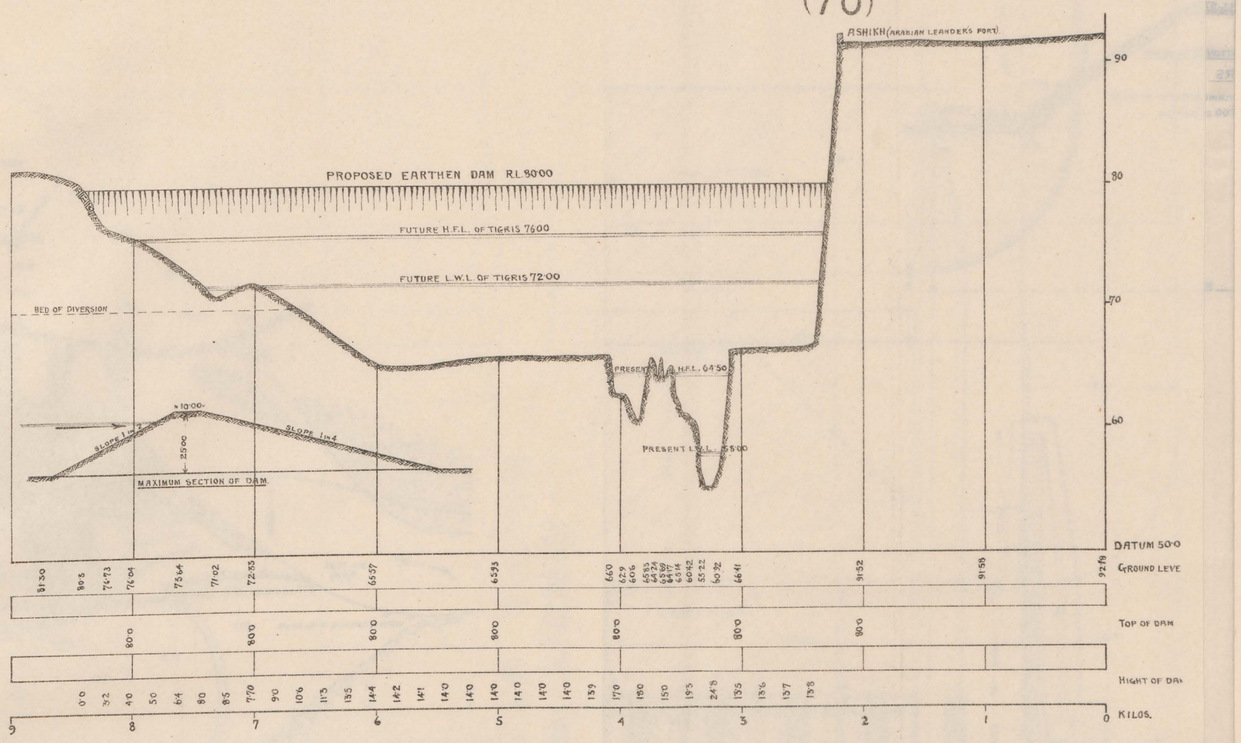
TRACED BY: Ahmed Rouchdy 9/3/11

W. Willcocks 4/3/11



LONGITUDINAL SECTION OF PROPOSED TIGRIS DIVERSION.

LONGITUDINAL SCALE = 1/40,000
VERTICAL " = 1/400



CROSS-SECTION OF THE TIGRIS AT SITE OF PROPOSED DAM.

LONGITUDINAL SCALE = 1/40000
VERTICAL " = 1/400.

PRELIMINARY PROJECT

DRAWING Nº 70

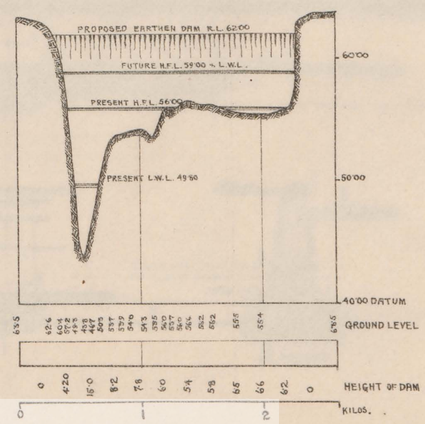
PROPOSED TIGRIS DAM AT ASHIKH

DRAWN BY
N Bauer
16.3.11

PLAN OF TIGRIS NORTH OF SAMARRA

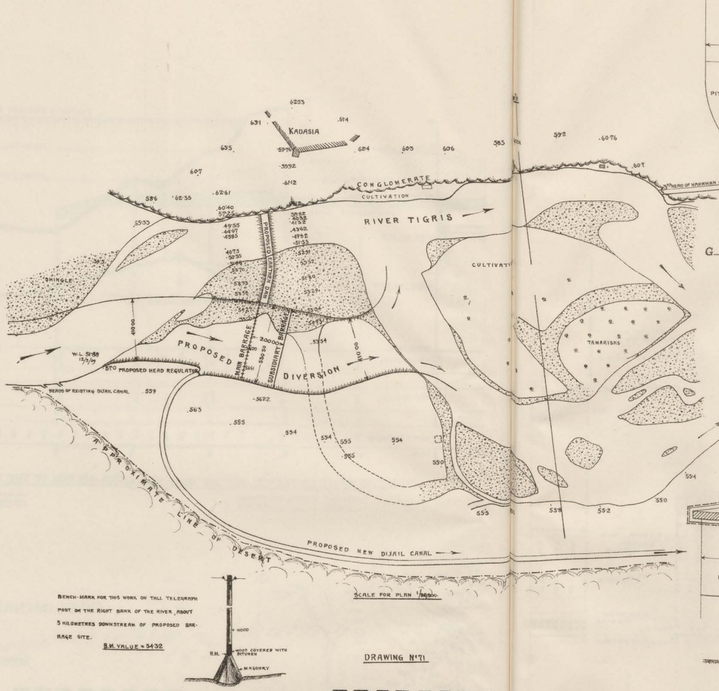
SCALE 1/100,000

SURVEYED AND LEVELLED BY MESSRS. E.C.F. MOORE & H.E. WEBER. MARCH 1911.



SUBSIDIARY DAM AT KADASIA.

LONGITUDINAL SCALE = 1/40,000
VERTICAL " = 1/400



BENCH-MARK FOR THIS WORK ON TALL TELEGRAPH POST ON THE RIGHT BANK OF THE RIVER, ABOUT 5 KILOMETRES DOWNSTREAM OF PROPOSED BARRAGE SITE.

B.M. VALUE = 542.32

DRAWING N°71.

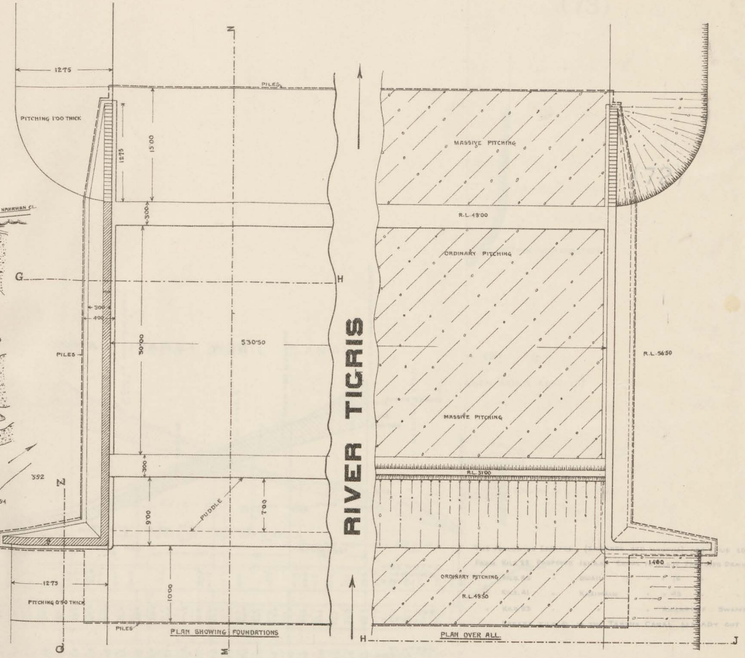
PROPOSED BELED BARRAGE ON THE TIGRIS

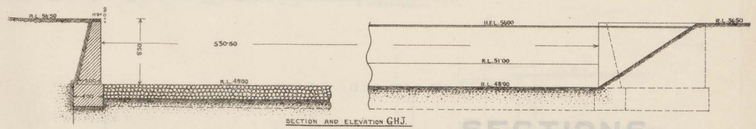
SCALE 1/600

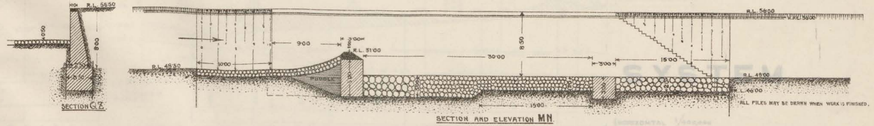
REFERENCES:-

BRICK MASONRY	2:1 CEMENT MORTAR		PITCHING IN SECTION
BRICK MASONRY	4:1 CEMENT MORTAR		PITCHING IN ELEVATION
BRICK MASONRY	LIME MORTAR		PUDDLE
CONCRETE			METALLING

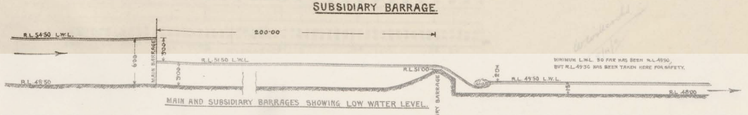
THE BOTTOM OF THE PITCHING EITHER IN CONTACT WITH THE PUDDLE OR I WILL CONSIST OF FINELY BROKEN STONE OR BRICK, OR LIME SURFACES OR S THE BRICK MASONRY IN LIME MORTAR IN THE FOUNDATIONS, WINGS AND ABUTMENTS MAY BE REPLACED BY STONE MASONRY.



