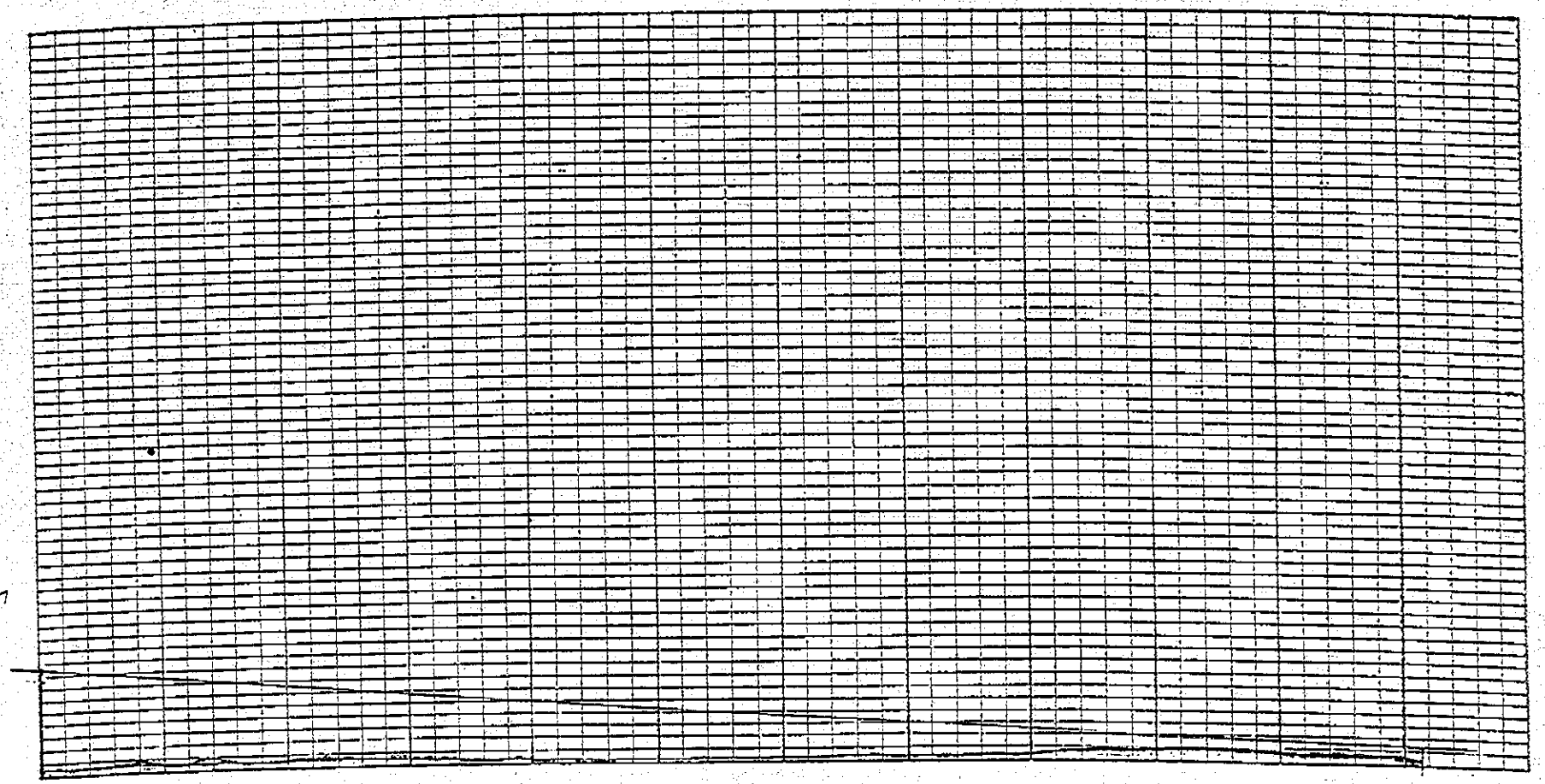
Ramna —— Nayarhat 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	85.0 (m)	85.0 (m)	85.0 (m)
	Receive. Height (Hr)	13.0 (m)	13.0 (m)	18.0 (m)
	*(Above Sea Level)			
	Distance (D)	27.7 (Km)	27.7 (Km)	27.7 (Km)
1	Antenna Gain (Ga)	10.0 dB	10.0 dB	14.0 dB
	(Transmitting Side)	Sleeve	Sleeve	3.B.Collinear
	(Receiving Side)	3E Yagi	3E Yagi	3E Yagi
2	Feeder Loss (Lf1)	-6.5 dB	-6.5 dB	-3.7 dB
	(Transmitting Side)	10D-2V	10D-2V	AFZE50-7
		(100.0 m)	(100.0 m)	(80.0 m)
	(Receiving Side)	10D-2V	10D-2V	10D-2V
		(20.0 m)	(20.0 m)	(30.0 m)
3	Free space Loss (Lpf)	-104.8 dB	dB	-104.8 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	— dB
	Plane earth Loss (Lpp)	— dB	dB	— dB
	Additional Loss (As) for spherical earth	-16.5 dB	dB	-16.5 dB
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	-3.0 dB
5	Correction Value After Actual Test (Lpc)	dB	dB	-10.4 dB
6	Span Loss (Ls)	-117.6 dB	dB	-124.4 dB
7	Transmitting Power (Pt)	10W. 40dBm	10W. 40dBm	10W. 40dBm
8	Receiving Power (Pr)	-77.6 dBm	dBm	-84.4 dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	35.4 dBμV/m	25.0 dBμV/m	28.6 dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	32.4 dB	dB	25.6 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	53.4 dB	dB	46.6 dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	-5.8 dB	dB	-5.8 dB
16	S/N at Fading (S/Nf)	47.6 dB	dB	41.3 dB
17	Judgement			Good
18	Remarks			

Scale ; C Type 30km/600m
(15km/150m ; 60km/2400m)

TERRAIN PROFILE



$79\frac{1}{6}$ · $79\frac{1}{5}$ $79\frac{1}{1}$

RAMNA
ALTITUDE 6 m
ANTENNA HEIGHT 79 m

27.7 km

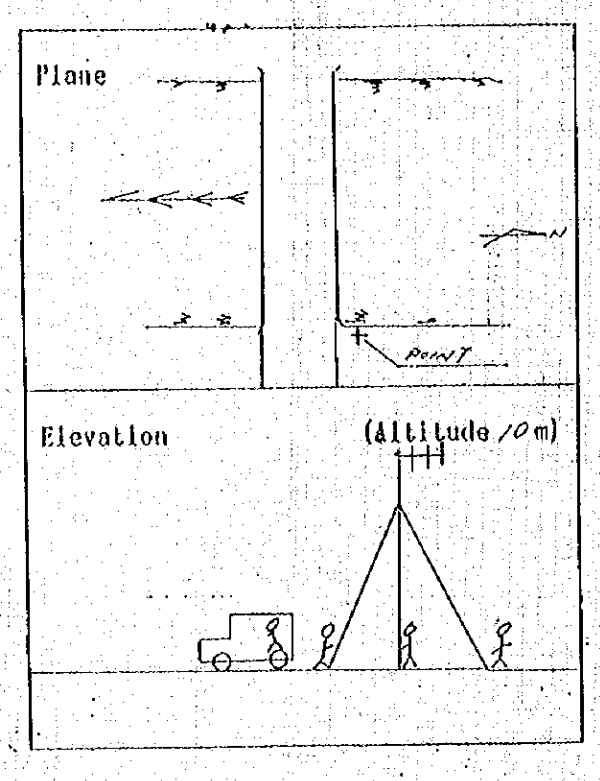
NAYARHAT
ALTITUDE 3 m
ANTENNA HEIGHT 10 m

K=4/3

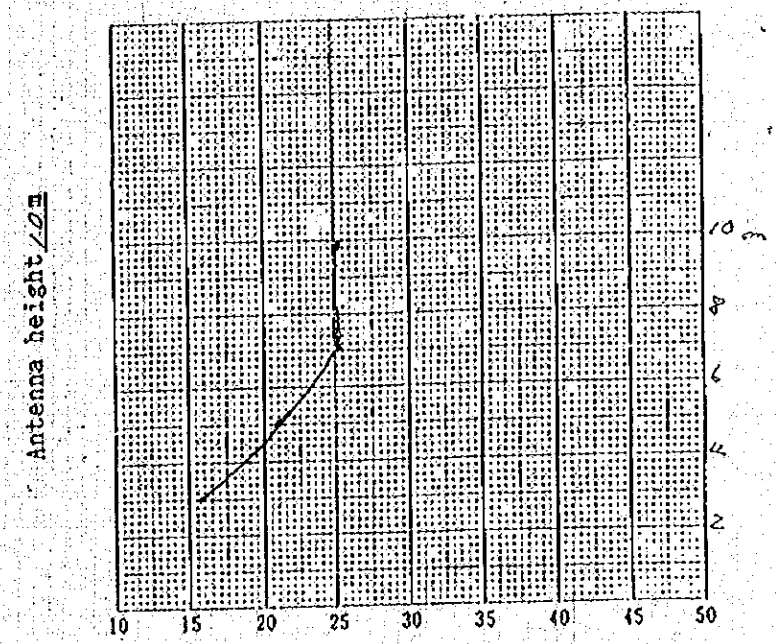
Transmitting station → Measuring Station

RAMNA → NAYARHAT

Roughly Drawing of Surveyed Point



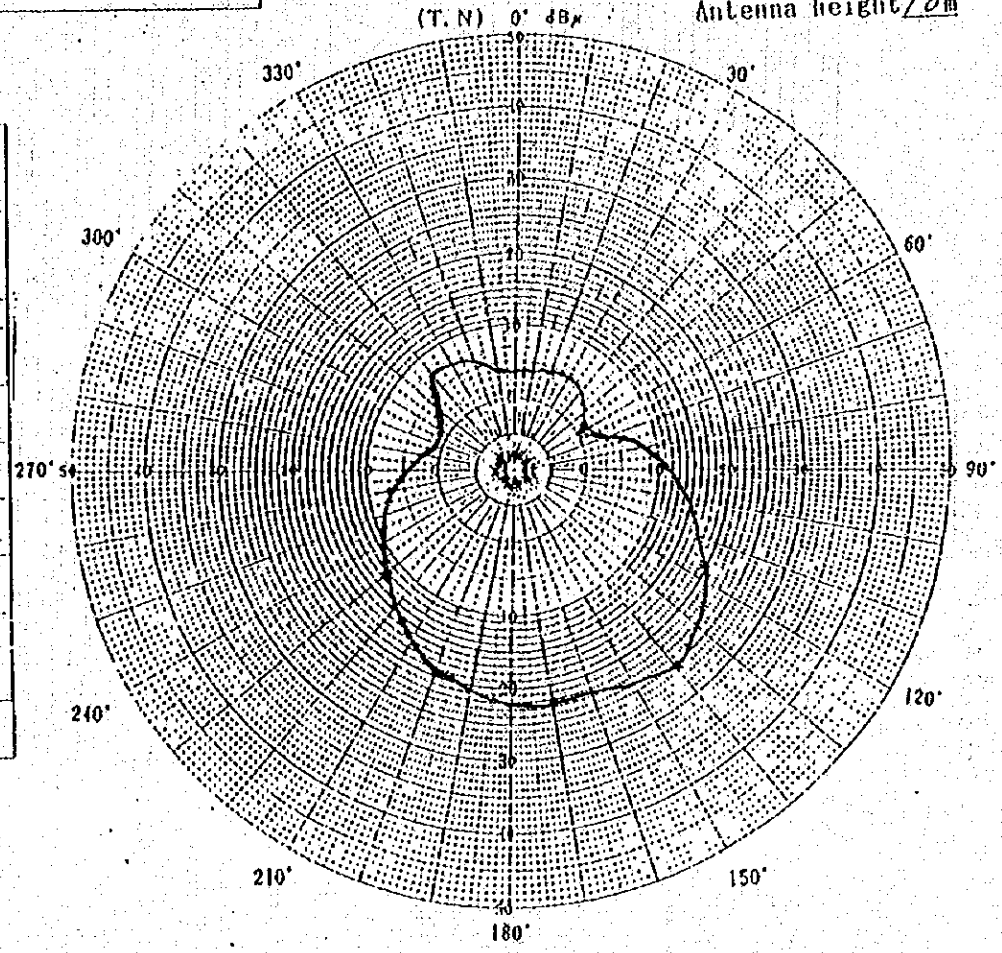
Antenna Vertical pattern



Receiving input voltage

Antenna Horizontal directivity pattern

Antenna height 10m



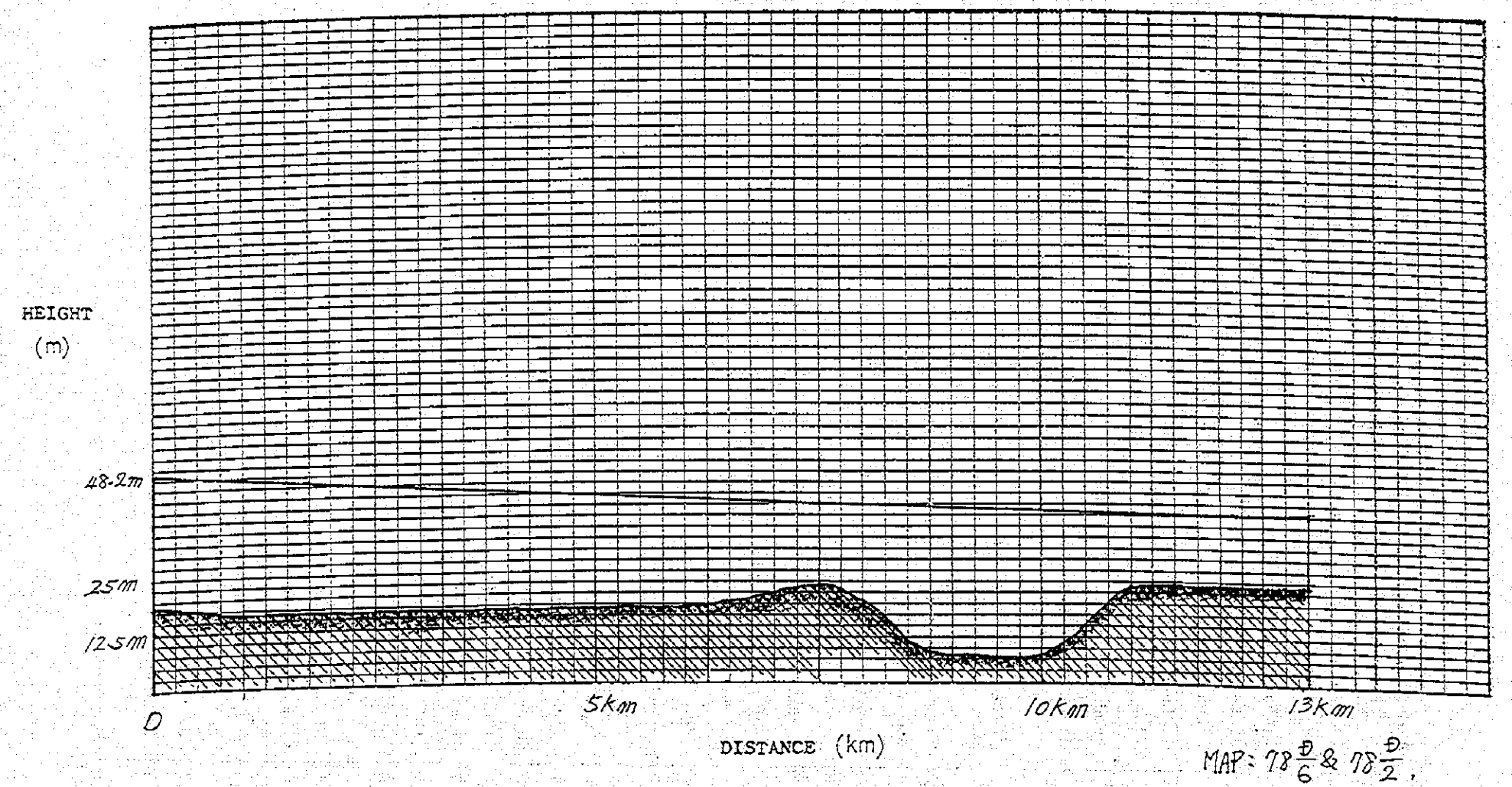
Station Name / Item	Transmitting station	Measuring station
Transmitting Power	10 (W) 40 (dBm)	
Frequency	1432 (MHz)	
Type of Antenna	SLEEVE	3E YAGI
Polarization	V. H.	V H
Feeder	10D-2V 100 m	10D-2V 20 m
Antenna height	78.5 m	10 m
Field strength Meter	Band with 12 MHz	

Nawabganj —— Parkha 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	48.2 (m)	48.2 (m)	48.2 (m)
	Receive. Height (Hr)	31.0 (m)	31.0 (m)	41.3 (m)
	*(Above Sea Level)			
	Distance (D)	13.0 (Km)	13.0 (Km)	13.0 (Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	10.0 dB
	(Transmitting Side)	3E Yagi	3E Yagi	Sleeve
	(Receiving Side)	3E Yagi	3E Yagi	3E Yagi
2	Feeder Loss (Lf1)	-6.1 dB	-6.1 dB	-6.4 dB
	(Transmitting Side)	10D-2V	10D-2V	10D-2V
		(90.0 m)	(90.0 m)	(50.0 m)
	(Receiving Side)	10D-2V	10D-2V	10D-2V
		(20.0 m)	(20.0 m)	(30.0 m)
3	Free space Loss (Lpf)	-98.2dB	dB	-98.2 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	— dB
	Plane earth Loss (Lpp)	— dB	dB	— dB
	Additional Loss (As)	-5.0 dB	dB	-5.0 dB
	for spherical earth			
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	-6.0 dB
5	Correction Value	dB	dB	-15.6 dB
	After Actual Test (Lpc)			
6	Span Loss (Ls)	-104.9 dB	dB	-116.2 dB
7	Transmitting Power (Pt)	10W. 40dBm	10W. 40dBm	10W. 40dBm
8	Receiving Power (Pr)	-64.9 dBm	dBm	-76.2 dBm
9	Receiving input Voltage	48.1	32.5	36.8
	(0dBμV=-113dBm) (Er)	dBμV/m	dBμV/m	dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	45.1 dB	dB	33.8 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	66.1 dB	dB	54.8 dB
15	Expected Fading Value (Lf)	-4.3 dB	dB	-4.3 dB
	(0.1dB/Km+3dB)			
16	S/N at Fading (S/Nf)	61.8 dB	dB	50.5 dB
17	Judgement			Good
18	Remarks			

Scale; C Type 30km/600m
(15km/150m; 60km/2400m)

TERRAIN PROFILE



MAP: 78 D/6 & 78 D/2.

NAWAB GANJ
ALTITUDE 18.2 m
ANTENNA HEIGHT 30m

13 km

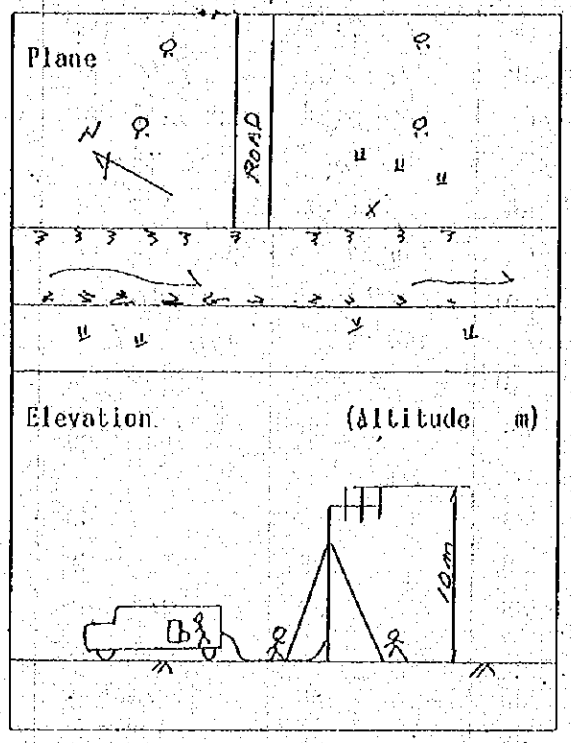
PANKHA
ALTITUDE 21 m
ANTENNA HEIGHT 10 m

K=4/3

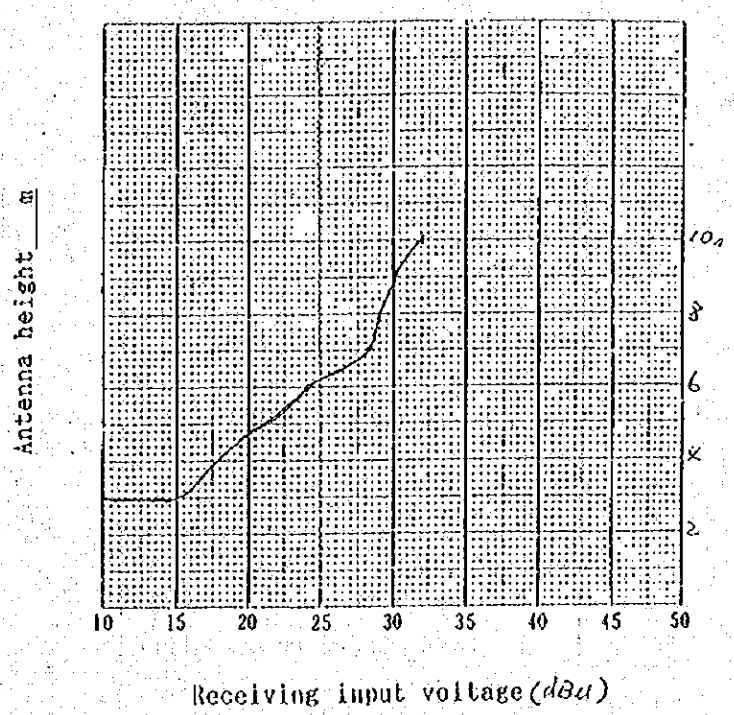
Transmitting station → Measuring Station

NAWABGANJ PANKHA

Roughly Drawing of Surveyed Point

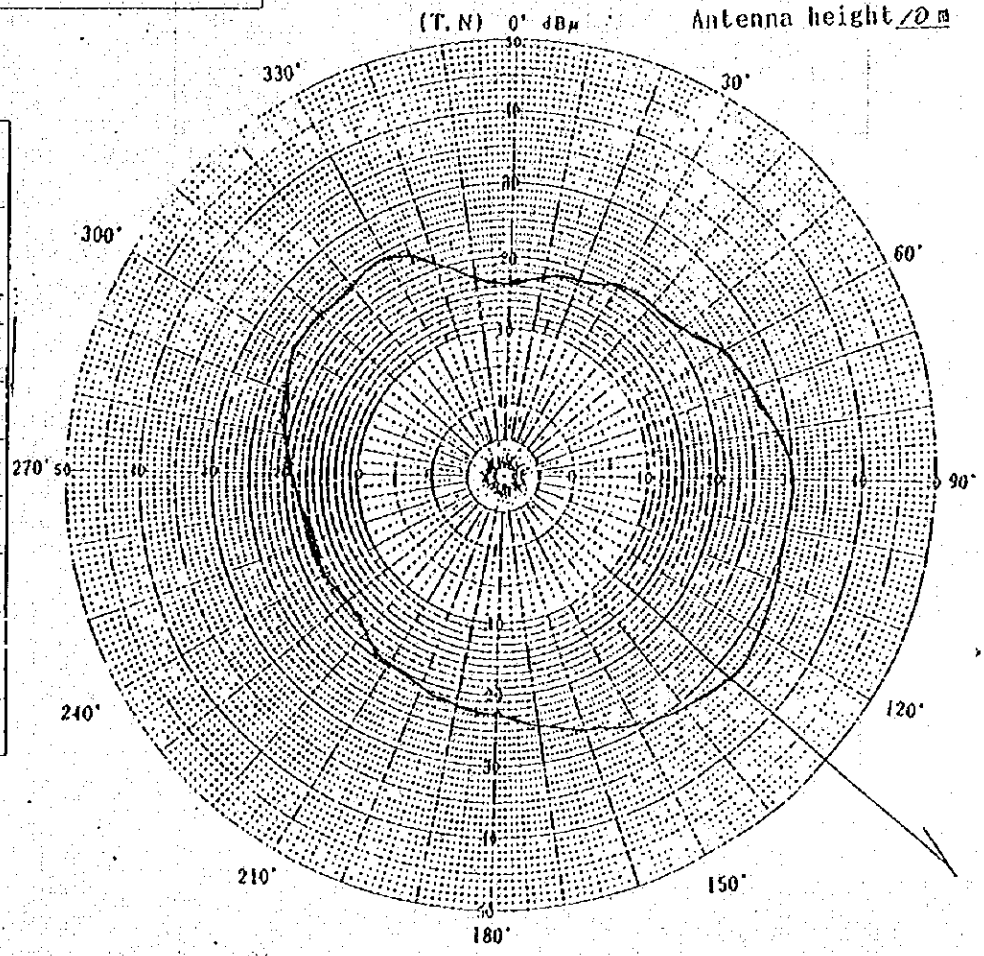


Antenna Vertical pattern



Antenna Horizontal directivity pattern

Antenna height 10 m

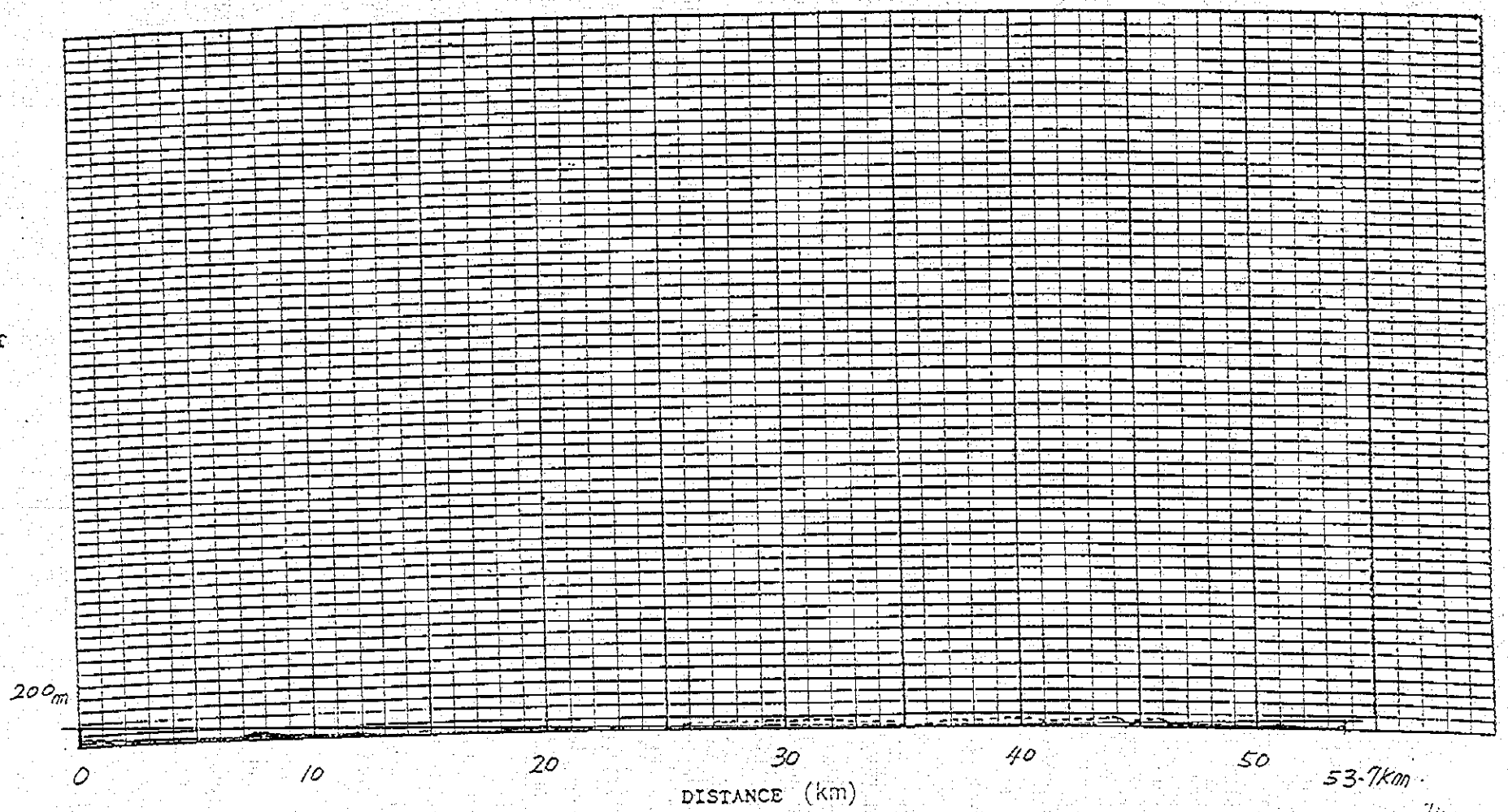


Station Name / Item	Transmitting station NAWABGANJ	Measuring station PANKHA
Transmitting power	10 (W) 40 (dBm)	
Frequency	108.25 (MHz)	
Type of Antenna	SLY	3 E YAGI
Polarization	V H	V H
Feeder	100-2V 60 m	100-2V 20 m
Antenna height	30 m	10 m
Field strength Meter	Band width 12 KHz	

	Rajshahi — Pankha 150Mz Band Radio Path Design Table			
	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	76.7 (m)	76.7 (m)	76.7 (m)
	Receive. Height (Hr)	31.3 (m)	31.3 (m)	41.3 (m)
	*(Above Sea Level)			
	Distance (D)	53.7 (Km)	53.7 (Km)	53.7 (Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	19.0 dB
	(Transmitting Side)	3E Yagi	3E Yagi	3B Collinear
	(Receiving Side)	3E Yagi	3E Yagi	8E Yagi
2	Feeder Loss (Lf1)	-6.1 dB	-6.1 dB	-5.2 dB
	(Transmitting Side)	10D-2V	10D-2V	AFZE50-7
		(90.0 m)	(90.0 m)	(90.0 m)
	(Receiving Side)	10D-2V	10D-2V	10D-2V
		(20.0 m)	(20.0 m)	(30.0 m)
3	Free space Loss (Lpf)	-110.6 dB	dB	-110.6 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	— dB
	Plane earth Loss (Lpp)	— dB	dB	— dB
	Additional Loss (As)	-20.8 dB	dB	-20.8 dB
	for spherical earth			
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	-6.0 dB
5	Correction Value	dB	dB	-17.7 dB
	After Actual Test (Lpc)			
6	Span Loss (Ls)	-121.3 dB	dB	-141.8 dB
7	Transmitting Power (Pt)	10W, 40dBm	10W, 40dBm	10W, 40dBm
8	Receiving Power (Pr)	-81.3 dBm	dBm	-101.8 dBm
9	Receiving input Voltage	31.7	14.0	11.2
	(0dBμV=-113dBm) (Er)	dBμV/m	dBμV/m	dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	28.7 dB	dB	8.2 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	49.7 dB	dB	29.2 dB
15	Expected Fading Value (Lf)	-8.4 dB	dB	-8.4 dB
	(0.1dB/Km+3dB)			
16	S/N at Fading (S/Nf)	41.3 dB	dB	20.8 dB
17	Judgement			N.G
18	Remarks			

Scale; C Type 30km/600m
(15km/150m; 60km/2400m)

