



**GOVERNMENT OF SINDH
IRRIGATION AND POWER DEPARTMENT
KOTRI BARRAGE PROJECT**

COMPLETION REPORT

**OF THE
KOTRI BARRAGE
IRRIGATION SCHEME**

1947-1974

**VOLUME - VII
AKRAM WAH SYSTEM
HYDERABAD**

1974

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IMPORTANT DATA REGARDING KOTRI BARRAGE PROJECT

1. Administrative Approval of the Scheme given on.	21st Sep: 1946	
2. Foundation Stone of the Barrage laid on.	12th Feb: 1950	
3. Opening Ceremony of the Barrage performed on.	15th March 1955	
4. Left Bank Combined channel flowed on.	5th June 1955	
5. Fuleli Feeder Flowed on.	5th June 1955	
6. Pinyari Feeder Flowed on.	12th June 1955	
7. Akram Wah Flowed on.	1st April 1958	
8. Kalri Baghar Feeder Upper Flowed on.	29th Sep: 1958	
9. Kalri Baghar Feeder Lower (P.Q. Fall) flowed on.	20th Dec: 1958	
10. Estimated cost of the whole scheme (As per F.F. 1964).	Rs. 45.16	Crore
11. Actual cost of the Barrage and Regulators.	Rs. 5.816	Crore
12. Total summer discharge of all the off-taking Canals.	41476	Cusecs.
13. Gross area commanded.....	3.21	Million acres.
14. Culturable commanded area.	2.72	-do-
15. Area designed to be cultivated annually.	2.03	Million acres.
16. Area cultivated during Pre-Barrage.	0.618	Million acres.
17. New area of virgin soil brought under cultivation.		Mill: acres.
18. Maximum discharge of the Thames @ London Bridge.	15,000	Cusecs.
19. Maximum designed full supply discharge of Fuleli Feeder.	15,026	Cusecs.
20. Maximum designed full supply discharge of Pinyari Feeder.	13636	Cusecs.
21. Width of the Suez Canal @ the surface.	200	Feet.
22. Width of Pinyari Feeder @ the surface.	272	Feet.
23. Width of Fuleli Feeder @ the surface.	300	Feet.
24. Width of combined channel @ the surface.		Feet.

SALIENT FEATURES OF CANAL DISTRIBUTION SYSTEM.

- i) Total length of Main Canals..... 367.18 Miles.
- ii) Total length of Branches..... 595.57 Miles.
- iii) Total length of Distributaries & Minors. 1819.15 Miles.
- iv) The Left Bank non-perennial feeders are functioning since Kharif 1955.
- v) The perennial channels viz the Akram Wah on the Left Bank and the Kalri Baghar Feeder on the Right Bank started getting Barrage supplies from April & December 1958 respectively.
- vi) The Right Bank Feeder encountered about 9 miles of rocky terrain involving rock excavation of 101 million cubic feet which required about 2.3 million pounds of dynamite. The depth of cut varied from 20 feet to 60 feet. This channel has many cross-drainage works, the major being the Baran Nai Super-Passage which was completed at a cost of approximately one Crore Rupees.

(IV)

SCHEDULE OF QUANTITIES AND COST
INVOLVED ON THE HEADWORKS.

1. Excavation for foundation.	52.2 Million Cubic Feet.
2. Permanent Piling.	0.229 Million Square Feet.
3. Mass concrete work.	8.80 Million Cubic Feet.
4. Reinforced cement concrete work.	1,26,000 Cubic Feet.
5. Prestressed road bridge 60 ft. span.	43 spans.
6. Steel draw bridge for lock span.	1 span.
7. Jungshahi stone used.	14 Million Cubic Feet.
8. Bricks used.	6.4 Million Numbers.
9. Total pitching work.	9.58 Million Cubic Feet.
10. Total cement used.	80,000 Tons.
11. Steel work in gates exclu- ding gate bridge.	
(a) Barrage gates 60x21 ft.	44 Nos.
Down stream lock gate 34x50ft.	1 No.
(b) Headregulator gates 24x10.50ft.	20 Nos.
Downstream canal lock gate. 24x13.5 feet.	1 No.
12. Actual cost of headworks.	6.955 Crore Rupees.

WORKS PRECEDING THE ACTUAL
CONSTRUCTION OF THE HEAD WORKS.

a) Metalled approach road upto Barrage site	6 miles.
b) Laying Broad Gauge Railway track siding at Jungshahi & the Barrage	14 miles.
c) Const of Station Buildings.	1 Set.
d) Const of Right Bank Colony Building (Bungalows & quarters of varied description for a population of over 5,000 souls) Hospitals Schools etc.	1 No .
e) Construction of Workshop.	1 No.
f) Construction of Diesel Power Station.	1,750 Kilowatts.
g) Cement Godown	1 No Tons capacity.

SALIENT FEATURES OF THE HEADWORKS.

1. Situation		4½ Miles upstream of Kotri
2. Length of Barrage between abutments.		2,984 Feet.
3. Total number of spans each 60ft.		44 Nos.
4. Lock channel for navigation.		270 ft. long & 60' wide.
5. Fish Ladders.		2 Nos.
6. Full supply discharges of Main feeders.		
i) Kalri Baghar Feeder	9,100 cusecs	37.78+20.60=58.38 Miles long.
ii) Pinyari Feeder	15,636 cs.	(Upper)(Lower) Miles long.
iii) Fuleli Feeder	15,026 cs.	59.80 Miles long.
iv) Akram Wah	3,714 cs.	76.20 Miles long.
7. Width of ordinary pier of Barrage.		7 Feet.
8. Width of abutment pier of Barrage		10 Feet.
9. Number of abutment piers		2 Nos. (Pier No. 15&27)
10. Height of river gate of Barrage.		21 Feet.
11. Height of Lock Gate of Barrage.		34 Feet on downstream side.
12. Weight of river gate.		44 Tons.
13. Weight of counterweight.		88 Tons.
14. Road Bridge level.		R.L. 86
15. Maximum flood level expected (Upstream)		R.L. 80.1
16. Pond Level.		R.L. 68.0
17. Crest level.		R.L. 48.0
18. Downstream pavement level.		R.L. 35.0
19. Maximum flood discharge at the Barrage site before its construction (1948).		7.10 lac cusecs.
20. Maximum flood discharge for which Barrage is designed.		8.75 lac cusecs.
21. Maximum flood discharge which was safely passed through the Barrage in its first year of life (1955).		7.92 lac cusecs.
22. Maximum flood discharge which was safely passed through the Barrage in its second year of life (1956).		9.81 lac cusecs.
23. Width of road bridge.		20 feet. Clear with two foot-paths 4 ft. each.

FOREWORD.

The work of writing Completion Report was entrusted to Mr. M.S.Siddiqui Sub Divisional Officer, Design Sub Division on 22-9-1970 under my direct supervision. Two Volumes viz Volume I (General) and Volume VII (Akram Wah) have been completed by the said officer in less than a year's period. This is a great achievement and I congratulate the Sub Divisional Officer and his staff for Completing these two Volumes of Completion Report. I hope that the same spirit and zeal will continue for compiling the remaining Volumes of Completion Report.

Dated:- 6-7-1971.

(H.M.DAHAR)
DEPUTY CHIEF ENGINEER
IRRIGATION G.M.BARRAGE
HYDERABAD SIND.

ACKNOWLEDGEMENT.

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Compilation of Completion Report is a hard job which requires patience, Concentration and cooperation of all concerned. I am thankful to all who contributed directly or indirectly, in the preparation of this Volumes. This is the direct outcome of the able guidance of my Deputy Chief Engineer, Mr.H.M.Dahar, under whose personal supervision this work is completed and who was always kind enough to solve my problems and encourage my efforts.

I owe my sincer gratitude to Mr. M.A.Talpur, Superintending Engineer, Left Bank Construction Circle for arranging quick disposal, supplying old record and deputing his officials to assist me. Mr Mir Muhammed Sathio Divisional Head Draftsman extended me great help in preparation of this Volume.

Thanks are due to Mr. M.Y.Solangi, Chief Designer Officer for personal efforts in the approval of ^{D-Staff} of this system. I am also thankful to my Technical Officer Mr. Khalid Masood who always helped me and guided me in the compilation of this Volume.

The Services rendered by Mr. Mahfooz Ali Khan Sub Engineer of Drainage Circle (on deputation) and Mr. Iqbal Yaqoob Shaikh Sub Engineer of Left Bank Construction Circle need special appreciation. I would further like to record my thanks to my staff members, M/S Abdullah Almani and Moinuddin Arain Draftsmen, Muhib Ali Shah Rizvi and Nazar Muhammed Sahito Tracers, and Ali Muhammed Soomro Junior Clerk for their deep sense of duty . The manuscript was typed by ^{Mr.} Abdul Rauf Khan Typist of Fuleli Division and the stencils were cut by Mr. Najibuddin Abbassi Junior Clerk/typist of this Sub Division.

HYDER B.D
6-7-1971

(M.S.SIDDIQUI)
SUB DIVISIONAL OFFICER
DESIGN SUB DIVISION

COMPLETION REPORT OF KOTRI BARRAGE IRRIGATION SCHEME.

VOLUME - VII.

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PREVIOUS HISTORY OF AKRAM WAH SYSTEM AND
SUBSEQUENT DEVELOPMENT UPTO FINAL CONSTRUCTION
OF THE SCHEME.

It was anticipated by Mr. Champhekar that even after all the developments in the Northern zone of Pakistan, there will be a winter discharge of about 2000 cs. due to regeneration of water between Sukkur and Kotri. He had, therefore, provided perennial supplies to tail areas of Fuleli comprising of about 3,00,000 acres. This arrangement was, however, found unsound as a greater part of this available winter water would have lost in the large Fuleli Canal section. This arrangement would have further prevented the Fuleli Canal from acting as a drain in the winter months and so increasing the ever present danger of water-logging. The flow of water through-out the year in Fuleli Canal would also have increased water-logging and salinity problem in and around the city of Hyderabad. Further, it would have been difficult to maintain the necessary Full Supply Level in the Canal during winter to feed the offtaking Channels.

In view of all these difficulties Mr. T.A.W.Foy the then Chief Engineer, Lower Sind Barrage, proposed a new perennial channel from the barrage for this area. In order to control the seepage and absorption losses of this valuable cold weather water the Channel was proposed to be lined with cement concrete and was called "Lined Channel". This is the first Lined Channel ever constructed in Sind. This Channel was subsequently named as "Akram Wah" in 1962 by the President of Pakistan in appreciation of the meritorious services rendered by Mr. Mohd Akram Sheikh, an eminent Engineer, during his period of long association with the Kotri Barrage.

The Gazette of West Pakistan dated 2nd February 1962
reads as under :-

"IRRIGATION, COMMUNICATION AND
WORKS DEPARTMENT.

The 19th January 1961:

No. 3/24-SOV(1)/59- The Governor of West Pakistan
is pleased to notify that in order to
commemorate the excellent services ren-
dered by Mr. Muhammad Akram Sheikh,
Chief Engineer, Irrigation, West Pakistan
on the execution of Ghulam Muhammad
Barrage Project, the President, in rel-
axation of the general instructions con-
tained in the Ministry of Home Affairs
letter No.29/4/53 dated the 19th May,
1955, has been pleased to approve the
naming of the Lined Channel of Ghulam
Mohammad Barrage as "AKRAM WAH".

By Order of the Governor of West Pakistan.

Sd/-
MUHAMMAD AFZAL SECRETARY."

Akram Wah takes off directly from head works &
is lined upto R.D. 191.8 i.e. Natli Tando Ghulam Ali
Road Bridge. From R.D. 191.8 upto tail (R.D. 381.0). There
is an earthen Channel. The portion from R.D. 110 to R.D.
130 is brick lined and the portion from R.D. 0 to 110 &
from R.D. 130 to R.D. 191.8 is constructed of C.C.
lining.

This is a perennial Canal with a designed dis-
charge of 3713.65 cusecs at head. It runs idle upto
R.D. 110 except withdrawals by pumps near Hyderabad for
growing vegetables. Gaja Branch takes off from Akram Wah
at R.D. 110 & is the biggest Canal of this system.
Akram Wah again runs idle right from R.D. 110 to R.D.
325 where off-taking Canals start getting water.

This System Comprises of Akram Wah and the following Branches :-

1. Gaja Branch.
2. Kazia (New) Branch.
3. Sanni Guni Branch.
4. Shadi Large Branch.
5. Lined Channel Escape.

The following Channels offtake directly from Akram Wah :-

1. Hamira.
2. Hadacher.
3. Saida.
4. Vahnai.
5. Karo Ali Bahar.
6. Mithna.
7. Ghar Kadhan.
8. Wangi.
9. Ali Wah Large.

There have been many changes in the original alignment approved by the Sind Government in the year 1950. The main Canal follows entirely new alignment right from R.D. 0 to 322.7 i.e., upto 70th Mile Cross Regulator of Pre-Barrage old Fuleli Canals. Beyond R.D. 322.7, Akram Wah follows the old Fuleli alignment with necessary remodelling and straightening upto its tail at R.D. 381.

The command of Akram Wah is bifurcated into two parts, one Part is in the command of Gaja Branch and the other below R.D. 322.7 falls in the Command of tail channels of Akram Wah. This tail area is called Tando Bago and Badin perennial areas of Akram Wah. Gaja system is comprised of mostly new canals and Commands a C.C.A of 1.02 lac acres. The tail distributaries of Akram Wah are mostly old offtaking channels of Pre-Barrage Fuleli Canal. A few distributaries like Kamaro and Guraho Ex.

-:4 :-

Defence Minor

Qazia new, Mor Ex.Raj Wah Kadhan/Khoski, Beroweran,
&
Padhar,/Kumbharo Ex.Bahadur Wah, Dubni ~~and Defence minor~~
ex Shadi Large are new channels. To have a better command
in tail; some canals have been extended viz Sanni Guni &
Raj Wah Kadhan.

Quite a reasonable area, previously settled on
Khoski Ex.Nasir Branch of Sukkur Region has been taken
on Shadi Large which follows the alignment of old Khoski
of Sukkur Barrage in its tail reach. Some areas previous-
ly falling in the command of Pinyari have also been taken
on ~~Akram Wah~~.

Work on this Canal was started in 1951. During
the flood of 1956 this channel was badly damaged and was
repaired at a cost of Rs. 6.0 lacs. Akram Wah started
feeding perennial supplies to Gaja area in Rabi 1957.

VOLUME VII.Chapter-II.DESCRIPTION OF TRACT COMMANDED BY SYSTEM
AND OF THE WORKS INCLUDED THEREIN.

As stated in Chapter-I, the Lined Channel (later on renamed as Akram Wah) was proposed by late Mr. (Sir) T.A.W. Foy, the then Chief Engineer, Lower Sind Barrage and approved by Sind Government in 1950 for giving perennial supply to an area of 3.86 lac acres of land situated at the tail of Fuleli Canal and for Gaja area comprising of about 1.02 lac acres of land. The gross commanded and culturable commanded area of this system are 5,49,005 acres and 4,88,230 acres respectively.

Out of the three Canal Systems on the Left Bank, Akram Wah System is wholly perennial. There are two perennial patches of lands situated far apart from each other. One patch lying along side Pinyari Feeder is irrigated from Gaja Branch and the other *patch lying at the tail - end* of Fuleli is irrigated by Shadi Large Branch, Kazia Branch, Sanni Guni Branch and other off-taking Channels from the above branches or direct from Akram Wah. Previously there was no Rabi cultivation on this tract at all. The assured barrage supply has brought large areas under wheat, oil-seeds, cotton, ~~sugar cane~~ and *garden-s.*

The final acreage of various crops as given in
(P-94)
Financial Forecast 1964 Vol:II/is as Under :-

<i>crops</i>	Gaja Area.	Remaining area.	Total.
Forest.	-	26050	26050
Sugar-Cane.	11530	37210	48740
Cotton.	31130	87430	118560
Garden.	5760	18610	24370
Fodder.	5760	18600	24360
Wheat.	23050	61390	84440
Oil Seed.	14410	46510	60920
Total.	91640	295800	387440

According to latest C.C.A. under the Command of this system, the crop acreage of Dry Kharif and Rabi etc is calculated in Chapter/IX of this Volume (Stt: I PF- 129).

The cropping pattern as adopted for this system in the financial Forecast of 1964 is reproduced below :-

Crops	Akram Wah excluding Gaja.	Gaja Area of Akram Wah.	Season.
Sugar-cane.	10 %	10 %	Kharif.
Cotton.	23.5 %	27 %	
Fodder.	5 %	5 %	
Forest.	3.5 %	--	Whole year.
Garden.	2.5 %	2.5 %	
Wheat.	16.5 %	20 %	Rabi.
Oil Seeds.	12.5 %	12.5 %	

This system irrigates following revenue District and Talukas :-

<u>District.</u>	<u>Taluka.</u>
Hyderabad.	1) Hyderabad. 2) Tando Mohammad Khan. 3) Matli. 4) Tando Bago. 5) Badin.

The important works on this system are as under :-

- 1) The Construction of 186.88 miles long Main Canals and Branches as given below with all other connected work.

a)	Akram Wah	76.20 miles long.
b)	Gaja Branch.	12.48 " "
c)	Shadi Large Br:	30.80 " "
d)	Sanni Guni Br:	27.00 " "
e)	Kazia Branch.	22.00 " "
f)	AkramWah escape	18.40 " "

186.88 miles long.

- 2) The construction of Distributaries & Minors of the System totalling 286.84 miles in length i/c all other connected works.

3) The Construction of 1396 water Courses including the remodelling of old ones as well as construction of modules at their heads.

4) All works connected with the drainage problem of this perennial area, which forms a part of the Kotri Barrage Surface Drainage Scheme.

STATEMENT NO. I.

STATEMENT SHOWING TOTAL G.C.A. AND C.C.A. OF EACH
CANAL OF AKRAM WAH SYSTEM.

S. No.	Name of Canal.	G.C.A.	C.C.A.	remarks
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II M.C. & BRANCHES.

1.	Akram Wah.	10357	10357
2.	Gaja Branch.	10307	10219
3.	Shadi Wah Large Branch.	56324	54137
4.	Sanni Guni Br:	26373	26330
5.	Kazia Wah Branch	78500	76587
6.	Akram Wah escape.	47330	-
Total II M.C. & BR:		229191	177630

III DISTRY & MINORS.

1.	Dodo Wah.	6574	6555
2.	Jamarki Minor.	2472	2472
3.	Dhandhi Minor.	11702	11672
4.	Gaja Minor.	2692	2692
5.	Kumb Minor.	10283	10283
6.	Bulri Minor	12254	12154
7.	Hassan Ali Minor.	8467	8427
8.	Dhatt Distry.	11941	11831
9.	Shorki Minor.	18230	17964
10.	Khiryari Minor.	7978	7971
11.	Shadi Wah Small	16356	16256
12.	Dubni Minor.	9215	8874
13.	Hamirah Minor	3011	2978
14.	Hadachar.	13555	12423
15.	Bahadur Wah.	21085	20100
16.	Defence Minor.	5439	5439
17.	Khoski Minor.	5838	5838
18.	Bero Weran.	9132	9094
19.	Kumbharo.	4612	4612
20.	Padhar Minor.	11966	11137
21.	Raj Wah Kadhan.	24211	23220

22. Sher Wah Small.	4064	4049
23. Mor Minor.	9112	9112
24. Ali Wah Large.	18141	17949
25. Adu Wah.	2712	2712
26. Sher Wah Large .	8185	7126
27. Wangi Wah.	2145	2145
28. Karo Ali Bahar.	7966	7742
29. Saeeda Wah.	3071	3071
30. Vahmai Minor.	5402	5231
31. Mithna Wah.	4240	4134
32. Ghar Kadhan.	5216	5136
33. Mehrab Wah.	1194	1149
34. Ganj Bahar.	2956	2869
35. <u>Kamaro Minor.</u> (Dy)	18908	18731
36. Guraho Minor. (Dy)	6533	4533
37. Noor Wah.	2956	2869
Total III D.M.	<u>319814</u>	<u>310600</u>

G.Total of II M.C.& III D.M. 5,49,005 4,88,230

Details of Gaja Area.

1. Gaja Branch.	10307	10219
2. Dodo Minor.	6574	6555
3. Jamarki Minor.	2472	2472
4. Dhandhi Minor.	11702	11672
5. Gaja Minor.	2692	2692
6. Kumb Minor.	10283	10283
7. Bulri Distry.	12254	12154
8. Hassan Ali Minor.	8467	8427
9. Dhatt Distry.	11941	11831
10. Shorki Minor.	18230	17964
11. Khiryari Minor.	7978	7971
	<u>1,92,900</u>	<u>1,02,240</u>

STATEMENT NO. II.

STATEMENT SHOWING CHIEF FEATURES OF DESIGN OF CHANNELS IN AKRAM WAH SYSTEM.

S. No.	Name of Channels.	Gross Area (Acres).	Culturable Area (Acres).	Discharge at head (cusecs).	F.S.D. at head (ft.).	B.W. at head (ft.).	Length of Canal (Miles).
1.	2.	3.	4.	5.	6.	7.	8.

AKRAM WAH SYSTEM.

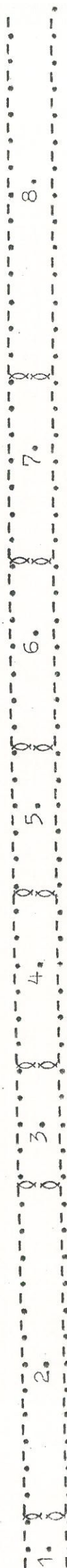
A - MAIN CANALS.

1.	Akram Wah (Direct Water Courses & Pump).	10,357	10,357	3713.65	15.0'	50.0'	76.20
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B - CHANNELS OFFTAKING DIRECTLY FROM MAIN CANAL OR FROM OFFTAKES OF MAIN CANAL.

1.	Hamirah.	3,011	2,978	24.79	2.2'	7.25'	3.60
2.	Hadachar,	13,555	12,423	85.4	3.3'	13.0'	8.06
3.	Saida.	3,071	3,071	47.23	2.75'	9.5'	3.70
4.	Vahmai.	5,402	5,231	35.49	2.4'	8.5'	5.76
5.	Karo Ali Bahar.	7,966	7,742	52.67	2.8'	10.50'	8.0
6.	Mithna.	4,240	4,134	30.66	2.4'	8.25'	5.4
7.	Ghar Kadhan.	5,216	5,136	56.84	2.9'	10.3'	7.4
8.	Mehrab.	1,194	1,149	8.77	1.6'	4.75'	3.0
9.	Wangi.	2,145	2,145	14.78	2.0'	6.25'	4.4
10.	Ali Wah Large.	18,141	17,949	186.45	4.35'	20.0'	16.36
11.	Adu Wah.	2,712	2,712	19.12	2.1'	5.25'	5.20

—: 11 :—



12. Sher Wah Large.	8,185	7,126	48.87	2.75'	9.75'	7.20
C - BRANCHES.						
1. Gaja Branch.	10,307	10,219	745.93	6.0	56.0'	12.48
2. Shadi Large.	56,324	54,137	943.13	7.4'	45.75'	30.80
3. Kazia Wah.	78,500	76,587	613.38	6.5'	36.0'	22.0
4. Sanni Guni.	26,373	26,330	686.84	6.7'	38.5'	27.0
5. Akram Wah escape.	47,330	--	850.00	7.0'	45.0'	18.40

D - DISTRIBUTUARIES AND MINORS TAKING OFF FROM BRANCHES OR FROM DISTRY OF THE BRANCH SYSTEM.

GAJA SYSTEM.

1. Dodo Wah.	6,574	6,555	50.57	2.9'	10.75'	5.10
2. Jamarki,	2,472	2,472	13.62	1.9'	5.7'	3.7
3. Dhandhi.	11,702	11,672	88.85	3.4'	13.25'	8.46
4. Kumb.	10,283	10,283	75.93	3.3'	12.25'	7.78
5. Gaja Minor.	2,692	2,692	20.53	2.2'	7.25'	2.80
6. Bulri Distry.	12,254	12,154	393.93	4.9'	36.0'	12.48
7. Dhatt Minor.	11,941	11,831	77.70	3.3'	12.0'	8.80
8. Hassan Ali.	8,467	8,427	50.86	2.7'	12.75'	5.10
9. Shorki Minor.	18,230	17,964	119.96	3.7'	16.5'	10.64

-: 12 :-

1.	2.	3.	4.	5.	6.	7.	8.
10. Khiryari.	7,978	7,971	58.84	3.0'	11.75'	6.80	
<u>SHADI LARGE SYSTEM.</u>							
1. Bahadur Wah.	21,085	20,100	420.36	5.7'	30.50	16.80	
2. Defence Minor.	5,439	5,439	37.99	2.6'	8.25'	6.60	
3. Khoski Minor.	5,838	5,838	36.47	2.6'	9.40'	3.84	
4. Beroveran.	9,132	9,094	59.42	3.0'	11.50'	4.08	
5. Kumbharo.	4,612	4,612	30.01	2.4'	8.25'	4.50'	
6. Padhar.	11,966	11,137	79.58	3.2'	12.75'	9.00	
7. Shadi Small.	16,356	16,256	100.96	3.5'	14.50'	9.90	
8. Dubni.	9,215	8,874	58.51	2.9'	11.25'	5.0	
<u>HAZIA SYSTEM.</u>							
1. Kamaro.	18,908	18,781	128.64	3.7'	16.75'	10.14	
2. Guraho.	6,533	4,533	119.62	3.9'	14.5'	12.44	
3. Noor Wah.	2,956	2,869	49.63	2.75'	9.75'	7.40	
4. Ganj Bahar.	2,956	2,869	71.38	3.10'	11.75'	9.0	
<u>SANNI GUNI SYSTEM.</u>							
1. Sher Wah Small.	4,064	4,049	31.41	2.4'	8.25'	7.62	
2. Raj Wah Kadhan.	24,211	23,220	386.13	5.6'	28.0'	20.48	
3. Mor.	9,112	9,112	120.28	3.7'	16.10'	10.30	

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STATEMENT NO. III.

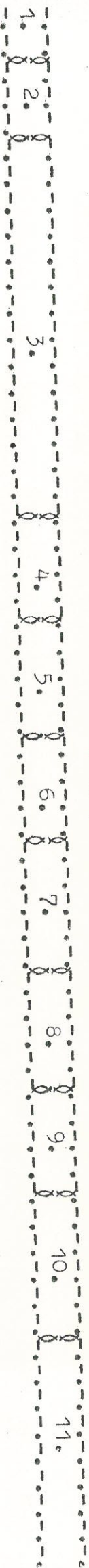
SHOWING IMPORTANT FEATURES OF THE HEAD AND X-REGULATORS
OF THE MAIN CANAL & BRANCHES IN AKRAM WAH SYSTEM.

S. No.	R.D. of Structure.	Name of Canal & Structure.	P.S.L.		BED WIDTH IN FEET.		F.S.DEPTH.		DISCHARGE IN CUSECS.	
			U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1.	0	Akram Wah H/Regulator.	68.00	67.00	-	50.00	-	15.0	-	3713.65
2.	4	Akram Wah X-Regulator.	66.68	66.68	50.0	50.00	15.0	15.0	3712.90	3712.90
3.	110	Gaja Branch X-Regulator.	59.04	58.79	44.0	52.00	17.5	14.2	3692.01	2946.08
4.	110	Gaja Branch H/Regulator.	59.04	58.79	44.0	56.00	17.5	6.00	3692.01	745.93
5.	325	Hamirah Head Regulator.	41.19	36.50	75.0	7.25	11.7	2.20	2816.17	24.79
6.	325	Shadi Large H/Regulator.	41.19	40.50	75.0	45.75	11.7	7.40	2816.17	943.13
7.	328	70th Mile X-Regulator.	40.95	40.35	75.0	80.00	11.7	8.70	1845.65	1845.65
8.	344	Hadachar H/Regulator.	38.81	34.00	80.0	13.00	8.70	3.30	1832.26	85.40
9.	346	Saida Wah H/Regulator.	38.61	34.95	76.0	9.50	8.60	2.75	1746.86	47.23
10.	350	Kazia Wah X-Regulator.	38.22	36.83	76.0	52.75	8.60	7.30	1694.81	1045.94
11.	350	Yehnai Head Regulator.	38.22	34.00	76.0	8.50	8.60	2.40	1694.81	35.49
12.	350	Kazia Wah H/Regulator.	38.22	35.62	76.0	36.0	8.60	6.50	1694.81	613.38
13.	358	Karo Ali Bahar H/Regulator.	35.89	33.92	52.75	10.5	7.3	2.80	1041.28	52.67

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
14.	372	Mithna Head Regulator.	34.42	31.58	52.75	8.25	7.3	2.4	980.44	30.66
15.	375	Ghar Kadhan H/Regulator.	34.10	30.48	50.00	10.3	7.10	2.9	948.11	56.84
16.	375	Vangi Wah H/Regulator.	34.10	30.75	50.00	6.25	7.10	2.0	948.11	14.78
17.	381	Akram Wah Tail Reg.	33.45	--	46.75	-	7.00	-	873.29	-
18.	381	Sanni Guni H/Regulator.	33.45	32.05	46.75	38.5	7.00	6.7	873.29	686.84
19.	381	Ali Wah Large H/Reg:	33.45	33.25	46.75	20.0	7.00	4.35	873.29	186.45
20.	381	Akram Wah escape H/Reg:	33.45	29.00	46.75	45.0	7.00	7.0	873.29	850.0

GAJA BRANCH SYSTEM.

21.	0	H/Reg: of Gaja Branch.	59.04	58.79	44.0	56.00	17.5	6.0	3692.01	745.93
22.	15.0	Gaja Dodo X-Regulator.	56.64	56.49	56.0	50.50	6.00	5.6	725.19	674.62
23.	15.0	Dodo Wah H/Regulator .	56.64	55.27	56.0	10.75	6.00	2.9	725.19	50.57
24.	36.5	Jamaraki Minor H/Reg: .	53.94	51.15	50.5	5.700	5.60	1.9	640.07	13.62
25.	61.6	Dhandhi H/Regulator.	51.06	50.78	47.0	13.25	5.40	3.4	578.29	88.85
26.	62.4	Gaja Tail Regulator.	50.87	-	47.0	-	5.40	-	490.39	-
27.	62.4	Kumb Distry H/Reg:	50.87	50.83	47.0	12.25	5.40	3.3	490.39	75.93
28.	62.4	Gaja Minor H/Reg:	50.87	50.83	47.0	7.250	5.40	2.2	490.39	20.53
29.	62.4	Bulri Dy. H/Regulator.	50.87	50.83	47.0	36.00	5.40	4.9	490.39	393.93



SHADI LARGE BRANCH SYSTEM.

30.	0	H/Reg: of Shadi large Br:	41.19	40.50	75.00	45.75	11.70	7.40	2816.17	943.13
31.	42.5	Bahadur Wah X-Regulator.	35.81	35.61	45.25	31.50	7.20	5.80	846.70	426.34
32.	42.5	Bahadur Wah H/Regulator.	35.81	35.50	45.25	30.50	7.20	5.70	846.70	420.36
33.	74.2	Shadi Small X-Regulator.	31.70	31.50	28.90	24.00	5.50	5.00	350.81	249.85
34.	74.2	Shadi Small H/Regula or.	31.70	31.50	28.90	14.50	5.50	3.50	350.81	100.96
35.	106.8	Dubni X/Regulator.	26.92	26.72	21.75	14.80	4.60	3.60	152.22	93.71
35.	106.8	Dubni H/Regulator.	26.92	25.00	21.75	11.25	4.60	2.90	152.22	58.51

KAZIA BRANCH SYSTEM.

37.	0	H/Regulator of Kazia Wah	38.22	35.62	76.00	36.00	8.60	6.50	1694.01	613.38
38.	64.2	Kamero X-Regulator.	27.90	26.28	32.00	27.10	6.00	5.40	482.47	353.83
39.	64.2	Kamero H/Regulator.	27.90	27.70	32.00	16.75	6.00	3.70	482.47	128.64
40.	86.0	Guraho X-Regulator.	23.50	23.30	25.00	19.00	5.20	4.30	294.28	174.66
41.	86.0	Guraho H/Regulator.	23.50	23.07	25.00	14.50	5.20	3.90	294.28	119.62
42.	110.0	Noor Wah X-Regulator	19.70	-	16.50	-	3.80	-	121.01	-
43.	110.0	Noor Wah H/Regulator	19.70	19.50	16.50	9.75	3.80	2.75	121.01	49.63
44.	110.0	Ganj Bahar H/Regulator.	19.70	19.50	16.50	11.75	3.80	3.10	121.01	71.38



SANNI GUNI BRANCH SYSTEM.

45.	0	H/Regulator of Sanni Guni Branch.	33.45	32.05	46.75	38.5	7.00	6.70	873.29	686.84
46.	9.20	Sher Wah Small X-Regulator.	31.00	30.80	38.50	37.0	6.70	6.60	674.62	643.21
47.	9.20	Sher Wah Small H/Regulator.	31.00	26.82	38.50	8.25	6.70	2.40	674.62	31.41
48.	22.50	Raj Wah X-Regulator.	29.28	28.28	37.00	23.00	6.60	4.80	629.14	243.01
49.	22.50	Raj Wah Kadhun H/Reg:	29.28	27.54	37.00	28.00	6.60	5.60	629.14	386.13

THE ALIGNMENT AND DESIGN OF CHANNELS
IN THE AKRAM WAH SYSTEM.

The proposal of the Chief Engineer, Lower Sind Barrage for a new Lined Channel was accepted in the cabinet meetings of 13.1.1950 and 1.2.1950. It was decided by the Cabinet, on the recommendations of special sub committee's report, that the combined discharge of the three Left Bank Feeders should not be less than the withdrawals fixed in Champhekar Project. The Capacities of Left Bank Feeders for designing their sections were, consequently, fixed in Chief Engineer, Lower Sind Barrage's letter No. 7486-I(2) dated 15.2.1950.

This channel was proposed for the perennial areas at Fuleli tail as given below :-

Channel.	C.C.A.
Shadi Wah Large.	1,11,657 acres.
Hamira.	16,601 "
Kazia.	99,591 "
Ali Bahar Karo.	8,899 "
Mithna.	3,655 "
Wangi.	1,784 "
Ghar Kadhan.	6,488 "
Sanni Guni.	92,293 "
Shah Wah Large.	10,533 "
Ali Wah Large.	16,137 "
Total	<u>3,67,638 acres.</u>

This area required a Kharif discharge of 3319 cusecs with 40% rice intensities, F.S.F. 50 acres per cusecs and losses at 2 cusecs - per million square feet of wetted perimeter for lined portion & 8 cusecs per million square feet of wetted perimeter for unlined portion.

Approximate dimensions of the Channel were worked out to be as under :-

B.W. - 44 ft.

F.S.D.- 15 ft.

Wotted Perimeter - 92 ft.

Length - 70 Miles.

The rabi discharge was worked out as 1185 cusecs (with 40% intensity and F.S.F. 140 acres per cusecs. The difference of Kharif and Rabi discharge to flow the Canal at F.S.L. was proposed to be met with by rotation.

Subsequently a conference was held at Tando Mohd Khan on 14.8.1951 to discuss with Zamindars the proper boundary between the perennial and non perennial areas in the Gaja portion of the perennial block. It was later on decided by the Council of Ministers to add 75,000 acres of Gaja command in the perennial area. The discharge of Akram Wah was thus increased from 3500 cusecs to 4100 cs. The C.C.A. was further changed vide Chief Engineer, Lower Sind Barrage letter No. 7486-I(2) dated 17.7.1951 as under:-

Original area.	3,67,638 acres.
Approved by Council of Ministers.....	75,000 "
Proposed from Hassan Ali.	21,411 "
	4,64,049 acres.

The Designed Discharge was thus increased to 4,300 cusecs. The C.C.A. and discharges as adopted in various Financial Forecasts are shown in the table given on page 20 of this Volume.

In 1969, Hiran Distry and Hiran Minor having an area of 11,630 acres were transferred, from perennial Akram Wah to non perennial Pinyari Feeder, under Government of West Pakistan Irrigation & Power Department's No.15/116-S.O.T&D(OP)67 dated 3.6.1969. Copy of Government Notification is attached at the end of this Chapter as Annexure I. (p-27).

The alignment of Gaja Branch and its minors were fixed vide Chief Engineer, Lower Sind Barrage letter No.

7486-I-1(2) dated 25th March 1953. One Dodi Minor off-taking from Dodo Distry was also included in that directive but it was desired that it should not be excavated. In view of the above directive this area was given temporary supply of irrigation water either from Fuleli or from neighbouring Guni Canal, both being non perennial Canals. Out of the total area of 1523-33 acres settled originally on Dodi Minor, 1492-36 acres were proposed to be settled on Fuleli and Guni (non-perennial) while remaining 30-37 acres were transferred to Dodo Distry. Consequent upon the construction of Akram Wah, some areas of Sukkur Barrage were sandwiched between Fuleli and Akram Wah and the supply of irrigation water to such areas from Sukkur Barrage Canals were discontinued. These areas were, therefore, taken in the command of Akram Wah. Total area transferred from Sukkur Barrage command is 19,157 acres. The details of areas settled on each channel of this system is given at the end of chapter II (P-8&9). The total cultivable commanded area now stands as 4,88,230 acres.

There were so many changes in the alignment of Akram Wah approved by Government in 1950. These changes, as usual, were necessitated on actual lay out in the field to avoid obstructions like villages, mosques, gardens grave-yards etc and also to avoid depressions or dhands.

Alternate alignments were thus marked at all such points. The line was shifted by means of a curve to save the village of Rahamatullah Jaheja. Another shifting was made near village Abdullah Halepoto to save a mosque from coming under the Canal. An alternate alignment was selected between Husri and Seri Minor. Near Matli town the alignment was shifted due east with a slight curve to save a garden and a factory. There was no further change of alignment upto R.D. 216 and the originally approved alignment was adhered to. Beyond R.D. 216, the original alignment was to cross three channels viz (1) Imam Wah Junubi, (2) Mulchand and (3) Khanote at R.D. 227.9 of Fuleli,

then to follow the existing Khanote upto R.D. 243 of Akram Wah and then to recross it due east. At the time of lay-out it was observed that the line was passing exactly over a mosque at R.D. 218, a village at R.D.226, a graveyard on Khanote bank at R.D. 227 and another village at R.D. 242. It was therefore, decided to run Akram Wah along the alignment of Mulchand wah upto the point of bifurcation of Khanote and Mulchand. From this point to R.D. 243 of the old alignment of Akram Wah the main Canal was proposed to utilize the existing alignment of Khanote. From R.D. 243 the canal was made to extend in a straight line upto R.D. 245 of the old alignment. From R.D. 251 to R.D. 265 the alignment was shifted half a mile due east to avoid several depressions and dhandhs coming in the original alignment. From R.D. 278 to R.D. 302 the alignment was shifted slightly due east to utilize a ridge as well as to avoid a grave yard Opposite R.D. 290. Below R.D. 328 i.e. 70th mile cross regulator, Old Fuleli is utilized right upto R.D. 381-0 (tail) with necessary remodelling.

A comparative statement showing area, discharge and final cultivation as envisaged in the original scheme & subsequent revisions is given below :-

Descrip- tion.	As per original scheme of 1950	1956	1959	1964	As per Completion Report
Gross Area.	-	-	5,39,276 acres.	5,87,230 acres.	5,49,005
Cultiv- able area.	3,67,999 acres.	4,83,308 acres.	4,87,347 acres.	4,87,350 acres.	4,88,230
Discharge @ Head.	3,500 cusecs.	4,100 cusecs.	3572.00 cusecs.	3,602 cusecs.	3713.65
Final Culti- vation.	2,94,400 acres.	3,71,431 acres.	3,87,440 acres.	3,87,440 acres.	3,88,142

The F.S.L. at the head of main Canal is R.L. 67.00 and full supply Depth is 15 ft. The Full Supply Level was kept as high as possible corresponding to the Barrage pond level of R.L. 68.00. The hydraulic gradient at head is 0.08 per thousand feet and the mean velocity of 3.99 feet per second. The full supply level at the tail of Akram Wah is at R.L. 33.45. This level as per original design was 34.92 which is lowered on account of change in Hydraulic gradient. The F.S.L. as per original and final design at various points are shown below :-

Situation.	F.S.L. as per original Design.	F.S.L. as per final design approved on 5.2.72.
Main Canal at Head.	67.00	67.00
Gaja Cross R.D. 110.	59.04 58.79	59.04 58.79
Road Bridge R.D. 191.8	52.15 52.05	52.15 52.05
Offtake of Shadi Large (R.D. 322.7 as per original design & R.D. 325.0 as per final design).	41.29	41.19
Offtake of Karo Ali Bahar (R.D. 361.3 as per original design & R.D. 358.0 as per final design.....).	37.00	35.89
Offtake of Wangi Wah RD. 375.	35.51	34.10
Offtake of Ali Wah (Tail) (RD. 380.50 as per original design & R.D. 381.0 as per final design.....).	34.92	33.45

The bed widths, full supply depths and discharges at a few important places as per final design on the main canal are as shown below :-

Situation.	Bed Width Feet.	Full Supply Depth (feet)	Designed Discharge (Cusecs).
Main Canal at Head.	50.0	15.00	3713.65
At the offtake of Gaja Br: (u/s side).	44.0	17.5	3692.01

Situation.	Bed Width (Feet).	Full Supply Depth(Feet).	Design Dis- charge(Cusecs)
At 70th Mile X-Reg: (u/s side).	75.0	11.7	1845.65
At the Offtake of Kazia.....	76.0	8.60	1694.81
At the offtake of Wangi Wah.(u/s side)	50.0	7.10	948.11

As already stated, the main canal is lined from head to R.D. 191.8 and from R.D. 191.8 to tail it is an earthen Channel. The lining from R.D. 0 to R.D. 110 and from R.D. 130 to 191.8 is of cement concrete whereas from R.D. 110 to 130 there is brick lining. The increase in sections of Akram Wah towards down stream side is due to the fact that a larger section is required for brick lined portion than cement lined reach and a still larger section is required for earthen portion. The Sections in various reaches are shown below :-

Reach.	Section.	Remarks.
R.D. 0 to 21.9	50 x 15)	C.C. lining.
R.D. 21.9 to 50	44 x 16)	
R.D. 50 to 110	44 x 17.5)	
R.D. 110 to 130	52 x 14.2	Brick lining.
R.D. 130 to 191.8	36x15.4	C.C. lining.
R.D. 191.8 to 328	75.0x11.7)	Earthen Portion.
R.D. 328 to 344	80.0x8.7)	
R.D. 344 to 350	76 x 8.6)	
R.D. 350 to 372	52.75x7.3)	
R.D. 372 to 375	50.0x7.1)	
R.D. 375 to 381	46.75x7.0)	

The design of Akram Wah was examined for the expected uplift pressure on the bed lining due to rise in subsoil water levels on completion of the Barrage. Spring levels were observed during 1950-51 at every mile of the

Canal bed upto R.D. 75 for determining the expected uplift pressure. The observed spring levels are reproduced below :-

R.D.	Observed Spring R.L.			
	September 1950.	January 1951.	August 1951.	October 1951.
5,000	52.5	47.38	48.02	-
10,000	-	44.93	49.59	-
15,000	50.80	39.48	49.55	-
20,000	-	44.31	39.98	49.16
25,000	53.91	43.86	41.45	45.00
30,000	52.50	53.72	42.25	46.64
35,000	-	38.62	52.7	50.7
40,000	-	38.77	45.02	46.00
45,000	-	38.92	44.31	-
50,000	49.50	40.43	43.40	-
55,000	-	43.65	41.12	-
60,000	-	42.54	41.56	-
65,000	47.20	32.70	41.90	-
70,000	46.30	39.70	38.26	-
75,000	45.50	29.10	34.02	-

The above spring levels showed considerable discrepancy between the sets of observations but it helped in conclusion of the following facts.