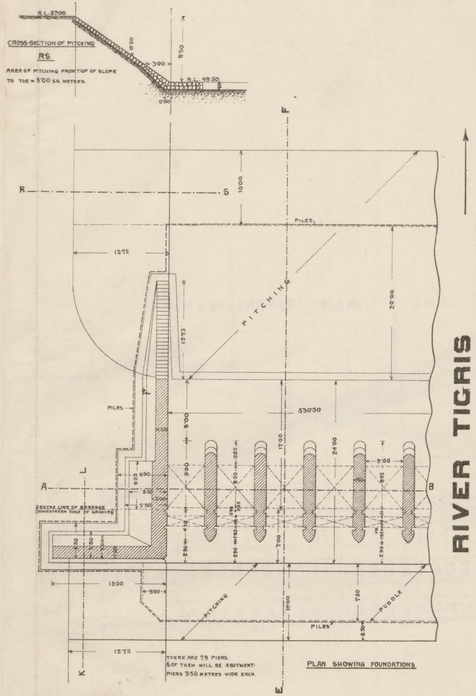


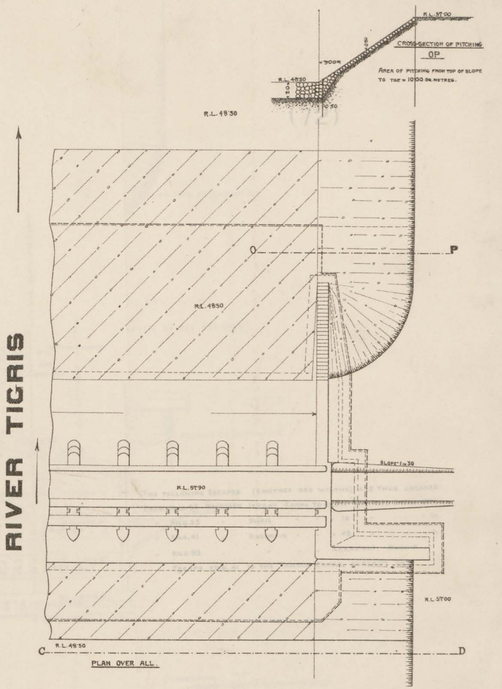


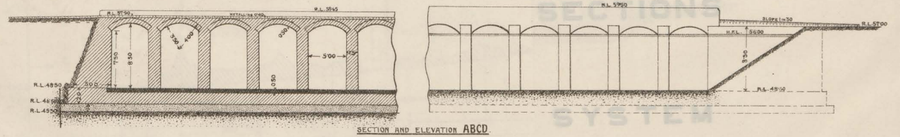
SUBSIDIARY BARRAGE.

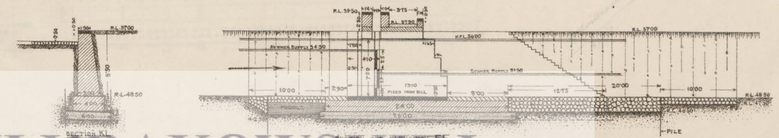


MAIN AND SUBSIDIARY BARRAGES SHOWING LOW WATER LEVEL.