TERRAIN PROFILE



$75\frac{D}{11}$ · $\frac{D}{6}$ $\frac{D}{7}$ $75\frac{D}{2}$

RAJSHAHI
ALTITUDE 22.7m
ANTENNA HEIGHT 54 m

53.7km

PANKHA
ALTITUDE 21.3m
ANTENNA HEIGHT 10 m

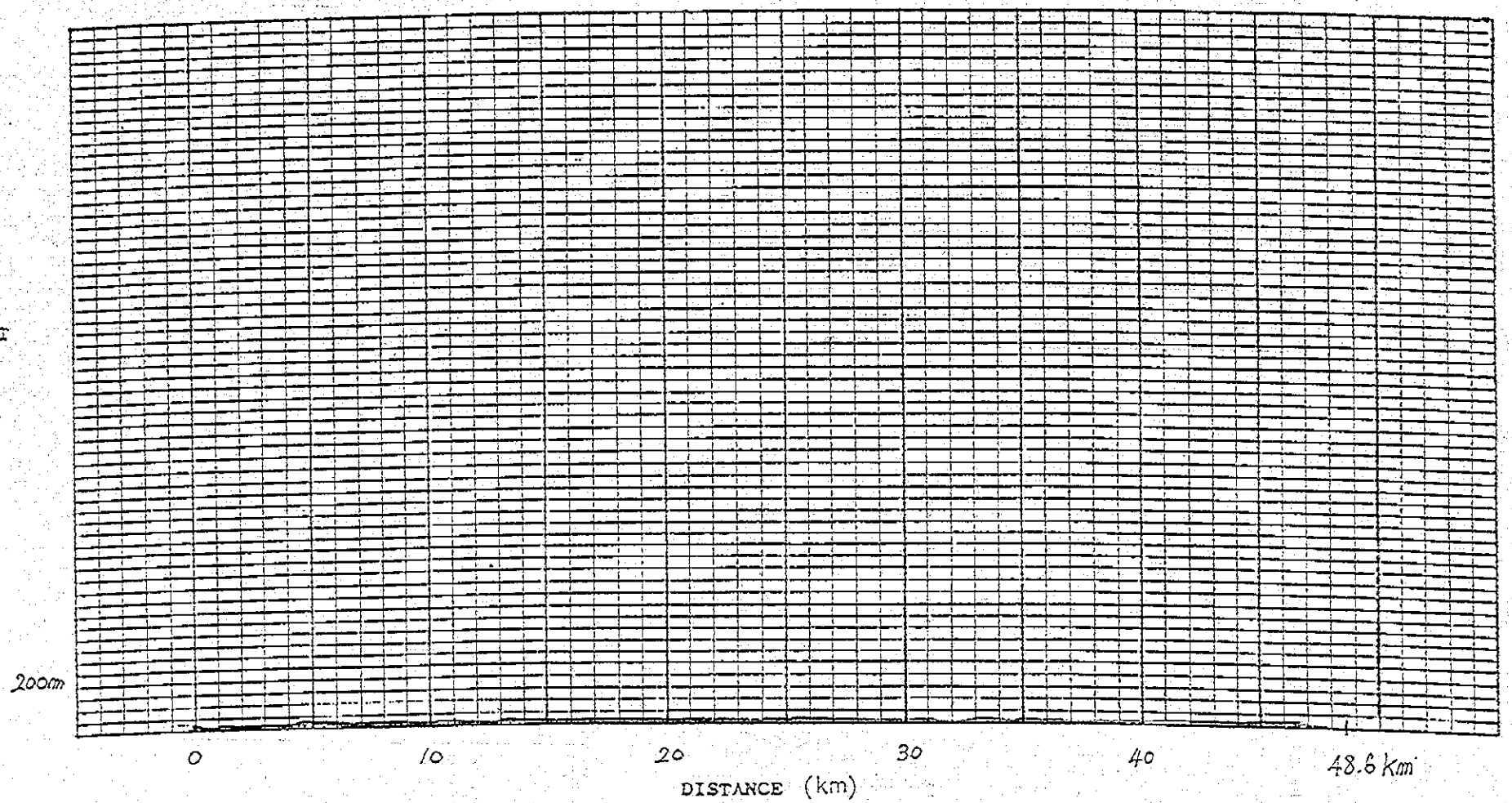
K=4/3

Rangpur —— Jatrapur 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	70.0 (m)	70.0 (m)	70.0 (m)
	Receive. Height (Hr)	40.0 (m)	40.0 (m)	40.0 (m)
	*(Above Sea Level)			
	Distance (D)	48.6 (Km)	48.6 (Km)	48.6 (Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	19.0 dB
	(Transmitting Side)	3EYagi	3EYagi	3B.Collinear
	(Receiving Side)	3EYagi	3EYagi	8EYagi
2	Feeder Loss (Lf1)	-4.9 dB	-4.9 dB	-5.2 dB
	(Transmitting Side)	10D-2V	10D-2V	AFZE50-7
		(60.0 m)	(60.0 m)	(90.0 m)
	(Receiving Side)	10D-2V	10D-2V	10D-2V
		(20.0 m)	(20.0 m)	(30.0 m)
3	Free space Loss (Lpf)	-109.7 dB	dB	-109.7 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	— dB
	Plane earth Loss (Lpp)	— dB	dB	— dB
	Additional Loss (As) for spherical earth	-17.3 dB	dB	-17.3 dB
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	-6.0 dB
5	Correction Value After Actual Test (Lpc)	dB	dB	-19.3 dB
6	Span Loss (Ls)	-115.7 dB	dB	-141.0 dB
7	Transmitting Power (Pt)	10W. 40dBm	10W. 40dBm	10W. 40dBm
8	Receiving Power (Pr)	-75.7 dBm	dBm	-101.0 dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	37.3 dBμV/m	18.0 dBμV/m	12.0 dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	-34.3 dB	dB	-9.0 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	55.3 dB	dB	30.0 dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	-7.9 dB	dB	-7.9 dB
16	S/N at Fading (S/Nf)	47.4 dB	dB	22.1 dB
17	Judgement			N.G
18	Remarks			

Scale ; C Type 30km/600m
(15km/150m ; 60km/2400m)

TERRAIN PROFILE



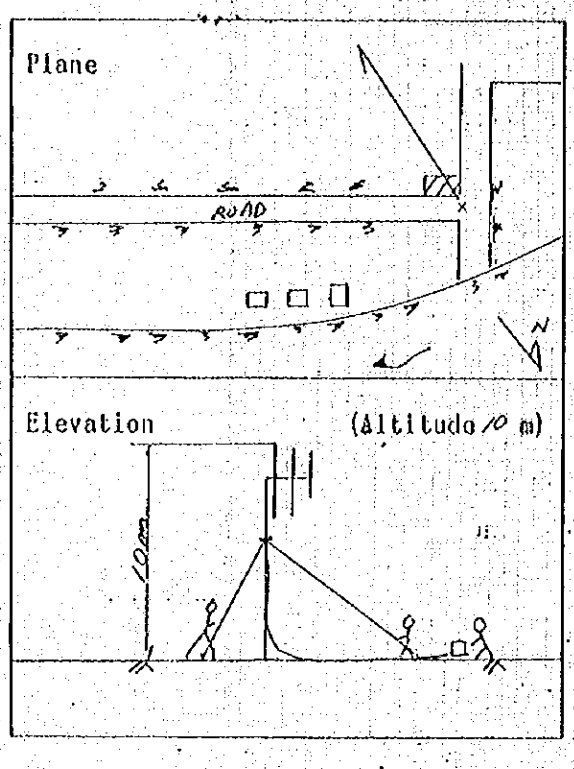
JATRAPUR		RANGPUR
ALTITUDE 7 m	48.6km	ALTITUDE 7 m
ANTENNA HEIGHT 10m		ANTENNA HEIGHT m

K= 4/3

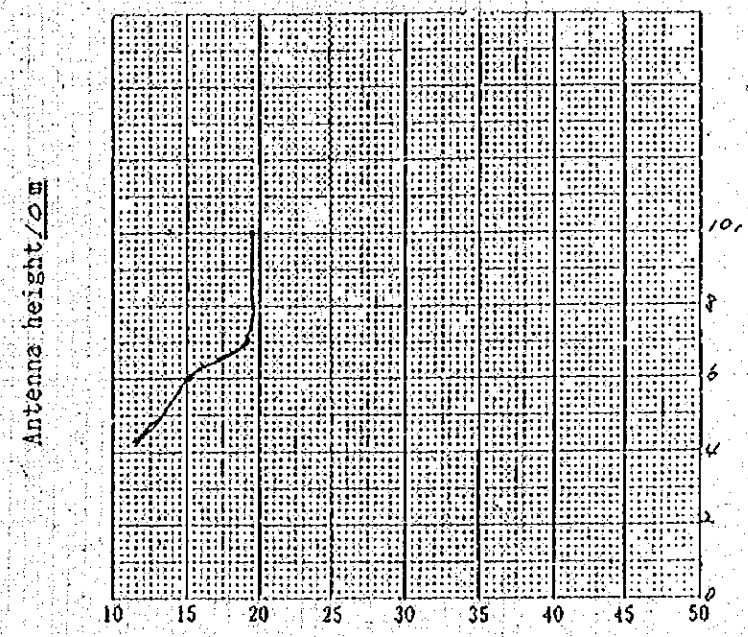
Transmitting station → Measuring Station

RANGPUR JATRAPUR

Roughly Drawing of Surveyed Point

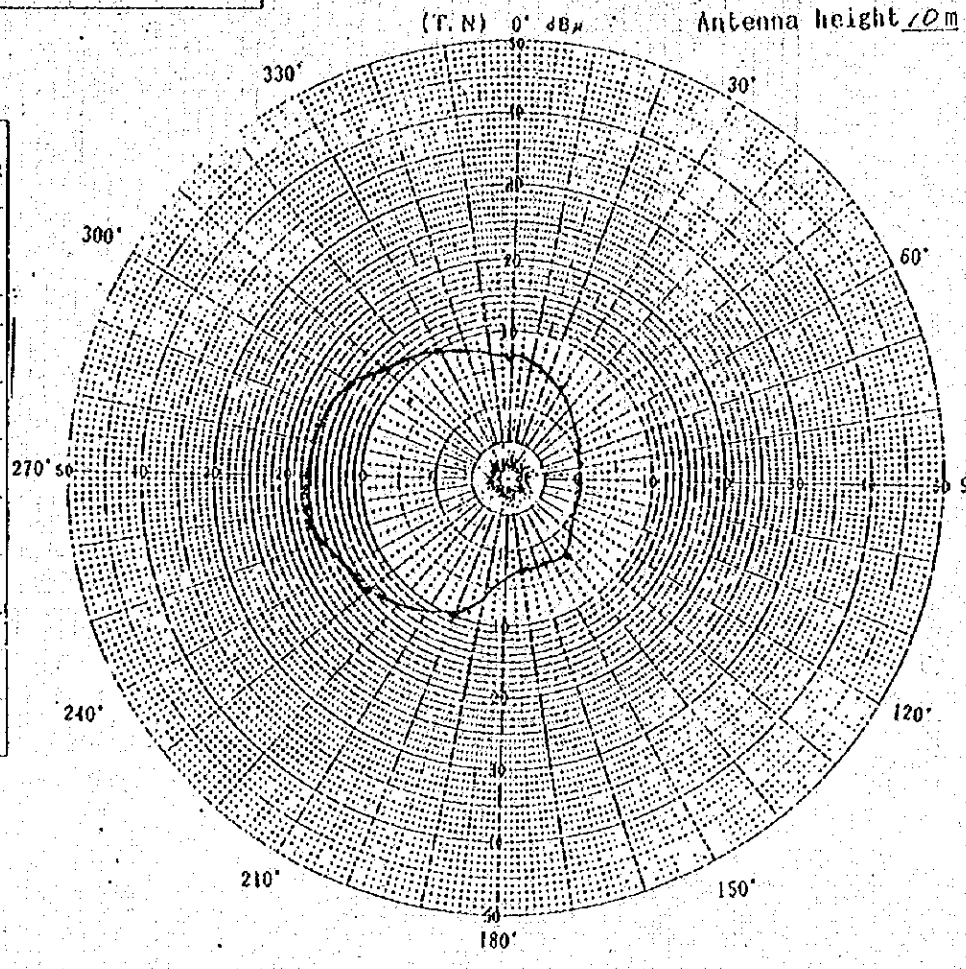


Antenna Vertical pattern



Receiving input voltage

Antenna Horizontal directivity pattern



Station Name / Item	Transmitting RANGPUR station	Measuring JATRAPUR station
Transmitting Power	10 (W) 40 (dBm)	
Frequency	149.25 (MHz)	
Type of Antenna	3E YAGI	3E YAGI
Polarization	V, H	V H
Feeder	100-2V 60 m	100-2V 20 m
Antenna height	4.2 m	10 m
Field strength Meter	Band width 12 KHz	

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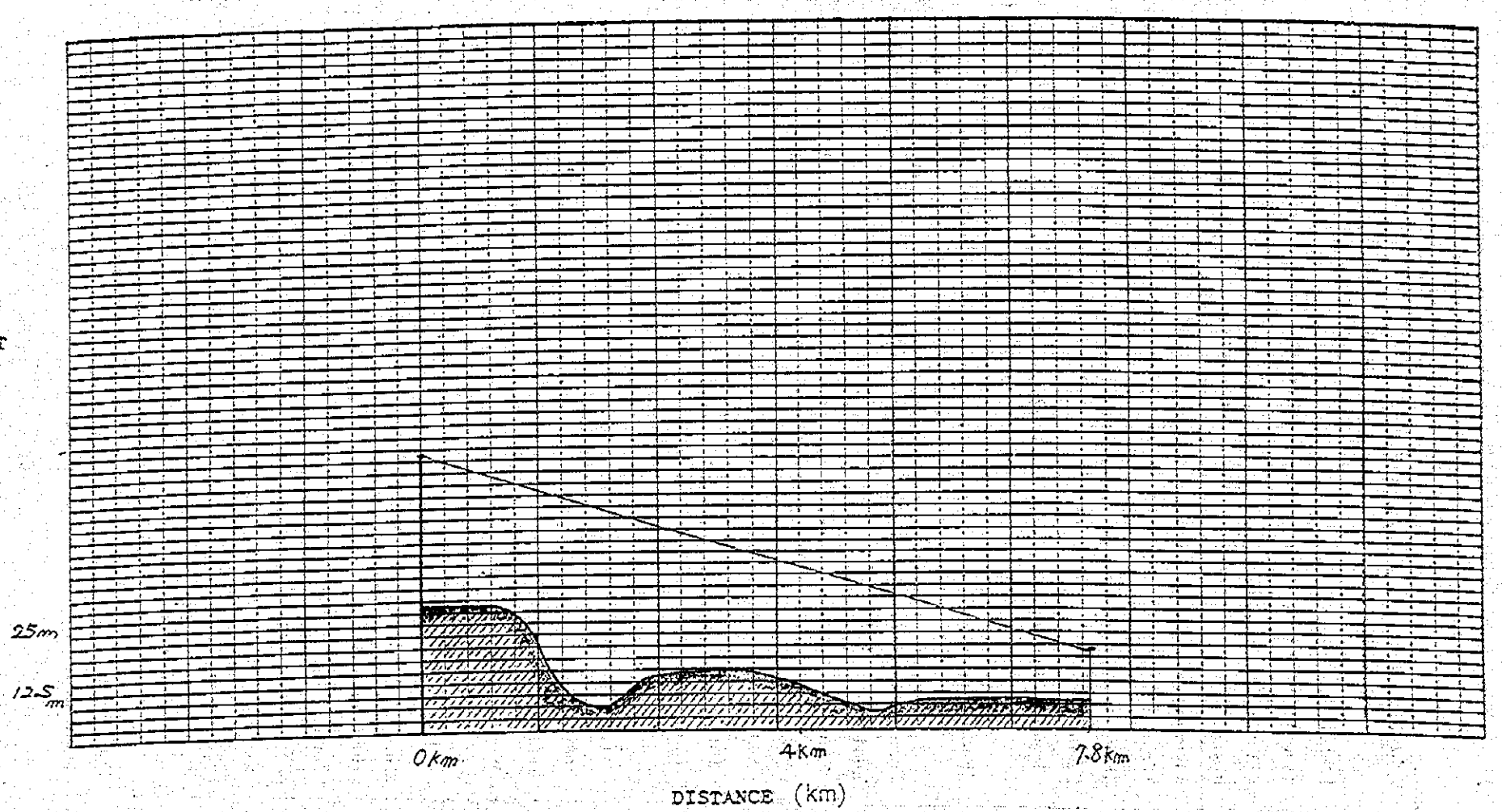
Kurigram —— Jatrapur 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	57.3 (m)	57.3 (m)	57.3 (m)
	Receive. Height (Hr)	17.0 (m)	17.0 (m)	22.0 (m)
	*(Above Sea Level)			
	Distance (D)	7.8 (Km)	7.8 (Km)	7.8 (Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	10.0 dB
	(Transmitting Side)	3EYagi	3EYagi	Sleeve
	(Receiving Side)	3EYagi	3EYagi	3EYagi
2	Feeder Loss (Lf1)	-4.9 dB	-4.9 dB	-5.2 dB
	(Transmitting Side)	10D-2V	10D-2V	10D-2V
		(60.0m)	(60.0 m)	(50.0 m)
	(Receiving Side)	10D-2V	10D-2V	10D-2V
		(20.0 m)	(20.0 m)	(30.0 m)
3	Free space Loss (Lpf)	-93.8 dB	dB	-93.8 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	— dB
	Plane earth Loss (Lpp)	— dB	dB	— dB
	Additional Loss (As) for spherical earth	-3.4 dB	dB	-3.4 dB
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	— dB
5	Correction Value After Actual Test (Lpc)	dB	dB	-17.1 dB
6	Span Loss (Ls)	-85.9 dB	dB	-109.5 dB
7	Transmitting Power (Pt)	10W, 40dBm	10W, 40dBm	10W, 40dBm
8	Receiving Power (Pr)	-45.9 dBm	dBm	-69.5 dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	67.1 dBμV/m	50.0 dBμV/m	43.5 dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	64.1 dB	dB	40.5 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	85.1 dB	dB	61.5 dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	-3.8 dB	dB	-3.8 dB
16	S/N at Fading (S/Nf)	81.3 dB	dB	57.7 dB
17	Judgement			Good
18	Remarks			

Scale; C Type 30km/600m
(15km/150m; 60km/2400m)

TERRAIN PROFILE



MAP: 78 G/9

KURIGRAM
ALTITUDE 27.3 m
ANTENNA HEIGHT 32 m

7.8 km

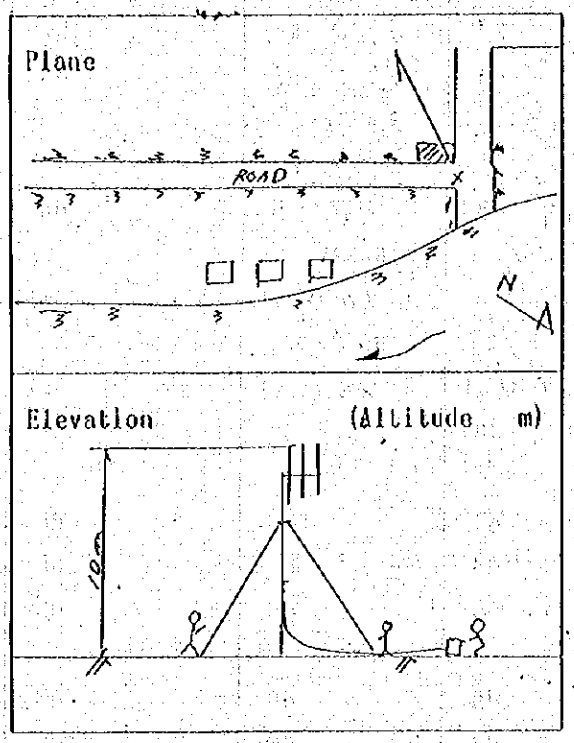
JATRAPUR
ALTITUDE 7.0 m
ANTENNA HEIGHT 10 m

K=4/3

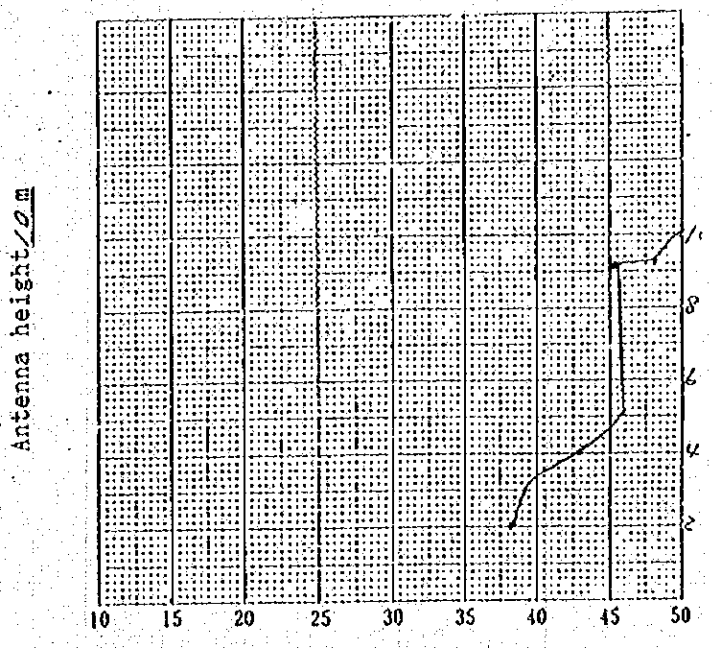
Transmitting station → Measuring Station

KURIGRAM JATRAPUR

Roughly Drawing of Surveyed Point



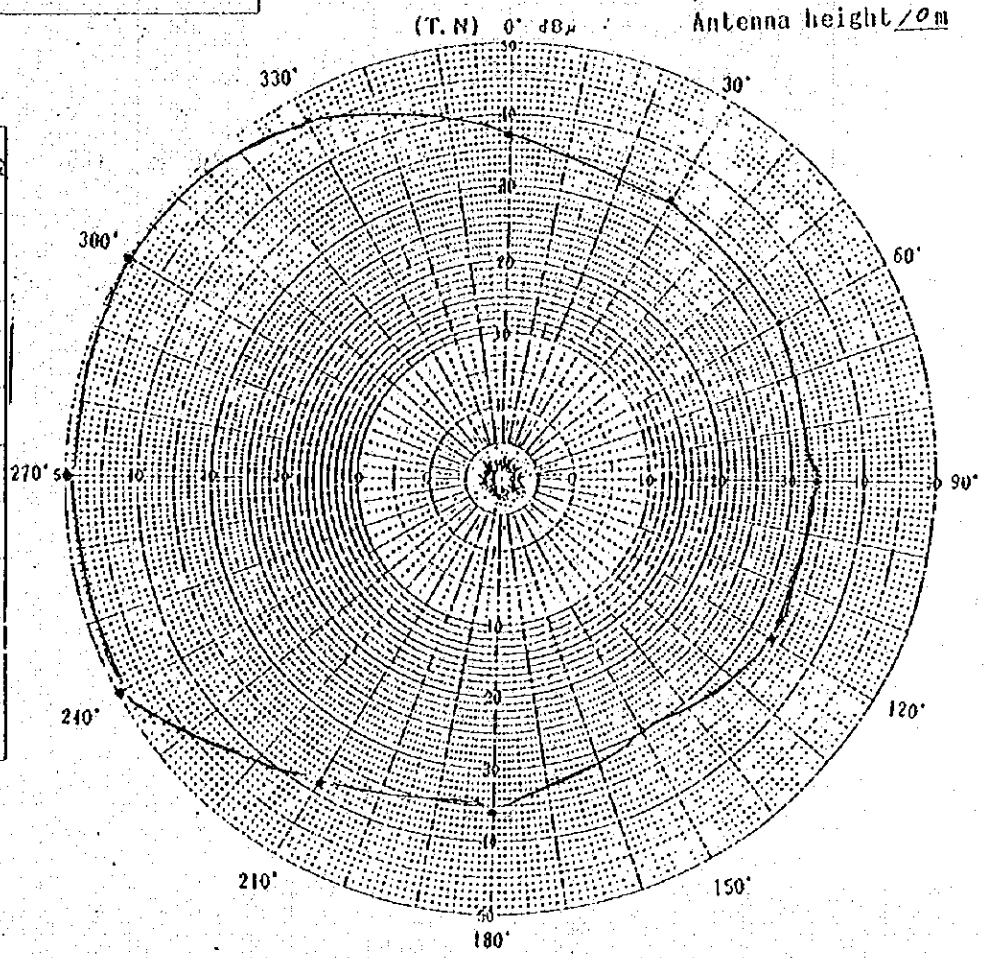
Antenna Vertical pattern



Receiving input voltage

Antenna Horizontal directivity pattern

Antenna height 10 m



Station Name / Item	Transmitting station	Measuring station
Transmitting Power	10 (W) 40 (dBm)	
Frequency	149.25 (MHz)	
Type of Antenna	SLEEVE	3ELYAGI
Polarization	V. H.	V H
Feeder	100-2V 60 m	100-2V 20 m
Antenna height	4.2 m	10 m
Field strength Meter	Band with 12 KHz	

23

Sylhet —— Amalshid 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	39.0 (m)	39.0 (m)	(m)
	Receive. Height (Hr)	22.0 (m)	22.0 (m)	(m)
	*(Above Sea Level)			
	Distance (D)	61.0 (Km)	61.0 (Km)	(Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	dB
	(Transmitting Side)	3EYagi	3EYagi	
	(Receiving Side)	3EYagi	3EYagi	
2	Feeder Loss (Lf1)	-4.9 dB	-4.9 dB	dB
	(Transmitting Side)	10D-2V	10D-2V	
		(60.0 m)	(60.0 m)	(m)
	(Receiving Side)	10D-2V	10D-2V	
		(20.0 m)	(20.0 m)	(m)
3	Free space Loss (Lpf)	-111.7 dB	dB	dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	dB
	Plane earth Loss (Lpp)	— dB	dB	dB
	Additional Loss (As)	-32.7 dB	dB	dB
	for spherical earth			
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	dB
5	Correction Value	dB	dB	dB
	After Actual Test (Lpc)			
6	Span Loss (Ls)	-133.3 dB	dB	dB
7	Transmitting Power (Pt)	10W. 40dBm	10W. 40dBm	10W. 40dBm
8	Receiving Power (Pr)	-93.3 dBm	dBm	dBm
9	Receiving input Voltage	19.7	5.0	
	(0dBμV=-113dBm) (Er)	dBμV/m	dBμV/m	dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	dBm
11	Threshold Margin (Mth)	16.7 dB	dB	dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	37.7 dB	dB	dB
15	Expected Fading Value (Lf)	-9.1 dB	dB	dB
	(0.1dB/Km+3dB)			
16	S/N at Fading (S/Nf)	28.6 dB	dB	dB
17	Judgement			
18	Remarks			

Sylhet —— Zakiganj 150Mz Band Radio Path Design Table

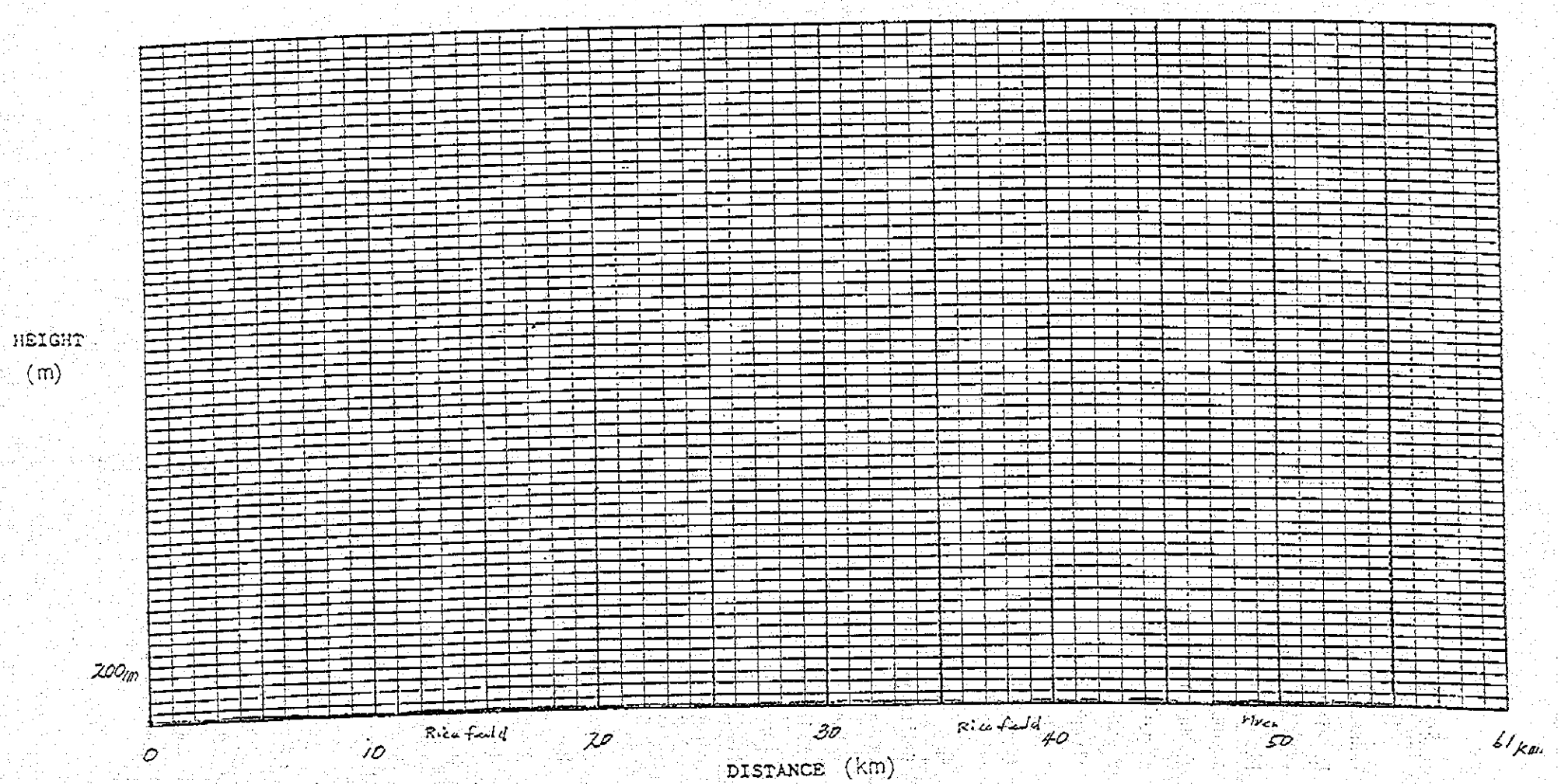
	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	(m)	(m)	39.0 (m)
	Receive. Height (Hr)	(m)	(m)	42.0 (m)
	*(Above Sea Level)			
	Distance (D)	(Km)	(Km)	51.0 (Km)
1	Antenna Gain (Ga)	dB	dB	19.0 dB
	(Transmitting Side)			3B Collinear
	(Receiving Side)			8E Yagi
2	Feeder Loss (Lf1)	dB	dB	-3.9 dB
	(Transmitting Side)		10D-2V	AFZE50-7
		(m)	(m)	(60.0 m)
	(Receiving Side)		10D-2V	10D-2V
		(m)	(m)	(40.0 m)
3	Free space Loss (Lpf)	dB	dB	-110.0 dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	dB	dB	— dB
	Plane earth Loss (Lpp)	dB	dB	— dB
	Additional Loss (As) for spherical earth	dB	dB	-30.0 dB
	Divider.Fil.etc.Loss (Lf2)	dB	dB	-3.0 dB
5	Correction Value After Actual Test (Lpc)	dB	dB	-14.7 dB
6	Span Loss (Ls)	dB	dB	-142.6 dB
7	Transmitting Power (Pt)	10W, 40dBm	10W, 40dBm	10W, 40dBm
8	Receiving Power (Pr)	dBm	dBm	-102.6 dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	dBμV/m	dBμV/m	10.4 dBμV/m
10	Threshold Level (Pth)	dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	dB	dB	7.4 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	dB	dB	28.4 dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	dB	dB	-8.1 dB
16	S/N at Fading (S/Nf)	dB	dB	20.3 dB
17	Judgement			
18	Remarks			

80

Scale; C Type 30km/600m

(15km/150m; 60km/2400m)

TERRAIN PROFILE



SYLHET
ALTITUDE 15 m
ANTENNA HEIGHT 24m

61 km

AMALSHID
ALTITUDE 12 m
ANTENNA HEIGHT 10 m

K=4/3

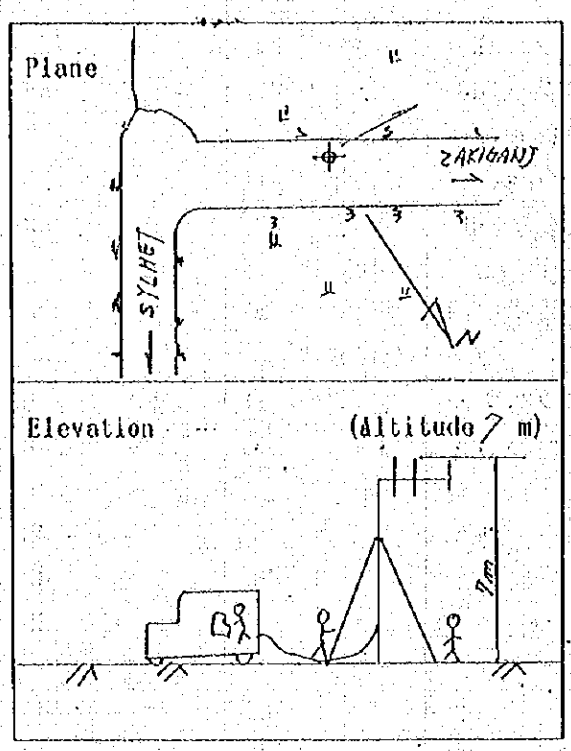
Beani Bazar —— Amalshid 150Mz Band Radio Path Design Table

	Item	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht)	31.0 (m)	31.0 (m)	(m)
	Receive. Height (Hr)	22.0 (m)	22.0 (m)	(m)
	*(Above Sea Level)			
	Distance (D)	33.7 (Km)	33.7 (Km)	(Km)
1	Antenna Gain (Ga)	16.0 dB	16.0 dB	dB
	(Transmitting Side)	3E Yagi	3E Yagi	
	(Receiving Side)	3E Yagi	3E Yagi	
2	Feeder Loss (Lf1)	-4.9 dB	-4.9 dB	dB
	(Transmitting Side)	10D-2V	10D-2V	
		(60.0 m)	(60.0 m)	(m)
	(Receiving Side)	10D-2V	10D-2V	
		(20.0 m)	(20.0 m)	(m)
3	Free space Loss (Lpf)	-106.5 dB	dB	dB
4	Additional Loss			
	Shadow Loss -1 (Lps)	— dB	dB	dB
	Plane earth Loss (Lpp)	— dB	dB	dB
	Additional Loss for spherical earth (As)	-23.5 dB	dB	dB
	Divider.Fil.etc.Loss (Lf2)	— dB	dB	dB
5	Correction Value After Actual Test (Lpc)	dB	dB	dB
6	Span Loss (Ls)	-118.6 dB	dB	dB
7	Transmitting Power (Pt)	10W, 40dBm	10W, 40dBm	10W, 40dBm
8	Receiving Power (Pr)	-78.6 dBm	dBm	dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	34.4 dBμV/m	17.0 dBμV/m	dBμV/m
10	Threshold Level (Pth)	-110.0 dBm	dBm	dBm
11	Threshold Margin (Mth)	31.4 dB	dB	dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	52.4 dB	dB	dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	-6.4 dB	dB	dB
16	S/N at Fading (S/Nf)	46.0 dB	dB	dB
17	Judgement			
18	Remarks			

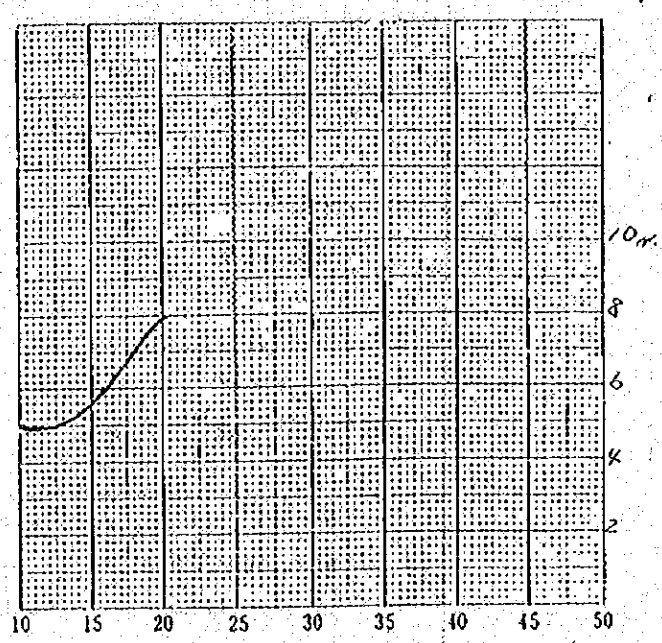
Transmitting station → Measuring Station

