PAPER No. 369

Operating Bombanwala Ravi Bedian Depalpur Link Canal in 1961

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Brief History

With the dawn of era of independence West Pakistan Government in Irrigation Department had to face a threat of reduction of Canal Water supplies coming from India. It had therefore, to devise means of Irrigation to a tract of land in West Pakistan, previously irrigated by Upper Bari Doab Canal, now known as Central Bari Doab Canal system.

A project was therefore prepared in 1948 to extend Rayya Branch of Upper Chenab Canal taking off at Bombanwala, R. D. 1,33,000 of Main Line Upper (U.C.C.). The project was revised in July, 1949 to pass an additional discharge of 2,000 Cusecs for Bedian Depalpur Link Canal. The Project included remodelling of Rayya Branch in Reach R.D. 0 to R.D. 1,77,000 for a capacity of 5,140 Cusecs at head and 3,044 Cusecs at Tail.

Construction on this project was started in 1948, and completed in 1952. M. R. B. D. was further extended in 1955 from Bedian R. D. 4,34,000 to R. D. 5,37,000 for meeting commitments of Depalpur Canal. The final revised capacity of remodelled Rayya Branch (now known as Bombanwala Ravi Bedian Depalpur Link Canal abbreviated B.R.B.D. Link) was 7,125 Cusecs at head.

Excavation of Channel was however done according to an interim section for 5,140 Cusecs at head but masonry works were remodelled to a final capacity of 7,125 Cusecs. The discharge had to be carried from Marala through U. C. C. by widening it on both sides. In the first phase, U.C.C. (Main Line Upper) was widened by 65.0 feet on right side for increasing the capacity by 3,000 Cusecs.

Soon after the construction of B. R. B. D. Link Project of Marala Ravi Link was taken up. It was found that a discharge of 2,000 Cs. (required for final capacity of B. D.) could be more economically carried through Marala Ravi Link Canal and transferred to B. R. B. D. Link at R. D. 1,88,500 through a Sub-Link. The scheme was executed at site and B. R. B. D. Link in reach R. D. 0 to R. D. 2,04,500 was not, therefore remodelled according to its final capacity.

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Operation

For operation purposes the Link Canal can be sub-divided into the following reaches :—

(*i*) Reach R.D. 0 to R.D. 2,04,500.

(*ii*) Reach R.D. 2,04,500 to R.D. 2,60,000.

(*iii*) Reach R.D. 2,60,000 to R.D. 3,73,000 (Lined).

(*iv*) Reach R.D. 3,73,000 to R.D. 4,34,000.

With the signing of Water Treaty with India in September, 1960 B.R.B.D. Link Canal up to R.D. 434 (Bedian) had to be brought under operation with effect from 10th of April 1961 to feed Central Bari Doab System as no water was to come from Madhopur (India) from 11th April, to 20th of September.

B.R.B.D. Link Canal has been running but with small discharges to feed direct off takes till the year 1961. A cross Section (Plate No. I) shows the condition of the Canal before it was opened in 1961.

The Canal at Head was gradually raised under a phased programme and after opening on 13-4-61 with a discharge of 1003 Cs. was raised to 5140 Cs. (its authorised full supply) as per statement attached. The Section of the channel had heavy silt deposits in bed as the Channel had been running low supplies for considerable time so it could not take full supply in the very beginning of its opening in Kharif 1961. The Channel by this time was only used for meeting the demands of old Rayya Branch System by constant watching day and night, it was possible to raise it to its designed capacity which helped washing of silt deposits from the bed of canal in upper reaches towards lower reaches, thus to bring it to the designed bed level.

A cross Section at R. D. 15,000 of B.R.B.D. Link after running in Kharif 1961 shows the improvement in its section without removal of Silt from bed but by pushing in the authorised discharge for a greater duration.

Due to running constant full supply in the link Canal necessity of heading up at the various cross regulators was altogether obviated in Kharif 1961 and the off-taking distys. were fed without heading up, as the heading up had the tendency of accumulation of silt in the bed and unnecessary berm formation thus tightening the Section and up setting the Regime of the Channel. The process brought the Channel to Regime.

Reach R.D. 2,04,500 to R.D. 2,60,000 B.R.B.D. Link

This reach of B.R.B.D. Link is in very heavy filling. The maximum height of banks above Natural surface level is up to 25 feet (*see* L, Section). The designed bed is about 14 feet higher than Natural surface level at

R.D. 2,60,000. The soil is of poor quality though this reach was opened for a small discharge in Kharif 1960 but was not attested for safe running of full supply discharge. Only one month and a half was left to open the Canal under the Indus Water Treaty, when a programme for treatment to this reach was chalked out.

Treatment with Killa Bushing in above reach

Cross Section at R.D. 2,35,000 R.D. 2,45,000 and R.D. 2,58,000 of B.R.B.D. Link showing the position of the Canal before it was opened in Kharif, are given as Plate II. For the safe running of the Canal it was thought essential that immediate steps be taken to provide cross spurs (Killas bushing) in the heavy filling Reach from R.D. 227 to 258. The time left was too short. Moreover the Killas were not available in the near vicinity as there was no Canal Plantation in this reach. These had to be procured from Canal Plantation along Marala Ravi Link involving lead over forty miles.

Due to very short time at disposal, the work was started from R.D. 2,58,000 (the heaviest filling reach) towards up stream and could be completed up to R.D. 2,33,000 by the 10th of April by which date the Canal was scheduled to be opened unde the Water Treaty.

Laying of Cross spurs

(*a*) *Alignment.*—In order to attain a regular edge of the berm formation an accurate laying of the spurs is very essential. To achieve this end centre line of the Canal was laid and dag-belled at site. From the centre line half width of the Canal was marked on either side. At these two edge lines thus marked, alignment of each Killa spur was accurately laid giving a width of two feet (*See* Plate III).

(*b*) *Driving Killas.*—Having marked the width as 2′, the Killas were so driven along the 2′ width that they were staggered in such a way that distance of each Killa was kept as two feet either way, as shown on the sketch given in Plate III.

(*c*) Having driven the Killas in the manner as described above, Sarkanda-Pilchi, or Kahi Rolls 6″ in diameter tied with Munj Ban were inter-twined in between the Killas driven in staggered lines as shown in the Sketch Plate III. Inner side of the spur was kept hollow to reduce the quantity of Sarkanda Rolls effecting considerable saving in cost.

As the time left was very short so the work had to be phased in such a way as to complete it within the time available before commissioning the Canal. It was so arranged that a gang was deputed to mark the centre line and the width of the Canal as well as alignment of spurs at 50′ apart. Another

gang was entrusted with the work of filling 6'' dia Sarkanda Rolls in the spurs. This was done by employing Departmental gangs on monthly basis. The work of cutting and carriage of Sarkanda Rolls as well as carriage of Killas from Marala Ravi Link Canal to site of work was only entrusted to the Contractors on work order basis. During carriage operations strict watch was kept to ensure that only the required quantity of Killas and Sarkanda Rolls are unloaded at each site to avoid unnecessary cross carriage and to save time. No doubt some reserve stock of Killas and rolls was piled at suitable sited for replenishing during operation which proved very useful later on.

The entire work could have been got done through Contractors, but the disadvantage foreseen was that the Contractors after completing the work would not be able to replenish which would be required on opening of the Canal. This point went in favour of getting the work done departmentally which increased efficiency as well as considerable saving.

(*d*) *Photos.*—Some of the photos taken when the work of Killa bushing was in progress (before opening of the Canal) are shown below:

1. Driving Killas (R.D. 2,33,000) facing down stream) .. Plate IV
2. Driving Killas (R.D. 2,34,000) and filling 6'' dia Sarkanda Rolls .. Plate V
3. Killa spurs complete with 6'' dia rolls filled in (R.D. 2,46,000 facing (U/S) .. Plate VI
4. Killa spur complete (close view) R.D. 2,49,000-R) .. Plate VII

Commissioning of B.R.B.D. Link Canal below R.D. 2,04,500

The Canal was due to be opened on 10th April 1961 as per Water Treaty. Some cross bunds in the Link Canal at the points of crossings of C.B.D.C. Channels had to be removed before B.R.B.D. could flow. It was so managed that the Cross bunds above the water surface level in the various channels crossing the link were removed when these Channels were getting supply from India. As soon as effect of reduction was received in these Channels work of remaining wet and slush earth work of bunds continued and the Canal below R.D. 2,04,500 B.R.B.D. Link was opened on 13-4-1961.

As the Link Canal in reach below R.D. 2,04,500 runs in the Riverian tract with very heavy filling so a very careful Schedule of its opening had to be laid down. The Schedule so chalked out was noted on the Gauge Register

there and then, and instructions were given to follow it strictly. This is given below for information and for guidance of officers, who may happen to operate such newly constructed canals, under similar conditions.

Schedule of Opening B.R.B.D. Link below Regulator R.D. 2,04,500 (in Kharif 1961)

Date	*Remarks*
13-4-1961 after morning Gauges.	"Open B.R.B.D. Link below regulator R.D. 2,04,500 with a discharge of 750 Cs. (seven hundred and fifty cusecs—gauge 2.84). This discharge is to be attained before morning gauges on 14-4-1961.
14-4-1961	Raise B.R.B.D. Link below regulator R.D. 2,04,500 at the rate of one hundred cusecs per hour. The suggested timings are as below : at 07.00 raise to gauge 3.08 dis. 850 Cs. at 08.00 ,, ,, 3.30 ,, 950 Cs. at 09.00 ,, ,, 3.50 ,, 1050 Cs. at 10.00 ,, ,, 3.70 ,, 1150 Cs. This discharge *i.e.*, 1150 Cusecs to be maintained till morning gauges on 15-4-1961.
15-4-1961	Raise B.R.B.D. Link at the rate of 50 Cs. every hour at the following suggested timings at 07.00 hours raise to gauge 3.80 dis. 1200 Cs. at 08.00 ,, ,, ,, 3.90 ,, 1250 Cs. at 09.00 ,, ,, ,, 3.99 ,, 1300 Cs: at 10.00 ,, ,, ,, 4.09 ,, 1350 Cs. at 11.00 ,, ,, ,, 4.18 ,, 1400 Cs. at 12.00 ,, ,, ,, 4.27 ,, 1450 Cs. The discharge of 1450 cusecs is to be maintained till the morning gauges of 16-4-1961.
16-4-1961	Raise B.R.B.D. Link below regulator R.D. 2,04,000 at the rate of 50 Cs. per hour at the following suggested timings : at 07.00 raise to gauge 4.37 dis. 1500 Cs. at 08.00 ,, ,, 4.45 ,, 1550 Cs. at 09.00 ,, ,. 4.54 ,, 1600 Cs. at 10.00 ,, ,, 4.62 ,, 1650 Cs. at 11.00 ,, ,, 4.71 ,, 1700 Cs. at 12.00 ,, ,, 4.80 ,, 1750 Cs.

