

3. T/R (BWDBが当初民間コンサルタント  
に直接発注するために作成したもの)

TERMS OF REFERENCE  
FOR  
UPDATING OF FEASIBILITY STUDY & DETAILED ENGINEERING  
OF  
KURIGRAM FLOOD CONTROL & IRRIGATION PROJECT-NORTH UNIT.

DIRECTORATE OF PLANNING  
BANGLADESH WATER DEVELOPMENT BOARD  
DHAKA.

MARCH, 1987

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OF  
KURIGRAM FLOOD CONTROL & IRRIGATION PROJECT-NORTH UNIT.

1. BACKGROUND INFORMATION.

Kurigram Flood Control & Irrigation Project is located in Kurigram & Lalmonirhat districts of Bangladesh between Lat.  $25^{\circ}-30'$  -  $26^{\circ}-10'$  N. and Long  $89^{\circ}-27'$  -  $89^{\circ}-47'$  E. The Project area is bounded by the international border and abandoned railway line leading to Fateswari in the North and North-West; Teesta river in the South, railway embankment from Kania to Hogaihat in the west and rivers Dudhkumar and Brahmaputra in the East. The Dharla river flows through the project area in a south eastern course dividing it into two land units namely North Unit, & South Unit.

The gross project area is about 105667 ha. (261,000 acres) and not cultivable area is about 80,972 ha. (200,000 acres). The land unit, located north of Dharla river named as North unit, covers gross area of about 41902 ha. (103,500 acres) and land unit, located south of Dharla river named as south unit, covers a gross area of about 63765 ha. (157,500 acres).

Due to inadequate irrigation, flood control & drainage facilities, the agricultural activities of the area are essentially traditional and productivity is low.

The river Dudhkumar and Dharla are the perinnial water course with average monthly lowest discharges (in March) are  $3290 \text{ m}^3/\text{Sec}$  (3290 cusecs) &  $70 \text{ m}^3/\text{Sec}$  (700 cusecs) respectively. The water of these two rivers may be sufficient to provide irrigation facilities to the project area.

To provide flood control, drainage & irrigation facilities to the project area, a flood control & irrigation project was proposed for implementation by the then EPWAPDA and accordingly a Consulting firm named as Pakistan Techno Consult Ltd. Dhaka was engaged for conducting feasibility Study. They submitted the first draft in 1969 and 2nd draft in 1971. The consultants studied different alternatives with various modes of river water diversion, irrigation area coverage, capital cost of different approaches and project operation & maintenance cost. In all, four alternative plans were studied, they are :

- (a) Alternative - A : The plan includes one pumping plant on Dharla river and one on Dudhkumar river.
- (b) Alternate - B : This plan includes one pumping plant on Dudhkumar and two pumping plants on Dharla river.
- (c) Alternate - C : One Barrage on Dharla river and another barrage on Dudhkumar river.
- (d) Alternate - D : One Barrage on Dharla river, one pumping plant on Dharla river and one pumping plant on Dudhkumar river.

Considering the advantages & disadvantages of these four alternative plans, the irrigation planning scheme under Alternative plan - D appeared technically & financially more responsive. As such, Alternative - D was accepted.

It was proposed to irrigate the North-unit by the water of Dudhkumar river through the proposed pumping plant at Pateswari and south unit by the water of Dharla river through the proposed barrage (for the southern lowlying area) and pumping plant at Bundo (for Northern high land area).

The project was started for implementation in 1973. It is an ongoing project. By this time some works have been completed. But due to financial & other constraints the progress is not satisfactory.

The feasibility study was conducted almost two decades back. By this time the hydrological regime, agricultural practice and socio-economic situation of the project area have been changed and the cost estimate of the project have also been increased. As such it is felt that the findings of the previous report are inadequate to fulfill the present demand. Hence it is necessary to update the feasibility study report and carry out the detail engineering of the project. It was decided in the meeting held in the Ministry of I.W.D & F.C. on 15.2.87 to update the Feasibility Study report for two units (namely north-unit and south unit) separately. This TOR has been prepared for North unit only.

### II. OBJECTIVE OF THE STUDY.

The objective of the Study is to update the previous feasibility studies including detail engineering of Kari-gram Flood Control & Drainage Project-North unit and to

formulate a comprehensive project plan for providing irrigation as well as flood control & drainage facilities to the project area.