BEANIBAZAR AMALSHID

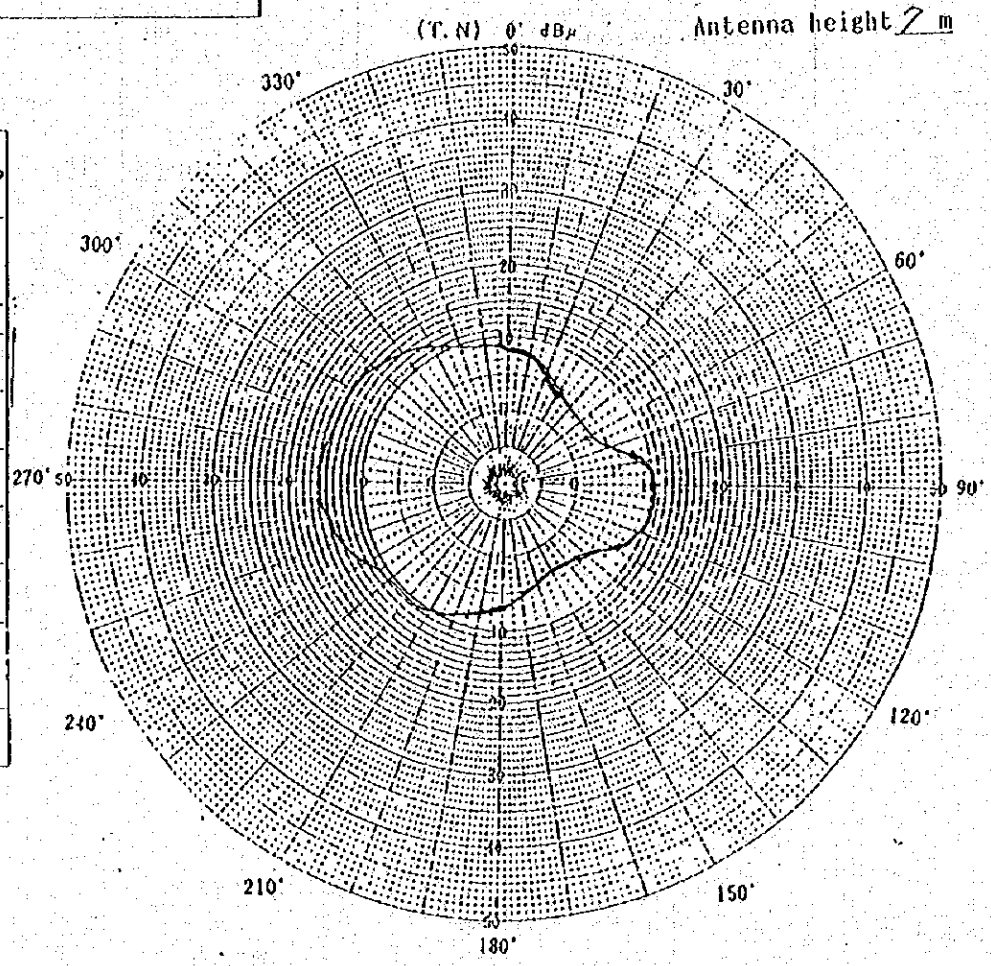
Roughly Drawing of Surveyed Point



Antenna Vertical pattern



Antenna Horizontal directivity pattern

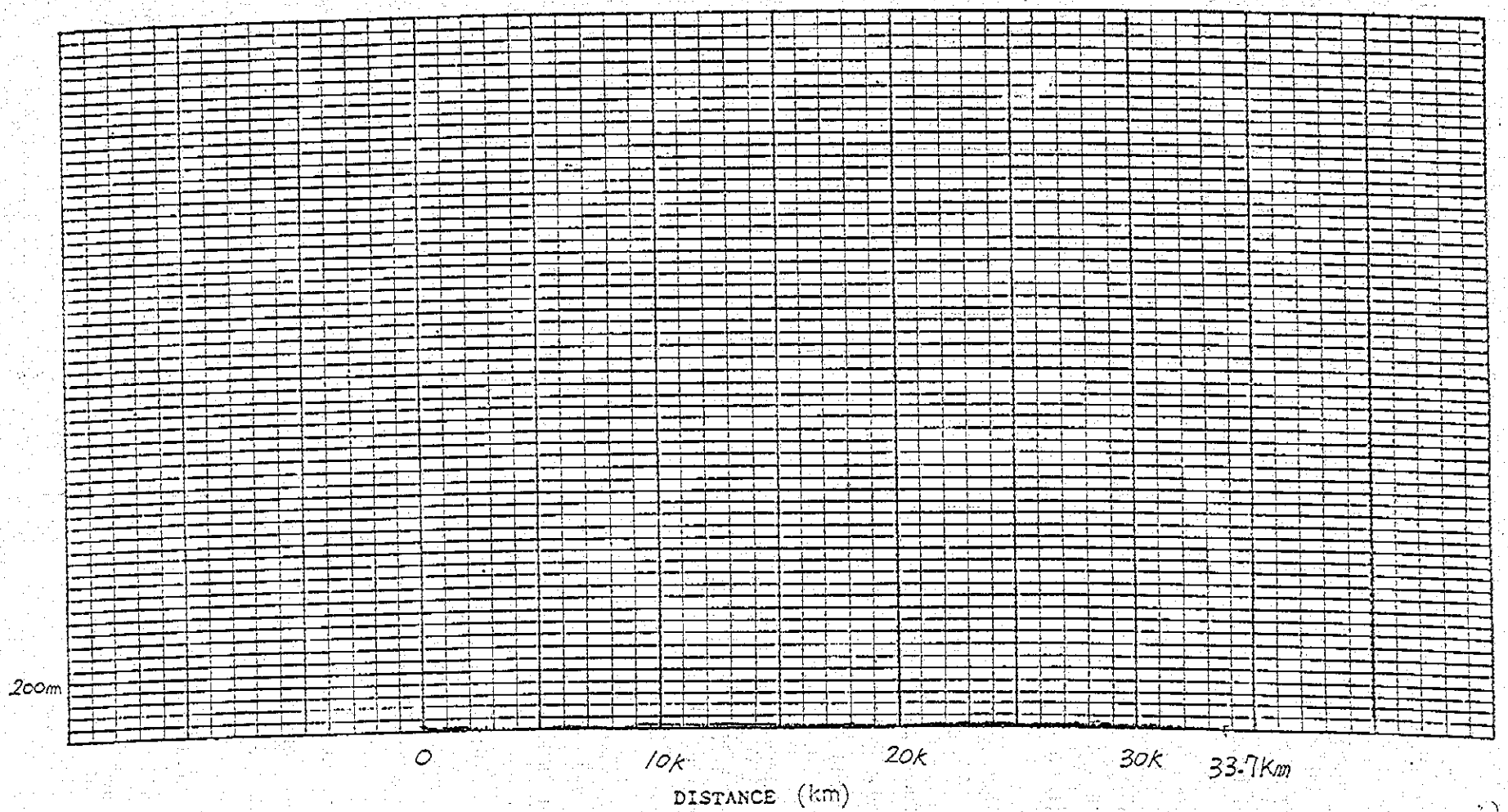


Station Name / Item	Transmitting station	Measuring station
Transmitting Power	10 (W) 40 (dBm)	
Frequency	148.25 (MHz)	
Type of Antenna	3E YAGI	3E YAGI
Polarization	V. H	V H
Feeder	100-2V .60 m	100-2V 20 m
Antenna height	30 m	7 m
Field strength Meter	Band with 12 kHz	

Scale; C Type 30km/600m

(15km/150m; 60km/2400m)

TERRAIN PROFILE



BEANIBAZAR
ALTITUDE 5 m
ANTENNA HEIGHT 26m

33.7km

AMALSHID
ALTITUDE 12 m
ANTENNA HEIGHT 10m

K=4/3

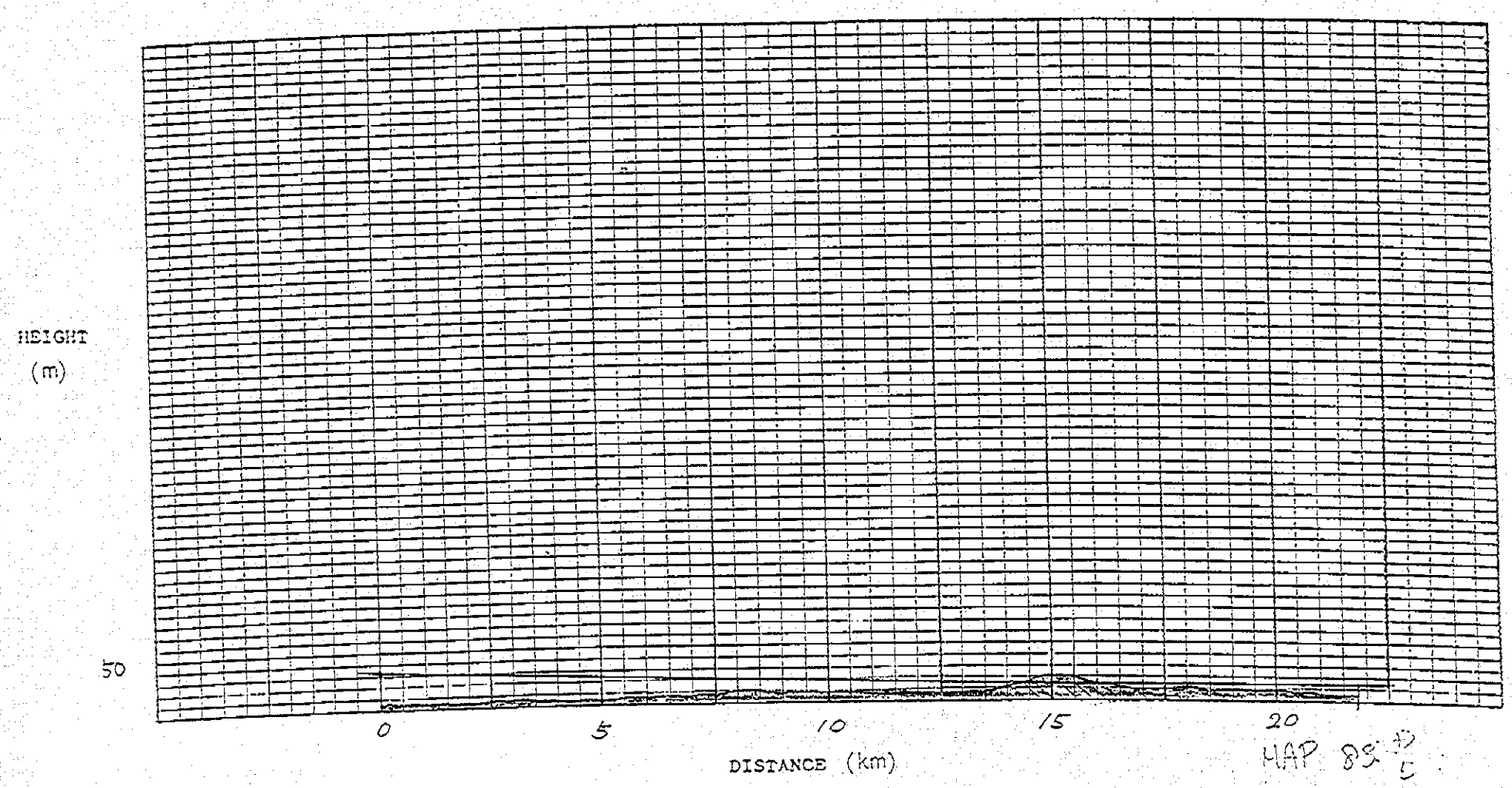
	Beani Bazar — Zakiganj 150Mz Band Radio Path Design Table			
	I t e m	Desk Plan	Actual Test	Design Value
	Transmit. Height (Ht) Receive. Height (Hr) *(Above Sea Level)	(m) (m)	(m) (m)	31.0 (m) 36.0 (m)
	Distance (D)	(Km)	(Km)	21.8 (Km)
1	Antenna Gain (Ga) (Transmitting Side) (Receiving Side)	dB	dB	22.0 dB 5E Yagi 5E Yagi
2	Feeder Loss (Lf1) (Transmitting Side) (Receiving Side) 	dB (m) (m)	dB 10D-2V (m) 10D-2V (m)	-6.4 dB 10D-2V (50.0 m) 10D-2V (50.0 m)
3	Free space Loss (Lpf)	dB	dB	-102.7 dB
4	Additional Loss Shadow Loss -1 (Lps) Plane earth Loss (Lpp) Additional Loss (As) for spherical earth	 dB dB dB	 dB dB dB	 — dB — dB -20.5 dB
	Divider.Fil.etc.Loss (Lf2)	dB	dB	-6.0 dB
5	Correction Value After Actual Test (Lpc)	dB	dB	-17.4 dB
6	Span Loss (Ls)	dB	dB	-131.0 dB
7	Transmitting Power (Pt)	10W. 40dBm	10W. 40dBm	10W. 40dBm
8	Receiving Power (Pr)	dBm	dBm	-91.0 dBm
9	Receiving input Voltage (0dBμV=-113dBm) (Er)	dBμV/m	dBμV/m	22.0 dBμV/m
10	Threshold Level (Pth)	dBm	dBm	-110.0 dBm
11	Threshold Margin (Mth)	dB	dB	19.0 dB
12	Crest Factor (Cf)	9 dB	9 dB	9 dB
13	S/N Improvement Factor (I)	12 dB	12 dB	12 dB
14	Standard S/N (S/N)	dB	dB	40.0 dB
15	Expected Fading Value (Lf) (0.1dB/Km+3dB)	dB	dB	-5.2 dB
16	S/N at Fading (S/Nf)	dB	dB	34.8 dB
17	Judgement			Good
18	Remarks			

98

Scale; C Type 30km/600m

(15km/150m; 60km/2400m)

TERRAIN PROFILE



HAP 83 D 5

83 D 1

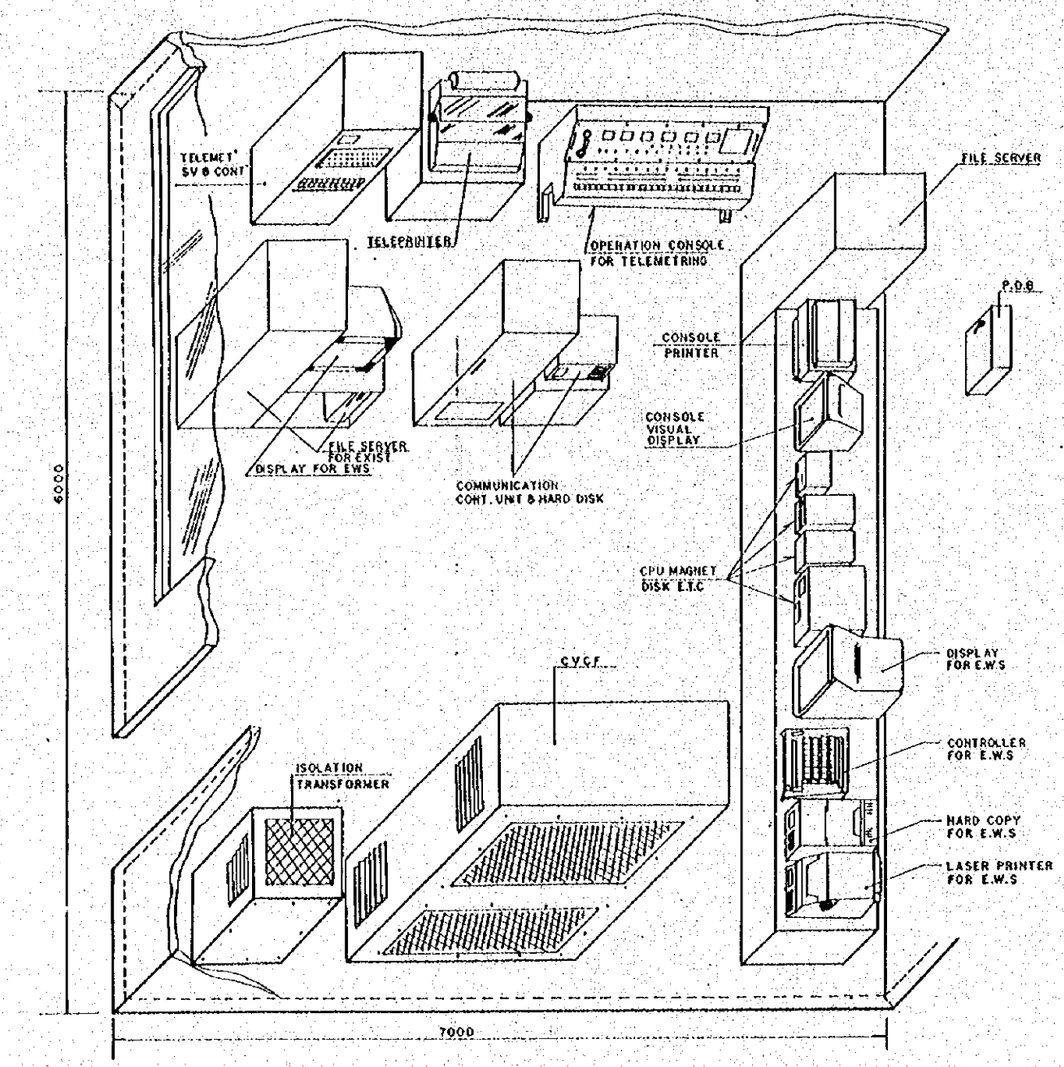
BEANIBAZAR
ALTITUDE 5 m
ANTENNA HEIGHT 26m

21.8km

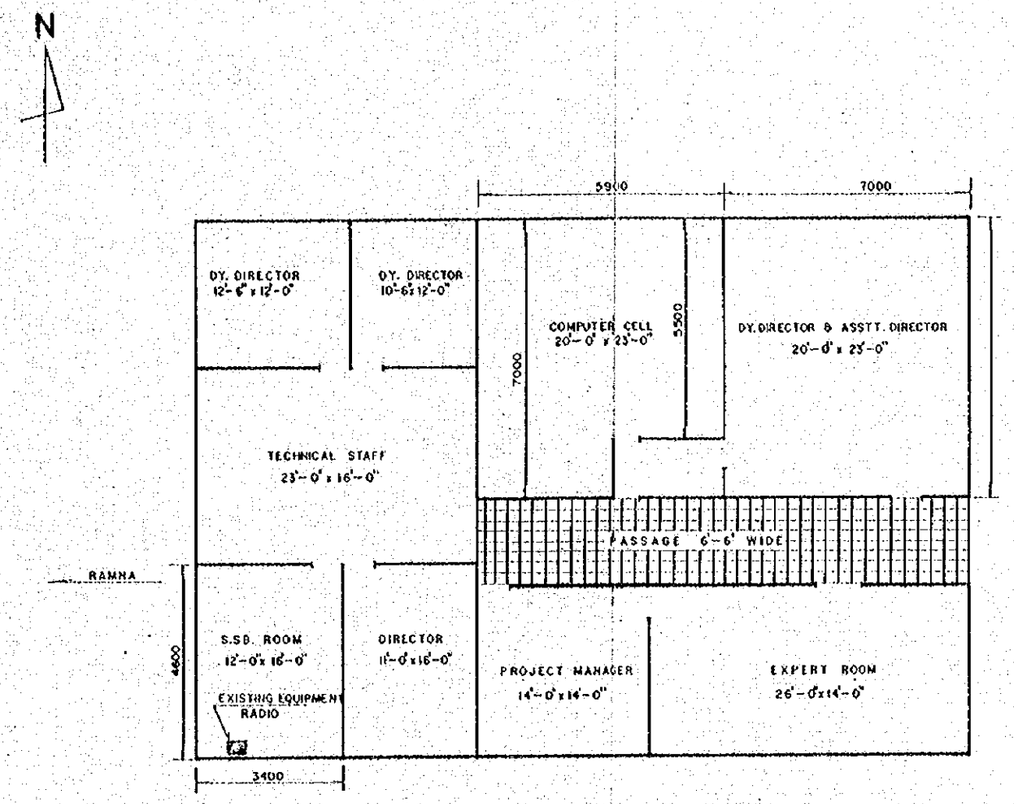
ZAKIGANGI
ALTITUDE 6 m
ANTENNA HEIGHT 10 m

K=4/3

APPENDIX F. DRAWINGS FOR TELEMETRY INSTALLATION WORK



MASTER STATION EQUIPMENT LAY-OUT PLAN

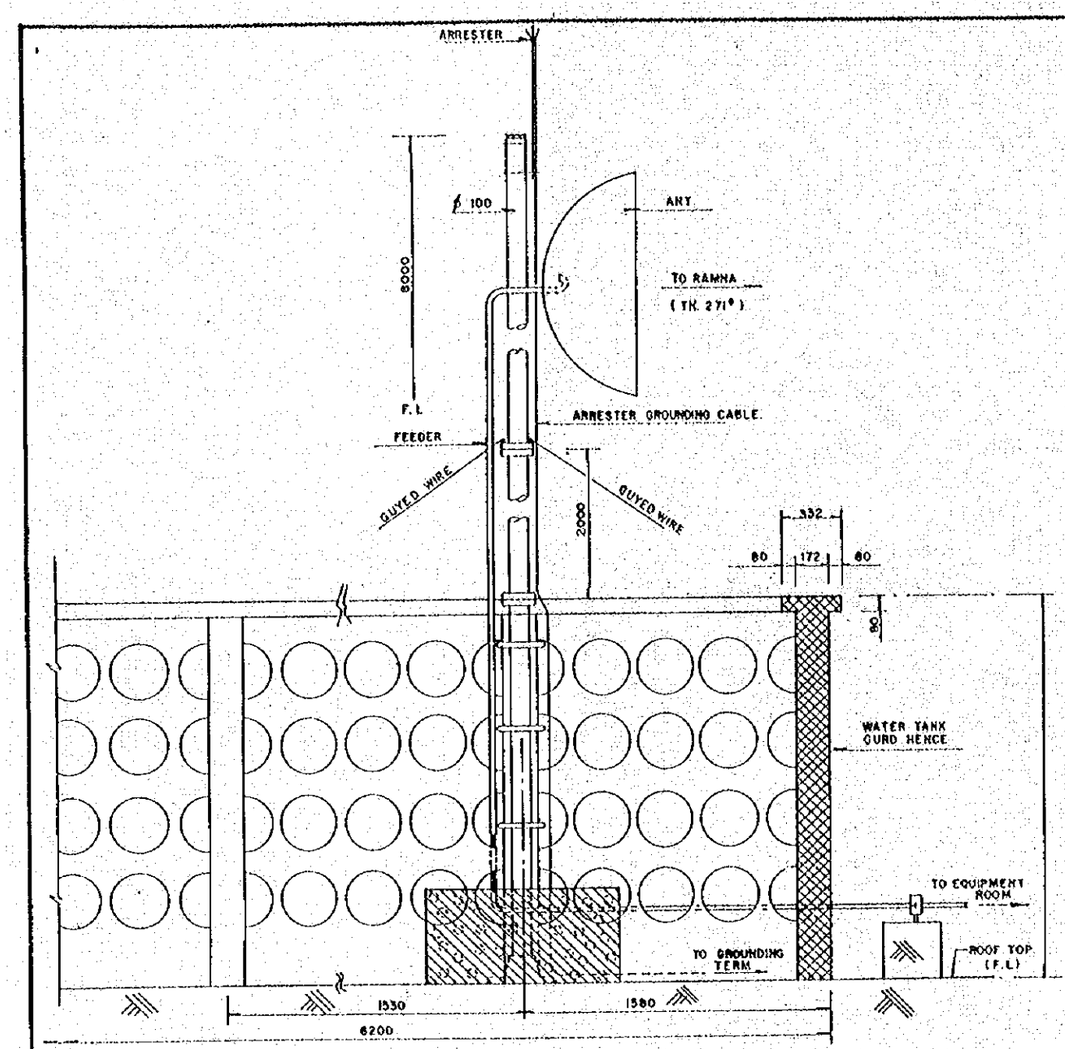


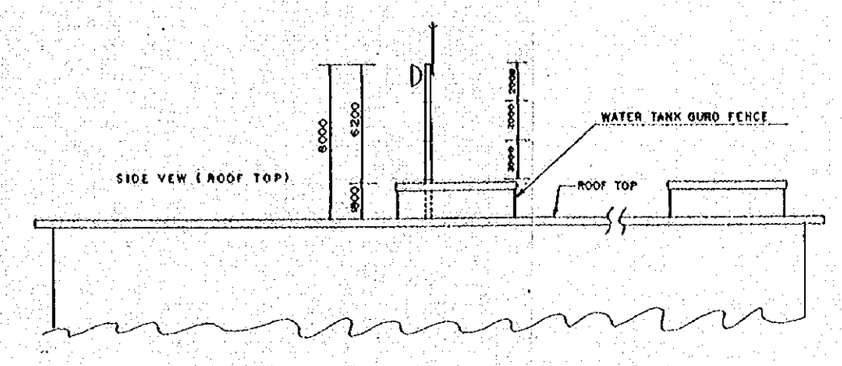
EXISTING LAY-OUT PLAN (8TH FLOOR)

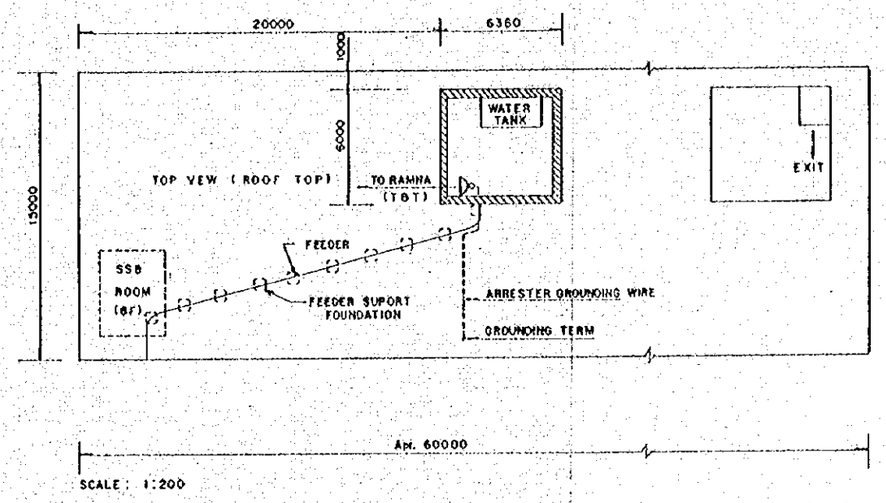
NOT TO SCALE

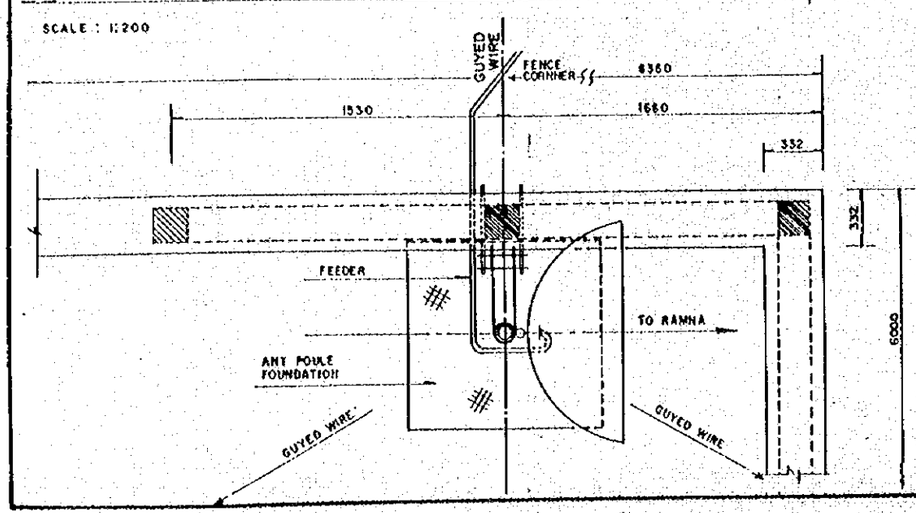
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK FF & WC (WAPDA) LAY-OUT PLAN		
DESIGN		SCALE :	NOT TO SCALE
CHECKED		DATE :	
DRAWN	MD AHSAN	DRG. NO.	01
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY









ANT INSTAL PLAN

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK FF & WC (WAPDA) INSTAL PLAN		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	02
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW EKATON ROAD, DHAKA-1000, BANGLADESH
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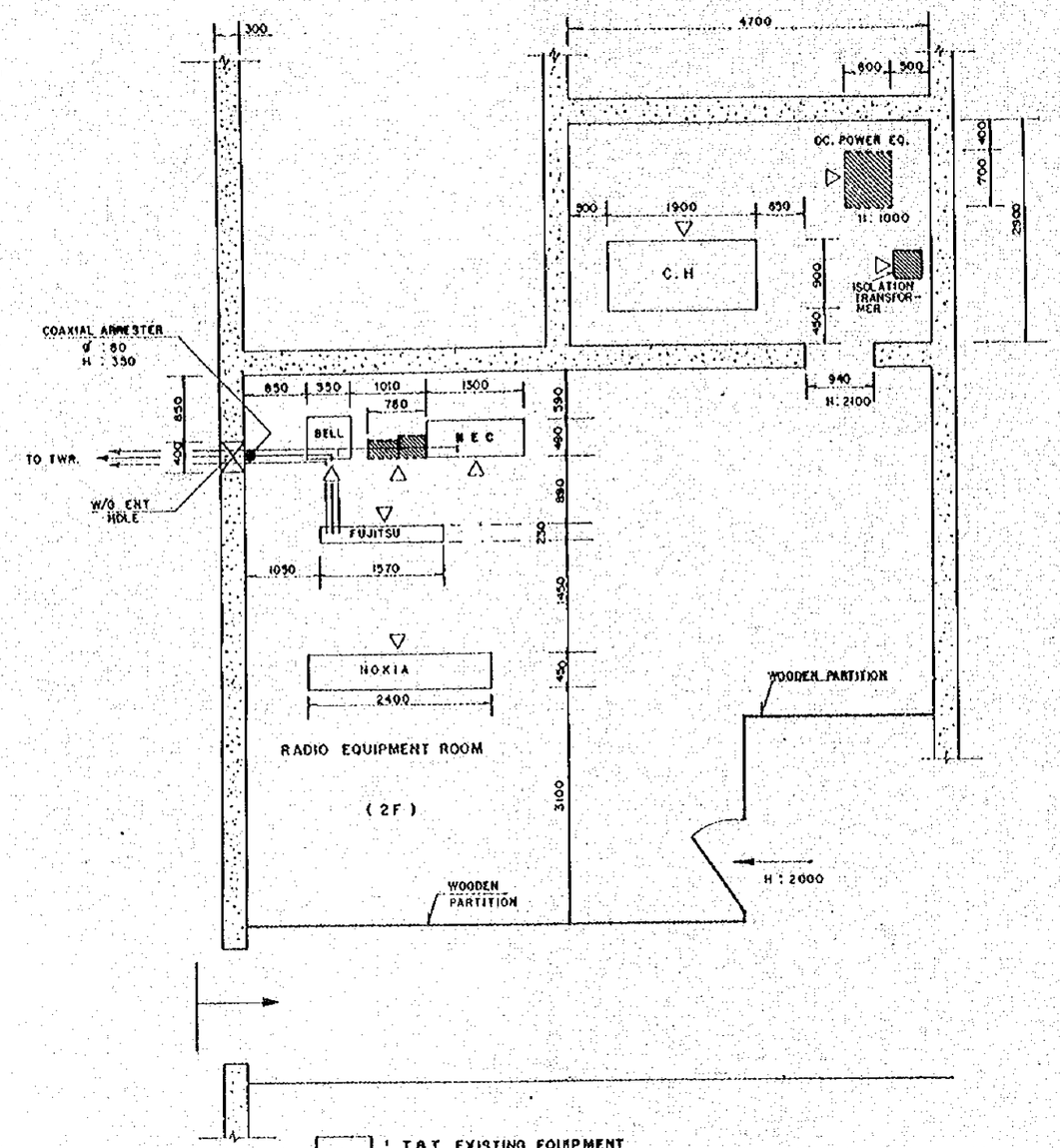
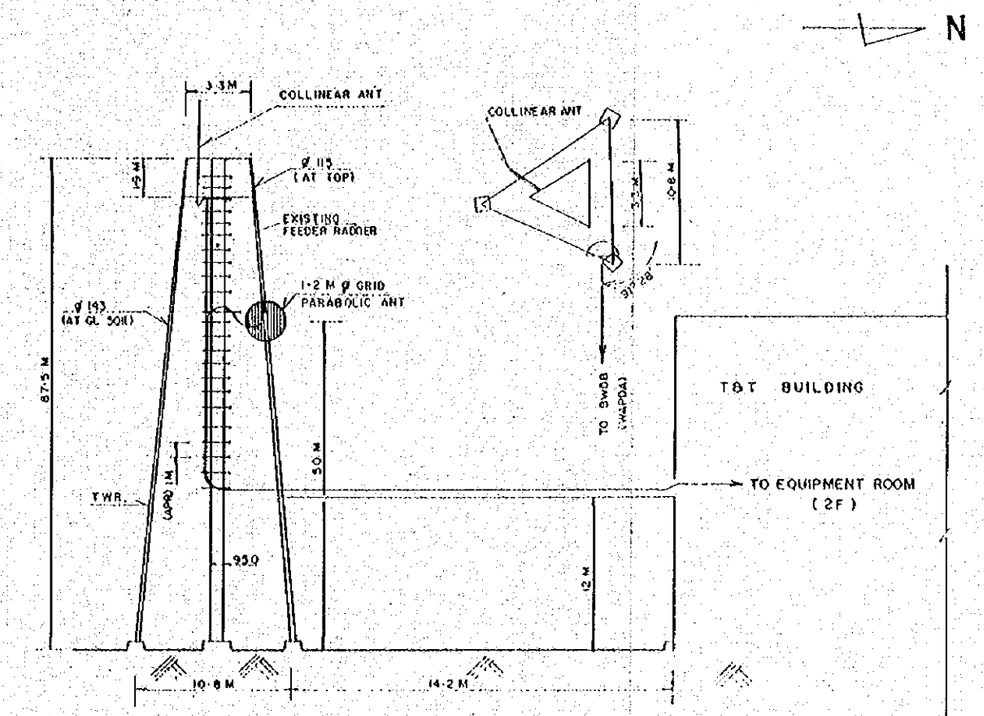
JAPAN INTERNATIONAL COOPERATION AGENCY