This discharge of 1750 Cs. is to be maintained till the morning gauges of 17-4-1961.

17-4-1961 Raise B.R.B.D. Link at the rate of 50 Cusecs per hour at the following suggested timings :

at	07.00	raise to gauge	4.88	dis.	1800 Cs.
at	08.00	,, ,,	4.96	,,	1850 Cs.
at	09.00	,, ,,	5.04	,,	1900 Cs.
at	10.00	,, ,,	5.12	,,	1950 Cs.
at	11.00	,, ,,	5.20	,,	2000 Cs.

This discharge of 2000 Cusecs is to be maintained till the morning gauge of 18-4-1961.

18-4-1961 The same schedule as per 17-4-1961 *i.e.*, raising at the rate of 50 Cs. per hour and daily increase of 250 Cs. (two hundred and fifty Cusecs) is to be implemented till the indent of C.B.D.C. perennial channels beyond Ravi Syphon has been met. No non-perennial channels are to be opened without the prior approval of D.C.E., Lahore as ordered by him.

The increase in the Link has been suggested in the mornings as before evening all the effect will have passed beyond R.D. 2,60,000 and as such the night watching will not involve any regulation changes."

Having laid down the above schedule after a careful thought, B.R.B.D. Link Canal was opened and raised.

Watching and Staunching

Watching.—As B.R.B.D. Link in this reach was to be raised to full supply for the first time since its construction, so a very careful watch to be kept as no risk could be taken to have a breach, as any such accident would have cut the supplies to the channels to be fed by B.R.B.D. Link for a year or so which would have caused devastation to the irrigated areas. The sad experience of breach at R.D. 2,59,000 by the unprecedented floods and the extent of damage warranted a careful operation of the canal, hence adoption of adequate precautionary measures.

Watching gangs for the day and for the night had to be employed separately. Lightening arrangements had to be adequate. Each Beldar was provided with a Lantern, Gas Lamps were fixed at suitable distances. During rainy season a Generating set had to be installed and transmission line from R.D. 2,60,000 to R.D. 2,45,000 was stretched and bulbs fixed at suitable intervals to give light at outer toe of the banks. Overseer Sections were reduced in length considerably to have efficient supervision. The average extent of an Overseer section was 20,000 feet. Separate Overseers were employed for the

night shift. B.R.B.D. Link was constructed during emergency in the year 1948 when India had stopped supplies. The Execution then, was restricted to excavation of the Canal with only very essential works. As such no buildings were considered then, in reach R.D. 2,04,500 to R.D. 2,80,000 there was absolutely no shelter for the staff. It was considered very essential to have some shelter for the watching staff. The works of constructing temporary watching huts at R.D. 227/R, 245/R, and R.D. 260 R, were, therefore, taken up immediately so as to be ready by the time, the link Canal is opened. These were completed at a cost of about Rs. 4,500 each. A photo of one of the huts constructed is given as Plate VIII.

In order to trace out any leakage, the watching Beldar was made to walk along the toe of the Bank in his reach during day and night. The day gang was not to leave in the evening till the night gang took over. By walking at the toe the leakages were traced immediately. Two Dozers were kept ready, one on each Bank in reach R.D. 245 to 260 to meet any emergency. These were working on strengthening Banks and were sent for as and when required.

Staunching.—Staunching work was done only during the day time for which separate gang had to be employed.

After opening of the Canal a trench was made one foot above the water surface level. The earth of the trench so dug was put on the inner side of the Canal. The trench dug was filled with water. The water in the trench was usually 1.0 above the water surface level in the Canal. The watching Beldar then was made to walk through the water filled trench to staunch it. The trench water may find its way through voids, and in case there was any leakage from the trench, through the bank it was detected, traced, and opened in its entire length and staunched properly. Having gone through this process in the entire length the Canal was carefully raised from the previous water surface level to that in the trench. The process was repeated and to the desired water surface level.

Photos of the process at R.D. 245 L are given as Plate IX.

Behaviour of the Canal

Leakages.—The soil through which B.R.B.D. Link in the reach in question passes, is kallar of a very bad quality, in spite of elaborate arrangements of watching day and night, and having two Dozers ready in hand, numerous leakages occurred during day as well as during night hours. Walking of the watching Beldars along toe of the bank made the task easy in detecting the leakages quickly and to control them in time leakages were opened in entire length and puddled properly. Difficulty was experienced when the Canal was raised after running steady supply for some time. A detailed statement

appended Annexure 'A' shows that in all 118 leakages occurred in the entire length of the Canal out of which 64 were in the reach R.D. 2,04,500 to R.D. 2,60,000. A big leakage occurred at R.D. 245 left at 3-00 a.m. on 21-6-61. It was but the timely detection during the vigilant watch that saved the canal from a breach. It was so high that it discharged about 150 Cs. The presence of Dozers helped closing the leakage in immediately thus saving the canal from breach.

Effect of Killa Bushing

The Canal at Head (Bombanwala) was raised to its maximum full supply *viz.* 5,140 Cs. gradually. Heading up at cross Regulators to feed off taking channels was prohibited. This forced all silt deposits in the bed of the Canal in reach R.D. 0—177 move to the lower reach. The supply equal to withdrawals was supplemented from Marala Ravi Link through Sub-Link. Thus the Canal in the reach R.D. 0—2,04,500 was made to take the maximum discharge that it could, safely up to its designed capacity and had put the Canal in regime as well. All this silt brought from above has deposited in the reach below R.D. 2,04,500. This reach required Silt for berm formation. It was thought that it may take one or two flow seasons to form the berms up to the levels. To which, Killa bushing was done. To my surprise during a short closure and reduction in supply in July, revealed that Killa bushing has caught so much silt that berms have formed up to the top of these spurs. Also Jungle growth specially of Gulabasi along the berms helped a great deal in formation of berms. The major precaution to be taken is that during formation of berms level is to be closed very gradually as the green berms fall in case of quick draw downs.

Photo taken in July 1961 at R.D. 233, 235-L, 246 to 245-L show very encouraging results of berms formation. (Plate X).

Photos taken at the close of the flow season show the formation of beautiful berms (Plate XI).

Cross Sections observed at R.D. 235, 245 and 258 before and after the flow season, show that 56,11,000 cft. of silt has deposited in the form of berm formation in this reach. The formation of berms in this reach which had made the Canal safe for its running up to this level is much more beneficial as compared to the amount spent on Killa bushing.

Ring Bund R.D. 258 to 260 B.R.B.D. Link

A breach occurred at this site during record flood of the year 1955. The breach was closed by means of ring bunds in the left and right bank. It formed a big pond. The wave action during stormy days made the waves rise up to 5 feet height and even more as one evening the Author happened to be at

R.D. 260/L, when a very heavy wind storm was experienced. This eroded the bank from the inside in more than 5′ width in about an hour. It necessitated the protection of the Ring bund. Orders were issued there and then to the Sub-Divisional Officer incharge to provide immediate protection to the Ring bund by means of gunny bags or cement empty bags filled with earth or sand to stand against wave action where the action was severe and to provide pilchi pitching in the reach where the damage was comparatively less. It was but for the protection so provided that the canal could be run in this reach. Photos of the protection so provided is given in Plate XII.

The plan of the Ring bund and area covered by it to show its magnitude and necessity of protection is also enclosed.

Reach R.D. 280 to 373 B.R.B.D. Link

This is lined reach and ordinary watching of one man per mile was sufficient to see in case there is any settlement of banks etc., as the canal was opened for the first time after about 8 years of its construction. No trouble was noticed in this reach.

Ravi Syphon

Table appended as Annexure B, shows the discharge passed through the syphon and the difference in water surface level U/S and D/S.

The maximum discharge of 3190 Cs. was passed below Ravi Syphon on 21-8-1961. After meeting requirements of C.B.D.C. Channels in full, about 700 Cs. was passed in Bedian Depalpur Link for its staunching.

Reach R.D. 373 to R.D. 434

This reach is unlined and runs in filling from R.D. 373 to 395 and R.D. 410 to R.D. 434. The soil is of poor quality Kallar. The treatment of Killa bushing and watching and staunching as explained in reach R.D. 2,04,500 to R.D. 2,60,000 had to be done here also in a similar way. (*See* Plate XIII).

The only deviation made was that spacing between the spurs was kept as **100′** instead of **50′** as in reach R.D. **233-258**. The work of Killa bushing here was entirely done by employing Departmental labour. Even carriage of Killas from M.B.L. and that of Jungle for filling was done by Government Truck. This caused a good deal of saving in the expenditure in spite of the fact that during entire operation period the replenishing of Jungle in the Killa bushing continued, and expenditure for the same was met with from within the estimated amount.

In spite of such treatment good deal of leakages occurred. At one time

three leakages occurred, simultaneously at R.D. 281-283/R. The overseer on watching duty showed very high sense of responsibility. He had to run two miles either way on Motor Cycle with Bugle in his mouth, collecting the watching Beldars and thus controlled the leakages in time and saved the Canal from a breach.

Effect of running B.R.B.D. Link on C.B.D.C. Channels fed from B.R.B.D. Link

A cross section of Lahore Branch canal observed below its off take from B.R.B.D. when it was fed from source in India and after it received continuous supplies for one season from B.R.B.D. Source, as well as cross section of Khaira Disty. under similar conditions are shown in Plates XIV and XV. The low supplies running for the last 13 years have resulted in silt deposits in the bed ultimately raising the bed levels and reducing the carrying capacity of these Channels. On the day of opening these Channels from B.R.B.D. Link, the high gauges showed a low discharge due to bed having been raised by silting. The assured and continuous supply from B.R.B.D. gradually washed away the silt resulting in lowering of the bed. Consequently the gauges in these off-taking Channels gave a higher discharge at a lower gauge as compared to the early dates of their opening from B.R.B.D. Link.