### III. SCOPE OF WORK.

The study shall include the following :

- i) Assessment of availability of water of river Dudhkumar.
- ii) Assessment of requirement of water for irrigation.
- iii) If excess water is available, assessment of possibility of utilizing the same for irrigating some area of south unit, and determination of the pumping requirements, the pumping plant design and layout plan.
- iv) Assess pumping requirement and check the adequacy of pumping plant of Pateswary.
- v) Demarcate the area of the project which may be irrigated (a) round the year and (b) Seasonal.

### IV. TERMS OF REFERENCE.

The overall study shall be conducted under the supervision of Chief Engineer, Planning, BWDB, Dhaka. Chief Engineer, Design, BWDB will be closely associated with the study.

The study will include but not be limited to the followings :

1. Collection: All available relevant maps, topographic, hydro, reports etc. on engineering, agricultural, socio-economic and other pertinent fields.

## 2. Survey & Investigation :

Existing data will be used for the study. However if it is felt necessary to obtain additional data, relevant survey works may be carried out through Survey Party-II of BWDB & Directorate of Land & Water Use.

The survey works may include the following :

- i) Field survey: Long & cross section of rivers, irrigation canals, drainage channels & spot level of major structure sites, Pumping station etc.
- ii) Hydrological Survey: Stage & over land discharge observation.
- iii) Soil Survey :
- iv) Agro-socio, Economic Survey.

## 3. Laboratory testing :

- i) Soil for foundation.
- ii) Agricultural Soil.

## 4. Studies.

- i) Updating the Feasibility Study report (reference: Pakistan Techno consultant Ltd. 1969 & 1971) of the project. (North Unit).
- ii) Review the available data and reports and study the problem of the area. Identify the requirements of additional data, which may be collected by survey through different offices of BWDB.

- iii) Study the present condition of the project and justify the need of updating of the feasibility study.
- iv) Carry out the hydrological, climatological, agricultural and socio-economic studies.
- v) Carry out the detail engineering of the project.
- vi) Study all the possible alternatives and identify the best alternative.
- vii) Study the foundation condition.
- viii) Preparation of Preliminary layouts of all the project features.
- ix) Study the flooding problems and extent of flood damage.
- x) Study the sedimentation and erosion problem of the river.
- xi) Perform hydraulic studies as may be necessary to determine the size of the canals, channels and structures.
- xii) Study the present drainage characteristics and future requirements.
- xiii) Study the availability of surface water resources for irrigation and suggest judicious use of water for irrigation. Determine the quantity of water which may be utilized for irrigating some area of south unit after meeting the demand of north unit.

- xiv) Identify the major constraints related to agricultural development in the project area and recommend the remedial measures.
- xv) Study to determine consumptive use of the proposed crops and total water requirement of the project area.
- xvi) Determine the area which may be irrigated a) round the year b) seasonally.
- xvii) Study the present land uses and identify future land capabilities. Study the present cropping pattern and propose a realistic future cropping pattern.
- xviii) Study the procedure for future water management in the project area.
- xix) Study the effect of withdrawal of surface water on navigation, fisheries & other water projects of the region and other uses of water.
- xx) Study of agro-socio-economic conditions.
- xxi) Study of infrastructural facilities necessary such as transportation, marketing, storage and credit facilities.
- xxii) Study the beneficiaries response to the proposed project.
- xxiii) Study the organisational set-up for execution, operation, maintenance and extension services of the project including co-ordination of all needed services for the scheduled development of the project.



5. Economic evaluation and financial analysis:

- i) Prepare a proposed construction and financing schedule.
- ii) Update and prepare cost estimates of the project.
- iii) Prepare the annual cost for operation & maintenance.
- iv) Prepare an estimate of annual benefits, positive or negative to be accrued after completion of the project.
- v) Make a financial appraisal to determine the repayment capacity of the farmers in the project.
- vi) Perform economic evaluation of all the alternative project plans from the national economic prospective. Show economic viability of the project by means of benefit cost Ratio (B/C), Internal Rate of Return (IRR) and other means.
- vii) Perform sensitivity analysis of the project.

6. Preparation of Report:

Prepare a updated feasibility study report of the project including detail Engineering in a standard acceptable to BWDB and international donor agencies like IDA, World Bank, ADB etc.