EQUIPMENT FLOOR LAYOUT PLAN (BWDB)

SCALE : 1:50

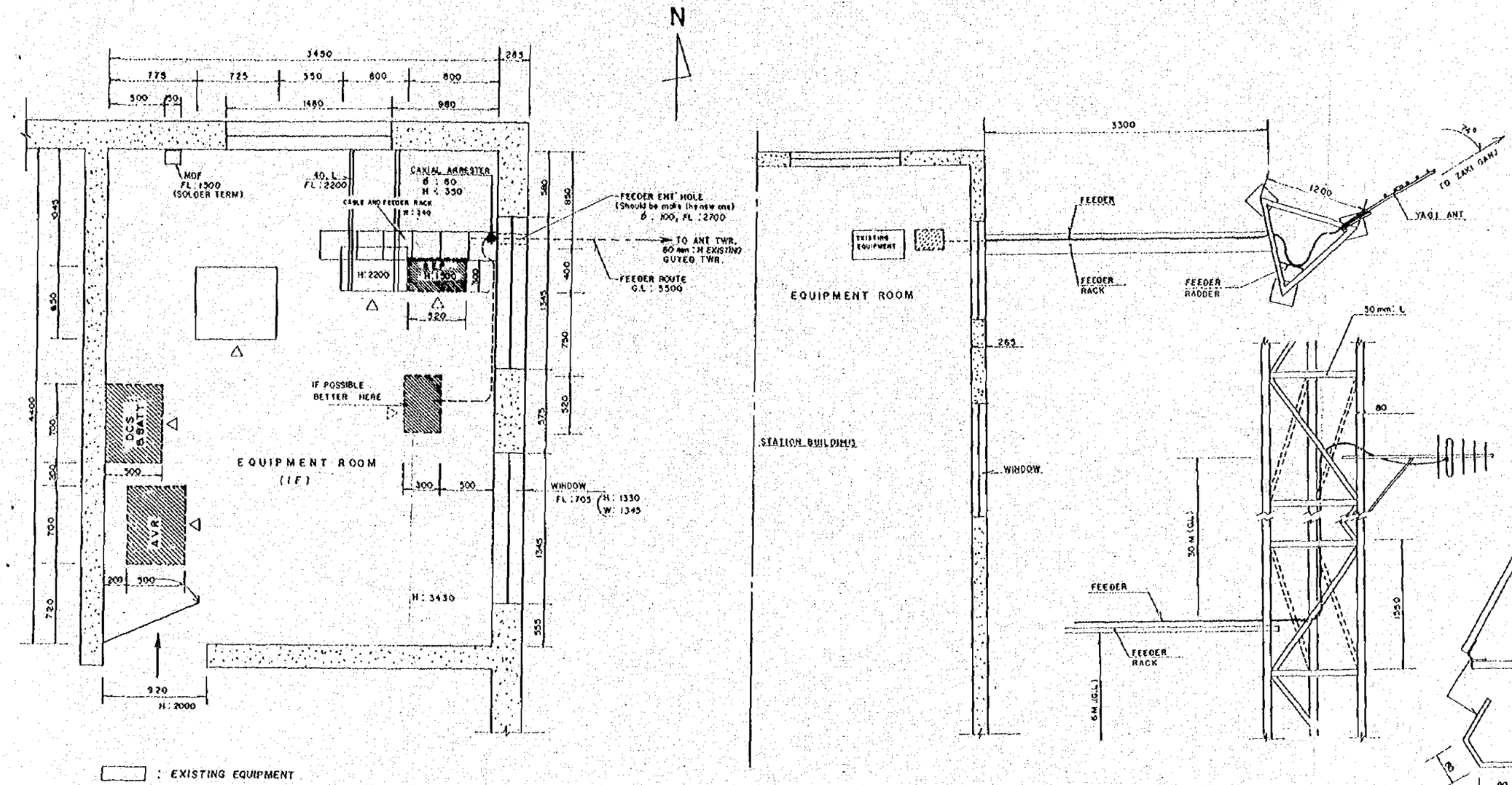


RAMNA T&T STATION

NOT TO SCALE

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE :	DETAILED DESIGN OF PILOT TELEMETRY NET WORK T&T RAMNA STATION		
DESIGN :		SCALE :	AS SHOWN
CHECKED :		DATE :	
DRAWN :	MD. AHSAN	DRG. NO.	03
APPROVED:			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



EQUIPMENT FLOOR LAYOUT PLAN

SCALE: 1:25 (BEANI BAZAR STATION)

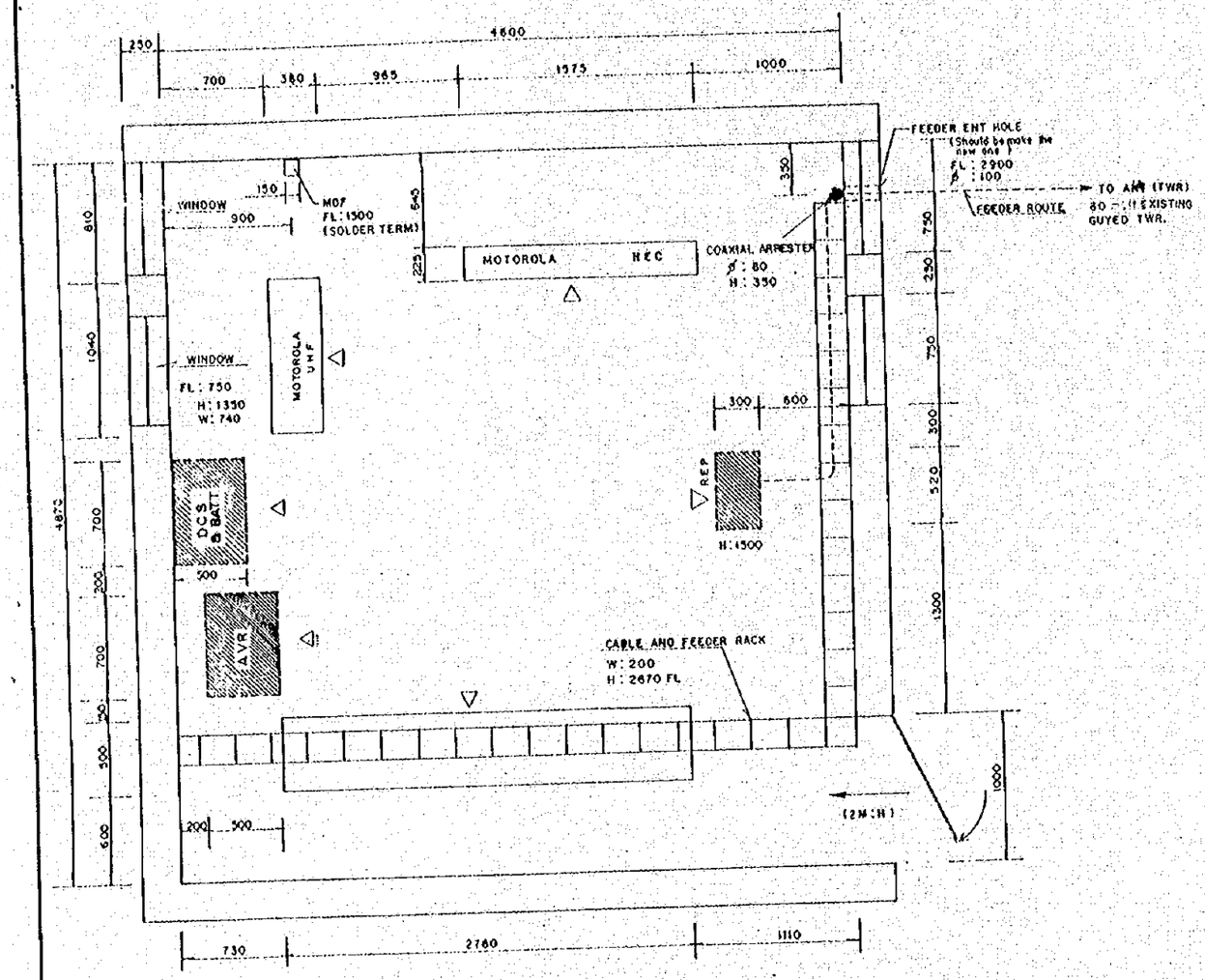
BEANI BAZAR T&T STATION

(ANT INSTAL PLAN)

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK T&T BEANI BAZAR STATION		
DESIGN :		SCALE :	AS SHOWN
CHECKED :		DATE :	
DRAWN :	MD. AHSAN	DRG. NO.	04
APPROVED :			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

KURIGRAM T & T STATION
REQUIREMENT OF BWDB 'EQ'

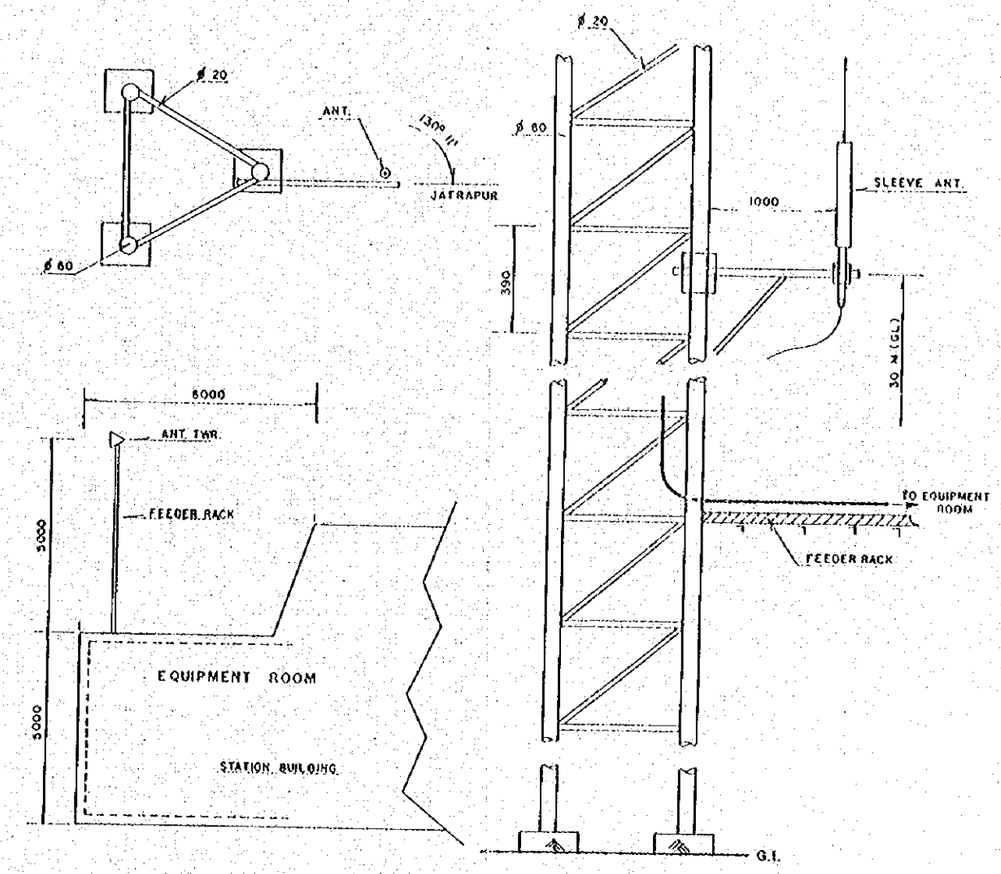


: T&T EXISTING EQUIPMENT

: BWDB EQUIPMENT INSTAL PLAN

FLOOR LAYOUT PLAN

SCALE : 1:25

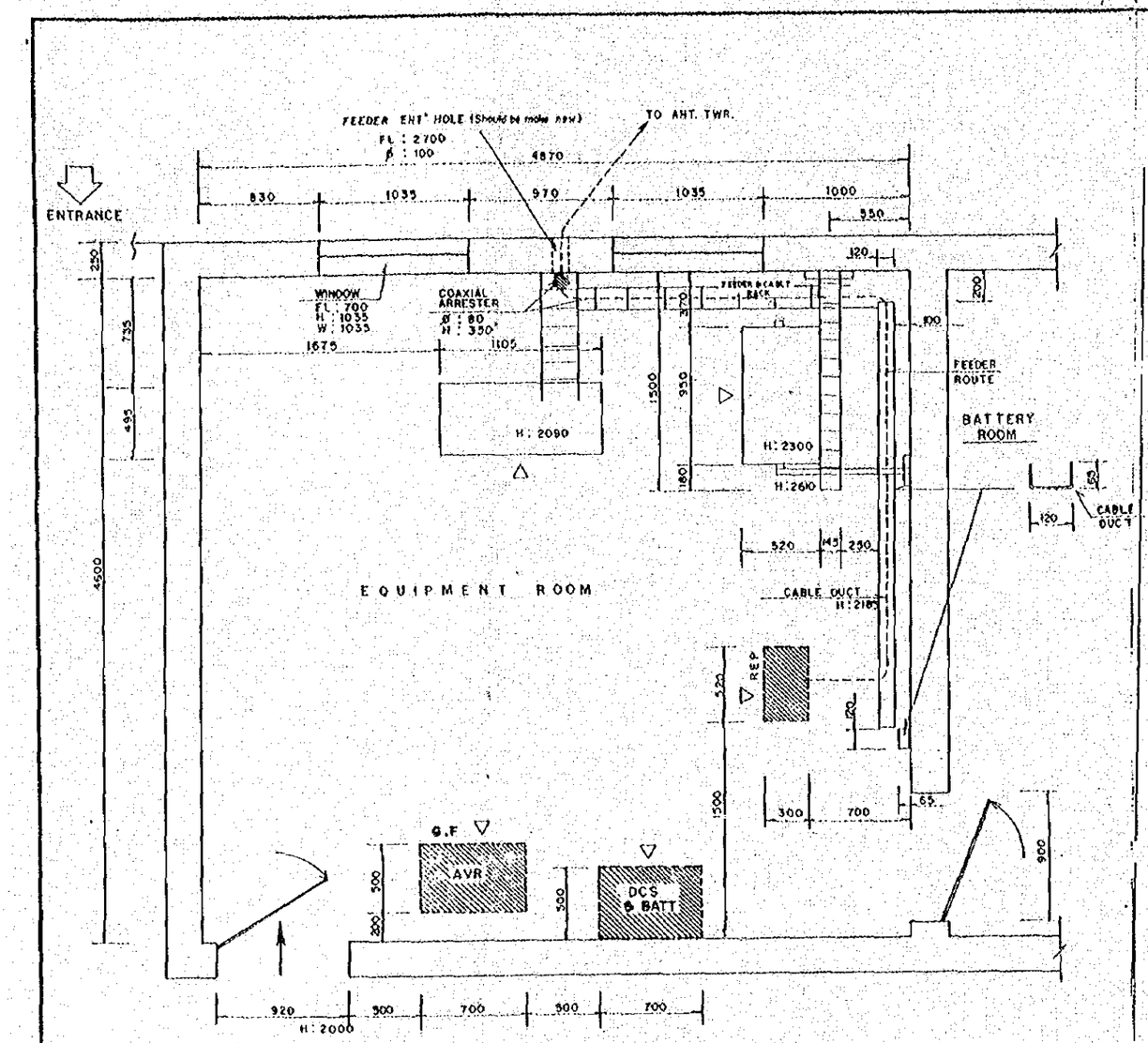


ANT. INSTAL PLAN

SCALE: 1.25

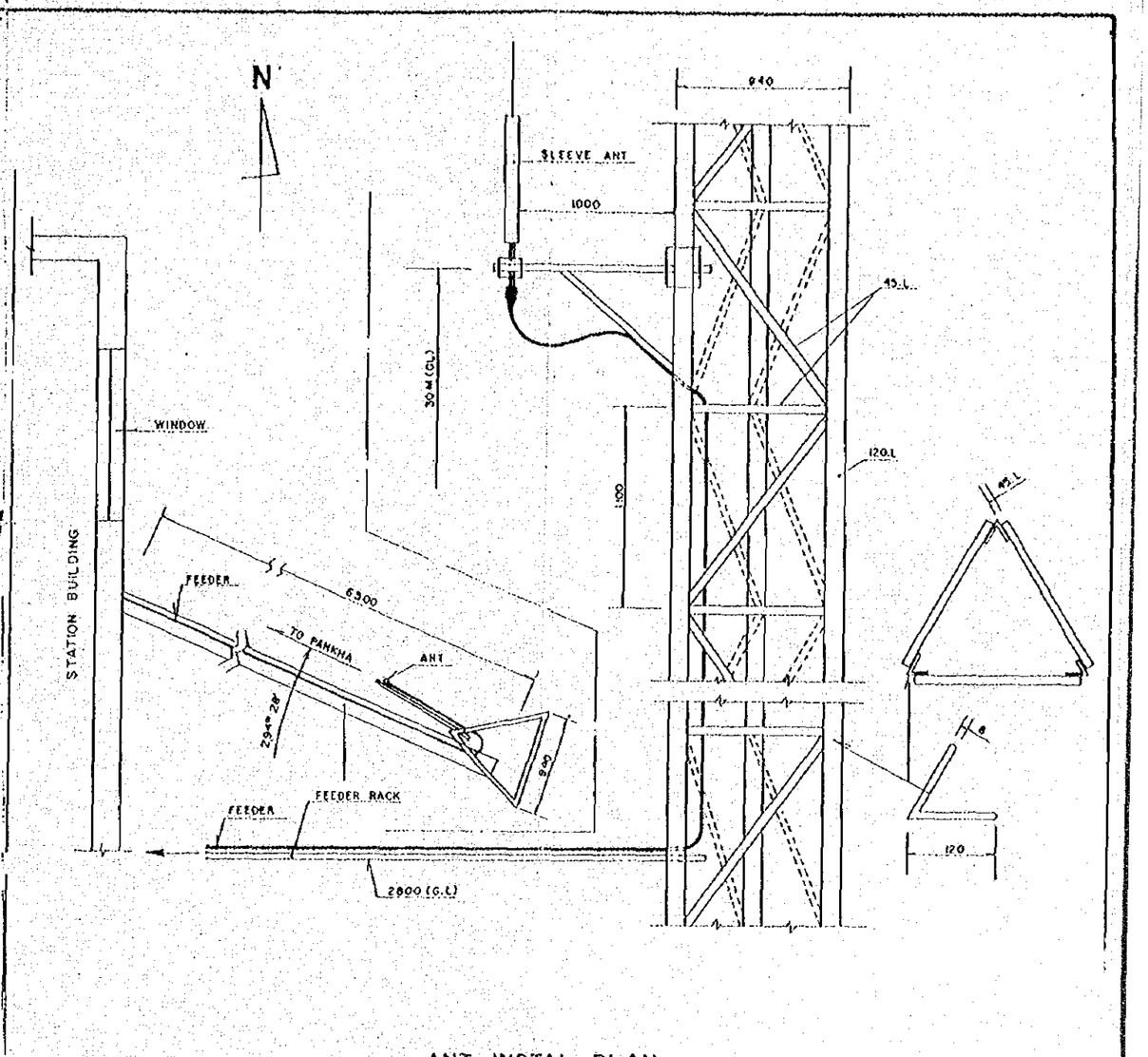
GOVERNMENT OF THE PEOPLES REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK T&T KURIGRAM STATION		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	05
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



EQUIPMENT FLOOR LAYOUT PLAN

SCALE : 1:25

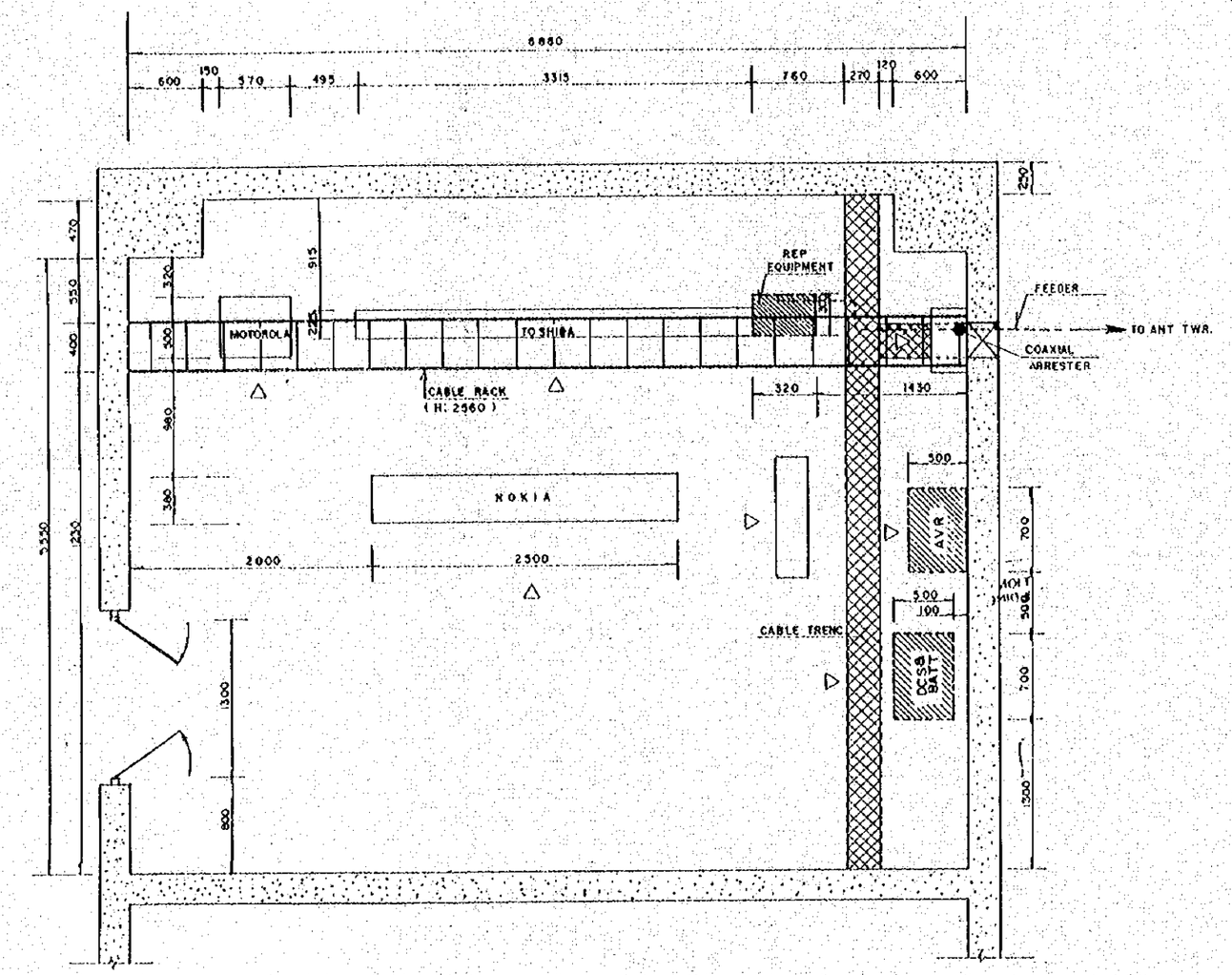


ANT. INSTAL PLAN

NOT TO SCALE

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK T & T NAWABGANJ STATION		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD AHSAN	DRG. NO.	06
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

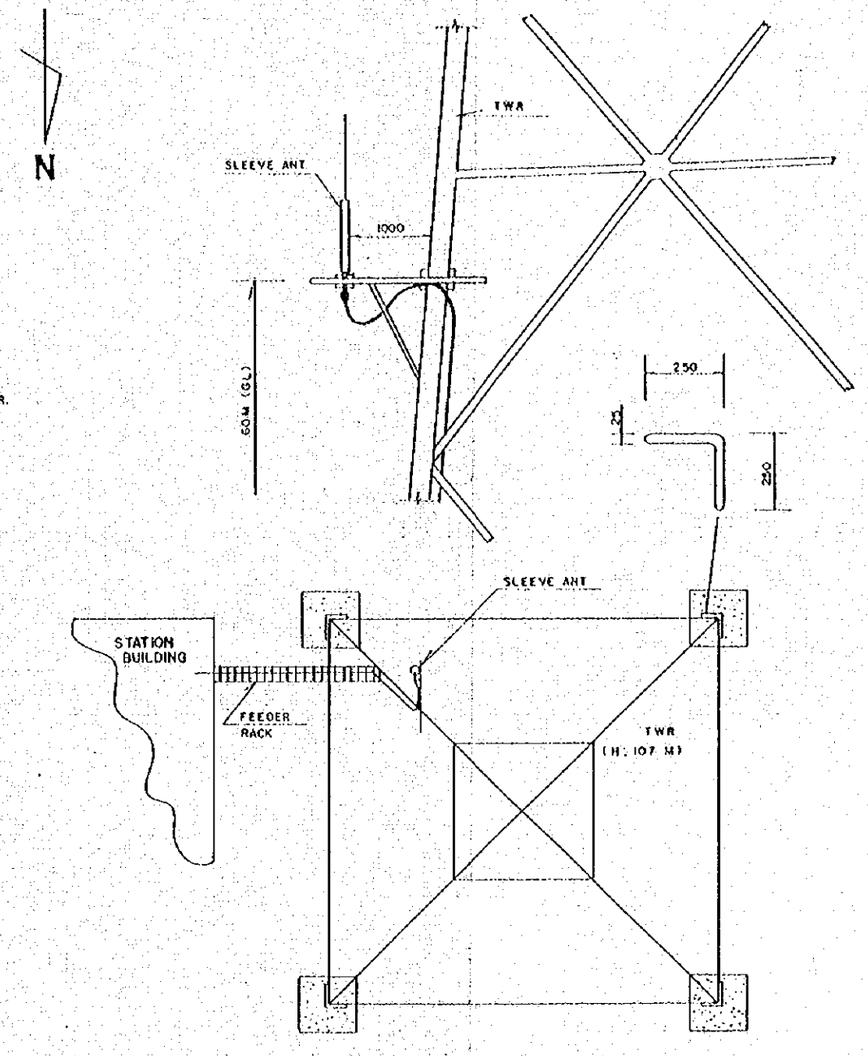


: T&T EXISTING EQUIPMENT

: PWDB EQUIPMENT

FLOOR LAY-OUT PLAN

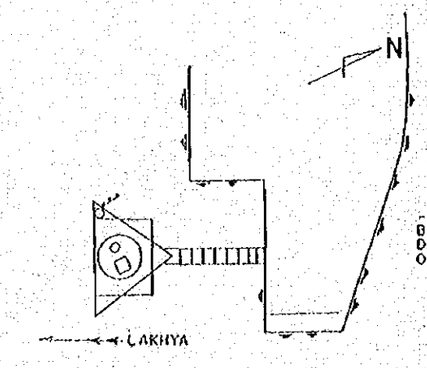
SCALE : 1:30



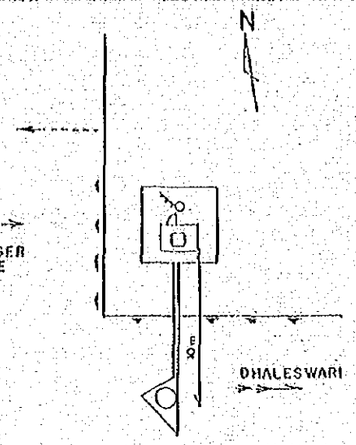
ANT. INSTAL. PLAN

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK T&T MAULBI BAZAR STATION		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	07
APPROVED			

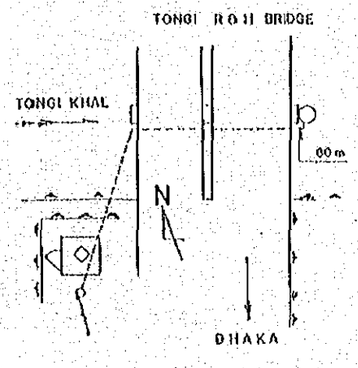
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



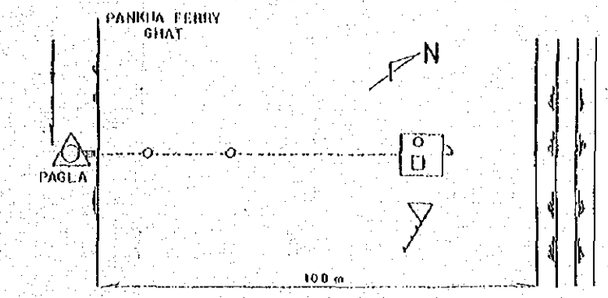
NARAYANGANJ



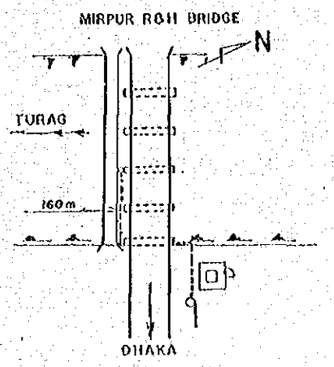
REKABI BAZR



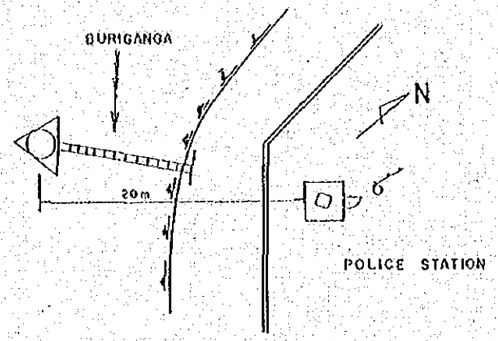
TONGI



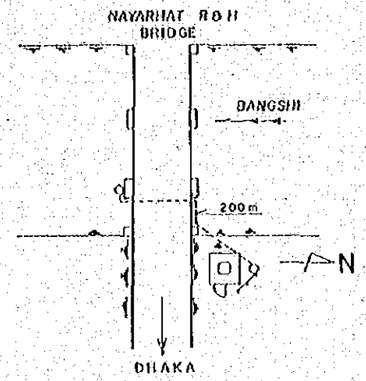
PANKHA



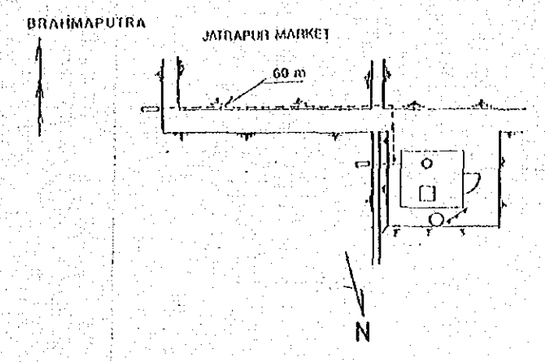
MIRPUR



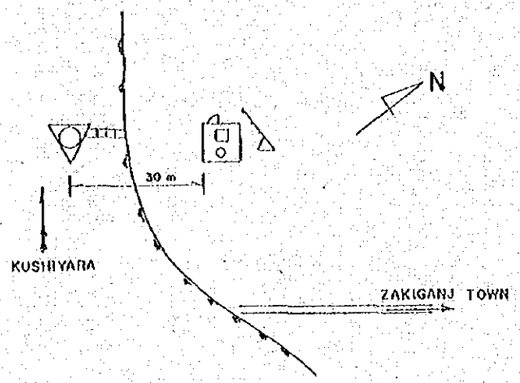
MILL BARAK



NAYARHAT



JATRAPUR



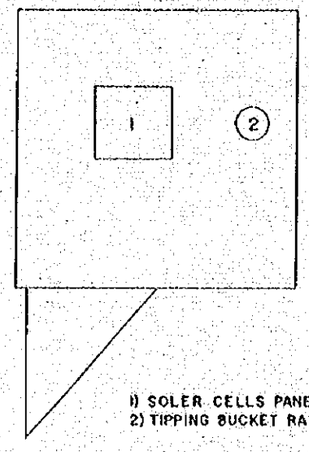
ZAKIGANJ

SITE PLAN FOR GAUGING STATION

NOT TO SCALE

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK SITE PLAN FOR GAUGING STATION		
DESIGN		SCALE	NOT TO SCALE
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	08
APPROVED			

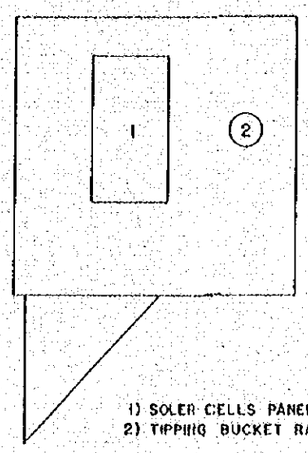
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



1) SOLER CELLS PANEL
2) TIPPING BUCKET RAINGAUGE

A) PANKHA
B) ZAKIGANJ

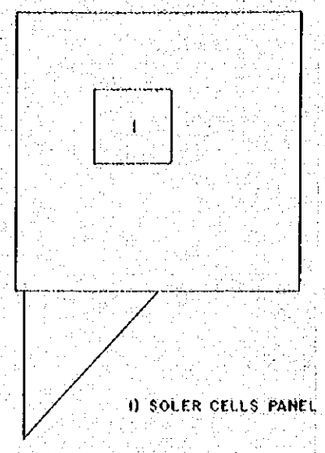
ROOF PLAN
SCALE : 1:25



1) SOLER CELLS PANEL
2) TIPPING BUCKET RAINGAUGE

A) JATRAPUR

ROOF PLAN

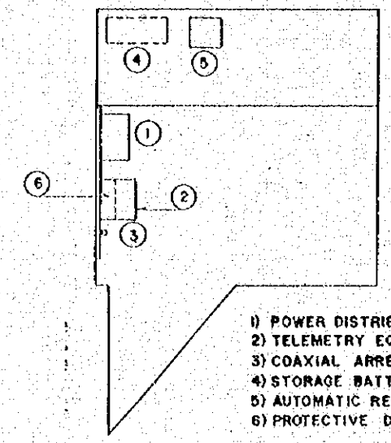


1) SOLER CELLS PANEL

A) TONGI
B) NAYARHAT
C) MILL BARAK
D) REKABI BAZAR
E) MIRPUR

ROOF PLAN

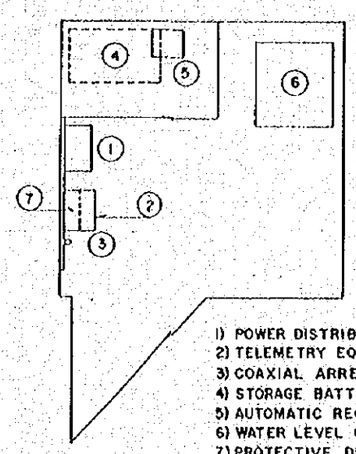
REMARK :
SOLAR PANEL FACING SOUTH



1) POWER DISTRIBUTION BOARD
2) TELEMETRY EQUIPMENT
3) COAXIAL ARRESTER
4) STORAGE BATTERY
5) AUTOMATIC RECORDER
6) PROTECTIVE DEVICE