- There must be no closure of Akram Jah during Summer, even upto the end of December for fear of blowing up the lining.
- Even with closure in December, repair work should be carried out with caution & foresight and preferably by lowering the water table locally in the neighbourhood of the repairs by well-point pumping.
- To take care of the eventual rise of spring level with the barrage in operation, it would be necessary to provide humps in the bed to retain a sufficient depth & weight of water to counter-act against uplift. These humps were to be designed for "no-shock", "no-afflux"

condition with full supply discharge running in the Canal.

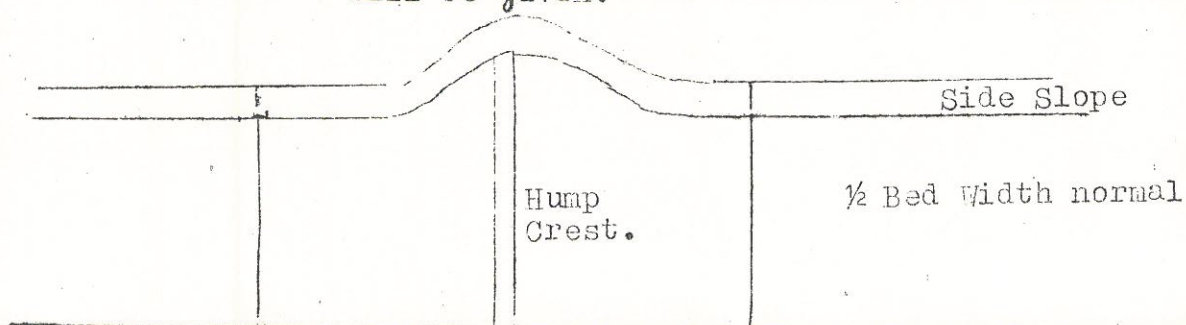
The determination of eventual spring levels during the December Closure was a matter of considerable un-certainty.

The pond R.L. during December was expected to be at R.L. 59.5. The Non perennial Fulcli Canal by the side of Akram Wah was assumed to have 1 ft. depth of draining water at R.L. 52.5. The pressure level under Akram Wah bed was thus assumed to be half way between 59.5 & 52.5 i.e. R.L. 56.0.

The design of humps was based on the observed spring levels of August 1951. The plotting of spring levels showed high winter levels to persist for about 20,000 ft. from the Barrage head, falling slowly thereafter and then quite rapidly.

The Design data of humps is given at the end of this chapter Annexure II (P-28). The following instructions were given by Chief Engineer Lower Sind Barrage under his No. 8098-I(2), dated 26.10.51 in connection with the design of humps.

- "(a) Except at the hump, the bed width will be as for the normal depths of 15 feet up to R.D. 21000 and 16 feet downstream of that point.
- (b) The hump will be given a crest width of 6 feet with upstream and downstream slopes at 1 in 15.
- (c) For those humps wider than normal bed width, the expansion will start and finish at the same point as the bed level change. On the upstream side an S curve will be given tangential to the normal at hump crest and at change point on the downstream side a curve of suitable radius will be given.



- (d) The Hump will be rounded with 5ft. radius to meet the inclined slopes upstream and downstream. (P-28)
- (e) Humps will be at the R.Ds shown in the statement/ and of the heights shown. Downstream of R.D. 75,000 humps of normal type will be given at 10000 feet intervals to protect the bed against the eventual rise consequent of the rice irrigation of the tract."

The length of Canal is 76.2 miles. One escape is provided in the tail called Lined Channel Escape for a discharge of 850.00 cusecs. The important features of all the channels of this system are given in Chapter IX of this Volume (pp-132). A brief description of design data in respect of the Branches of this System is given below:-

Important details.	Gaja Branch.	Shadi Large Branch	Kazia Branch.	Sanni Guni Branch.
Gross Area. (Settled on Branch itself). (acres)	10307 acres	56324 acres	78500 acres	26373 acres
Cultivable area. (Settled on Branch itself). (acres)	10219 acres	54137 acres	76587 acres	26330 acres
Discharge at head (cusecs).	745.93 cusecs	943.13 cusecs	613.38 cusecs	686.84 cusecs
Full Supply Depth at head (feet).	6 0 ft	7.4 ft	6.5 ft	6.7 ft
Bed Width at head (feet)	56.0 ft	45.75 ft	36.0 ft	38.5 ft
Length in Canal miles.....	12.48 miles	30.80 miles	22.00 miles	27.00 miles

In the Champhekar Project the Kharif discharge was disproportionately much more than the Rabi discharge on account of the provision of rice crop in the perennial zone and no attempt was made to balance these discharges. With the change in the Cropping Pattern and segregation of perennial and non-perennial areas, this purpose was achieved with an added advantage of lesser dose of water on the land thus reducing the danger of water logging.

The Kharif discharge of Akram Wah is 3713.65 cusecs and that of Rabi is 1970 cusecs, thus the ratio of Kharif to the Rabi discharge is 1.89.

The **condensed** Longitudinal Sections of Akram Wah and its branches are attached at the end of this Chapter. The same L-Sections on a bigger scale will be found in Volume -.VI of Plans accompanying the Completion Report. Sections of humps from R.D. 5 to 75 are given at PP- 56 to 67 of this Volume.

Sd/-
Section Officer T&D (OP)
For Secretary to Govt. of W. Pakistan
Irrigation and Power Department.

ANNEXURE II.

STATEMENT SHOWING DESIGN DATA OF HUMPS IN AERAM WAH.

S. No.	R.D. of Channel.	Section of Channel.	Observed Spring R.L. in August 1951.	Estimated Bed R.L. of hump.	Design Min. of hump.	Height of Min. of hump.	Designed Section of Channel at F.S.D. of hump.	Length of U/S & D/S of glacis transition.	Total length of transition.	Slewage of Half width.	Radius of U/S Curve.	Radius of D/S Curve.			
1.	5	50	48.02	56.0	51.6	56.0	4.4	4.4	60	10.6	66.0	138	Nil	Nil	Nil
2.	10	50	49.54	56.0	51.2	56.0	4.8	4.8	64	10.2	72.0	150	1.0	1295	2590
3.	15	50	49.55	56.0	50.8	56.0	5.2	5.2	68	9.8	78.0	162	2.5	595	1190
4.	20	50	49.20	56.0	50.4	56.0	5.6	5.6	72	9.4	84.0	174	4.0	445	890
5.	25	44	45.00	55.5	49.0	56.0	7.0	7.0	76	9.0	105.0	216	7.25	380	760
6.	30	44	45.64	55.0	48.6	55.5	6.9	6.9	75	9.1	103.5	213	6.90	390	780
7.	35	44	50.70	54.5	48.2	55.0	6.8	6.8	74	9.2	102.0	210	6.50	400	800
8.	40	44	46.00	54.0	47.8	54.5	6.7	6.7	73	9.3	100.5	207	6.15	410	820
9.	45	44	44.30	53.0	47.4	54.0	6.6	6.6	72	9.4	99.0	204	5.75	430	860
10.	50	44	41.30	52.0	47.0	53.0	6.0	6.0	66	10.0	90.0	186	3.50	530	1160
11.	55	44	41.12	51.0	46.6	52.0	5.4	5.5	60.5	10.5	82.5	171	1.40	1360	2720
12.	60	44	41.56	50.0	46.2	51.0	4.8	5.0	56.5	11.0	75.0	156	Nil.	Nil.	Nil.
13.	65	44	41.90	49.0	45.8	50.0	4.2	5.0	56.5	11.0	75.0	156	Nil.	Nil.	Nil.
14.	70	44	38.20	48.0	45.4	49.0	3.6	5.0	56.5	11.0	75.0	156	Nil.	Nil.	Nil.
15.	75	44	34.02	47.0	45.0	48.0	3.0	5.0	56.5	11.0	75.0	156	Nil.	Nil.	Nil.

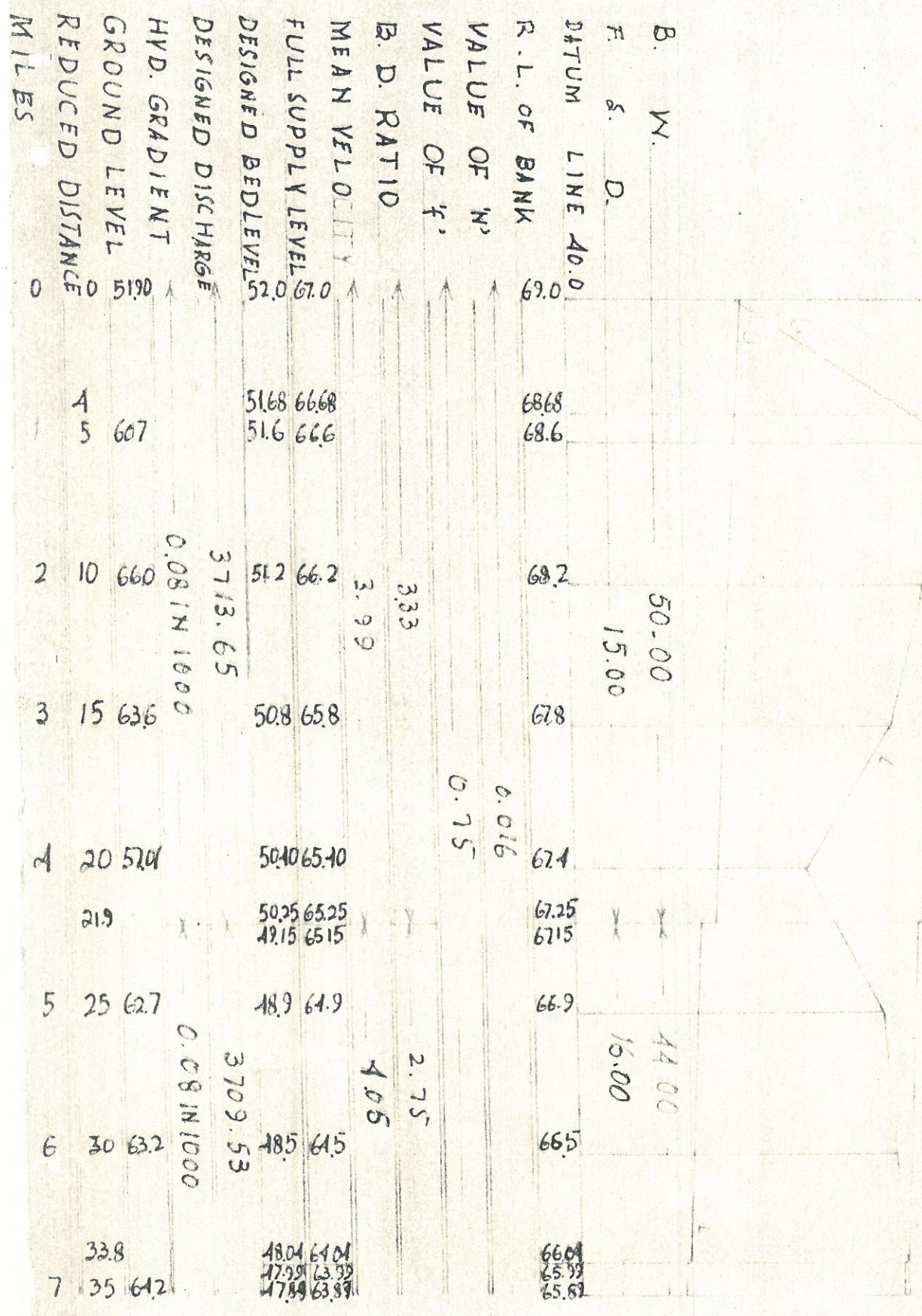
X-REGULATOR

SECTION AKRAM WAH

SCALE
H = 5000 = 1"
V = 10 = 1"

ROAD BRIDGE

RAILWAY BRIDGE
AND ROAD BRIDGE

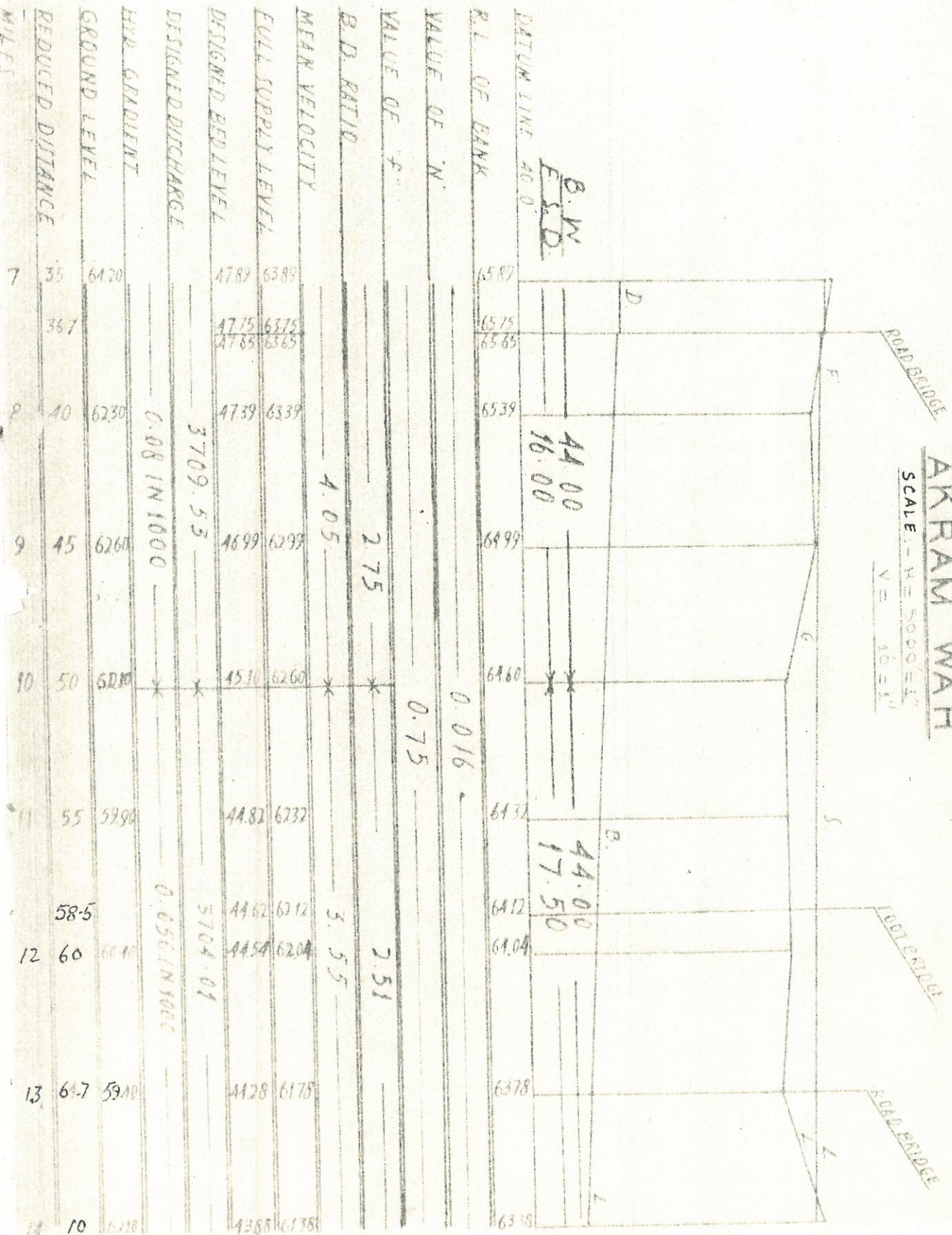


L-SECTION

AKRAM WAH

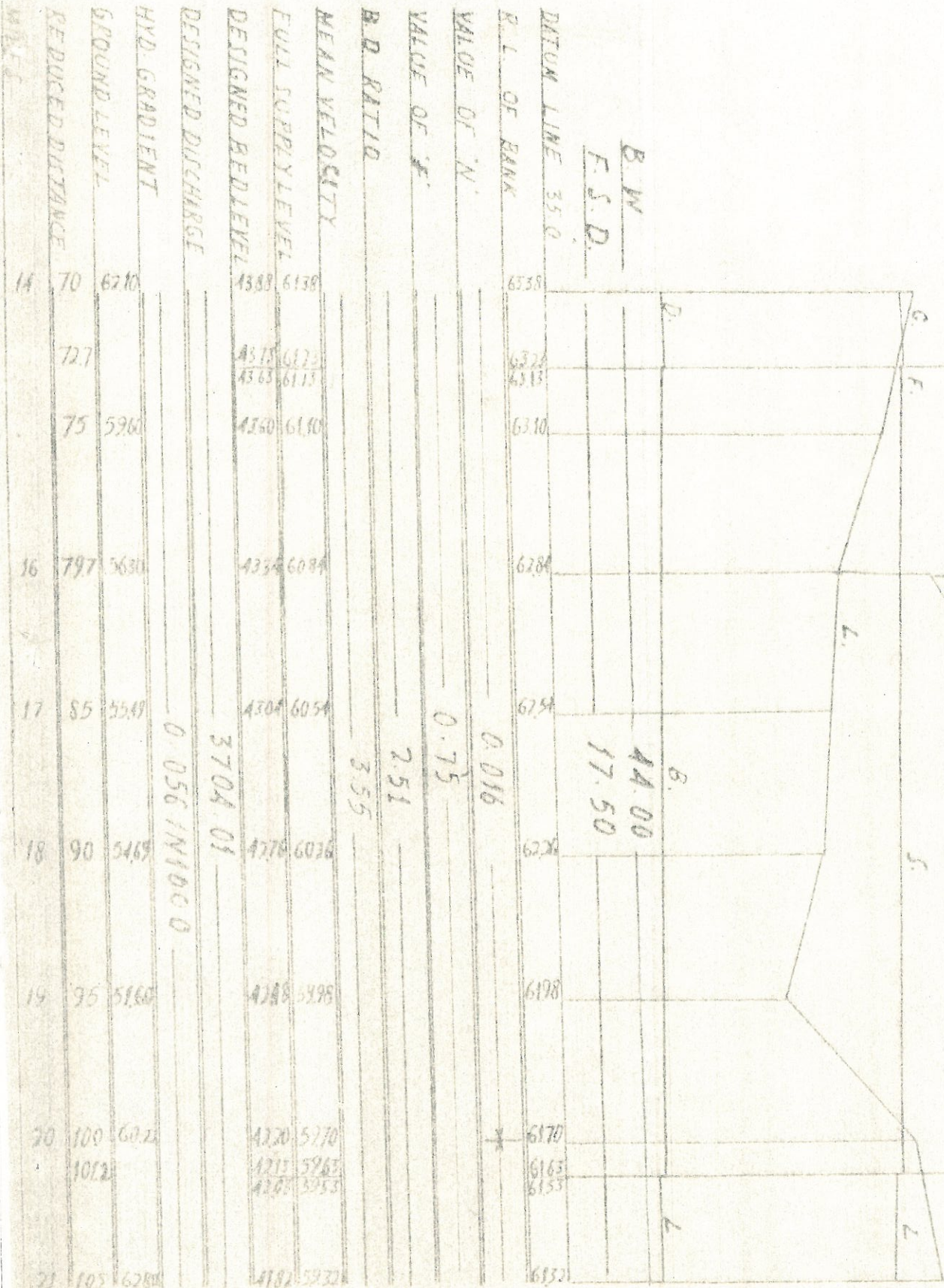
SCALE - 1" = 5000' H

V = 30 = 1"



L-SECTION AKRAM WAH

SCALE: H. 5000 = 1
V. 100 = 1'



L-SECTION AKRAM WAH

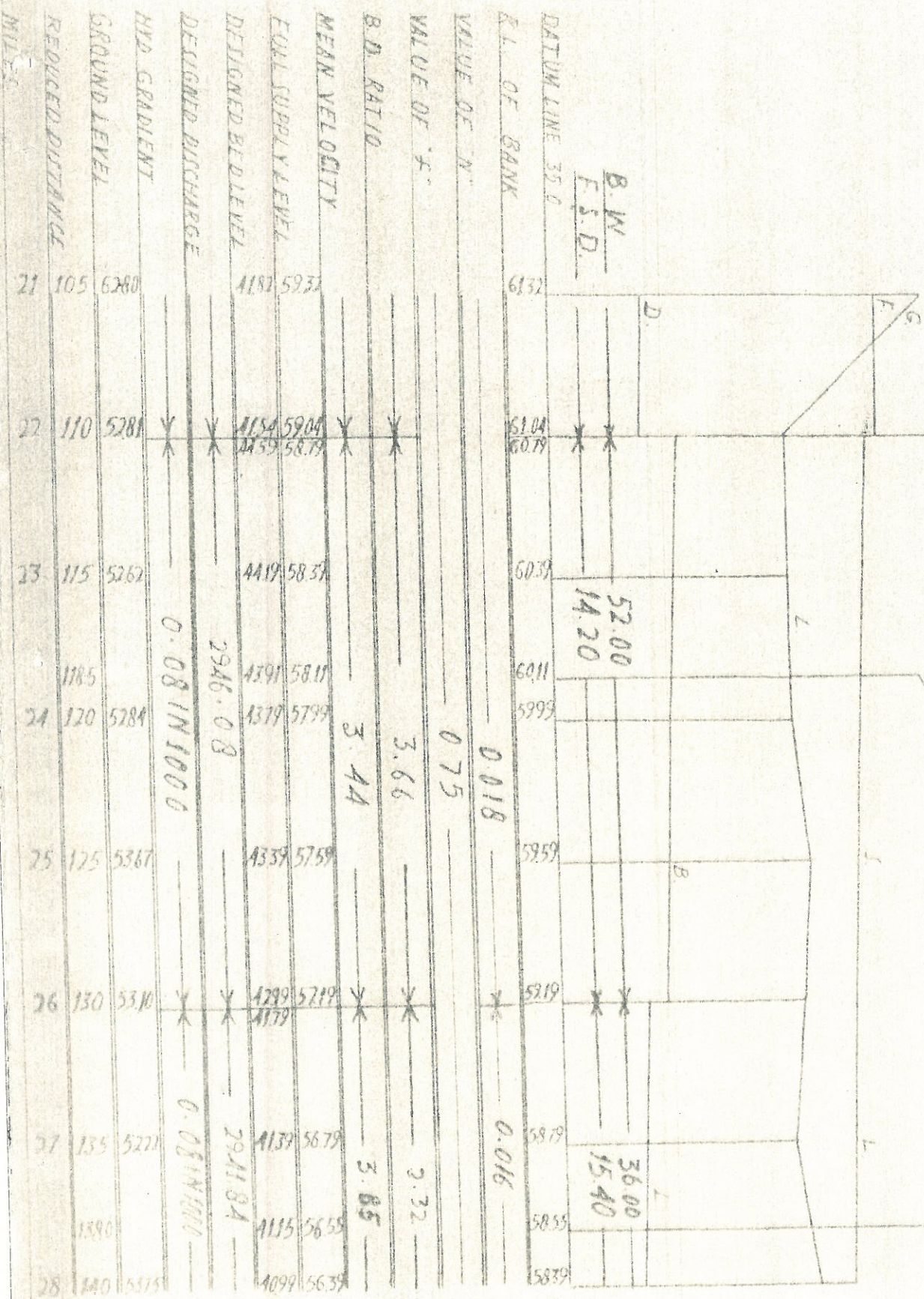
SCALE: H=5000 V=1

V = 100 ft

GATE KEEL

FOOT BRIDGE

FOOT BRIDGE



SECTION

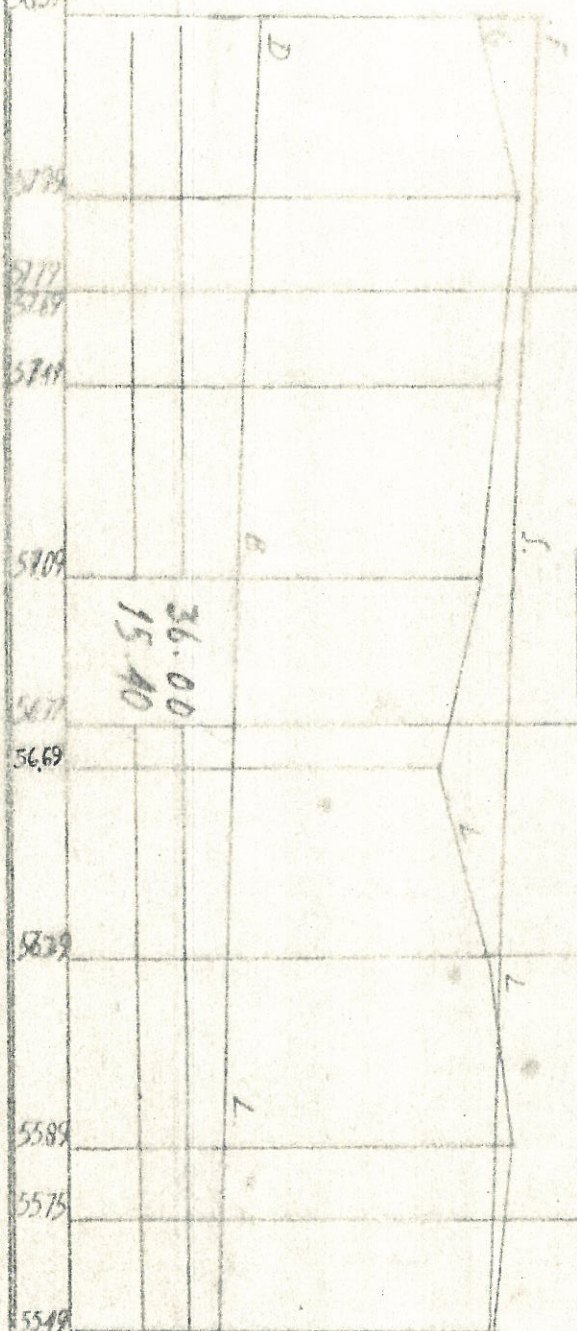
AKRAH WAT

SCALE: - H=5000=1

$$V = 10 \text{ A}$$

1001 Bridge

FOOT 2



B. W.

F50

100

RE OF BANK

VALUE OF "N"

VALUE OF f .

BD RATIO

MEAN VELOCITY

Full Supply View

DESIGNED BEDLEVEL

DESIGNED DISCHARGE

HYD: GRA DIEN T

SECOND LEVEL

REDUCED DISTANCE

卷之五

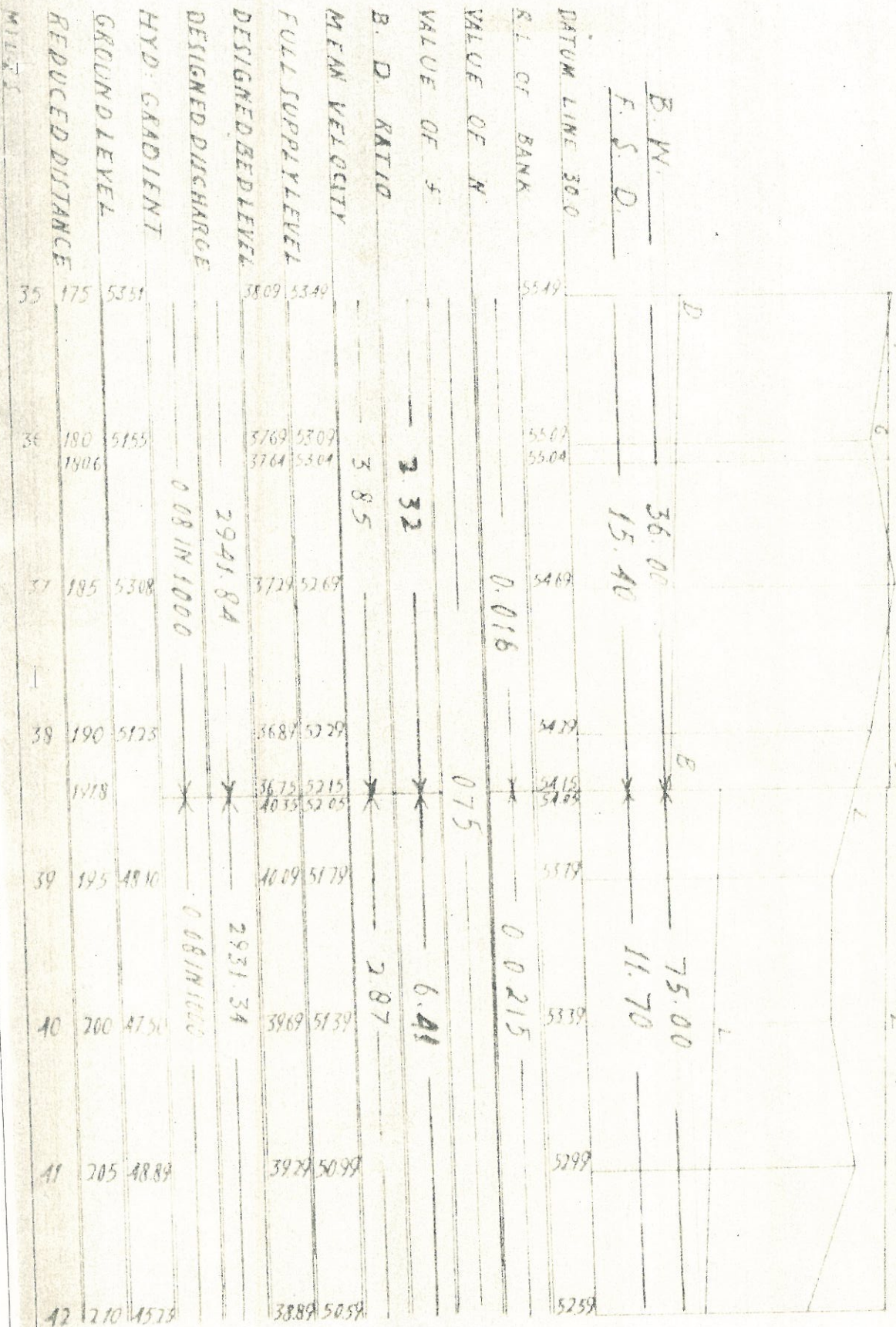
28	140	5373	4099	5639
29	145	5500	4059	5599
30	150	5444	4039	5579
31	155	5316	4039	5569
32	160	5074	3969	5509
33	165	5323	3937	5477
34	170	5406	3879	5469
35	175	5351	3889	5429
36	180	5375	3849	5389
37	185	5351	3835	5375
38	190	5316	3809	5349

L-SECTION AKRAM WAH

SCALE: H=5000 V=10:1

FOOT BRIDGE

TANIC GHUL - AMAL S.E.



Section

AKRAHMAH

SCALE - 1" = 5000'

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ALL PAPER

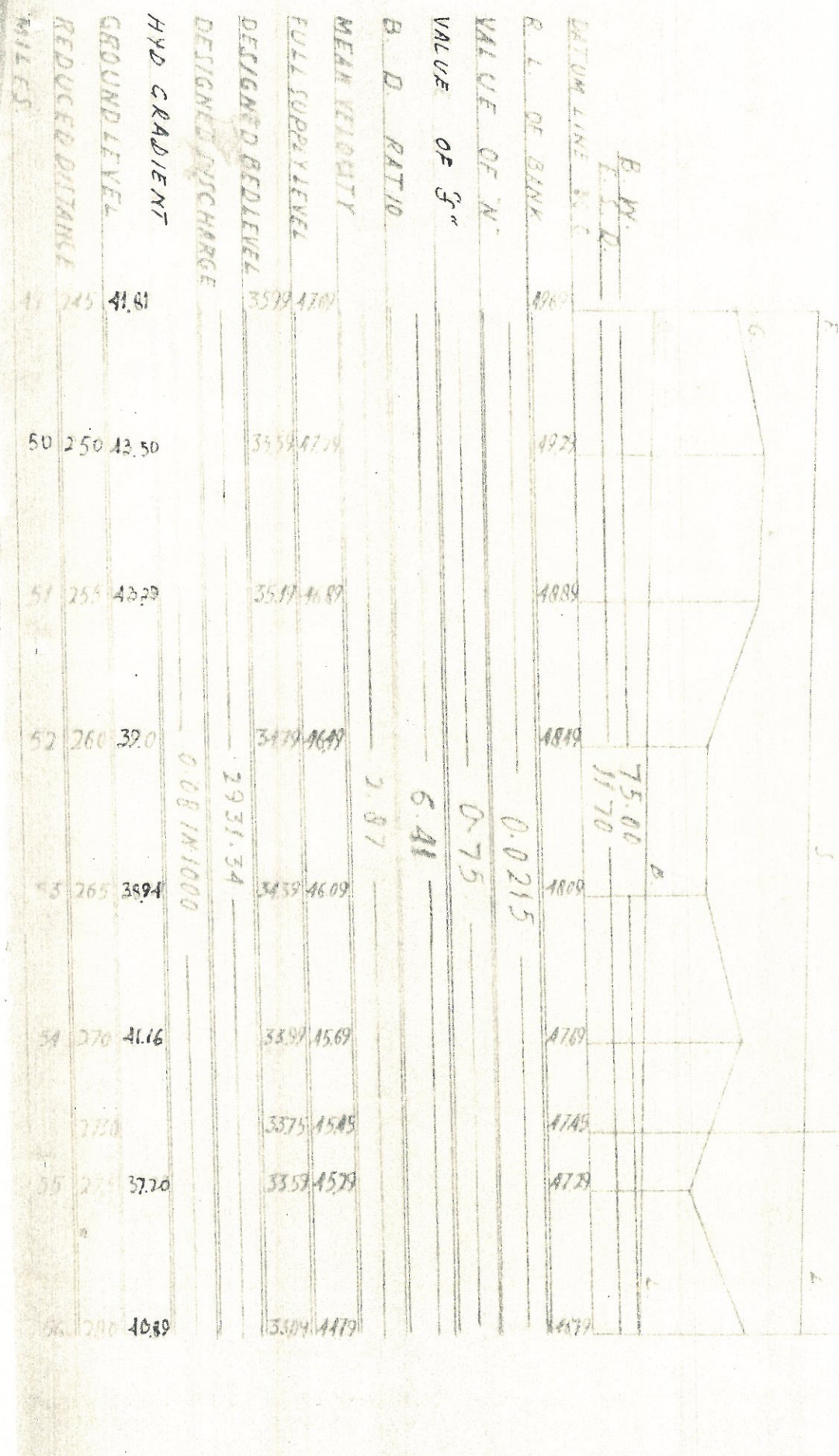
ROAD BRIDGE

L-SECTION

AKRAM WAH

SCALE: H=5000 FT.

V=10=1"

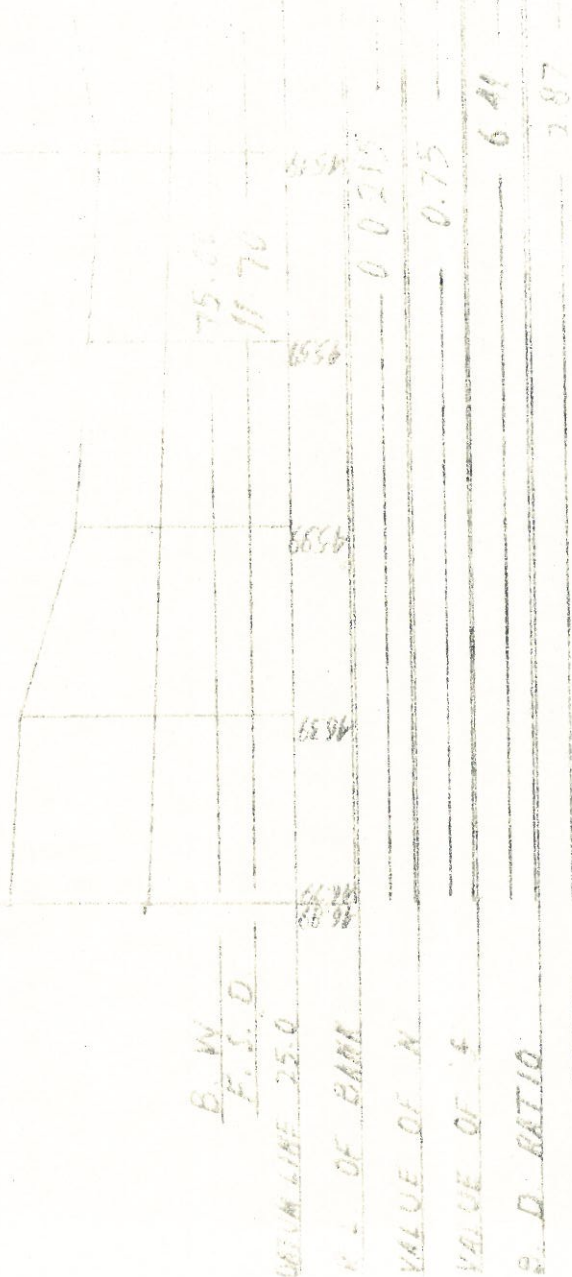


L-SECTION
AKRAM WAH

SCALE: H=5000-V
V=10-20

ALPHA DRAIN

ROAD RAIL



B.W
F.S.D

SECTION LINE 25.0

R.L. OF BANK

VALUE OF N

VALUE OF F

P. D. RATIO

MEAN VELOCITY

FULL SUPPLY LEVEL

DESIGNED BED LEVEL

DESIGNED DISCHARGE

HYD. GRADIENT

GROUND LEVEL

REDUCED DISTANCE

MILES

43.39

49.39

45.89

45.89

45.89

45.89

45.89

46.92

46.92

46.92

46.92

46.92

46.92

46.92

46.92

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

30.69 41.99

63 315 31.81

62 310 35.41

61 305 37.01

60 300 35.68

59 295 36.11

58 290 36.99

57 285 40.00

56 280 40.88

55 275 40.88

54 270 40.88

53 265 40.88

52 260 40.88

51 255 40.88

50 250 40.88

49 245 40.88

RECEIVED OF
Said to be
(MAINTENANCE) (MAINTENANCE)
(OVERSEAS)

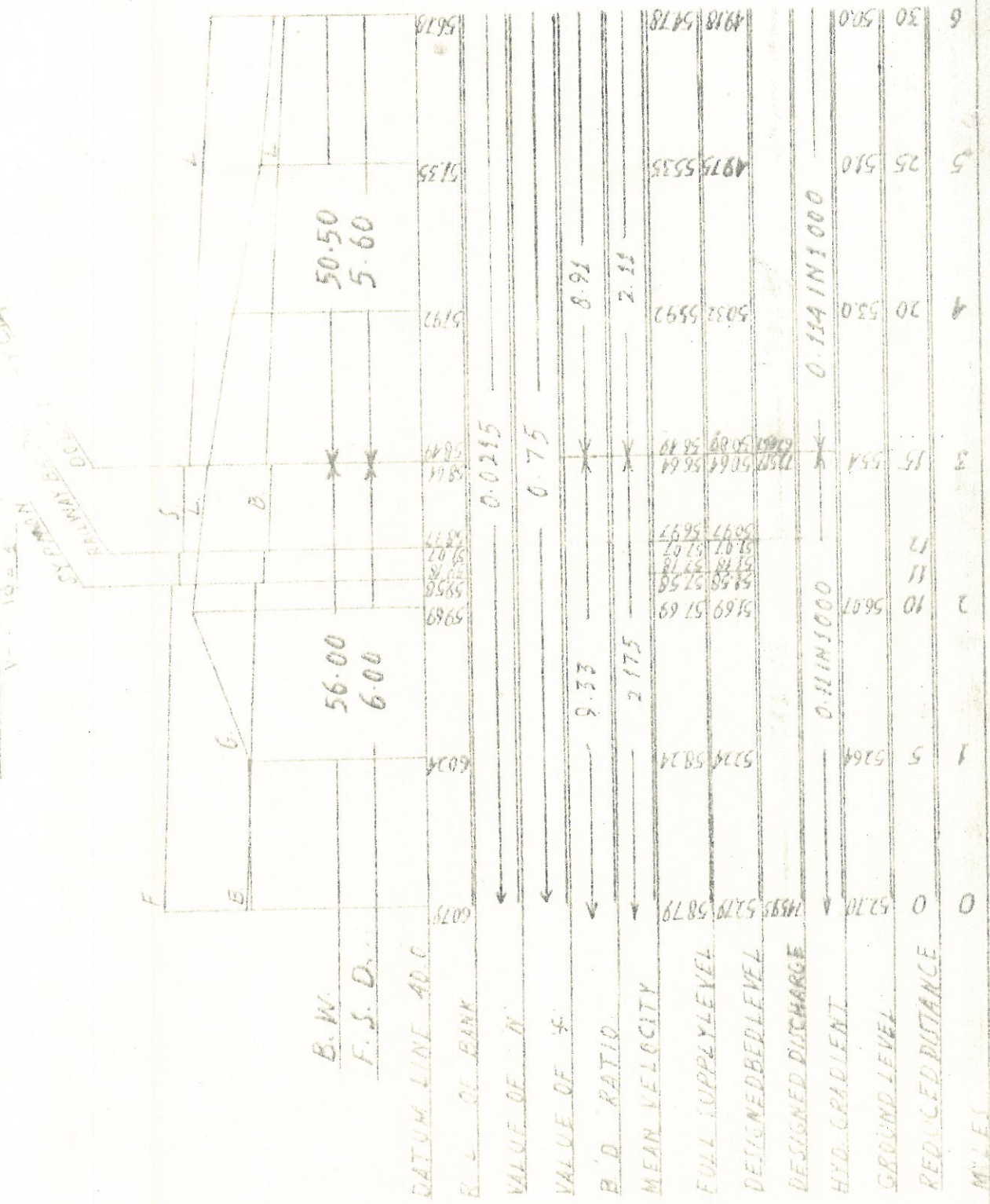
[illegible]

B. R.
F. S. D.

[illegible]

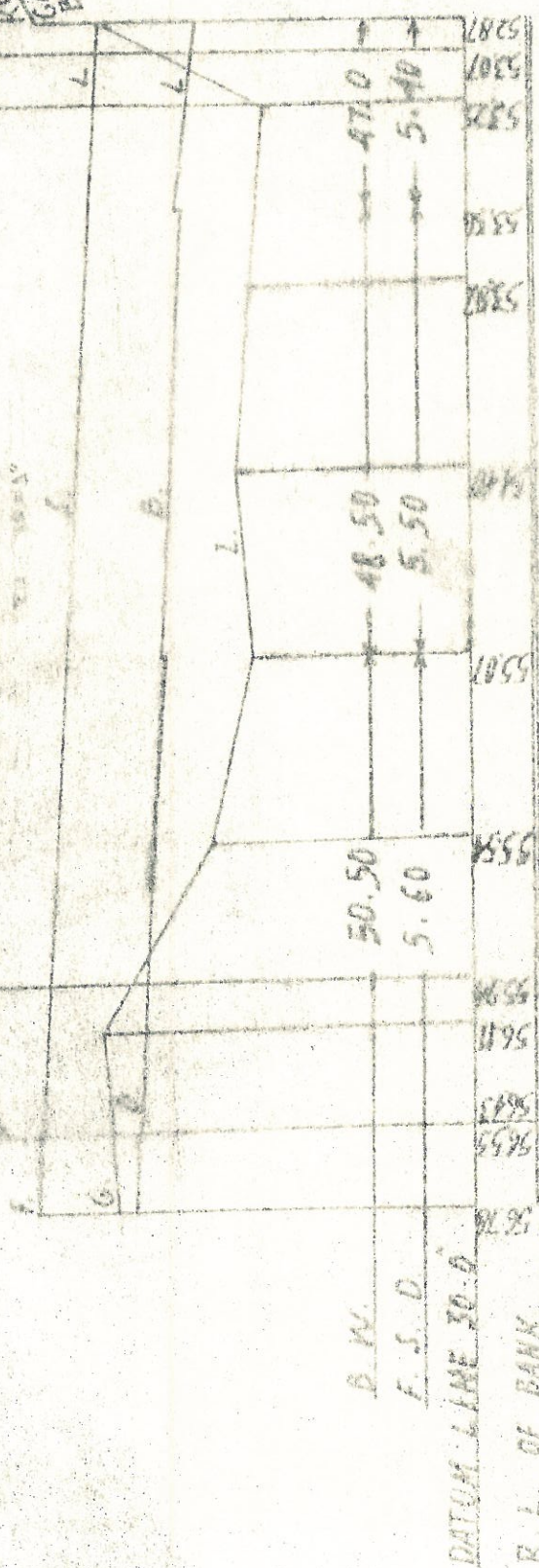
G A J A W A H

SCALE 1/1000



SECTION
GAJA WAH

CHANDI DILLI
ROAD BRIDGE
BOLLE DIH
KUMANG
KUMANG



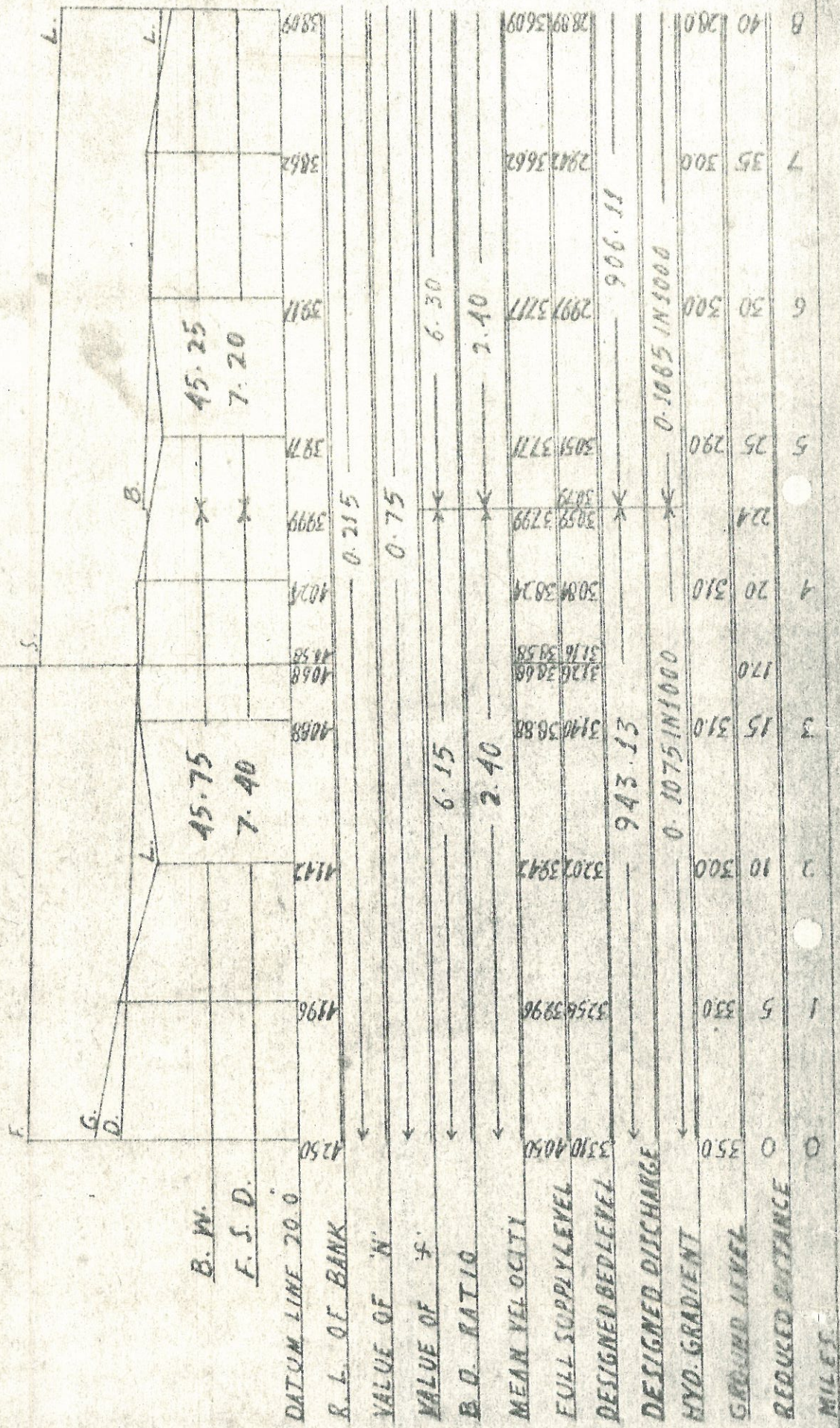
B.W.	50.50	48.50	47.0
F.S.D.	5.60	5.50	5.40
DATUM LINE 30.0	52.07	52.07	52.07
R.L. OF BANK	52.07	52.07	52.07
VALUE OF "N"	0.0215	0.0215	0.0215
VALUE OF "Y"	0.75	0.75	0.75
B. D. RATIO	8.91	8.80	8.70
MEAN VELOCITY	2.11	2.095	2.075
TULL SUPPLY LEVEL	48.30	48.30	48.30
DESIGNED BED LEVEL	48.30	48.30	48.30
DESIGNED DISCHARGE	0.114 IN 1000	0.115 IN 1000	0.116 IN 1000
HYD. GRADIENT	0.114 IN 1000	0.115 IN 1000	0.116 IN 1000
GROUND LEVEL	52.2	52.2	52.2
REDUCED DISTANCE	50	50	50
FILES	6	7	8

PREPARED BY J. S. L. (NA SAKHITO) (ABDULLAH ALMARI)
TRACED BY (M. H. O. ALMARI)
CHECKED BY (M. H. O. ALMARI)
DESIGNED FOR DIVISION HYD. SIND.