V. MANNING SCHEDULE:

The study will be conducted by a local consulting firm. The duration of consulting services is estimated to be completed within 12 (twelve) months.

4. クリグラム北部地区事業概要書



BANGLADESH WATER DEVELOPMENT BOARD

PROJECT BRIEF

FEB / 1989.

KURIGRAM FLOOD CONTROL AND IRRIGATION PROJECT.  
(NORTH UNIT)

KURIGRAM WATER DEV. DIVISION-II  
BWDB, KURIGRAM.

PROJECT BRIEF

Name of Project : Kurigram F.C. & Irrigation Project  
( North Unit ).

PROJECT BRIEF:

- A. Name of the Project : Kurigram Flood Control & Irrigation Project ( North Unit ).
- B. Project Location : The project is located in the four Upazilas namely Bhurungamari, Nageswari, Fulbari & Kurigram of the district of Kurigram, situated in the northern part of Bangladesh in between the Dudhkumar, the Brahmaputra and the Dharla rivers.
- C. Objective of the project : To increase agricultural production for achieving self-sufficiency of feedgrain by providing flood control, drainage and irrigation facilities.
- D. Project Description : Kurigram F.C. & Irrigation Project (North Unit) is surrounded by the rivers Dudhkumar, Brahmaputra and Dharla.

The project proposes to provide protection against external flooding to a gross area of 41,000 hectares lands by construction of 80 KM earthen embankment on the banks of the surrounding rivers. For drainage of internally generated run-off during monsoon, existing channels will be developed into an efficient drainage system.

Contd...P/2.

Besides these, 75 vents ( 5'-0" x 6'-0" ) outfall regulators are proposed for construction to evacuate excess run-off within the project area. 29 Vents and 19 Vents drainage structures are also proposed to construct respectively on major and minor drainage channels.

Water from the Dudhkumar river will be lifted by installation of a pumping plant consisting of 12 Nos. pumps of capacity 200 cusec each at Pateswari near Sonahat Rly. bridge in Upazila- Bhurungamari to provide irrigation by gravity to a net irrigable area of 32,000 hectares.

Upto June' 1988 about 60 KM F.C.Embkt., 5 Nos. outfall drainage structures ( 23 Vents 5'-0"x 6'-0" ) and 1 No. bridge ( 80' span) on drainage channel have been constructed.

It is programmed to construct 5 Nos. outfall drainage regulator ( 24 Vents 5'-0" x 6'-0" ) and 5 KM flood control Embkt. during the year 1988-89. Also repair of breaches caused during 1988 flood, some protective works and resectioning of certain portion of embankment will be done under Flood damage Restoration Project & F.F.W. programs.

E. Administrative  
Authorities  
responsible for :-

- i) Sponsoring : Ministry of Irrigation, Water Development and Flood Control, Govt. of the People's Republic of Bangladesh.

Contd...P/3.

- ii) Execution : Bangladesh Water Development Board.
  - iii) Operation and Maintenance : Bangladesh Water Development Board.
- F. Preliminary Survey, Investigation and Feasibility Studies etc. : Feasibility study made by "Pakistan Techno Consultant " and submitted in the year, 1969.
- G. Benefits and Justification :-
- a) Direct benefit : Cropping intensity will be increased from 179% to 210% with the irrigation facilities, producing net incremental benefit of Tk. 730.89 million per year.
  - b) Indirect benefit : Improve communication, marketing, transportation and power facilities.
  - c) Employment opportunities : Employment opportunity will increase greatly during execution and employment of labour will permanently increase due to increase of agricultural activities.
  - d) Foreign exchange earning : Foreign exchange may be earned by exporting surplus agricultural products i.e., Tobacco, Rice and Wheat etc.
  - e) Project beneficiaries and distributive impacts : The farmer of the project will be benefited directly by selling the agricultural products.

Contd...P/4

The landless and unemployed people will be benefitted by the employment opportunity created by the project country as a whole will be benefitted for the increased production.