FLOOR PLAN
SCALE : 1:25

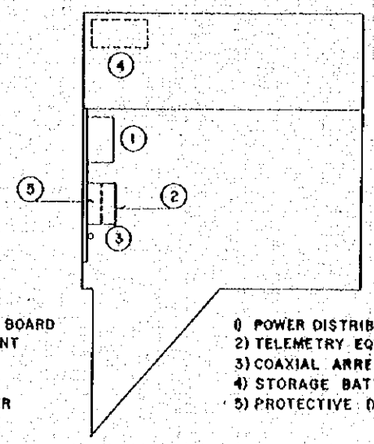
A) PANKHA
B) ZAKIGANJ



1) POWER DISTRIBUTION BOARD
2) TELEMETRY EQUIPMENT
3) COAXIAL ARRESTER
4) STORAGE BATTERY
5) AUTOMATIC RECORDER
6) WATER LEVEL GAUGE
7) PROTECTIVE DEVICE

FLOOR PLAN

A) JATRAPUR



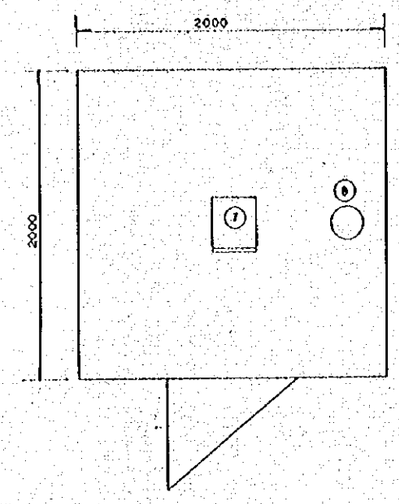
1) POWER DISTRIBUTION BOARD
2) TELEMETRY EQUIPMENT
3) COAXIAL ARRESTER
4) STORAGE BATTERY
5) PROTECTIVE DEVICE

FLOOR PLAN

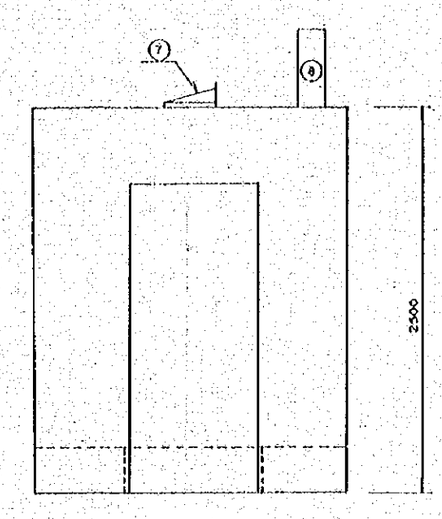
A) TONGI
B) NAYARHAT
C) MILL BARAK
D) REKABI BAZAR
E) MIRPUR

GOVERNMENT OF THE PEOPLES REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	09
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

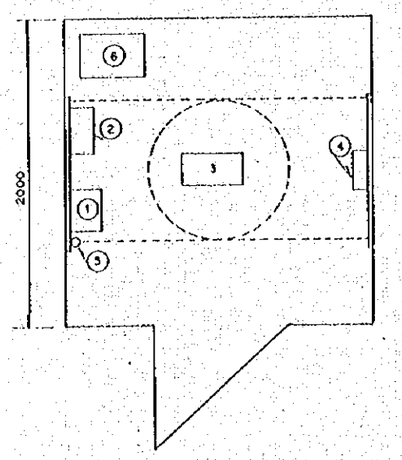


ROOF PLAN
SCALE : 1:25



FRONT ELEVATION

REMARK :
SOLAR PANEL FACING SOUTH



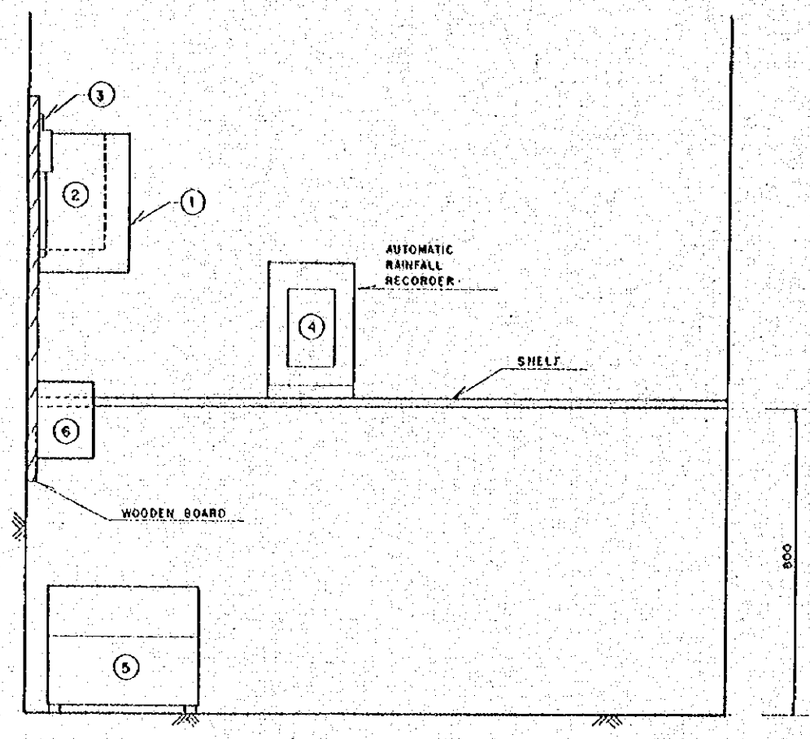
FLOOR PLAN
(NARAYNGANJ)

① TELEMETRY EQUIPMENT
② POWER DISTRIBUTION BOARD
③ WATER LEVEL GAUGE EQUIPMENT
④ PROTECTIVE DEVICE
⑤ COAXIAL ARRESTER
⑥ STORAGE BATTERY
⑦ SOLAR CELL PANEL
⑧ TIPPING BUCKET RAINFALL GUAGE

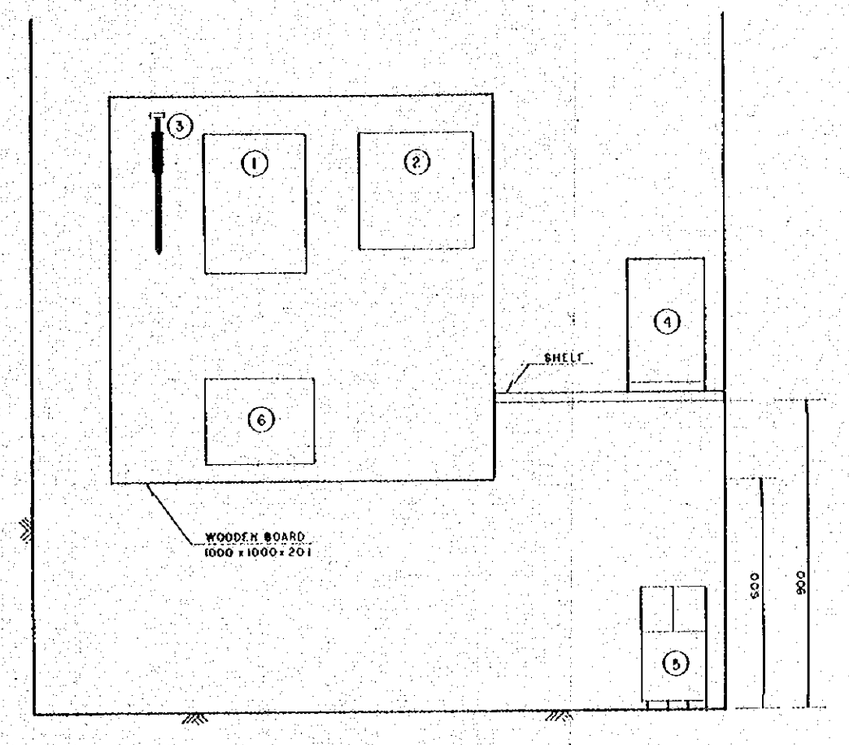
NARAYANGANJ GAUGING STATION

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	10
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



FRONT VIEW
SCALE : 1/10



LEFT SIDE VIEW
SCALE : 1/10

NOTE :

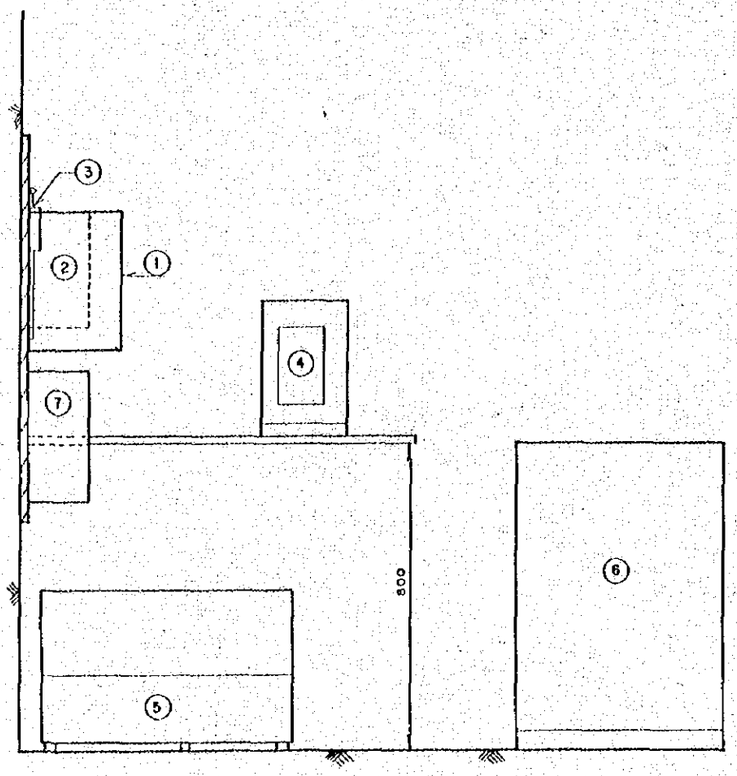
1) TELEMTRY EQUIPMENT
2) POWER DISTRIBUTION BOARD
3) COAXIAL ARRESTER
4) AUTOMATIC RAINFALL RECORDER
5) STORAGE BATTERY
6) PROTECTIVE DEVICE

REMARK :

WATER LEVEL GAUGING STATION WITHOUT AUTOMATIC RAINFALL RECORDER

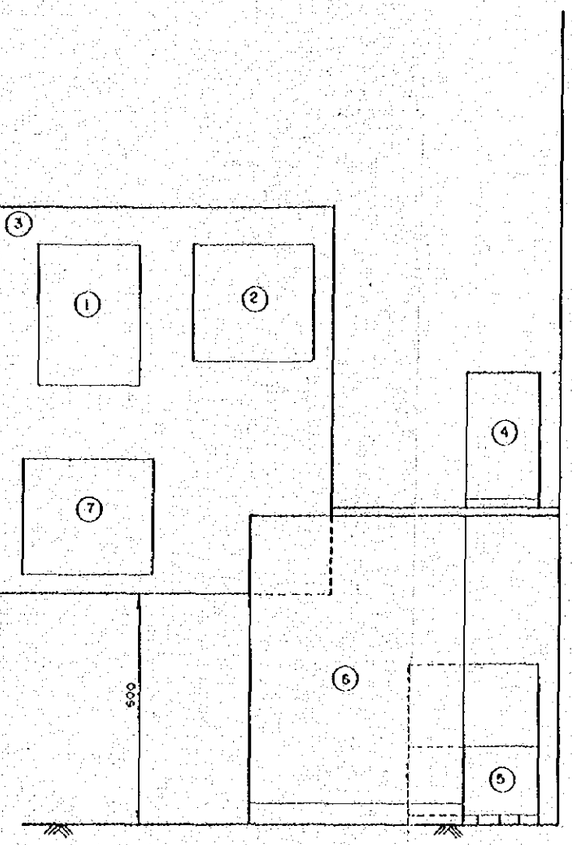
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	11
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
25, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



FRONT VIEW

SCALE : 1:10



LEFT SIDE VIEW

NOTE

1) TELEMTRY EQIPMENT
2) POWER DISTRIBUTION BOARD
3) COAXIAL ARRESTER
4) AUTOMATIC RAINFALL RECODER
5) STORAGE BATTERY
6) WATER LEVEL EQUIPMENT
7) JUNCTION BOX (PROTECTIVE DEVICE)

JATRAPUR GAUGIN STATION

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NET WORK		
DESIGN		SCALE	AS SHOWN
CHECKED		DATE	
DRAWN	MD. AHSAN	DRG. NO.	12
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

APPENDIX G: SUMMARY OF BILL OF QUATION FOR BANGLADESH FFWS PILOT PLAN

SUMMARY OF BILL OF QUOTATION FOR BANGLADESH FFWS PILOT PLAN

ITEM NO.	WORK ITEM	Q'TY	FOREIGN CURRENCY (YEN) UNIT COST	FOREIGN CURRENCY (YEN) AMOUNT	LOCAL CURRENCY (TK) UNIT COST	LOCAL CURRENCY (TK) AMOUNT
I	DIRECT COST					
1	SUPPLY OF EQUIPMENT AND INSTALLATION WORKS AND A/T	1	349,063,000	349,063,000		
2	SPARE PARTS AND UNITS	1	99,054,000	99,054,000		
3	MEASURING INSTRUMENTS	1	20,285,000	20,285,000		
	TOTAL OF DIRECT COST			468,402,000		
II	INDIRECT COST					
1	SITE SURVEY	1	10,390,000	10,390,000		
2	DOCUMENTATION FEE	1	16,159,000	16,159,000		
3	OFFICE EXPENSES	1	36,430,000	36,430,000		
4	FACTORY ACCEPTANCE TEST	1	1,148,000	1,148,000		
5	FACTORY TRAINING	1	11,800,000	11,800,000		
6	ON-THE-JOB TRAINING		(NOT APPLICABLE)			
	TOTAL OF INDIRECT COST			75,927,000		
III	ANCILLARY WORK	1	28,947,350	28,947,350		
	GRAND TOTAL			573,276,350		

SUMMARY OF BILL OF QUOTATION FOR BANGLADESH FFWS PILOT PLAN

ITEM NO.	WORK ITEM	Q'TY	FOREIGN CURRENCY (YEN) UNIT COST	FOREIGN CURRENCY (YEN) AMOUNT	LOCAL CURRENCY (TK) UNIT COST	LOCAL CURRENCY (TK) AMOUNT
I	DIRECT COST					
1	SUPPLY OF EQUIPMENT AND INSTALLATION WORKS AND A/T					
1-1	FFWC of DHAKA Station	1	235,207,000	235,207,000		
1-2	T & T Terminal Station at DHAKA (Ramna)	1	21,653,000	21,653,000		
1-3	T & T Terminal Station at Maulvi Bazar	1	7,040,000	7,040,000		
1-4	T & T Terminal Station at Nawabganj	1	6,890,000	6,890,000		
1-5	T & T Terminal Station at Beani Bazar	1	6,967,000	6,967,000		
1-6	T & T Terminal Station at Kurigram	1	6,890,000	6,890,000		
1-7	Rainfall and Waterlevel Gauging Station at Pankha, Narayanganj and Zakiganj	3	6,529,000	19,587,000		
1-8	Rainfall and Waterlevel Gauging Station at Jatrapur	1	16,153,000	16,153,000		
1-9	Waterlevel Guaging Station at Tongi, Nayarhat, Mirpur, Millbarak and Rekabi Bazar	5	5,008,000	25,040,000		
1-10	Rent-A-Car for Installation Work and A/T	1	3,636,000	3,636,000		
	Total of 1			349,063,000		
2	Spare Parts and Units	1	99,054,000	99,054,000		
3	Measuring Instruments	1	20,285,000	20,285,000		
	Total of I			468,402,000		

SUMMARY OF BILL OF QUOTATION FOR BANGLADESH FFWS PILOT PLAN

ITEM NO.	WORK ITEM	Q'TY	FOREIGN CURRENCY(YEN) UNIT COST	FOREIGN CURRENCY(YEN) AMOUNT	LOCAL CURRENCY(TK) UNIT COST	LOCAL CURRENCY(TK) AMOUNT
II	INDIRECT COST					
1	Site Survey	1	10,390,000	10,390,000		
2	Documentation Fee	1	16,159,000	16,159,000		
3	Office Expenses	1	36,430,000	36,430,000		
4	Factory Acceptance Test (Two Person x Five Days)	1	1,148,000	1,148,000		
5	Factory Training (Three Months)	1	11,800,000	11,800,000		
6	On-the-Job Training		(NOT APPLICABLE)			
	Total of II			75,927,000		
III	ANCILLARY WORK	1	28,947,350	28,947,350		
	GRAND TOTAL			573,276,350		

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
I	DIRECT COST						
1	SUPPLY OF EQUIPMENT AND INSTALLATION WORKS AND A/T						
1-1	FFWC of DHAKA Station						
1-1-1	Supply of Equipment						
	-1 Telemetry Equipment						
	(1) Telemetry Supervisory/Control Equipment	set	1				
	(2) Teleprinter	set	1				
	(3) Operation Console	set	1				
	Sub-total						
	-2 Computer Equipment						
	(1) Communication Control Unit (CCU)	set	1				
	(2) Hard Disk Unit (for CCU)	set	1				
	(3) Console Visual Display (for CCU)	set	1				
	(4) Console Printer (for CCU)	set	1				
	(5) File Surver Equipment for Statistical Processing and Analysis	set	1				
	(6) Engineering Work Station (EWS), 19" color	set	1				
	(7) File Surver Equipment for Existing Facilities Connecting	set	1				
	(8) LAN Cable (300m)	set	1				
	(9) Software						
	1) For File Surver	set	1				
	2) For EWS	set	1				
	3) Support Software (OS,etc.)	set	1				
	Sub-total						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
	-3 Multiplex Communication Equipment						
	(1) Multiplex Radio Equipment (2Ghz,PCM-PSK,0.2W)	set	1				
	(2) Antenna (12mø G.P.)	set	1				
	(3) Coaxial Cable w/ Connector	set	1				
	(4) Remote Supervisory Equipment (Master)	set	1				
	(5) PCM Multiplex Terminal Equipment	set	1				
	Sub-total						
	-4 Power Supply Equipment						
	(1) CVCF (10kVA)	set	1				
	(2) Isolation Transformer (20kVA)	set	1				
	Sub-total						
	-5 Installation Materials	L.S.					
	Sub-total of 1-1-1						
1-1-2	Installation Works and A/T	L.S.					
	Total of 1-1						
1-2	T & T Terminal Station at DHAKA (Ramna)						
1-2-1	Supply of Equipment						
	-1 Telemetry Equipment						
	(1) Repeater Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	2				
	(3) Antenna (3-stace Collinear)	set	1				

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
	(4) Antenna Filter	set	1				
	(5) Coaxial Cable w/Connector (100 m)	set	1				
	(6) Coaxial Arrester	set	1				
	Sub-total						
	-2 Multiplex Communication Equipment						
	(1) Multiplex Radio Equipment (2Ghz,PCM-PSK,0.2W)	set	1				
	(2) Antenna (12mø G.P.)	set	1				
	(3) Coaxial Cable w/ Connector	set	1				
	(4) Remote Supervisory Equipment (Remote)	set	1				
	(5) PCM Multiplex Terminal Equipment	set	1				
	Sub-total						
	-3 Power Supply Equipment						
	(1) Automatic Voltage Regulator (1kVA)	set	1				
	(2) DC Power Supply Equipment	set	1				
	Sub-total						
	-4 Installation Materials	L.S.					
	Sub-total of 1-2-1						
1-2-2	Installation Works and A/T	L.S.					
	Total of 1-2						
1-3	T & T Terminal Station at Maulvi Bazar						
1-3-1	Supply of Equipment						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
	(1) Repeater Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	2				
	(3) Antenna (Sleeve)	set	1				
	(4) Antenna Filter	set	1				
	(5) Coaxial Cable w/Connector (100 m)	set	1				
	(6) Coaxial Arrester	set	1				
	(7) Automatic Voltage Regulator	set	1				
	(8) DC Power Supply Equipment	set	1				
	(9) Installation Materials	L.S.					
	Sub-total of 1-3-1						
1-3-2	Installation Works and A/T	L.S.					
	Total of 1-3						
1-4	T & T Terminal Station at Nawabganj						
1-4-1	Supply of Equipment						
	(1) Repeater Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	2				
	(3) Antenna (Sleeve)	set	1				
	(4) Antenna Filter	set	1				
	(5) Coaxial Cable w/Connector (50 m)	set	1				
	(6) Coaxial Arrester	set	1				
	(7) Automatic Voltage Regulator	set	1				
	(8) DC Power Supply Equipment	set	1				
	(9) Installation Materials	L.S.					
	Sub-total of 1-4-1						
1-4-2	Installation Works and A/T	L.S.					
	Total of 1-4						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN) UNIT COST	FOREIGN CURRENCY (YEN) AMOUNT	LOCAL CURRENCY (TK) UNIT COST	LOCAL CURRENCY (TK) AMOUNT
1-5	T & T Terminal Station at Beani Bazar						
1-5-1	Supply of Equipment						
	(1) Repeater Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	2				
	(3) Antenna (5-element,Yagi)	set	1				
	(4) Antenna Filter	set	1				
	(5) Coaxial Cable w/Connector (50 m)	set	1				
	(6) Coaxial Arrester	set	1				
	(7) Automatic Voltage Regulator	set	1				
	(8) DC Power Supply Equipment	set	1				
	(9) Installation Materials	L.S.					
	Sub-total of 1-5-1						
1-5-2	Installation Works and A/T	L.S.					
	Total of 1-5						
1-6	T & T Terminal Station at Kurigram						
1-6-1	Supply of Equipment						
	(1) Repeater Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	2				
	(3) Antenna (Sleeve)	set	1				
	(4) Antenna Filter	set	1				
	(5) Coaxial Cable w/Connector (50 m)	set	1				
	(6) Coaxial Arrester	set	1				
	(7) Automatic Voltage Regulator	set	1				
	(8) DC Power Supply Equipment	set	1				
	(9) Installation Materials	L.S.					

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY(YEN) UNIT COST	FOREIGN CURRENCY(YEN) AMOUNT	LOCAL CURRENCY(TK) UNIT COST	LOCAL CURRENCY(TK) AMOUNT
	Sub-total of 1-6-1						
1-6-2	Installation Works and A/T	L.S.					
	Total of 1-6						
1-7	Rainfall and Waterlevel Gauging Station at Pankha, Narayanganj and Zakiganj						
1-7-1	Supply of Equipment						
	-1 Telemetry Equipment						
	(1) Telemetry Equipment (Multiple Gauge Type)	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	1				
	(3) Antenna (5-element,Yagi)	set	1				
	(4) Coaxial Cable (40 m w/connector)	set	1				
	(5) Coaxial Arrester	set	1				
	(6) Raingauge Equipment	set	1				
	(7) Automatic Recorder	set	1				
	(8) Waterlevel Gauge Equipment (Float Type)	set	1				
	Sub-total						
	-2 Power Supply Equipment						
	(1) Solar Cells w/Distributer (12V,9.2W)	set	1				
	(2) Alkaline Battery (12V,40AH)	set	1				
	Sub-total						
	-3 Installation Materials	L.S.					
	Sub-total of 1-7-1						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN) UNIT COST	FOREIGN CURRENCY (YEN) AMOUNT	LOCAL CURRENCY (TK) UNIT COST	LOCAL CURRENCY (TK) AMOUNT
1-7-2	Installation Works and A/T	L.S.					
	Total of 1-7						
	Total of 1-7 x 3 stations						
1-8	Rainfall and Waterlevel Gauging Station at Jatrapur						
1-8-1	Supply of Equipment						
	-1 Telemetry Equipment						
	(1) Telemetry Equipment (Multiple Gauge Type)	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	1				
	(3) Antenna (3-element,Yagi)	set	1				
	(4) Coaxial Cable w/Connector (60 m)	set	1				
	(5) Coaxial Arrester	set	1				
	(6) Raingauge Equipment	set	1				
	(7) Automatic Recorder	set	1				
	(8) Waterlevel Gauge Equipment (Prresure Type)	set	1				
	Sub-total						
	-2 Power Supply Equipment						
	(1) Solar Cells w/Distributer (12V,49W)	set	1				
	(2) Alkaline Battery (12V,100AH)	set	1				
	Sub-total						
	-3 Installation Materials	L.S.					
	Sub-total of 1-8-1						
1-8-2	Installation Works and A/T	L.S.					

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN) UNIT COST	FOREIGN CURRENCY (YEN) AMOUNT	LOCAL CURRENCY (TK) UNIT COST	LOCAL CURRENCY (TK) AMOUNT
	Total of 1-8						
1-9	Waterlevel Guaging Station at Tongi, Nayarhat, Mirpur, Millbarak and Rekabi Bazar						
1-9-1	Supply of Equipment						
	-1 Telemetry Equipment						
	(1) Telemetry Equipment	set	1				
	(2) Radio Equipment (150MHz,10 w)	set	1				
	(3) Antenna (3-element,Yagi)	set	1				
	(4) Coaxial Cable w/Connector (40 m)	set	1				
	(5) Coaxial Arrester	set	1				
	(6) Waterlevel Gauge Equipment (Float Type)	set	1				
	Sub-total						
	-2 Power Supply Equipment						
	(1) Solar Cells w/Distributer (12V,9.2W)	set	1				
	(2) Alkaline Battery (12V,40AH)	set	1				
	Sub-total						
	-3 Installation Materials	L.S.					
	Sub-total of 1-9-1						
1-9-2	Installation Works and A/T	L.S.					
	Total of 1-9						
	Total of 1-9 x 5 stations						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
1-10	Rent-A-Car for Installation Work and A/T	L.S.					
	Total of 1						
2	Spare Parts and Units						
2-1	Supply of Equipment						
	-1 Spare Parts and Units						
	(1) For Telemetry Equipment	L.S.					
	(2) For Computer Equipment	L.S.					
	(3) For Multiplex Communication Equipment	L.S.					
	Sub-total						
	-2 Consumables						
	(1) For Telemetry Equipment	L.S.					
	(2) For Computer Equipment	L.S.					
	Sub-total						
	Total of 2						
3	Measuring Instruments						
3-1	For Telemetry Equipment						
	(1) Termination Power Meter	set	1				
	(2) Through Type Power Meter	set	1				
	(3) Standard Signal Generator	set	1				
	(4) Frequency Counter	set	1				
	(5) Signal Generator	set	1				

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY(YEN)		LOCAL CURRENCY(TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
	(6) Level Meter	set	1				
	(7) Code Chacker	set	1				
	(8) Calling Tester	set	1				
	(9) Osciloscope	set	1				
	(10) Tester	set	1				
	(11) Digital Multimeter	set	1				
	(12) Output Tester	set	1				
	(13) Portable Type Engine Generator (650VA)	set	1				
	Sub-total of 3-1						
3-2	For Computer Equipment						
	(1) On-line Monitor	set	1				
	(2) LAN Protcol Analyser	set	1				
	(3) Debugging Tool (PC-286)	set	1				
	Sub-total of 3-2						
3-3	For Multiplex Communication Equipment						
	(1) BER Measuring Equipment	set	1				
	(2) Repeater Checker	set	1				
	(3) Fixed Attenater	set	1				
	(4) Syncroscope	set	1				
	(5) Digital Multimeter	set	1				
	(6) Tool Set	set	1				
	(7) PCM Channel Analyzer	set	1				
	(8) Frequency Shifter	set	1				
	Sub-total of 3-3						
	Total of 3						

DETAILED BREAKDOWN OF QUOTATION FOR FORECASTING AND WARNING PILOT SYSTEM

ITEM NO.	WORK ITEM	UNIT	Q'TY	FOREIGN CURRENCY (YEN)		LOCAL CURRENCY (TK)	
				UNIT COST	AMOUNT	UNIT COST	AMOUNT
	TOTAL OF I						
II	INDIRECT COST						
1	Site Survey	L.S.					
2	Documentation Fee	L.S.					
3	Office Expenses	L.S.					
4	Factory Acceptance Test (Two Person x Five Days)	L.S.					
5	Factory Training (Three Months)	L.S.					
6	On-the-Job Training	(NOT APPLICABLE)					
	Total of II						
III	ANCILLARY WORK	L.S.					
	GRAND TOTAL						

APPENDIX H. SCHEDULE OF ITEMS OF WORK

AND

BILL OF QUANTITIES FOR ANCILLARY WORK

The BOQ shall be read in conjuncton with the drawing.