L-SECTION SHADI LARGE

SCALE: H=5000'
V=10.5'

ROAD BRIDGE



SECTION
SHADI LARGE

2221-19500-5
V = 1000

QUESTIONS

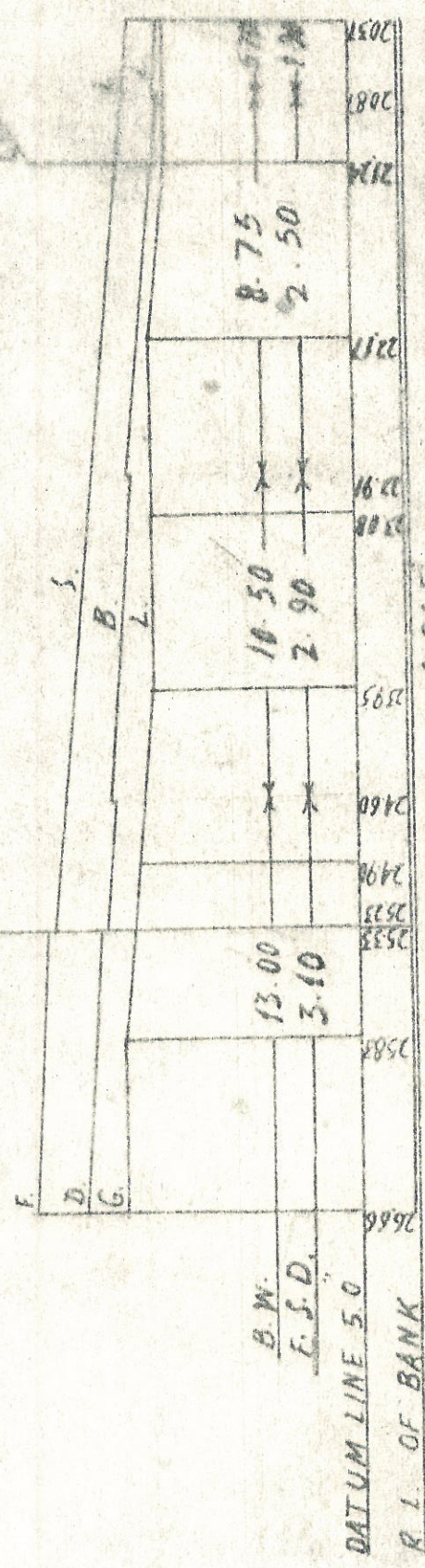
[illegible]

L-SECTION

SHADI LARGE

SCALE: H=5000=1"
V=10'=1"

ROAD BRIDGE

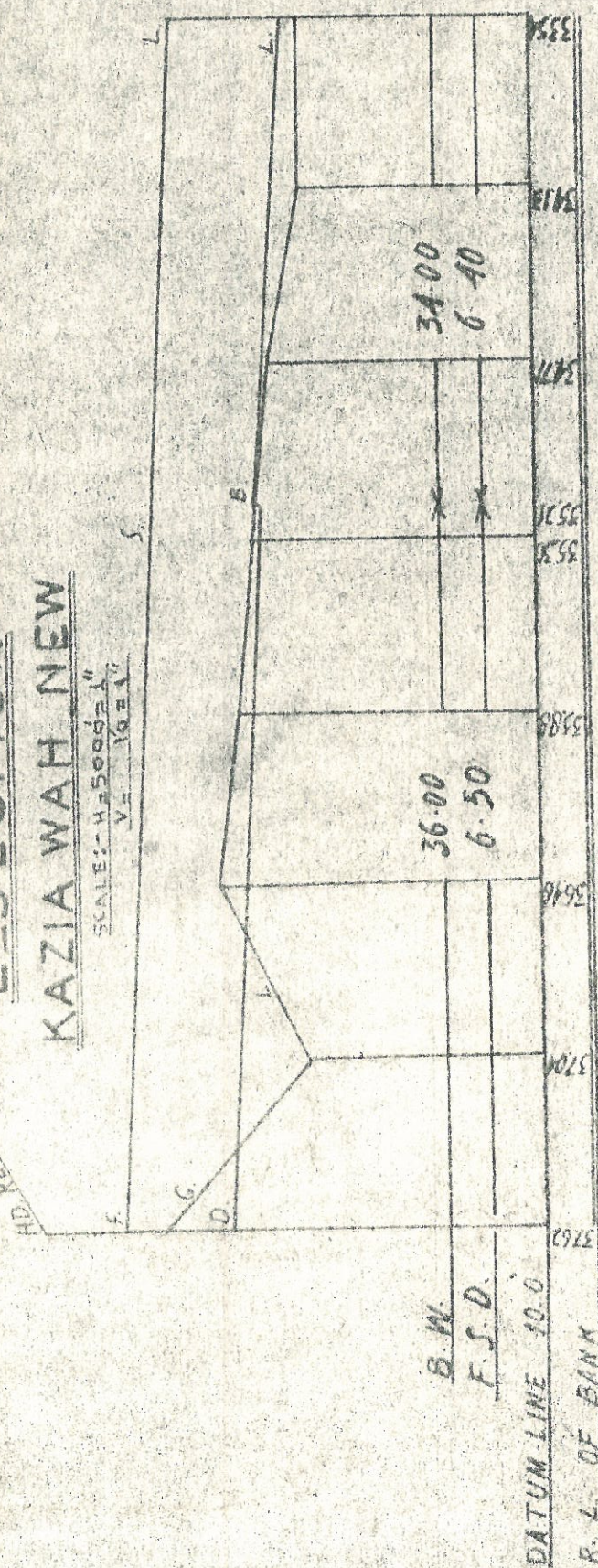


DATE LINE 5.0	2666	2588	2538	2533	2490	2460	2398	2291	2257	2087	2057
B.W.	13.00									8.75	2.50
F.S.D.	3.10										
R.I. OF BANK	2588	2538	2533	2013	2523	1984	2290	1950	2260	1970	
VALUE OF 'N'	0.215										
VALUE OF 'F'	0.75										
B.D. RATIO	4.00	1.51									
MEAN VELOCITY	1.51										
FULL SUPPLY LEVEL	2023	2333	2013	2523	1984	2290	1950	2260	1970	1887	1697
DESIGNED BED LEVEL	2073	2583	74.32								
DESIGNED DISCHARGE	0.166 IN	1000									
HYD. GRADIENT	0.166 IN	1000									
GROUND LEVEL	1280	150	180								
REQUIRED DISTANCE	120	190									
FILES	24	25	26	27	28	29	30				

COMPARISON (M.S. SIDDIQUI)
JUNIOR DIVISIONAL OFFICER
ATTN: JRG DIVISION
OVER: JRG DIVISION
(MAHMOOD ALI)
1994
(ABHIMANI)

KAZIA WAH NEW

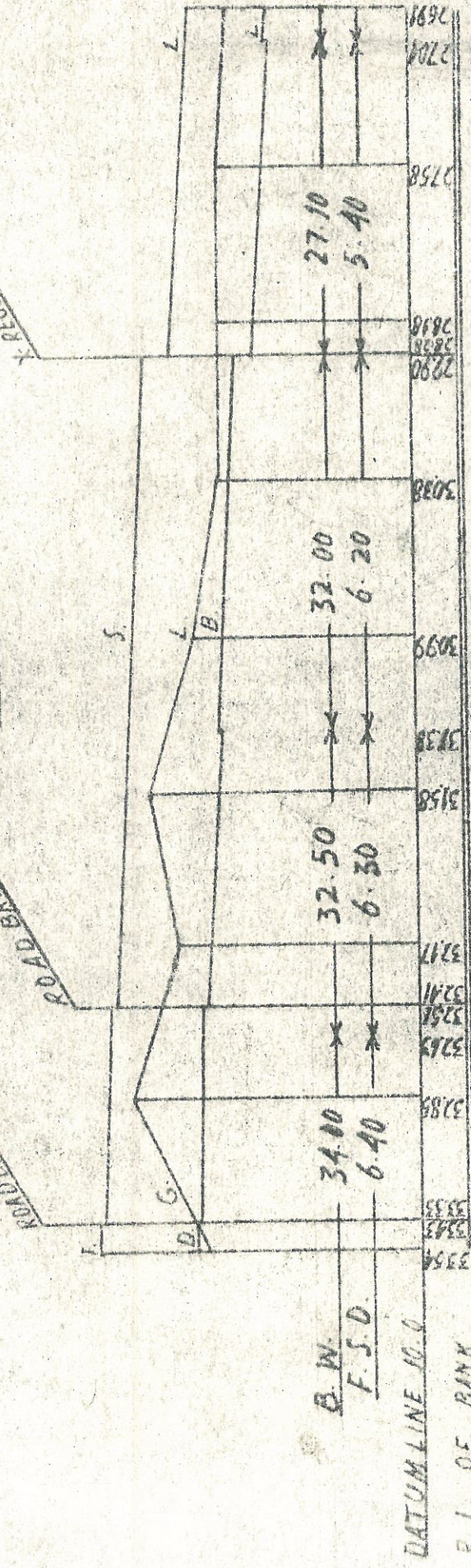
SCALE: H=5000 FT
V=10 FT

[illegible]

L-SECTION
KAZIA WAH NEW

SCALE: H=500G=1"
V=10' H=1"

ROAD BRIDGE

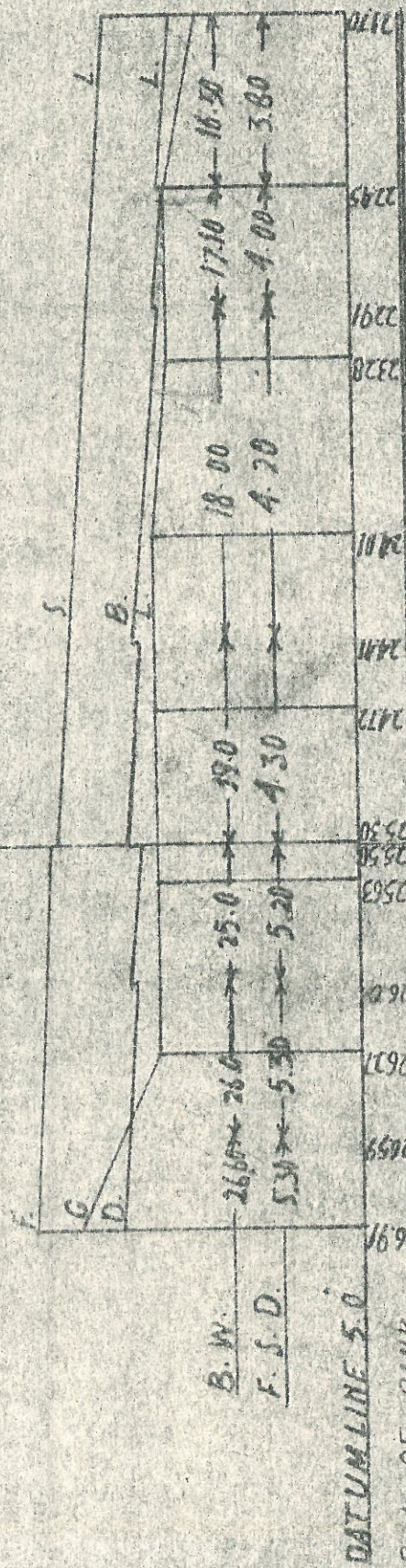


B.W.	34.00	32.50	32.00	27.10	27.04	26.94
F.S.D.	6.40	6.30	6.20	5.40	5.38	5.28
DATUM LINE 10.0	33.54	33.53	32.88	32.17	31.58	30.98
R.L. OF BANK	33.54	33.53	32.88	32.17	31.58	30.98
VALUE OF 'N'	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215
VALUE OF 'F'	0.75	0.75	0.75	0.75	0.75	0.75
E.D. RATIO	5.31	5.15	5.15	5.02	5.02	5.02
MEAN VELOCITY	2.21	2.21	2.18	2.02	2.02	2.02
FULL SUPPLY LEVEL	25.00	24.97	24.94	24.91	24.88	24.85
DESIGNED BED LEVEL	25.00	24.97	24.94	24.91	24.88	24.85
DESIGNED RICHARGE	566.91	529.68	511.00	353.83	353.83	353.83
HYD. GRADIENT	0.117 IN 1000	0.118 IN 1000	0.119 IN 1000	0.127 IN 1000	0.127 IN 1000	0.127 IN 1000
GROUND LEVEL	36	40	45	50	55	60
REDUCED DISTANCE	35	40	45	50	55	60
MILE	7	8	9	10	11	12

L-SECTION
KAZIA WAHNEW

SCALE 1"=500' H
V.E. 10-5-17

REGULATOR



B.W.

F.S.D.

DATUM LINE 5.0

R.L. OF BANK

VALUE OF "N"

VALUE OF "f"

B.O. RATIO

MEAN VELOCITY

FULL SUPPLY LEVEL

DESIGNED BED LEVEL

DESIGNED DISCHARGE

HYD. GRADIENT

GROUND LEVEL

REDUCED DISTANCE

MILES

COMPALED BY

MAHMOOD ALIKHAN

SUB-DIVISIONAL OFFICER

(M.S. SIDDIQUI)

PREPARED BY

(ABDUL KHALID)

DESIGN SUB-DIVISION HYD. ENG.

OVER C.F.R.

KAZIA WAH NEW

5000 H-10795



0.0215

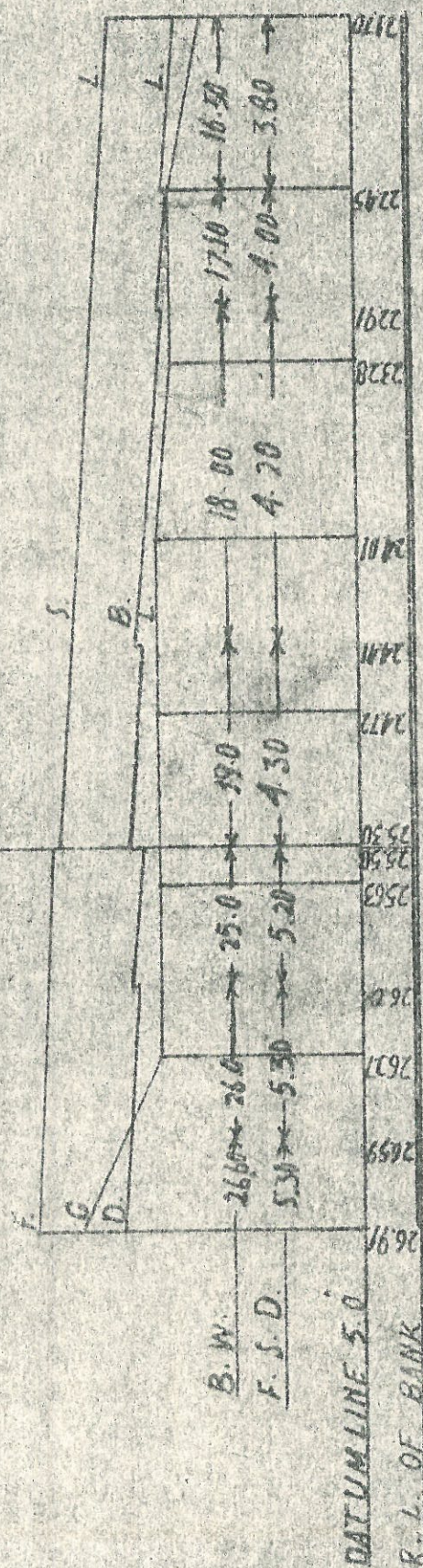
0.75

L-SECTION

KAZIA WAHNEW

SCALE: H = 5000 = 1"
V = 10 = 1'

REGULATOR



B. W.

F. S. D.

DATUM LINE 5.0

R. L. OF BANK

VALUE OF "N"

VALUE OF "f"

B. O. RATIO

MEAN VELOCITY

FULL SUPPLY LEVEL

DESIGNED BED LEVEL

DESIGNED DISCHARGE

HYD. GRADIENT

GROUND LEVEL

REDUCED DISTANCE

MILES

COMPALED BY

MANFODZALIKHAN

SUB-DIVISIONAL OFFICER

(M. S. SIDDIQUI)

DESIGN SUB-DIVISION HYD. SIND

OVER C.F.P.

(ABOULLAH)

PREPARED BY

MANFODZALIKHAN

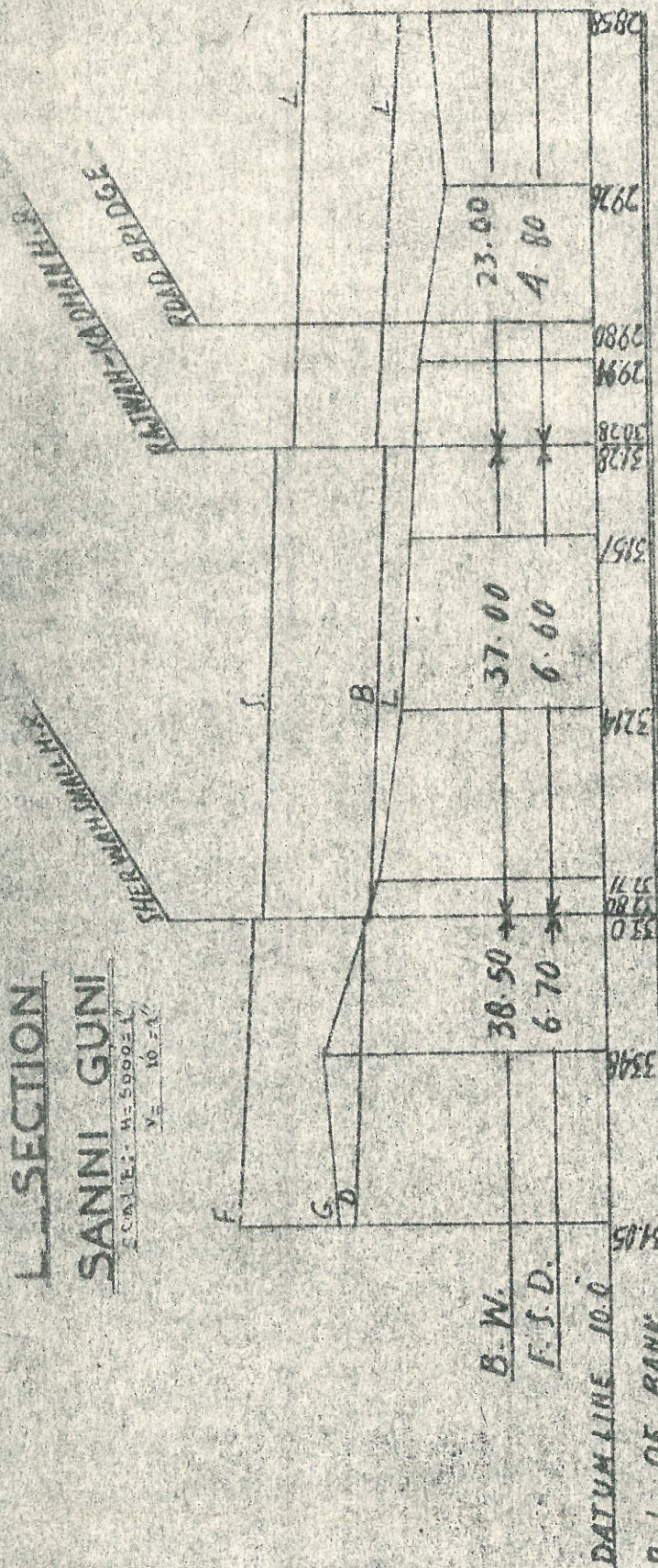
SUB-DIVISIONAL OFFICER

(M. S. SIDDIQUI)

DESIGN SUB-DIVISION HYD. SIND

SANZINI GUZZI

СДАТЬ: 11-5000-1

$$N_{\text{eff}} = 10 = 1$$


VALVE OF "N"	VALVE OF "F"	B. D. RATIO	MEAN VELOCITY	FULL SUPPLY LEVEL	DESIGNED BED LEVEL	DESIGNED DISCHARGE	HYD. GRADIENT	GROUND LEVEL	REDUCED DISTANCE	FILES
0.0215	0.75	5.60	2.27	2430.510	2430.510	686.34	0.114 IN 1000	2720	0	1
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	2
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	3
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	4
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	5
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	6
		5.60	2.24	2430.510	2430.510	643.21	0.114 IN 1000	2720	0	7

L. SECTION

KAZIA WAHNEW

SCALE 1" = 500' H. V. = 10'

COMPALED BY (M.S. SIDDIQUI)

SUB-DIVISIONAL OFFICER

DESIGN SUB-DIVISION HYD. SIND

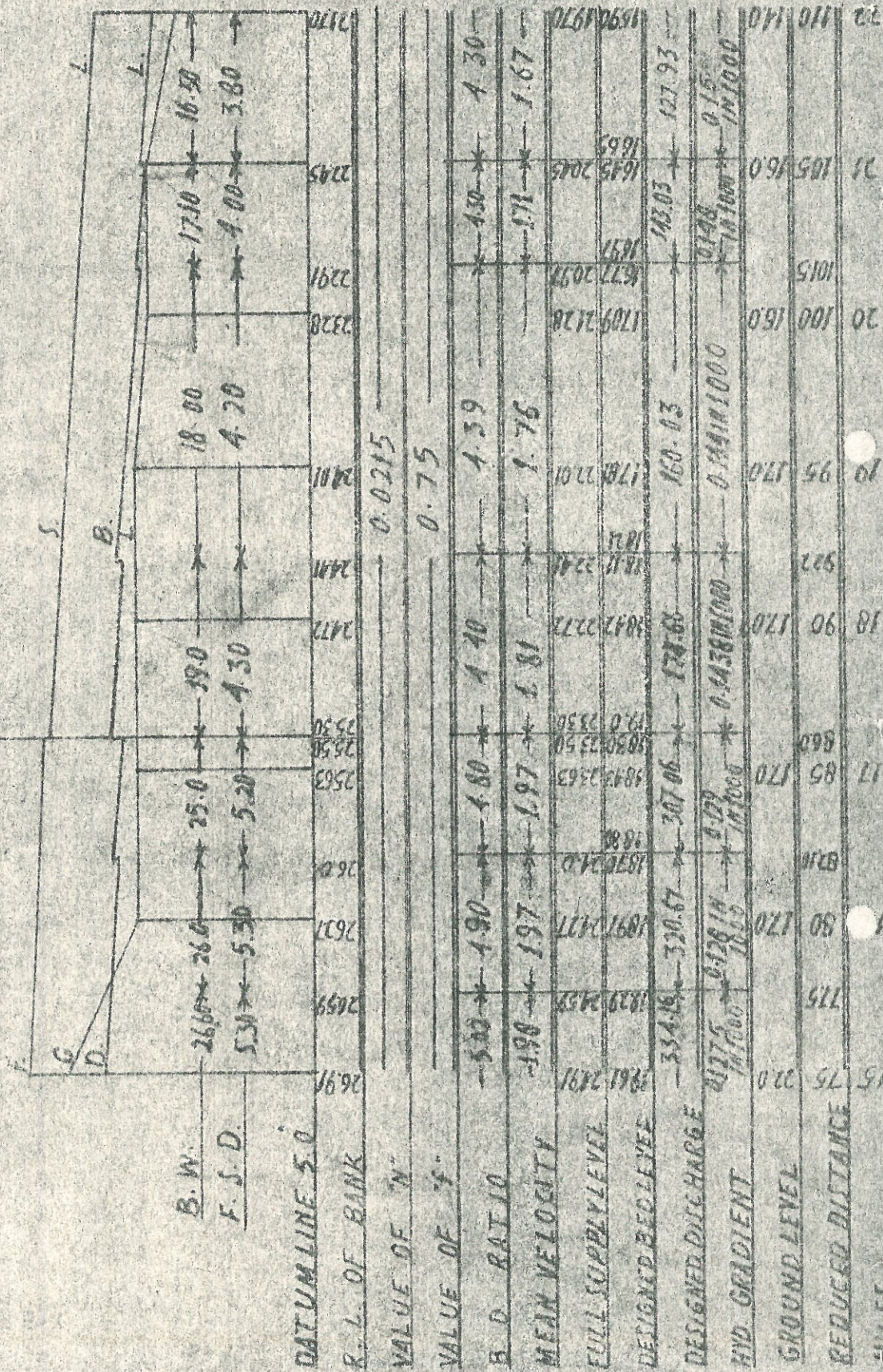
COMPALED BY

MAHMOOZ ALIKHAN

OVER SEER

PREPARED BY

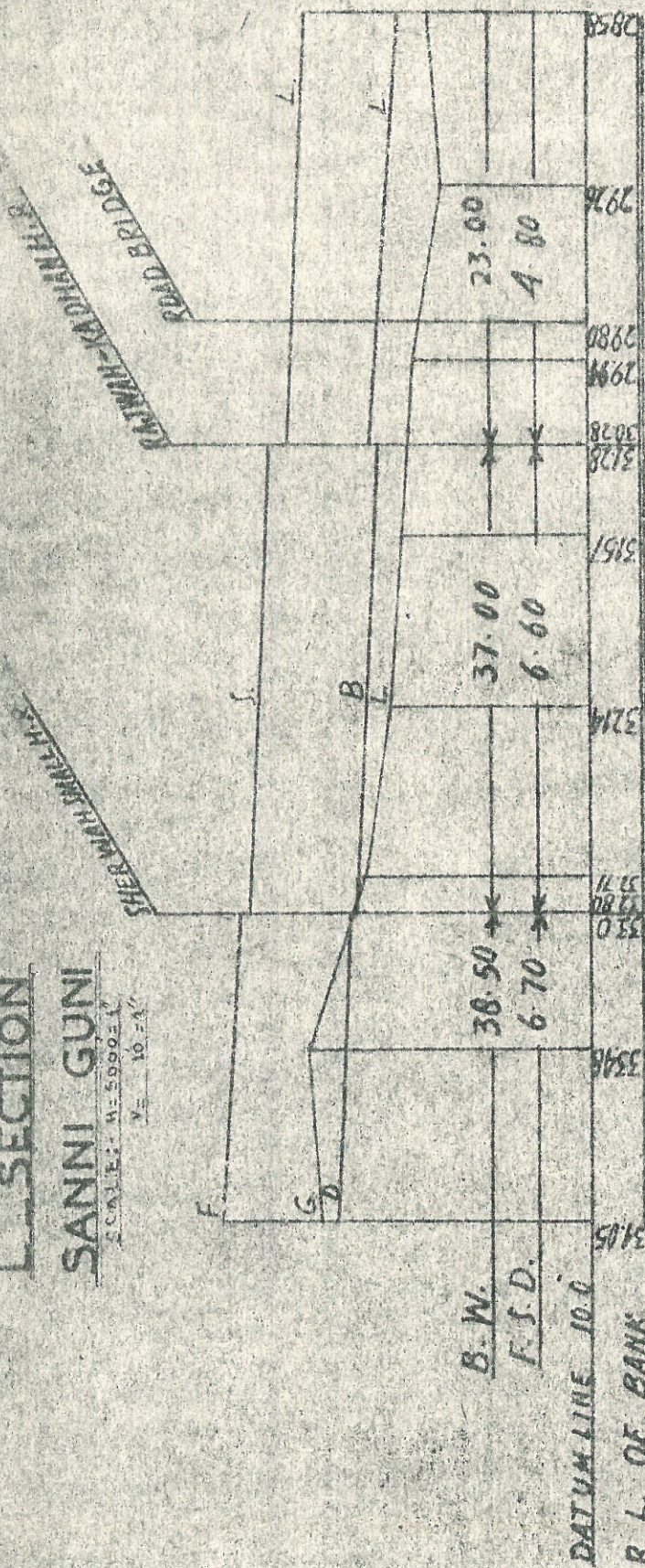
MAHMOOZ ALIKHAN



SANZI GUNZ

CC-01-E-11-5000-1

10 = 4

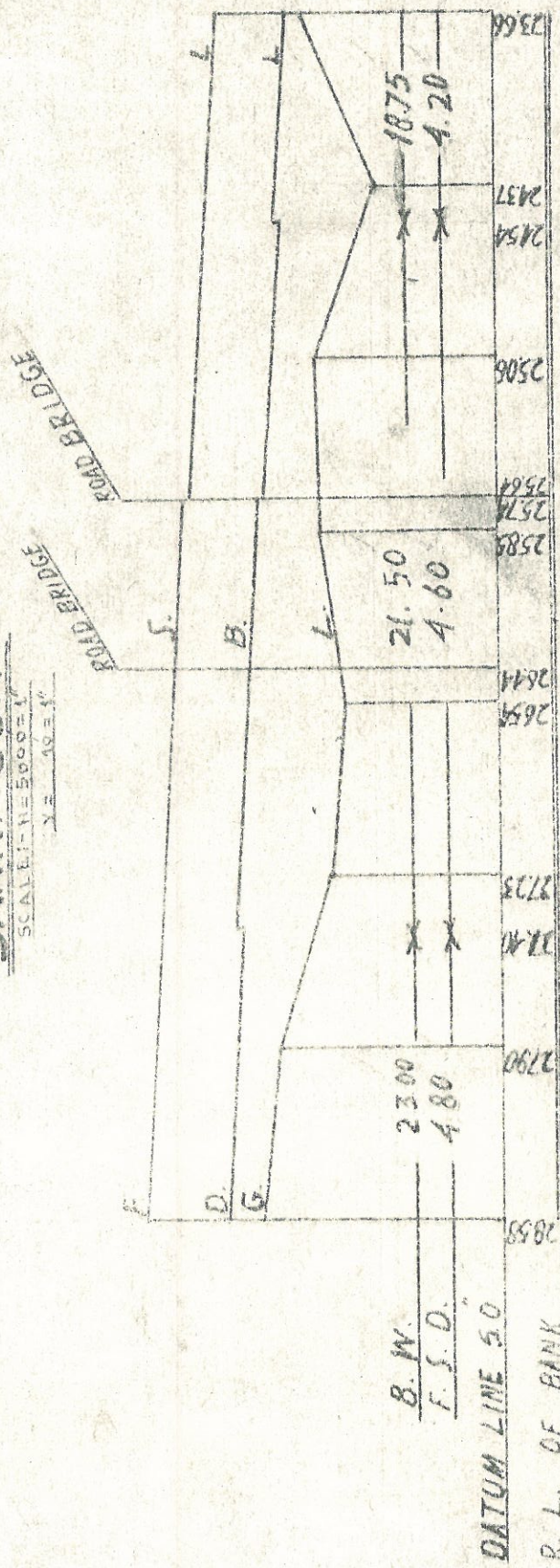


FILE	REDUCED DISTANCE	GROUND LEVEL	HYD. GRADIENT	DESIGNED DISCHARGE	DESIGNED BED LEVEL	FULL SUPPLY LEVEL	MEAN VELOCITY	B. D. RATIO	VALUE OF "f"	VALUE OF "N"
0	0	26.0	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
1	5	27.0	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
2	10	28.5	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
3	15	29.2	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
4	20	30.8	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
5	25	32.6	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
6	30	34.9	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215
7	35	36.7	0.14 IN 1000	643.21	2430.31	2430.31	2.27	5.60	0.75	0.0215

SECTION

NO. 22

SCALE: 1" = 5000'

$$x_{10} = 99$$


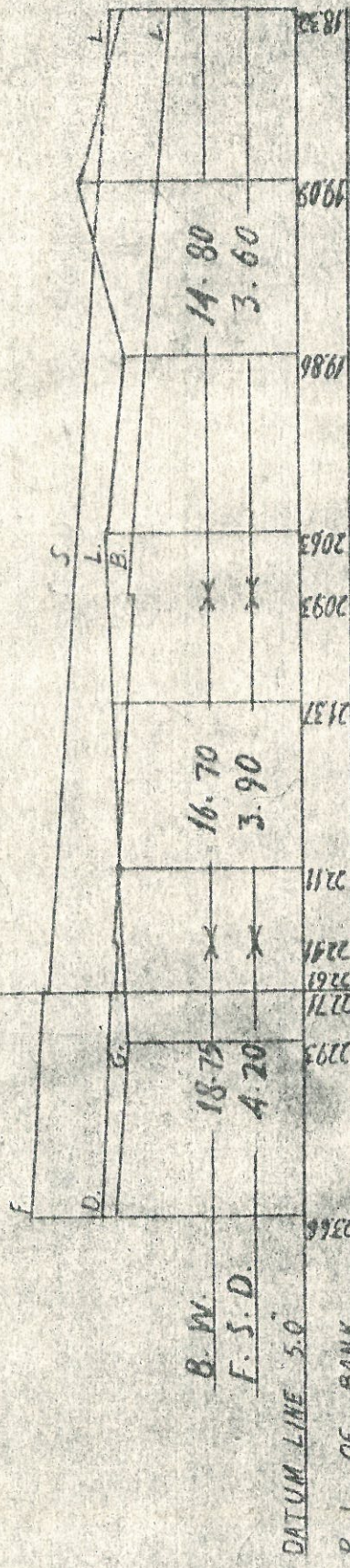
	7	9	10	11	12	13	14
MILES.	55	45	50	55	60	65	70
REDUCED DISTANCE	188	154	140	158	159	1210	185
GROUND LEVEL							
HYD. GRADIENT			0.135 IN 100				0.143 IN 1000
DESIGNED DISCHARGE			243.01				170.10
DESIGNED BED LEVEL	2178.7650	2060.2540	2110.2590	1925.3585	1846.2306	1794.2234	1749.2165
FULL SUPPLY LEVEL		2063.2573	1994.2444	1925.3585	1846.2306	1794.2234	1749.2165
MEAN VELOCITY			1.912	1.888			1.78
B. D. RATIO			4.80	4.73			4.44
VALUE OF "F"							
VALUE OF "N"							

SECTION 7

SANNI GUNI

SCALE: $N=5000'$
 $V=40:1'$

ROAD BRIDGE



VALUE OF "N"	0.0115		0.75	
VALUE OF "F"	0.0115		0.75	
B. D. RATIO	4.44	4.28	4.10	1.63
MEAN VELOCITY	178	170	163	1.63
FULL SUPPLY LEVEL	16.51 20.71	16.31 20.11	15.03 18.93	13.49 17.09
DESIGNED BED LEVEL	16.73 20.93	15.97 19.37	15.03 18.93	14.26 17.86
DESIGNED DISCHARGE	170.10	135.83	107.80	107.80
HYD. GRADIENT	0.143 IN 1000	0.148 IN 1000	0.154 IN 1000	0.154 IN 1000
GROUND LEVEL	75 15.5	76 16.10	78 16.40	79 16.50
REDUCED DISTANCE	14 70 16.50	16 80 16.10	17 85 16.40	18 90 16.5
MILES	21 105 15.50	20 100 18.1	19 95 15.7	18 90 16.5

L-SECTION

SANNI GUNI

SCALE: H=5000=1'
V=10=1'

(M.S. SIDDIQUI)

COMPARED BY

(MAHFOOZ ALIKHAN) SUB-DIVISIONAL OFFICER,

DESIGN SUB-DIVISION, HYD. SIND

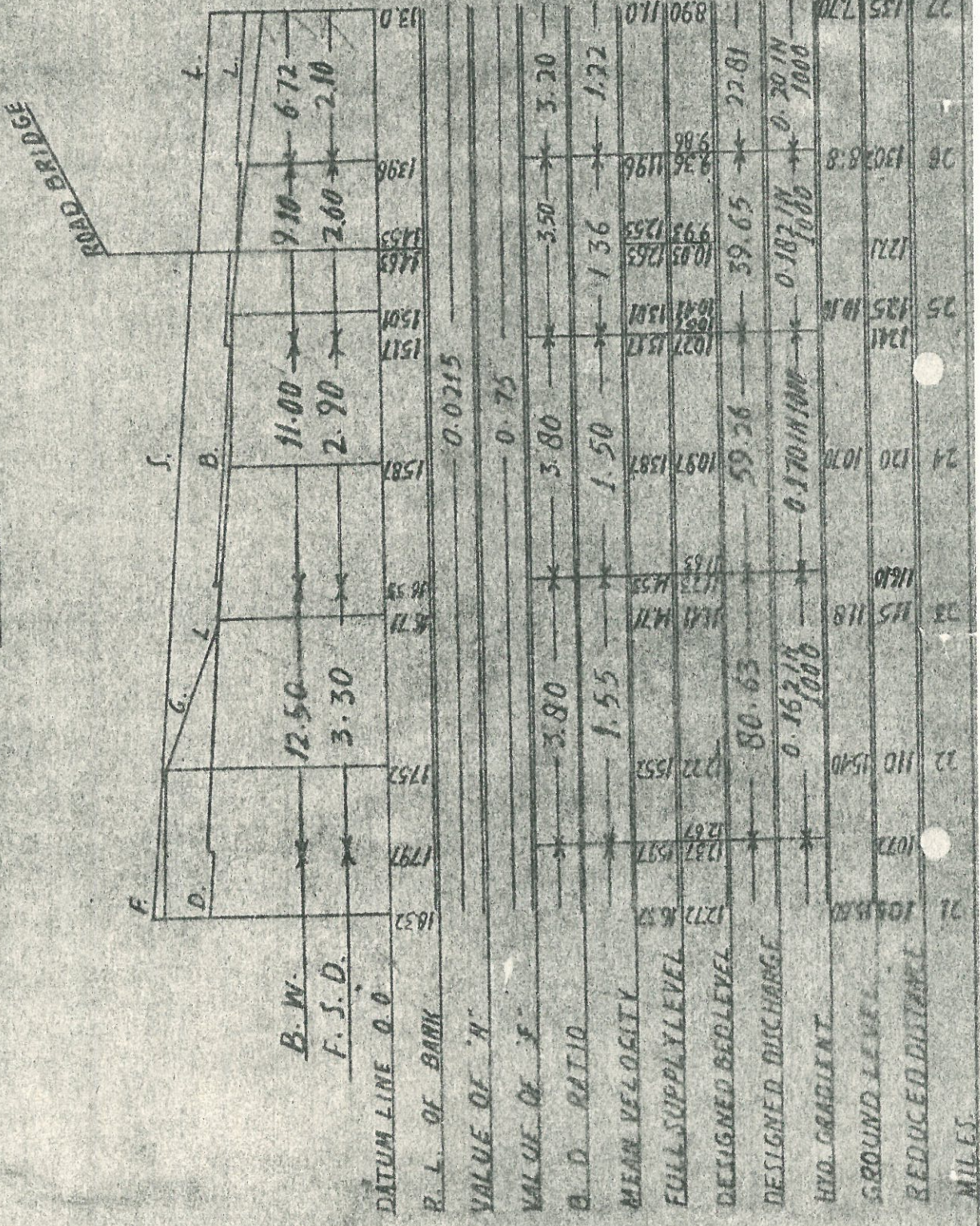
OVER SEER

(ABDULLAH ALI)

PREPARED BY

(N.A. SAMITO)