H. Financial & Economical analysis :-

a) Financial :

- i) B.C. ratio : 1.10 : 1.00  
 ii) Internal rate of return : 16.90%

b) Economical :

- i) B.C. ratio : 2.22 : 1.00  
 ii) Internal rate of return : 26.83%

I. Estimated cost of the project (in million Taka) :-

<u>Local</u> :	<u>Foreign Exchange</u> :	<u>Total</u> :
305.43	59.99	364.42 (as per PP of North & South Unit approved in January, 1973).
5038.10	824.34	5862.44 (as per revised un-approved PP of both Units submitted in May, 1986).
1465.16	123.84	1589.00 (as per revised un-approved PP of North Unit submitted in September, 1987 and January, 1988).

Contd...P/5

J. Date of commencement : 1973- 74.

K. Date of completion  
of the project : 1994- 95( as per recast  
revised submitted  
PP ).

L. Expenditure incurred  
upto June, 1987-88 : 63.60 million Taka.

M. Cumulative achieve-  
ment upto June, 1988 : 9.00%

N. Project Features :-

1. FLOOD EMBANKMENT : 80 KM

2. PUMPING PLANT : 1 No.

Irrigation  
capacity : 67.99 Cumec.

2. No. of Pump : 12 Nos.

Dynamic Head : 7.62 Meter to 8.54 Meter.

Discharge rate/  
Pump : 5.66 Cumec

Length of  
Intake channel : 378 Meter

Contd...P/6



3. DRAINAGE SYSTEM :

No. of drainage unit : 4 Nos.  
Length of drainage channel :-  
a) Main drainage channel : 157 KM  
b) Branch drainage channel : 219 KM

4. IRRIGATION SYSTEM :

No. of irrigation unit : 1 No.  
Length of main channel : 28 KM  
Length of branch channel : 26 KM  
Length of Laterals : 113 KM  
Length of Sub-laterals : 60 KM

5. BRIDGES & CULVERTS ON DRAINAGE CHANNELS :-

On Main channels : 8 Nos.  
On Branch channels : 18 Nos.

Contd...P/7

6. BRIDGES ON IRRIGATION CANALS :-

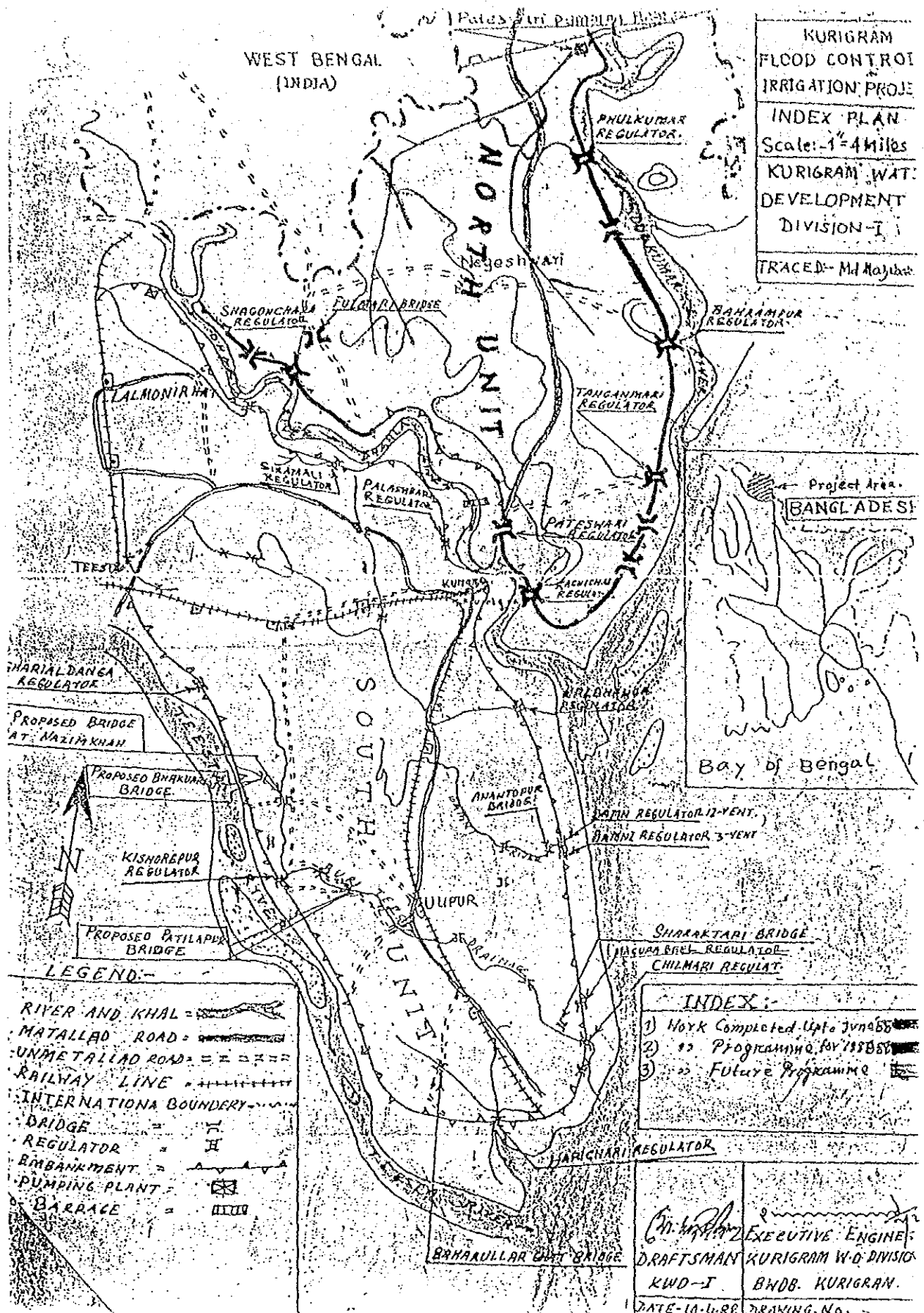
On Main canals	:	3 Nos.
On Branch canals	:	3 Nos.
On Lateral canals	:	10 Nos.