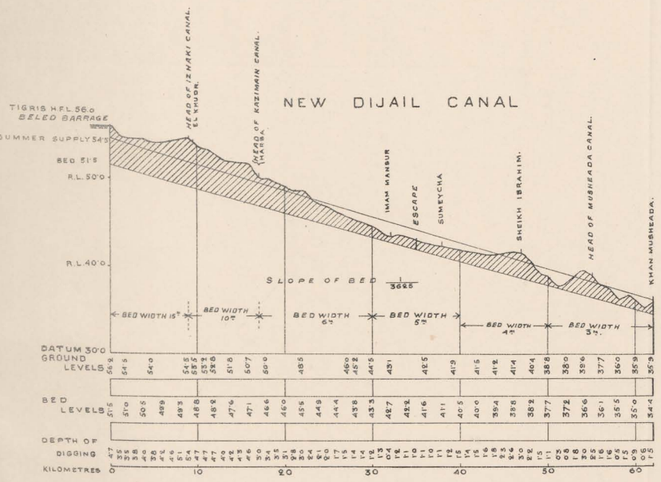


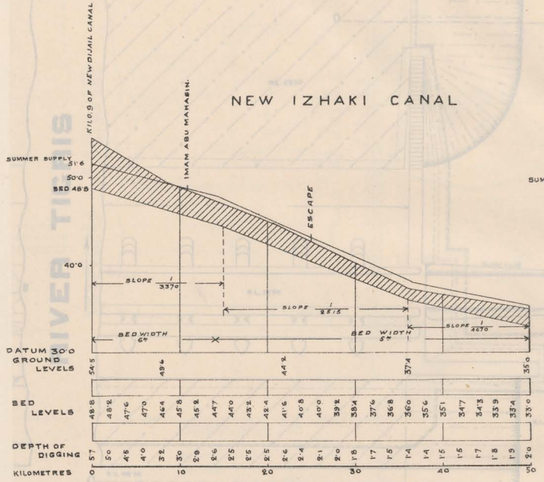


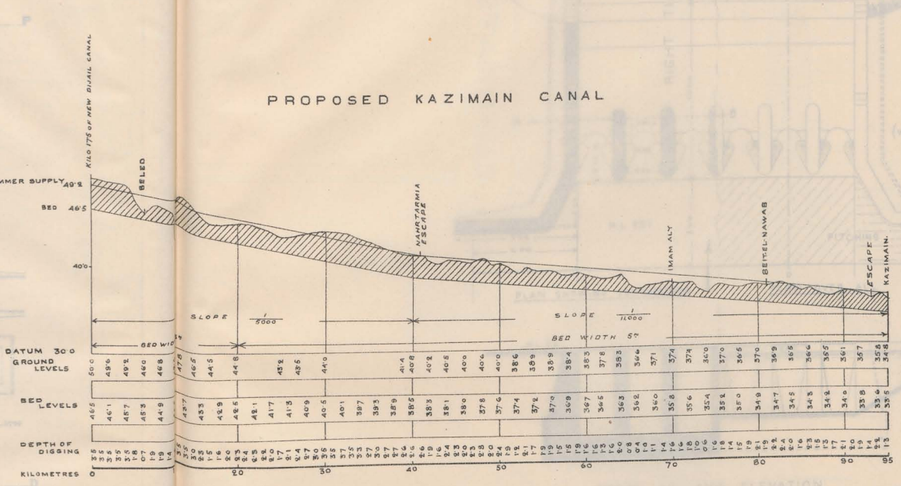




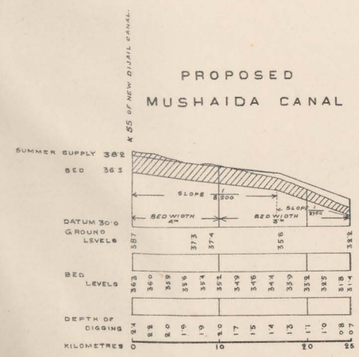
MAIN BARRAGE

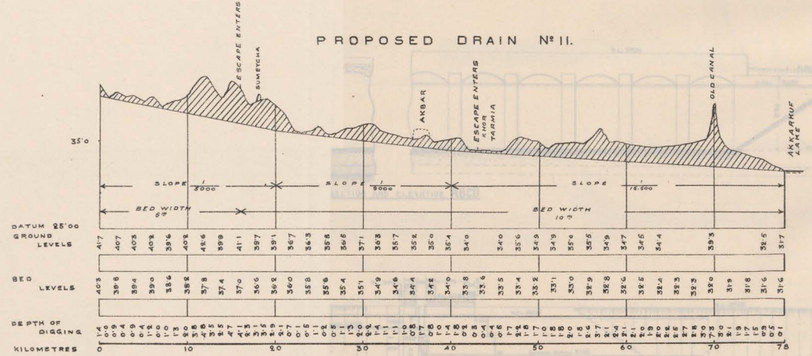


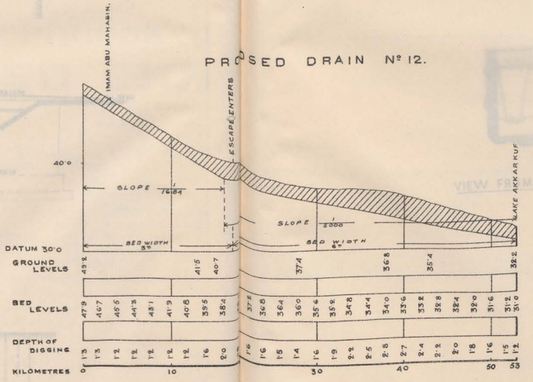




THE FOLLOWING ESCAPES (5 METRES BED WIDTHS) ARE THUS LOCATED:
FROM KILO. 25 PROPOSED IZHAKI CANAL TO KILO 17 PROPOSED DRAIN Nº12.
" KILO. 35 " DIJAIL " " " 16 " " " 11.
" KILO. 41 " KAZIMAIN " " " 43 " " " 11.
" KILO. 93 " " " " AKKARKUF SWAMP
ESCAPE KILO. 41 IS THE TARMIA CANAL ALREADY CUT







DRAWING Nº 72.

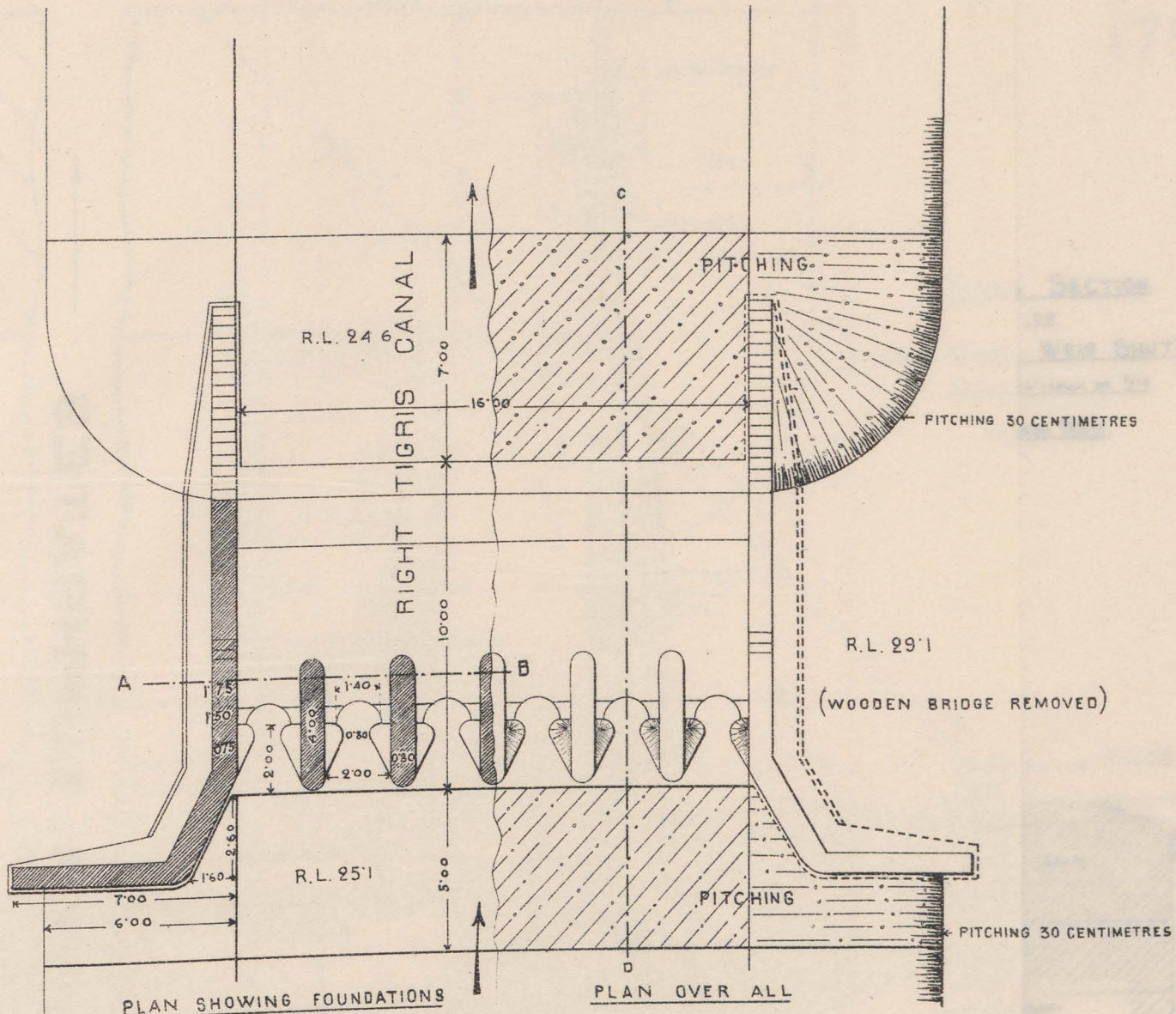
LONGITUDINAL SECTIONS OF THE BELED SYSTEM

SCALES { HORIZONTAL 1/400,000
VERTICAL 1/400

DRAWN BY Mr E.C. MOORE & MUSTAPHA BEY IBRAHIM

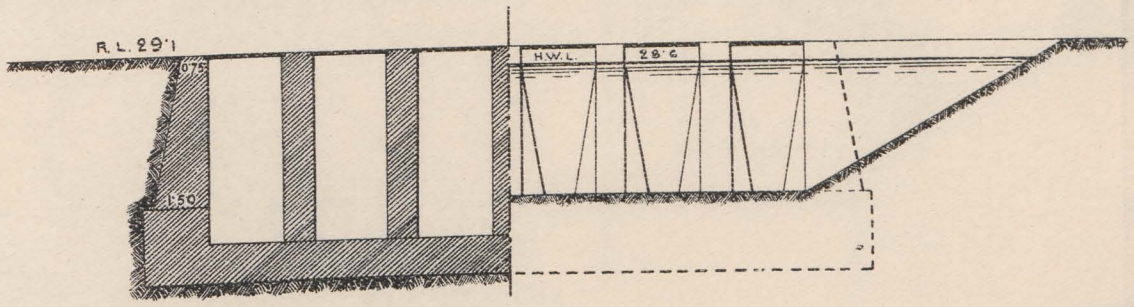
6/9/11.

8/11/12

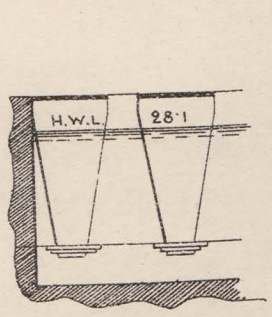


PLAN SHOWING FOUNDATIONS

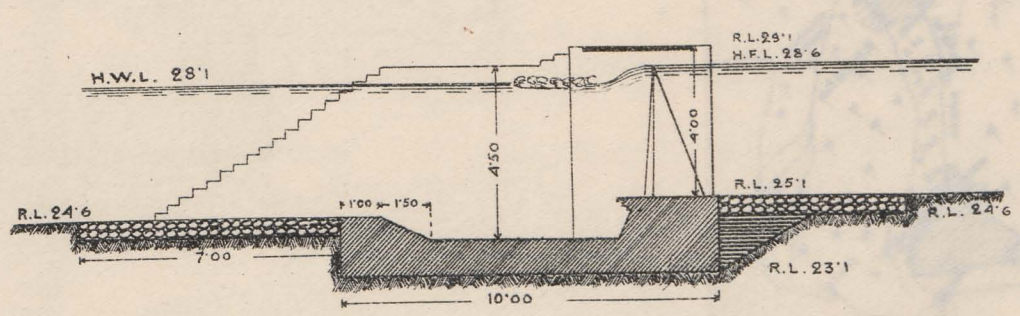
PLAN OVER ALL



SECTION A B AND ELEVATION



VIEW FROM DOWNSTREAM



SECTION C D

DRAWING Nº 73.