TRACED BY



L-SECTION
AKRAU WAH ESCAPE

SCALE: H=5000' V=10'

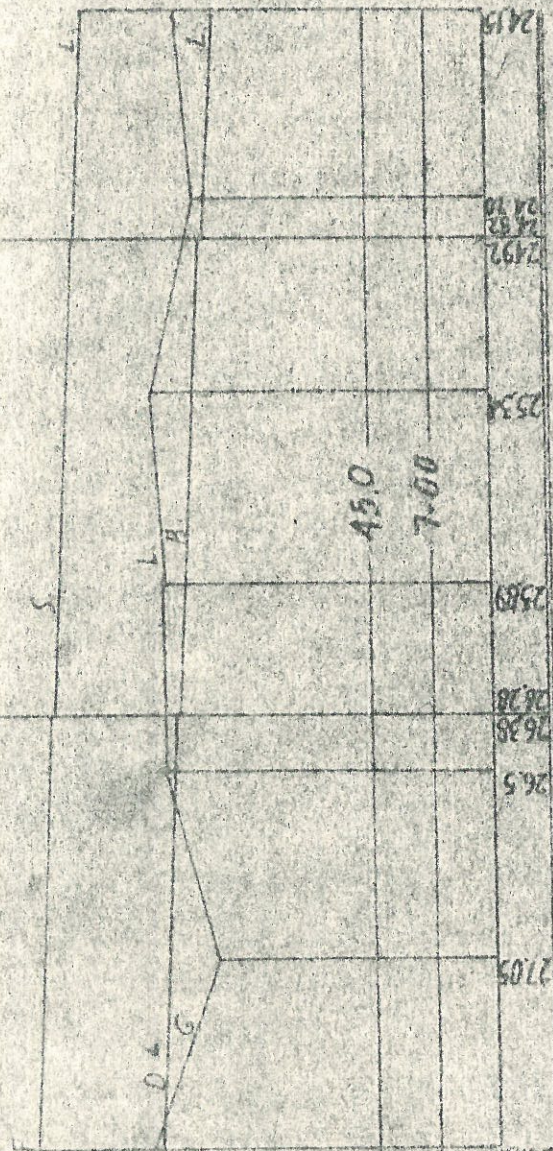


	VALUE OF "N"								
	VALUE OF "f"								
	B-D RATIO								
	MEAN VELOCITY								
	FULL SUPPLY LEVEL								
	DESIGNED BED LEVEL								
	DESIGNED DISCHARGE								
	HYD GRADIENT								
	GROUND LEVEL								
	REDUCED DISTANCE								
	MILES								

AKRAI WAH E3 CAPE

10000

11



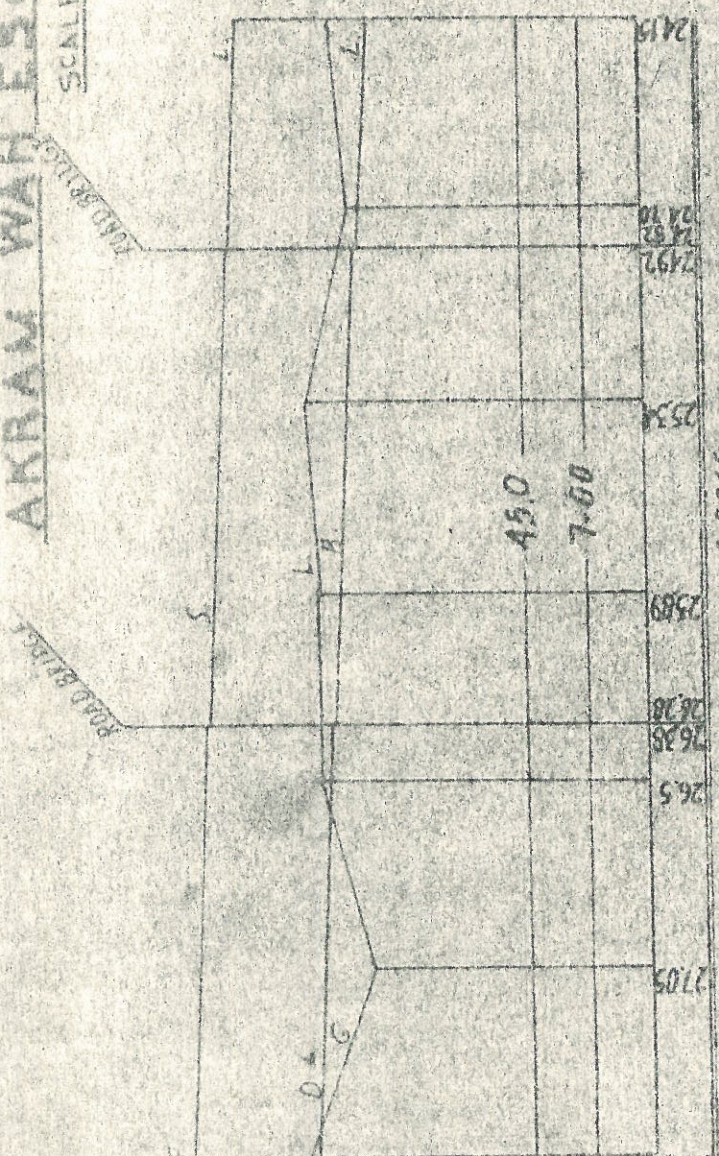
BED WIDTH	FULL SUPPLY DEPTH	DATUM LINE 0.00	R.L. OF BANK	VALUE OF "N"	VALUE OF "F"	B. D. RATIO	MEAN VELOCITY	FULL SUPPLY LEVEL	DESIGNED BED LEVEL	DESIGNED DISCHARGE	HYD. GRADIENT	GROUND LEVEL	REDUCED DISTANCES	MILES
45.0	7.00		26.5	0.0215	0.3	6.43	2.36	1750.2450	1809.2505	Q50=80	0.109 IN 1000	414	30 1901	6
			26.38					1738.2438	1809.2505			414	35 158	7
			26.28					1728.2418	1809.2505			414	45 187	9
			25.89					1689.2389	1809.2505			414	50 1872	10
			25.34					1634.2334	1809.2505			414	55 1608	11
			24.82					1582.2282	1809.2505			414	60 1732	12
			24.19					1531.2231	1809.2505			414		

L-SECTION

AKRAM WAH ESCAPE

SCALE: H=5000=1"

V = 10=1"

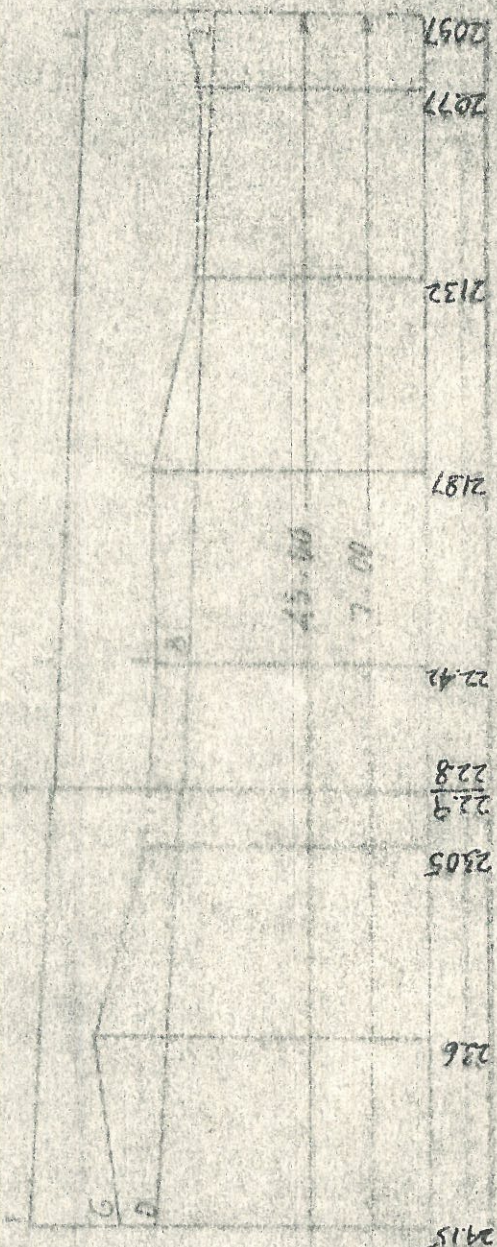


BED WIDTH	450	7.00	2534	2419
FULL SUPPLY DEPTH				
DATUM LINE 0.00				
ELL. OF BANK				
VALUE OF 'N'	0.0215			
VALUE OF 'f'	0.7			
B. D. RATIO	6.43			
MEAN VELOCITY	2.36			
FULL SUPPLY LEVEL	1589.2389	1589.2389	1589.2389	1589.2389
DESIGNED BED LEVEL	1589.2389	1589.2389	1589.2389	1589.2389
DESIGNED DISCHARGE	850.00			
HYD. GRADIENT	0.109 IN 1000			
GROUND LEVEL	1589.2389	1589.2389	1589.2389	1589.2389
REDUCED DISTANCES	1589.2389	1589.2389	1589.2389	1589.2389
MILES	1589.2389	1589.2389	1589.2389	1589.2389

SECTION
AKRAM WAM ESCAPE

SCALE: H=5000=1"
V=10=1"

ROAD BRIDGE



ROAD WIDTH
FULL DEPTH
DATUM LINE 0.00
R. L. OF BANK
VALUE OF "n"
VALUE OF "s"
B/D RATIO
DESIGNED BEDLINE
DESIGNED THICKNESS
HYD GRADIENT
GROUND LEVEL
REDUCED DISTANCES
MILLS

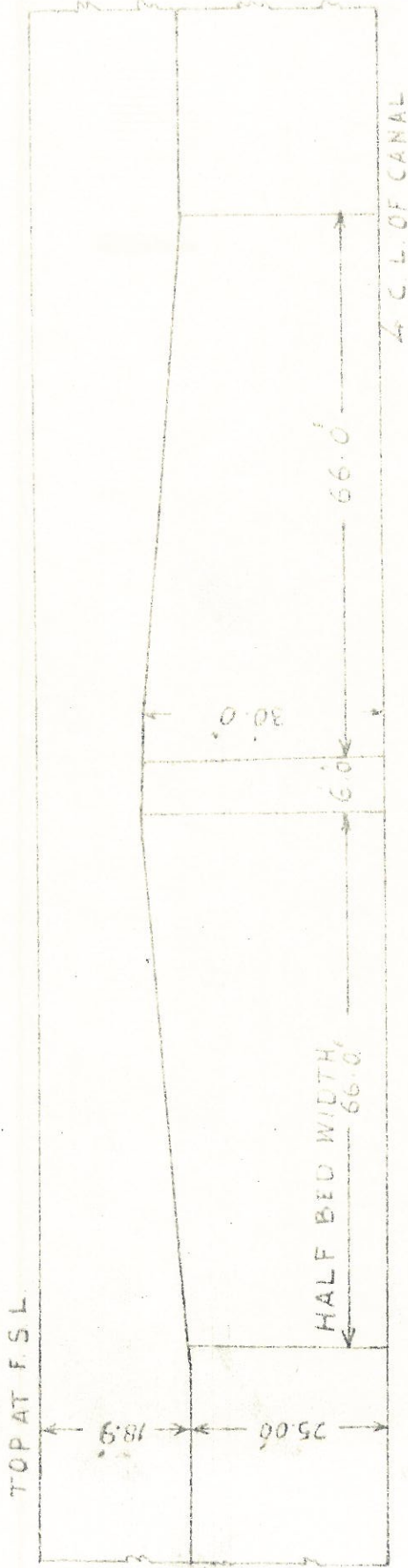
24.15	23.6	23.05	22.9	22.8	22.42	21.87	21.32	20.77	20.57
0.0215	0.7	6.43	2.36	850.00	8.109 IN 1000	13.920.9	13.820.8	13.420.42	12.8719.87
14.0521.05	14.6216	14.0521.05	13.920.9	13.820.8	13.420.42	12.8719.87	12.5719.32	11.7718.77	11.5718.57
15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87	15.87
13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.65
17.60	17.60	17.60	17.60	17.60	17.60	17.60	17.60	17.60	17.60
16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90
15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.92	15.92

PREPARED BY S. K. S. (N.A. SAHITO)
CHECKED BY (N.A. SAHITO)
DESIGNED BY (N.A. SAHITO)
SUB DIVISIONAL OFFICER
DESIGN FOR DIVISION H.D. SIND

HUMPS IN AKRAH W AT

RD.50.

SCALE: $H = 20' = 1"$
 $V = 20' = 1"$



PLAN



ELEVATION

HUMPS IN AKRAM WAHL

AT

R.D. 10.0

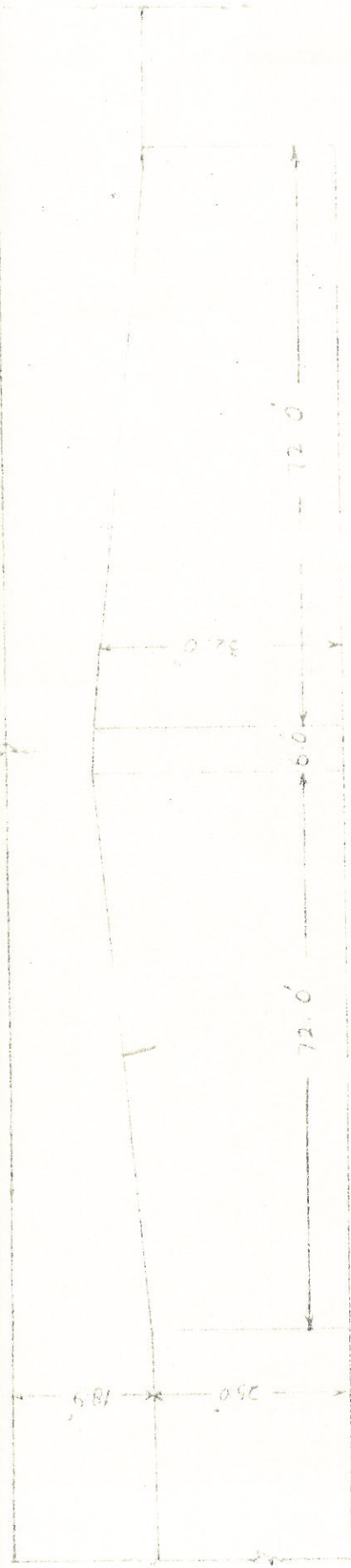
$H = 20.5'$
 $V = 20.5'$

SCALE =

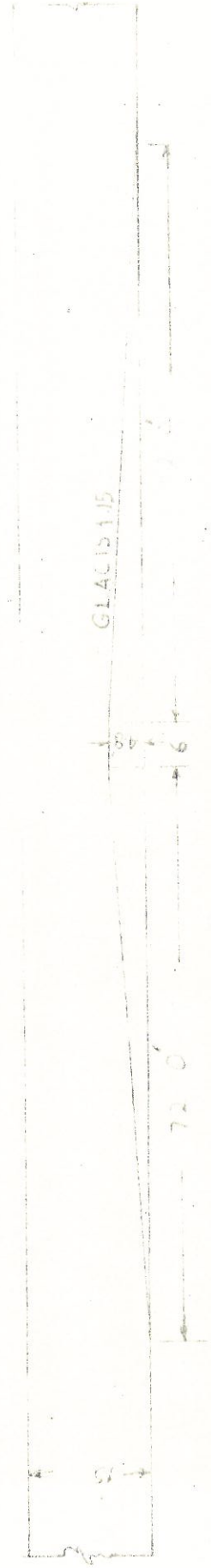
RADIUS 1590

SEWING 1.0

RADIUS 1295



PLAN



ELEVATION

HUMPS IN AKRAM WAH

05100

SCALE =

CHINESE

RADIOS 595

RADIUS 1190

HUMPS IN AKRAM WAH

AT RD 200

$$\begin{aligned} H - 5006 &= 1 \\ V 40 &= 1 \end{aligned}$$

RADIUS 890

RADIUS 445

SLEWING

TOP OF FILL

18.9

25.0

HALF BED WIDTH

84.0

36.0

11.1

84.0

PLAN

GLACIS 1:15

84.0

ELEVATION

11.1

84.0

HUMPS N. AKRAM, NAH

AT

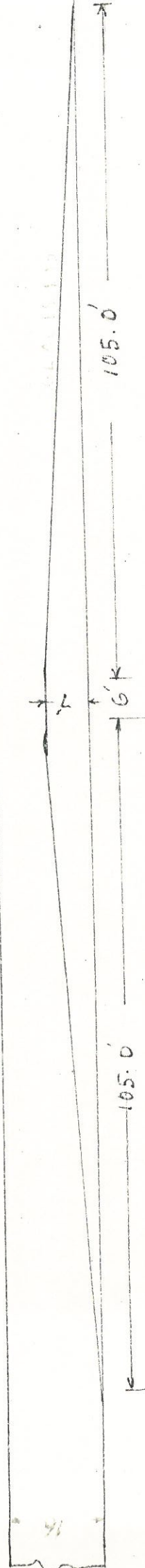
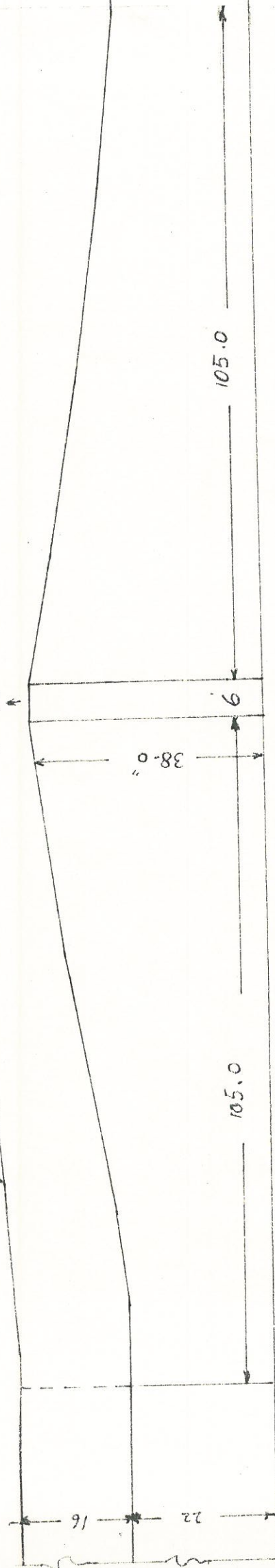
R.D. 25.0

SCALE 1" = 20'-1"
V = 20' = 1"

SLEWING

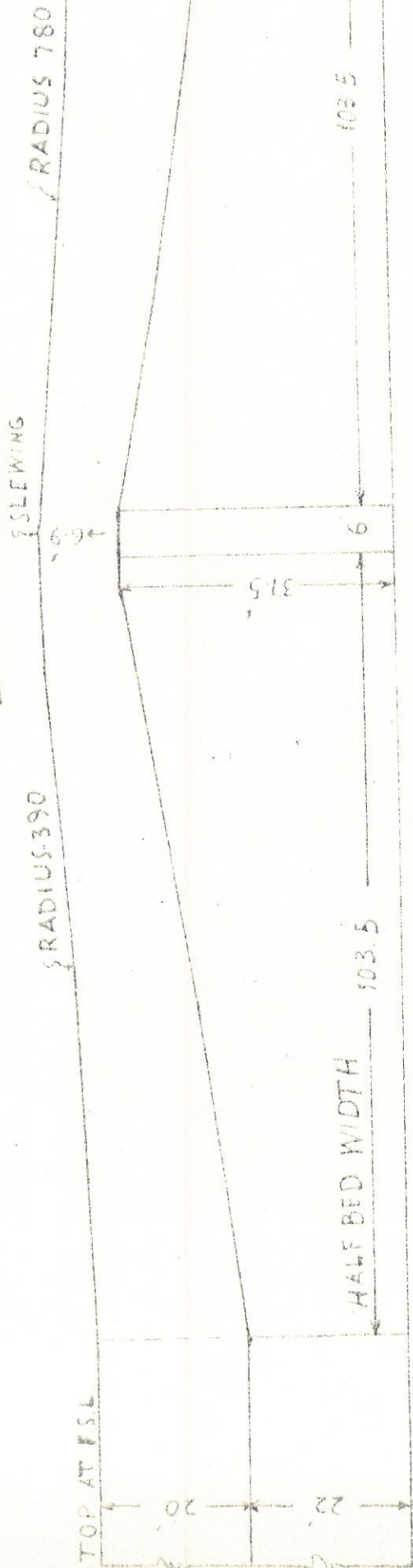
RADIUS 380

RADIUS 760

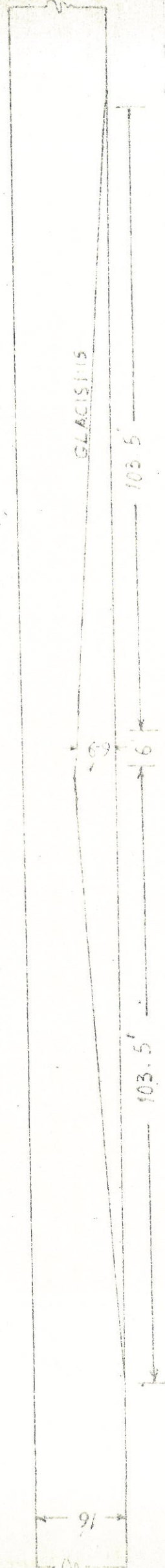


HUMPS IN AKRAM WAH
AT B.D. 300

MS 20'±1"
SCALE: 1" = 20'±1"



PLAN



ELEVATION

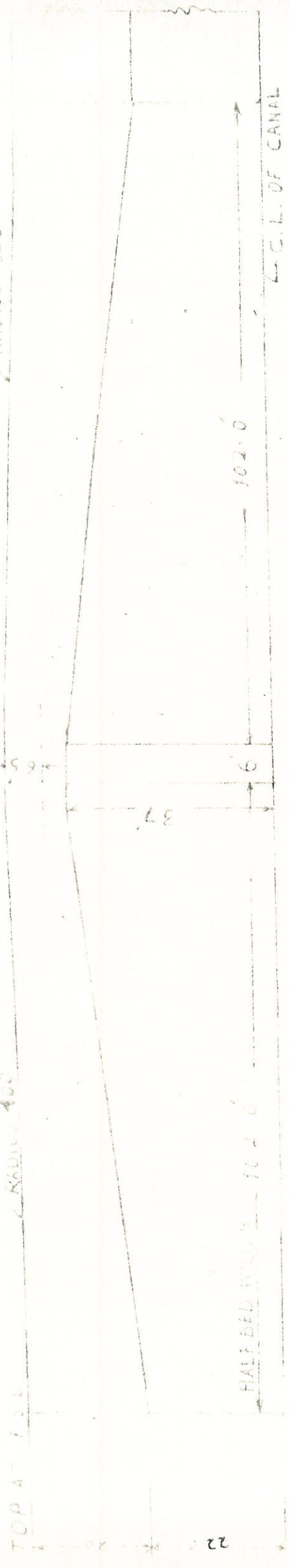
HUMPS IN AKRAM WAH
AT R.D. 35.0

SCALE: $H = 20' = 1"$
 $V = 20' = 1"$

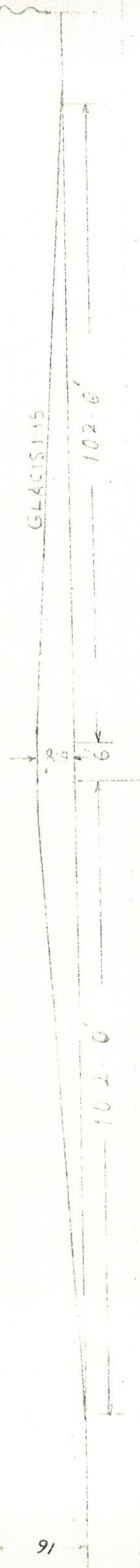
SLEWING

RADIUS 800

RADIUS 400



PLAN



ELEVATION

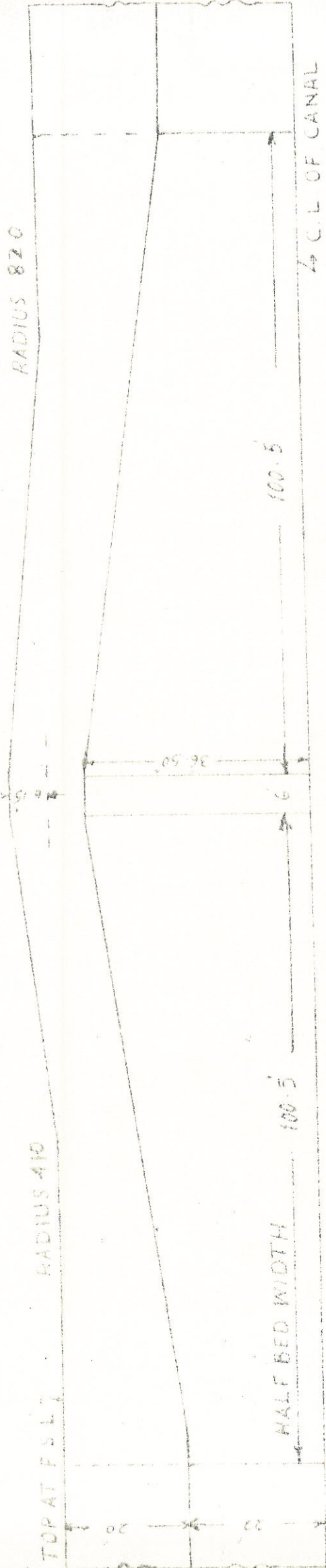
HUMPS IN AKRAM WAH

AT

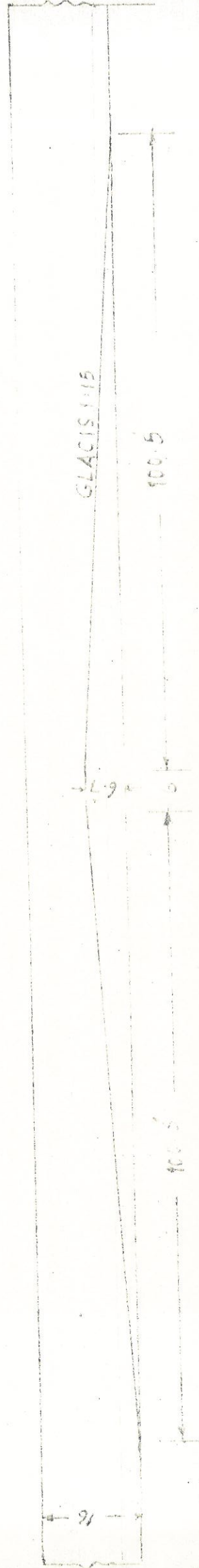
R.D. 40.0

SCALE:- $H = 20' = 1''$
 $V = 20' = 1''$

SLEWING



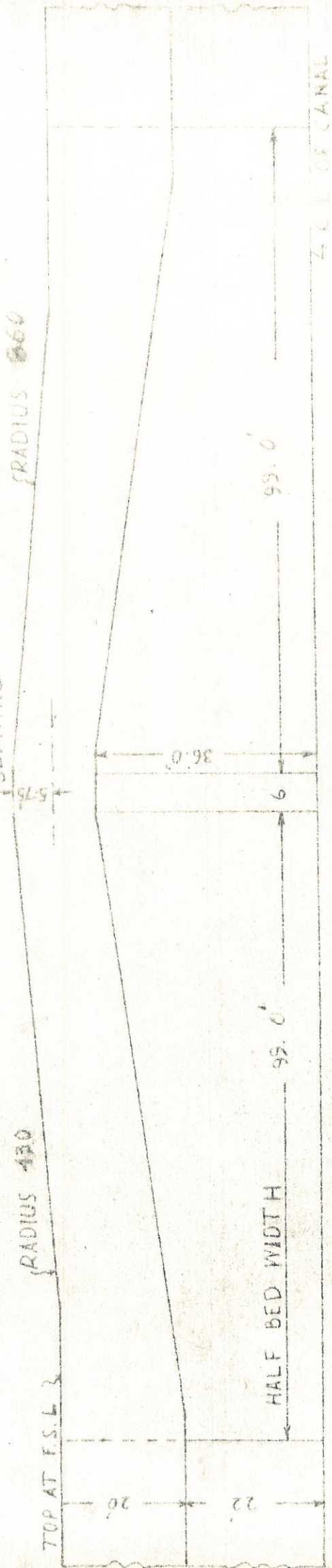
PLAN



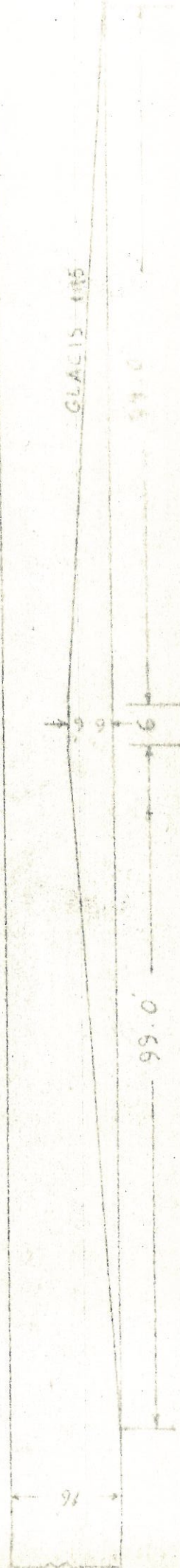
ELEVATION

HUMPS IN AKRAM WAH AT R.D. 45.0

SCALE:-
H = 20' = 1"
V = 26' = 1"
SLEWING



PLAN



ELEVATION

HUMPS IN AKRAM WAH
AT P.D. 500

TOP AT 15.2

KALIBED WIDTH 900

90

350

卷之四

2446

CLAVIS

20-0

2019-2020

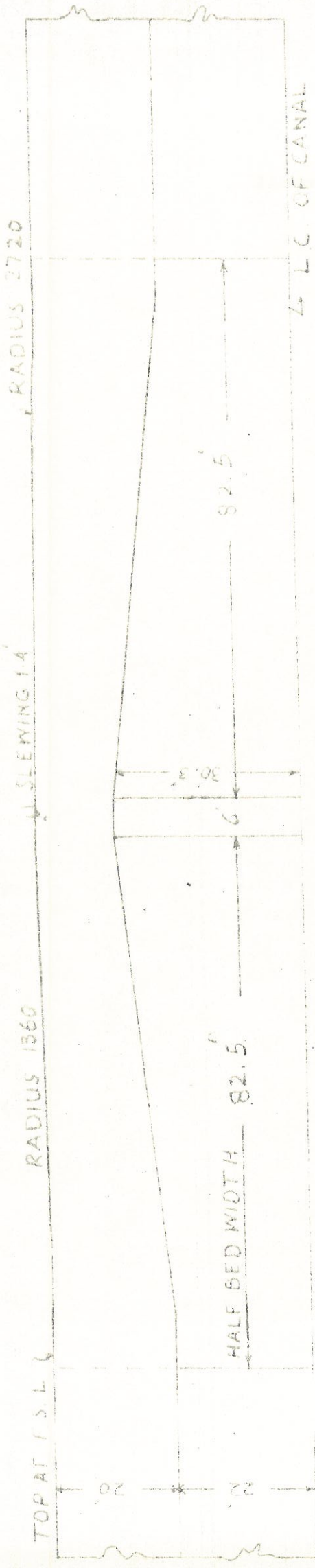
40

20

4-21-

HUMPS IN AKRAM WAH AT R.D. 550

SCALE:- H=20' V=20'



PLAN

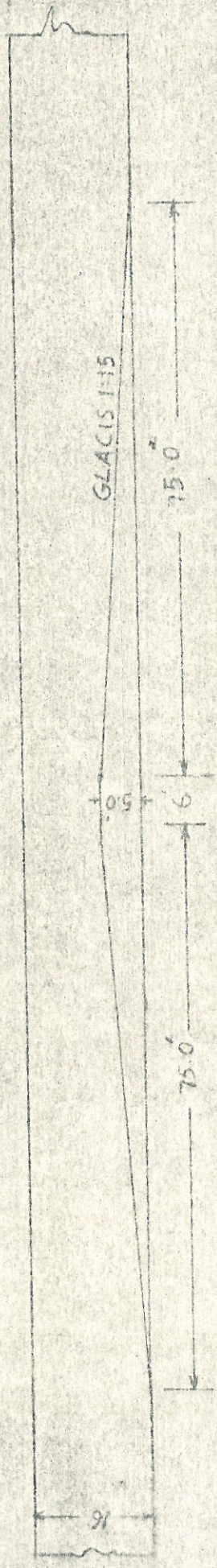
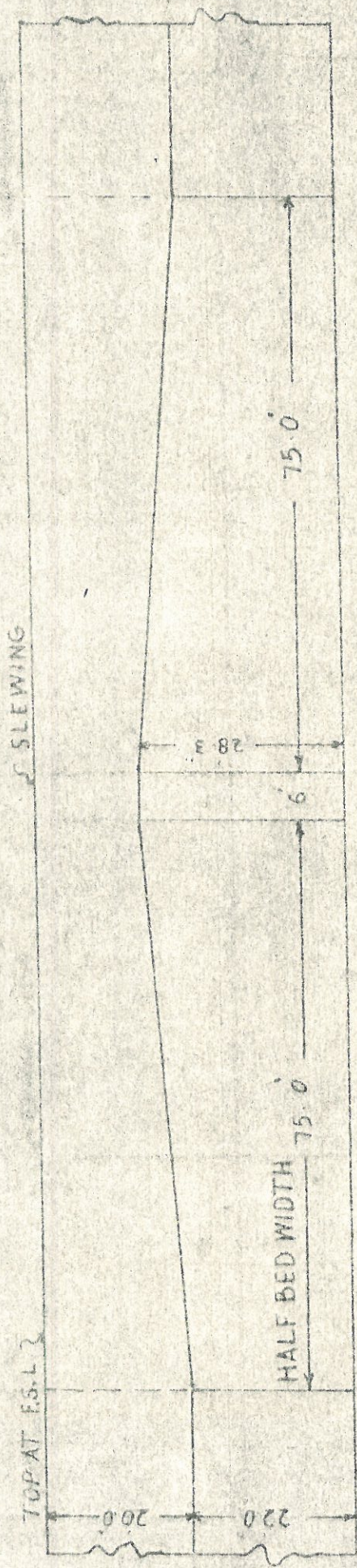


ELEVATION

HUMPS IN AKRAM WAH AT R.D. 60.0

RD'S 60.0
65.0
70.0
75.0

SCALE:- $H=20' = \frac{1"}{40}$
 $V=26' = \frac{1"}{10}$



Land Acquisition, the maintenance of works constructed, Plantation Forest, Drainage and rice cultivation ban etc.

The land required for the new canals and other connected works of Akram Wah System was acquired through the Agency of Land Acquisition Officer. The area of land acquired for the various canals in the Akram Wah System is tabulated as under :-

S. No.	Name of Channels.	Length in canal miles	Area acquired in acres.
--------	-------------------	-----------------------	-------------------------

"A" MAIN CANALS.

1. Akram wah. 76.20 1525+14 443-05

"B" BRANCHES.

1. Gajra. 12.48 59+24 93-07

2. Shadi Large. 30.80 18-10 350-31

3. Kazia wah. 22.00 4-05 3-00

4. Suni Gunt. 27.00 29-14 134-18

"C" DISTRIBUTARIES.

1. Hadachar. 8.06 32-13 -

2. Ali wah Large. 16.36 1-08 11-10

3. Dodo wah. 5.10 0-18 4-38

4. Dhandi. 8.46 32-21 84-36

5. Kumb. 7.78 15-09 88-07

6. Bulri. 12.48 19-05 172-25

7. Dhatt. 8.80 23-27 72-10

8. Shorki. 10.64 9-34 166-34

9. Khiryari. 6.80 3-14 87-12

10. Bahadur wah. 16.30 8-14 176-06

11. Beroveran. 4.08 3-23 26-15

12. Padhar. 9.00 1-33 155-36

13. Shadi small 9.90 14-06 11-38

S. No.	Name of Channels.	Length in Canal miles	Area acquired in acres.
			Kabul. Na-Kabul.

14. Dubai.	5.00	-	56-04
15. Kamaro.	10.14	74-10	190-07
16. Guraho.	12.44	31-16	124-06
17. Raj wah Kadhun.	20.48	6-00	239-09
18. Mor.	10.30	--	163-09
Total:-			
		327-16	1386-22

" IN MINORS.

1. Vehnat.	5.76	4-26	5-00
2. Gafa	2.30	2-05	3-00
3. Defence	6.60	-	77-17
4. Khoski.	3.34	-	77-16
5. Kumbharo.	4.50	-	50-17
6. Sher wah Large.	7.20	32-08	69-32
Grand total.			
		2003-02	3244-05

The cost of acquisition of this 2003-02 acres of

Kabul Land was approximately Rs. 6,89,000. The area of

3244-05 acres of Na-Kabul Land was got reserved under section

38 of Land revenue code. The average rate of Kabul Land

varied from Rs. 323/- to 1267/- per acre.

In addition to the above areas acquired for canals,

an area of 29-27 acres of Kabul Land and 142-13 acres of

Na-Kabul Land was acquired for buildings, Inspection

bungalows and brick kilns etc. An approximate amount of Rs.

21,500/- was paid as compensation for the Land acquired for

such miscellaneous purpose.

No new Land was acquired for the following channels

of the system.

1. T.C. Escape.

2. Hasan Ali Distry.

3. Ganj Bahar Distry.

4. Noor wah minor.

5. Sher wah small minor.

Passes through old abandoned Bhadda.

Channel remodelled within the existing limits.

6. Ghar kadhan Distry.

7. Wangi Minor.

8. Adu Wah.

9. Jamaraki minor.

No compensation paid as per statement of Khatedars.

The following channels are not yet remodelled.

1. Karo Ali Bahar Distry.

2. Hamirah minor.

3. Saeeda minor.

4. Mithna.

5. Mehrab.

An approximate amount of Rs. 1,10,000 is

required for the above channels as given in details of

remaining works (P-158).

The maintenance of completed items did not

really involve any work until a year or two prior to the

opening of the new canals. By that time, there were

hundreds of miles of inspection paths, earthen banks,

lined portions of main canal and various types of structures

and buildings which required strict vigilance and proper

maintenance and upkeep. During the floods of 1956, the

AKRAM was badly damaged and was repaired at a cost of

Rs. 6.00 lacs.

After the opening of the canals, plantation of

trees on both sides of inspection path was started which have

by now grown in good avenue on whole of Akram wah and

various portions of other channels of the system. In 1963

the then Govt. of W. Pakistan vide Services & General

Administration Department No. S-VIII-2-17/63 dated

10.8.63 decided that canal plantation work should be

handed over to Forest Deptt.: The Kotri Barrage Irrigation

authorities allowed the Forest Deptt.: to take over plan-

tation on land strips i.e. outer toe of bank and boundary

of canal only, but the Forest Deptt.: stressed upon getting

all the plantation on canal banks and berms. This resulted

in prolonged correspondence and consequently the plantation work remained under lined Channel-Division. The expenditure of plantation on any canal was generally incurred for 3 consecutive years. An area of 13022 acres was reserved for forest in the command of Akram Wah in Master Plan of 1959, excluding Gajra area where no forest was proposed. This area was to increase to 26050 acres on full development as per Fourth Revised Financial Fore-cast of 1964. A water allowance of 0.44 cusecs for Kharif and 0.29 cusecs for Rabi has been provided for each thousand acres of forest.

In the original proposal of Mr. T.A.W. Roy, rice cultivation to the extent of 40% of C.C.A. for the whole ^{system} of the Akram Wah (including Gajra area) was proposed. In the 1956 revision, rice cultivation was reduced to 10% for the whole area. In the 3rd and 4th revised financial forecasts of 1959 and 1964, the cropping pattern was changed and no provision for rice cultivation was made for the whole of this system.

The cultivation of rice, however, continued in the system inspite of the proposed change of cropping pattern. This continued rice cultivation in the Gajra tract fed by perennial irrigation water supply started aggravating the menace of water-logging with such rapidity that Government, at the highest level, was compelled to take immediate remedial and preventive action. Accordingly, after considerable deliberation on 9.1.1960, the Board of Revenue, West Pakistan, in exercise of the powers conferred on them under section 3 of the West Pakistan Rice (Restriction on cultivation) Ordinance 1959, banned the cultivation of rice in areas commanded by the Gajra system. Copies of the said ordinance and the orders of Board of Revenue are reproduced at the end of this chapter (PP-73-81). Subsequently on 14.5.1960, as a measure of special relief to the holders of low lying lands or "bowls", the Board of Revenue, West Pakistan, issued another notification.

excluding certain "bowl" areas from the operation of the ban on rice cultivation imposed earlier. The total area so excluded was about 5000 acres. In order to provide still further relief to holders of such patches of lands as could grow no crop other than rice and where rice culti-

vation was necessary for reclamation of land, the Board of Revenue West Pakistan permitted temporary relaxation of the ban on rice cultivation provided the relaxation did not exceed a certain fixed percentage of the total area in Gajra Command. The Zamindars of Gajra area fully cooperated with the Govt. and started switching over to dry crops like sugar-cane, cotton, jwar, Bajra etc., in Kharif season and wheat, Oilseeds etc in Rabi season. They have now fully realized the benefits of the ban on rice cultivation. It is further hoped that the zamindars of Badin and Tando Bago area will soon realize the benefits of the ban and switch over to dry crops.

The importance of correct drainage was realized by the Govt., soon after the opening of Kotri Barrage. To achieve this goal, one Drainage Division of Kotri Barrage Drainage scheme named Lower Sind Drainage Division at Tando Muhammad Khan is working actively against this menace. The drainage scheme is under-taken in Gajra area on experimental basis. Surface drains have been provided for the rest of this system. The progress achieved upto 30-6-74 alongwith the revised programme for main items of works are as under:-

S. No.	Sub Head.	Revised programme.	Progress achieved upto 30-6-74.
1.	Length of Drains	392 miles.	292.9 miles.
2.	Regulators.	2 Nos.	-
3.	X-Drainage works	12+159 Nos.	6+71 Nos.
4.	Bridges.	162 Nos.	178 Nos.
5.	Earth work.	4867 lac cft.	3600 lac cft.
6.	Inlets.	1930 Nos.	427 Nos.
7.	Area benefited.	4320 lac acres	4.00 lac acres.

Lahore Thursday, December 17, 1959.

LAW DEPARTMENT NOTIFICATION

The 17th December 1959.

No. Leg. 3(52)/59- The following Ordinance by the

Governor of West Pakistan is hereby published for

General information :-

THE WEST PAKISTAN RICE (RESTRICTIONS ON
CULTIVATION) ORDINANCE, 1959.

WEST PAKISTAN ORDINANCE NO. LV. III OF 1959.

An ordinance to regulate the cultivation of rice

in the Province of West Pakistan.

Whereas, in order to check the increase of water-

logging, salinity, seepage and the resultant damage to land

in the Province of West Pakistan, it is expedient to regulate

the cultivation of rice in the province in the manner here-in-

after appearing.

Now, therefore, in pursuance of the Presidential

Proclamation of the seventh day of October, 1958, and in

exercise of all powers enabling him in that behalf, the Governor

of West Pakistan, is pleased to make and promulgate the following

ordinance:-

Short title & commence- 1) (1) This ordinance may be called the West Pakistan

ment.

Rice (Restrictions on Cultivation) Ordinance, 1959.

(1) It extends to the whole of the Province of

West Pakistan except the Federal Capital and the Special Areas.

(11) It shall apply in such area and on such date

as the Board of Revenue may, by notification, announce in this

behalf.

Definitions.

2)

In this Ordinance :-

(1) "Board of Revenue" means the Board of Revenue

West Pakistan, as established under the West Pakistan Board of

Revenue Act, 1957.

(11) "Government" means the Government of West

Pakistan.

3) The Board of Revenue may, by notification,

prohibit or impose such restrictions on the cultivation

of rice in such area as may be specified in the notific-

cation.