7. CULVERTS ON IRRIGATION CANALS :-

On Main canals	:	4 Nos.
On Branch canals	:	4 Nos.
On Lateral canals	:	21 Nos.
On Sub-lateral canals	:	21 Nos.

8. NO.s OF OUTLET STRUCTURES :- 1360

Problem & Bottleneck :- The physical progress of the project is very slow due to inadequate allocation in the A.D.P. The revised P.P. requires to be approved soon and year-wise allocation of fund to be made as mentioned in the P.P. to carryout detail engineering of the Project alongwith physical construction simultaneously.



KURIGRAM  
 FLOOD CONTROL  
 IRRIGATION PROJECT  
 INDEX PLAN  
 Scale: 1"=4 Miles  
 KURIGRAM WATER  
 DEVELOPMENT  
 DIVISION-I  
 TRACED- Md Masud

Project Area  
 BANGLADESH

Bay of Bengal

LEGEND:-

- RIYER AND KHAL = [Symbol]
- METALLAD ROAD = [Symbol]
- UNMETALLAD ROAD = [Symbol]
- RAILWAY LINE = [Symbol]
- INTERNATIONAL BOUNDARY = [Symbol]
- BRIDGE = [Symbol]
- REGULATOR = [Symbol]
- EMBANKMENT = [Symbol]
- PUMPING PLANT = [Symbol]
- BARRAGE = [Symbol]

- INDEX:-
- 1) Work Completed upto 1965 [Symbol]
  - 2) " " Programme for 1966 [Symbol]
  - 3) " " Future Programme [Symbol]

Executive Engineer  
 DRAFTSMAN KURIGRAM W.D. DIVISION  
 KWD-5 B.W.D. KURIGRAM.  
 DATE-10-4-88 DRAWING No. -

5. PROJECT PROFORMA (PP) 表紙

FORM-PP

REVISED - MAY, 1986

1ST RECAST SEPTEMBER, 1987

2ND RECAST - JANUARY, 1988

*For Japanese Team  
Issued by  
S. E. Khan  
1/2/88  
Kand. Unit - II*

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH  
MINISTRY OF PLANNING  
PLANNING COMMISSION.

PROJECT PROFORMA (PP)  
ON  
KURIGRAM FLOOD CONTROL AND IRRIGATION PROJECT  
NORTH UNIT

BANGLADESH WATER DEVELOPMENT BOARD  
DHAKA.

6. Pateswari 12. vents Regulator 工事概要

Brief Report for Construction of Pateswari 12(twelve) vents(5'-0"x6'-0")R.C.C.Regulator in connection with Kurigram Flood Control & Irrign.Project (North Unit) during the Year 1988-89.