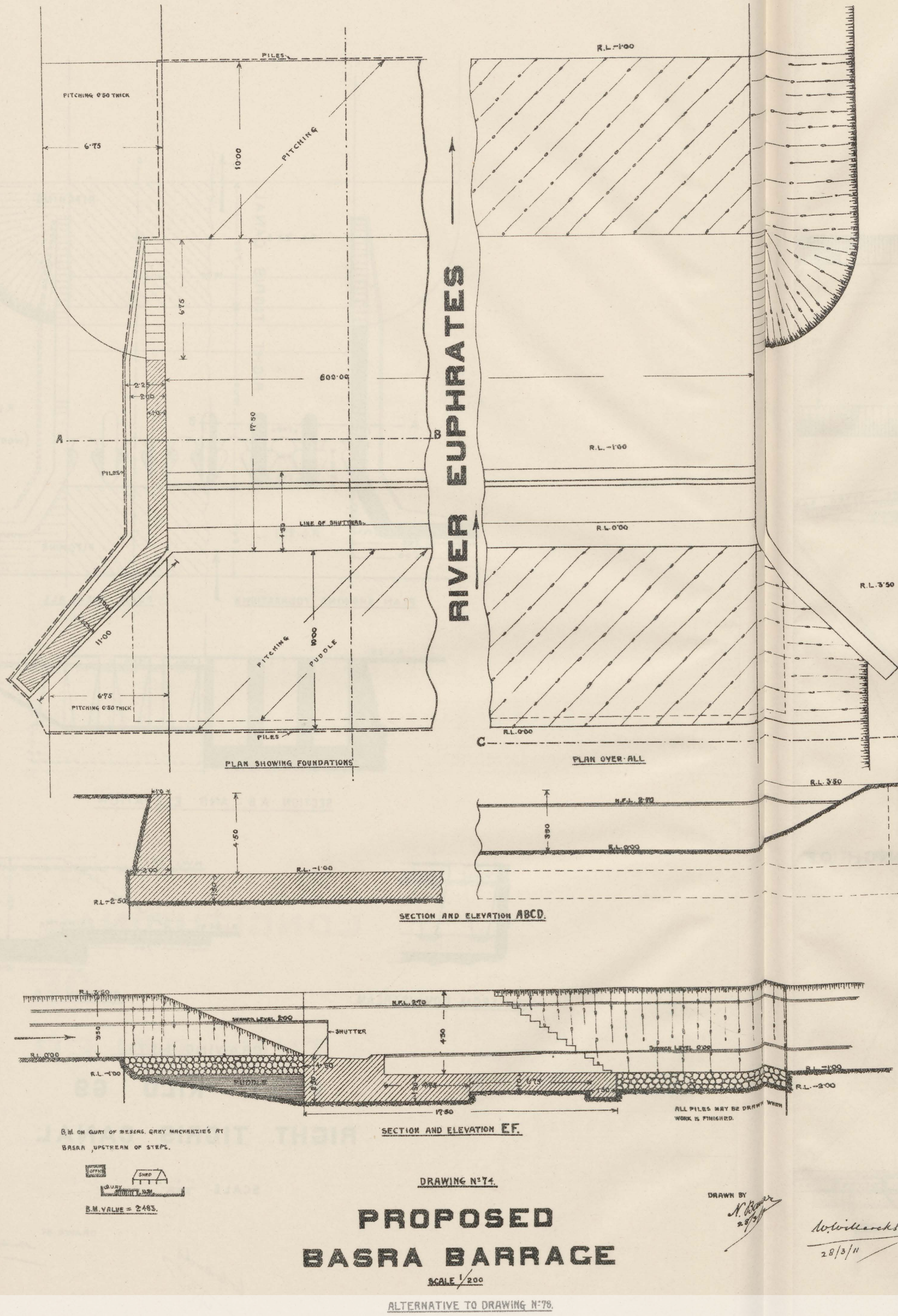
FALL KILO 69

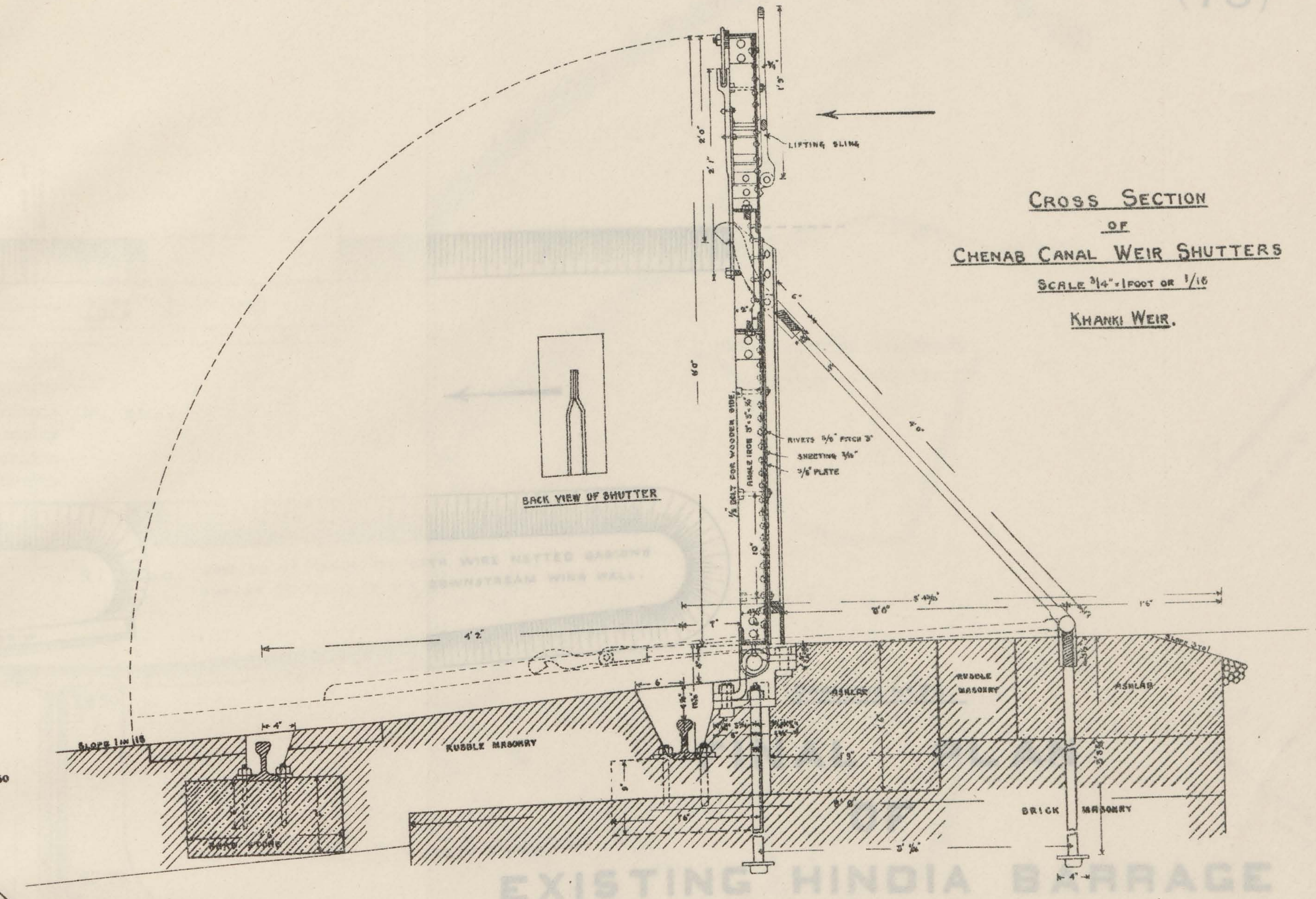
RIGHT TIGRIS CANAL

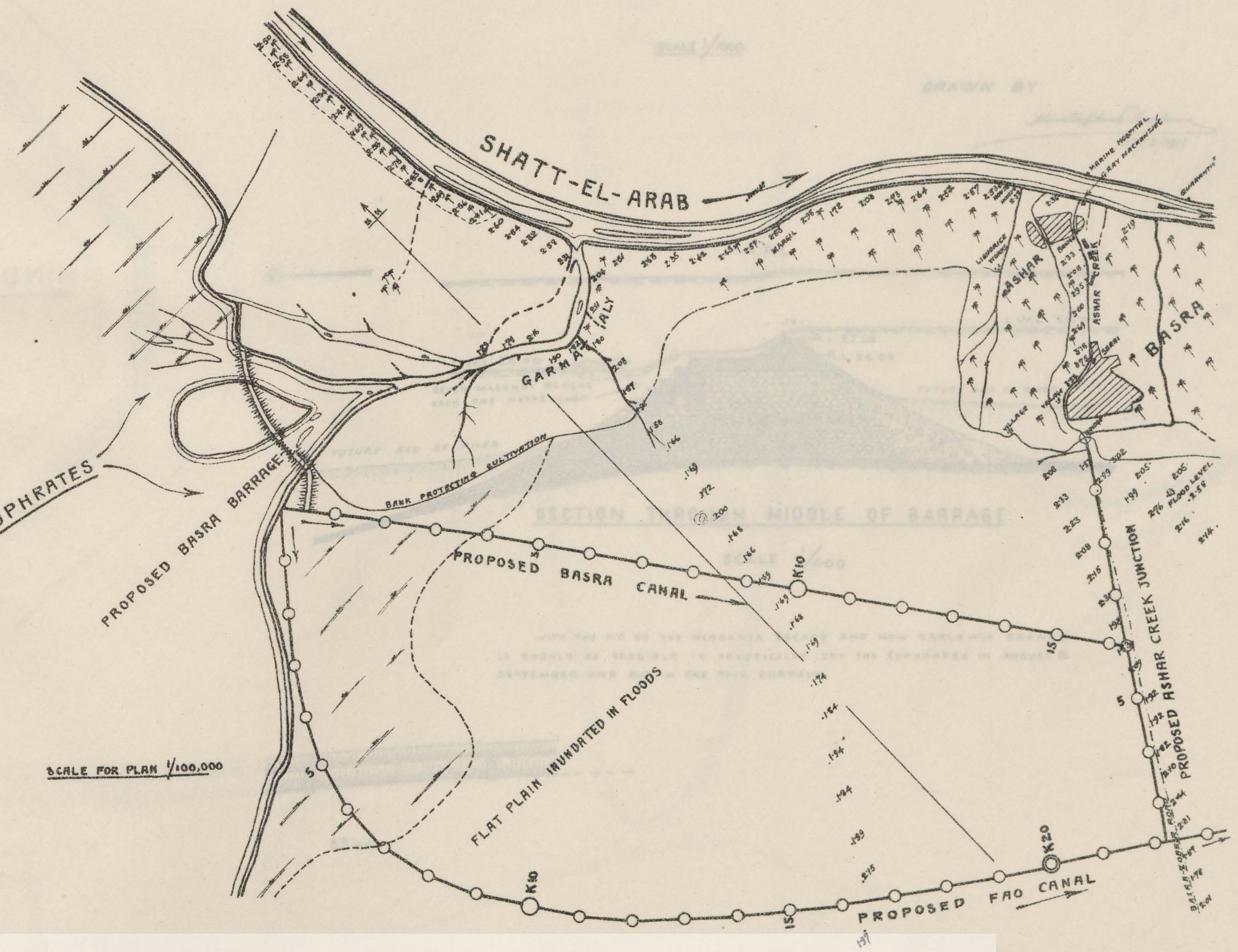