A. CIVIL WORKS

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
1	Mobilisation of man, materials and equipment, preparation of site, clearing of all existing debris, jungles and obstruction, cutting of specified trees if reqd; supply of all materials, furnitures & construction of camp office for Engineers including sanitary facilities & arrangement of water supply etc. as per direction of Engineer. (Acquisition/purchage of land/survey work etc. are not included in this bill.)	No	1.00		1.00							2.00	50,000.00	100,000.00
		No		1.00								1.00	30,000.00	30,000.00
		No				1.00	1.00	1.00				3.00	20,000.00	60,000.00
		No							1.00	1.00	1.00	3.00	20,000.00	60,000.00
2	Earthwork in excavation of all kinds of soil in foundation upto 6 ft. depth including necessary soring, bailing out water, levelling etc. complete as per direction of the Engineer.	Cu. m	4.00	4.00	4.00	4.00	4.00	4.00	4.00		4.00	32.00	39.12	1,251.77
3	Earth filling in foundation trenches in 6" layers with earth obtained from spoils of item no-2 including breaking clods, watering, compacting and consolidating each layer upto finish level and dressing complete as per direction of Engineer.(Measurement will be taken on compacted volume)	Cu. m	2.60	2.60	2.60	2.60	2.60	2.60	2.60		2.60	20.80	39.66	824.84

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
4	Earth filling in surrounding areas in 6" layer with carted (supplied by contructor) soil, breaking clods, watering, compacting and consolidating each layer upto finished level and keeping side slope (1:2), dressing etc. complete as per direction of Engineer.(measurement will be taken on compacted volume)	Cu.m		334.00	159.00	20.00	58.00				188.00	759.00	118.35	89,827.21
5	Single layer first class brick flat soling under column footing & stair footing , preparation of bed by ramming, watering, levelling, filling the interstices with local sand as per specification and direction of the Engineer.	Sq. m	5.00	5.00	5.00	5.00	5.00	5.00	5.00	-	5.00	40.00	126.50	5,060.02
6	Lean concrete with cement, sand and 3/4" (20mm) down graded picked jhama chips in proportion (1:3:6) under col. footing & stair footing including breaking chips, mixing, laying, compacting, levelling and curing for at least 7 days etc. complete as per drawing, specification and direction of the Engineer.	Cu.m	0.25	0.25	0.25	0.25	0.25	0.25	0.25		0.25	2.00	2,789.19	5,578.38
7	R. C. C. work in proportion (1:2:4) in pile cap,neck col., column, grade beam, roof beam, lintel, floor & roof slab, shelf, drop wall, parapet, stairs, door frame etc. where ever necessary with 1" (25 mm) & down graded crushed stone chips, sand (F.M. 2.50) with min. 28 days ultimate cylinder crushing strength f'c=3000 psi. excluding cost of M.	Cu.m	7.94	8.01	7.83	7.83	7.83	7.83	7.83		8.01	63.11	6,326.16	399,244.26

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	S. roads & its fabrication but including cost of all other materials, breaking chips, screening, centering, shuttering, mixing, casting in forms, compacting, curing for 28 days & all other incidental charges etc. complete as per drawing, design, specification and direction of the Engineer.													
8	Supplying and fabrication of plain reinforcing steel round bar in all R. C. C. structures including cleaning rust, cutting, bending, binding (with supply of G. I. binding wire of 22 BWG) placing & keeping in position, hooking, cranking, lapping etc. complete as per specification, design, drawing and direction of the Engineer. (No extra payment for necessary laps, chairs, spacers etc. unless it is shown in approved drawing.)	Kg.	1070.00	1078.00	1060.00	1060.00	1060.00	1060.00	1060.00		1078.00	8526.00	34.34	292,816.94
9	12"(250 mm) thick cavity wall in superstructure with two separate layer of 5" first class brick work with cement morter (1:6) making bond with connected walls, column etc. and 2"(50mm) gap in between, filled with Styropore insulation board, 3mm G.I. tie wire @ 500X300 bothway scafolding, racking out joints & curing for at least 7 days etc. as per specification & direction of the Engineer. (This incld. cost of all materials)	Sq.m	15.50	15.50	15.50	15.50	15.50	15.50	15.50		15.50	124.00	824.26	102,207.74

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
10	Min. 1/2" (13mm) thick cement plaster (1:4) with cement and sand (FM 1.6) on the superstructure walls including racking out brick joints, cleaning by wire brash, wetting the surface, squaring the edges & corners, scaffolding,curing for at least 7 days etc. complete as per specification and direction of the Engineer.	Sq.m	32.00	32.00	32.00	32.00	32.00	32.00	32.00		32.00	256.00	**74.41**	19,049.47
11	Min. 1/4" (6mm) thick cement plaster (1:4) with cement & sand (FM 1.6) to ceiling & all other R. C. C. surfaces (except floor & steps) upto 6" below GL including squaring the edges and corners, scaffolding, making drip course where necessary, chipping cleaning by wire brash, wetting the surface curing for at least 7 days etc. complete in all respect as per specifications & direction of the Engineer.	Sq.m	51.50	52.00	51.00	51.00	51.00	51.00	51.00		52.00	410.50	**56.10**	23,027.08
12	Min13mm (1/2") thick cement plaster (1:4) with cement & sand (FM 1.6) to skirting and riser with neat cement finishing including squaring the edges and corners, cleaning by wire brash, wetting the surface, curing for at least 7 days etc. complete in all respect as per specifications & direction of the Engineer.	Sq.m	4.00	4.00	4.00	4.00	4.00	4.00	4.00		4.00	32.00	**87.00**	2,784.15

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANI Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
13	1"(25mm) thick patent stone (1:1-1/2:3) over concrete in floors and steps with cement, 50% local sand (FM 1.5), 50% course sand (FM 2.5) and pea-gravel including, screening, washing, mixing, laying, consolidating, finishing the top surface with neat cement finish, maintain required slopes & curing for at least 7 days etc. complete as per specification, direction of Engineer.	Sq.m	7.00	7.00	7.00	7.00	7.00	7.00	7.00		7.00	56.00	150.54	8,430.41
14	Supply 2 No. M.S. plate 6mm thick, having 4 No. of 12mm dia. 300mm long bolts welded vertically to each plate & embed the plate in to concrete/fix to roof in such a way that at least 150mm threaded bolt should be elongated from the finished level of roof for fixing of rainfall gauge and solar cell as per drawing, specification, direction of Engineer.													
	Plate size: (400X400) & (600X600) Bolt 4 No. (300X300) & (500X500) Sq. point	Pair	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.00	487.68	3,901.48
	Plate size: (700X700) & (400X400) Bolt 6 No. (300X300) & 4 No. (300X300) Sq. point	Pair		1.00								1.00	572.40	572.40

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
15	Supply Mild Steel door manufactured with 50X50X6mm(2"X2"X1/8") angle frame in four sides, fixing in position with 6no. M.S. clamp, 32X3mm---225mm (1-1/2"X1/8"---9") long bufercated end, embeded to wall with concrete morter(1:2:4). The door leaf made of 32X32X3mm (1-1/2"X1-1/2"x1/8 ") steel angle frame in four sides, and one horizontal stiffener at the middle & two pair of diagonal stiffener at top & bottom portion, M.S. sheet skin 1mm thick in both surface filled with styropore insulaton including febrication, two coats of synthic enemal paint of approved colour over a coat of red oxide priming,fixing of six hings, hatch bolt, pull handle (both sides), neoprene seal all around the junction of leaf & frame etc. all complete as per drawing, specification & direction of Engineer. Size: 800X2100	No	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	8.00	3,999.93	31,999.45
16	Supply, fitting and fixing in position 150mm dia. M.S. vent pipe, in cavity wall with concrete morter (1:2:4) including welding of expanded metal lath at outer end, embadding, cutting, welding, painting two coats of synthic enemal paint with approved colour over a coat of red oxide primer at in & out side of vent pipe.	4	4.00	4.00	4.00	4.00	4.00	4.00	4.00		4.00	32.00	602.16	19,269.27

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
17	White washing three coats with slaked lime including supply of gum, reqd. amount of blue etc. on wall, ceiling, parapet & where ever necessary including surface preparation, scaffolding etc. all complete as per specfication & direction of Engineer.	Sq.m	83.58	83.00	83.00	83.00	83.00	83.00	83.00		84.00	665.58	8.01	5,333.72
18	Providing 4"(100 mm) thick (average) lime terracing (7:2:2) on R.C.C. roof slab with 20mm 3/4" down graded brick chips, surki and lime including mixing the materials on ground, simultaneous cutting and watering for 7 days, lifting the mixture on roof slab, laying concrete in proper grade and slope making ghondy,beating concrete upto required grade with necessary molasses, rounding junctions, proper finishing on top surfaces, curing etc. complete in all respects as per specification, drawing and direction of the Engineer.	Sq. m	10.00	10.00	10.00	10.00	10.00	10.00	10.00		10.00	80.00	5,553.42	444,273.98
19	Providing gal. barbed wire fencing with R.C.C. (1:2:4) pillers @ 3M (10 ft) max. c/c and of section 100X100 (4"X4") at top & 150X150 (6"X6") at bottom of 3100mm (10') total height (2100 above GL and 1000 below GL) incld. footing, supplying, fitting, fixing 10 line barbed wire horizontally fixed with the post through 6mm(1/4") dia. rods embeded into the post and two line diagonal from post to post with 12 BWG 2 ply barbed	M	31.00	31.00	31.00	31.00	31.00	31.00	31.00		31.00	248.00	457.92	113,564.16

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	wire, 4 points barbs @ at least 112m (4-1/2") c/c including materals, carring, excavation, back fill, hoisting, plain concrete (1:2:4) base, casting, curing etc. all complete as per drawing, specification and direction of Engineer.													
20	Supply and fix in position M.S. gate with 25X25X5mm (1"X1"X3/16") angle frame in four sides/cross bressing and gal. barbed wire infill simillar arrangement as fence, hang on three hings with pillar of fence, locking arrangement to pillar of other side, including cutting, welding, painting as in door etc. complete as per drawing, direction of Engineer. Size : 800X2100mm.	Each	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	8.00	1,837.40	14,699.23
	MECHANICAL WORKS. **(SPECIAL STEEL WORK)**													
	NOTE: Before febrication, the shopdrawing prepared by the contractor must be approved by the Engineer. They must submit the erection and embedding procedure as a whole & get approval before commencing the work.													
21	Supply and erection of River type stilling well 900mm dia 6mm (1/4") thick into required depth of ground, true to vertical, wash away inner soil up to the bottom of the well, by any suitable means inlcuding supply													

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	of all material, febricating flange type pipes by rounding & welding, keeping hole of 300mm,arrangement of flanged joint at the bottom hole, welding expanded metal lath at other opening and making cats ladder by 20mm dia M.S. round bar welded to inner side of pipe. This includes also Febrication of tower by 100mm dia. vertical main member, 32mm dia horizontal & diagonal cross bressing, keeping flange & hole for water tight nut bolt joint, transport to site, hoisting of well & embeding partly, hoisting tower member, embedding bottom of tower member for at least 6M by any suitable method, filling vertical pipe of tower member by plain concrete (1:3:6), casting plain concrete (1:3:6) at the bottom of well, painting 2 coats of anti-corrossive paint in inner & outer surface of well and outer surface of tower and one layer of heavy bitumen coat for embeded portion of well & tower, all other incidental work etc. complete in all respect as per drawing, direction and satisfaction of Engineer.													
	Total length 10M, sunk 3.75M	No	1.00									1.00	502,213.73	502,213.73
	Total length 14.8M, sunk 5.5M	No			1.00							1.00	686,930.14	686,930.14
	Total length 10.2M, sunk 3M	No							1.00			1.00	502,213.73	502,213.73
	Total length 9M, sunk 2.5M	No								1.00		1.00	524,471.80	524,471.80
	Total length 9M, sunk 3.5M	No									1.00	1.00	460,511.83	460,511.83

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
22	Supply and erection of Bridge type stilling well 600mm dia. 6mm (1/4") thick, fasten againt bridge pier on chair by flat bar 100X6mm with stiffened end and bolt joint at junction as per drawing inlcuding supply of material, febrication of flanged type well by rounding & welding, keeping holes 300mm dia. as shown, welded expanded metal lath at opening, elongation of well by flange & water tight nut bolt joint , transportation to site, hoisting and placing the well in position, fastening with pier, painting 2 coats of anti- corrossive paint in inner & outer surface of well & tie bar, all other incidental work etc. complete in all respect as per drawing, direction & satisfaction of Engineer Total length of pipe 8.5 m Circumference of pier 16M	No				1.00						1.00	175,250.33	175,250.33
23	Supply & erection of Bridge type stilling well 600mm dia. 6mm thick placed beside pier with a tower support in between, fastening tower with pier by 100X6mm flat bar & well with tower on chair by100X6mm flat bar with stiffened end and bolt joint at junction as per drawing, max. 2M interval between fasteners, including supply of materials, febrication of flanged type pipe by rounding & welding, keeping holes 300mm dia; welding expanded metal lath at opening, febrication of tower by 70X70X6mm angle													

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	main member & 50X50X6mm angle horizontal/cross bressing, keeping flange & hole for nut bolt joint, transportation to site, hoisting and placing in position of well & tower member, painting 2 coats of anti corrossive paint in inner & outer surface of pipe and outer surface of tower, all other incidental work etc, complete in all respect as per drawing, direction & satisfaction of Engineer.													
	Total length of well 13.5m, Circumference of pier 15.43M Length of tower 12MX width 3.7M	No					1.00					1.00	318,520.68	318,520.68
	Total length of well 11m, Circumference of pier 8.2M Length of tower 12MX width 3.6M	No						1.00				1.00	271,190.30	271,190.30
24	Dismelting by any means existing old well and shed and transport all dabries from the site and dumping as instructed by Engineer	L.S							1.00			1.00	3,198.00	3,198.00
25	Supply and embed in position 305mm dia. pipes 6mm(1/4") wall thickness with flanged end, jointing with vertical (900mm) pipe at one end including supply of materials, febrication of flanged type pipe by rounding & welding, welding of expanded metal lath at outer opening, transporting, hoisting, placeing, excavation in any depth, soring if required, filling with excavated soil,													

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	dewatering if required, 1 coat of hot bitumen both sides & warping out side of pipe with one layer of 1000 gauge polythene sheet, all other incidental work etc. complete in all respect as per drawing, direction & satisfection of Engineer.													
	Pipe 4M long, at a deepth of 3M.	No	1.00									1.00	49,888.78	49,888.78
	Pipe 10.5M long, at a deepth of 3.5M.	No			1.00							1.00	115,127.96	115,127.96
	Pipe 13M long, at a deepth of 2.5M.	No							1.00			1.00	141,991.15	141,991.15
	Pipe 16M long, at a deepth of 1.5M.	No								1.00		1.00	175,250.33	175,250.33
	Pipe 10M long, at a deepth of 2.25M.	No									1.00	1.00	116,726.96	116,726.96
26	Supply and fix in position G.I. ladder (inclind) febricated by 50X50X6mm angle side supports & 20mm dia. steps at 300mm interval. It includes two post of 100mm dia vertical support at the middle, embeding to ground at least 3M by any suitable method, filled with concrete (1:3:6); hand rail & side supports by 1" dia. pipe, febrication, placing in position, fixing one end with platform of well and other end on brick steps, excavation, brick work, pointing, two coats of anti-corrossive paint on steel surface etc. complete in all respect as per drawing, direction & satisfiction of Engineer.													
	Length 9M, Middle support 4M	No	1.00									1.00	30,061.19	30,061.19
	Length 9M, Middle support 4.5M	No			1.00							1.00	30,700.79	30,700.79
	Length 10M, Middle support 4M	No							1.00			1.00	31,340.39	31,340.39
	Length 5.5M, Middle support 4M	No								1.00		1.00	21,234.71	21,234.71
	Length 5.5M, Middle support 2.5M	No									1.00	1.00	25,583.99	25,583.99

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
27	Supply & fix in position G.I. ladder (Vertical) with casing febricated by 32X6mm (1-1/2"X1/4") flat ber side supports and 20mm dia. steps at 300mm interval and 32X6 mm (1-1/2"X1/8") F.B. casing including materials, febrication, hang & fix in position with 2 coats of anti-corrossive paint etc. complete in all respect as per drawing, direction & satisfation of Engineer													
	Total length 2.5M	No				1.00						1.00	2,302.56	2,302.56
	Total length 5.5M	No					1.00					1.00	5,244.72	5,244.72
	Total length 3M	No						1.00				1.00	2,878.20	2,878.20
28	Supply and embed horizontally in to ground (150mm deep) 150mm dia G.I. pipe 3M long each, with flanged end including supply of material, excavation, back fill, embeding in position on compacted sand bed, making 5 hand holes (400 x 400 x 400) by 125mm brick wall, 100mm plain concrete base, 100mm R.C.C. top slab with M.S. cover, connection between pipes etc all complete in all respect as per drawing, direction and satisfaction of Engineer.													
	Total length of pipe 35M	No		1.00								1.00	76,751.97	76,751.97
29	Extra extension room at ground level of station house, (size 2400 x 1000 x 2000) with 450mm brick footing,125mm brick	L.S		1.00								1.00	19,187.99	19,187.99

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	wall, plaster (1:6), white wash, C.I. sheet roofing, plain concrete (1:2:4) on one brick flat soling under footing & floor, plaster (1:4) with neat cement finish in floor, steel door (2100 x 800), painting two coats synthic enamel over a coat ofpriming, including excavation, backfilling, embedding 6 hanger of 20mm dia. rod, 200 mm flash from wall at a circular profile of 1500mm dia. for warping the cable around etc. complete in all respect as per drawing direction & satisfaction of Engineer													
30	Supply and embed horizontally in to ground 50mm dia. PVC conduct for cable at a depth of 600mm, and hand hole (200 x 200 x 600) at an interval of Max. 30 M including materials, excavation, back filling,100mm plain concrete (1:3:6) base, 125mm brick wall, 100mm R.C.C. (1:2:4) top slab with reinforcement, M.S. cover etc. all complete as per drawing, direction & satisfaction of Engineer.													
	Total length 100M with 3 hand hole	No	1.00									1.00	10,745.28	10,745.28
	Total length 45M with 1 hand hole	No				1.00						1.00	4,669.08	4,669.08
	Total length 15M	No									1.00	1.00	1,407.12	1,407.12
31	Supply and irect staff gauge in position as shown in drawing and direction of Engineer (Gauge supplyed by BWDB) 3M long.	L.S	1.00	1.00	2.00						2.00	6.00	8,954.40	53,726.38

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
32	Supply and erect stilling well cover (1000 x 700) made of 5 mm thick chequered plate with bended edge, cutting sq. hole and a extended platform made of 50X50X6mm(2" x 2" x 1/8") angle frame /stiffener, filled with mesh made from 6mm M.S. rod at 75mm interval bothway, 25mm dia. G.I. pipe hand rail including cutting, bending, welding, hoisting, fixing in position with nut bolt joint on well/tower painting two coats of synthic enemal paint over a coat of anti-corrosion priming etc. complete in all respect as per drawing, direction & satisfaction of Engineer. Cover size 1000 x 700mm Platform size 1000X500 (mesh)	L.S	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	8.00	7,675.20	61,401.58
33	Supply & construct Station house (2000X2000X2500) over Stilling well cover plate consists of 4 wall, 1 roof,one (800X2500) double leaf door, two cable inlet duct 50mm dia.& 200mm long with bended end, 4 air duct 50mm dia. with bended end, one cable hanger made of 10mm dia. rod etc. The wall, roof & door made of 50X50X6mm angle frame/stiffener covered with 1mm G.I. sheet filled with 50mm thick Styropore insulation board. The door frame have neoprene seal for water tight at its closed position including 6 hings and locking arrangement. Supply of all material,													

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	febrication, hoisting, placeing, fixing, painting 2 coats with synthic enamal paint of approved colour over a coat of anti-corossive priming etc. complete in all respect as per drawing, direction of Engineer.	L.S								1.00		1.00	110,330.96	110,330.96
34	Supply & errect machine box (1000X700X1000) over Stilling well cover plate consists of 4 wall, 1 roof,one (1000X1000) doble leaf door, two cable inlet duct 50mm dia.& 200mm long with bended end, 4 air duct 50mm dia.with bended end, one cable hanger made of 10mm dia. rod etc. The wall, roof & door made of 25X25X4.5mm angle frame/stiffener covered with 1mm G.I. sheet, filled with 50mm thick Styropore insulation board. The door frame have neoprene seal for water tight at its closed position including 6 hings and locking arrangement, Supply of all material, febrication, hoisting, placeing, fixing, painting 2 coats with synthic enemal paint of approved colour over a coat of anti-corossive priming etc. complete in all respect as per drawing, direction of the Engineer.	L.S	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	8.00	23,025.59	184,204.73
35	Supply and fixed in position two wooden board 1000X1000X25mm thick, 800mm above floor level in Station house, including supply of Garjan wood plank, carpentry work, 2 coats of oil paint over a coat of													

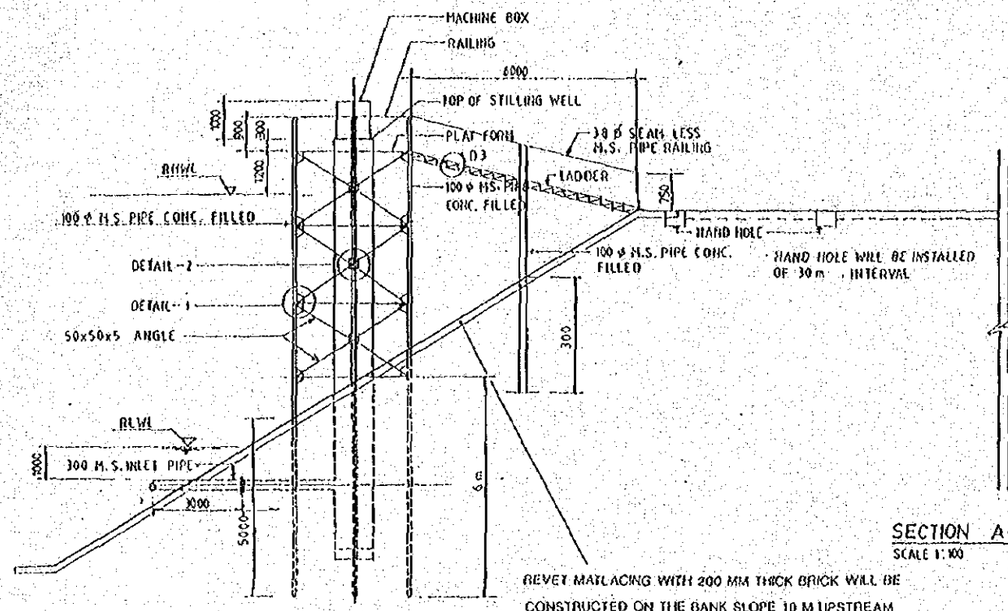
Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	primming of approved colour, fixing to wall etc. complete in all respect as per drawing, specification direction of Engineer.	L.S	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.00	1,279.20	11,512.80
36	Painting 2 coats of synthic enemal paint of approved colour, where ever necessary, over primer (applied before) , including cleaning, surface preparation, scaffolding etc. complete in all respect as per specification & direction of Engineer.	M.Sq.	66.00	18.00	91.00	52.00	63.00	70.00	65.00	58.00	58.00	541.00	57.56	31,142.11
37	Supply and erect self supported G.I Antenna pole true to vertical and in position including supply of M.S. pole with transportation, erection with R.C.C. (1:2:4) base, excavation, backfilling, shuttering, reinforcing, casting, curing, 2 coats of synthic enemal paint over a coat of anti-corrissive priming etc. all complete in all respect as per drawing, direction & satisfaction of Engineer.													
	Length 15 M	No		1.00								1.00	47,330.38	47,330.38
	Length 15 M	No				1.00						1.00	47,330.38	47,330.38
	Length 15 M	No					1.00					1.00	47,330.38	47,330.38
	Length 15 M	No						1.00				1.00	47,330.38	47,330.38
	Length 10 M	No							1.00			1.00	28,142.39	28,142.39
	Length 15 M	No								X	1.00	1.00	47,330.38	47,330.38

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
38	Supply and erect self supported G.I. Antenna pole true to vertical and in position including supply of M.S. pole with transportation, hoisting, erection on tower head by fixing plate with nut bolt arrangement, 2 coats of synthic enemal paint over a coat of anti-corrosssion priming etc. all complete in all respect as per drawing, direction & satisfaction of Engineer.													
	Length 15 M	No								1.00		1.00	41,957.74	41,957.74
	Length 8 M at BWDB BLDG.	No								1.00		1.00	19,827.59	19,827.59
39	Supply and erect guyed triangular antenna tower including supply of material 50 mm pipe for main post, 25 mm pipe for horizontal/diagonal bressing, febrication by cutting, pressing both ends of bressing, nut/bolt joint with flange, welded to main post, tie from three sides at each point at10 M interval with prestressing tandom 7 strand of min. 20 mm (3/4") dia; 2 costs of anti-corrossive paint in exposed surface, embed on R.C.C (1:2:4) base with excavation, back filling, shuttering, reinforcing, casting, curing etc. complete in all respect as per drawing,direction & satisfaction of Engineer.													
	Length 20 M	L.S	1.00									1.00	177,488.93	177,488.93
	Length 30M	L.S			1.00							1.00	269,911.10	269,911.10

Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
40	Complete lightening protection for antenna tower by supplying all materials, fitting & fixing in postion, 25mm dia.---2M long solid copper rod pointed at one end & fixed on to copper base plate (size: 200x100x13mm) on top of tower , copper wire size not less than 9mm dia. shall be provided from copper base at the top of the tower to the earth electrode, supported with tower at a distance not more than 1M. Two nos. of earth electrode (min size 25mm dia.) shall be sunk up at a depth of not less than 10 M. from 0.75M below finished ground level at a distance of not less than 10M. Inspection pit (500x500x500mm) shall be provided at the top of each earth electrode. A test point shall be provided at 0.75M from ground level on tower base, complete in a box size 200x150x100 with copper plate 150x150x6mm complete with copper nut & bolt. Copper wire of size not less than 9mm dia. shall be connected to one of the earth electrode in inspection pit. Both earth electrode shall be connected with copper wire not lss than 9mm dia. At the second electrode, instrument earthing of station house shall be connected etc complete in all respect including testing as per drawing, specification & instruction of Engineer.	No.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.00	30,000.00	270,000.00

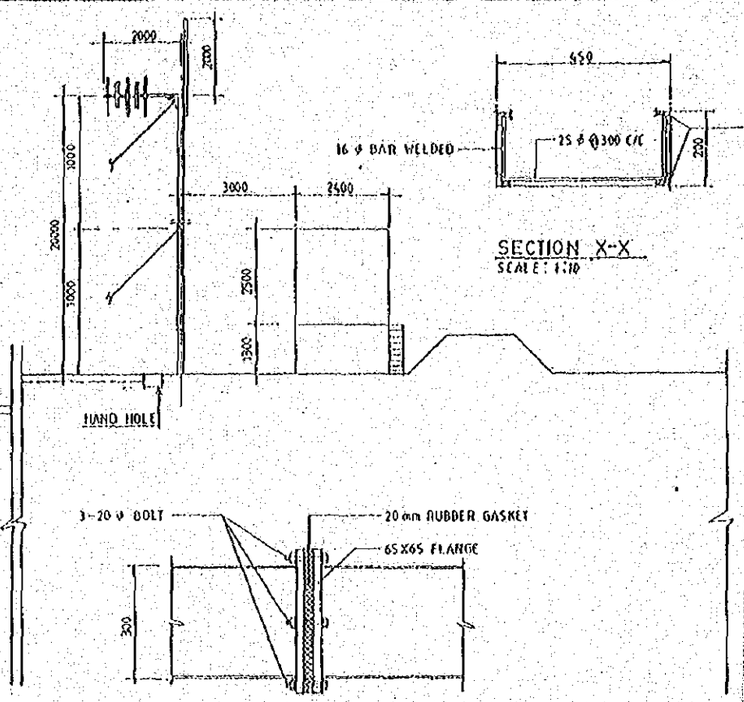
Item	Description	Unit	PAN KHA Qty.	JATRA PUR Qty.	ZAKI GANJ Qty.	TONGI Qty.	MIR PUR Qty.	NAYAR HAT Qty.	MILL BARAK Qty.	NARAY ANGANJ Qty.	REKABI BAZAR Qty.	Total Qty.	Rate Tk	Total Amount Tk
	C. REVETMENT WORKS													
41	Providing 200 mm thick brick and placing revet matlacing on the bank slope 10 m upstream and downstream of the stilling well.	Sq. m	400									400	470	188,000
		GRAND TOTAL=TK												7,823,607.92

APPENDIX I. DRAWINGS FOR ANCILLARY WORK

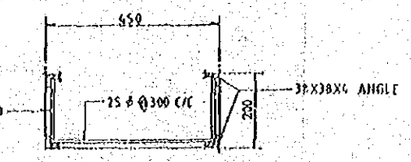


REVET MATLACING WITH 200 MM THICK BRICK WILL BE CONSTRUCTED ON THE BANK SLOPE 10 M UPSTREAM AND DOWNSTREAM OF THE STILLING WELL.

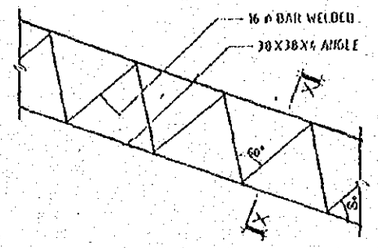
SECTION A-A
SCALE 1:100



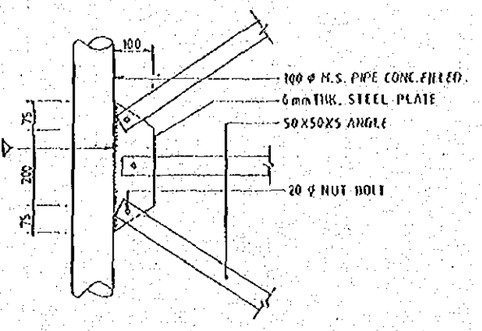
INLET PIPE JOINT DETAIL D4



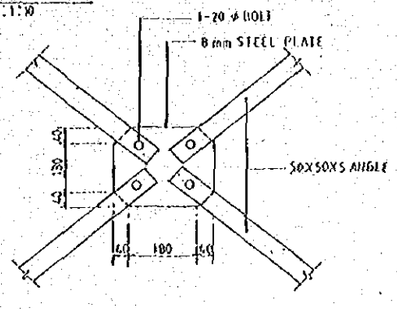
SECTION X-X
SCALE : 1:10



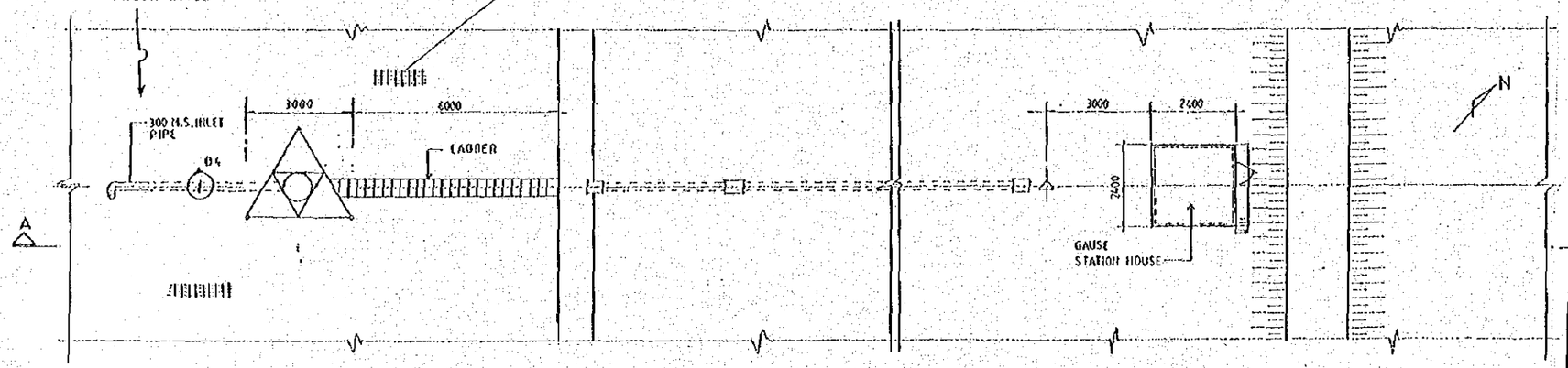
DETAIL - D3
SCALE : 1:20



DETAIL - D1
SCALE : 1:10



DETAIL - D2
SCALE : 1:10

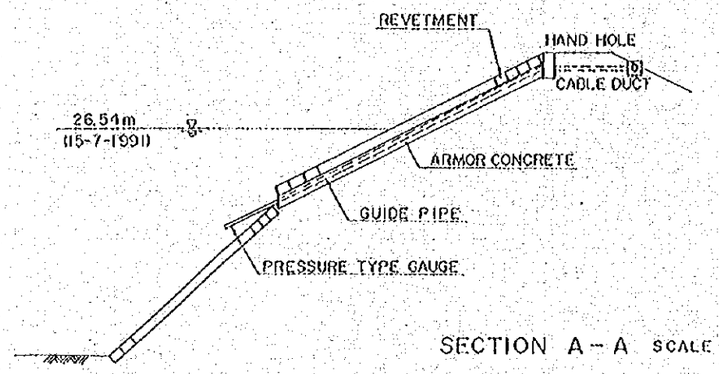


PLAN
SCALE 1:100

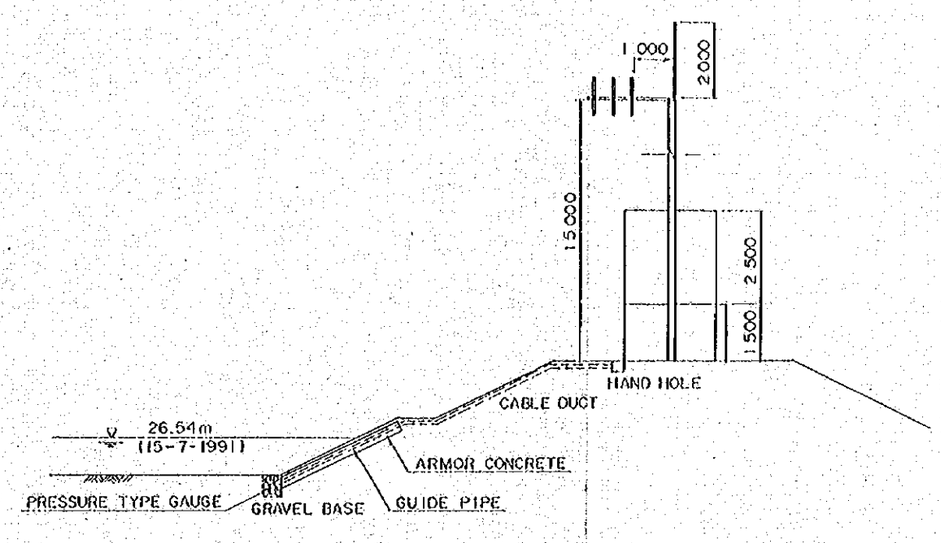
NOTE :-
1. ALL DIMENSIONS ARE IN MILLIMTER IF NOT INDICATED OTHER WISE.
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGEICY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK PANKHA STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	ABU ASHRAF MALIK	DRG. NO.	01
APPROVED			

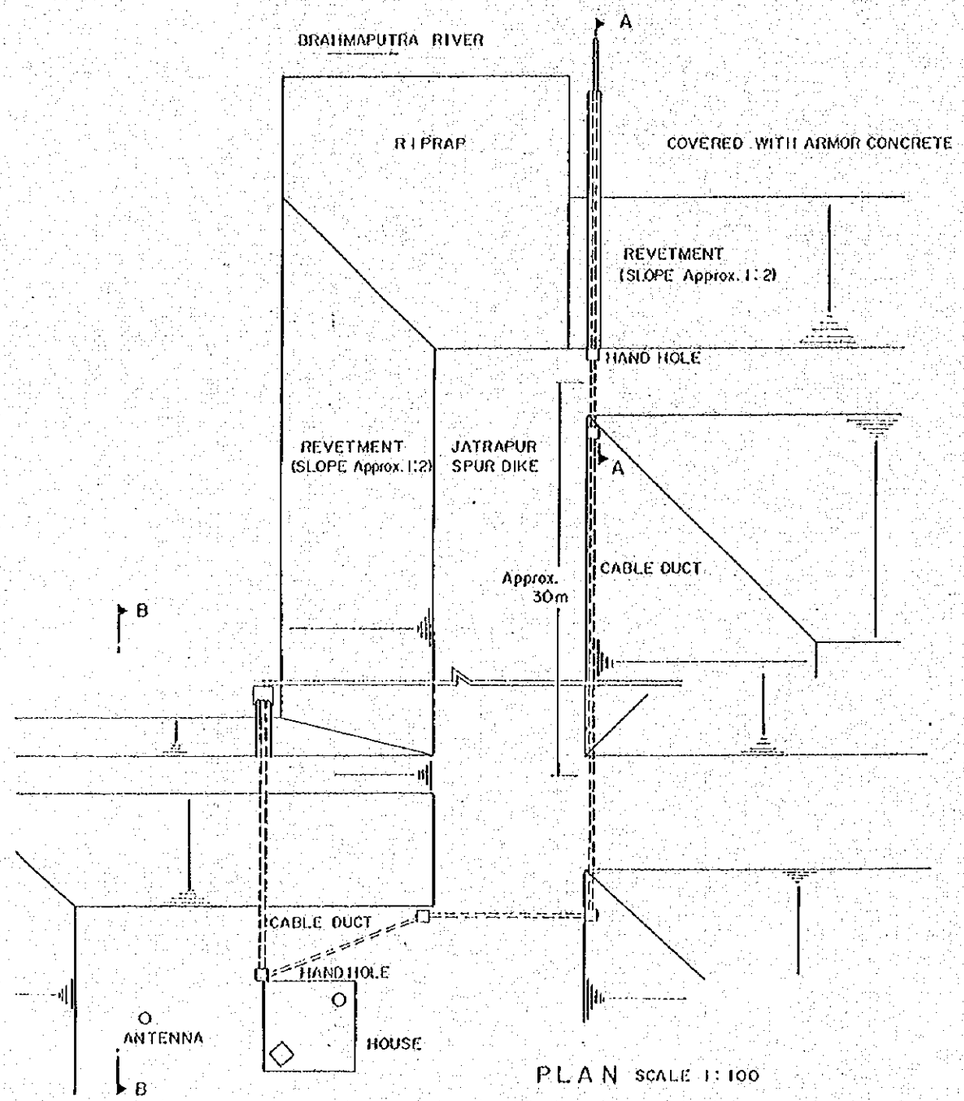
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