1. Name of Work :- Construction of Pateswari 12(twelve) vents (5'x5')R.C.C.Regulator during the year 1988-89.
2. Situation of Work :- Mouza-Madhabraa,U.P.-Bhogdanga, Upzila & Dist.-Kurigram.
3. Engineering Information :
  - (A) Vent No. :- 12(Twelve)
  - (B) Vent size :- (5'-0"x6'-0")
  - (C) Invert level :- + 74.00
  - (D) Discharge Capacity :- 1680 Cusec.
4. Estimated Cost :- Tk. 92,38,051/-
5. Amount as per Agreement :- Tk. 83,14,245/90 ( 10% less)
6. Construction Firm/  
Name of Contractor :- M/S.Sattar Brother's,  
J.L.Roy,Rangpur.
7. Date of Starting work :- 1-7-1988
8. Date of completion  
(as per Agreement) :- 24-10-1989
9. Donar Agency :- G.O.B.
10. Present situation :-

The Contractor is doing the work of excavation of foundation and Construction of ring-bundh. Due to problem in de-watering system the progress is very slow.

7-1 月別降水量(クリグラム観測所)

MONTHLY TOTAL RAIN FALL(IN M.M.)  
NAME OF RAINFALL STATION: R-182,KURIGRAM

Month.	YEAR												
	1981	1982	1983	1984	1985	1986	1987	1988					
January	8.89	0.00	7.37	2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
February	17.78	0.00	21.59	0.00	14.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.31
March	40.64	34.29	51.05	2.54	21.84	0.00	0.00	0.00	25.83	0.00	0.00	25.83	36.58
April	83.82	63.50	74.93	154.94	153.42	120.90	147.32	150.62	147.32	150.62	150.62	147.32	150.62
May	368.30	182.88	316.48	378.97	309.63	229.87	242.06	488.44	242.06	229.87	242.06	242.06	488.44
June	115.57	624.84	350.52	80.26	627.38	332.99	491.49	666.50	491.49	332.99	491.49	491.49	666.50
July	471.17	279.40	819.40	754.38	695.71	583.69	870.20	685.55	870.20	583.69	870.20	870.20	685.55
August	421.64	285.75	334.26	144.53	194.56	240.06	607.06	703.07	607.06	240.06	607.06	607.06	703.07
September	210.82	635.76	371.09	518.92	383.79	562.36	312.42	332.49	312.42	562.36	312.42	312.42	332.49
October	0.00	62.23	186.69	116.59	73.41	371.86	305.56	15.75	305.56	371.86	305.56	305.56	15.75
November	0.00	3.81	0.00	0.00	0.00	7.62	0.00	80.77	0.00	7.62	0.00	0.00	80.77
December	0.00	0.00	25.40	0.00	20.32	0.00	0.00	1.52	0.00	0.00	0.00	0.00	1.52

7-2 月別降水量 ( BHURUNGAMARI : 揚水機場予定地点 )

MONTHLY TOTAL RAINFALL ( IN M.M. )  
 NAME OF RAINFALL STATION: 159, BHURUNGAMARI, DIST. KURIGRAM. ( Near Pumping Plant )

M o n t h	Y E A R											
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	
January	0.00	0.00	0.00	0.00	0.00	0.76	7.62	0.00	0.00	8.13	0.00	
February	2.54	10.16	10.16	15.75	0.00	15.75	0.00	21.84	0.00	17.27	148.84	
March	17.78	0.00	25.40	29.21	47.50	31.75	55.63	100.58	3.05	65.92	31.24	
April	154.94	22.86	29.21	154.43	126.49	137.67	217.68	55.63	234.95	120.65	76.71	
May	289.56	170.18	381.00	386.33	216.92	261.11	749.55	278.64	170.69	407.92	368.56	
June	505.46	156.21	448.82	271.02	604.01	418.34	512.57	475.23	973.58	870.46	428.75	
July	609.60	632.46	463.55	622.81	566.93	818.90	1144.73	924.81	323.60	873.51	466.00	
August	269.24	379.73	1070.36	325.12	332.49	696.47	289.81	255.27	319.28	925.83	1285.10	
September	251.46	561.34	360.68	169.42	766.83	693.17	647.19	423.42	617.22	380.49	869.70	
October	139.70	228.60	39.88	0.00	88.14	132.84	227.08	127.07	238.00	150.37	93.20	
November	0.00	17.78	0.00	0.00	0.00	0.00	0.00	0.00	37.59	19.56	17.34	
December	0.00	0.00	0.00	12.95	0.00	30.48	8.13	15.75	8.89	0.00	0.00	

8. ドウドクマール川水位データ (揚水機場地点)

(near Pumping Plant)

SUMMARY OF ANNUAL AND MONTHLY WATER LEVEL.