Provided that a cultivator shall be entitled to

gather the standing crop raised by him before the issue

of such notification.

4) Who-ever contravenes the provisions of this

Ordinance or the rules made or directions issued there-

under shall on a complaint made in writing by any Revenue

Officer, be punished with fine which may extend to ten

times the land revenue assessment chargeable for the

crop or simple imprisonment not exceeding six months

or both.

5) No civil court shall have jurisdiction to

Jurisdiction of Civil Court.

entertain any claim, suit, prosecution or any other

legal proceedings for anything done, or intended to

be done in good faith under the provisions of this

Ordinance, or the rules made and directions issued

there-under.

6) For the purpose of carrying into effect the

provisions of this Ordinance, the Board of Revenue

may frame rules and issue such directions in the

form of standing orders as it may deem fit.

Power to make rules.

Lahore
Dated the 16th Dec:
1959.

AKHTAR HUSSAIN
GOVERNOR OF WEST PAKISTAN.

(copy)

Board of Revenue, West Pakistan

NOTIFICATION.

No. 117/60-99- P.V. Dated the 9th Jan: 1960.

In exercise of the power conferred under section 3 of the West Pakistan Rice (Restrictions on cultivation) Ordinance, 1959 and in amplification of its notification No. 54/60-76.P.V. dated the 8th January 1960, the Board of Revenue, West Pakistan is pleased to give below the details of the areas within the command of Gajwa system in the Ghulam Muhammad Barrage Project on which the cultivation of rice has been banned.

S. No.	Name of Channel.	Name of Water Course.		Area in acres.

1. Gajwah Branch Ex- 1-L, 2-R, 3-L, 4-L, 5-L, 10,620-13 Lined Channel.

11-L, 12-R, 13-L, 14-L,
15-L, 16-R, 17-L, 18-L,
19-R, 20-R, 21-L, 22-R,
23-R, 24-L, 25-L, 26-R,
27-L.

2. Hiran Distri- butary.

1-L, 2-R, 3-L, 4-R, 5-R,
6-L, 7-R, 8-L, 9-R, 10-L,
11-R, 12-R, 13-L, 14-L.

3. Hiran Minor.

1-R, 2-R, 3-R, 4-R, 5-R,
6-R, 7-R, 8-R, 9-R, 10-R,
11-R, 12-L, 13-R, 14-R,
15-R, 16-L.

4. Dodowah Distri- butary.

1-R, 2-R, 3-R, 4-L, 5-R,
6-L, 7-R, 8-L, 9-R, 10-R,
11-R, 12-L, 13-L, 14-R,
15-L, 16-L, 17-L.

5. Dodi Minor.

1-R, 1-L, 2-L, 3-L.

6. Dhandhi Minor.

1-R, 2-R, 3-L, 4-R, 5-R,
6-R, 7-R, 9-L, 10-R, 11-L,
12-L, 13-R, 14-L, 15-R,
16-L, 17-R, 18-R, 19-L,
20-R, 21-L, 22-R, 23-L, 24-R,
25-R, 26-L, 27-R, 28-L, 29-R, 30-L.

No.	Name of Channel.	Name of Water Course.	Area in acres.
-----	------------------	-----------------------	----------------

7. Kumb Minor.

1-T, 2-R, 3-R, 4-L, 5-R,

11,422-06

8. Gaja Minor.

1-T, 2-L, 3-L, 4-L, 5-L,
6-R, 7-R, 8-L, 9-L, 10-L,
11-L, 12-R, 13-L, 14-L,
15-L, 16-R, 17-L, 18-R,
19-L, 20-R, 21-R, 22-L,
23-L, 24-L, 25-L, 26-L,
27-L, 28-L.

3,132-18

9. Bulri District-
Butary.

1-L, 2-L, 3-R, 4-L, 5-L,
6-L, 7-R, 8-L, 9-R, 10-L,
11-R, 12-R, 13-L, 14-L,
15-L, 16-R, 17-L, 18-R,
20-L, 21-R, 22-L, 23-R,
24-L, 25-R, 26-L, 27-R.

3,442-30

10. Dhatt Minor.

1-R, 2-L, 3-R, 4-L, 5-R,
6-R, 7-L, 8-R, 9-R, 10-L,
11-R, 12-L, 13-R, 14-R,
15-R, 16-R, 17-L, 18-R,
19-L, 20-R, 21-L, 22-R, 23-R,
24-L, 25-R, 26-R, 27-L, 28-L,
29-L, 30-L.

11,407-12

11. Hassan Ali Minor.

1-R, 2-L, 3-L, 4-L, 5-R,
6-R, 7-R, 8-L, 9-R, 10-L,
11-L, 12-R, 13-R, 14-R, 15-L,
16-R, 17-L, 18-L.

7,930-26

12. Khiriyari Minor.

1-L, 2-R, 3-L, 4-L, 5-R, 6-L,
7-L, 8-R, 9-L, 10-L, 11-R,
12-L, 13-R, 14-R, 15-L, 16-L,
17-R, 18-L, 19-R, 20-L, 21-R,
22-L.

8,752-08

13. Shorki Minor.

1-L, 2-R, 3-R, 4-L, 5-R, 6-L, 17,777-11
7-L, 8-R, 9-R, 10-L, 11-L,
12-R, 13-L, 14-R, 15-L, 16-L,
17-R, 18-L, 19-L, 20-R, 21-R,
22-R, 23-R, 24-R, 25-R, 26-R,
27-R, 28-L, 29-R, 30-L, 31-L,
32-R, 33-L, 34-L, 35-R, 36-R,
37-L, 38-R, 39-L, 40-L, 41-L.

Grand Total :-

1,07,272-38

(copy)

-: 77 :-

No. 1906/60/1439-P.V.- In exercise of the powers conferred under section 5 of West Pakistan Rice (Restrictions on Cultivation) Ordinance, 1959, and amplification of its notification No. 117/60/99-PV, dated the 9th January, 1960, the Board of Revenue West Pakistan, is pleased to exclude the following bowl areas from the operation of the above notification within the command of Gajra System in Ghulam Muhammad Barrage Project:-

Survey Number

Noorani Jagir.

231, 232, 233, 234, 285, 236, 237,
2.32, 239, 290, 291, 292, 293, 294,
295, — : 226, 297.

Paturu Jagir.

46, 47, 48, 101, 164, 165, 166.
31, 50, 51, 52, 91, 92, 93, 90, 94/1,
95, 94/2, 162, 163.

Lakhi Keti.

142, 143, 1, 2, 3, 4, 5, 6, 8, 9, 10,
14, 173, 171, 172, 173, 174, 175, 176,
177.

Ladhan.

351, 354, 355, 356, 357, 359, 353,
352, 345, 344, 341, 342, 343, 360,
361, 362, 338, 337, 336, 335, 334,
331, 147, 143, 144, 145, 146, 153,
351 P, 267, 266, 265, 262, 263, 269,
303, 307, 304, 330, 329.

Kumb.

204 P, 204 P, 135, 134, 36, 37, 38,
39, 439, 422, 139, 322 P, 323 P,
51, 53, 54, 55, 56, 290, 119, 418,
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53, 54, 55, 56, 57, 58, 132, 133,
135, 136, 144, 145, 146, 147, 148,
149, 150, 151, 152, 155.

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357, 359, 360, 459, 463, 464, 460,
696, 334, 395, 396, 397, 390, 399,
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320, 332, 321, 319, 318, 292, 529,
528, 530, 324, 323, 714, 527, 712,
713, 715, 560, 559, 531, 532, 322,
533, 534, 535, 536, 537, 538, 539,
540, 541, 286, 285, 291, 282, 283,
280, 287, 288, 289, 290, 291, 542,
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316, 315, 314, 313, 312, 311, 310,
309, —, 300, 307, 306, 305, 304,
303, 302, 301, 292, 277, 279, 278,
284, 362, 738, 363, 361, 737, 736,
351, 352, 353, 347, 356, 348, 349,
350, 733, 396, 397, 398, 399, 400,
401, 402, 734, 405, 406, 407, 739,
365, 364, 360, 742, 354, 355, 743,
358, 744, 357, 745, 705, 206, 205,
204, 203, 207, 208, 209, 202P.

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41, 42, 43, 44, 163, 164, 165, 166,
167, 168, 169, 170, 383, 384, 387,
386, 213, 220.

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29, 30, 3, 34, 33, 592, 593, 32,
598, 589, 590, 118.

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311, 433, 432, 310, 307, 435, 434,
308, 306, 277, 278, 279, 271, 297,
303, 101, 102, 86, 89, 90, 91, 92,
93, 448, 72, 73, 60, 465.

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40, 24, 23, 22.

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154, 281, 283, 151, 162, 163, 280,
172, 317, 173, 174, 177, 164, 175,
279, 107, 106, 105, 102, 103, 104,
99, 98, 96, 100, 101, 95, 94, —,
139, 140, 141, 145, 146, 147, 148,
286, 280, 149.

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Nakarji.

278, 279, 280, 281, 282, 283, 284,
285, 288, 270, 271, 272, 273, 274,
275, 253, 274, 255, 256, 260, 261,
262, 264, 265, 266, 267, 268, 269,
286, 287, 298, 299, 300, 301, 303,
304, 326, 327, 328, 329, 325.

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475, 477, 495, 496, 418, 461, 478,
460, 474, 217, 213, 219, 220, 221,
222, 224, 225, 226, 227, 176, 177,
178, 163, 457, 475, 479, 480, 153,
154, 155, 156, 157, 158, 159, 160,
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211, 216, 215, 238, 257, 258, 23,
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350, 351, 352, 353, 354, 355.

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Miran Jagir.

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132, 133, 544, 545, 141, 142, 143, 144,
145, 146, 147, 546, 127, 126, 125,
235, 234, 541, 540, 539, 538, 211,
210, 209, 542, 543, 131, 208, 214, 207,
206, 205, 204, 203, 215.

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155, 181, 180, 189, 178, 185, 186,
176, 182, 179, 187, 188, 206, 208, 264,
176, 177, 210, 211, 213, 207, 162,
164, 163, 166, 167, 168, 169, 170,

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104, 94, 67, 68, 72, 73, 74, 76, 315,
316, 95, 96, 97, 98, 99, 100, 102,
217, 325, 109, 110, 111, 324, 326,
34, 40, 41, 39, 48, 321, 322, 42, 43,
45, 46, 47, 244, 245, 54, 55, 53, 52,
36, 58, 44, 45, 247, 246, 241, 242,
176, 177, 178, 179, 180, 181, 182,
183, 184, 185, 186, 189, 191, 192,
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200, 201, 202, 203, 204, 205, 206,
297, 203, 209, 210, 211, 212, 213, 214,
215, 216, 217, 218, 208, 210, 263, 264.

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166, 167, 171, 176, 177, 170, 178,
179, 180, 181, 182, 365, 366, 113,
114, 115, 116, 117, 118, 119, 120,
121, 122, 123, 124, 362, 363, 364,
326, 327, 328, 191, 192, 243, 1, 2,
193, 194, 195, 196, 229,
31, 32, 33, 34, 35, 36, 37, 38, 39,
40, 41, 42, 43, 44, 51, 50, 49, 37,
35, 45, 51, 52, 53, 54, 55, 56, 57,
58, 59, 60, 61, 62, 63, 64, 65, 174,
175, 176, 177, 178, 179, 180, 181, 182,
183, 184, 185, 186, 193, 201, 202, 209,
210, 211, 212, 213, 214, 215, 216,
217, 218, 219, 220, 221, 222, 223,
225, 226, 227, 228, 239, 318, 320,
326, 329, 331, 333, 375, 170, 171, 172,
173, 204, 229, 230, 395, 32, 37, 88,
90, 84, 85, 86, 404, 433, 394, 395,
396, 397, 398, 95, 431, 278, 279, 280,
430, 91, 393, 89, 94, 303, 309, 310,
311, 312, 276, 275, 412, 413, 414, 415,
416, 417, 418, 419, 420, 402, 401, 399,
273, 274, 411, 109, 107, 404, 406,
104, 105, 106, 428, 429, 103, 114,
115, 407, 422, 424, 427, 426, 93, 99,
408, 403, 108, 452, 425, 453, 420, 421.
437, 56, 57, 58, 59, 60, 61 to 67,
91, 68, 69, 70, 71, 78, 79, 80, 81,
32, 33, to 90, 92.
221, 169, 170, 173, 177, 176, 171,
172, 220, 94 to 101, 32, 327.
108, 12,
383, 389, 3 90, 391, 392, 394, 395,
396, 397, 398, 399, 400, 401, 402,
403, 404, 405, 406, 411, 412, 28,
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Dhandhl.

Khirsar.

Abd Mehando.

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Khairpur.

Shorki.

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27/4, 4, 26/4, 26/1, 2, 29/2, 47/2,
48/1,
164, 165, 166, 167, 168, 178, 179,
183, 184, 135, 136, 187, 138, 189,
190, 191, 192,

S.M. IKRAM
Member (Land Utilization),
Board of Revenue, West Pakistan.

NOTE :-

The contents given from page 77 to page 81 are true copy of the Gazette Notification, hence no attempt has been made to rectify duplication of same survey number in Deh or frequent repetition of the same Deh.

The structures for the Akram Wah System were

designed in the Combined Central Drawing Office of Lower Sind Barrage Secretariate in Karachi on the basis of the data supplied by the Executive Engineer, Lined Channel

Division. This data consisted of site plan showing the

situation of structure on the canal, the ground level,

trial pit data, discharge, full supply level, bed width

and depth of canal at the required site of structure. The

plans and estimates for smaller structures and other works

were sanctioned by the Executive Engineer, Lined Channel

Division and Superintending Engineer, Left Bank Construc-

tion Circle according to the delegated powers. Statement

No. 1 at the end of this chapter (P- 83) shows the

position of cross regulators on the Main Canal and Branches

of this system. In addition to the road bridges over

regulators, 37 bridges (including foot bridges) were

constructed on Akram Wah and its branches and escape.

Statement No. 2 (P- 85) gives the details of all the

above road bridges.

Details of other structures viz Aqueduct, Siphons

etc are given in Statement III (P- 89) . Statement IV

gives the

(P- 90)/total number of all kinds of structures on

various channels of this system.

Most of the structures were constructed during

the period 1951 to 1970. The estimates were prepared on

the basis of prevalent schedule of rates. The revisions of

schedules of rates from time to time have been discussed

in chapter VIII of Volume III of Completion Report.

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STATEMENT NO. I SHOWING CROSS REGULATORS ON THE MAIN CANAL & BRANCHES OF
AKRAM WAH SYSTEM.

No.	Situation.	Off taking channels.	Disch. in cusecs. U/s	D/S	T.S.L.	D.B.L.	REMARKS.
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

MAIN CANAL.

1.	R.D. 4	Akram Wah.	3712.90	3712.90	66.63/66.63	51.63/51.63	
2.	R.D. 110	Gajja X-Regulator.	3692.01	2946.08	59.04/58.79	41.54/44.59	
		1. Gajja Branch.					
3.	R.D. 323.0	70th Mile X-Reg.	1345.65	1345.65	40.95/40.35	29.25/31.45	
		Akram Wah.					
4.	R.D. 350	Kazia X-Regulator	1694.81	1045.94	38.22/36.83	29.62/29.53	
		1. Vehnai.					
		2. Kazia Branch.					
5.	R.D. 381.0	Tail X-Reg: A/Wah	373.29	Nil-	33.45/-	26.45/-	
		Akram Wah.					
		1. Sunni Guni.					
		2. Ali Wah Large					
		3. I.O. Escape.					
6.	R.D. 15.0	Gajja Dodo X-Reg:	725.19	674.62	56.64/56.49	50.64/50.39	
		Gajja Branch					
		1. Dodo Wah,					
7.	R.D. 62.4	Gajja Tail X-Reg:	490.39	Nil-	50.87/-	45.47/-	
		Gajja Branch.					
		1. Bulri.					
		2. Kumb.					
		3. Gajja Minor.					

BRANCHES.

S. No.	Situation.	Off taking channels.	Disch. in cusecs. U/S	D/S	T.S.L.	D.B.L.	REMARKS.
1.	2.	3.	4.	5.	6.	7.	8.
8.	R.D. 42.5 Shadi large.	<u>Bahadur wah X-Reg:</u> 1. Bahadur.	846.70	426.34	35.31/35.61	28.61/29.31	
9.	R.D. 74.2 Shadi large.	<u>Shadi small X-Reg:</u> 1. Shadi small.	350.81	249.35	31.70/31.50	26.20/26.50	
10.	R.D. 106.3 Shadi large.	<u>Dubni X-Regulator.</u> 1. Dubni.	152.22	93.71	26.92/26.72	22.32/23.12	
11.	R.D. 64.2 Kazia branch.	<u>Kamaro X-Regulator</u> 1. Kamaro.	432.47	353.83	27.90/26.28	21.90/20.33	
12.	R.D. 36.0 Kazia Branch	<u>Guraho X-Regulator</u> 1. Guraho.	294.29	174.66	23.50/23.30	13.30/19.00	
13.	R.D. 110 Kazia Branch.	<u>Noor wah X-Reg:(Tail)</u> 1. Noor Wah. 2. Gand Bhir.	126.84	-Nil-	19.70/-	15.90/-	
14.	R.D. 9.2 Sunni Guni.	<u>Sher wah small X/Reg:</u> 1. Sher wah small.	674.62	643.21	31.00/30.30	24.30/24.20	
15.	R.D. 22.5 Sunni Guni.	<u>Raj wah X-Regulator.</u> 1. Raj Wah Kadhan.	629.14	243.01	29.23/28.28	22.68/23.48	

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STATEMENT NO. II OF ROAD AND RAILWAY BRIDGES ON
MAIN CANAL AND BRANCHES IN AKRAM WAH SYSTEM.

S. No.	R.D. of Canal.	ROAD From.	OR RAILWAY To.	Type of Bridge.	Cost of Bridge.	Year of Completion.	REMARKS.
--------	----------------	------------	----------------	-----------------	-----------------	---------------------	----------

AKRAM WAH.

1.	21.9	Hyderabad.	Hala.	Road Bridge.	95,581.00	1952-53	
2.	33.6	Hyderabad.	Rohri and Mirpurkhas.	Railway Bridge.	4,60,047.00	1954-55	
3.	33.8	Hyderabad.	Mirpurkhas.	Road Bridge.	2,75,569.00	1954-55	
4.	36.7	Hyderabad.	Changhro.	Road Bridge.	1,49,509.00	1954-55	
5.	53.5	Hyderabad.	Changhro.	Foot Bridge.	4, 622.00	1953-59	
6.	64.7	Hyderabad.	Husri.	V.Road Bridge.	1,31,865.00	1954-55	
7.	72.7	Hyderabad.	Husri.	Road Bridge.	71,121.00	1957-53	
8.	79.7	Hyderabad.	Husri.	Foot Bridge.	4,240.00	1953-59	
9.	101.2	Hyderabad.	Seri.	Road Bridge.	75,122.00	1955-56	
10.	113.5	Hyderabad.	Village Panwar	Foot Bridge.	4,329.00	1959-60	
11.	138.0	T.M.Khan.	Tando Fazal.	Foot Bridge.	3,811.00	1959-60	

No.	R.D. of Canal.		ROAD OR RAILWAY.		Type of Bridge.	Cost of Bridge.		Year of Completion.	REMARKS
	FROM.	TO.							
1.	2.	3.	4.	5.	6.	7.	8.		
12.	147.5	T.M. Khan.	Phulkara.	Road Bridge.	92,836.00	1960-61			
13.	159.0	Matli T.M.K.	Laghari Goth.	Foot Bridge.	4,141.00	1953-59			
14.	165.0	Matli T.M.K.	Village Baran	Foot Bridge.	4,776.00	1960-61			
15.	171.3	Laghari Goth.	Village Jabeja	Foot Bridge.	1,250.00	1961-62			
16.	180.6	Phulkara.	Matli.	Foot Bridge.	3,584.00	1961-62			
17.	191.8	Matli.	T/Gh: Ali.	Road Bridge.	35,363.00	1959-60			
18.	236.3	Dundo.	Rajo Khanani.	Road Bridge.	30,030.00	1961-62			
19.	273.0	Talhar.	Rajo Khanani.	Road Bridge.	93,779.00	1961-62			
20.	300.0	Talhar.	Tando Bago.	Road Bridge.	1,25,726.00	1961-62			
21.	356.0	Tandc. Bago	Badin.	Road Bridge.	46,799.00	1962-63			
GAJA BRANCH.									
1.	12.0	Hyderabad.	Badin.	Railway Bridge.		1954-55			

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S. No.	R.D. of Canal.	ROAD OR RAILWAY.		Type of Bridge.	Cost of Bridge.	Year of completion.	REMARKS
		FROM.	TO.				
2.	32.2	F.M. Khan..	Mula-Katiar.	Road Bridge.	25,700.00	1957-58	
3.	62.0	T.M. Khan.	Mirpur-Bathoro	Road Bridge.	20,795.00	1958-59	
<u>SHADI WAH LARGE BRANCH.</u>							
1.	17.0	Tando Bago.	Pangrio.	Road Bridge.	34,035.00	1951-52	
2.	30.0	Tando Bago.	Pangrio.	Road Bridge.	62,637.00	1961-62	
3.	94.0	Azad Kashmir-Chak)	ADC Chak.	Road Bridge.	21,575.00	1969-70	
4.	123.0	Nindo.	Tango.	Road Bridge.	81,318.00	1969-70	
<u>KAZIA WAH BRANCH.</u>							
1.	35.0	Nindo.	Talhar via Badin.	Road Bridge.	--	1962-63	
2.	43.0	Nindo.	Badin.	Road Bridge.	41,435.00	1962-63	
<u>SUNNI GUNI BRANCH.</u>							
1.	26.0	Lowari.	Nindo.	Road Bridge.	15,432.00	1967-68	
2.	50.7	Kadhan.	Nindo.	Road Bridge.	10,053.00	1962-63	
3.	55.8	Kadhan.	Nindo.	Road Bridge.	23,054.00	1962-63	
4.	77.73	Kadhan.	Mithi.	Road Bridge.	66,579.00	1962-63	
5.	127.10	Kadhan.	Rahim ki-Bazzar.	Road Bridge.	9,339.00	1962-63	

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S. No.	R.D. of Canal.	ROAD From.	OR RAILWAY To.	Type of Bridge.	Cost of Bridge.	Year of completion	REMARKS
1.	2.	3.	4.	5.	6.	7.	8.

LINED CHANNEL ESCAPE.

1.	21.0	Mindo.	Lowari.	Road Bridge.	41,947.00	1967-68.	
2.	41.4	Kadhan.	Mindo.	Road Bridge.		Constructed by B & R Deptt:	
3.	53.9	Kadhan.	Engineering chak.	Road Bridge.		Constructed by B & R Deptt:	
4.	71.5	Kadhan.	Mithi.	Road Bridge.		Constructed by Drainage.	

STATEMENT NO. III SHOWING STRUCTURES OTHER THAN BRIDGES AND
REGULATORS ON THE MAIN CANAL AND BRANCHES IN AKRAM WAH SYSTEM.

1.	2.	3.	4.	5.	6.	7.
S. No.	R.D. & Name of Canal.	F.S. Discharge at structures.	Type of Structures.	Cost of Structures.	Year of Completion.	Salient details of Structures.
<u>A Q U E D U C T S.</u>						
1.	135 Akramwah.	2940.95	Aqueduct for water course No. 3-AR T.M. Khan Distry.	5327/-	1959-1960	2' Dia R.O.C. Pipe.
2.	142.5 Akramwah.	2939.72	Aqueduct for water course No. 6-R T.M. Khan Distry.	4330/-	1959-1960	1' Dia R.O.C. Pipe.
3.	153 Akramwah.	2937.94	Aqueduct for water course No. 9-AR T.M. Khan Distry.	6149/-	1959-1960	1.5 Dia R.O.C. Pipe.
4.	159 Akramwah.	2936.92	Aqueduct for water course No. 10-R T.M. Khan Distry.	1405/-	1959-1960	1' Dia R.O.C. Pipe.
<u>S Y P H O N S.</u>						
5.	214 Akramwah.	2920.78	Ali pur Syphon	5.6 lacs.	1961-1962	(1. Number of barrels 9. (2. Size of barrel 6'x6'. (3. Thickness of Barrel wall 1.0'
6.	230 Akramwah.	2859.08	Talhar Syphon	6.5 lacs.	1961-1962	(1. Number of Barrels 9. (2. Size of barrel 6'x6'. (3. Thickness of Barrel wall 1.0'
7.	11.0 Gajra Bp.	737.03	Gajra Syphon under Tuleli Feeder 2.81 lacs		1955-1957	4 nos 9'-5"x7'-10"
8.	124 Shadi large.	93.39	Chhab.	716/-	1961-1962	
9.	150 Shadi large.	33.73	Chhab.	23,424/-	1970.	16' R/Bridge cum Chhab one span of 6 ft.

STATEMENT NO. IV SHOWING TOTAL NO. OF
STRUCTURES COMPLETED UP TO 30.6.74 IN THE
AKRAM WAH SYSTEM.

--: 90 :-

Name of structure.			
Total Number of structure.	Main Branches	Escapedisty.	Minors.
.....			

1. Cross regulator
with or without
falls.....

5 10 - 7 2 24

2. Head Regulator
with or without
Road Bridges.

1 4 1 23 14 43

3. Siphons.

2 1 - - - 3

4. Aqueducts.

4 - - - - 4

5. Road Bridges.

20 13 4 31 9 77

6. Railway Bridges.

1 1 - - - 2

7. Obstacles

- 2 2 2 - 4

The various types of buildings constructed in the

system are shown in statement No. 1 (P- 92) at the

end of this chapter. Inspection Bungalows, signallers

quarters, Juice estt: quarters and Darogah's Landies

were constructed at various places within the system as

per requirements. Non-Residential buildings were constructed

at Tando Mohammad Khan to accommodate new offices. Temporary

buildings were constructed at Serai. **four Residential**

colonies as shown below were constructed to meet with the

requirements of the staff engaged for the execution and

maintenance of various works.

1. Tando Mohammad Khan Colony.

2. Badin Colony.

3. Kadhah Colony.

4. Dubni Colony.

The location of all buildings was made primarily

with reference to post barrage conditions as far as they

could be anticipated.

On account of the rise in the cost of living, the

schedule of rates were frequently revised. This has been

discussed in details in Volume III. The rates allowed in

the estimates were those prevalent at the time of

sanction of the estimates. Statement No. 2 showing plinth

area and actual cost of various types of buildings, is

appended at the end of this chapter (P- 95).

STATEMENT NO. I BUILDINGS IN AKRAM WAH SYSTEM.

1.	2.	3.	4.	5.	6.
No.	Type of Buildings	Situation (Name of Colony or RD of Channel)	Year of construction.	Cost of Building	Number of buildings.
<u>INSPECTION BUNGALOWS.</u>					
1.	1st Class Inspection Bungalow	Badin Colony.	1962	1,89,414/-	1 No.
2.	Out Houses.				
3.	S.D.O's Residence.	Badin Colony	1963	37,649/-	1 No.
4.	B-type quarters	Badin Colony.	1964	29,015/-	2 Nos.
5.	C-type quarters	Badin Colony.	1964	27,324/-	3 Nos.
6.	D-type quarters	Badin Colony.	1964	19,176/-	3 Nos.
7.	Signaller's quarter.	Badin Colony.	1964	9,301/-	1 No.
8.	1st class I/ Lndhi	Khoski.	1962	32,359/-	1 No.
9.	Out Houses.				
10.	11nd Class Inspection Bungalow	Kadnan.	Pre-Barrage	--	1 No. Transferred from Ruled Division.
11.	S.D.O's Residence.	Kadnan Colony	1962	33,910/-	1 No.
12.	C-type quarters	Kadnan Colony.	1963	40,442/-	4 Nos.
13.	D-type quarters	Kadnan Colony.	1963	20,503/-	4 Nos.
14.	Signaller's quarter.	Kadnan Colony.	1963	6,217/-	1 No.

1.	2.	3.	4.	5.	6.
S. No.	Type of buildings	Situation (Name of Colony or RD of channel.	Year of construction.	Cost of Building	Number of buildings.
15.	IInd Class Inspection Bungalow.	Matli.	1962	32,730/-	1 No.
16.	Out Houses.	Matli.	1962	24,000/-	1 No.
17.	IInd Class Inspection Bungalow.	Lowari.	Pre-Barrage.	-	1 No. Transferred from Puleli Division.
18.	IInd Class Inspection Bungalow.	Dubni Colony.	1963	56,754/-	1 No.
19.	Out Houses.	Dubni Colony.	1963	24,194/-	1 No.
20.	C-type quarters	Dubni Colony.	1963	14,202/-	1 No.
21.	D-type quarters	Dubni Colony.	1963	7,609/-	1 No.
22.	Ist Class Inspection Bungalow.	Tripple sluice.	Pre-Barrage.	-	1 No.
23.	XEN's Bungalow.	T.M.Khan B/Colony.	1955	52,381/-	2 Nos.
24.	Out Houses.	T.M.Khan B/Colony.	1955	13,918/-	2 Nos.
25.	S.D.O's Residence.	T.M.Khan B/Colony.	1955	49,218/-	2 Nos.
26.	A-type quarters in 2 blocks, each of 2 quarters.	T.M.Khan B/Colony.	1956	39,696/-	4 Nos.
27.	B-type quarters in 2 blocks, each of 6 quarters.	T.M.Khan B/Colony.	1956	86,548/-	12 Nos.
28.	C-type quarters in 2 blocks, each of 10 quarters.	T.M.Khan B/Colony.	1956	1,11,494/-	20 Nos.
29.	D-type quarters.	T.M.Khan B/Colony.	1956	27,885/-	10 Nos.

S. No.	Type of buildings	Situation (Name of colony or RD of channel.	Year of construction.	Cost of buildings.	Number of Buildings..
30.	B-type quarter	Bulri Town.	1964	15,790/-	1 No.
31.	Sluice Estt: quarter.	Bulri H/Regulator	1964	7,469/-	1 No.
32.	Darogha Landhi.	Bulri H/Regulator	1964	7,469/-	1 No.
33.	Signaller's quarter.	Gaja H /Regulator	1963	7,351/-	1 No.
34.	Sluice Estt: quarter.	Gaja X-Regulator.	1964	6,395/-	1 No.
35.	Darogha Landhi.	Gaja X-Regulator.	1964	7,500/-	1 No.
36.	Sluice Estt: quarter.	Dhatt Head.	1964	7,351/-	1 No.
37.	Darogha Landhi.	Dhatt Head.	1964	7,469/-	1 No.
38.	Sluice Estt: quarter.	Khiryari Head.	1964	7,755/-	1 No.
39.	Darogha Landhi.	Khiryari Head.	1964	8,336/-	1 No.

NON RESIDENTIAL BUILDINGS.

1.	XEN's Office Block for 2 XEN.	T.M.Khan B/Colony.	1955	76,667/-	1 No.
2.	Out Houses for Two XEN's offices	T.M.Khan B/Colony.	1955	23,560/-	1 No.
3.	S.D.O's Office block for two officers	T.M.Khan B/Colony.	1955	35,907/-	1 No.
4.	Out houses for 2 SDO's Office.	T.M.Khan B/Colony.	1955	24,513/-	1 No.
5.	Mosque.	T.M.Khan B/Colony.	1955	39,750/-	1 No.
6.	Latrine 4 seated.	T.M.Khan B/Colony.	1955	3,790/-	1 No.
7.	Latrine 3 seated.	T.M.Khan B/Colony.	1955	3,151/-	1 No.
8.	S.D.O's Office 1 seated.	Badin.	1964	34,217/-	1 No.

Note :- Temporary buildings constructed at Seri have not been shown in the above statement.

-: 95 :-

STATEMENT NO. II SHOWING PLINTH AREA AND ACTUAL COST OF
VARIOUS TYPES OF BUILDINGS IN THE AKRAM WAH SYSTEM.

1. S. No.	2. Name of Buildings.	3. Situation.	4. Plinth area sft.	5. Actual Cost Rs.	6. Rate/sft. of Plinth area.	7. REMARKS.
<u>Inspection Bungalows.</u>						
1.	1st Class Inspection Bungalow.	Badin.	5273 sft.	1,89,414/-	23.35	
	Out Houses.	Badin.	2336 sft.			
2.	1st Class I/ Landhi with out houses.	Khoski.	1933 sft.	32,359/-	16.43	
3.	1st Class Inspection Bungalow.	Matli.	2006 sft.	38,730/-	19.33	
	Out Houses.	Matli.	1430 sft.	24,000/-	16.73	
4.	1st Class Inspection Bungalow.	Dubni.	2006 sft.	56,754/-	28.29	
	Out houses.	Dubni.	1430 sft.	24,194/-	16.91	
5.	E.E.s. Bungalows 2 Nos.	T.M.Khan.	5626 sft.	52,331/-	11.00	
5.A.	Out houses 2 Nos.	T.M.Khan.	2966 sft.	13,918/-	4.59	
6.	S.D.O's Residence, 2 Nos.	Badin.	4723 sft.	49,213/-	10.40	
7.	S.D.O's Residence 1 No.	Badin.	2364 sft.	37,649/-	15.92	
8.	S.D.O's Residence 1 No.	Kadhan.	2364 sft.	33,910/-	14.45	
9.	A-type quarters in 2 Pl:	T.M.Khan.	7116 sft.	39,696/-	5.58	
10.	B-type quarters in 2 Pl:	T.M.Khan.	9768 sft.	36,543/-	3.86	

S. No.	Name of Buildings.	Situation	Plinth area Sft.	Actual cost Rs.	Rate/sft. of Plinth area.	R E M A R K S.
1.	2.	3.	4.	5.	6.	7.
11.	B-type quarters 2 Nos.	Badin.	1628 Sft.	29,015/-	17.82	
12.	O/seer quarter (B-type) 1 No.	Bulri Town.	814 Sft.	15,790/-	19.40	
13.	C-type quarters 20 Nos.	T.M.Khan.	12060 Sft.	1,11,494/-	9.24	
14.	C-type quarters 3 Nos.	Badin.	1309 Sft.	27,324/-	15.10	
15.	C-type quarters 4 Nos.	Kadnan.	2412 Sft.	40,442/-	16.80	
16.	C-type quarters 1 No.	Dubni.	603 Sft.	14,202/-	23.52	
17.	D-type quarters 10 Nos.	T.M.Khan.	3450 Sft.	27,335/-	8.08	
18.	D-type quarters 3 Nos.	Badin.	1035 Sft.	19,176/-	19.50	
19.	D-type quarters 4 Nos.	Kadnan.	1300 Sft.	20,603/-	15.80	
20.	D-type quarters 1 No.	Dubni.	345 Sft.	7,609/-	22.10	
21.	Signalers quarter 1 No.	Badin.	537 Sft.	9,301/-	17.32	
22.	Signalers quarter 1 No.	Kadnan.	537 Sft.	6,817/-	12.71	
23.	Signalers quarter 1 No.	Gaja H/Regulator	537 Sft.	7,351/-	13.70	
24.	Sluice Estt: quarter 1 No.	Gaja X-Regulator	308 Sft.	6,395/-	20.76	
25.	Sluice Tstt: quarter 1 No.	Bulri H/Reg:	308 Sft.	7,469/-	24.44	
26.	Sluice Estt: quarter 1 No.	Dhatt Head.	308 Sft.	7,351/-	23.86	

S. No.	Name of Buildings.	Situation.	Plinth area Sft.	Actual Cost Rs.	Rate/sft. of plinth area.	R E M A R K S
1.	2.	3.	4.	5.	6.	7.
27.	Sluice Estt: quarter 1 No.	Khiryari Head.	303 Sft.	7,765/-	25.21	
28.	Darogha Landhi 1 No.	Gaja X-Regulator.	603 Sft.	7,500/-	12.43	
29.	Darogha Landhi 1 No.	Bulri E-Regulator	603 Sft.	7,469/-	12.43	
30.	Darogha Landhi 1 No.	Dhatt Head.	603 Sft.	7,469/-	12.33	
31.	Darogha Landhi 1 No.	Khiryari Head.	603 Sft.	8,386/-	14.73	
<u>NON RESIDENTIAL.</u>						
<u>two divisions</u>						
1.	E.E's Office block for 1 No.	T.M.Khan.	13294 Sft.	76,667/-	5.77	
2.	Cut houses for 2 E.E's Office 1 No. block	T.M.Khan.	1769 Sft.	28,560/-	16.10	
3.	S.D.O. office/for two Officers	T.M.Khan.	2045 Sft.	35,907/-	17.55	
4.	S.D.O. office 1 No.	Badin.	2045 Sft.	34,217/-	16.70	
5.	S.D.O. Office 1 No.	Kadhan.	2045 Sft.	34,217/-	16.70	
6.	Out houses for 2 SDO's office 1 set	T.M.Khan.	1483 Sft.	24,513/-	16.52	
7.	Mosque 1 No.	T.M.Khan.	3667 Sft.	39,750/-	10.89	
8.	Latrine 4 seated 1 No.	T.M.Khan.	86 Sft.	3,790/-	44.00	
9.	Latrine 3 seated 1 No.	T.M.Khan.	64.5 Sft.	3,151/-	48.85	

The total mileage of water courses in the Akram wah

system is as under :-

Mileage of water courses (new & old, utilized with or without remodelling).	Name of Canal System.
---	-----------------------

Akram Wah & its direct off-takes. 1104

Gaja System. 1261

Shadi Large System. 1232

Kazla System. 956

Sunni Gunt System. 809

Total:- 5362 miles.

The existing channels of Fuleli System transferred to

Akram Wah had their own water courses and the same were utilized

as far as possible, with extension or remodelling wherever found

necessary. 93% of the amount spent on water-courses is to be

recovered from rhatadars.

Statement showing Number and Length of water courses in Akram Wah System.

Length in miles	Number.	Name of M.C. & Branches
Old	New	Total
Old	New	Total

Akram Wah & its direct off-takes. 279 11 290 1060 44 1104

Gaja System. 232 43 330 1074 137 1261

Shadi Large system. 283 43 326 1068 164 1232

Kazla System. 226 19 245 381 75 956

Sunni Gunt System. 182 23 205 717 92 809

Total :- 1252 144 1396 4300 562 5362

The channel wise break up of water courses is shown below

Akram wah & its direct offtakes.

Name of Channel.	No. of Old T/C	Length of old T/C (miles)	No. of new T/C (miles)	Length of new T/C (miles)	Total No. old & new T/C.	Total Length old & new T/C (miles).
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Akram wah.	3	32	-	-	3	32
Hamira minor.	14	42	-	-	14	42
Hadachar Disty.	33	132	4	16	37	148
Gada wah minor.	16	64	-	-	16	64
Vihari minor.	16	48	-	-	16	48
Karo Ali Bahar.	32	128	-	-	32	128
Mithna minor.	16	64	-	-	16	64
Char Kachan Disty.	33	132	-	-	33	132
Mehrib minor.	35	15	-	-	5	15
Wangi minor.	10	30	-	-	10	30
Ali wah large.	56	224	5	20	61	244
Adu wah.	11	33	-	-	11	33
Sher wah large.	29	116	2	8	31	124
Total:-	279	1060	11	44	290	1104

G.A. SYSTEM.

Gaja Branch.	23	112	6	24	34	136
Dodo wah.	17	51	2	6	19	57
Jamarki minor.	7	21	-	-	7	21
Dhandhi Disty.	32	128	4	16	36	144
Kumb Disty.	29	116	4	16	33	132
Gaja minor.	8	24	-	-	8	24
Bulri Disty.	35	140	6	24	41	164
Dhatt Disty.	37	148	16	64	53	212
Hassan Ali Disty.	22	66	3	9	25	75
Shorki Disty.	46	134	5	20	51	204
Khiryari Disty.	21	84	2	8	23	92
Total :-	232	1074	48	197	330	1261

SHADI LARGE SYSTEM.

Name of Channel.	No. of Length of old W/C	No. of Length of new W/C	No. of Length of old W/C & new W/C	Total Length old & new W/C
------------------	--------------------------	--------------------------	------------------------------------	----------------------------

Shadi wah Large	95	380	29	112	124	492
Bahadur wah.	50	200	2	8	52	208
Defence minor.	13	54	3	9	21	63
Khoski minor.	12	36	-	-	12	36
Beroveran Disty.	22	66	-	-	22	66
Kumbharo minor.	12	36	1	3	13	39
Pachar Disty.	25	100	1	4	26	104
Shadi small Disty.	36	144	3	12	39	156
Dubni Disty.	13	52	4	16	17	68
Total :-	233	1068	43	164	326	1232

KAZIA SYSTEM.

Kazia Branch.	81	324	15	60	96	384
Kamaro Disty.	59	236	3	12	62	248
Guraho Disty.	31	124	1	3	32	127
Noor wah minor.	23	69	-	-	23	69
Ganj Bahar Disty.	32	128	-	-	32	128
Total :-	226	881	19	75	245	956

SUNNI GUNI SYSTEM.

Sunni Guni Branch.	80	320	9	36	89	356
Sher wah small minor	11	33	-	-	11	33
Raj wah Kadhah Disty	67	268	9	36	76	304
Mor minor.	24	96	55	20	29	116
Total :-	182	717	23	92	205	809

350 acres of cultivable land.

The principles adopted for the design and construction

of water courses are dealt with in Volume III of Completion Report

VOLUME VII.

Chapter VIII.

LINING OF AKRAM TAHSIL; ESTIMATE AND
RATES OF LINING.

Akram Tah is the first lined channel ever constructed in Sind. According to the original scheme, the whole length of Akram Tah was to be lined with cement concrete upto R.D. 522.7 (70th mile X/Regulator of Tuleli). A rate of Rs. 152/- per % cft. of cement concrete lining was approved vide Chief Engineer Lower Sind Barge No. 3098-I(2) dated 8th September 1953. The rate analysis is attached at the end of this chapter as Annexure-I. The above rate was provisional and applicable to the retarded progress of 1500 cft. of concrete output per day of double shift per lining train. It was further instructed to increase the progress to 2000 cft per train per day to decrease the rate correspondingly. The progress, however, could not be increased and the average output per month per lining train remained below 50,000 cft. As the work proceeded further, it was anticipated that the rate would further increase on account of the increased lead of material specially stone. The suitability of brick lining was, therefore, considered. It was envisaged that brick kilns situated 3 to 4 miles apart would reduce the carriage from the kiln to Akram Tah and would accelerate the progress as well. The comparative rate analysis of C.C. lining and brick lining (attached at the end of P-110) however, showed that brick lining was not going to be economical and hence the proposal was dropped.

The portion of Akram Tah from R.D. 110 to 150 was already excavated when it was decided that Gaj Branch would offtake from R.D. 110 rather than R.D. 150 as per original design. This proposal necessitated a reduced section after R.D. 110. But as a wider section was already excavated and artificial consolidation for back fill was not desirable, it was proposed to have lining of the

excavated wider section but using a lining material of higher coefficient of viscosity. The water was then discussed with Mr. Mohd Moosa, the then Chief Engineer Irrigation, West Pakistan and Mr. A.R. Kazal, the then Left Bank Construction Circle by the then Deputy Chief Engineer in consultation with the Chief Engineer Irrigation West Pakistan not to carry out lining below R.D. 130. The lining of Akram Wah was discussed at length by Mr. Roy in his note dated 20th March 1954 but the then Finance Secretary disagreed with the Secretary Lowering Barrage particularly on the economics of the lining. It was felt that the lining was not going to pay for itself in the saving of water and could not be substantiated on economical grounds. The only case for lining was the reduction of addition of water to the subsoil table due to percolation and a certain amount of saving in the quantity of precious water supplies. It was, therefore, decided to dispense with the lining of further portion of Canal. The portion, from R.D. 130 to 191 was however decided to be lined on account of the following reasons.

1) The lining was to end at a large masonry structure to obtain adequate transition from lining to earthen portion and

2) The ground from R.D. 130 to R.D. 191 was fairly high where the canal was almost in a cut and the lining had a very good chance of operating successfully.