SCALE $\frac{1}{200}$

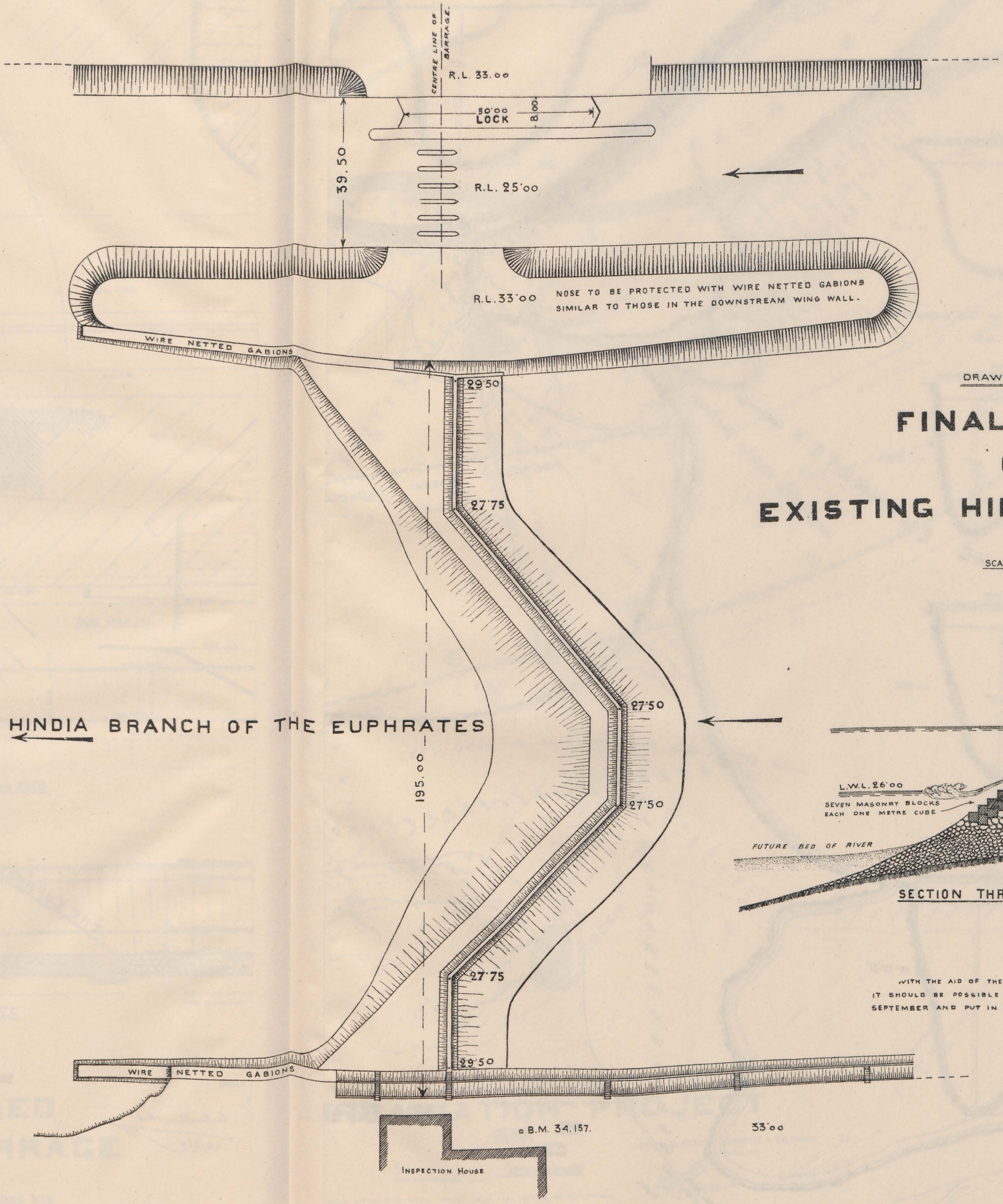
DRAWN BY

Mustapha Shaban
20.3.911









DRAWING Nº 75.