(1977-78 to 1981-82 in ft. & 1982-83 to 1986-87 in Mitre)

Name & No. of River :- 36, Dudhkumar.

Name & No. of Gauge Station :- 81 Pateswardi in Upazilla Bhurungamuri, Dist. Kurigram.

Water Year	Annual	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Decem.	January.	February	March.
1977-78	H.W.L. 98.95	83.30	92.50	93.80	96.80	98.95	94.95	94.65	90.65	89.40	88.55	87.90	87.50
	L.W.L. 85.40	85.40	87.70	90.50	90.65	92.95	91.35	90.60	89.40	88.55	87.95	87.50	87.20
1978-79	H.W.L. 97.50	88.80	91.50	94.00	97.50	95.90	94.20	92.45	89.15	89.95	87.15	86.65	86.25
	L.W.L. 88.85	87.25	88.25	89.85	91.90	91.20	90.95	89.10	88.00	87.15	86.65	86.30	85.85
1979-80	H.W.L. 97.75	86.35	90.25	89.75	97.75	96.30	97.10	95.90	89.90	88.60	87.05	86.20	86.35
	L.W.L. 85.55	85.85	86.45	87.55	89.65	91.70	90.95	89.95	88.10	86.90	86.25	85.85	85.86
1980-81	H.W.L. 98.25	87.50	88.45	94.95	96.90	98.25	96.40	91.05	89.10	87.75	86.70	86.35	86.35
	L.W.L. 85.70	85.70	87.00	88.30	91.75	93.60	91.45	89.20	87.75	86.70	86.35	86.00	85.85
1981-82	H.W.L. 98.45	88.55	89.25	95.90	96.75	98.45	97.45	92.65	89.80	88.60	88.05	87.70	87.60
	L.W.L. 86.65	86.65	87.45	89.00	93.85	94.45	92.15	89.80	88.60	88.00	87.70	87.40	87.30
1982-83	H.W.L. 30.340	27.085	27.055	28.850	30.340	29.110	29.150	27.730	26.940	26.550	26.350	26.970	26.230
	L.W.L. 26.020	26.650	26.320	26.425	28.305	27.145	27.775	28.970	26.570	26.350	26.150	26.050	26.020
1983-84	H.W.L. 30.670	26.390	27.360	28.620	29.900	29.300	30.670	28.450	27.170	26.700	26.700	26.340	26.200
	L.W.L. 26.030	26.030	26.540	26.950	28.230	28.00	28.510	27.170	26.710	26.530	26.340	26.200	26.100
1984-85	H.W.L. 30.860	26.440	28.375	29.075	30.220	29.590	30.860	28.440	27.480	27.060	26.855	26.725	26.795
	L.W.L. 26.110	26.110	26.430	27.295	27.915	27.850	28.220	27.480	27.060	26.855	26.685	26.645	26.545
1985-86	H.W.L. 30.000	26.795	27.850	29.590	30.000	29.030	29.310	29.150	28.030	27.410	26.870	26.670	26.530
	L.W.L. 26.430	26.605	26.660	27.850	28.570	27.760	28.360	27.910	27.320	26.880	26.670	26.530	26.430
1986-87	H.W.L. 29.720	26.830	27.130	29.050	29.460	29.720	29.410	29.420	27.820	27.240	26.880	26.540	26.420
	L.W.L. 26.10	26.400	26.800	28.390	28.170	28.600	27.880	27.240	26.850	26.850	26.650	26.650	26.10
1987-88	H.W.L. 30.460	26.850	26.980	28.420	29.840	30.460	29.425	28.400	27.400	27.400	27.400	27.400	27.400
	L.W.L. 26.500	26.500	26.720	27.200	28.00	28.035	28.340	27.400	27.400	27.400	27.400	27.400	27.400

*[Signature]*  
 Sub. Dir. Kurigram  
 Head. Kur. Sub-Division  
 R.W.D. Kurigram.