It fed various C.B.D.C. Channels to the authorized full supply. With the result that tail of some of the Channels where there have been chronic shortage such as Niaz Beg and Bucher Kahna Distributaries etc., were fed to their authorized full supply discharge with the result that irrigation in Lahore District was assured.

This also improved the regime of these Channels. The Shudkar irrigation figures on this system for the period, these channels got supplies from B.R.B.D. Link were of the order of 321,000 acres and with great satisfaction to the cultivators.

General

After making all such arrangements of Killa bushing, watching and staunching the matter was left to Almighty for success.

By grace of God and under instructions, guidance and moral support of the then Superintending Engineer, as well as for the hard and arduous work put in right from a watching Beldar up to the Superintending Engineer, B.R.B.D. Link at head was raised to **5,140** Cusecs, and below R.D. 2,04,500 the link was raised to **3,600** Cusecs, during Kharif, 1961 though so many leakages occurred. This is a great achievement of the Irrigation Department.

B.R.B.D. Link was inspected by the Additional Chief Engineer (Opera-

tion) Irrigation Department, West Pakistan on 11-5-1961 and 13-5-1961 An extract from his Inspection Note is reproduced below:—

B.R.B.D. Link

"B.R.B.D. Link was inspected from Head to Batapur on 11-5-1961 and from Barki Road Crossing to Gandasinghwala on 13-5-1961. *Very good efforts have been made to run the Channel successfully and all concerned may be congratulated for the same*".

Word of Thanks

My thanks are due to the watching staff right from the Beldars to the Sub-Divisional Officers with whose vigilant efforts for watching and staunching the canal could run successfully and the Water Treaty relating to B.R.B.D. Link was implemented in letter and spirit.

The Process of staunching and watching continued in the year 1962, 1963, and 1964, and B.R.B.D. Link Canal was raised to as below:

Year	Discharge run below Ravi Syphon (Cusecs)	Supplies delivered to Dipalpur Canal (Cusecs)
1962	4439	1546
1963	4870	2104
1964	5050	2025

ANNEXURE A

Statement showing the Leakages occurred in B.R.B.D. Link during the year 1961

Date	Reach R.D. 0-204		Reach R.D. 204-260		Reach R.D. 373-400		Reach R.D. 400-434	
	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time
16-4-61	—	—	249-250/R	Evening	—	—	—	—
16-4-61	—	—	250-251/R	„	—	—	—	—
17-4-61	—	—	238000/R	„	373-378/I&R	5.00 p.m.	423509/L	4.00 p.m.
18-4-61	—	—	238000/R	—	—	—	415000/R	7.00 p.m.
18-4-61	—	—	222/L 255/L	—	—	—	424000/	5.00 a.m.
							L(2)	6.00 a.m.
18-4-61	—	—	255/R	5.30 p.m.	—	—	425000/L	6.00 a.m.
19-4-61	177500/L	10.00 a.m.	—	—	—	—	—	—
20-4-61	—	—	—	—	—	—	409000/R	4.30 a.m.
20-4-61	—	—	—	—	—	—	409000/L	4.30 a.m.
21-4-61	—	—	—	—	—	—	421400/L	1.00 a.m.

[*contd.*

ANNEXURE A—(*contd.*)

Statement showing the Leakages occurred in B.R.B.D. Link during the year 1961

Date	Reach R.D. 0-204		Reach R.D. 204-260		Reach R.D. 373-400		Reach R.D. 400-434	
	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time
23-4-61	190000/R	11.00 a.m.						
23-4-61	171000/R	8.00 a.m.	—	—	—	—	—	—
23-4-61	200000/R	1.00 p.m.	—	—	—	—	—	—
23-4-61	201000/R	2.00 p.m.	—	—	—	—	—	—
25-4-61	—	—	—	—	381000/R	6.00 a.m.	424000/L	4.00 p.m.
25-4-61	—	—	—	—	383-384/L 386-387/R	8.00 p.m. 2.00 p.m.	424000/L	4.00 p.m.
26-4-61	—	—	221060/L 223570/R	—	—	—	—	—
27-4-61	—	—	—	—	381-382/R 379-380/R	8-9 p.m. 4.55 a.m.	—	—
29-4-61	—	—	249650/R	8.00 a.m.	—	—	—	—

Statement showing the Leakages occurred in B.R.B.D. Link during the year 1961

Dated	Reach R.D. 0-204		Reach R.D. 204-260		Reach R.D. 373-400		Reach R.D. 400-434		Reach R.D. 434-	
	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time
6-5-61	—	—	—	—	—	—	423500/L	3.00 a.m.	511500/R	5.30 a.m
5-5-61	—	—	—	—	—	—	423800/L	2.00 a.m.	—	—
11-5-61	—	—	—	—	—	—	409700	10.30 p.m.	—	—
13-5-61	—	—	—	—	379100/R	6.10 p.m.	—	—	—	—
9-5-61	—	—	—	—	373-374/R	7.55 a.m.	—	—	—	—
14-5-61	—	—	238000/R	Evening	—	—	—	—	—	—
30-5-61	—	—	—	—	378-79/L	15.00 hrs.	421-22	3.00 hrs.	—	—
8-6-61	—	—	—	—	—	—	425000/L	7.30 a.m.	—	—
16-6-61 & 15-6-61	—	—	—	—	375/R 374/L	17 & 18 hrs.	—	—	—	—
17-6-61	—	—	—	—	—	—	418500/L	10.30 p.m.	—	—
24-6-61	—	—	—	—	—	—	416/L	15 hrs.	—	—
18-6-61	—	—	223510/R & 249400/R	18 hrs.	—	—	—	—	—	—
20-6-61	—	—	249875/R	11.30 a.m.	—	—	—	—	—	—
20-6-61	—	—	249580/R	12.9 a.m.	—	—	—	—	—	—
20-6-61	—	—	255700/R	15.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	237725/R	18.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	251010/R	18.00 hrs.	—	—	—	—	—	—

20-6-61	—	—	250870/R	18.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	249350/R	20.30 hrs.	—	—	—	—	—	—
20-6-61	—	—	249700/R	21.10 hrs.	—	—	—	—	—	—
20-6-61	—	—	250600/R	21.30 hrs.	—	—	—	—	—	—
20-6-61	—	—	243250/R	22.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	256000/R	22-30 hrs	—	—	—	—	—	—
20-6-61	—	—	253000/R	23.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	256000/R	22.30 hrs.	—	—	—	—	—	—
20-6-61	—	—	247000/R	24.00 hrs.	—	—	—	—	—	—
20-6-61	—	—	—	—	395-396/R	10.00 hrs.	—	—	—	—
21-6-61	—	—	246000	3.00 a.m.	—	—	—	—	—	—
22-6-61	—	—	21010/R &	—	—	—	—	—	—	—
			27169/R	—	—	—	—	—	—	—
22-6-61 &	—	—	38300/R &	at night	—	—	—	—	—	—
23-6-61			42100/R							
Total	5		32		13		17			

Total No. of leakages up to 31-6-1961: 32+35=67 No.

	5		32		13		17			
1-7-71	—	—	—	—	33500/R	—	423-4	1.00 a.m.	—	—
3-7-61	—	—	221505/R	10.00 a.m.	—	—	—	—	—	—
3-7-61	—	—	22330/L	11.00 a.m.	—	—	—	—	—	—
3-7-61	—	—	237615/R	14.00 hrs.	—	—	—	—	—	—
4-7-61	37500/L & 41596/R	—	—	—	—	—	—	—	—	—

[*contd.*

Statement showing the Leakages occurred in B.R.B.D. Link during the year 1961—*(contd.)*

Dated	Reach R.D. 0-204		Reach R.D. 204-260		Reach R.D. 373-400		Reach R.D. 400-434		Reach R.D. 434-	
	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time	R.D.	Time
4-7-61	—	—	—	—	—	—	—	—	446100/R (2 Nos.)	6.30 hrs.
4-7-61	—	—	—	—	—	—	—	—	446100/R	6.30 a.m.
4-7-61	—	—	—	—	—	—	—	—	45200/R	1.00 p.m.
6-7-61	177000/R	4-5 p.m.	—	—	—	—	—	—	—	—
9-7-61	—	—	216500/R	12.00 hrs.	—	—	—	—	—	—
9-7-61	—	—	224400/R	13.00 hrs.	—	—	—	—	—	—
12-7-61	—	—	239260/R	14.00 hrs.	—	—	—	—	—	—
13-7-61	—	—	249300/R	15.00 hrs.	—	—	—	—	51190/R	15.45 hrs.
20-7-61	—	—	237795/R	14.30 hrs.	—	—	—	—	—	—
20-7-61	—	—	237795/R	16.00 hrs.	—	—	—	—	—	—
20-7-61	—	—	250800/R	8.30 hrs.	—	—	—	—	—	—
20-7-61	—	—	251200/R	10.00 hrs.	—	—	—	—	—	—
20-7-61	—	—	249100/R	11.10 hrs.	—	—	—	—	—	—
20-7-61	—	—	249210/R	12.00 hrs.	—	—	—	—	—	—
20-7-61	—	—	249405/R	12.00 hrs.	—	—	—	—	—	—
21-7-61	—	—	249405/R	12.00 hrs.	—	—	—	—	—	—
21-7-61	—	—	249630/R	13.00 hrs.	—	—	—	—	—	—
21-7-61	—	—	258176/R	20.00 hrs.	—	—	—	—	—	—

21-7-61	—	—	237330/R	13.30 hrs.	—	—	—	—	—	—	
21-7-61	—	—	237940/R	14.00 hrs.	—	—	—	—	—	—	
21-7-61	—	—	237530/R	14.00 hrs.	—	—	—	—	—	—	
21-7-61	—	—	237840/R	14.00 hrs.	—	—	—	—	—	—	
21-7-61	—	—	238800/R	14.00 hrs.	—	—	—	—	—	—	
27-7-61	—	—	249405/R	12.00 hrs.	—	—	423/L	—	—	—	
27-7-61	—	—	249630/R	13.00 hrs.	—	—	425/L	—	—	—	
27-7-61	—	—	258176/R	20.00 hrs.	—	—	414/L	—	—	—	
27-7-61	—	—	237330/R	13.00 hrs.	—	—	—	—	—	—	
27-7-61	—	—	237940/R	14.00 hrs.	—	—	—	—	—	—	
27-7-61	—	—	237530/R	14.00 hrs.	—	—	—	—	—	—	
27-7-61	—	—	237840/R	14.00 hrs.	—	—	—	—	—	—	
27-7-61	—	—	238800/R	14.00 hrs.	—	—	—	—	—	—	
29-7-61	—	—	237720/R	14.00 hrs.	—	—	—	—	—	—	
13, 14-8-61	—	—	—	—	—	—	41560/R	24.00 hrs.	8350/R	14.00 hrs.	
26-8-61	—	—	—	—	381/R	17.00 hrs.	423/R	11.00 hrs.	—	—	
8-9-61	—	—	—	—	—	—	425/L	—	—	—	
8-9-61	—	—	—	—	—	—	414/L	—	—	—	
15-9-61	—	—	253276/L	9.00 a.m.	—	—	—	—	—	—	

B.R.B.D. Link Canal closed on 20-9-1961.