SECTION A – A SCALE 1:100



SECTION B – B SCALE 1:100



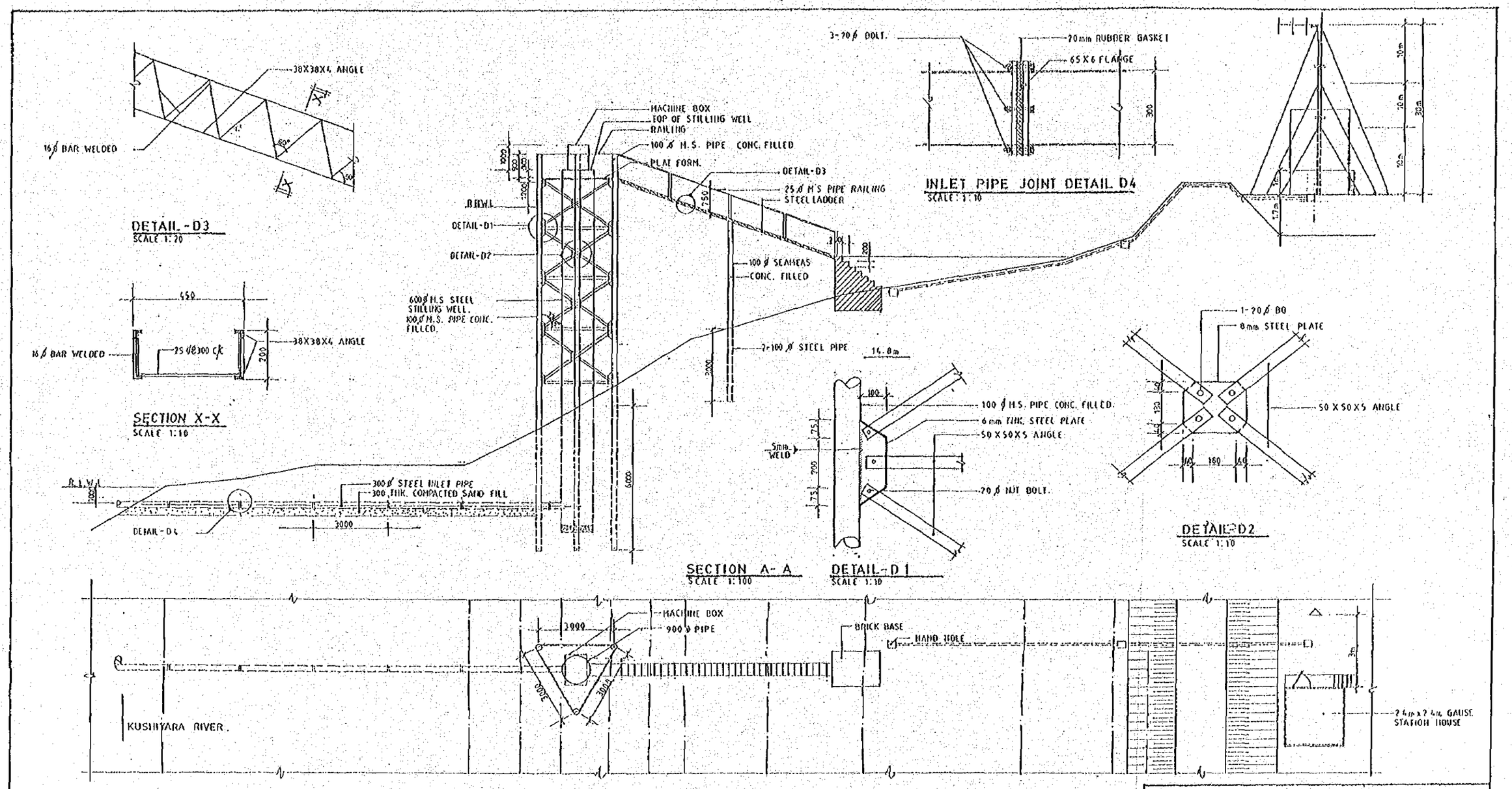
PLAN SCALE 1:100

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY

GOVERNMNT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK JATRAPUR STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	ABUASHRAF MALIK	DRG. NO	02
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

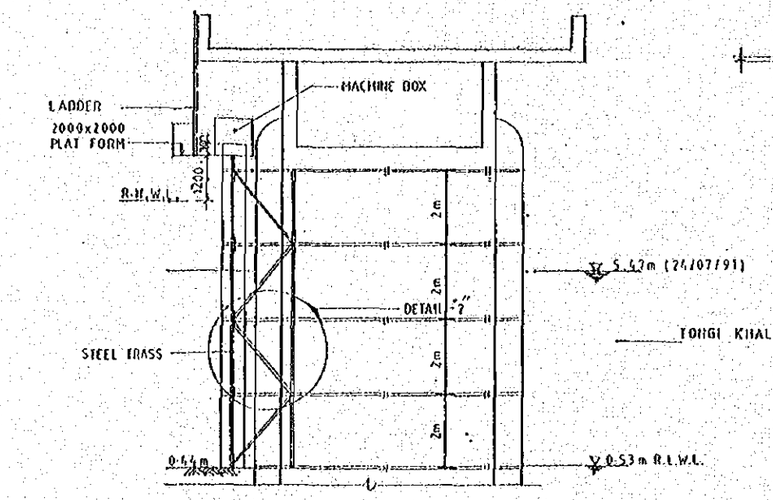


NOTE:-

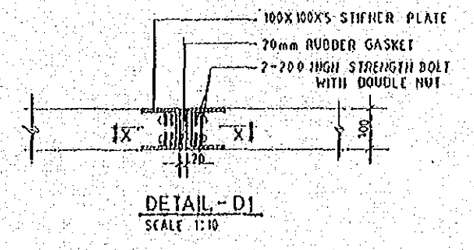
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHER WISE.
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.

GOVERNMENT OF THE PEOPLES REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPER		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEMEM		
DRG TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK ZAKIGANJ STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG. NO.	03
APPROVED			

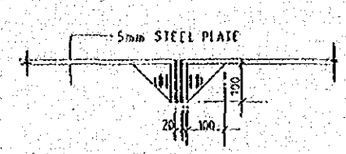
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY



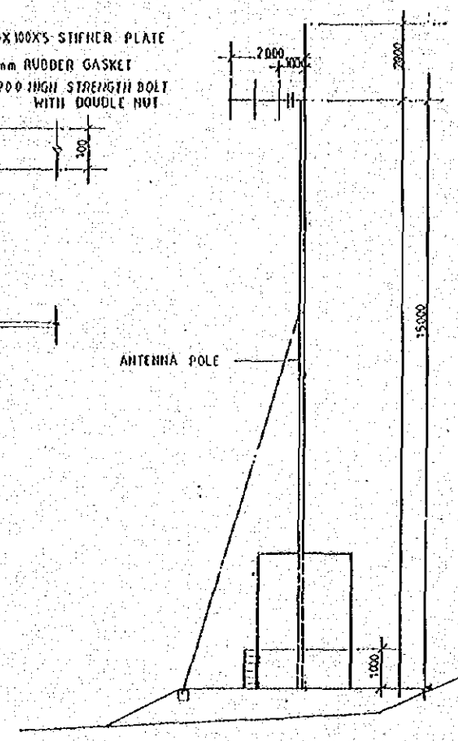
ELEVATION
SCALE 1:100



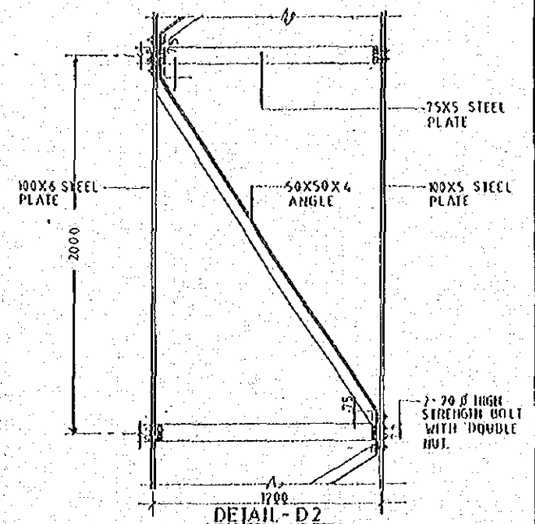
DETAIL - D1
SCALE 1:10



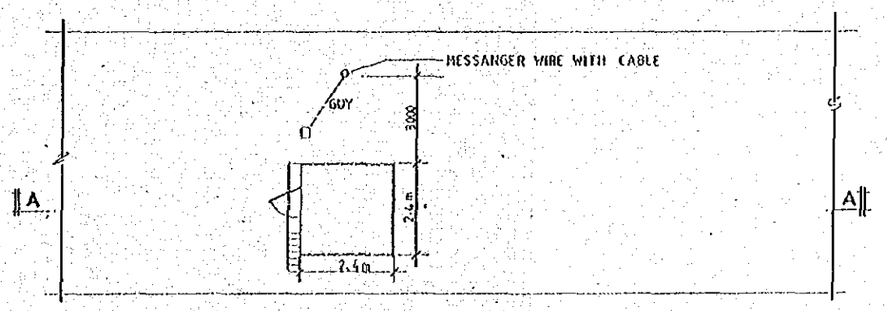
SECTION X-X
SCALE 1:10

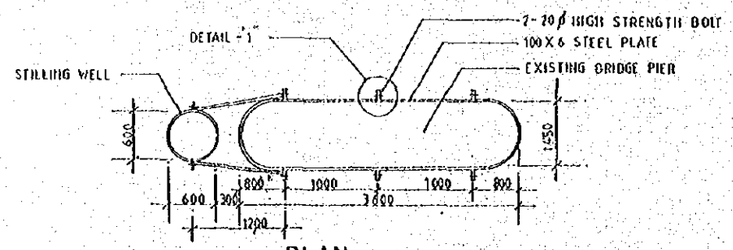


SECTION A-A
SCALE 1:100



DETAIL - D2
SCALE 1:20

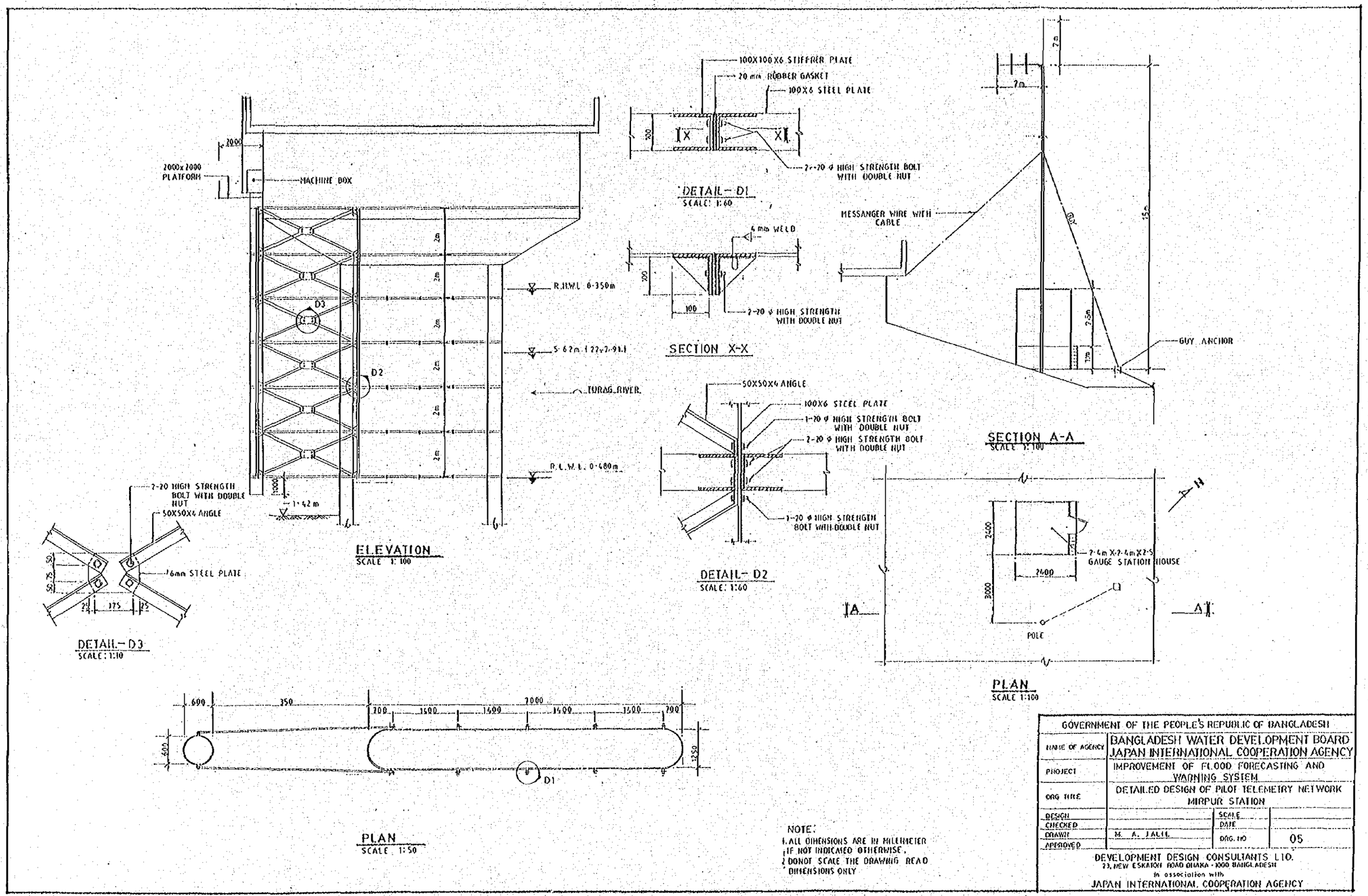




PLAN
SCALE 1:50

GOVERNMENT OF THE PEOPLES REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK TONGI STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN		DRG. NO.	04
APPROVED			

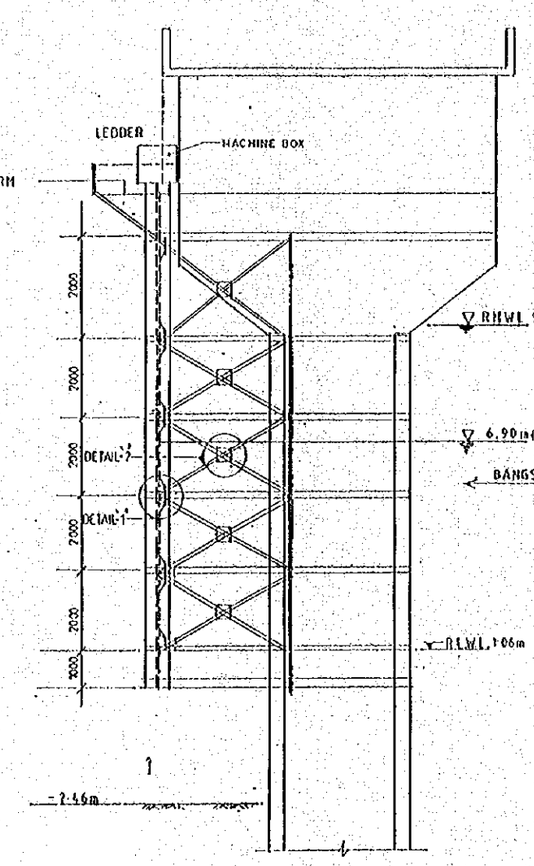
DEVELOPMENT DESIGN CONSULTANTS LTD
23 NEW ESKATON ROAD DHAKA-1000 BANGLADESH
In association with
JAPAN INTERNATIONAL COOPERATION AGENCY



NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE.
2. DONOT SCALE THE DRAWING READ DIMENSIONS ONLY

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK MIRPUR STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG. NO	05
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY



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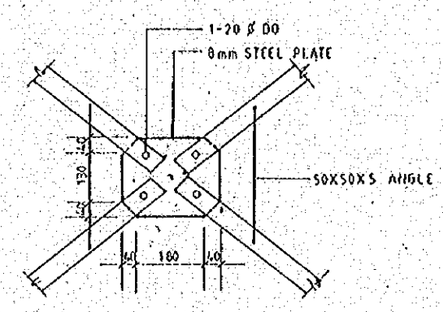
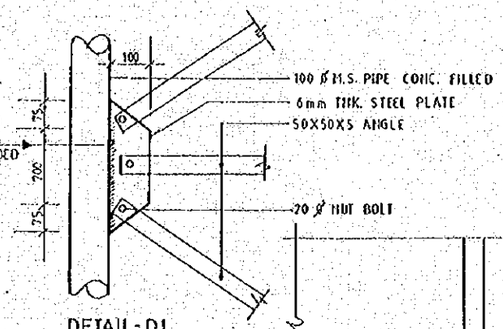
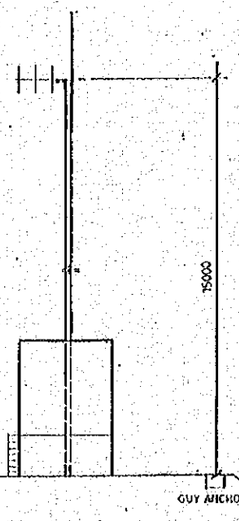
SCALE 1: 100



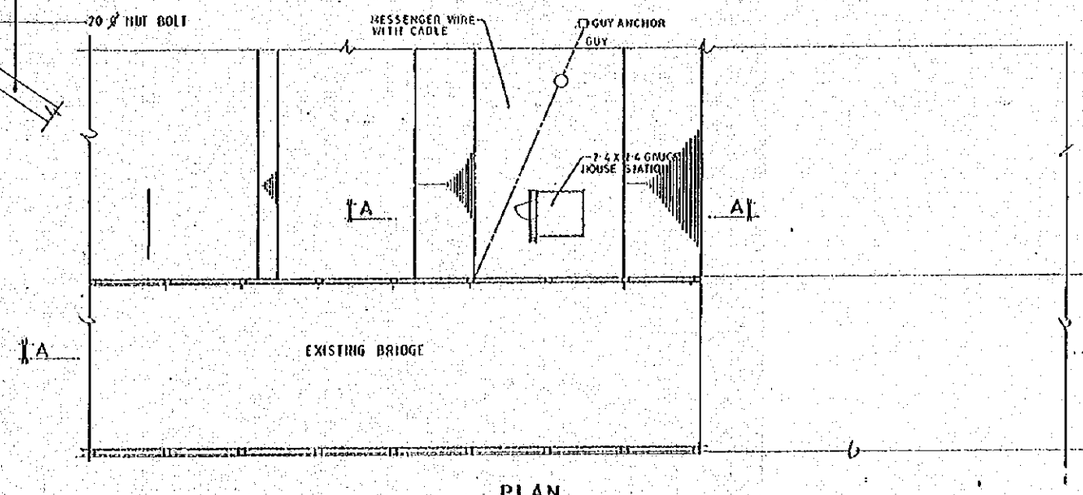
DETAIL-D2
SCALE 1: 10



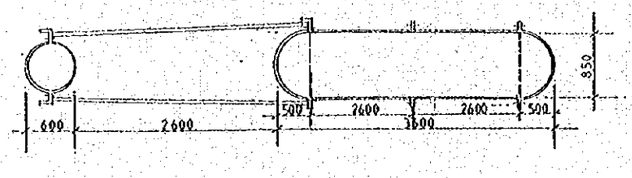
DETAIL-D1
SCALE 1:10



SECTION A-A
SCALE 1: 100



PLAN
SCALE 1:200

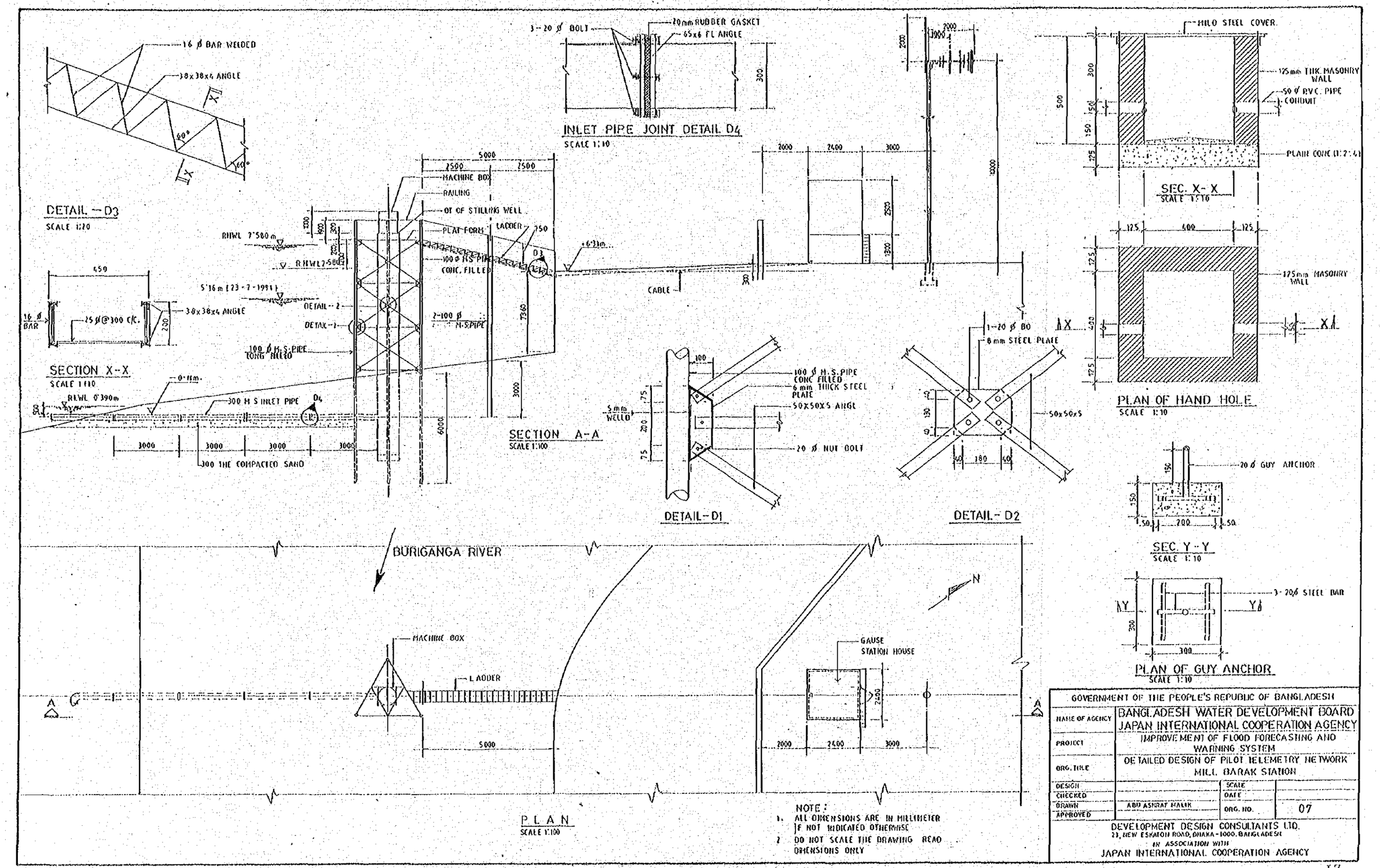


PLAN
SCALE 1:50

NOTE:-
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. NO.	DETAILED DESIGN OF PILOT TELEMETERY NETWORK NAYAR HAT STATION		
DESIG		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG.NO.	06
APPROVED			

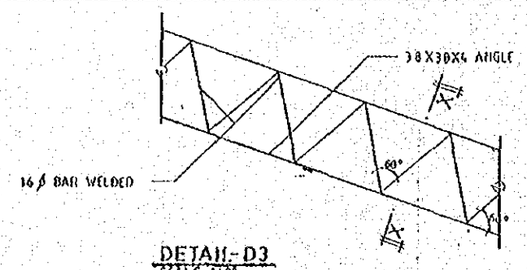
DEVELOPMENT DESIGN CONSULTANTS LTD.
73, NEW ESKATON ROAD, DHAKA-1000 BANGLADESH
In association with
JAPAN INTERNATIONAL COOPERATION AGENCY.



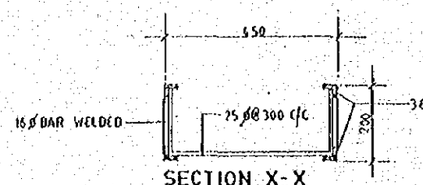
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
ORG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK MILL BARAK STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	ABU ASHRAF MALIK	ORG. NO.	07
APPROVED			

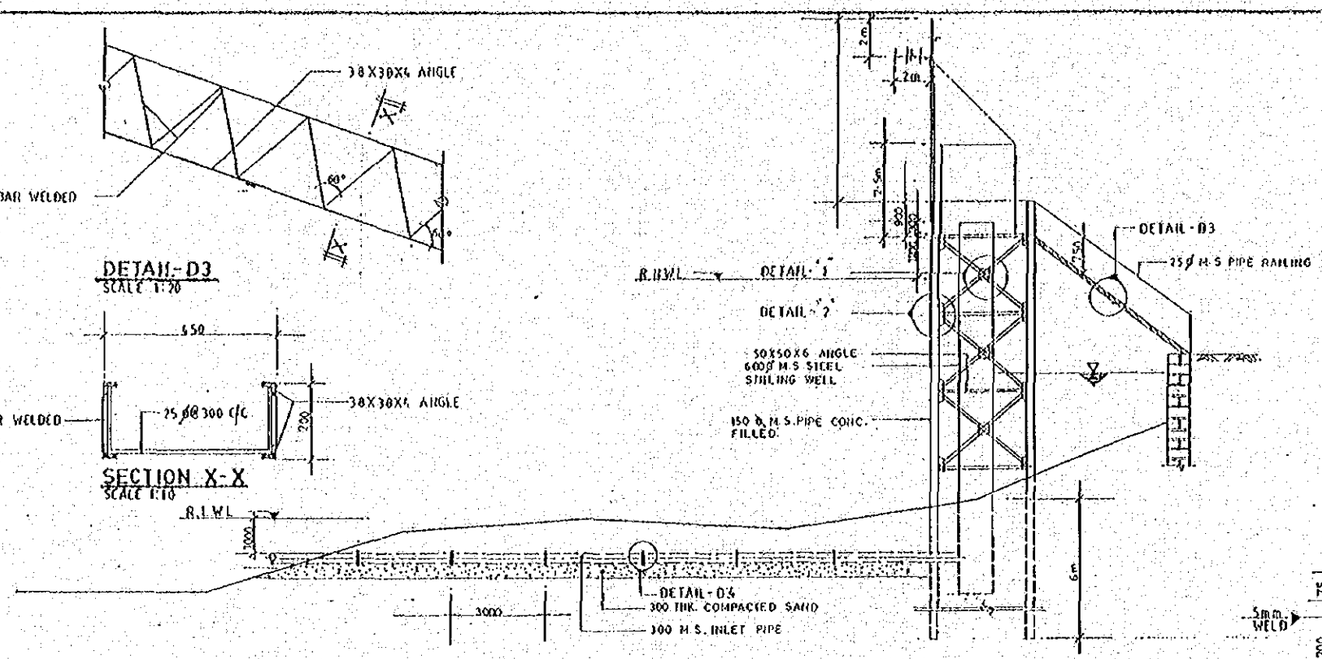
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY



DETAIL-D3
SCALE 1:20



SECTION X-X
SCALE 1:10



SECTION A-A
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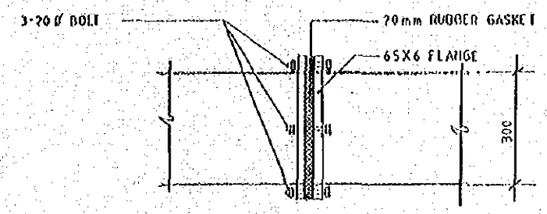
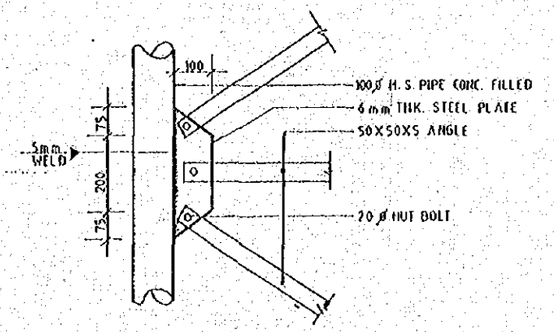
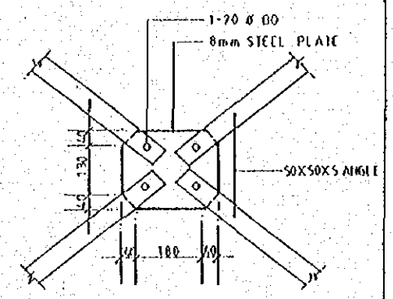


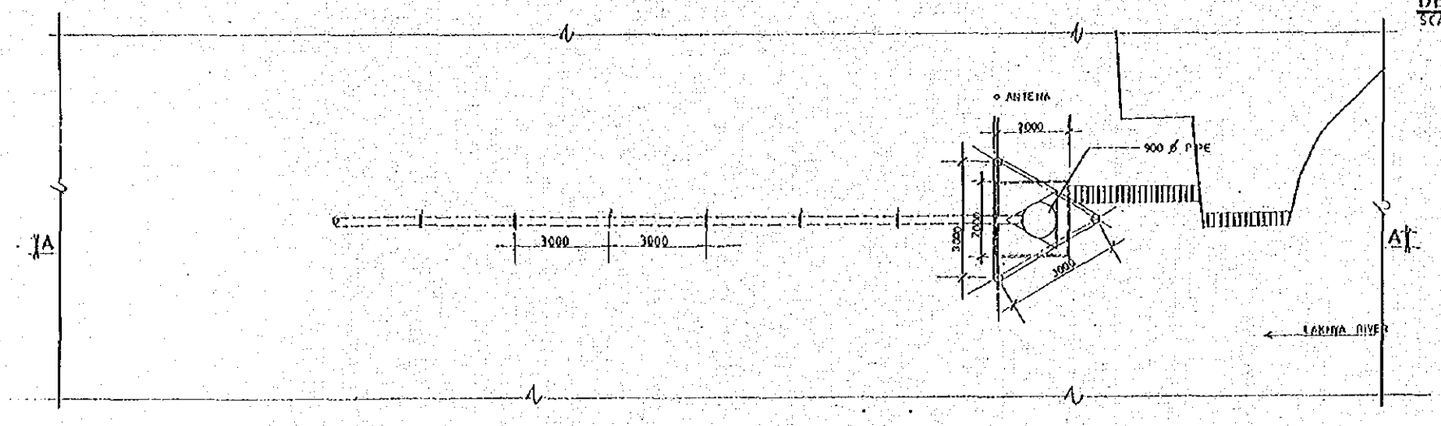
INLET PIPE JOINT DETAIL-D4
SCALE 1:10



DETAIL-D1
SCALE 1:10



DETAIL-D2
SCALE 1:10

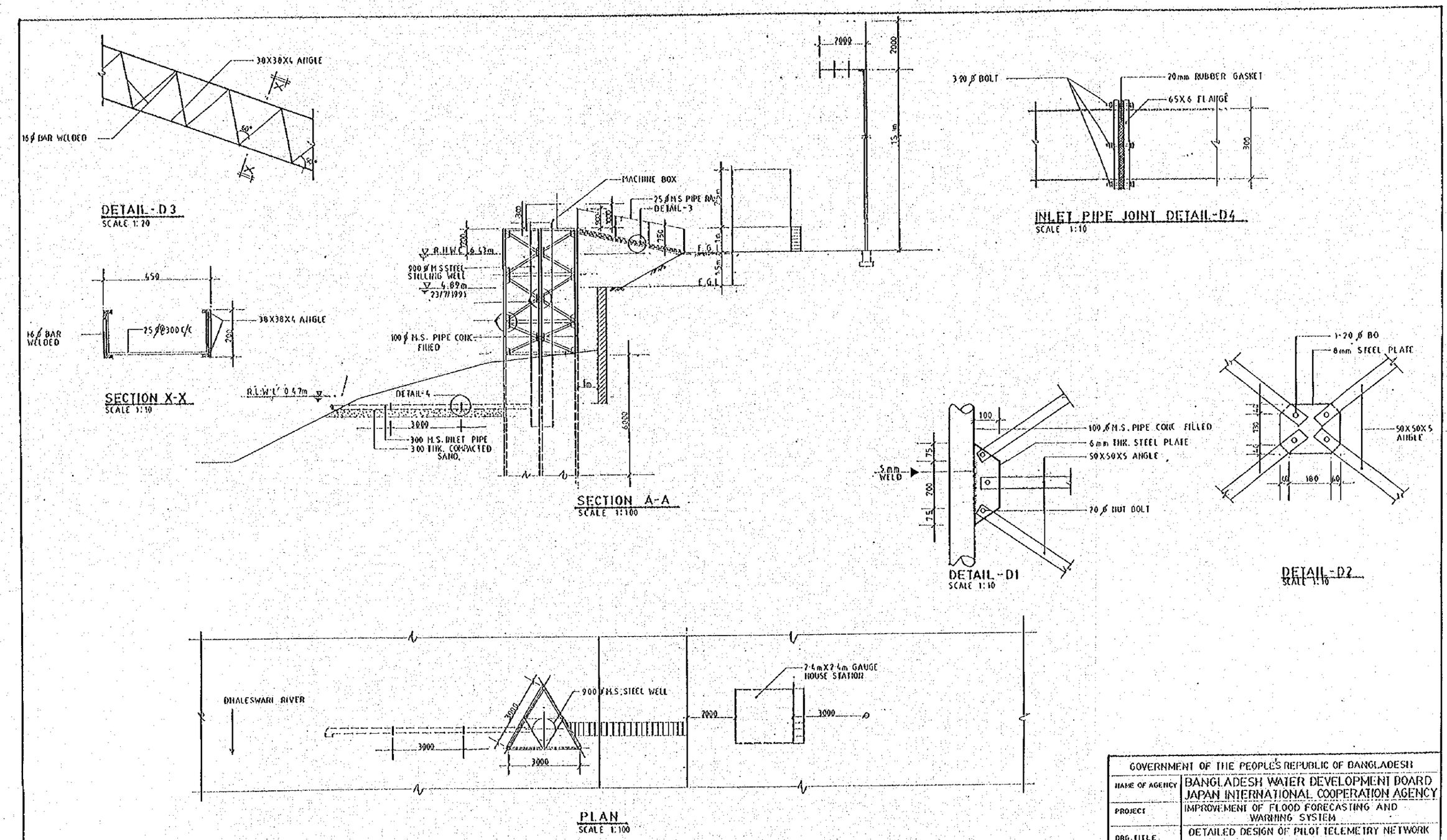


PLAN
SCALE 1:100

NOTE:-
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHER WISE.
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM.		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK NARAYANGANJ STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	H. A. JALIL	DRG. NO	08
APPROVED			