This was discussed with the Chief Engineer Irrigation West Pakistan on 20th July 1956 and was

approved by him under letter No. 924/GII/56/50378/179/56

dated 13.8.1956.

Comparison of actual working rates for 100 cft. of

C.C. lining as against B.B. lining near R.D. 110 is given

as Annexure III (PP-112-114). Detailed estimate of brick

lining from R.D. 120 to R.D. 130 sanctioned by Deputy

Chief Engineer Irrigation Hyderabad on 11.2.58 is attached

as Annexure IV (PP-115-124). Annexure V is a copy of

C.C. lining estimate sanctioned on 30.11.61.(PP-125-126).

ANNEXURE-I.

COPY OF RATE ANALYSIS FOR CEMENT CONCRETING SIDES AND BED OF AKRAM WAH SANCTIONED BY CHIEF ENGINEER LOWER SIND BARAGE WIDE NO. 3093-I(2) DATED 28TH SEP. 1953.

1. Rate of 100 cft. of concreting cement on assumption of 1500 cft. Out-put per day).
Civil labour including work charged establishment.
(double shift Rs. 13,470/- P.M. as per statement (1) attached (P-105).
∴ per day = $\frac{13,470}{25}$ = Rs. 538/13 say Rs. 539/-
2. Mechanical staff, lubrication oil and depreciation of machines per day. Rs. 160/-

3. Material.

Aggregate.	1500 cft.
Stone.	1650 cft.
Local sand.	500 cft.
Bholari sand.	250 cft.
Cement.	250 cft.
(1) Cost of 1650 cft. of stone	at 6/- % cft.

(11) Transport of 1650 cft of stone lead-6 miles at -/5/4 = $16.5 \times 3.5 \times \frac{1}{4} = 115/8$ Rs. 115/8

(111) Loading of 1650 cft of stone at Rs. 1/10 per % cft. Rs. 26/13

(1V) 250 cft. Bholari sand including transport @ Rs. 14/- per % cft. Rs. 35/-

(V) Cost of 500 cft. sand at Rs. 2/- % cft. Rs. 10/-

(VI) Transport of 500 cft. of sand for 2 mile lead at -/5/4 per ton miles. Rs. 13/11

(VII) Loading of 500 cft. of sand at Rs. 1/10/- per % cft. Rs. 8/2/-

(VIII) Cement 200 bags at Rs. 4/5 per bag. Rs. 862/8/-

(IX) Transport of 200 bags-lead 6 miles at -/5/4 per ton mile. Rs. 20/-/-

(X) Loading and un-loading of cement bags 200 Nos. at -/1/- per bag. Rs. 12/8/-

Total Item 3. Rs. 1203/2

Say Rs. 1203/-

4. Consumable articles.

- (1) Gunny bags.
- (b) Mats.
- (c) Wooden frames fitted
- (d) Spades etc.
- (e) Ropes.
- (f) Pipes etc.

L.S. Rs. 2000/- a month i.e. a day = Rs. 80/-

ABSTRACT.

(1)	Civil labour and supervising staff.	Rs. 539/-
(2)	Mechanical staff lubrication oil and depreciation of machines.	Rs. 160/-
(3)	Cost and Transport of materials.	Rs. 1203/-
(4)	Consumable articles.	Rs. 80/-

Total per 1500 cft. Rs. 1992/-
Cost of 100 cft. concreting = $\frac{1992}{15}$ Rs. 132/2/3
Say Rs. 132/- per % cft.

(a) CIVIL STAFF ON EACH LINING TRAIN.

1)	On Muster Roll Cooly 2x106 = @ 2/- a day = 424	
2)	Jamadar. 2x4=8 = @ 2/8 = 20	
3)	Masons. 2x5=10 = @ 5/- = 50/-	
4)	Bullock 2x1=2 = @ 6/- = 12/-	Cart.

:: In a month of 25 days = 12650.

WORKCHARGED ESTABLISHMENT.

1)	Mistries 6 Nos. @ 120/-	720
2)	Field storekeeper 1 No. @ 100/- = 100	

13470 per month.

STATEMENT SHOWING STRENGTH OF LABOUR PER DAY.

WORKCHARGED ESTABLISHMENT. (per lining train=double shift) Mistries.

1)	Concrete mistries. 4 Nos.	
11)	For bed sleepers, stone crushing etc. 2 Nos.	

6 Nos.

L A B O U R.

1) Coolies for laying concrete on 2 faces

{ 20
30 = 50 Nos.

11) Mixer coolies for filling faces.

4 Nos.

111) Sand filling in Measures and putting in mixer (150) coolies.

6 Nos.

11v) Hopper Coolies.

2 Nos.

v) Cement loading Coolies.

2 Nos.

vi) Cement from store Coolies.

2 Nos.

1 No. Bullock Cart

vii) Store Coolies.

20 Nos.

viii) Gunny Bags Coolies.

2 Nos.

ix) Water men with Mashak.

2 Nos.

x) Railway Gangmen.

6 Nos.

xi) Jambars.

4 Nos.

xii) Masons.

5 Nos.

ix) Coolies for bed sleeper concrete.

4 Nos.

x) Coolies for dressing sleepers in advance.

6 Nos.

106 Coolies.

4 Jambars.

5 Masons.

1 Bullock

Cart.

ANNEXURE II.

--: 107 :-

RATE ANALYSIS FOR CEMENT CONCRETING SIDE SLOPES AND BED OF ARKAT TANK, FROM R.D. 110 to 326.

All items except materials remain same as in previous analysis sanctioned by Government vide 3003-I(2) dated 8.9.53 attached at page-104).

3- MATERIALS.

1. Cost of 1650 cft. of stone at Rs. 6/- per 100 cft.

2. Transport of 1650 cft. of stone @ Rs. 20/- per % cft vide analysis (P-103).

3. Cost of 750 cft. of sand @ Rs. 2/- per % cft.

4. Transport of 750 cft. of sand for 1 mile lead by bullock cart.

5. Transport of 750 cft. of sand @ Rs. 3/15/6 per ton.

6. Loading of 750 cft. of sand @ Rs. 1/10/- per 100 cft.

7. Cement bags, 200 nos. @ Rs. 4/5/6 per bag.

8. Transport of 200 bags=10 tons @ 10 miles lead by Leyland trucks @ Rs. -/5/4 per ton mile.

9. Loading & unloading of cement bags @ -/1/- per bag.

Total :-

Rs. 1513-8-0

Rs. 12-8-0

Rs. 35-5-0

Rs. 362-8-0

Rs. 149-0-0

Rs. 15-0-0

Rs. 99-0-0

Rs. 330-0-0

Rs. 12-3-0

Rs. 1513-8-0

Rs. 359-0-0

Rs. 160-0-0

Rs. 1513-8-0

Rs. 30-0-0

Rs. 2292-8-0

Rs. 132-0-0

Rs. 2424-3-0

Rs. 5850/-/-

Contents of concrete in one panel = $36.19 \times 15 = 542.85$ cft.
For 1550 cft 3 brick sleepers are required on each side = 6 sleepers @ say Rs. 22/- each.
Grand Total:-

STEEPERS.

1. Civil Labour.
2. Mechanical staff etc.
3. Cost & Transport of Materials.
4. Consumable article.
Total :-

A B S T R A C T.

1. Cost of 1650 cft. of stone at Rs. 6/- per 100 cft.
2. Transport of 1650 cft. of stone @ Rs. 20/- per % cft vide analysis (P-103).
3. Cost of 750 cft. of sand @ Rs. 2/- per % cft.
4. Transport of 750 cft. of sand for 1 mile lead by bullock cart.
5. Transport of 750 cft. of sand @ Rs. 3/15/6 per ton.
6. Loading of 750 cft. of sand @ Rs. 1/10/- per 100 cft.
7. Cement bags, 200 nos. @ Rs. 4/5/6 per bag.
8. Transport of 200 bags=10 tons @ 10 miles lead by Leyland trucks @ Rs. -/5/4 per ton mile.
9. Loading & unloading of cement bags @ -/1/- per bag.
Total :-

3- MATERIALS.

All items except materials remain same as in previous analysis sanctioned by Government vide 3003-I(2) dated 8.9.53 attached at page-104).

RATE ANALYSIS FOR CEMENT CONCRETING SIDE SLOPES AND BED OF ARKAT TANK, FROM R.D. 110 to 326.

ANNEXURE II.

--: 107 :-

CALCULATIONS FOR RATE OF TRANSPORT OF STONE FOR
C.C. LINING AKRAM T.H. FROM R.D. 110 TO TAL.

SOURCE OF STONE. Khatwar Quarry with Railway siding.

Transporting stone from Khatwar Quarry to Matli Railway
Station by Rail and from Matli to R.D. 235 of Akram T.H. by
Dumpers may be taken as a fairly accurate average for the whole
Length.

T E A D S.

Khatwar siding to Matli Railway station
by rail. = 20 miles.

Matli station to R.D. 245 of Akram T.H.
by Dumpers = 10 miles (average lead).

RATE ANALYSIS FOR TRANSPORTING 100 CFT. OF STONE.

1. Loading into B.G. wagons at Khatwar
Quarry siding @ -/15/- % cft vide
schedule.

- 1(a) Carriage of stone from quarry
(stacks) to loading site 1/4.

2. Railway freight @ -/3/- per mile per
100 cft. for 20 miles.

3. Unloading from B.G. wagons at Matli
station @ -/10/- per 100 cft.

4. Loading into Dumpers @ 1/10/-
per 100 cft.

5. Transport of stone from Matli to R.D.
235 by dumpers 100 cft., = 3.5 tons
for 10 miles @ Rs. -/5/4 per ton mile.

344 Rs. 20/-/-

RATE ANALYSIS OF ITEM 2 (above) FOR TRANSPORT OF
STONE BY RAIL (P.W.D. RATE OF 45 WAGONS).

1. Charge for whole train carrying 900
tons @ Rs. 3/12/- per mile for 20 miles.

2. Charges for return of empty train @
Rs. 2/8/- per mile for 20 miles.

3. Hire of rate @ -/3/6 when loaded and
-/1/- per vehicle per mile when empty
45 x 20 x 4.5/16.

4. Charge on marked capacity @ -/4/6
per ton on 900 tons.

For 900 tons & 20 miles lead = Rs. 631/4

For 3.5 tons & 1 mile lead. = Rs. 631.25 x 3.5/900 x 20
= 2 annas.

Rate per 100 cft per mile. = 2 annas.

Working rate of R.B. Division. = 3 annas per 100 cft. per mile.

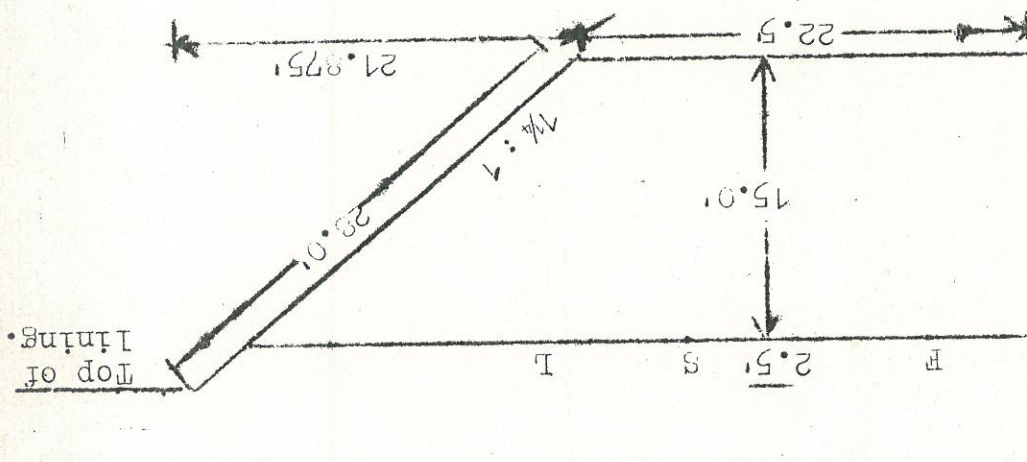
Adopt -/3/- per 100 cft.

RAJAH ANALYSIS FOR BRICKS LINING AKRAM WAH BELOW R.D. 110.

:- 109 :-

Approved section of Akram Wah with cement concrete lining (N = .016) is 43.5' x 14.2' and for brick lining i.e., n = .018 equivalent section is 45 x 15 (design calculations available on P-111).

Assume the following section for working out rate per ft. length of canal.



Average perimeter i.e., along the joint of the two layers. = $45 + 2 \times 28.00 = 101.00$ ft.

Average surface of lining per ft. length for both layers. = 101.00 ft.

1- : No. of 10"x10"x2" tiles in bottom layer. = $\frac{100}{101 \times 144} = 8.47$ Nos.

No. of 10"x10"x2" tiles in top layers of bed = $\frac{100}{45 \times 144} = 65$ Nos.

Total:- 211 Nos.

Add 10% wastage. 21 Nos.

2- No. of 10"x5"x5" bricks for top layer of side slopes. = $\frac{50}{56.00 \times 144} = 162$ Nos.

Add 10% wastage. 16 Nos.

Total :-

178 Nos.

-:110:-

- 5- Cement mortar 1:6 required for--
- a) Plaster between layers of tiles $2 \times 101.00 \times 0.5 = 8.42$ cft.
& bottom of tiles.
- b) For Laying $10'' \times 10'' \times 2''$ tiles $= 211 \times 2 (2 \times 10) \times \frac{12}{0.5} = 2.44$ cft.
- c) For Laying $10'' \times 5'' \times 3'' = 162 \times \left\{ \frac{10 \times 3}{144} + \frac{5 \times 3}{144} \right\} \times \frac{12}{0.5} = 2.12$ cft.

Total :-
12.98 cft.
Add 10% wastage.
1.30 cft.
=14.28 cft.

A B S T R A C T.

1. Cost of $10'' \times 10'' \times 2''$ bricks tiles 232 Nos., @ say Rs. 40/-/- 1000 Nos. 9/4/-

2. Cost of $10'' \times 5'' \times 3''$ bricks tiles 178 Nos., @ say Rs. 31/3/- 1000 Nos. 5/9/-

3. Cost of materials for 1:6 cement mortar 14.28 cft. @ 61/6/-per %cft. 8/12/-

4. Labour cost for Laying $\frac{1}{2}''$ thick plaster 203 sft @ 7/14/- % cft. 115/15/-

5. Labour cost for Laying $10'' \times 10'' \times 2''$ tiles 101.00 + 45 = 146.00 sft. @ Rs. 11/13 % cft. 17/4/-

6. Labour cost for Laying $10'' \times 5'' \times 3''$ bricks 56.00 sft., @ Rs. 17/2/- % sft. (vide schedule item 37). 9/9/-

7. Transport as per statement (P- 114). 5/6/0

Rate of bricks lining. = say Rs. 72/-/- per Rft.

Cubical content of masonry in 1 Rft. of lining
 $= \frac{47 \times 5}{12} + \frac{56.00 \times 6}{12} = 19.60 + 28.00 = 47.60$

For 100 cft. of masonry, rate $= \frac{71.69 \times 100}{47.60} = 150/3/-$

Rate of bricks lining on schedule rates = Rs. 7,200/-/- per 100 sft.

COMPARISON.

Estimated rate of C.C. Lining.

estimated rate of B.B. Lining.

- (1) Per 100 cft. = Rs. 161-10-0 Rs. 150/3/-
- (2) Per Rft. = Rs. 53-8-0 Rs. 72/0/-
- (3) Per 100 Rft. = Rs. 5850-0-0 Rs. 7200/0/-

-- 111 --

$$N = .018, Q = 3248 \quad S = .08/1000 \text{ Rft.}$$

Assume section 46 x 14.5

$$\text{Area} = (46 + 14.5 + 3.625) \times 14.5 = 929.8 \text{ sqft.}$$

$$P = 46 + 2 \times 14.5 / 1 + (1.25)^2 = 46 + 46.422 = 92.422 \text{ ft.}$$

$$\therefore R = \frac{92.422}{929.8} \text{ ft.}$$

$$\therefore V = \frac{1.4358}{2} \times R / 3 \times 3/2 \times (.00008)^{2/3} \times 1.4858 \times \left\{ \frac{.018}{92.422} \right\}^{2/3}$$

$$\therefore A = Q/V = \frac{3248}{3.3623} = 966.0 \text{ sqft.}$$

Difference in area is considerable hence further trial is essential.

Assume section 45 x 15 as a second trial.

$$\text{Area} = (45 + 15 + 3.75 \times 15 = 956.25 \text{ sqft.}$$

$$P = 45 + 2 \times 15 / 1 + (1.25)^2 = 45 + 48.023$$

$$= 93.023 \text{ ft.}$$

$$\therefore R = \frac{956.25}{93.023} \text{ ft.}$$

$$\therefore V = \frac{1.4358}{2} \times \left(\frac{956.25}{93.023} \right)^{2/3} \times (.00008)^{2/3} \times 1.4858 \times \left\{ \frac{.018}{93.023} \right\}^{2/3}$$

$$= 3.411 \text{ ft/sec.}$$

$$\therefore A = Q/V = \frac{3248}{3.411} = 952.2 \quad \therefore \text{O.K.}$$

ANNEXURE III.

ANALYSIS OF ACTUAL WORKING RATES FOR 100 CFT.
OF G.C. LINING NEAR R.D. 110.

1. CIVIL LABOUR (FOR 100 CFT.)

- (a) Laying concrete etc.(contractor.) 33-7-0
(b) Departmental w/c Estt: 2-0-0
(c) Consumable articles included 0-0-0
In (a) above.

33-7-0
36-0-0
say.

2. COST OF MATERIALS (FOR 1500 CFT.).

- (a) Cost of 1650 cft., of stone
at Rs. 6/8/- (including losses &
supervisory charges). 107-8-0

- (b) Cost of cement at 5/6 per bag
for 200 bags (issue rate 5/4/-) 1100-0-0

- (c) Cost of 750 cft. sand at Rs. 1/-
per % cft. 7-8-0

Total :- 1215-0-0

3. COST OF TRANSPORT OF MATERIALS (FOR 1500 cft)

- (a) 1650 cft., of stone (average lead
from Khattar quarry 6 miles)
(actual rate of Rs. 12/-/-.) 198-0-0

- (b) Loading & un-loading etc. 26-3-0

- (c) Cartage of sand 750 cft., at Rs. 19/-
per 100 cft., (5 tons/100 cft). 142-8-0

- (d) Cement cartage 200 bags (10 ton). 24-0-0

- (e) Loading & un-loading Rs. 2/-
per 100 bags. 4-0-0

Total :- 396-0-0

say Rs. 396/-/-.

4. MECHANICAL CHARGES (FOR 1500 cft.)

including depreciation etc. ... 160-0-0

Total :- Rs. 1215-0-0

Rs. 396-0-0

Rs. 150-0-0

G.Total 2, 3, 4 & above Rs. 1771-0-0
per 100 cft. ... Rs. 1771 x 100 = 177100-0
Total rate - 113-0-0

113-0-0

36-0-0

154-0-0 per % cft.

The sanctioned rate is Rs. 132/-/- per % cft.

% above is 16.7%

Estimated cost of cement	362-8-0
Actual cost.	1100-0-0
Difference.	237-3-0
1. Rate per 100 cft.	= Rs. 154-0-0
2. Rate per 1 Rft.	= Rs. 63-3-0
3. Rate per 100 Rft.	= Rs. 6350-0-0

ABSTRACT OF COST OF BRICK LINING
(ON ACTUAL WORKABLE RATES).

- Cost of 10"x10"x2" brick tiles 232 nos. @ Rs. 50/- per 1000 nos Rs. 11-10-0
- Cost of 10"x5"x3" brick tiles 173 nos. @ Rs. 36/- per 100 nos. Rs. 6-7-0
- Cost of materials for 1:6 cement mortar 14.23 cft. @ Rs. 76/3 per 100 cft. as per rate analysis Rs. 10-15-0
- Labour cost for laying 1/4" thick plaster 203 sft. @ Rs. 10/- per 100 sft. Rs. 20-5-0
- Labour cost for laying 10"x10"x2" tiles 146.00 sft. @ Rs. 15/- per 100 sft. Rs. 22-0-0
- Labour cost for laying 10"x5"x3" 56.00 sft. @ Rs. 20/- per 100 sft. Rs. 11-5-0
- Transport as per statement attached Rs. 6-4-0

Total :- Rs. 88-14-0

say Rs. 89/- per Rft.

Workable Rate of brick lining Akram Mah = Rs. 8,900/- per 100 Rft. Against Actual working rate of C.C. Lining at R.D. 110 = 6350/- per Rft.

Material rate for cement mortar 1:6 100 cft.

Scheduled rates. Workable rates.

100 cft., sand @ 1/- cft. 1-0-0

13.4 bags cement @ 4/- P.Bag. 53-10-0 @ 5/-

Total :-

add 10% contractor's profit. 5-7-0

60-1-0

@ 2.2% Turnover Tax.

1-5-0

say ... 76/3/-

Rate - Rs. 61/6/- per % cft.

TRIMPORT STATEMENT

Quantity	Brick	Brick	Cement.	Sand.
1.Cement mortar 14.6cft	10"x5"x3"	10"x10"x2"	2 bags	14.34 cf
2.Bricks 10"x5"x3"	178	-	-	-
3.Brick 10"x10"x2"	--	232	-	-

Total :-

178 Nos 232 Nos 2 bags 14.34 cf
@ 3.5 tons 4.6 tons %0

Weight.

0.62 tons. 1.07 tons 1 ton 0.716

Lead.

1.5 miles 1.5 miles 10miles 1 mile

Bullock cart.

Rate per ton.

1/-ton. 1/-P.ton 3/5/4 3/15/6

P.ton.

Amount.

-/10/- 1/1/1 -/5/4 2/13/10

Total :

Allow 8/-L.S.
for stacking.

Total :-

5/6/3

-/8/-

4/14/3

Say Rs. 5/6/- . (Refer P-110)

ON workable rates.

-/15/-

1/9/6

-/5/4

2/13/10

5/11/6+8 for stacking
= 6/3/6

Say Rs. 6/4/- . (Refer P-113).

ANNEXURE IV.

Copy of Brick lining estimate of Akram wah from R.D. 120 to 130 for Rs. 7,23,849/- sanctioned under Deputy Chief Engineer, Irrigation Hyderabad No. 8093/I-(1), dated 11.2.1958.

BRICK LINING OF AKRAM WAH FROM R.D. 120 TO 130.

A B S T R A C T.

Quantity.	Item.	Rate.	Per.	Amount.
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6,05,047 sft.

1) Brick lining in side slopes with 10"x10"x2"

1st class tiles in sur-

face layers in 1:3

cement mortar and 1:2

cement pointed and

10"x5"x3" 1st class

tiles in 1:6 cement

mortar in 2nd layer with

1/2" thick 1:6 cement

plaster sand-witcheed and

1/2" thick 1:6 cement

plaster at base layer

including final dre-

ssing water arrangement

and transport etc.

Complete rate analysis

attached at P- 118.

3,92,595 sft.

2) Brick lining in bed

with 10"x10"x2" 1st class

tiles in surface layer in

1:3 cement mortar and 1:2

cement pointed and 10"x10"x2"

1st class tiles in 1:6 cement

mortar in 2nd layer and 1/2" thick

1:6 cement plaster sand

witcheed & 1/2" thick 1:6 cement

plaster as base layer inclu-

ding final dressing, water

arrangement. Rate analysis

attached at P- 119 .

76,111 sft.

3) Profile walls

(slopes). Rate analysis

attached on P-122.

Transportation (as

per statement

attached P-123).

Add contingencies @ 5%

%

Add 1 1/2/Estt: charges.

Total :-----

7,23,849/-

10697/-

713152/-

33960/-

679192/-

38321/-

53362/-

204149/-

372860/-

BRICK LINING OF KRM TUN FROM P.D. 120 TO 130.

MEASUREMENT.

DESCRIPTION.	No.	Length.	Breadth.	Total.
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1) Brick lining in side slopes with 10"x10"x2" Ist class tiles in surface layer in 1:3 cement mortar and 1:2 cement pointed and 10"x5"x7" Ist class tiles in 1:6 cement mortar in 2nd layer with 1/2" thick 1:6 cement plaster sand-witcheed and 1/2" thick 1:6 cement plaster at base layer including final dressing water arrangement & transport charges etc. complete.

a) Width of side slopes to be lined.- 22.43 + 9.6 = 32.03 ft. (Refer calculation sheet on P-117).

b) Length to be lined.- 10000 ft. deduct width of sleeper for 15 interval = $\frac{10,000}{15} = 666 \times 10 = 555 \text{ ft.}$

Total length to be lined.

= 10,000-555 = 9445

Area of side slopes to be lined. 2 x 9445 x 32.03 = 6,05,047.3 ft

2) Brick lining in bed with 10"x10"x2" Ist class tiles in same as above.-

Bed width = 42.04 ft.

(a) deduct width of 2 No. toe walls of 10" each $2 \times 10" = 1.66 \text{ ft.}$

∴ net width to be lined

42.04-1.66 = 40.38 ft.

(b) Length to be lined = 10,000 ft.

deduct width of bed sleeper.

50 ft. apart = $\frac{10,000}{33 \times 10} = \frac{30}{12} = 277.5 \text{ ft.}$

∴ net length to be lined 10,000-277.5

= 9722.5 ft.

Area of bed to be lined. 1 x 9722.5 x 40.38 = 3,92,595.3 ft

3) Profile walls.-

(a) Toe walls in side slopes. 2 x 10,000 = 20,000

(b) sleeper in side slopes @ 15 ft.

Interval = $\frac{10,000}{15} = 666 \text{ No.}$

= 666 No.

∴ Total length of 666 No. sleeper

in both sides.

2 x 666 x 32.03 = 42,664

(c) Sleeper in bed @ 30 ft. intervals.

$\frac{10,000}{30} = 333 \text{ No.}$

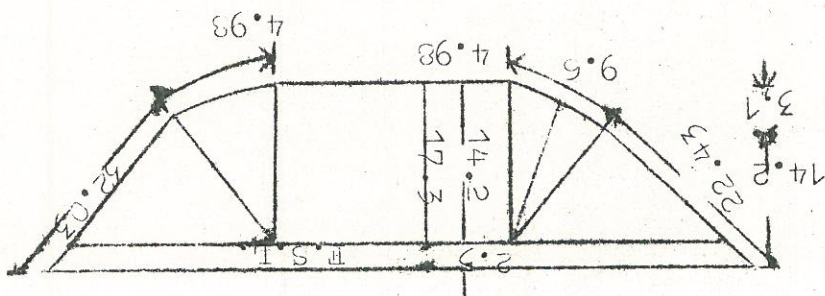
∴ Total length of sleeper in bed 1 x 333 x 40.38 = 13,447

Total :-

76,111.3 ft.

Brick lining of stream wash from R.D. 120 to 130 = 10 RDS

Section = 52 x 14.2.


$$\frac{\text{Perp}}{\text{Hyp.}} = \sin \theta = \frac{4.98}{7.62479} = \sin 38^\circ - 40' = 4.98$$
$$\frac{\text{Perp}}{\text{Hyp}} = \sin \theta = \frac{\text{Perp}}{4.98} = \sin 38^\circ - 40' = .62479$$
$$\therefore \text{Perpendicular Distance} = 4.98 \times 0.62479 = 3.11 \text{ ft.}$$

Total depth upto the bottom of lining = $14.2 + 2.5 + 0.43$

$$= 17.13 \text{ ft} \cdot \text{ft}$$

∴ Inclined length. $= 1.6 \times (17.13 - 3.11)$

$$= 22.47 \text{ ft.}$$

Length of curve.

$$= 27 \times 14.2 \times \frac{38.66}{360}$$

$$9.6 \text{ ft.} = \text{Total length} = 22.43 + 9.6 = 32.03 \text{ ft.}$$

Rate analysis for 100 sqft. of Brick lining in side slopes with 10"x10"x2", 1st class tiles in surface layer in 1:3 cement mortar and 1:2 cement pointed and 10"x5"x2" Ist class tiles in 1:6 cement mortar in 2nd layer with 1/2 thick 1:6 cement plaster sand withched and 1/2" thick 1:6 cement

P.T.O.

Plaster at base layer including final dressing and water arrangement.

1. COST OF MATERIAL.

1. 10"x10"x2" Ist class tiles in surface layer 153 No. @ 40% (details of material given on P-120).

2. 10"x5"x7" Ist class tiles in 2nd layer 317 No. @ 31/3% (details of material given on P-120).

3. 1:2 cement mortar for pointing (2/3 of Rs. 1-6-0, the cost of material of cement pointing for 100 sft. of brick masonry vide item No. 13).

4. 1:3 cement mortar in joints (Rate as per estimate sanctioned by D.C.E. vide his No. 3095/1-(I), dated 11.2.57, 12.37, 2.05 cft. @ 111/- % cft.

5. 1:6 cement mortar in joints and two 1/2" thick plaster layers (Rate as per estimate sanctioned by D.C.E. vide his No. 3095/1-(I), dated 11.2.57, 12.37 at 55/13/6 % cft. (details given on P-120).

Total cost:-

26/6/1

6/14/1

2. LABOUR CHARGES.

1. Laying 10"x10"x2" Ist class tiles in 1:3 cement mortar 100 sft. including 1:2 cement pointing @ 11/13% sft. (details given on P-121).

2. Laying 10"x5"x7" Ist class tiles in 1:6 cement mortar 100 sft. excluding cement pointing at 11/14 (details given on P-121).

3. Laying 1:6 cement plaster (Rate as per estimate sanctioned by D.C.E. vide his No. 3095/1-(I), dated 11.2.1957) 200 sft. @ 4/10 % sft.

4. Final dressing 100 sft. @ 1/5 % sft.

5. Water arrangement including pumping, boring tube well or making water course etc. complete.

Total labour charges. Rs. 35/4/-

Total rate per 100 sft.

1. Material. 26/6/1

2. Labour. 35/4/-

61/10/1

Total say Rs. 61/10/-. (Refer P-115).

Rate analysis for 100 sft. of brick lining in bed with 10"x10"x2", Ist class tiles in surface layer in 1:3 cement mortar and 1:2 cement pointed and 10"x10"x2" Ist class tiles in 1:6 cement mortar in 2nd layer with 1/2" thick 1:6 cement plaster sand-witched and 1/2" thick 1:6 cement plaster as base layer

including final dressing and water arrangement.

COST OF MATERIAL.

- 1) 10"x10"x2" Ist class tiles 317 No. @ 40/- % Nos. (Details given on P-120).
- 2) 1:2 cement mortar for pointing (2/3 of Rs. 1/6/-, cost of material of cement pointing per 100 sq. ft. masonry vide item No. 13) 2/3 x 1/6/-
- 3) 1:3 cement mortar in joints = 2.05 cft. @ 111/- % cft. & in laying & joints top layer. (Details of material give on P-120) (Rates per estimate sanctioned by D.C.E. No. 8095/I (I), dated 11.2.57)
- 4) 1:6 cement mortar in joints and two 1/2" thick plaster layer 11.21 cft @ 55/13/6 % cft (Rates per estimate sanctioned by D.C.E. vide his No. 8095/1-(I), dated 11.2.57) (details given on P-121).

Total Material :-

22/1/9

Labour Charges.

- 1) Laying 10"x10"x2" Ist class tiles in 1:3 cement 100 sq. ft. @ 11/13/- (mortar including 1:2 cement pointing top layer).
- 2) Laying 10"x10"x2" Ist class tiles 100 sq. ft. @ 6/9 per % sq. ft. in 1:6 cement mortar in 2nd layer. (Bottom layers) (details given on P-121).
- 3) Laying 1:6 cement plaster (Rates as per estimate sanctioned by D.C.E. vide his No. 8095/1-(I), dated 11.2.57) 200 sq. ft. @ 4/10 % sq. ft.
- 4) Final dressing 100 sq. ft. @ 1/5/- % sq. ft.
- 5) Water arrangement including pumping, boring tube wells and making water course etc. complete 1/-/-

Total Labour Charges :-

29/15/-

Total rate :-

1. Material. 22/1/9
2. Labour charges. 29/15/-

52/-/9 per % cft.

Say Rs. 52/- % cft. (Refer P-115)

Material for 100 sq. ft. of brick lining in side slopes

with 10"x10"x2", Ist class tiles in 1:3 cement mortar 1:2

cement pointed in surface layer and 10"x5"x3" Ist class flat

tiles in 1:6 cement mortar in 2nd layer with 1/2" thick 1:6

cement plaster at base and $\frac{1}{2}$ " thick 1:6 cement plaster sand
switched between two tiles layers.

1. 10"x10"x2" 1st class tiles in surface layer $\frac{100 \times 12 \times 12}{10 \times 10} = 144$

Add 10% for waste 14

(Refer P-118) 158

2. 10"x5"x3" 1st class tiles in 2nd layer. $\frac{100 \times 12 \times 12}{10 \times 5} = 288$

Add 10% waste. 29

(Refer P-113) 317

3. 1:3 cement mortar in joints of 10"x10"x2" surface layer
same as item of material statement for bed lining = 2.05 cft.

(Refer S.No.2 below).

4. 1:6 cement in joints of 10"x5"x3" tiles 2nd layer

Vertical joints $\frac{288 \times 30 \times 1}{12 \times 3 \times 12} \times \frac{1}{3} = 1.38$

Horizontal joint $100 \times 1/8 \times 1/12 = 1.04$

2.92

Add 10% waste. .29

3.21 cft.

5. 1:6 cement mortar in base layer and sand switched layer.

$\frac{200 \times 1}{12} = 3.33$

Add 10% for waste.

9.16

Total of item 4 & 5 = 3.21 + 9.16 = 12.37

(Refer P-118)

Materials for 100 sq. ft. of brick lining in bed with 10"x10"x2"

1st class tile in surface layer in 1:3 cement mortar and 1:2

cement pointed and 10"x10"x2" 1st class tiles in 2nd layer in

1:6 cement mortar with $\frac{1}{8}$ " thick 1:6 cement plaster at base and

in between the two tile layers.

1. 10"x10"x2" 1st class tiles in 1st layer. $\frac{100 \times 12 \times 12}{10 \times 10} = 144$

10"x10"x2" 1st class tiles in 2nd layers. $\frac{100 \times 12 \times 12}{10 \times 10} = 144$

Add 10% for waste.

288

29

(Refer P-113)

317
brick

2. 1:3 cement mortar in joints of 10"x10"x2" surface
layer $\frac{1}{4}$ " thick

Vertical joints $144 \times 40 \times \frac{1}{12} \times \frac{1}{2} = 0.83$ cft.

Horizontal joint $100 \times 1/8 \times 1/12 = 1.04$ cft.

1.37

Add 10% waste. 0.13 cft.

2.05 cft.

3. 1:6 cement mortar in joints of 2nd layer 10"x10"x2" layer $\frac{1}{2}$ "
thick joints). Same as 2. above. 2.05 cft.

4. 1:6 cement mortar in 1/2" thick plaster at base and in between the two tile layers. $200 \times \frac{2 \times 12}{2} = 8.33$

add 10% wastage 0.83

9.16 cft.

Total of item 3 and 4 = 2.05 + 9.16 = 11.21 (Refer P-119)

1. Labour rate for laying 10"x10"x2" tiles in brick lining with cement pointing for 100 sq. ft.

Labour rate for 100 sq. ft. of laying tiles in flooring laid on 5" well rammed lime concrete vide item 36. 14/12/-

Deduct labour rate for 25 cft. of lime concrete at 11/13/- % cft. vide item rate for laying tiles including cement pointing for 100 sq. ft. Net. 11/13/-

2. Labour rate for laying 10"x10"x2" in brick tiles lining without cement pointing 100 sq. ft. (Refer P-119)

Labour rate for laying 10"x10"x2" in flooring with cement pointing vide R. No. I (above) 11/13/-

Deduct amount for cement pointing included in the rate at 2/3rd of the labour rate of cement pointing for 100 sq. ft. in masonry 2/3rd of (7/14/-) = 5/4/-.

Rate for laying 10"x10"x2" without cement pointing 100 sq. ft.

6/9/- (Refer P-119)

3. Labour rate for laying 10"x5"x3" flat bricks in lining without cement pointing:-

Labour rate for laying 10"x5"x3" flat brick on 5" well rammed lime concrete with cement pointing for 100 sq. ft. vide item 37. Deduct labour rate of 25 cft. lime concrete at 11/13 % cft.

Deduct for cement pointing (Labour) at 5/4/- % sft. 17/2/-

11/14/-

Labour rate for laying 10"x5"x3" flat tiles in lining without cement pointing 100 sq. ft. is 11/14/- (Refer P-119)

RATE ANALYSIS FOR PROFILE WALLS (BRICK STEEPER) UNIT 100 RB (AS PER ESTIMATE SANCTIONED WIDE D.C.R. NO. 8095/1-11(1), DATED 11.2.57.

a) Bricks 10"x5"x3" 1st class.

1st layer 15" wide = 360 No.

2nd & 3rd layer 10" each 2x240 = 480

240 Nos. 84

add 10% wastage

Total :-

924

@ Rs. 31/8 per % No = Rs. 29/1/-

303

b) Plaster 1:6 1/2" thick

- i. top of 15" wide layer = 100x15/12x1/24 = 5.20 cft.
ii. For 10" wide layer = 100x10/12x1/24 = 3.47 cft.
iii. For laying 1/8" thick = 100 x 10 x 1/8x1/12 = 0.38 cft.
iv. For joints 1/2" thick = 360x3/12(10+5) x 12x1/12 = 2.34 cft.
v. For joints 1/4" thick = 240x3/12x10/12x1/4x12 = 1.00 cft.
12.89 cft.
1.29
14.18 cft.

Wastage 10%

14.18 cft. @ Rs. 55/13/6 per %cft. (schedule rate) Rs. 7-14-6

c) Cement mortar 1:3, 10"x5"x3" bricks.

- (i) For laying 100x10/12x1/8x1/12 = 0.37 cft.
(ii) For joints 240x3/12x10/12x1/4x12 = 1.00 cft.
(iii) For pointing = 0.67 cft.

Wastage 10%

2.54
2.30 cft.

2.8 cft. @ Rs. 111/2/- per % cft.

d) Labour.

- i) Labour for laying 1st layer & 2nd layer excluding cement pointing @ 1/4/8/- (Item 37 deducting 1/3rd Labour. 19/4/-
ii) Labour for cement pointing 3 layers of 85 sft. in 1:30 14/8 (Item 37 deducting 1/3 Labour 12-0-0
for cement pointing.

iii) Labour of cement plaster 100x(15+10) = 208 sft. 9/10/-
Total (d) @ 4/10. 40-14-0

e) Final dressing (approved rate). 1-5-0

f) Water arrangement including pumping etc. complete 1-0-0

Total

(a) 29-1-0

(b) 7-14-6

(b) 3-2-0

(d) 40-14-0

(e) 1-5-0

(f) 1-0-0

83-4-6

333 83/4/-

(Refer F-115).

123 :-

Quantity.	Item.	Rate	Per	Amount.
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605047 gft. 1) B.B. Lining in side slopes. 3/11/- % gft. 22,311/- (details given below)

392595 gft. 2) B.B. Lining in bed. 3/3/- % gft. 12,514/- (details available on P-124).

76111 Rft. 3) B.B. Rime in Pro- file walls. (details available on P-124) . 5/4/- % Rft. 3,996/-

58,921/-

No.	Item.	Quantity.	Unit.	Price.	Total.
1	Bricks	1000	sq. ft.	1.00	1000.00
2	Cement	1000	sq. ft.	1.00	1000.00
3	Sand	1000	sq. ft.	1.00	1000.00
4	Gravel	1000	sq. ft.	1.00	1000.00
5	Reinforcing Steel	1000	sq. ft.	1.00	1000.00
6	Formwork	1000	sq. ft.	1.00	1000.00
7	Paint	1000	sq. ft.	1.00	1000.00
8	Plaster	1000	sq. ft.	1.00	1000.00
9	Insulation	1000	sq. ft.	1.00	1000.00
10	Roofing	1000	sq. ft.	1.00	1000.00
11	Windows	1000	sq. ft.	1.00	1000.00
12	Doors	1000	sq. ft.	1.00	1000.00
13	Handrails	1000	sq. ft.	1.00	1000.00
14	Lighting	1000	sq. ft.	1.00	1000.00
15	Electrical	1000	sq. ft.	1.00	1000.00
16	Plumbing	1000	sq. ft.	1.00	1000.00
17	HVAC	1000	sq. ft.	1.00	1000.00
18	Fire Protection	1000	sq. ft.	1.00	1000.00
19	Security	1000	sq. ft.	1.00	1000.00
20	Landscaping	1000	sq. ft.	1.00	1000.00
21	Site Preparation	1000	sq. ft.	1.00	1000.00
22	Foundation	1000	sq. ft.	1.00	1000.00
23	Framing	1000	sq. ft.	1.00	1000.00
24	Roof Deck	1000	sq. ft.	1.00	1000.00
25	Roofing Membrane	1000	sq. ft.	1.00	1000.00
26	Roofing Tiles	1000	sq. ft.	1.00	1000.00
27	Roofing Flashing	1000	sq. ft.	1.00	1000.00
28	Roofing Gutter	1000	sq. ft.	1.00	1000.00
29	Roofing Siding	1000	sq. ft.	1.00	1000.00
30	Roofing Shingles	1000	sq. ft.	1.00	1000.00
31	Roofing Underlayment	1000	sq. ft.	1.00	1000.00
32	Roofing Vapor Barrier	1000	sq. ft.	1.00	1000.00
33	Roofing Insulation	1000	sq. ft.	1.00	1000.00
34	Roofing Joists	1000	sq. ft.	1.00	1000.00
35	Roofing Rafters	1000	sq. ft.	1.00	1000.00
36	Roofing Trusses	1000	sq. ft.	1.00	1000.00
37	Roofing Bracing	1000	sq. ft.	1.00	1000.00
38	Roofing Decking	1000	sq. ft.	1.00	1000.00
39	Roofing Sheathing	1000	sq. ft.	1.00	1000.00
40	Roofing Siding	1000	sq. ft.	1.00	1000.00
41	Roofing Shingles	1000	sq. ft.	1.00	1000.00
42	Roofing Underlayment	1000	sq. ft.	1.00	1000.00
43	Roofing Vapor Barrier	1000	sq. ft.	1.00	1000.00
44	Roofing Insulation	1000	sq. ft.	1.00	1000.00
45	Roofing Joists	1000	sq. ft.	1.00	1000.00
46	Roofing Rafters	1000	sq. ft.	1.00	1000.00
47	Roofing Trusses	1000	sq. ft.	1.00	1000.00
48	Roofing Bracing	1000	sq. ft.	1.00	1000.00
49	Roofing Decking	1000	sq. ft.	1.00	1000.00
50	Roofing Sheathing	1000	sq. ft.	1.00	1000.00

No.	Item.	Quantity.	Unit.	Remarks.
	Quarry Bricks	10" x 5" x 3" Nos.		
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	Bricks	10" x 5" x 3" Nos.		
	Bricks			

1.	2.	3.	4.	5.	6.	Total :-
1. Lining 10"x10"x2"	100 sqft.	100 sqft.	100 sqft.	100 sqft.	100 sqft.	500
2. Lining 10"x5"x3"	317	317	317	317	317	1584
3. 1/4" cement Mortar 1:3 for joints.	2.05cft.	2.05cft.	2.05cft.	2.05cft.	2.05cft.	10.25
4. 1/4" cement Mortar For joint 1:6 in tiles 10"x10"x2"	2.05cft.	2.05cft.	2.05cft.	2.05cft.	2.05cft.	10.25
5. 1/4" cement Mortar For joints 1:6 in bricks 10"x5"x3"	3.21cft.	3.21cft.	3.21cft.	3.21cft.	3.21cft.	16.05
6. 1/2" cement plaster size.	9.16cft.	9.16cft.	9.16cft.	9.16cft.	9.16cft.	45.8
						100

.. .. : 1000

Weight in tons.	Lead in miles.
1.1	1 1/2
.85	1 1/2
.75	5
.73	2

Rate per mile per ton by truck including 22%

• 32490ms

Topol Charles. 1-3-0 0-14-9 8-8-0 1-1-0

7041 3-11-5 3AY.....3/11/- % 3J5.