Grand total upto 20-9-61	8	64	15	25	6	
Overall Total	118					

ANNEXURE B

Statement showing difference in Water Level U/S & D/S Ravi Syphon during the year 1961

Date	Gauge		Difference	Discharge D/S Ravi syphon	Discharge Tabular	Difference
	U/S	D/S				
				Cs.		
16-4-61	724.30	722.70	1.60	1663	4120	(—) 2457
17-4-61	724.00	722.60	1.40	1510	4074	(—) 2564
18-4-61	724.40	722.90	1.50	1760	4240	(—) 2480
19-4-61	724.40	722.70	1.70	1822	4120	(—) 2298
20-4-61	724.00	716.00	6.00	NIL	1182	(—) 1182
21-4-61	724.00	715.00	9.00	750	873	(—) 123
22-4-61	724.00	721.00	3.00	1800	3246	(—) 1446
23-4-61	724.50	722.50	2.00	2000	4019	(—) 2019
24-4-61	724.50	722.50	2.00	2106	4019	(—) 1913
25-4-61	724.70	722.65	2.05	2209	4097	(—) 1888
26-4-61	724.70	722.62	2.08	2409	4083	(—) 1674
27-4-61	724.50	722.50	2.00	2500	4019	(—) 1519
28-4-61	724.70	722.20	2.50	2423	3858	(—) 1435
29-4-61	724.50	722.20	2.30	2324	3858	(—) 1534
30-4-61	724.50	722.30	2.20	2430	3911	(—) 1481

Statement showing difference in Water Surface Level U/S and D/S Ravi Syphon during the year 1961

Date	Gauge		Difference	Discharge D/S Ravi syphon	Discharge Tabular	Difference	Correction factor
	U/S	D/S					
				Cs.	Cs.	Cs.	%
1-5-61	724.5	722.3	2.2	2455	3911	(—) 1456	(—) 36.2
2-5-61	724.5	722.25	2.25	2450	3890	(—) 1440	(—) 37.02
3-5-61	724.5	722.3	2.2	2450	3941	(—) 491	(—) 3.02
4-5-61	724.5	722.25	2.25	2450	3890	(—) 1440	(—) 37.0
5-5-61	724.5	722.3	2.20	2470	3911	(—) 1441	(—) 36.80
6-5-61	724.5	722.3	2.2	2516	3911	(—) 1395	(—) 35.66
7-5-61	724.5	722.3	2.2	2528	3911	(—) 1383	(—) 35.36
8-5-61		722.2		2530	3858	(—) 1328	(—) 34.30
9-5-61	724.4	722.2	2.2	2518	3858	(—) 340	(—) 34.7
10-5-61	724.4	722.2	2.2	2545	3858	(—) 1313	(—) 34.03
11-5-61	724.4	722.2	2.2	2540	3658	(—) 1118	(—) 34.0
12-5-61	723.9	721.9	2.0	2408	3679	(—) 1271	(—) 34.60
13-5-61	724.2	722.15	2.05	2535	3809	(—) 1274	(—) 33.4
14-5-61	724.0	722.0	2.00	2611	3532	(—) 921	(—) 26
15-5-61	724.4	722.2	2.2	2569	3858	(—) 1289	(—) 33.4
16-5-61	724.4	722.2	2.2	2560	3858	(—) 1298	(—) 33.5
17-5-61	724.4	722.2	2.2	2560	3858	(—) 1298	(—) 33.64
18-5-61	724.4	722.2	2.2	2557	3858	(—) 1301	(—) 33.72
19-5-61	724.4	722.2	2.2	2562	3858	(—) 1296	(—) 33.7
20-5-61	724.4	722.2	2.2	2562	3858	(—) 1296	(—) 33.7
21-5-61	724.4	722.2	2.2	2560	3858	(—) 1298	(—) 33.62
22-5-61	724.4	722.2	2.2	2565	3858	(—) 1293	(—) 33.4
23-5-61	724.5	722.3	2.2	2575	3911	(—) 1336	(—) 34.20
24-5-61	724.5	720.9	3.6	1550	3178	(—) 1628	(—) 51.2
25-5-61	724.5	719.2	5.3	1659	2391	(—) 732	(—) 30.6
26-5-61	Gauge not observed due to Eid Holiday						
27-5-61	724.5	719.0	5.5	1500	2310	(—) 810	(—) 35
28-5-61	724.5	722.0	2.5	2275	3532	(—) 1257	(—) 35.5
29-5-61	724.5	722.0	2.5	2300	3532	(—) 1232	(—) 35.4
30-5-61	724.3	722.0	2.3	2300	3532	1232	(—) 35.4
31-5-61	724.5	722.0	2.5	2526	3532	(—) 1006	(—) 28.5

Statement showing difference in water surface level U/S and D/S Ravi Syphon during the year 1961

Date	Gauge		Difference	Discharge D/S Ravi syphon	Discharge Tabular	Difference	Correction factor
	U/S	D/S					
				Cs.			%
1-6-61	724.5	722.3	2.2	2626	3941	(—) 1315	(—) 33.3
2-6-61	724.5	722.3	2.2	2620	3941	(—) 1321	(—) 33.3
3-6-61	724.5	722.2	2.3	2550	3858	(—) 1308	(—) 33.9
4-6-61	724.5	722.3	2.2	2626	3941	(—) 1315	(—) 33.3
5-6-61	724.5	722.3	2.2	2626	3941	(—) 1315	(—) 33.3
6-6-61	724.4	722.2	2.2	2610	3858	(—) 1248	(—) 32.3
7-6-61	724.5	722.25	2.2	2630	3890	1260	32.4
8-6-61	724.5	722.25	2.25	2720	3890	1260	32.4
9-6-61	724.5	722.5	2.25	2778	4000	1222	30.5
10-6-61	724.5	722.5	2.0	2795	4000	1205	30.1
11-6-61	724.5	722.5	2.0	2794	4000	1206	30.1
12-6-61	724.5	722.5	2.0	2790	4000	1210	30.2
13-6-61	724.5	722.5	2.0	2790	4000	1210	30.2
14-6-61	724.5	722.5	2.0	2790	4000	1210	30.2
15-6-61	724.5	722.5	2.0	2790	4000	1210	30.2
16-6-61	724.5	722.5	2.0	2816	4000	1184	29.6
17-6-61	724.5	722.6	1.9	2870	4048	1178	28.9
18-6-61	724.5	722.2	2.3	2694	3858	1164	30.1
19-6-61	724.5	722.6	1.9	2701	4048	1347	33.2
20-6-61	724.4	722.4	2.0	2802	4048	1246	30.7
21-6-61	724.5	722.5	2.0	2886	4000	1114	27.8
22-6-61	723.5	722.2	1.3	2650	3858	1208	31.3
23-6-61	724.5	722.5	2.0	2850	4000	1150	28.7
24-6-61	724.4	722.4	2.0	2800	3982	1182	29.8
25-6-61	723.0	722.2	0.8	2640	3858	1218	31.6
26-6-61	724.5	722.5	2.0	2888	4000	1112	27.8
27-6-61	724.5	722.5	2.0	2890	4000	1110	27.8
28-6-61	724.5	722.5	2.0	2900	4000	1110	27.5
29-6-61	724.5	722.6	1.9	2937	4048	1111	27.8
30-6-61	724.5	722.6	1.9	3009	4048	1005	25.6

Statement showing difference in water surface levels U/S and D/S Ravi Syphon during the year 1961

Date	Gauge		Difference	Discharge D/S Ravi syphon	Discharge Tabular	Difference	Correction factor
	U/S	D/S					
				Cs.			%
1-7-61	724.5	722.6	1.9	2995	4074	(—) 1079	26.14
2-7-61	724.5	722.75	1.75	3054	4157	(—) 1103	26.5
3-7-61	724.5	722.75	1.75	3053	4157	(—) 1104	26.5
4-7-61	724.5	722.75	1.75	3065	4157	(—) 1092	26.2
5-7-61	724.5	722.75	1.75	3065	4157	(—) 1092	26.4
6-7-61	724.5	722.75	1.75	3090	4157	(—) 1067	25.66
7-7-61	724.5	722.75	1.75	3055	4157	(—) 1102	26.5
8-7-61	724.5	722.75	1.75	3055	4157	(—) 1102	26.5
9-7-61	724.4	722.7	1.7	2939	4130	(—) 1191	26.4
10-7-61	724.7	722.95	1.75	3189	4253	(—) 1064	24.5
11-7-61	724.5	722.2	2.3	2655	3858	(—) 1203	30.94
12-7-61	724.5	720.5	4.0	1674	3005	(—) 1331	49.9
13-7-61		722.2		2800	3858	(—) 1058	27.2
14-7-61	724.6	722.95	1.65	3189	4336	(—) 1147	26.42
15-7-61	724.5	722.2	2.3	2714	3858	(—) 1144	29.7
16-7-61	724.5	722.7	1.8	2903	4130	(—) 1227	29.7
17-7-61	724.5	722.7	1.8	2903			
18-7-61	724.4	721.0	3.4	1824	3244	(+) 1420	43.3
19-7-61	724.4	721.0	3.4	2598	3650	(—) 1052	28.8
20-7-61	724.7	722.9	1.8	3042	4240	(—) 1198	28.21
21-7-61	724.7	722.95	1.75	3096	4268	(—) 1172	37.9
22-7-61	724.8	723.0	1.8	3155	4296	(—) 1141	36.55
23-7-61	723.2	719.7	3.5	1203	2678	(—) 1475	54.7
24-7-61	724.5	722.0	2.5	2506	3754	(—) 1248	30.57
25-7-61	722.7	719.8	2.9	1203			
26-7-61	723.2	715.8	7.4	..			
27-7-61	724.5	722.2	2.3	2775	3885	(—) 1110	28.83
28-7-61		719.8		1364	2678	(—) 1114	49.60
29-7-61	723.0	722.0	1.0	2644	3754	1110	29.57
30-7-61	724.8	723.0	1.8	3042	4296	(—) 1254	29.18
31-7-61	721.1	720.5	0.6	1652	3005	(—) 1353	45.00