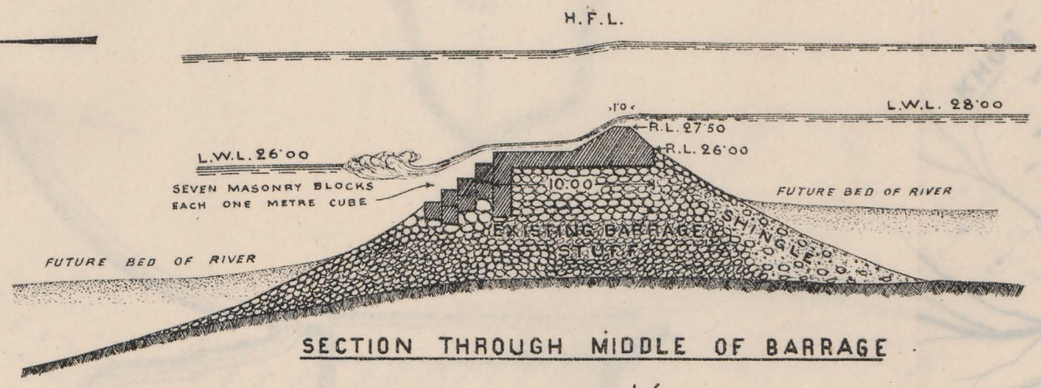
FINAL PLAN OF EXISTING HINDIA BARRAGE

SCALE 1/1000

DRAWN BY

Mustafha Ibrahim

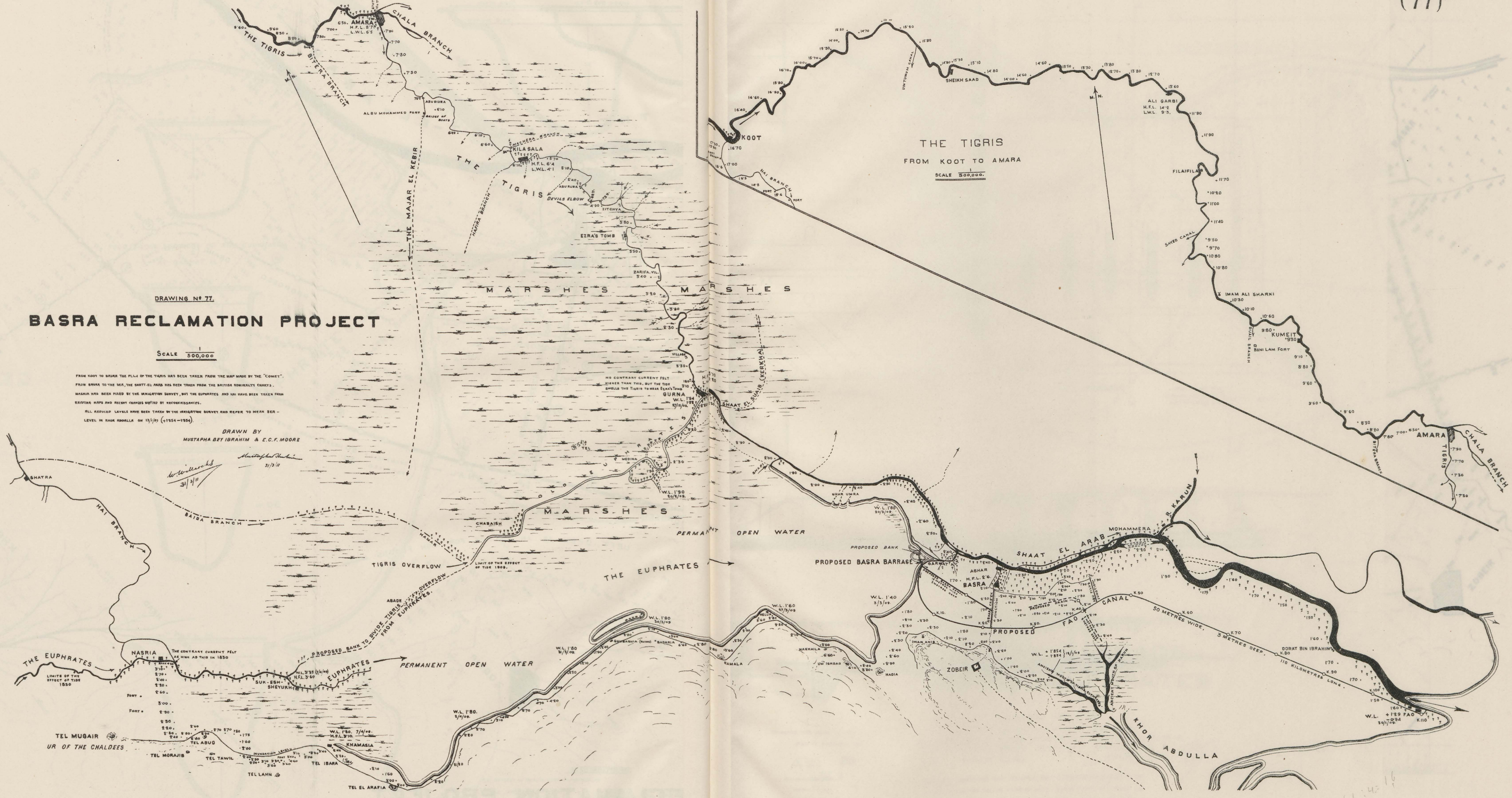
23/3/1911

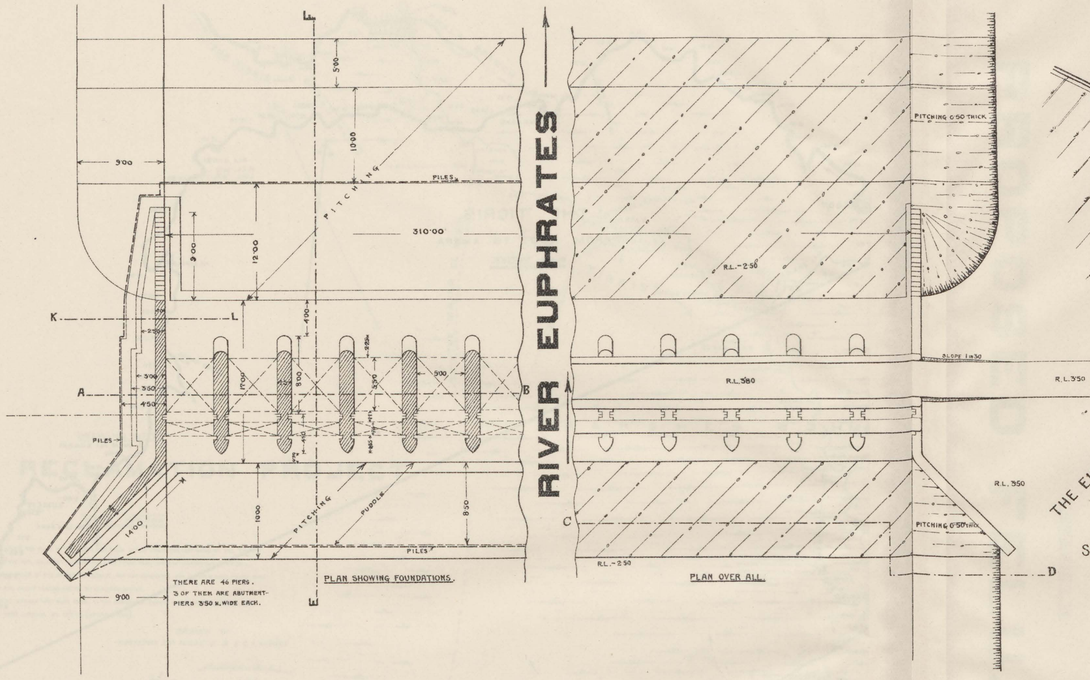


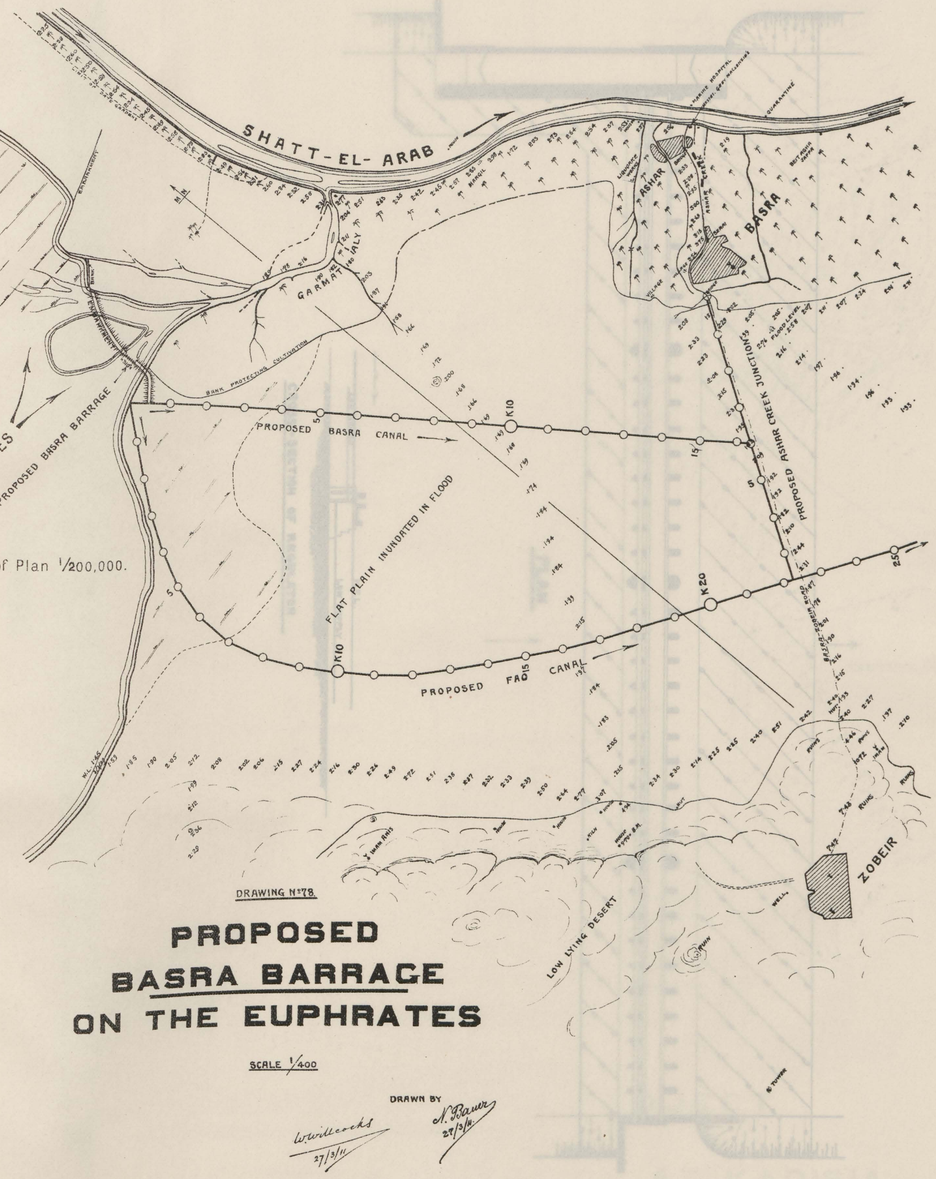
SECTION THROUGH MIDDLE OF BARRAGE

SCALE 1/400

WITH THE AID OF THE HABBANIA ESCAPE AND NEW SAKLAWIA BRANCH IT SHOULD BE POSSIBLE TO PRACTICALLY DRY THE EUPHRATES IN AUGUST & SEPTEMBER AND PUT IN THE TAIL CURTAIN.