∴ Amount for 6,05,047 gft. @ 3/11/- % gft. = 22,311/-

Transport charges of material for 100 sft. of B.B. Lining in bed of Akram wah from R.D. 120 to 130.

No.	Item.	Quantity	Brick size	(Nos.)	Cement (cft.)	Sand (cft.)
-----	-------	----------	------------	--------	---------------	-------------

1.	Lining of 10"x10"x2" tiles in 2 layer.	100 sft.	317	-	-	-
2.	1:3 cement mortar for 1st layer.	2.05 cft.	-	0.57	2.05	-
3.	1:2 cement mortar for pointing.	0.44 cft.	-	0.22	0.44	-
4.	1:6 cement mortar in 2nd layer.	2.05 cft.	-	0.34	2.05	-
5.	1:6 cement mortar for 1/2 plaster last 2 layers.	9.16 cft.	-	1.53	9.16	-
Total :-		317	2.66	13.70	-	-
Weight in tons.		1.7	0.13	0.61	-	-
Lead per mile.		1 1/2	5	2	-	-
Rate per mile per ton by trucks, including 22% surcharge.		1/1/4	3/9/11	1/7/2	-	-
Total :-		1/13/4	-/7/8	-/14/2	-	-

Total rate = say 3/3/- per % sft.

Amount for 3,92,595 sft. @ 3/3/- per % sft. = 12,514/- (Refer P-123).

Transport charges of material for profile walls in side slopes, bed and toe walls (100) Rft. Akram wah from R.D. 120 to 130.

No.	Item.	Quantity	Bricks	(Nos.)	Cement (cft.)	Sand (cft.)
-----	-------	----------	--------	--------	---------------	-------------

1.	1st class Bricks 10"x5"x2"	100 sft.	924	-	-	-
2.	Plaster 1:6 in 3 layers each 1/2" thick.	14.18 cft.	-	2.36	14.18	-
3.	Cement mortar in laying & pointing ratio 1:3	2.8 cft.	-	0.93	2.8	-
Total :-		924	3.29	16.98	-	-
Weight in tons.		3.21	0.16	0.32	-	-
Mileage.		1 1/2	5	2	-	-
Rate per mile per ton by truck including 22% surcharge.		1/1/4	3/9/11	1/7/2	-	-
Total 5/3/10 say. 5/4/- per % Rft.		3/7/7	-/9/3	1/3/0	-	-

Amount for 76,111 Rft. @ 5/4/- % Rft. = 3,996/- (Refer P-123).

ANNEXURE V.

Copy of cement lining estimate of Akram Wah from R.D. 94.5 to 110 for Rs. 15,30,231/- sanctioned under Deputy Chief Engineer Irrigation Hyderabad Region No. 3098/1-7(1), dated 30.11.1961.

ABSTRACT SHEET.

Cement concreting from R.D. 94.5 to 110.

Quantity.	Item.	Rate.	Per.	Amount.
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1. Cement concreting

1:3:6 of Akram Wah
4" thick in bed and
5" deep on side slopes
total quantity as per
measurement sheet
(P-126)=6,66,500 cft.

733150 a) Stone ballast. 6.50 % Cft. 47,655/- Cft.

222166 b) Local sand. 2.00 % Cft. 4,443/- Cft.

111083 c) Bholari sand. 2.00 % Cft. 2,222/- Cft.

83366 d) Cement bags. 5.27 Bag. 4,68,321/- Bags

666500 2. Civil labour charges. 61.30 % Cft. 4,08,564/- Cft.

666500 3. Mech:stiff, lubrication oil & depreciation 30.205 % Cft. 2,01,316/- Cft.

666500 4. Transportation Loading 58.60 % Cft. 3,90,569/- Cft.

& un-loading charges
for construction
material.

15.5 RD. 5. Consumable articles. 50.00 R.D. 775/-

2067 Nos. 6. Brick sleepers. 3.08 Each. 6,366/-

15,30,231/-

Rate per mile = Rs. 4,93,620/-

Rate per % cft= Rs. 92.29

Rate per % cft= Rs. 229.59

2067 Nos

Chapter - IX.

VOLUME - VII.

TABLED DETAILS OF DESIGN OF CHANNELS & OF STRUCTURES.

Statement I, (P-129) gives the gross & culturable areas commanded by Channels in the Akram nab System and the ultimate cultivation of the system.

Statement II, (P-132) gives the leading features of the channels & length of water courses etc.

Statement III, (P-135) gives details of all structures on Main Canals & Branches of the System.

The design elements shown in these statements are taken from the latest approved Design statements of channels. Any variation of these design elements with those shown on I-Sections at the end of Chapter-III of this volume or with plans available in Volume VI of Plans may be due to change of actual R.D. of construction or on account of the revision of D-Statement at a later date.

THE AKRAM WAR SYSTEM.

STATEMENT I. Statement of areas and discharges of channels.

STATEMENT II. Statement of important features of channels.

STATEMENT III. Statement of the leading features of the structures in the Akram war system

--: 129 :-

STATEMENT NO. I.

AKRAM TAH SYSTEM

STATEMENT OF AREA & DISCHARGE OF CHANNELS.

No.	For channels offtaking from Akram Wah.	Channels offtaking from channels in col. No. 2	Channels offtaking from channels in col. No. 3.	R.D. of outtake	Gross in acres.	Culturable area	Dry Kharif including garden & forest (44.5% acres)	Rabi i/c garden & forest (35% acres)	Total acres.	Designed Dis charge at Head.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
AKRAM TAH SYSTEM										
AKRAMWah (Direct w/cs & Pump)										
1.	Gaja Branch.	-	-	Barrage	10357	10357	4609	3625	8234	3713.65
2.	"	1. Dodo	-	110.0	10307	10219	4547	3577	8124	745.93
3.	"	2. Jemarki	-	35.5	5574	5555	2917	2294	5211	50.57
4.	"	3. Dhandhi	-	51.6	11702	11672	5194	4035	9279	88.35
5.	"	4. Kumb Disty.	-	62.4	10283	10283	4576	3599	3175	75.93
6.	"	5. Gaja Minor.	-	62.4	2692	2692	1198	942	2140	20.53
7.	"	6. Bulri Disty	-	62.4	12254	12154	5409	4254	9663	393.93
8.	"	"	1. Dhatt Dy.	29.3	11941	11831	5255	4141	9406	77.70
9.	"	"	2. Hasan Ali	29.3	8467	8427	3750	2949	6699	50.86
10.	"	"	3. Shorki.	62.4	18230	17964	7994	6237	14231	119.96
11.	"	"	4. Khiriyari.	62.4	7978	7971	3547	2790	6337	53.34

-: 130 :-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
12. Shadi large.	-	-	-	325.0	56324	54137	24091	18948	42539	943.13
13. " "	1. Bahadur Wah.	-	-	42.5	21035	20100	8945	7035	15980	420.34
14. " "	" "	1. Defence	-	30.2	5439	5439	2420	1903	4323	37.99
15. " "	" "	2. Khoski.	-	55.1	5333	5333	2593	2043	4641	36.47
16. " "	" "	3. Beroweran	-	73.3	9132	9094	4047	3193	7230	59.42
17. " "	" "	4. Kumbharo.	-	84.0	4612	4612	2052	1614	3666	30.01
18. " "	" "	5. Padhar.	-	84.0	11966	11137	4956	3898	3354	79.53
19. " "	2. Shadi small	-	-	74.2	16356	15256	7234	5690	12924	100.96
20. " "	3. Dubni Disty	-	-	106.0	9215	8074	3949	3106	7055	53.51
21. Hamirah.	-	-	-	325.0	3011	2978	1325	1042	2367	24.79
22. Hadacher.	-	-	-	344.0	13555	12423	5523	4342	9086	85.40
23. Saeeda Wah.	-	-	-	346.0	3071	3071	1367	1075	2442	47.23
24. Vehnai.	-	-	-	350.0	5402	5231	2323	1831	4159	35.49
25. Kazi Wah.	-	-	-	350.0	73500	76587	34031	26805	60886	613.32
26. " "	1. Kamaro.	-	-	64.2	18903	18731	3358	6574	14932	128.64
27. " "	2. Guraho.	-	-	86.0	6533	4533	2017	1587	3604	119.62
28. " "	3. Noor Wah.	-	-	110.0	2956	2869	1277	1004	2281	49.63
29. " "	4. Ganj Bahar.	-	-	110.0	2956	2869	1277	1004	2231	71.33
30. Karo Ali Bahar.	-	-	-	358.0	7966	7742	3445	2710	6155	52.67
31. Mithna.	-	-	-	372.0	4240	4134	1340	1447	3237	30.66

--: 131 :-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
32. Ghar Kadhah.	-	-	-	375.0	5216	5136	2286	1798	4084	56.84
33. " " 1. Mehrab Wah.	-	-	-	21.5	1194	1149	512	402	914	8.77
34. Wangi Wah.	-	-	-	375.0	2145	2145	955	751	1706	14.78
35. Sani Guni.	-	-	-	381.0	26373	26330	11717	9216	20933	686.84
36. " " 1. Sherwah small	-	-	-	9.2	4064	4049	1802	1417	3219	31.41
37. " " 2. Rajwah Kadhah	-	-	-	22.5	24211	23220	10333	8127	18460	386.13
38. " " 1. Mor.	-	-	-	54.3	9112	9112	4055	3189	7244	120.28
39. Ali Wah large	-	-	-	381.0	18141	17949	7987	6282	14269	186.45
40. " " 1. Adu Wah.	-	-	-	1.0	2712	2712	1207	949	2156	19.12
41. " " 2. Sherwah large	-	-	-	26.0	8185	7126	3171	2494	5665	48.87
42. L.C.Escape.	-	-	-	381.0	-	-	-	-	-	850.00
				5,49,005	4,88,230	2,17,276	1,70,880	3,88,156		

NOTE :- 1. G.C.A. & C.C.A. is taken from statement No. I at P- 889 of this volume and not from D-Statement.

2. Cultivation is calculated on overall culturable commanded area & is quite theoretical.
The proportion of area under various crops specially Forest and Garden may practically vary on individual channels.

-: 132 :-

STATEMENT NO. II,

AKRAM WAH SYSTEM.

IMPORTANT FEATURES OF CHANNELS.

S. No.	Akram Wah & channels off-taking from Akram Wah.	Channels off-taking from channel in col. No. 2.	Channels off-taking from channel in col. No. 3.	Design-charge at Head (cusecs)	F. S. L. in of bed of channel	In of width of off-taking channel (feet)	Full supply depth of off-taking channel (ft.)	Mean velocity of flow (ft./sec)	Length of channel (R.D.)	No. of water courses (new & old both).	Length of new water courses (miles).	Length of old & re-modelled water courses (miles).
1.	AKRAM WAH.	-	-	3713.65	68.00	67.00	50' 0	15'	3.99	381.0	8	32
2.	Gaja Branch.	-	-	745.93	59.04	58.79	56' 0	6'	2.175	62.4	24	112
3.	"	1. Dodo.	-	50.57	56.64	55.27	10.75'	2.9'	1.455	25.5	19	51
4.	"	2. Jamarki	-	13.62	53.94	51.15	5.7'	1.9'	1.10	18.5	7	21
5.	"	3. Dhandhi.	-	88.85	51.06	50.78	13.25'	3.4'	1.585	42.3	36	128
6.	"	4. Kumb.	-	75.93	50.87	50.83	12.25'	3.3'	1.545	38.9	16	116
7.	"	5. Gaja.	-	20.53	50.87	50.83	7.25'	2.2'	1.24	14.0	8	24
8.	"	6. Bulri	-	393.93	50.87	50.83	36.0'	4.9'	1.97	62.4	41	140
9.	"	1. Dhatt.	-	77.70	47.19	47.00	12.0'	3.3'	1.545	44.0	53	148
10.	"	2. Hassan Ali.	-	50.86	47.19	47.00	12.75'	2.7'	1.29	25.5	25	66
11.	"	3. Shorki.	-	119.96	41.61	41.46	16.5'	3.7'	1.665	53.20	51	184
12.	"	4. Rhiyari.	-	58.84	41.61	40.76	11.75'	3.0'	1.48	34.0	23	84

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
12. Shadi large Br.	-	-	-	943.13	41.19	40.50	45.75	7.4'	2.40	154.0	124	112	380
13. " " 1. Bahadur Wah	-	-	-	420.36	35.81	35.50	30.50	5.7'	2.06	84.0	52	8	200
14. " " 1. Defence.	-	-	-	37.99	31.83	30.74	8.25	2.6'	1.37	33.0	21	9	54
15. " " 2. Khoski	-	-	-	36.47	28.80	25.36	9.4	2.6'	1.38	19.2	12	-	36
16. " " 3. Beroveran	-	-	-	59.42	26.16	25.00	11.5'	3.0'	1.48	20.4	22	-	66
17. " " 4. Kumbharo	-	-	-	30.01	24.35	22.25	8.25'	2.4'	1.328	22.5	13	3	36
18. " " 5. Padhar.	-	-	-	79.58	24.35	24.00	12.75'	3.2'	1.60	45.0	26	4	100
19. " 2. Shadi small	-	-	-	100.96	31.70	31.50	14.5'	3.5'	1.70	49.5	39	12	144
20. " 3. Dubni.	-	-	-	58.51	26.92	25.00	11.25'	2.9'	1.46	25.0	17	16	52
21. Hamirah.	-	-	-	24.79	41.19	36.50	7.25'	2.2'	1.25	18.0	14	-	52
22. Hadachar.	-	-	-	85.40	38.81	34.00	13.0'	3.3'	1.66	40.3	37	16	132
23. Saeeda Wah.	-	-	-	47.23	38.61	34.95	9.5'	2.75'	1.496	18.5	16	-	64
24. Vehnai.	-	-	-	35.49	38.22	34.00	8.5'	2.4'	1.328	28.8	16	-	48
25. Kazi Branch.	-	-	-	613.38	38.22	35.62	36.00'	6.5'	2.24	110.0	96	60	324
26. " 1. Kamaro.	-	-	-	128.64	27.90	27.70	16.75'	3.7'	1.70	50.7	62	12	236
27. " 2. Gurah.	-	-	-	119.62	23.50	23.07	14.5'	3.9'	1.68	62.2	32	3	124
28. " 3. Noor Wah.	-	-	-	49.63	19.70	19.50	9.75'	2.75'	1.496	37.0	23	-	69
29. " 4. Ganj Bahar.	-	-	-	71.38	19.70	19.50	11.75'	3.10'	1.597	45.0	32	-	128
30. Karo Ali Bahar.	-	-	-	52.67	35.89	33.92	10.50'	2.80'	1.51	40.0	32	-	128

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
31. Mithna.	-	-	-	-	30.66	34.42	31.58	8.25'	2.4'	1.339	27.0	16	-	64
32. Ghar Kadhan.	-	-	-	-	56.84	34.10	30.48	10.3'	2.9'	1.55	37.0	32	-	132
33. " "	1. Mehrabwah	-	-	-	8.77	26.20	26.00	4.75'	1.6'	0.96	15.0	5	-	155
34. Wangi.	-	-	-	-	14.78	34.10	30.75	6.25'	2.0'	1.08	22.0	10	-	30
35. Sunni Guni Br:	-	-	-	-	686.84	33.45	32.05	38.5'	6.7'	2.27	135.0	89	36	320
36. " "	1. Sherwah small	-	-	-	31.41	31.00	26.82	8.25'	2.4'	1.339	38.10	11	-	23
37. " "	2. Rajwah Kadhan	-	-	-	386.13	29.28	27.54	28.00'	5.6'	2.06	102.40	76	36	268
38. -	" "	1. Mor.	-	-	120.28	20.35	20.15	16.10	3.70'	1.65	51.50	29	20	96
39. Ali Wah Large.	-	-	-	-	186.45	33.45	33.25	20.00	4.35'	1.80	81.80	61	20	224
40. " "	1. Adu Wah.	-	-	-	19.12	33.11	28.27	6.25'	2.1'	1.235	26.0	11	-	33
41. " "	2. Sherwah Large	-	-	-	48.87	29.49	27.23	9.75'	2.75'	1.496	36.00	31	8	116
42. L.C. Escape.	-	-	-	-	850.00	33.45	29.0	45.00'	7.0'	2.36	92.0	-	-	-

NOTE :- Column 1 to 11 are taken from approved D-Statement.

Column 12 to 14 are taken from Chapter VII (P - 98) of this Volume.

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STATEMENT NO. III.
AKRAM WAH SYSTEM.

STATEMENT OF LEADING FEATURES OF THE STRUCTURES IN AKRAM WAH SYSTEM.

S. No.	R.D.	Type of Structure.	LEADING FEATURES OF CANAL.						LEADING FEATURES OF STRUCTURES.						
			Discharge (Cusecs).	D/S	U/S	Bed width (feet).	D/S	U/S	Depth (ft).	D/S	U/S	F.S.L.	D/S	No. of span	Width of crest level.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
A-Regulators.															
AKRAM WAH.															
1.	0	H/R of Akram Wah.	-	3713.65	-	50.0	15.0	68.0	67.0	2	24	56.0	Barrage/141		
2.	4	Subsidiary Reg:	3712.90	3712.99	50	50	15.0	15.0	66.68	66.68	66.6	2	24	54.50	50/63
3.	110	Gaja Br: X-Reg:	3692.01	2946.08	44	52	17.5	14.2	59.04	58.79	52.80	2	24	46.82	49/69
4.	110	Gaja Br: H/Reg:	3692.01	745.93	52	56	14.2	6.0	59.04	58.79	52.80	4	8	52.98	65/34
5.	325	Hamirah H /Reg:	2816.17	24.79	75.0	7.25	11.7	2.2	41.19	36.50	34.0	1	10	34.30	42.0/62.0
6.	325	Shadi large H/Reg:	2816.17	943.13	75.0	45.75	11.7	7.4	41.19	40.50	34.0	3	9	34.19	48/78
7.	328	70th X-Regulator	1845.65	1845.65	75.0	80.0	11.7	8.7	40.95	40.35	33.8	4	18	29.00	48.5/126
8.	344	Hadacher H/Reg:	1832.26	85.40	80.0	13.0	8.7	3.3	38.81	34.00	32.0	1	10	32.00	41.5/65
9.	346	Saeedawah H/Reg:	1745.26	47.23	76.0	9.5	8.6	2.75	38.61	34.95	31.7	1	7.5	33.5	27.5/47.5
10.	350	Kaziawah X/Reg:	1694.81	1045.94	76.0	52.75	8.6	7.3	38.22	36.83	28.7	3	10	30.0	38/74.5
11.	350	Vahanai H/Reg:	1694.81	35.49	76.0	8.5	8.6	2.4	38.22	34.00	28.7	3	10	33.5	27.5/47.5
12.	350	Kazla Wah H/Reg:	1694.81	613.38	76.0	36.0	8.6	8.5	38.22	35.62	28.7	3	8	30.0	40/75
13.	358	Karo Ali Bahar H/Reg	1041.28	52.67	52.75	10.56	7.3	2.8	35.89	33.92	32.68	1	8	31.50	24.1/52.5
14.	372	Mithna H/Reg:	970.24	30.66	52.75	8.25	7.3	2.4	34.42	31.58	33.58	1	8	29.50	26/36.5

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1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
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15.	375	Ghar Kathan H/Reg:	948.11	56.84	50.0	10.3	7.10	2.9	34.10	30.48	34.5	1	8	28.5	67.5/56
16.	375	Wangi H/Regulator	948.11	14.78	50.0	6.25	7.10	2.0	34.10	30.75	30.6	1	6	30.0	24.0/12
17.	381	Akram Wah T/Reg:	873.29	-	46.75	-	7.00	-	33.45	-	-	-	-	-	-
18.	381	Sanni Guni H/Reg:	873.29	686.84	46.75	38.5	7.0	6.70	33.45	32.05	29.5	3	10	27.0	26.0/22.0
19.	381	Ali Wah Large H/Reg	873.29	186.45	46.75	20.0	7.0	4.35	33.45	33.25	26.0	3	10	27.50	27.50/22.5
20.	381	L.C.Escape, H/Reg:	873.29	850.00	46.75	45.0	7.0	7.0	33.45	29.00	18.3	1	8	22.00	25.0/-

GAJA BRANCH.

21.	15	Gaja Dodo X/Reg:	725.19	674.62	56.0	50.5	6.0	5.	56.64	56.49	55.4	2	10	55.88	33.0/26.50
22.	15	Dodo Wah H/Reg:	725.19	50.57	56.0	10.75	6.0	2.9	56.64	55.27	55.6	1	6	54.0	25/11.0
23.	36.5	Jamaraki M.H/Reg:	640.07	13.62	50.5	5.7	5.6	1.9	53.94	51.15	49.4	1	5	50.25	22/22
24.	61.6	Dhandhi H/Reg:	578.29	88.85	47.0	13.25	5.4	3.4	51.06	50.78	46.00	1	8	47.58	23/29
25.	62.4	Gaja T/Regulator	490.39	-	47.0	-	5.4	-	50.87	-	-	-	-	-	-

26.	62.4	Kumb M.H/Reg:	490.39	75.93	47.0	12.25	5.4	3.3	50.87	50.83	46.31	1	8	48.25	12.12
27.	62.4	Gaja M.H/Regulator	490.39	20.53	47.0	7.25	5.4	2.2	50.87	50.83	46.41	1	5	48.87	26.0/9.25
28.	62.4	Bulri Dy.H/Reg:	490.39	393.93	47.0	36.0	5.4	4.9	50.87	50.83	50.13	3	8	45.48	15/22

SHADI LARGE BRANCH.

29.	42.5	Bahadur Wah X/Reg:	846.70	426.34	45.25	31.50	7.20	5.80	35.81	35.61	27.68	3	7	29.5	65.0/40.0
30.	42.5	Bahadur Wah H/Reg:	846.70	420.36	45.25	30.50	7.20	5.7	35.81	35.50	27.68	3	7	29.5	67/55
31.	74.2	Shadi small X/Reg:	350.81	249.85	28.90	24.0	5.5	5.0	31.70	31.50	24.0	2	8	27.0	30.5/30.0

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1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
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32.	74.2	Shadi small H/Reg:	350.81	100.96	28.90	14.5	5.5	3.5	31.70	31.50	23.0	2	5	28	22/32
33.	106.8	Dubni X-Regulator	152.22	93.71	21.75	14.80	4.6	3.6	26.92	26.72	21.5	2	5	23	30.0/21.0
34.	106.8	Dubni H/Regulator	152.22	58.51	21.75	11.25	4.6	2.9	26.92	25.00	21.5	1	8	23	27/48

KAZIA BRANCH.

35.	64.2	Kamaro X/Regulator	482.47	353.83	32.0	27.10	6.0	5.4	27.90	26.28	22.0	3	6	22.5	30.0/-
36.	64.2	Kamaro H/Regulator	482.47	128.64	32.0	16.75	6.0	3.7	27.90	27.70	22.5	2	6	24.5	19/36.5
37.	86.0	Guraho X/Regulator	294.28	174.66	25.0	19.0	5.2	4.3	23.50	23.30	23.0	2	7	19.3	18.0/30.5
38.	86.0	Guraho H/Regulator	294.28	119.62	25.0	14.5	5.2	3.9	23.50	23.07	23.0	1	10	19.0	12.5/22.5
39.	110.0	Noorwah X/Reg:	121.01	-	16.5	-	3.8	-	19.70	-	20.0	1	10	18.0	25/25
40.	110.0	Noorwah H/Reg:	121.01	49.63	16.5	9.75	3.8	2.75	19.70	19.50	14.0	1	6	18.0	26.0/42.0
41.	110.0	Ganj Bahar H/Reg:	121.01	71.38	18.5	11.75	3.8	3.10	19.70	19.50	14.0	1	6	18.0	27.0/48.0

SANNI GUNI BRANCH.

42.	9.2	Sherwah small X-Reg:674.62	643.21	38.5	37.0	6.7	6.6	31.0	30.80	24.0	2	6	25.40	30.25/30.25	
43.	9.2	Sherwah small H-Reg:674.62	31.41	38.5	8.25	6.7	2.4	31.0	26.82	24.0	1	6	24.40	37/47	
44.	22.5	Rajwah X/Reg:	629.14	243.01	37.0	23.0	6.6	4.8	29.28	28.28	22.6	2	6	23.3	20.0/23.0
45.	22.5	Rajwah Kadhan H/Reg 629.14	386.13	37.0	28.00	6.6	5.6	29.28	27.54	22.6	2	10	23.0	41/70	

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STATEMENT NO. III (Contd).

S. No.	R.D.	Type of Structure.	LEADING FEATURES OF CANAL.				LEADING FEATURES OF STRUCTURES.				Length of protection.
			Discharge Cusecs.	Bed Width	Depth (feet).	F.S.L.	G.L.	No. of Spans	Width of span	Crest level.	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
<u>B-ROAD BRIDGES.</u>											
<u>AKRAM WAH.</u>											
1.	21.9	Road bridge on Akramwah	3703.53	44.0	16.0	65.25 65.15	59.10	2	24.00	49.95	46.0
2.	33.6	Rly bridge on Akramwah	3707.24	44.0	16.0	64.21 64.11	59.50	2	29.55	48.32	30.5
3.	33.8	R/B Hyd: Mirpurkhas.	3707.30	44.0	16.0	64.09 63.99	61.90	2	24.00	48.26	37.0/47.0
4.	36.7	Southern bypass Rd.	3706.63	44.0	16.0	63.75 63.65	61.40	2	24.00	49.82	30.0/30.0
5.	58.5	Foot Bridge.	3702.31	44.0	17.5	62.12	61.40	3	31.47	44.60	-
6.	64.7	Village Road Bridge	3701.07	44.0	17.5	61.78	60.37	2	24.00	44.37	52.0
7.	72.7	Road Bridge.	3699.47	44.0	17.5	61.23 61.13	59.10	2	24.00	43.74	52.0
8.	79.7	Foot Bridge.	3698.07	44.0	17.5	60.84	55.11	3	31.47	43.43	-
9.	101.2	Road Bridge.	3693.77	44.0	17.5	59.63 59.53	58.00	2	24.00	42.20	22.0
10.	118.5	Foot Bridge.	2944.28	52.0	14.2	58.11	52.84	1	27.75	43.79	-

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	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
11.	138.0	Foot Bridge.	2940.49	36.0	15.4	56.55	53.75	3	10	40.33	-	
12.	147.5	Road Bridge.	2938.87	36.0	15.4	<u>55.79</u> 55.69	54.51	3	10	40.33	56.0	
13.	159.0	Foot Bridge.	2936.92	36.0	15.4	54.77	53.85	3	10	40.33	-	
14.	165.0	Foot Bridge.	2935.90	36.0	15.4	54.29	53.23	3	10	40.33	-	
15.	171.8	Foot Bridge.	2934.74	36.0	15.4	53.75	53.36	3	10	40.33	-	
16.	180.6	Foot Bridge.	2933.25	36.0	15.4	53.04	54.34	3	26 (one full & two sloping)	37.85	-	
17.	191.8	Road Bridge.	2931.34	75.0	11.7	<u>52.15</u> 52.05	48.00	2	19.1	40.41	33/63	
18.	236.8	Road Bridge.	2898.43	75.0	11.7	48.35	36.65	3	24	36.62	19.5/19.5	
19.	273.0	Road Bridge.	2861.13	75.0	11.7	45.45	37.31	3	24	33.65	19.5/19.5	
20.	300.0	Road Bridge.	2837.76	75.0	11.7	43.19	39.45	3	24	31.41	39.33/39.33	
21.	356.0	Road Bridge.	1042.55	52.75	7.30	<u>36.20</u> 36.10	36.00	2	27.5	28.70	30.25/30.25	
GAJDA BRANCH.												
22.	12.0	Railway Bridge.	725.62	56.0	6.0	<u>57.07</u> 56.97	Constructed by Railway Department.					
23.	32.2	Road Bridge.	661.64	50.5	5.6	<u>54.53</u> 54.43	50.0	4	12	48.36	30	
24.	62.0	Road Bridge.	490.71	47.0	5.4	<u>41.01</u> 50.91	46.93	Constructed by B & R Department.				

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1	2	3	4	5	6	7	8	9	10	11	12
SHADI WAH LARGE.											
25.	17.0	Road Bridge.	934.17	45.75	7.4	38.68 38.58	31.0	1x13 1x12.5 2x5.35	30.96	11/11	
26.	80.0	-do-	244.63	24.0	5.0	30.74 30.64	23.2	2	10	26.21	28/66
27.	94.0	-do-	202.24	21.75	4.6	28.77 28.67	23.0	1	18	21.94	29.25/29.25
28.	128.0	-do-	72.69	13.0	3.1	23.33 23.23	17.5	1	10	19.37	12
KAZIA BRANCH.											
29.	36.0	-do-	560.57	34.0	6.4	31.43 31.33	26.0	2	14	25.34	
30.	43.0	-do-	529.28	32.5	6.3	30.51 30.41	26.0	2	12.5	20.00	32.5/32.5
SUNMI GUNI BRANCH.											
31.	26.0	-do-	241.09	25.0	4.8	27.80	20.8	1	22	22.5	
32.	50.7	-do-	204.04	21.5	4.6	24.44	17.6	2	9	19.95	19.5/19.5
33.	55.8	-do-	191.39	21.5	4.6	23.74/23.64	15.7	2	9	19.24	17.5/17.5
34.	76.6	-do-	141.74	18.75	4.20	20.71/20.61	16.40	2	7	16.41	20.9/20.9
35.	127.1	-do-	32.92	9.1	2.6	12.63/12.53	11.63	1	9	11.63	15/15
LINED CHANNEL ESCAPE.											
36.	21.0	Road Bridge.	350.00	45.0	7.0	26.70/26.60	21.0	3	24.25	19.68	20/20
37.	41.4	Road Bridge.	350.00	45.0	7.0	24.38/24.28	18.0	2	23	14.06	19/19
38.	53.9	Road Bridge.	350.00	45.0	7.0	22.92/22.82	17.0	Constructed by B & R Department.			
39.	71.5	Road Bridge.	350.00	45.0	7.0	20.90/20.80	14.0	2	25.23	14.06	19/19

NOTE :-1. Leading features of canals are taken from approved D-Statements
 2. Leading features of structures are taken from data supplied by Divisions or from Plans available in plan volumes of Completion Report.

THE PROGRESS OF WORK DURING CONSTRUCTION.

Chapter No. X.

VOLUME VII.

1951-52

The work of Akram Wah System was started under the control of Superintending Engineer, Left Bank Construction Circle. A new Division named Lined Channel Division was opened on 9.10.1950 exclusively for this system. The proposal of Construction of Akram Wah was approved by the Cabinet on 1.2.1950. From that date till the creation of Lined Channel Division, the preliminary work of this system was carried out by Main Line Division. The year-wise progress of work on this system is given below. For the purpose of progress, years have been reckoned from July to June.

1949-50. Preliminary survey, lay out, levelling and

estimating were started during the year under report. Arrangements for procurement of machinery and suitable staff were also under process.

1950-51.

The alignment work of Akram Wah remained in progress. Requisition for acquiring land for Akram Wah from R.D. 10,000 to 33,000 and for brick kilns site through-out the Division were submitted to the Land Acquisition Officer. Alternate alignments were marked on various portions in order to save villages, gardens, mosques, graveyards etc from coming in the alignment.

The first dragline (machine No.22) started work of excavation of Akram Wah on 8.1.1951. Machine No.9 started work on 27.3.1951 and two more machines (No. 6 and 20) started work from 9.4.1951. and 28.4.51 respectively. The total progress of earth work done during the year under report is given below:-

S. No.	Machine No.	Quantity done during the year.	Quantity previous update	Quantity progress.
1.	Dragline machine No.9	58,13,000	58,13,000	58,13,000
2.	Dragline machine No.22	20,53,900	20,53,900	20,53,900
3.	Dragline machine No.20	3,26,900	3,26,900	3,26,900
4.	Dragline machine No. 6	19,57,220	19,57,220	19,57,220
Total :-		1,01,51,020	1,01,51,020	1,01,51,020

Construction of Sub-Divisional Office at Sert was started in February 1951. This was a part of temporary buildings to be constructed there.

Work at Shah Nihal Quarry was started on 8.1.1951. By the end of the year under report, Quarrying work on Husri quarry and Saidpur quarry was also started.

1951-52.

In addition to the four draglines already working on Akram Wah, D-7 tractors were also put on the earth work. Machine No. 9 was transferred to Main Line Division on 15.5.1952 and machine No. 10 started work on Akram Wah from June 1952. Alignment and preliminary work for Gaja Branch and remaining portions of Akram Wah was in progress.

The earth work done during the year is given below :-

S. No.	Machine No.	Quantity done during the year under report	Previous quantity.	Total upto date.
1.	Dragline No. 9	1,36,48,279	58,13,000	1,94,61,279
2.	Dragline No. 22	48,57,576	20,53,900	69,11,476
3.	Dragline No. 20	43,92,100	3,26,900	47,19,000
4.	Dragline No. 6	1,56,76,280	19,57,220	1,76,33,500
5.	Dragline No. 10	22,64,660	--	22,64,660
6.	Tractor.	1,84,03,700	--	1,84,03,700
Total :-		5,92,42,595	1,01,51,020	6,93,93,615

Construction of temporary buildings at Sert remained in progress. Estimating and Design work of various structures of the system was in progress.

1952-53.

Most of the preliminary work and alignment of Akram Wah was completed upto R.D. 150. The work of alignment of Gaja Branch and its distributaries was in progress.

All requisitions for acquiring land for Akram Wah from head to R.D. 150 were finalized and forwarded to the Land

Acquisition Officer.

Design of structures were under preparation and

finalisation.

Road bridge at R.D. 21.9 of Akram was connecting Hyderabad Hala road was completed this year. Lining work was started during this year from July 1952. Three lining trains were erected in the first instance and the reaches allotted to each were as under :-

Lining Train No. 1	From R.D. 50 to R.D. 27.
Lining Train No. 2	From R.D. 50 to R.D. 68.
Lining Train No. 3	From R.D. 78 to R.D. 96.5

The progress of each lining train is given below:-

Lining Train No. 1	2,34,217 Cft.
Lining Train No. 2	53,037 Cft.
Lining Train No. 3	1,10,078 Cft.
total :-	3,97,332 Cft

The greater part of earth work was done by tractors and koehring machine No. 20. Most of the draglines were transferred from Akram wash to other Divisions as shown below :-

Machine No. 22	Transferred to Feeder Divn on 8.12.52
Machine No. 6	Transferred to Remodelling Division 10.12.52
Machine No. 20	Transferred to Main Line Divn on 26.1.53
Machine No. 10	Transferred to Main Line Divn on 23.2.53

Koehring dragline No. 30 arrived back on 15.5.53

The progress of earth work during the year was as under :-

Previous progress.	6,93,93,615 cft.
Work done during the year.	3,20,66,385 cft.
Total upto date progress	10,14,60,000 Cft.

1953-54.

The target date for the completion of 1st stage

of work was 31.5.54 and the task envisaged for 1st stage was 1110.90 lac cft of earth work and 42.60 lac cft of

Concreting. The quantity of earth work done upto 31.5.1954 exceeded the task envisaged for 1st stage, but the work of concreting lagged behind the schedule. 4th lining train

was started from 5.10.1953 at R.D. 25. 5th lining train was erected at R.D. 68 and started work from 19.4.1954.

The total progress of earth work and concreting done during the year is given below :-

Done During the year.	Previous quantity	Upto-date progress.
Earth work 1,25,21,000	10,14,60,000	11,39,81,000
Lining work 11,26,927	3,97,332	15,24,259

Railway bridge of Kotri Rohri section at R.D. 33.6 of Akram wah was in progress. Plans and estimates for buildings at Tando Muhammad Khan were under sanction.

1954-55.

Alignment and survey of Akram wah below R.D. 150

was taken in hand. The work of alignment and survey of

Gaja Branch was completed. Work on Distributaries and

Minors was in progress.

The total task of earth work and lining on Akramwah

engaged for 2nd stage from 1.6.1954 to 31.5.1955 was

767.00 lac cft and 27.85 lac cft respectively. The allotted

task of earth work for 2nd stage on Gaja Branch was 500

lac cft.

Italian Dragline No. 29 and 30 were put on excavat-

tion of Akram wah and a fleet of Fowler Tractors on Gaja

Branch. Lining train No. 6 started concreting work from

20.1.1955 & the work of lining upto R.D. 110 was completed.

The actual progress during the year under report

was as given below :-

Work done during the year.	Previous progress.	Upto-date progress.
----------------------------	--------------------	---------------------

Earth work 1,79,26,000

11,39,81,000

13,19,07,000

Lining Akram wah

25,78,000

15,24,259

43,08,259

Concreting in

2,06,000

subsidary veg: i/c lining in head reach.

Earth work

1,62,51,000

1,62,51,000

Gaja Branch.

Gross regulator at R.D. 110 of Akram Wah was almost complete. Head regulators of Burti, Kumb and Gafa Minor were completed.

Work of Gafa syphon under Tuleli was nearing completion.

Five Road and Railway bridges were completed as

shown below:-

R.D. 33.6	Akram Wah.	Railway Bridge.	Hyderabad to Rohri & Mirpurkhas line.
R.D. 33.8	Akram Wah	Road Bridge	Hyderabad-Mirpurkhas road.
R.D. 36.7	Akram Wah.	Road Bridge.	Hyderabad-Ghan-gro road.
R.D. 64.7	Akram Wah.	Road Bridge.	Hyderabad Husri Road.
R.D. 12.0	Gafa Branch	Railway Bridge	Hyderabad to Badin Line.

Temporary buildings at Seri were completed and buildings at Tando Muhammad Khan were well under way.

1955-56.

The total progress of lining and earth work of Akram Wah and Gafa Branch are given below :-

Work done during the year.	Previous progress	Up-to-date progress.
----------------------------	-------------------	----------------------

Earth work Akram Wah	3,34,43,000	13,19,07,000	16,53,50,000
Earth work Gafa Br:	1,92,07,000	1,62,51,000	3,54,58,000
Lining Akram Wah	8,24,000	43,08,259	51,32,259

Road bridge at R.D. 101.2 of Akram Wah for

Hyderabad Seri road was completed this year. Buildings at Tando Mohd Khan Barrage Colony were mostly completed. Head regulator of Gafa Branch was completed this year. Other regulators of distry and Minors were in progress.

Repair works of the portion of cement concrete

lining of Akram wah damaged due to the floods of 1956

were started with the tile brick lining throughout the

damaged portion from R.D. 4 to R.D. 168. Brick lining

from R.D. 110 to R.D. 130 was started from 1.5.1957. Earth

work over Gaja Branch, Dhatt, Bulri, Kumb, was almost

completed. Earth work over Dhandi, shorki, Dodo wah, was

in progress.

Gaja syphon & other regulators over Gaja system

were almost complete and ready to receive the barrage

supplies.

The progress of earth work was as under :-

Done during the year.	Previous progress	Total upto-date progress.
--------------------------	----------------------	------------------------------

Earth work of 72.49 lac cft.	1653.50 lac cft	1725.99 lac cft
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Akram wah.	1653.50 lac cft	1725.99 lac cft
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Earth work of 35.00 lac cft	354.58 lac cft	389.58 lac cft
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Gaja System	354.58 lac cft	389.58 lac cft
-------------	-------------------	----------------

Total:-

2115.57 lac cft

Gaja system, which previously used to receive

irrigation supplies from Bulri Canal, started getting Rabi

supplies from Akram wah in 1957 and final irrigation

arrangement were completed this year for the whole of Gaja

Area.

Gaja syphon under Bulri Feeder was completed this

year. "A" type, "B" type, C-type & "D" type quarter blocks

at Dando Mohd Khan were also completed. The cultivation

figures of the year under report were as under.-

Kharif.	33,917	acres.
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Rabi.	3,486	acres.
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Total :-

37,403	acres.
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The area released during the year is given below:-

Kabul	68,060	acres.
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Nakabul.	47,214	acres.
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1,15,274	acres.
----------	--------

1957-58.

The progress of earth work on this system was much less as compared to other years as most of the machinery remained engaged on flood protective works. Raising and strengthening of banks of Gaj Branch remained in progress. Excavation of tail portion of shorki was in progress. The work done during the year in the whole system is shown below :-

Progress during the year. 57.80 lac cft.
Previous progress. 2115.57 lac cft.

Total :- 2173.37 lac cft.

Road Bridges/t R.D. 72.7 of Akram wah and R.D. 32.2 of Gaj Branch were completed this year. G.C. lining was completed upto R.D. 191.8. Brick lining work upto R.D. 130 was completed. Excavation of tail portion of shorki was in progress. The cultivation raised during the year under report was as shown below :-

Kharif. 40,271 acres

Rabi. 9,309 acres

Total :- 49,580 acres.

1958-59.

The total progress of earth work during the year

was 149.12 lacs cft making the progressive total of whole system as 2322.49 lac cft. Strengthening of banks of Gaj Branch was completed. The following structures were completed during the year under report.

R.D. 58.5 Akram Wah. Foot Bridge

R.D. 79.7 Akram Wah. Foot Bridge.

R.D. 159.0 Akram Wah. Foot Bridge.

R.D. 62.0 Gaj Branch Road Bridge.

R.D. 8.0 Rumb Minor Road Bridge.

Work of construction of modules on Dhandhi and DHATT was started. The cultivation raised during the year was as

under :-

Kharif.

Rabi.

Total :-

55,701 acres.

12,197 acres.

67,898 acres

1959-60.

Total quantity of earth work done during the year

on Akram wah system was 114.79 lac cft, raising the upto-date progress to 2437.28 lac cft. Excavation of water

courses was also in progress. All the excavation work of

the region was entrusted to Machinery Tool Organization

under the instructions of West Pakistan Government with

effect from 21.1.1960, side by side, Irrigation Machinery

which was not handed over to M.F.O. also remained busy in

excavation

/ work of the system.

The following structures were completed during the

year under report.

R.D. 118.5 Akram wah Foot Bridge.

R.D. 138.0 Akram wah Foot Bridge.

R.D. 191.8 Akram wah Road Bridge.

R.D. 135.0 Akram wah } Aqueducts for water.

R.D. 142.5 Akram wah } Courses No. 3-AR, 6-R

R.D. 153.0 Akram wah } 9-AR & 10-R of Tando

R.D. 159.0 Akram wah } Mohd Khan Distry.

as under :-

Kharrif.

47,523 acres.

Rabi.

15,138 acres.

Total :-

62,661 acres.

1960-61.

The total progress of earth work on the whole

system was 246.41 lac cft, raising the total up-to-date

progress to 2683.69 lac cft. The overall progress of M.F.O.

was not satisfactory. The following structures were

constructed in the system during the year under report.

R.D. 147.5 Akram wah Road Bridge.

R.D. 165.00 Akram wah Foot Bridge.

The cultivation raised during the year under

report is given below :-

Kharrif.

28,642 acres

Rabi.

29,937 acres

Total :-

58,579 acres.

Earth work on Shadi Large branch, Shadi small, Dubni, Bahadur, Khoski, Beroveran, Kumbhoro and Padhar was in progress. The total quantity of earth work done during the year was = 1541.84 lac cft.

done upto the end = 2683.69 lac cft.

4225.53 lac cft.

The following structures were completed during

the year under report.

R.D. 171.8	Akram Wah.	Foot Bridge.
R.D. 180.6	Akram Wah.	Foot Bridge.
R.D. 236.8	Akram Wah.	Road Bridge.
R.D. 273.00	Akram Wah.	" "
R.D. 300.00	Akram Wah.	" "
R.D. 17.00	Shadi Large	" "
R.D. 80.00	Shadi Large	" "
R.D. 214.00	Akram Wah.	Syphon.
R.D. 280.00	Akram Wah.	Syphon.
R.D. 124.00	Shadi Wah.	Chhab.
Large.		

The following buildings were constructed during

the year under report.