Statement showing difference in the Water Surface Level U/S and D/S Ravi Syphon during the year 1961

Date	Gauge		Difference	Discharge D/S Ravi syphon	Discharge Tabular	Difference	Correction factor
	U/S	D/S					
				Cs.	Cs.		%
1-8-61	719.3	717.6	1.7				
2-8-61	723.3	721.4	1.9	2345	4464	(—) 1119	26.67
3-8-61	721.3	720.2	1.1				
4-8-61	720.0	719.10	0.9	2431	3497	(—) 1066	30.48
5-8-61	719.4	717.85	1.55				
6-8-61	718.7	716.4	2.3				
7-8-61	720.0	715.5	4.5				
8-8-61	721.0	716.1	4.9				
9-8-61	722.1	721.1	1.0	2285	3806	(—) 1521	39.93
10-8-61	722.2	721.4	0.8				
11-8-61							
12-8-61							
13-8-61							
14-8-61							
15-8-61		722.45		2585	3992	(—) 1407	35.24
16-8-61		722.3		2528	3911	(—) 1383	35.36
17-8-61		720.7		1643	3101	(—) 1453	47.00
18-8-61							
19-8-61		721.1		2301	3296	(—) 995	30.2
20-8-61		722.5		2888	4019	(—)	28.14
21-8-61		722.9		3190	4240	(—)	24.78
22-8-61							
23-8-61							
24-8-61		722.0		2675	3754	1079	28.74
25-8-61		723.0		3170	4296	1126	26.20
26-8-61		723.0		3218	4296	1078	24.90
27-8-61		723.0		3168	4296	1128	26.25
28-8-61		722.0		2580	3754	1174	31.3
29-8-61		722.0		2480	3606	1126	24.84
30-8-61							
31-8-61		722.0		2640	3750	1110	29.67

Statement showing difference in water surface levels U/S and D/S Ravi Syphon during the year 1961.

Date	Gauge		Difference	Discharge D/S Ravi Syphon	Discharge Tabular	Difference	Correction factor
	U/S	D/S					
				Cs.	Cs.		%
1-9-61							
2-9-61							
3-9-61							
4-9-61							
5-9-61							
6-9-61							
7-9-61		722.8		3014	4184	1170	27.94
8-9-61		722.5		2819	4019	1200	29.85
9-9-61							
10-9-61							
11-9-61							
12-9-61							
13-9-61							
14-9-61							
15-9-61		722.8		3110	4174	1064	25.64
16-9-61		720.9		1792	3198	1406	43.96
17-9-61							
18-9-61							
19-9-61		723.0		3170	4296	1126	26.20
20-9-61							
21-9-61							
22-9-61							
23-9-61							
24-9-61							
25-9-61							
26-9-61							
27-9-61							
28-9-61							
29-9-61							
30-9-61							

Statement showing daily gauges and discharges run at Head of B.R.B.D. Link during the year 1961

Date	March		April		May		June		July		August	
	Gauge	Discharge	Gauge	Discharge	Gauge	Discharge	Gauge	Discharge	Gauge	Discharge	Gauge	Discharge
1	Closed		Closed		5.2	3709	5.62	4095	5.22	3727	Closed	
2	,,		,,		5.25	3755	5.73	4197	5.50	3985	,,	
3	,,		,,		5.25	3755	5.84	4302	5.8	4265	,,	
4	,,		,,		5.35	3846	5.94	4398	6.0	4456	,,	
5	,,		,,		5.45	3938	6.04	4496	6.0	4456	,,	
6	,,		,,		5.52	4002	6.04	4496	6.35	4798	,,	
7	,,		,,		5.52	4002	6.04	4496	6.35	4798	,,	
8	,,		,,		5.52	4002	6.04	4496	6.35	4798	2.4	1506
9	,,		,,		5.52	4002	6.04	4496	6.45	4897	4.39	3002
10	,,		,,		5.52	4002	6.15	4601	6.45	4897	0.4	445
11	,,		,,		5.52	4002	6.25	4699	1.30	854		Closed
12	,,		,,		5.35	3846	6.35	4798	1.30	854	3.30	2138
13	,,		1 91	1003	5.52	4002	6.35	4798	4.65	3224	5.30	3800

14		,,		2.15	1198	5.52	4002	6.55	4996	5.70	4171	5.85	4303
15		,,		1.91	1003	5.52	4002	6.55	4996	6.45	4897	6.10	4553
16		,,		2.15	1198	5.37	4198	6.55	4996	6.45	4897	5.55	4030
17		,,		2.90	1877	5.84	4303	6.55	4996	1.0	307	Closed	
18		,,		3.96	2995	5.94	4398	6.55	4996	0.60	524	4.8	3354
19		,,		3.96	2995	6.04	4496	6.55	4996	5.10	3619	6.15	4601
20		,,		3.96	2995	6.04	4496	6.35	4798	6.20	4650	6.30	4748
21		,,		3.96	2995	6.04	4496	6.35	4798	6.45	4898	3.60	2366
22		,,		3.96	2995	6.04	4496	6.35	4798	1.0	307	Closed	
23		,,		3.96	2995	6.04	4496	6.35	4798	3.7	2443	3.20	2143
24		,,		3.96	2995	6.04	4496	4.70	3266	Closed		5.90	4361
25		,,		3.96	2995	4.39	3002	0.60	524	Closed		6.70	5146
26	1.50		698	4.95	3486	4.39	3002	5.0	3530	1.80	1132	6.70	5146
27	0.66		200	4.95	3486	4.60	3181	2.40	1506	1.0	703	6.70	5146
28	Closed			4.95	3486	5.20	3709	2.40	1506	1.0	703	6.70	5146
29		,,		4.95	3486	6.30	3820	4.9	3442	4.9	3442	6.6	5046
30		,,		4.95	3486	5.52	4002	5.1	3619	4.5	3096	6.55	4996
31		,,		—	—	5.52	4002	—	—	Closed		2.40	1506

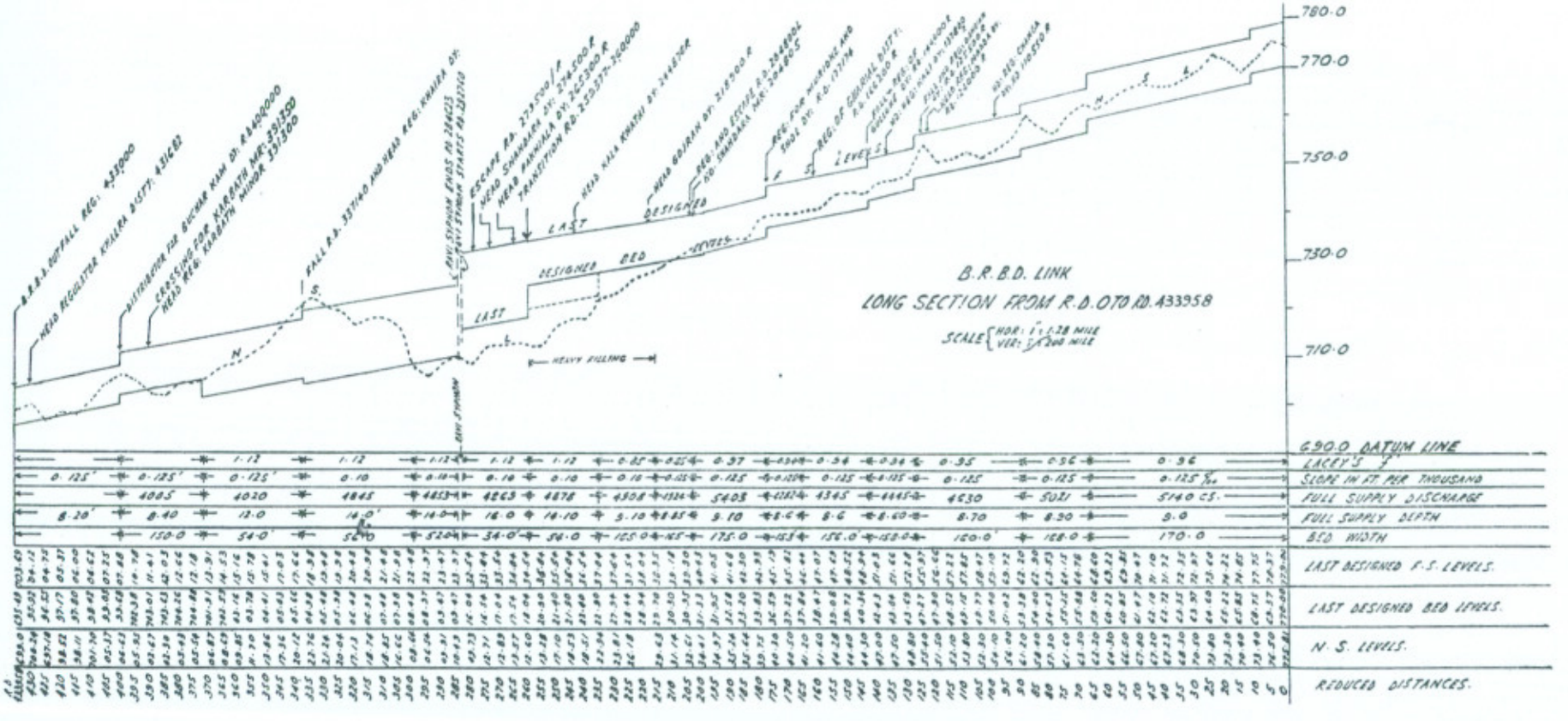
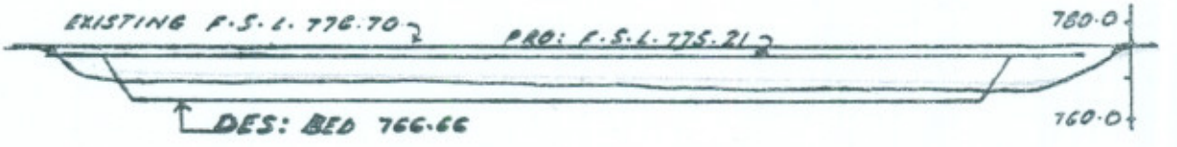