DRAWING N°78

PROPOSED BASRA BARRAGE ON THE EUPHRATES

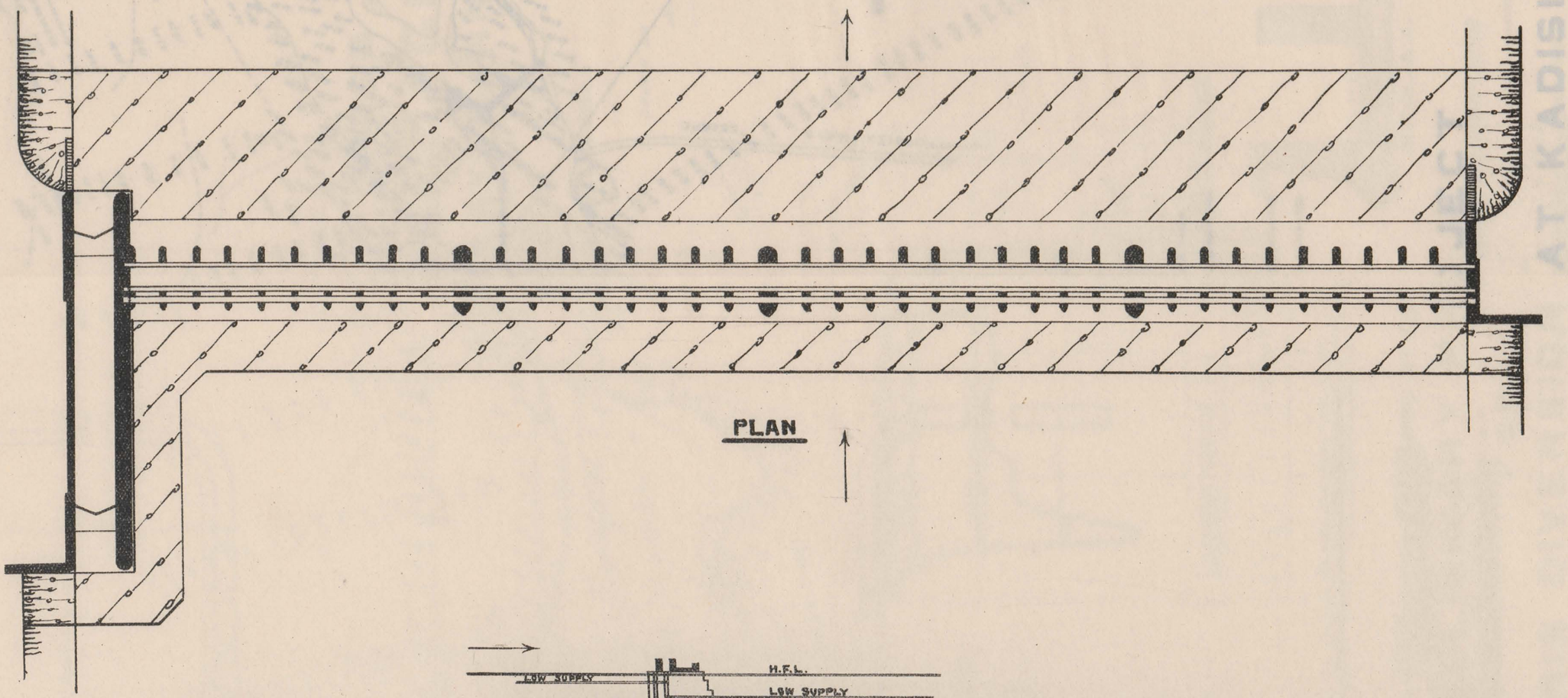
SCALE 1/400

DRAWN BY

W. Willcocks 27/3/11

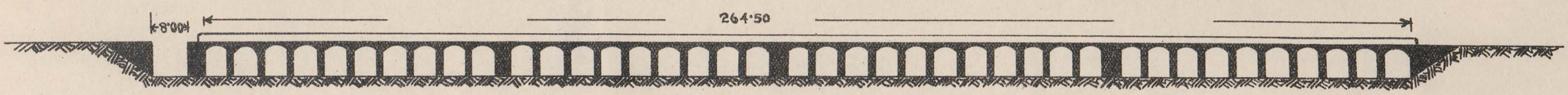
N. Bauer 27/3/11

(79)