- 1) Ist Class Inspection Bungalow at Badin.
- 2) Ist Class Inspection Landhi at Khoski.
- 3) 2nd Class Inspection Bungalow at Mtili.
- 4) S.D.O's Residence at Kadhan Colony.

Construction of Gross Regulators on Shadi Large R.D. 42.5, 74.2 and 106.8 and Head Regulator of Shadi

Large, Shadi Small, Dubni, Khoski, Beroveran, Padhar and

Kumbhoro were completed.

The cultivation raised during the year is shown

below :-

Kharif. 29,724 acres

Rabi. 24,187 acres.

Total :-

53,911 acres.

The area released during the year was as under:--

Kabul.	38,742 Acres.
Nakabul	92,067 Acres.
	<u>1,30,809 Acres.</u>

1962-63.

Earth work on the following channels was in progress during this year.

1. Akram Wah.
2. Kazi Branch.
3. Sami Gumbi.
4. Shadi Large.
5. Raj Wah Kadhun.
6. Khoski.
7. Shadi Small.
8. Padhar.
9. Dubul.
10. Kamro.
11. Gurabo.
12. Ali Wah Large.
13. Sherwah small.
14. Mor Distry.

The total earth work done during the year was 1464.30 lac cft, raising the upodate progress since

commencement to 5689.83 lac cft.

The following structures were constructed during the year under report.

R.D.	356.0	Akram Wah.	Road Bridge.
R.D.	36.0	Kazi Branch.	"
R.D.	43.00	Kazi Branch.	"
R.D.	4.00	Ganj Bahar.	"
R.D.	50.7	Sami Gumbi.	"
R.D.	55.8	Sami Gumbi.	"
R.D.	77.73	Sami Gumbi.	"
R.D.	127.10	Sami Gumbi.	"

The following buildings were constructed during the year under report.

1. 2nd Class Inspection Bungalow at Dubul Colony.
2. S.D.O's Residence at Badin Colony.
3. C-Type Quarters 4 Nos. at Kadhun Colony.
4. C-type quarter 1 No. at Dubul Colony.
5. D-type Quarters 4 Nos. at Kadhun Colony.
6. D-type quarter 1 No. at Dubul Colony.
7. Stenaller's quarter at Kadhun Colony.
8. Stenaller's quarter at Gafa Head Regu for

The cultivation raised during the year was as

under :-

Khairi	51,836 acres
Rabi	56,254 acres
Total :-	1,08,090 acres

The area released during the year under report

is given below :-

Kabuli	1,19,145 acres
Makabuli	92,842 acres
	2,11,987 acres

1963-64.

The earth work on following channels was in

progress during the year under report.

1. Akram Wah.
2. Lined Channel escape.
3. Sanni Guni Branch.
4. Kazi Branch.
5. Raj Wah Kadhan.
6. Shadi Small.
7. Ali Wah Large.
8. Guraho.
9. Noor Wah.
10. Kamaro.
11. Vahni.
12. Sher Wah small.
13. Sher Wah Large.

Progress during the year	=	293.08 lac cft.
Previous Progress	=	5689.83 lac cft.
Total :-		5982.91 lac cft.

The following buildings were completed during the

year under report.

1. B-type quarters 2 Nos @ Badin Colony.
2. B-type quarter 1 No. @ Bulri Town.
3. C-type quarters 3 Nos @ Badin Colony.
4. D-type quarters 3 Nos @ Badin Colony.
5. Signaller's quarter @ Badin Colony.
6. Sluice gate: quarter @ Gaja Cross Regulator.
7. " " " " @ Bulri Head Regulator.
8. " " " " @ Dhutt head.
9. " " " " @ Khityari head.
10. Darogh Landhi. @ Gaja Cross Regulator.
11. Darogh Landhi. @ Bulri Head Regulator.

12. Darogha Landht. @ Dhatt Head.
13. Darogha Landht. @ Khiriyari Head.
14. Mosque. @ Pando Mohd Khan B. Colony.

The cultivation raised during the year was as under :-

Khairi.	1,00,239 acres.
Rabi.	73,100 acres.
Total :-	1,73,339 acres.

1964-65.

Earth work on following channels of the

system was in progress.

1. Akram Wah. 2. Lined Channel Escape.
3. Ali Wah Large. 4. Jamarkti Minor.
5. Beroweran Distry. 6. Sher Wah Large.

Total work done during the year..... = 105.43 lac cft.
Total work done upto the end of previous year..... = 5,982.91 lac cft.

6,088.34 lac cft.

Most of the structures were already constructed

and no big structure worth mention was completed this

year. The cultivation raised was as under :-

Khairi.	1,06,097 acres
Rabi.	99,718 acres
	2,05,815 acres

1965-66.

Earth work on following channels of the

system was under progress.

1. Jamarkti. 2. Sher Wah Large.
3. Ali Wah extension. 4. Noor Wah.

Total work done during the year..... = 29.69 lac cft.

Total work done upto the end of previous year.....

6088.34 lac cft.

6118.03 lac cft.

On account of the war with India, most of the

works remained suspended during the year under report.

The cultivation raised during the year under

report was as under :-

Kharif. = 1,41,809 acres.

Rabi. = 1,42,739 acres.

2,84,548 acres.

1966-67.

There was practically no work of any sort on this

system during the year under report except earth work on

defence Minor. The cultivation raised during the year

was as under :-

Kharif. 1,56,540 acres.

Rabi. 1,76,921 acres.

Total :- 3,33,461 acres.

Earth work done during

the year.....

= 21.00 lac cft.

= 6118.03 lac cft.

Previous progress.....

Total :-

6129.03 lac cft.

1967-68.

Earth work on only two channels (viz Vahni and

Defence Minor) of this system was carried out during this

year.

Total progress done during

the year.....

38.29 lac cft.

Total progress done upto the

end of previous year.....

6139.03 lac cft.

6177.32 lac cft.

The following structures were constructed during

this year.

R.D. 26.0 Sunni Guni Branch Road Bridge.

R.D. 21.0 Lined Channel Road Bridge.

Escape.

The cultivation raised during the year under

report was as under :-

Kharif.

1,64,153 acres.

Rabi.

1,23,813 acres.

Total :-

2,87,966 acres.

Earth work on Kazi Branch and adu which remained in progress during the year under report.

Total work done during the year.....	35.00 lac cft.
Total work done upto the end of previous year....	6177.32 lac cft.
Total :-	6212.32 lac cft.

No structure or building was completed in the system during the year under report.

The cultivation raised during the year was as

under :-

Khairi.	1,58,030
Rabi.	1,27,181
Total :-	2,85,211

1969-70.

The following structures were constructed in the system during the year under report.

R.D. 94.0	Shadi Tree	Road Bridge.
R.D. 128.0	"	Road Bridge.
R.D. 150.0	"	Ohhab

The actual cultivation raised during the year was as under :-

Khairi.	1,56,828 acres
Rabi.	1,06,148 acres
Total :-	2,62,976 acres.

Earth work done during the year,

Earth work done upto the end of previous year.....

Upto-date progress.

1970-71.

'C' point water course was converted into Signal of Minor ex Shadi Large at R.D. 150. Quantity/earth work during the year = 13.54 lac cft. Previous quantity = 6214.92 lac cft. Upto-date progress 6228.46 lac cft.

The following structures were completed during

the year under report.

- R.D. 32 Bahadur, Cross Regulator,
R.D. 150.0 Head Regulator of Signal Minor,
Shad Large
R.D. 17 Defence Minor, Road Bridge,
R.D. 10 Kumbharyo Road Bridge,

The actual cultivation raised during the year

were as under :-

Rabi.	84,652 acres.
Kharif.	1,74,831 acres.
	2,59,483 acres

1971-72.

All new works remained practically suspended on account of 1971 war with India.

Actual cultivation figures of Kharif & Rabi are

Given below :-

Kharif.	1,77,835 acres.
Rabi.	1,07,248 acres.
	2,85,083 acres.

1972-73.

The following structures & Buildings were cons-

tructed during the year under report:-

1. Road Bridge over Pandhi Link R.D. 7.0
2. Head Regulator of Pandhi Link @ R.D. 139.0 of Kram Wah.
3. Daroga Pandhi on Pandhi Link @ R.D. 139.0 of Kram Wah.

Earth work was executed on remodelling of wasti wah and

Char Kadhani; extension of Abri minor and construction of

Pandhi Link.

Progress during the year. = 73.88 lac cft.

previous progress. = 6228.46 lac cft.

Updated progress:- 6302.34 lac cft.

Cultivation :-

Kharif.

1,91,722 acres

Rabi.

1,13,865 acres

Total :-

3,05,587 acres

1973-74.

Chhab cum fall regulator @ R.D. 19.0 of April

Minor ex Pandhi was constructed. Earth work was executed

in different reaches of Chorki Minor.

Progress of earth work = 5.89 lac cft.

previous progress. = 6302.34 lac cft.

Total upodate. = 6308.23 lac cft.

Cultivation :-

Kharif.

Rabi.

Total :-

3,43,593 acres.

1,29,853 acres.

2,13,740 acres.

A tentative list of balance works to be done

after 1973-74 is given on next page :-

ABSTRACT SHOWING REVISED PROVISION FOR THE
BALANCE WORK TO BE DONE AFTER 30.6.74.

-: 157 :-

Sub - Head.	II M.C. & Branches.	D&M.	Total.
-------------	---------------------	------	--------

A-Preliminary. - 11,200

B-Land. - 1,10,000

G-Bridges. - 10,78,900

K-Buildings. 31,00,000 --

L-Earth work 7,72,800 18,92,700 26,65,500

M-Flintation. - 2,02,000 2,02,000

O-Misc: 4,000 30,100 34,100

O₂ Soaking & testing 40,000 2,66,200 3,06,200

O₃ -Modules. 25,01,400 28,33,800 53,35,200

F-Maintenance. - 3,62,800 3,62,800

Total II M.C. & III B.M.

64,18,200

67,87,700

1,32,05,900

IV Drainage & protective works. -

nil.

V Water Courses. -

4,80,000

VI Special T & P. -

nil.

VII Losses on Stock. -

nil.

Total I works. -

1,36,85,900

DETAILS OF A-PRELIMINARY & B-LAND.

Name of Canal.	A-Preliminary.	B-Land.
.....		

II M.C. & Branches. -Nil- -Nil-

III D & M.

1. Saldar. 1,600 10,000

2. Mithana. 1,600 15,000

3. Koro Ali Bazar. 3,200 20,000

4. Hamira. 1,600 15,000

5. Mohrab. 1,600 20,000

6. Paddar extension. 800 15,000

7. Gurabo. " " 800 15,000

11,200 1,10,000

DETAILS OF K-BUILDINGS.

II M.C. & Branches.

Location & description	S. & Nos. of buildings.	No.
.....		

KHOSKI HEAD.

1. Darogha Landht 1 No.

2. Sluice estt: quarters 2 Nos.

3. B-type quarters 1 Nos.

DUBNI.

1. Sluice Estt: quarter 1 No.

2. I/Bung: Low with out houses 1 No.

3. C-type quarter 1 No.

BAHADUR.

1. Darogha Landht 1 No.

2. Sluice estt: quarter 1 No.

70th MILE OF AKRAM WAH.

1. Sluice estt: quarter 1 No.

LOWARI TOWN.

1. Masonry well 1 No.

2. L-trines two seated 1 No.

SHADI SMALL.

1. Ist class I/Landht. 1 No.

2. Sluice estt: quarter 1 No.

N I N D O.

1. Darogha Landht 1 No.

KAMARO HEAD.

1. Sluice estt: quarter 1 No.

KAZIA 5th MILE.

1. Sluice Estt: quarter 1 No.

TANDO BAGO

1. Ist class I/Bung: Low 1 No.

2. Masonry well. 1 No.

3. L-trines two seated 1 No.

8,45,600

38,900

38,900

48,600

2,23,600

34,000

38,900

77,800

5,24,900

1,79,800

S. No.	Location & description	and Nos. of buildings.	
		Amount.	

Gurabo 11th Mile.

1. Ist class I/L mndht. 1 No. 2,23,600

RAJ WAH KADHAN.

1. Ist class I/L mndht. 1 No. 2,23,600

GATA X-REGUL. FOR R.D. 15.0

1. Ist class I/L mndht. 1 No. 2,62,400

BULRI HEAD.

1. Ist class I/L mndht. 1 No. 2,53,200

2. Signallers quarters 1 No. 2,53,200

3. B-type quarter 1 No. 86,200

H/REGULATOR OF DHATP.

1. B-type quarter 1 No. 86,200

Total :-

31,00,000

DETAILS OF L-ENTRY WORK & M-PLANTATION.

Name of Channel.	L-Entry work.	M-Plantation.
------------------	---------------	---------------

II M.C. & BRANCHES.

1. Gunt Gunt Branch. 7,72,800 -

Total :-

7,72,800 -

III D & M.

1. Seeds. 31,800 22,600

2. Withms. 6,000 23,200

3. Kuro Ali Bahar. 1,57,500 54,400

4. Hamir. 12,75,000 10,000

5. Mehrab. 15,000 5,000

6. Padhar extension. 1,24,200 -

7. Gurabo extension. 2,15,700 -

8. All with Large extension. 67,500 86,800

Total :-

18,92,700

2,02,000

II M.C. & Branches.

000' 07 000' 7

000' 0+7

26, 200

3,600

57,000

8 400

20,000

3,500

15,000

15,000

000647

50,000

30, 100

2,66,200

DETAILS OF O-3 MODULES.

Name of Canals.

A M O U N T.

II M.C. & BRANCHES.

1.	Kazla Branch.	8,26,200
2.	Gaja Branch.	6,17,200
3.	Shadi Large Branch.	10,58,000

Total :-

25,01,400

III D & M.

1.	Bahadur Wah.	3,91,200
2.	Kamroo.	4,03,900
3.	Guraho.	3,36,300
4.	Noor Wah.	60,000
5.	Hamira .	3,20,000
6.	Shar Wah Small.	1,20,000
7.	Ali Wah Large.	2,30,000
8.	Shar Wah Large.	3,90,000
9.	Karo Ali Bahar.	3,13,900
10.	Ganj Bahar.	68,500
11.	Saida.	45,000
12.	Mithna.	55,000
13.	Mehrab.	70,000
14.	Padhar.	30,000

Total :-

28,33,800

DETAILS OF F-M-INTENDANCE.

UNKNOWN.

Name of Channel.

III D & M.

1.	Gaada.	34,400
2.	Mithna.	35,200
3.	Karo All Bahar.	78,200
4.	Hamira.	40,000
5.	Mehrab.	30,000
6.	Padhar.	15,000
7.	Guraho.	10,000
8.	All Jah Large.	1,20,000

Total :-

3,62,800

ABSTRACT OF EXPENDITURE ON AKRAM WAH SYSTEM.

	Actual expenditure upto 30.6.74.	Anticipated expenditure after 30.6.74.	Total expenditure till final completion of System.
I - Works.	5,97,09,967	1,36,85,900	7,33,95,867
II Establishment.	82,46,958	for five years. 25,00,000	1,07,46,958
III T&P Ordinary.	2,49,381	" " 20,000	2,69,381
IV Suspense.	29,65,236	" " -	29,65,236
V R & R.	10,21,495	" " 2,50,000	12,71,495
Total direct charges.	7,01,50,047	1,59,55,900	8,61,05,947
Indirect charges.			
a) Capitalization @ 4/- per acres for 25 years (for 5420 acres)			5,42,000
b) Audit charges @ 1% of I - Works.			7,33,958
Grand Total Direct and Indirect charges.			8,73,81,905

DETAILS OF TOTAL EXPENDITURE ON I-TORKS OF UFRM 7TH SYSTEM.

Sub - Head.	Anticipated after 30.6.74.			Actual upto 30.6.74.			Total expenditure till final completion.		
	II M.C.	III D.M.	Total.	II M.C.	III D.M.	Total.	II M.C.	III D.M.	Total.
A-Preliminary.	-	11,200	11,200	59,600	8,987	68,587	59,600	20,187	79,787
B-Land.	-	1,10,000	1,10,000	5,75,224	1,26,512	7,01,736	5,75,224	2,36,512	8,11,736
C-Torks.	-	-	-	-	(-) 1,000	(-) 1,000	-	(-) 1,000	(-) 1,000
D-Regulator.	-	-	-	13,89,174	5,06,966	18,96,140	13,89,174	5,06,966	18,96,140
E.I. Siphon.	-	-	-	21,20,430	722	21,21,152	21,20,430	722	21,21,152
F-Bridges.	-	10,78,900	10,78,900	22,30,830	3,33,684	25,64,514	22,30,830	14,12,584	36,43,414
G-Enclos.	-	-	-	3,48,112	-	3,48,112	3,48,112	-	3,48,112
H-Buildings.	31,00,000	-	31,00,000	20,78,252	4,501	20,82,753	51,78,252	4,501	51,82,753
I-Earth work.	7,72,800	18,92,700	26,65,500	179,40,500	50,73,982	2,30,19,482	1,87,13,300	69,71,682	2,56,84,982
J-2 Lining.	-	-	-	1,56,46,897	-	1,56,46,897	1,56,46,897	-	1,56,46,897
K-Flotation.	-	2,02,000	2,02,000	8,71,541	2,92,225	11,63,766	8,71,541	4,94,225	13,65,766
L-Misc:	4,000	30,100	34,100	1,29,079	42,620	1,71,699	1,33,079	72,720	2,05,799
M-50 kind & testing	40,000	2,66,200	3,06,200	7,52,997	3,15,184	10,68,181	7,92,997	5,81,384	13,74,381

-: 168 :-

Sub - Head.	Anticipated after 30.6.74.			Actual upto 30.6.74.			Total expenditure till final completion.		
	II M.C.	III D.M.	Total.	II M.C.	III D.M.	Total.	II M.C.	III D.M.	Total.
O-3 Modules.	25,01,400	28,33,800	53,35,200	8,11,249	13,99,475	22,10,724	33,12,649	42,33,275	75,45,924
I-Maintenance	-	3,62,800	3,62,800	43,63,405	18,40,604	62,04,009	43,63,405	22,03,404	65,66,809
U-Unforeseen.	-	-	-	3,374	1,980	5,354	3,374	1,980	5,354
Total II M.C. III D.M.	64,18,200	67,87,700	1,32,05,900	4,93,20,664	99,51,442	5,92,72,106	5,57,38,864	1,67,39,142	7,24,78,006
IV-Drainage & Protection works.	-	-	-	-	-	-	-	-	-
V-Water Courses.	-	-	4,80,000	-	-	4,18,958	-	-	8,98,958
VI-Special T & F.	-	-	-	-	-	-	-	-	-
VII-Losses on stock	-	-	-	-	-	18,903	-	-	18,903
Total I-Works.	-	-	1,36,85,900	-	-	5,97,09,967	-	-	7,33,95,867

NOTE :- (1) The following expenditure incurred by Fuleli Division on Akram Twh System during 1963-64 and 1964-65 has been included in the expenditure of Lined Channel Division.

II M.C. Rs. 4,65,746/-
 III D.M. Rs. 1,26,616/-
 V T/Courses. Rs. 45,355/-

(2) Expenditure of Rs. 7,30,384/- on II M.C. and Rs. 9,54,519 on III D.M. incurred by Fuleli Divn on Akram Twh System during 1962-63 has not been included and the actual expenditure upto 1962-63 as adopted in the financial forecast 1964 has been taken as correct.

STATEMENT SHOWING DETAILS OF YEARLY
HEAD 63-A (1) KOTRI BARRAGE IRRIGATION
FOR AKRAM YAH SYSTEM.

S. No.	Head of Account.
1950-51 to 1962-63 (as per F.F. 1964)	1963-64
	1964-65.

1. II M.C. & Branches. 4,04,93,167 20,05,704 19,15,278
2. III D & M. 46,93,813 10,02,154 6,76,878

3. IV D & F. -- -- --

4. V Water Courses. 2,76,318 61,183 66,211

5. VI Special F & F. -- -- --

6. VII Losses on stock 18,000 -- --

Total I-works. 4,54,81,298 30,69,041 26,58,367

7. II ESTABLISHMENT. 34,54,281 6,88,665 4,14,175

8. III F & F Ordinary 1,94,099 8,595 17,472

9. IV Suspense. 36,55,160 (-) 1,32,506 (-) 4,24,863

10. V R & R. 63,858 18,986 (-) 92,196

Grand Total Direct Charges. 5,27,20,980 36,14,809 27,57,347

EXPENDITURE OF DIRECT CHARGES UNDER THE
SCHEME FOR THE YEAR 1950-51 TO 1973-74

-: 170 :-

1965-66.	1966-67.	1967-68.	1968-69.	1969-70.
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12,99,059	6,21,061	8,71,815	7,39,775	4,28,398
4,18,415	5,73,929	6,97,658	5,28,299	2,06,830

--	--	--	--	--
5,612	--	--	9,321	--

--	--	--	903	--
--	--	--	--	--

17,17,474	11,94,990	15,69,473	12,78,298	6,40,840
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4,21,449	3,33,462	3,71,258	3,73,055	2,95,956
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4,528	10,210	7,659	4,806	(-)2,719
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95,221	5,286	(-)38,227	58,126	(-)4,56,700
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(-)84,254	13,061	42,967	69,249	4,500
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23,22,976	15,30,887	18,67,196	16,45,036	4,72,877
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Contd. on next page.

-- 171 :-

1970-71.	1971-72.	1972-73.	1973-74.	Total upto 30.6.74.
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2,98,751	29,021	5,50,953	67,682	4,93,20,664
2,90,312	88,439	4,67,502	3,07,213	99,51,442

-	-	-	-	-Nil-
---	---	---	---	-------

-	-	-313	-	4,18,958
---	---	------	---	----------

-	-	-	-	-
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-	-	-	-	18,903
---	---	---	---	--------

5,89,063	1,17,460	10,18,768	3,74,895	5,97,09,967
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4,28,741	4,30,998	5,02,782	5,32,086	82,46,958
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(-) 244	4,975	-	-	2,49,381
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3,84,548 (-)	85,857	(-)1,23,637	28,685	29,65,236
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4,57,581	98,647	1,15,667	3,13,429	10,21,495
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9,44,527	3,68,929	12,82,246	6,22,237	7,01,50,047
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-: 172 :-
STATEMENT SHOWING YEARLY EXPENDITURE
AKRAM WAH SYSTEM:

Departmental	upto	1962-63.	1963-64	1964-65	1965-66
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A-Preliminary.	50,906	3,976	2,283	234	
B-Land.	57,818	98,790	49,644	25,417	
C-Works.	-	-	-	-	
D-Regulators.	6,35,079	2,33,814	2,52,205	1,19,775	
E.I. Syphon.	17,44,670	1,72,773	32,517	1,34,959	
G-Bridges.	16,94,810	1,98,668	1,25,303	44,298	
H-Escape.	-	1,87,089	1,61,023	-	
K-Buildings.	11,84,704	2,10,133	2,44,999	1,55,931	
L-E/Work.	1,70,80,946 (-)	51,024	3,54,413	2,60,104	
L-2 Lining.	1,55,98,528	43,210	-	-	
O-Misc.	46,799	33,038	14,940	2,019	
O-2 Soaking & testing.	5,02,648	1,68,621	59,342	30,700	
O-3 Modules.	67,591	48,018	12,362	36,190	
M-Plantation.	3,83,283	1,37,788	1,22,566	65,777	
P-Maintenance.	14,45,385	5,20,810	4,83,681	4,22,425	
U-Unforeseen.	-	-	-	1,230	
Total :-	4,04,93,167	20,05,704	19,15,278	12,99,059	

1966-67	1967-68.	1968-69	1969-70.	1970-71.
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201 - - - - -

75,607 2,28,667 3,569 13,995 13,742

- - - - -

58,372 23,459 2,868 45,484 11,369

11,561 - - 12,612 1,194

23,146 49,174 68,302 (-) 11,391 37,772

- - - - -

43,842 92,186 12,932 17,265 1,196

1,55,373 59,923 9,062 (-) 959 -

- - - (-) 10,860 (-) 29,563

2,065 18,853 4,653 6,712 -

- 149 - (-) 5,455 (-) 3,008

3,926 54,090 7,116 91,112 2,08,841

24,798

91,761

35,668

9,900

-

2,20,867

2,53,045

5,95,605

2,59,983

54,875

1,303

508

-

-

333

6,21,061

8,71,815

7,39,775

4,28,398

2,98,751

1971-72.	1972-73	1973-74	1974-75
59,600	5,75,224	13,89,174	21,20,430
22,30,830	3,48,112	20,78,252	1,79,40,500
1,023	34,499	10,060	1,56,46,897
1,29,079	7,52,997	8,11,249	8,71,541
4,737	1,01,992	43,63,405	3,374
29,021	5,50,953	67,682	4,93,20,664

59,600	5,75,224	13,89,174	21,20,430	22,30,830	3,48,112	20,78,252	1,79,40,500	1,023	1,29,079	7,52,997	8,11,249	8,71,541	4,737	29,021
-	6,272	6,112	10,144	748	---	1,06,668	61,254	34,499	---	---	37,498	---	---	5,50,953
-	-	-	-	-	-	8,091	11,396	10,060	-	-	-	-	-	67,682
-	-	-	-	-	-	20,78,252	1,79,40,500	1,56,46,897	1,29,079	7,52,997	8,11,249	8,71,541	4,737	4,93,20,664

-: 175 :-
III D & M.

Departmental Head.	Upto 1962-63.	1963-64.	1964-65.	1965-66.
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A-Preliminary.	8,255	-	-	-
B-Land.	5,161	30,888	1,916	5,259
C-Works.	-	-	-	-
D-Regulators.	1,67,812	1,25,186	45,844	25,561
F.I. Siphon.	-	72.2	-	-
G-Bridges.	1,12,995	45,239	35,282	22,210
H-Escape.	-	-	-	-
K-Buildings.	-	2,390	-	1,257
L-E/Work.	36,62,128	4,17,175	57,919	98,465
L ₂ -Lining.	-	-	-	-
O-Misc:	5,161	5,334	26,664	-
O ₂ -Soaking & testing.	1,68,898	72,392	69,741	2,094
O-3 Modules.	1,95,789	70,293	1,66,268	36,154
M-Plantation.	77,135	63,038	56,611	35,307
F-Maintenance.	2,90,479	1,69,497	2,16,633	1,92,108
T ₂ -Unforeseen.	-	-	-	-
Total :-	46,93,813	10,02,154	6,76,878	4,18,415

1966-67.	1967-68.	1968-69.	1969-70.	1970-71.
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5,73,929	6,97,658	5,28,299	2,06,830	2,90,312
---	1,980	-	-	-
1,85,533	2,50,618	3,18,633	1,19,513	41,082
23,616	22,500	13,433	585	-
31,781	88,805	18,881	11,192	92,933
---	2,059	-	-	-
-	2,902	2,559	-	-
-	-	-	-	-
2,84,576	2,60,509	1,01,432	43,185	44,804
-	854	-	-	-
-	-	-	-	-
2,926	28,093	38,477	16,694	25,704
-	-	-	-	-
27,743	13,265	14,604	-	86,526
-	-	-	-	(-)1,000
17,304	26,073	20,280	15,661	263
450	-	-	-	-

-: 177 :-

III D & M.

1973-74

1972-73

1971-72

30,674

Total upto

282

8,987

(-) 68

3,775

1,26,512
(-) 1,000

5,06,966

425

722

3,33,684

5,864

200

45,074

49,914

13,801

50,78,982

4,501

42,620

3,15,184

13,99,475

2,61,857

3,60,134

65,388

2,92,225

18,40,604

53,054

3,454

1,980

4,67,502

3,07,213

88,439

99,51,442

STATEMENT SHOWING EXPENDITURE ON I-WORKS

S. No.	Departmental Head.	AKRAM WASH SYSTEM excluding GATA		
		II M.C. & Branches.	III D.M.	II M.C. & Branches.

1.	A-Preliminary.	43,516	1,722	4,526
2.	B-Land.	5,43,035	43,345	15,415
3.	C-Works.	-	1,000 (-)	-
4.	D-Regulators.	8,86,183	82,075	43,127
5.	E-1. Syphon.	10,47,943	722	10,72,487
6.	G-Bridges.	18,64,023	12,271	23,074
7.	H-Escape.	3,48,112	-	-
8.	K-Buildings.	13,81,092	-	1,01,050
9.	L-Earth work.	1,33,58,766	8,24,562	4,95,754
10.	L-2 Lining.	1,56,46,897	-	-
11.	O-Miscellaneous	60,279	1,623	7,051
12.	O-2 Soaking & testing.	3,82,216	35,095	71,865
13.	O-3 Modules.	19,607	1,64,552	43,953
14.	M-Plantation.	5,15,517	15,937	66,744
15.	P-Maintenance	24,49,252	2,75,368	6,27,963
16.	U-unforeseen.	2,866	-	-
Total.		3,85,49,304	14,56,272	25,73,009

BY DETAILED HEADS OF ACCOUNT UP TO 50.6.74. (Franch-wise)

Branch	Shad Large Pr	Kazla Franch System.
III D.M.	II M.C.	II M.C. & Branches.
Branches	III D.M.	III D.M.

3,906	10,944	3,359	-	-	32,780	8,050	-	62,016	-	1,326	18,30,201	-	11,321	1,70,309	2,14,722	5,98,420	1,16,351	3,92,789	2,85,709	1,97,597	-
27,068	2,117	21,646	-	-	-	-	-	-	-	1,326	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
1,65,123	2,49,477	2,10,290	-	-	57,948	8,050	-	-	-	1,326	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
82,254	2,16,549	1,47,751	-	-	-	-	-	-	-	1,326	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
-	-	-	-	-	-	-	-	-	-	1,326	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
1,326	1,45,106	3,175	-	-	2,56,238	-	-	-	-	1,326	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
18,30,201	23,49,509	11,92,215	-	-	6,01,086	8,60,560	-	-	-	18,30,201	23,49,509	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7,56,701	5,66,448	3,92,789	-	-	2,85,709	1,97,597	-	-	-	7,56,701	5,66,448	-	3,92,789	2,85,709	1,97,597	-	-	-	-	-	-
1,30,548	1,08,876	1,16,351	-	-	92,262	31,835	-	-	-	1,30,548	1,08,876	-	13,095	25,125	73,115	87,804	92,262	3,92,789	2,85,709	1,97,597	-
37,22,224	42,00,492	27,84,236	-	-	14,43,371	12,42,379	-	-	-	37,22,224	42,00,492	-	3,92,789	2,85,709	1,97,597	-	-	-	-	-	-

Departmental		Sunt Gunt System.		Total expenditure upto 30.6.1974.	
Head.	Branches.	II M.C.&	III D.M.	II M.C.&	III D.M.

A-Preliminary	614	-	59,600	8,987	1,26,512
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B-Land.	14,657	1,673	5,75,224	-	(-),000
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C-Works.	-	-	-	-	5,06,966
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D-Regulators	1,52,439	41,428	13,89,174	21,20,430	722
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E.1. Syphon.	-	-	22,30,830	3,33,684	-
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G-Bridges.	1,27,184	29,392	3,48,112	20,78,252	4,501
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H-Escape.	-	-	1,56,46,897	50,78,982	-
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K-Buildings.	1,94,766	-	1,79,40,500	42,620	-
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L-Earth work	11,35,385	3,71,444	1,29,079	3,15,184	13,99,475
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L-2 Lining.	-	-	7,52,997	2,92,225	18,40,604
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O-Miscellaneous	10,405	505	8,71,541	1,980	5,97,09,967
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O2 Soaking & testing.	60,119	14,285	43,63,405	4,93,20,664	25,54,488
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O-3 Modules.	3,36,236	61,201	3,374	7,46,331	-
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M-Plantation.	88,142	6,274	8,71,541	4,93,20,664	-
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I-Maintenance.	4,34,033	2,18,149	43,63,405	4,93,20,664	-
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U-unforeseen.	508	1,980	3,374	4,93,20,664	-
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Total.	25,54,488	7,46,331	4,93,20,664	99,51,442	5,97,09,967
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Total II M.C.	-	-	-	-	-
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& III D.M.	-	-	-	-	-
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IV Drainage & protective works.	-	-	-	-	-
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V Water Courses.	-	-	-	-	-
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VI Spl P & F.	-	-	-	-	-
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VII Losses on Stock	-	-	-	-	-
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Total I-Work.	-	-	-	-	-
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Plate No. _____ Heading of Plan. _____ R.D. _____ Situation of Structures: _____ Channel. _____

Sl. No.	Description	Amount
1.	Secondary Head Regulator of Lined Channel.	4.00
2.	H-1 Road Bridge on Lined Channel.	21.00
3.	Hyderabad - Mirpurkhas Road Bridge on Lined Channel.	33.30
4.	Road Bridge on Lined Channel @ R.D. 33.8 Hyderabad-Mirpurkhas Road.	33.80
5.	Road Bridge southern bye pass (new) over Lined Channel.	36.00
6.	Aqueduct on Lined Channel @ R.D. 41.45 for crossing water course & Husri Minor	41.45
7.	2x24 spans 12ft. Road bridge on Lined channel.	53.00
8.	2x24 spans Husri bridge road bridge on Lined Channel.	63.00
9.	2x24 spans 12ft. Road Bridge on Lined Channel.	72.50
10.	Foot Bridge on Lined Channel.	78.00
11.	Seri Village Road Bridge on Lined Channel (Foundation plan).	100.00
12.	Gross Regulator on Lined Channel @ R.D. 110 & Gaj Head Regulator combined with Road Bridge (General Plan).	110.00
13.	X-Regulator on Lined Channel @ R.D. 110 and Gaj Head Regulator combined with Road Bridge (Foundation Plan).	110.00
14.	X-Regulator on Lined Channel @ R.D. 110 & Gaj H/Regulator combined with Road Bridge Long & Cross section of X-Reg:	110.00
15.	X-Regulator on Lined Channel @ R.D. 110 & Gaj H/Reg: combined with Road Bridge Long & Cross sections of Head regulator and Road Bridge.	110.00
16.	Revised down stream floor of X-Regulator on Lined Channel.	110.00
17.	Foot Bridge on Lined Channel.	120.00
18.	2x20 spans 12ft. Road Bridge on Lined Channel.	143.00
19.	Road Bridge combined with water course @ R.D. 147.5 of Lined Channel.	147.50
20.	Foot Bridge on Lined Channel.	178.00
21.	22ft. skew Road Bridge on Lined Channel	191.00

22	Bahawal syphon @ R.D. 4.35 of Bahawal under lined channel.	193.20	aktam wah.
23	Mehra syphon @ R.D. 2.27 under lined channel.	218.55	" "
24	Road Bridge on lined channel (Dando-Rajo Khan Road).	273.00	" "
25	22ft. wide Bridge over lined channel.	300.00	" "
26	Remodelling of head Regulator Shadi Large ex lined channel.	325.00	" "
27	Head Regulator of Hadachar Distry ex lined channel.	341.0	" "
28	Group of Regulators i.e. X-Regulator over lined channel & Remodelling head Regulator Gazla new.	347.0	" "
29	Head Reg: Saida Dy. ex lined channel.	348.0	" "
30	Head Regulator Koro Ali Bihar ex lined channel.	353.8	" "
31	Head Reg: of Wangi Dy. ex aktam wah.	275.0	" "
32	Head Reg. of Sumi Gunt ex lined channel	381.0	" "
33	Plan showing method of concreting on the lined channel.	General	" "
34	Reinforcement bars of Gaj syphon under R.D. 10.75 of Gaj wah.	10.75	Gaja Branch
35	X-Regulator over Gaj wah @ R.D. 15.9 & Head Regulator Hiran & Dodo wah (Gen:Plan)	15.9	" "
36	X-Regulator over Gaj wah @ R.D. 15.9 & Head Reg: Hiran & Dodo wah (X-section).	15.9	" "
37	12ft. Village Road Bridge W.M. Khan - Mulla Kattar Road over Gaj wah.	32.0	" "
38	Head Regulator Jamarki Minor ex Gaj Br: Bathoro Road) over Gaj wah.	36.0	" "
39	22ft. Road Bridge (Dando Mohd Khan-Mirpur	60.5	" "
40	Head Regulators of Bulri Distry, Kumb and Gaj M. @ R.D. 61 of Gaj wah.	61.0	" "
41	8 ft. Village Road Bridge over Jamarki .	10.0	Jamarki.
42	22ft. Road Bridge Bathoro Road over Dhandi Minor.	14.3	Dhandi Minor
43	Village Road Bridge Mulla Kattar-Kapoor Road over Dhandi Minor.	14.0	" "
44	Road Bridge over Kumb Minor	0.1	Kumb Minor
45	16 ft. Road Bridge over Kumb Minor.	8.0	" "
46	X-Regul tor on Kumb Minor.	22.5	" "

Plan No. Heading of Plan. Station of Structures R.D. Channel.

47.	Chhab @ R.D. 33.5 of Kumb Minor.	33.5	Kumb Minor.
48.	12 ft. Village Road Bridge over Gaja Minor Head Regulator.	0.00	Gaja Minor.
49.	16 ft. wide Road Bridge over Bulri.	10.2	Bulri Disty
50.	16 ft. wide R/Bridge over Sherwah large	27.0	Sher Wah Large
51.	Head Regulator of Hassan Ali Minor @ R.D. 28.5 of Bulri Dy. (General Plan).	28.5	Bulri Disty
52.	Head Regulator of Hassan Ali Minor @ R.D. 28.5 of Bulri Dy (X-section).	28.5	" "
53.	X-Reg: on Bulri Dy @ R.D. 29.5 & Head Regulators of Hassan Ali & Dhatt Minor	29.5	" "
54.	Head Regulators of Shorki & Kharyari @ R.D. 60.5 of Bulri Dy (General Plan).	60.5	" "
55.	Head Regulator of Shorki and Kharyari @ R.D. 60.5 of Bulri Dy (X-sections).	60.5	" "
56.	Profile on Dhatt Minor.	22.5	Dhatt Minor
57.	16 ft. Road Bridge over Dhatt Minor.	29.0	" "
58.	Fall on Dhatt Minor.	34.8	" "
59.	Road Bridge on Hassan Ali Link on P.M. Khan-Khore Wah Road.	9.00	Hassan Ali.
60.	Profile of Shorki Minor.	16.0	Shorki
61.	Village Road Bridge over Bulri-Khore Wah Road over Shorki Minor.	22.0	" "
62.	Chhab over Shorki Minor.	24.7	" "
63.	Full Regulator on Kharyari Minor.	17.4	Kharyari Minor
64.	Remodelling Road Bridge over Shadi Large	19.0	Shadi Wah Large
65.	Group of Regulators i.e. X-Regulator of Shadi Wah Large & Head Regulator Bahadur Disty.	44.9	" "
66.	Group of Regulators i.e. X-Regulator over Shadi Large & Head Reg: of Shadi Small.	74.20	" "
67.	22 ft. wide Road Bridge over Shadi Wah Large (Fangrio + Pando Bago Road).	76.40	" "
68.	12 ft. Road Bridge over Shadi Wah Large (Fangrio + Pando Road).	91.30	" "
69.	16 ft. Road Bridge over Shadi Wah Large.	93.0	" "
70.	Group of Regulators i.e. X-Regulator over Shadi Wah Large & H/Reg: Dubni Disty.	108.8	" "
71.	16 ft. Road Bridge cum chhab over Shadi Large.	118.0	" "
72.	16 ft. Road Bridge over Shadi Wah Large.	122.9	" "
73.	22 ft. Road Bridge over Shadi Wah Large.	133.5	" "

Plan No. Heading of Plan, Situation of Structures, R.D. Channel.

74.	16ft. Road Bridge cum Chhab over Shadi Wah Large.	150.0	
75.	Head Regulator 'C' point Minor (cum 16ft. Bridge).	150.0	
76.	22ft. Road Bridge over Bahadur Wah (Tando Bago-Pangrio - Road).	14.6	Bahadur Wah.
77.	12ft. wide Road Bridge over Bahadur Wah (Khosra Turk Village Road).	27.8	" "
78.	Head Regulator of Defence Minor @ R.D. 30.4 of Bahadur Wah.	30.4	" "
79.	X-Regulator over Bahadur Wah.	32.0	" "
80.	12ft. wide Road Bridge over Bahadur Wah (Mindu Lingrio Road).	43.0	" "
81.	Group of Regulators i.e. X-Regulator over Bahadur Wah H/Regulator Khoski.	57.7	" "
82.	Group of Regulators i.e. X/Regulator over Bahadur Dye H/Reg: Beroveran Distry.	76.0	" "
83.	Group of Regulators i.e. Fall Regulator Bahadur Dye H/Reg: Padhar & H/Reg: Kumbhario.	84.0	" "
84.	16ft. Road Bridge over Defence Minor.	17.0	Defence Minor.
85.	X-Regulator over Khoski Minor.	2.0	Khoski.
86.	16 ft. Road Bridge over Khoski Minor.	15.0	Khoski.
87.	12ft. wide Bridge over Khoski Minor.	16.4	Khoski.
88.	12ft. Road Bridge over Beroveran Dy.	12.7	Beroveran.
89.	12ft. Road Bridge over Kumbhario Minor	10.0	Kumbhario.
90.	12ft. Road Bridge over Padhar Distry.	14.0	Padhar Distry
91.	22ft. Road Bridge over Shadi small (Tando Bago Pangrio Road).	19.3	Shadi small.
92.	22ft. Road Bridge over Shadi Small.	29.8	" "
93.	12ft. wide Road Bridge over Dubni.	11.00	Dubni Minor.
94.	Road Bridge cum Chhab over Dubni Minor	13.0	" "
95.	16ft. Road Bridge over Dubni Minor.	18.00	" "
96.	16ft. Road Bridge over Hadachar Minor (Tando Bago-Mindu Shahr Road).	23.3	Hadachar.
97.	Road Bridge over Kazi Branch (Badin-Mindu, Kachan Road).	44.0	Kazi Branch.
98.	16ft. wide Road Bridge over Kamaro Minor, Ex Kazi.	18.80	Kamaro.
99.	22ft. wide Road Bridge Guraho Distry (Kachan - Suran Road).	10.6	Guraho.
100.	16ft. Road Bridge over Karo Ali Bahar (Tando Bago-Towari Road).	17.0	Karo Ali Bahar.

Plan No.	Heading of Plan.		Situation of Structures.
	R.D.	Channel.	

101.	Group of Regulators i.e. Remodelling of X-Reg: over Suni Gunt Branch & Head Regulator of Raj Wah Kathan.	22.50	Suni Gunt Br:
102.	22ft. Road Bridge over Suni Gunt.	55.80	" "
103.	22ft. Road Bridge over Suni Gunt.	77.73	" "
104.	16ft. Road Bridge over Chhab Suni Gunt Br: (Kathan - Maro Post Road).	112.0	" "
105.	22ft. Road Bridge over Suni Gunt.	120.43	" "
106.	Remodelling Road Bridge over Sherwah small (Lower-Mindo Road).	14.30	Sher Wah small.
107.	16ft. Road Bridge over Sher Wah small	15.00	" "
108.	16ft. Road Bridge over Sherwah small.	35.00	" "
109.	22ft. Road Bridge over Raj Wah Kathan.	43.30	Raj Wah Kathan.
110.	22ft. Road Bridge over Raj Wah Kathan.	50.70	" "
111.	Group of Regulators i.e. X-Regulator over Rajwah Kathan & H/Reg: Mor Disty.	54.25	" "
112.	24ft. Road Bridge over Raj Wah Kathan.	82.10	" "
113.	16ft. Road Bridge over Mor Disty.	8.00	Mor Disty.
114.	16ft. Road Bridge and Chhab over Mor Disty.	18.00	" "
115.	16ft. Road Bridge over Mor Disty.	26.10	" "
116.	16ft. Road Bridge over All Wah Large.	52.00	All Wah Large.
117.	Remodelling 15ft. Road Bridge over Lined Channel escape.	20.00	Lined Channel Escape.
118.	Remodelling 16ft. Road Bridge over Lined Channel escape.	70.00	Lined Channel Escape.