B.R.B.D. LINK
LONG SECTION FROM R.D. 0 TO RD. 433958
SCALE HOR: 1" = 1.28 MILE
VER: 1" = 200 MILE
780.0
770.0
750.0
730.0
710.0
690.0 DATUM LINE
LACEY'S f
SLOPE IN FT. PER THOUSAND
FULL SUPPLY DISCHARGE
FULL SUPPLY DEPTH
BED WIDTH
LAST DESIGNED F.S. LEVELS.
LAST DESIGNED BED LEVELS.
N. S. LEVELS.
REDUCED DISTANCES.
HEAVY FILLING
LAST DESIGNED BED LEVELS
LAST DESIGNED F.S. LEVELS
HEAD REGULATOR KHALRA DISTT. 431682
CROSSING FOR KARBATH MR. 391350
HEAD REG. KARBATH MINOR 391300
FALL R.D. 337140 AND HEAD REG. KHALRA DY.
RAVI SYPHON ENDS RD. 284623
RAVI SYPHON STARTS RD. 283760
ESCAPE RD. 273500 / R
HEAD SHAHDARA DY. 274500 R
HEAD PARNIALA DY. 265300 R
TRANSITION RD. 259377-260000
HEAD KALA KHATHI DY. 244870 R
HEAD GOJRAN DY. 218900 R
REG. AND ESCAPE R.D. 284880L
NO. SHAHDARA MAR. 204805
REG. FOR MORIONS AND SHOE DY. R.D. 177174
REG. OF CHARIAL DISTT. R.D. 166200 R
NO. REG. CHARIA DY. 110550 R
RAVI SYPHON

PLATE I

CROSS SECTION AT R.D. 15,000

OF B.R.B.D. LINK SHOWING THE POSITION OF EXISTING BED BEFORE OPENING AND AFTER FLOW OF 1961.



0	16	44	50	68	100	150	180	190	200	244	250	265
777.32	76.07	76.57	70.67	68.77	68.77	68.37		67.37	67.77	67.47	63.07	776.47

REFERENCES.

EXISTING BED AFTER FLOW OF KHARIF 1961.——

EXISTING BED BEFORE OPENING IN AUGUST 1961.——

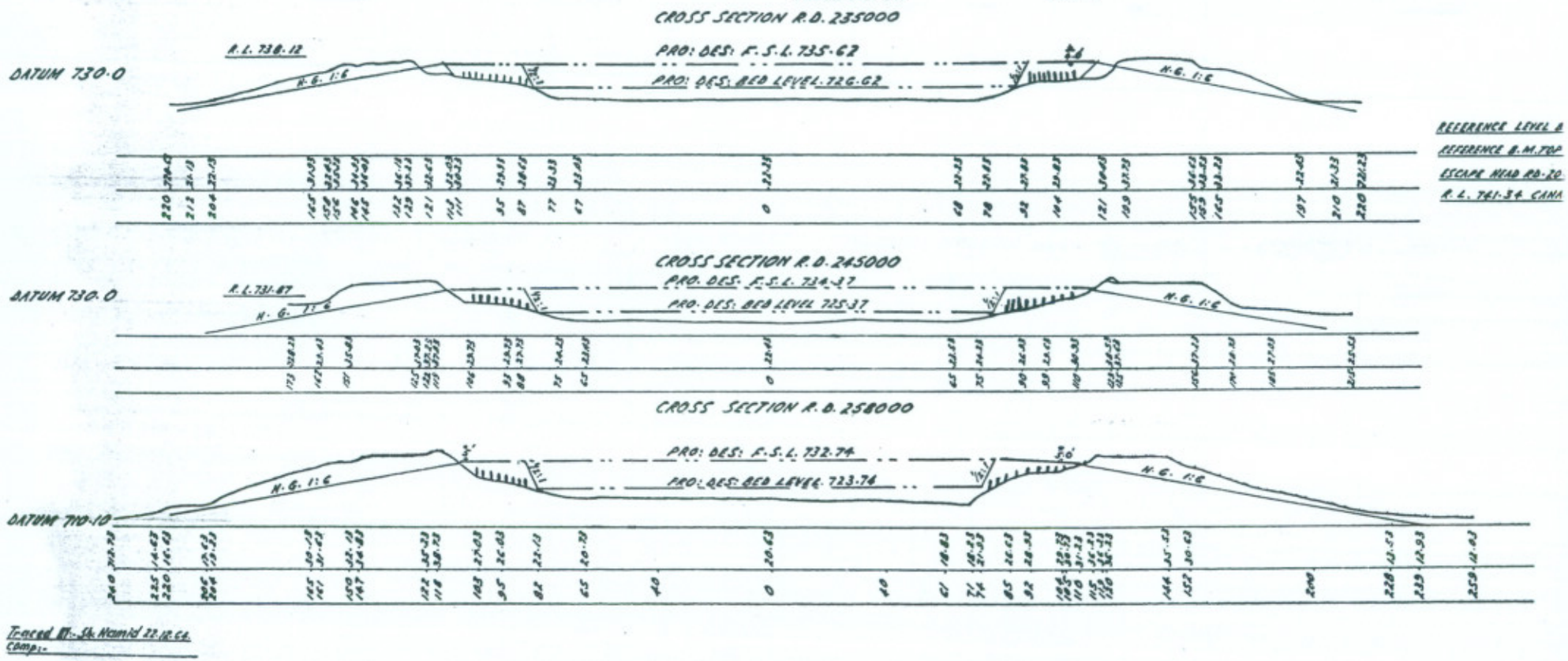
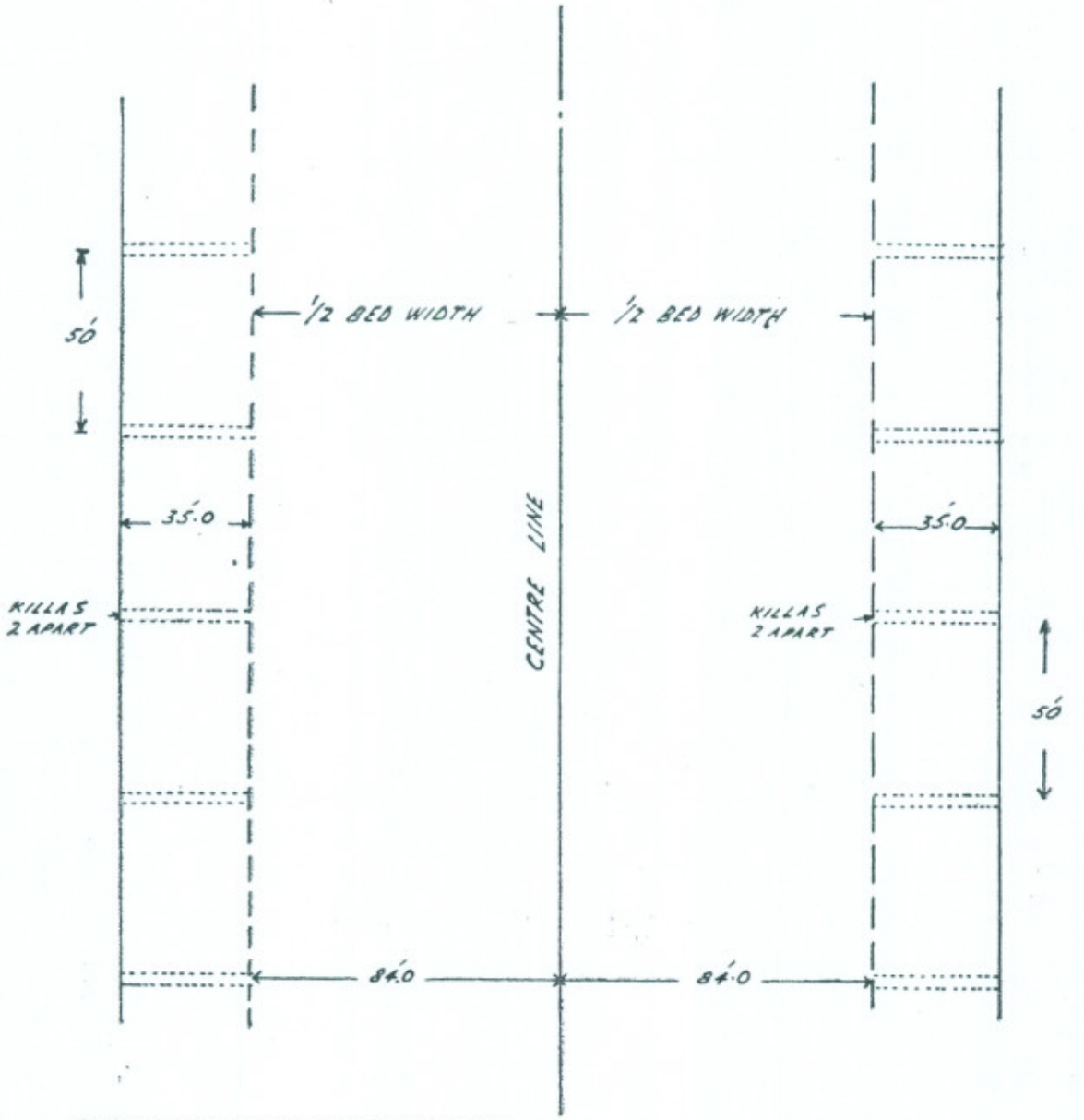
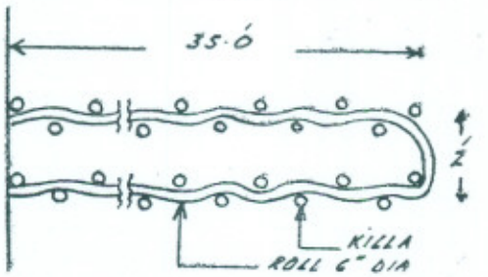

CROSS SECTION R.D. 235000
DATUM 730.0
R.L. 738.12
PRO: DES: F.S.L. 735.62
PRO: DES: BED LEVEL 726.62
H.G. 1:6
REFERENCE LEVEL
REFERENCE B.M. TOP
ESCAPE HEAD RD-20
R.L. 741.34 CANA
CROSS SECTION R.D. 245000
DATUM 730.0
R.L. 731.87
PRO. DES. F.S.L. 734.37
PRO. DES: BED LEVEL 725.37
H.G. 1:6
CROSS SECTION R.D. 258000
DATUM 710.10
PRO: DES: F.S.L. 732.74
PRO: DES: BED LEVEL 723.74
H.G. 1:6
Traced BY:- Sh. Hamid 22.12.64.
Comp:-

PLATE III

PLAN SHOWING PROPOSED ARRANGEMENT OF KILLA BUSHING ON B.R.B.D. LINK R.D. 233000 TO 250000.