PLAN

CROSS-SECTION OF REGULATOR



ELEVATION

DRAWING 79

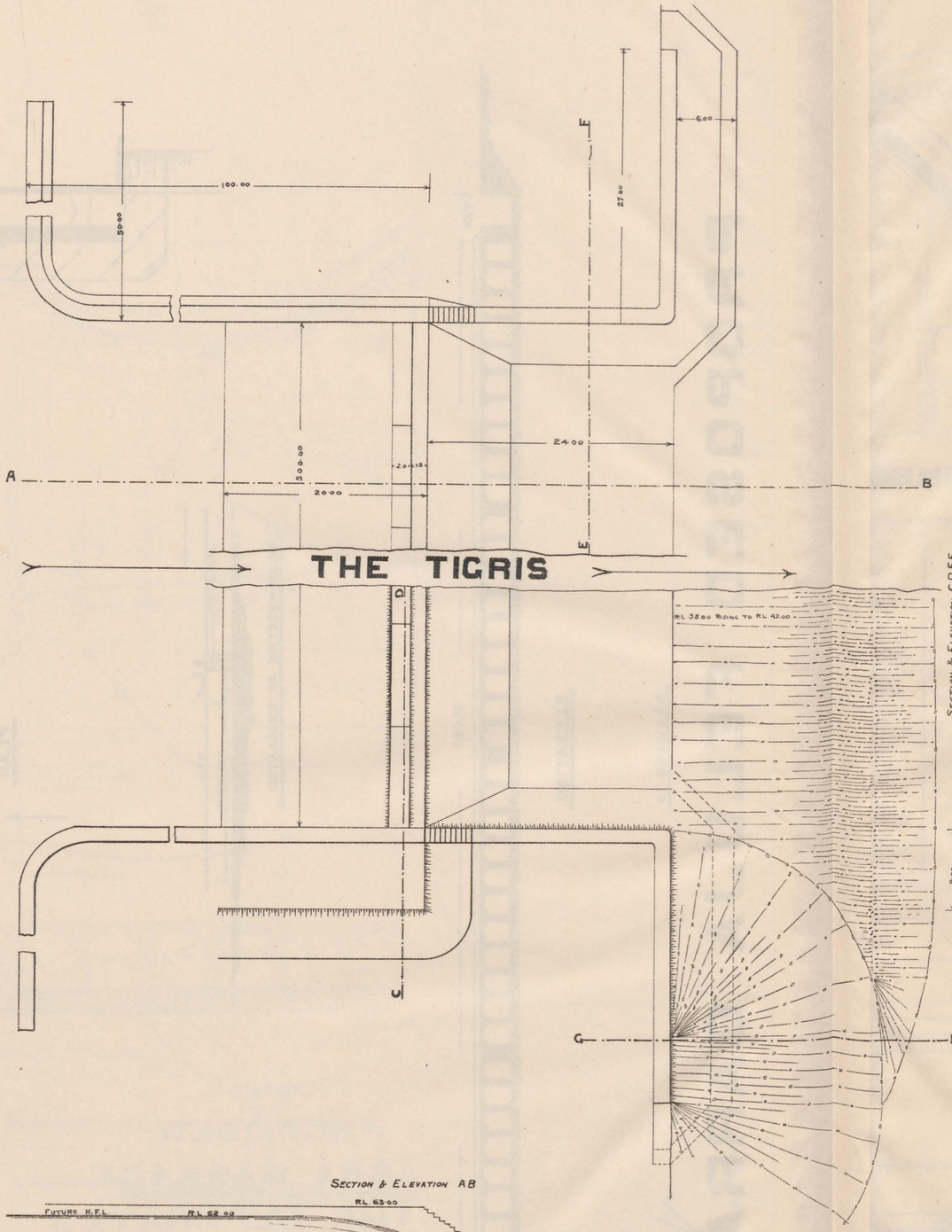
PROPOSED FELUJA BARRAGE

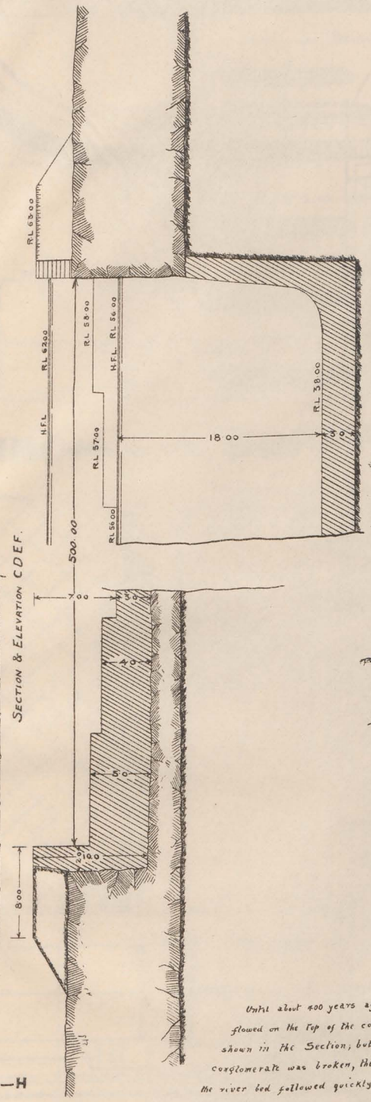
SCALE 1/1,000

DRAWN AND TRACED BY

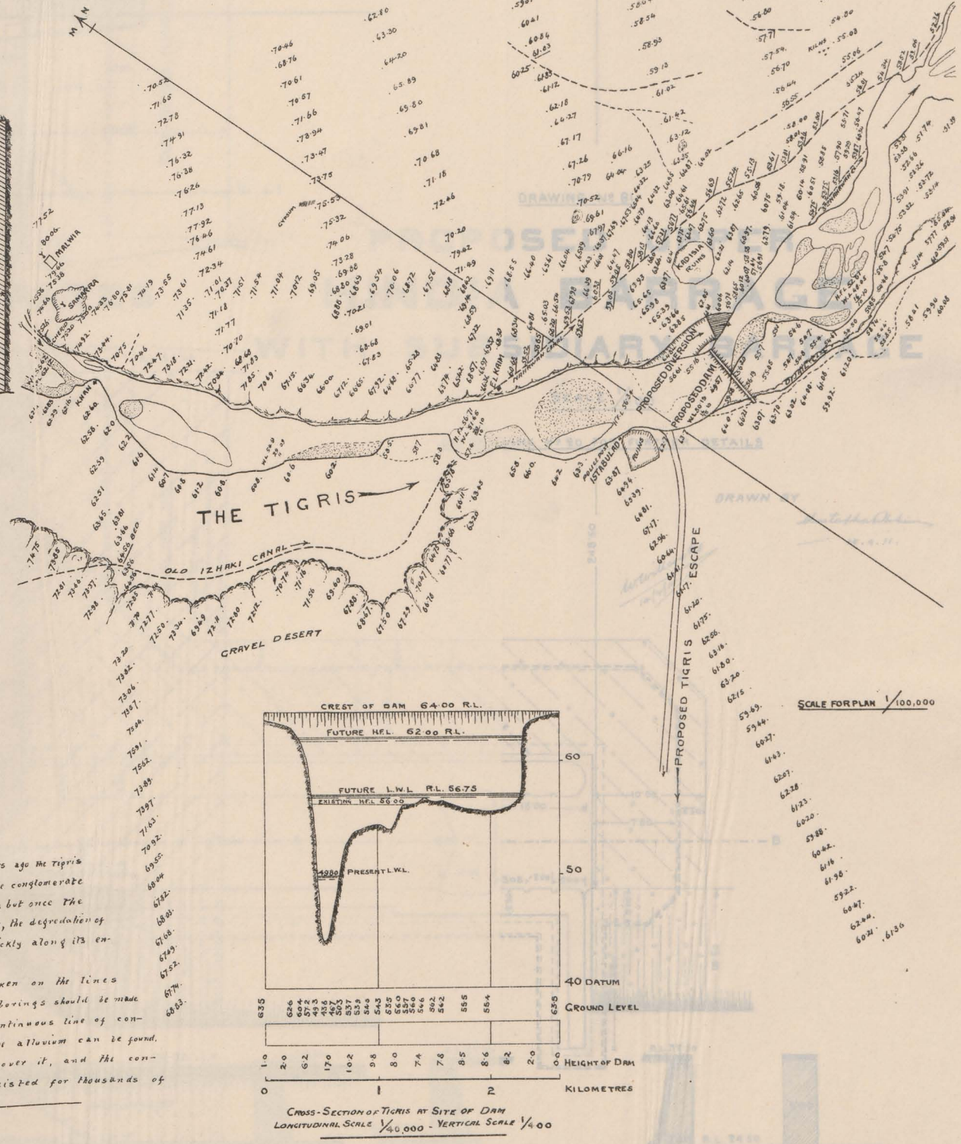
N. Bano 30/8/10

B.V. Watts 30/8/10





SECTION & ELEVATION CDEF.

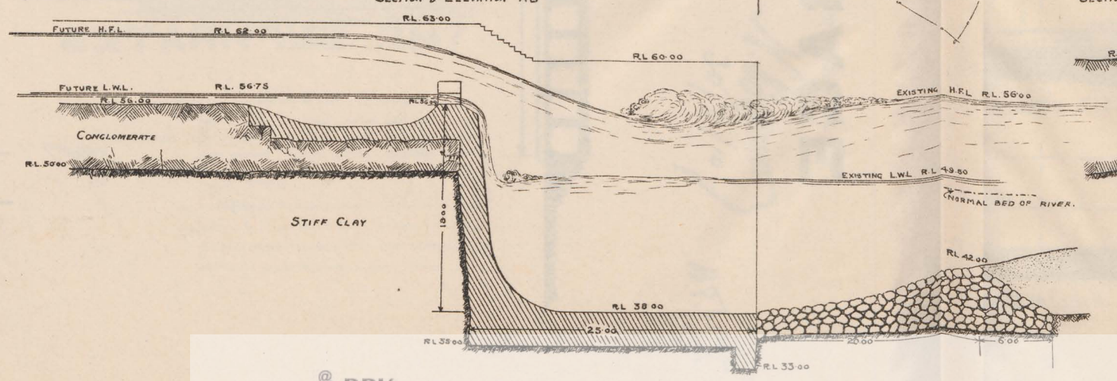


Until about 600 years ago the Tigris flowed on the Top of the conglomerate shown in the Section; but once the conglomerate was broken, the degredation of the river bed followed quickly along its entire length.

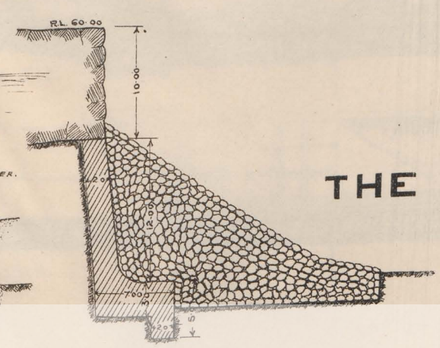
Before any work is undertaken on the lines of the preliminary project, borings should be made near Tel Gibara, and if a continuous line of conglomerate dipping under the alluvium can be found, the river should be turned over it, and the conditions obtained which existed for thousands of years.

CROSS-SECTION OF TIGRIS AT SITE OF DAM
LONGITUDINAL SCALE 1/40,000 - VERTICAL SCALE 1/400

SECTION & ELEVATION AB



SECTION G.H.



DRAWING Nº 80

PRELIMINARY PROJECT FOR THE TIGRIS DIVERSION AT KADISIA

SCALE 1/400

DRAWN BY H.E. WEBER

TRACED BY: Ahmed Rashdy 13/4/19

W.H. Willcocks 13/4/19

DRAWING Nº 81

PROPOSED UPPER HINDIA BARRAGE WITH SUBSIDIARY BARRAGE

SCALE 1/400

SEE DRAWING Nº 20 FOR FURTHER DETAILS

DRAWN BY

Mustafa Habib Khan

14.4.11.

← HINDIA BRANCH OF THE EUPHRATES

SECTION AND ELEVATION I-K.

SECTION AND ELEVATION A-B.

SECTION C-D

SECTION E-F

SECTION G-H.