*[Signature]*

*[Signature]*  
 Kurigram  
 R.W.D. Kurigram



9. ドウドクマール川流量データ

DISCHARGE DATA :

River : 35, Dudhkumar.  
Station: 81, Pateswari.

near  
(Pumping Plant)

Month	Maximum discharge with W.L.		Minimum discharge with W.L.		Remarks
	Discharge (Cumec)	W.L. Meter	Discharge (Cumec)	W.L. (Meter)	
January/ 87 :	105.00	26.640	22.91	26.580	
February/87 :	81.87	26.530	76.17	26.46	
March/ 87 :	83.15	26.572	72.42	26.43	
April/ 87 :	83.47	26.550	80.61	26.562	
May/ 87 :	166.36	26.90	106.36	26.740	
June/ 87 :	1636.00	28.63	221.00	27.158	Recorded Highest Discharge
July/ 87 :	2151.00	28.995	-	-	= 5639 Cumec.
August/ 87 :	2463.00	29.050	2008.00	28.845	
September 87 :	2339.00	29.385	1053.00	28.415	W.L. 30.460
October/ 87 :	964.00	28.365	298.00	27.460	Date: 11-8-87.
November/87 :	208.00	26.965	-	-	
December/87 :	162.00	26.830	113.00	26.670	Recorded lowest discharge
January/ 88 :	99.00	26.57	91.00	26.480	= 60.00 Cumec.
February/88 :	82.00	26.400	73.00	26.350	W.L. 26.350
March/ 88 :	70.00	26.330	65.00	26.240	Date: 7.4.76.
April/ 88 :	70.00	26.300	-	-	
May/ 88 :	223.00	27.122	138.00	26.770	
June/ 88 :	508.00	28.022	160.00	26.780	
July/ 88 :	896.00	28.300	-	-	
August/ 88 :	4202.00	30.690	2180.00	29.195	
September 88 :	2142.00	29.380	2054.00	29.305	
October/ 88 :	481.00	27.850	244.00	27.310	
November/88 :	186.00	27.100	162.00	25.880	
December/88 :	111.00	26.590	98.00	26.480	

10 クリグラム北部地区内地下水ポンプ設置状況

Statement of Deep Tube-well, Shallow Tube-well and Low-lift Pumps installed by BADC & BWDB in Kurigram F.C. & Irrigation Project area (North Unit).

A) Installed by BADC :

( BADC : Bangladesh Agricultural Development Corporation )

Sl. No.	Name of Upazila	Existing			Programme for installation of D.T.W. during 1988-89	Remarks
		D.T.W.	S.T.W.	L.L.P.		
1.	Kurigram :	15	29	17	26	
2.	Nageswari :	60	162	142	50	
3.	Fulbari :	19	35	43	31	
4.	Bhurungamari :	25	180	59	29	
Total :		119	406	261	136	

Total acreage Covered (app) 7000 acre  $\approx$  2834 hectare.

B) Installed by BWDB: ( By Dinajpur Operation & Maintenance Division, BWDB, Dinajpur ).

Sl. No.	Name of L.L.P.I. Scheme	Name of Upazila	Commanded area (in acre)	Irrigable area in acre	Position of Pumps			Total
					Run-ning	Repa-ira-ble	Con-demned	
1.	Bhurungamari :	Bhurungamari	485.88	400.00	3	1	2	6
2.	Raigonj :	Nageswari	600.00	350.00	2	5	1	8
3.	Pateswari :	Kurigram	1200.00	1100.00	1	1	2	4
Total :-			2285.88	1850.00	6	7	5	18

N.B.- Type of Pumps:- 2(Two) Gusec. Centrifugal pump.

By BWDB area irrigated every year is app 40 hectare.

## 11. その他事前調査収集資料リスト

- ① クリグラムかんがい排水計画 F/S レポート (抜粋)  
Pakistan Techno Consult
- ② Rangpur District Statistics 1983  
Bangladesh Bureau of Statistics.
- ③ 1987 Statistical Yearbook of Bangladesh  
Bangladesh Bureau of Statistics.
- ④ クリグラム北部地区計画平面図
- ⑤ クリグラム県行政区分図
- ⑥ Teesia Canal ( Teesta Project ) 計画縦横断面図







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