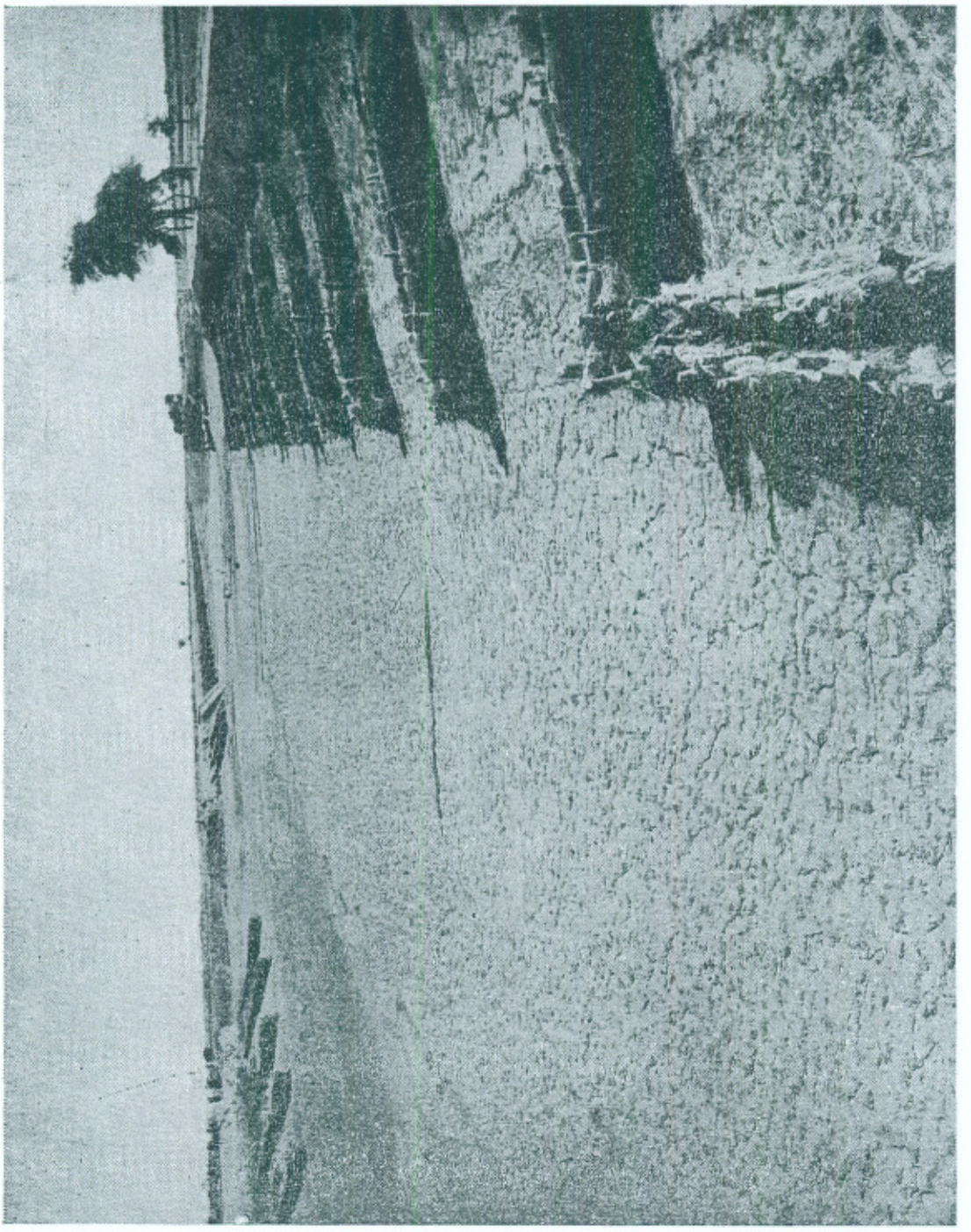
DETAIL OF KILLAS AND BUSHING





Driving Killas (R.D. 2,33,000) (facing down stream). Plates IV—V

Driving Killas (R.D. 2,34,00/Right) (facing Up/Stream) and filling 6'' dia Sarkanda Rolls.



Killa Spurs Complete with 6″ Dia Rolls Filled in (R.D. 2,46,000 Facing Up/Stream). Plate VI



Killa Spur Complete (Close View) (R.D. 2,49,000—Right).

Plate VII

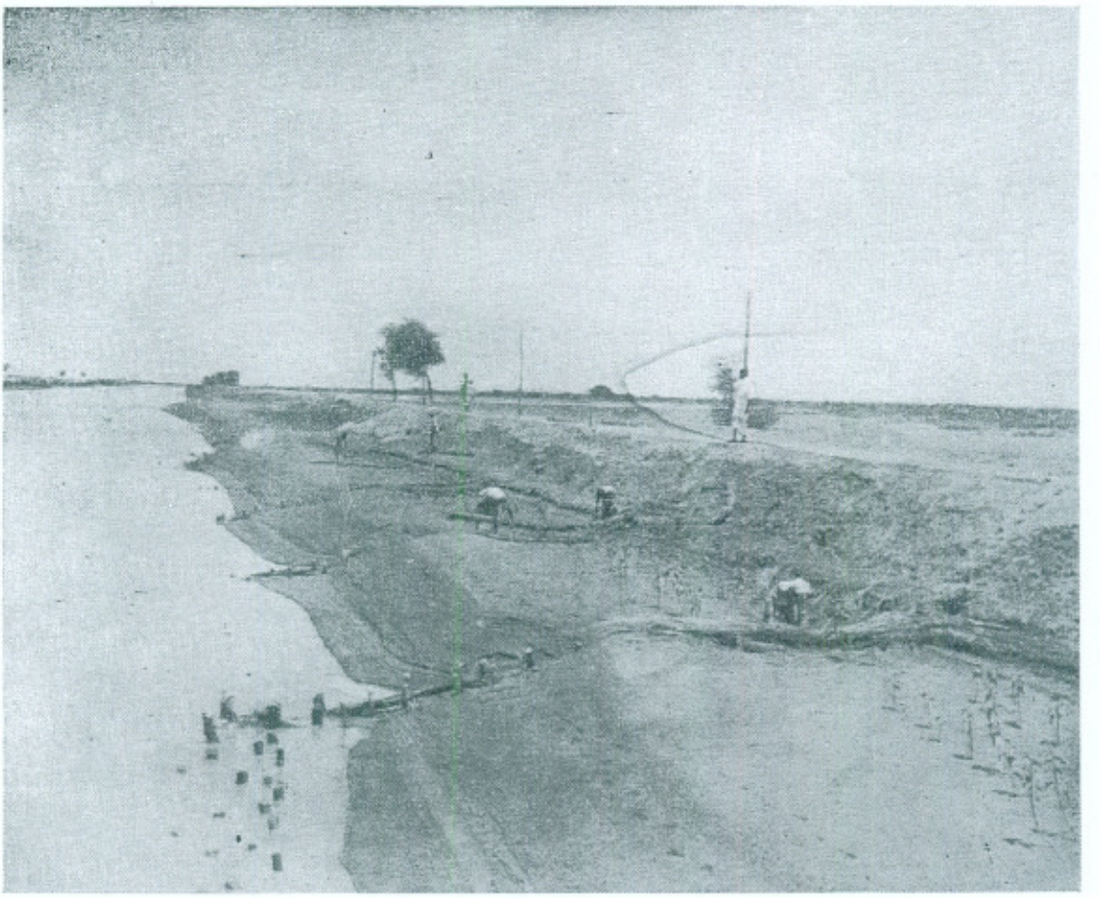


Temporary Watching Hut at R.D. 227/Right, Bombanwala Ravi Bedian Depalpur Link. Plate VIII

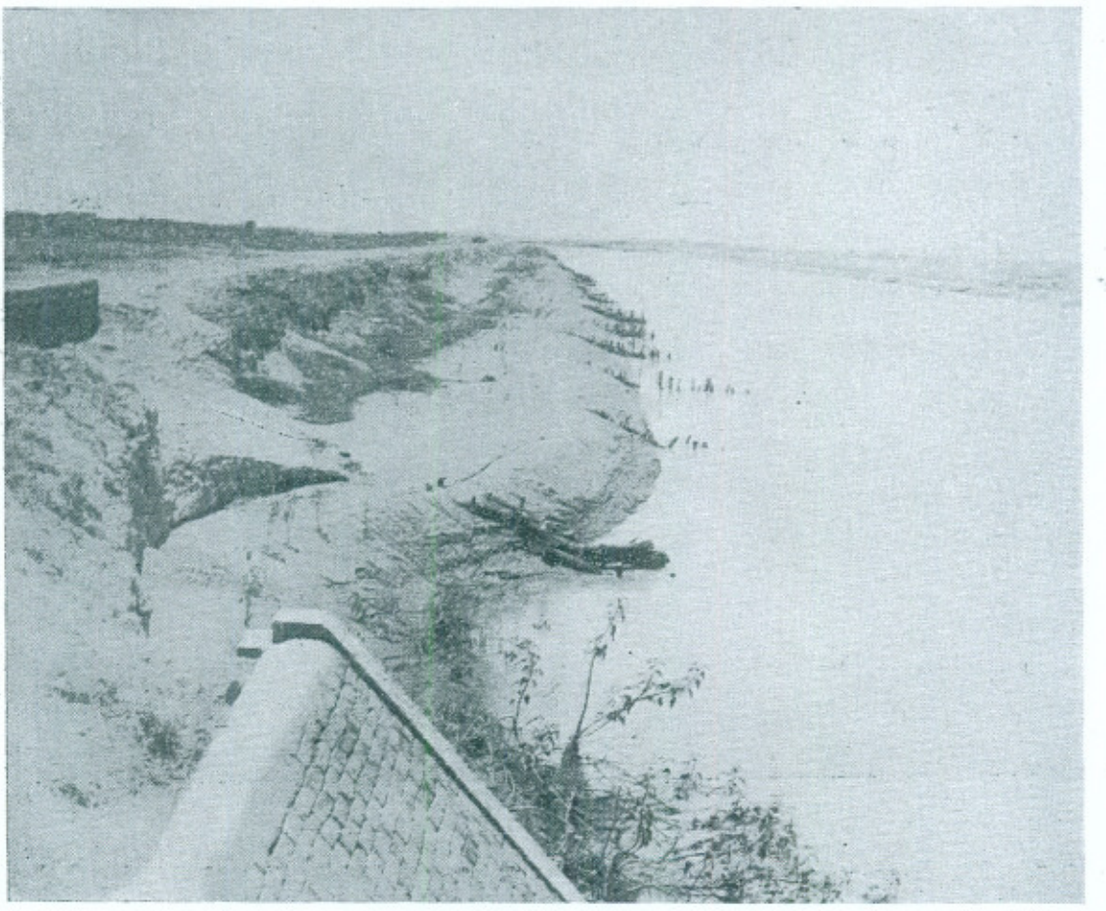


Staunching Bombanwala Ravi Bedian Depalpur Link R.D. 245/Left.

Plate IX



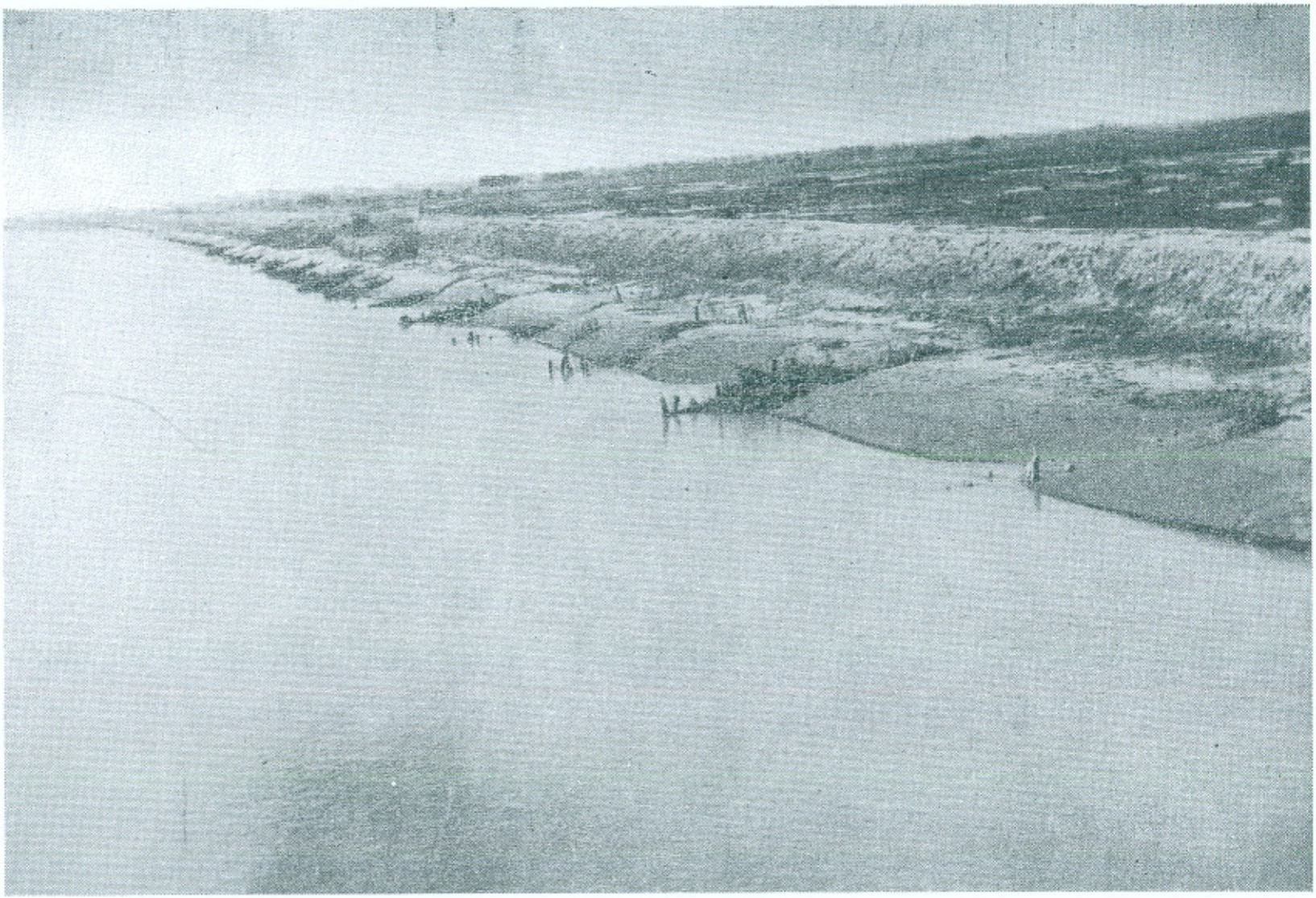
R D. 233-234/Left Down Stream facing from Bridge R.D. 233. Plate X



R.D. 246-245/Left U/S facing from Bridge R.D. 246. Plate XI



Photo showing protection provided to the Ring Bund R.D. 250/Left, Bombanwala Ravi Bedian Depalpur Link Canal. Plate XII



Photos of Bombanwala Ravi Bedian Depalpur Link Canal Reach R.D. 233-258 taken at the close of the flow season of the year, 1961, showing formation of beautifnl berms.

Plate XIII



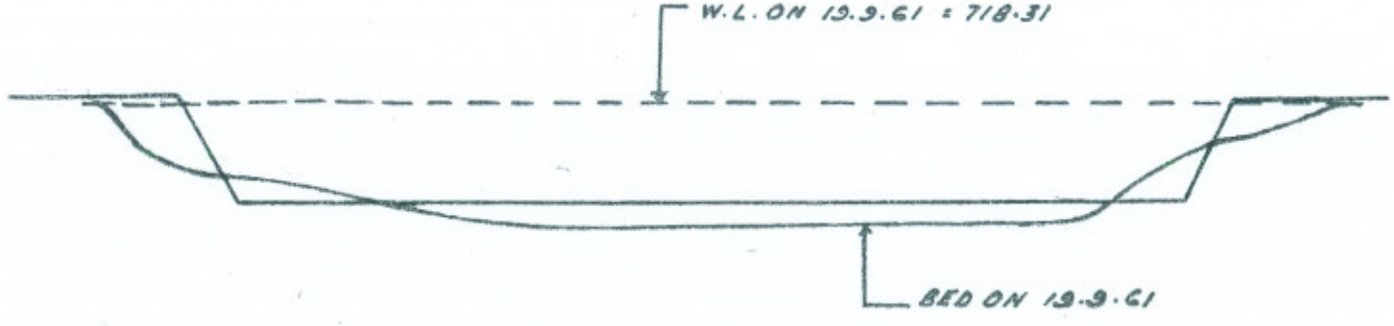
Plate XIV

Staunching Bombanwala Ravi Bedian Depalpur Link R.D. 381/Left.

CROSS SECTION OF LAHORE BRANCH

AT R.D. 219500 SHOWING POSITION OF EXISTING BED, BEFORE OPENING IN KHARIF AND AFTER FLOW OF 1961.

SCALE = 1/100

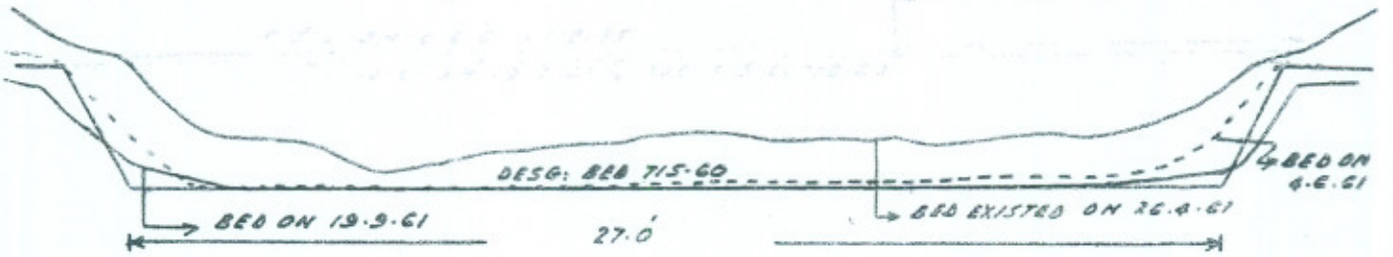


19.4.61	0	2.4	3.4	4.0	5.5	5.8	5.6	5.6	5.4	5.2	2.3	1.3	0
24.4.61	0	2.9	3.7	4.1	4.3	4.65	4.7	4.3	4.5	4.35	3.2	2.2	0
	0	3	6	10	16	22	28	34	40	46	50	53	56 57

Plate XIII

PLATE XV

CROSS SECTION OF KHAIRA DISTY OF B.R.B.D LINK
SHOWING
THE POSITION OF EXISTING BED BEFORE OPENING IN
KHARIF AND AFTER FLOW OF 1961.



0	1.0	1.7	2.2	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.4	2.5	2.5	2.5	2.3	2.3	2.2	2.2	2.2	1.8	0
DATED 19.9.61																														SILT : 0.0	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0	1.4	2.9	3.1	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.1	3.0	3.0	2.9	2.5	0
DATED 4.6.61																														SILT : 0.10	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
	0	0.8	1.5	1.55	1.8	2.02	2.60	2.50	2.30	2.20	2.18	1.90	1.90	1.70	1.80	1.70	1.80	1.85	1.85	1.80	2.05	1.95	1.90	1.85	1.85	1.55	1.20	0.5	0			
DATED 26.4.61																														SILT : 0.85	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	27.5				