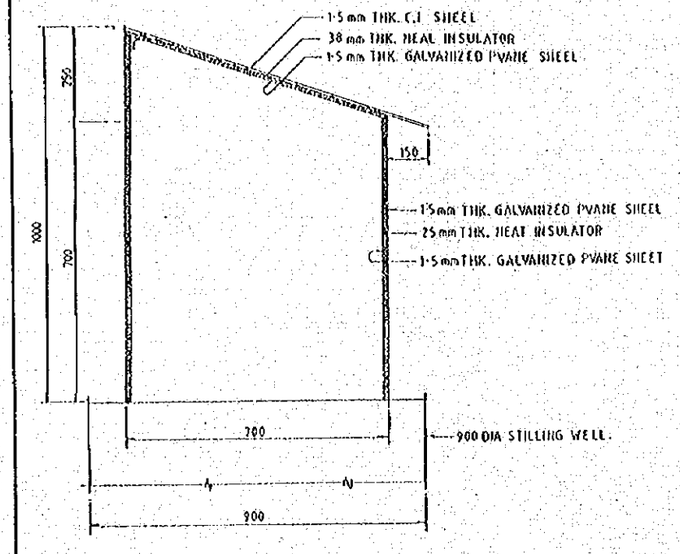
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY



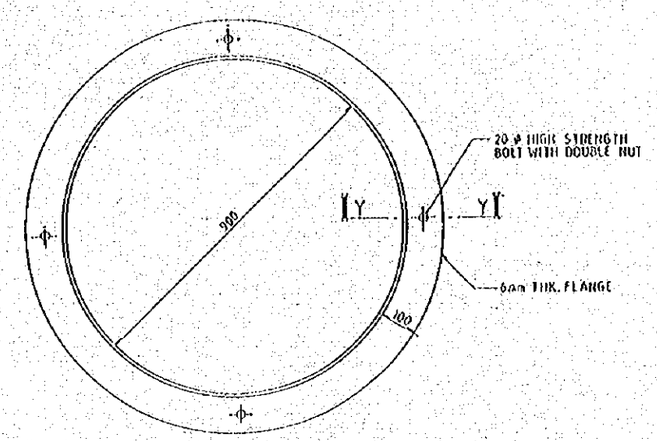
NOTE :
1 ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE
2 DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK REKABI BAZAR STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG. NO	09
APPROVED			

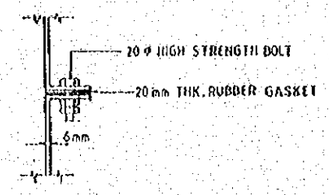
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA- 1000 BANGLADESH
In association with
JAPAN INTERNATIONAL COOPERATION AGENCY



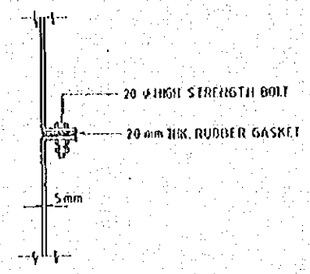
SECTION A-A



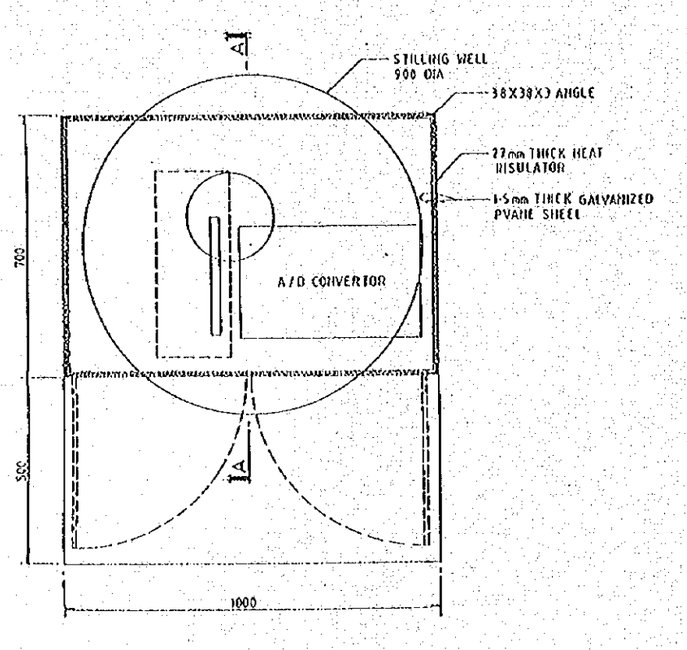
900 DIA SITILLING WELL CONNECTION DETAIL



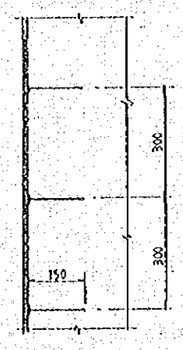
SECTION Y-Y



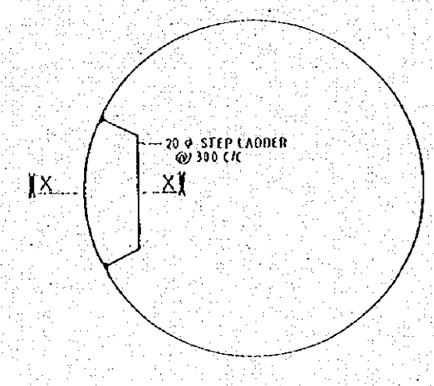
SECTION G-G



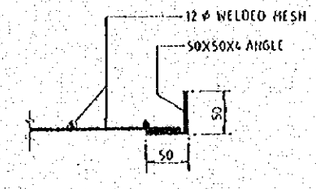
PLAN OF MACHINE BOX



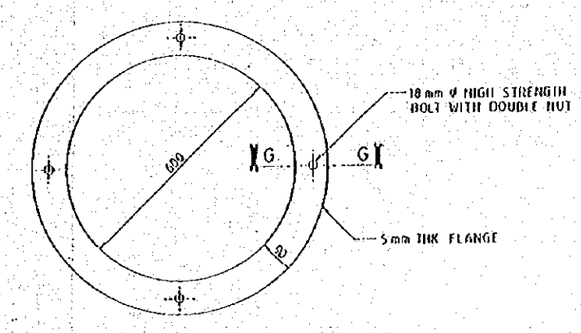
SECTION X-X



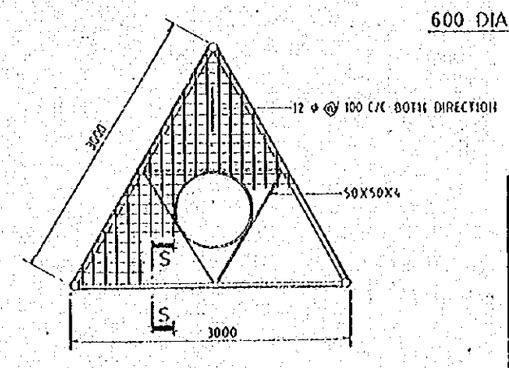
STILLING WELL INSIDE LADDER DETAIL



SECTION S-S



600 DIA STILLING WELL CONNECTION DETAIL



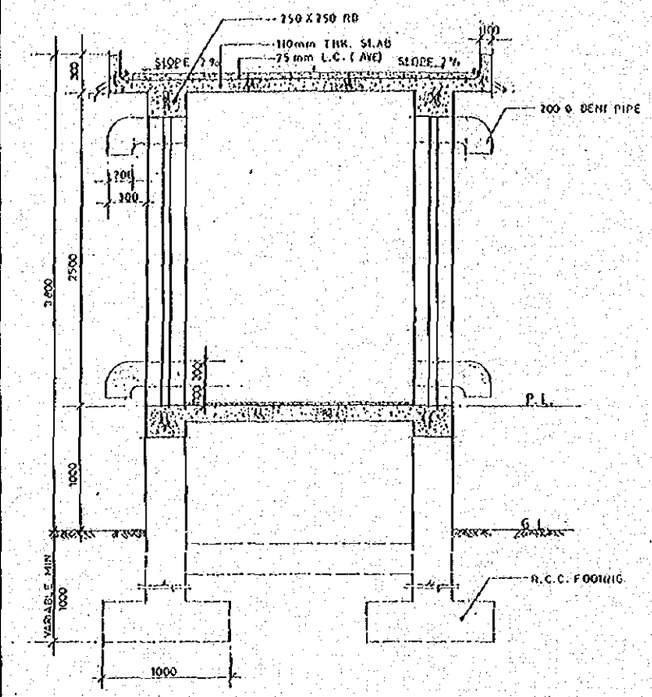
STILLING WELL PLATFOR DETAIL

NOTE :-

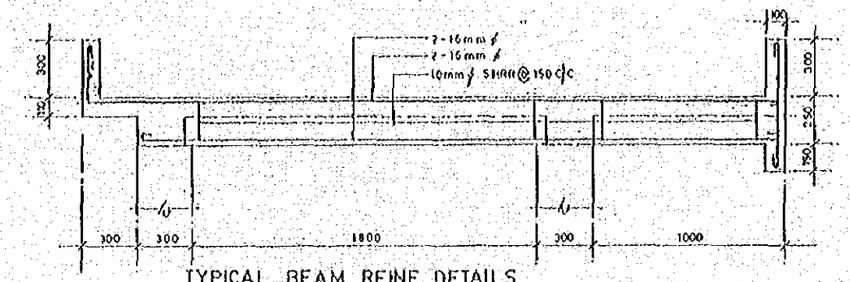
1. ALL DIMENSION ARE IN MILLIMTER IF NOT INDICATED OTHERWISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOR FORECASTING AND WARNING SYSTEM		
DRG. NO.	DETAILED DESIGN OF PILOT TELEMETERY NETWORK MISLELLANEOUS DETAILS		
DESIGN		SCALE:	
CHECKED		DATE	
DRAWN	H AL-SIDDIQUE	DRG. NO.	10
APPROVED			

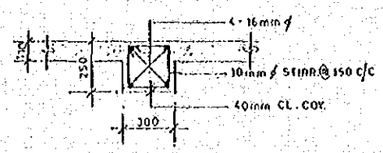
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY



SECTION A-A
SCALE 1: 30

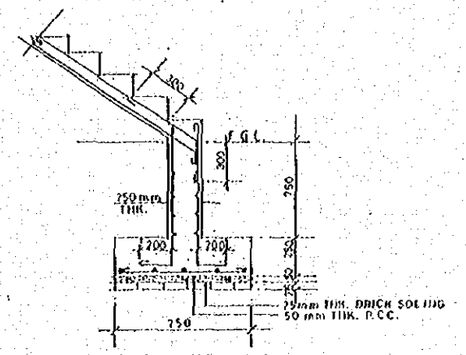


TYPICAL BEAM REINF DETAILS
SCALE 1: 20

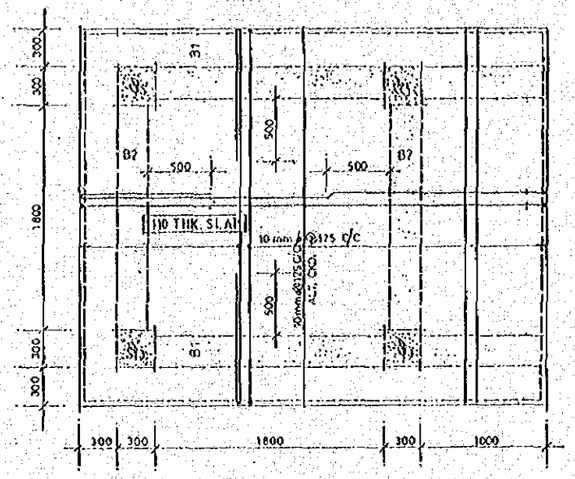


TYPICAL BEAM SEC
SCALE 1: 20

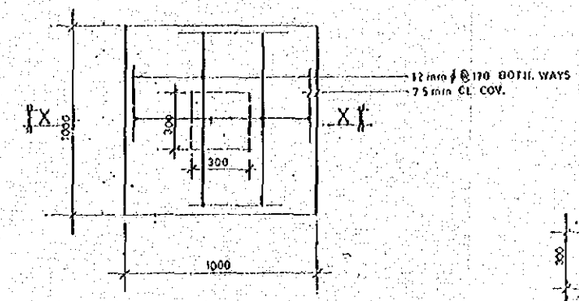
NOTE :-
FOR DEPTH OF FOOTING FROM EXISTING GROUND REF. TO RESPECTIVE SIDE DRG.



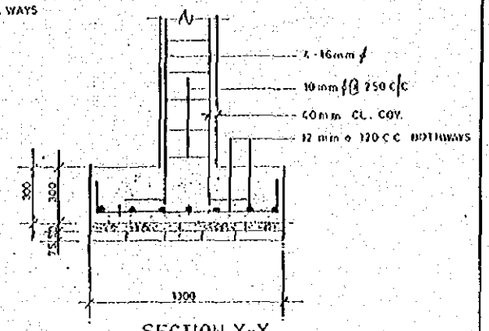
STAIR FOOTING
SCALE 1: 30



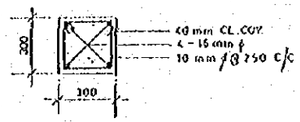
ROOF REINFORCEMENT PLAN
SCALE 1: 30



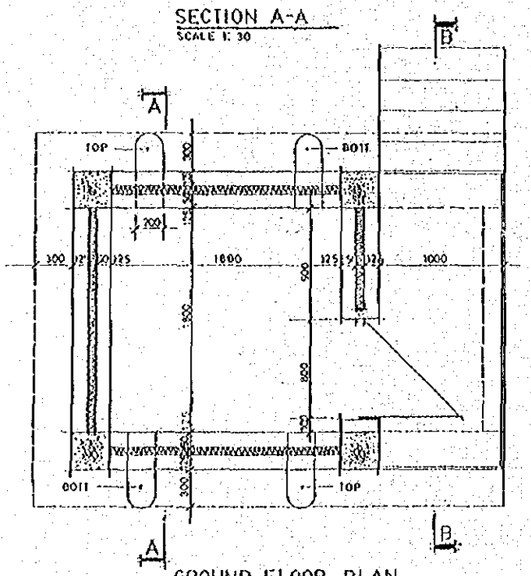
FOOTING REINF PLAN
SCALE 1: 20



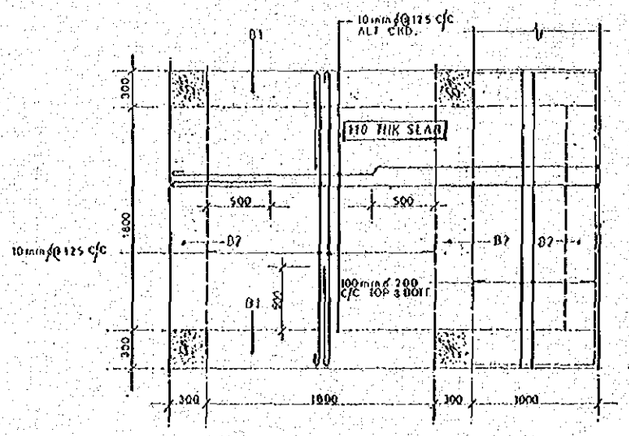
SECTION X-X
SCALE 1: 20



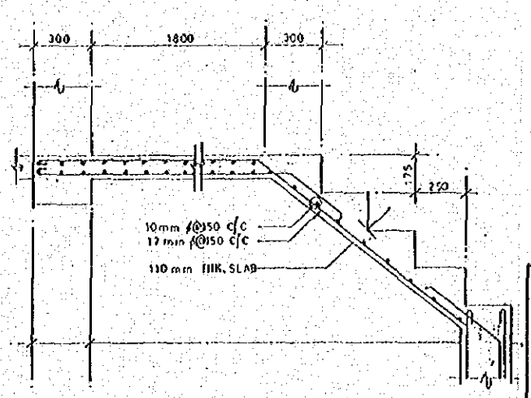
TYP. COLUMN SEC
SCALE 1: 20



GROUND FLOOR PLAN
SCALE 1: 30



GR. FLOOR REINF. PLAN
SCALE 1: 30



SEC. B-B (REINF)
SCALE 1: 20

NOTE :
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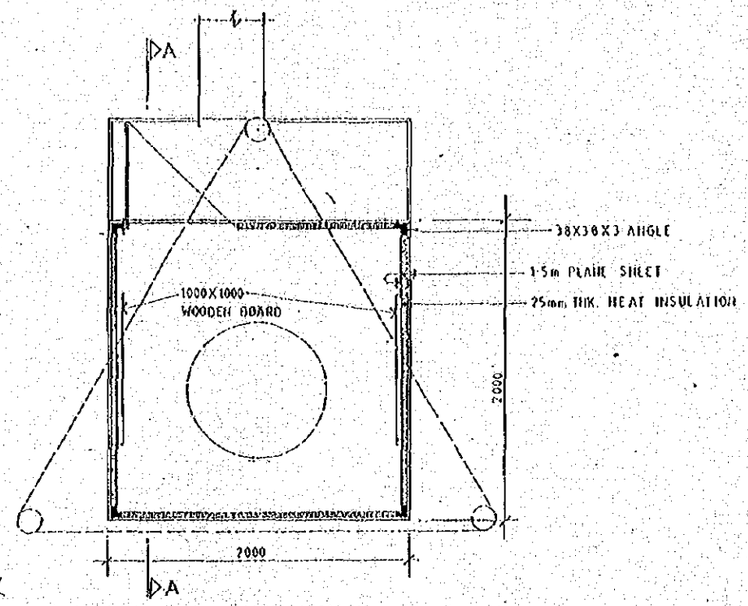
DO NOT SCALE THE DRAWING READ DIMENSINS ONLY

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG. TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK STATION HOUSE (TYPE-1)		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG. NO	11
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY



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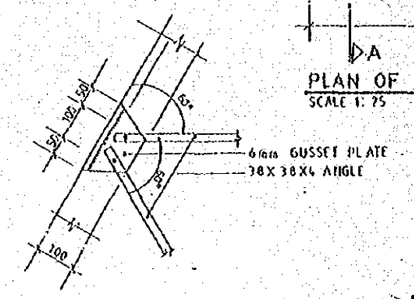

DETAIL -D3
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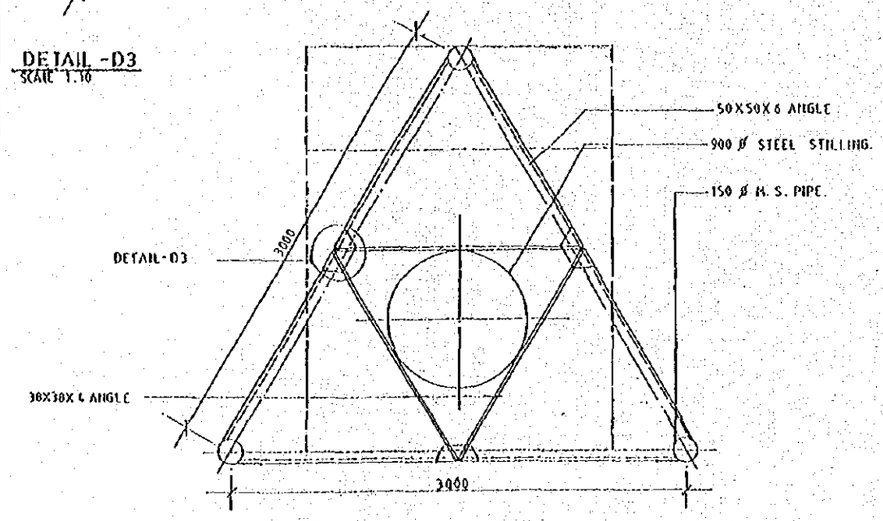

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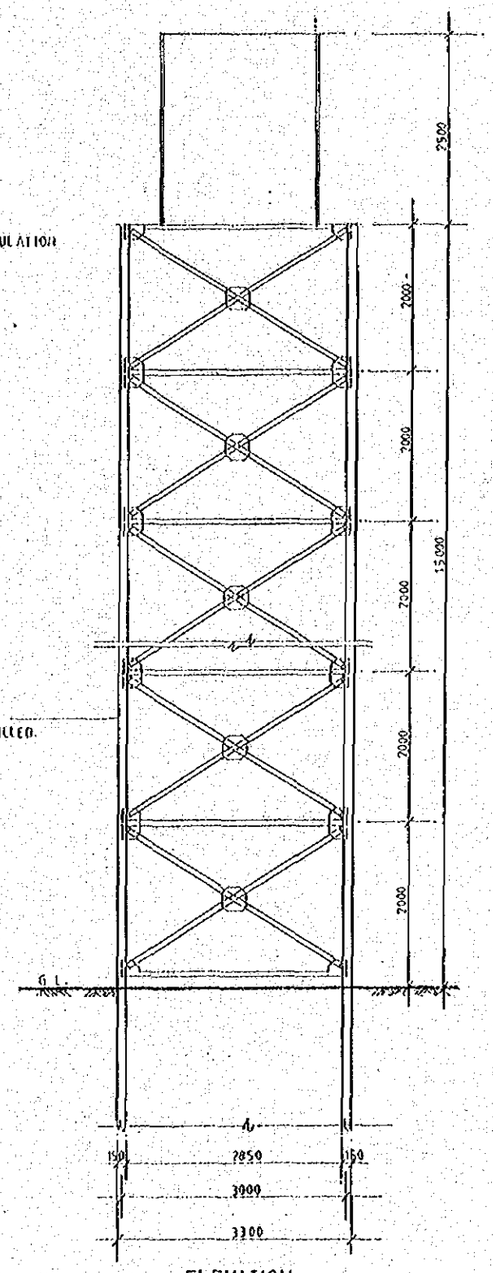
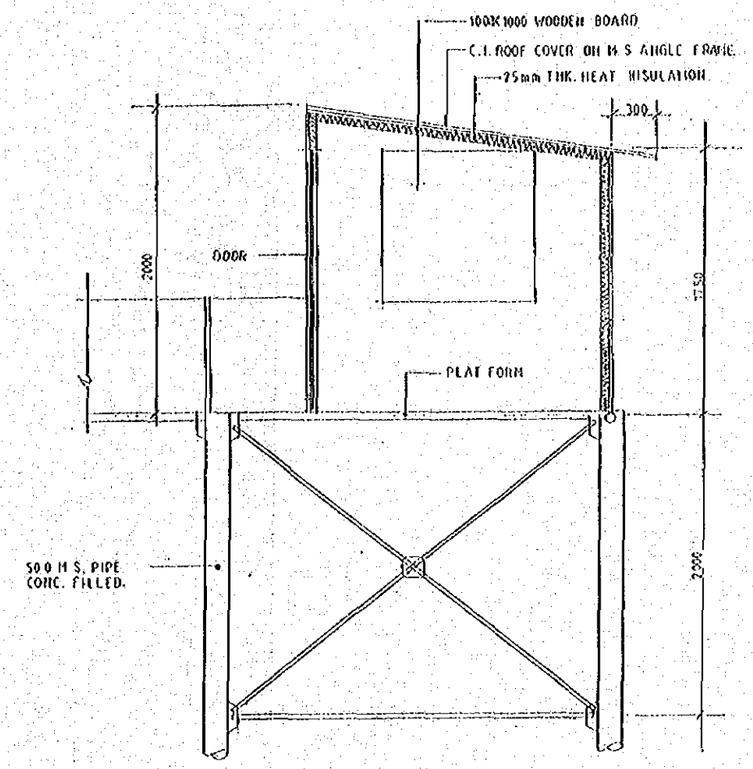


ELEVATION
SCALE 1:50



SECTION A-A
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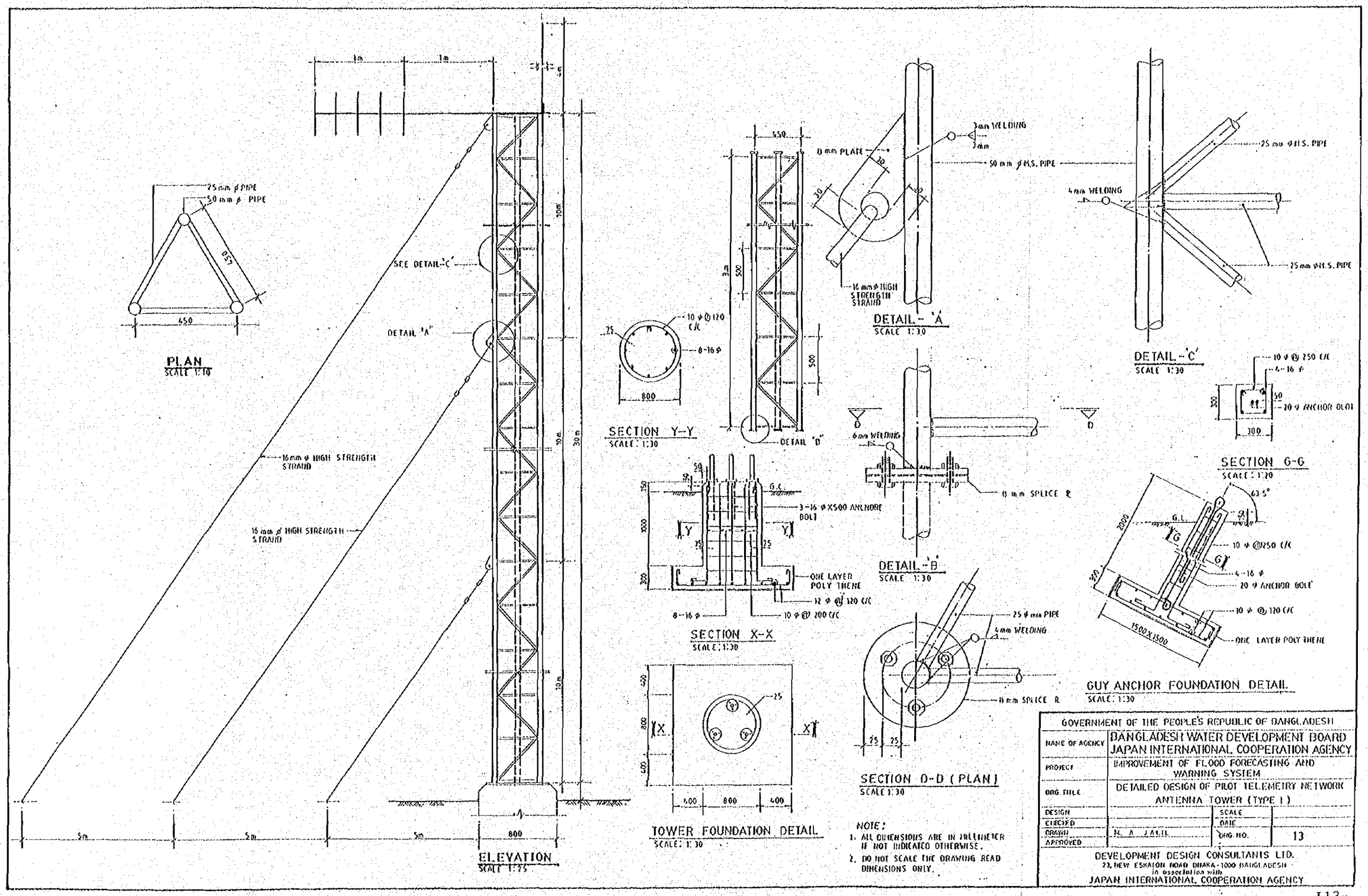
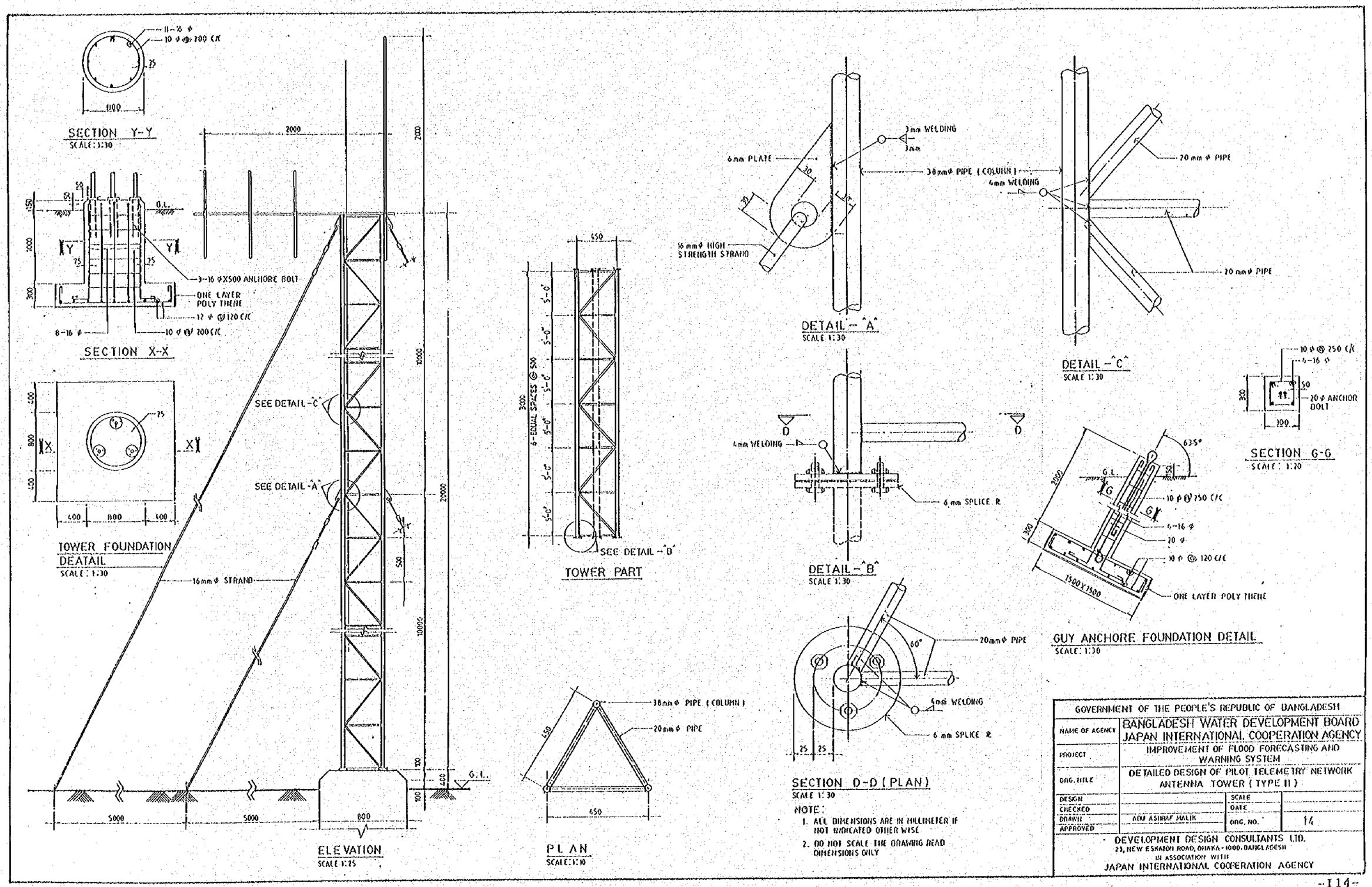
NOTE:-
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHER WISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DWG TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK NARAYANGANJ STATION		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN		DWG. NO	12
APPROVED			

DEVELOPMENT DESIGN CONSULTANTS LTD
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
In association with
JAPAN INTERNATIONAL COOPERATION AGENCY


PLAN
SCALE 1:10
25 mm φ PIPE
50 mm φ PIPE
450
ELEVATION
SCALE 1:25
SEE DETAIL 'C'
DETAIL 'A'
16 mm φ HIGH STRENGTH STRAND
5m
800
SECTION Y-Y
SCALE 1:30
10 φ @ 120 C/C
8-16 φ
DETAIL 'D'
SECTION X-X
SCALE 1:30
3-16 φ X500 ANCHORE BOLT
ONE LAYER POLY THENE
12 φ @ 120 C/C
10 φ @ 200 C/C
G.L.
TOWER FOUNDATION DETAIL
SCALE 1:30
DETAIL - 'A'
SCALE 1:30
3mm WELDING
8 mm PLATE
50 mm φ M.S. PIPE
16 mm φ HIGH STRENGTH STRAND
DETAIL - 'B'
SCALE 1:30
6 mm WELDING
8 mm SPLICE R
SECTION D-D (PLAN)
SCALE 1:30
25 φ mm PIPE
4 mm WELDING
DETAIL - 'C'
SCALE 1:30
25 mm φ M.S. PIPE
4 mm WELDING
SECTION G-G
SCALE 1:20
63.5°
10 φ @ 250 C/C
4-16 φ
20 φ ANCHOR BOLT
10 φ @ 120 C/C
1500X1500
ONE LAYER POLY THENE
GUY ANCHOR FOUNDATION DETAIL
SCALE 1:30
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE.
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY.
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
NAME OF AGENCY
BANGLADESH WATER DEVELOPMENT BOARD
JAPAN INTERNATIONAL COOPERATION AGENCY
PROJECT
IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM
DRG. TITLE
DETAILED DESIGN OF PILOT TELEMETRY NETWORK ANTENNA TOWER (TYPE I)
DESIGN
CHECKED
DRAWN
H. A. JALIL
APPROVED
SCALE
DATE
DRG. NO.
13
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
in association with
JAPAN INTERNATIONAL COOPERATION AGENCY


SECTION Y-Y
SCALE 1:30
SECTION X-X
TOWER FOUNDATION DEATAIL
SCALE 1:30
SEE DETAIL-'C'
SEE DETAIL-'A'
16mm φ STRAND
ELEVATION
SCALE 1:25
TOWER PART
SEE DETAIL-'B'
PLAN
SCALE 1:10
DETAIL-'A'
SCALE 1:30
DETAIL-'B'
SCALE 1:30
DETAIL-'C'
SCALE 1:30
SECTION D-D (PLAN)
SCALE 1:30
GUY ANCHORE FOUNDATION DETAIL
SCALE 1:30
SECTION G-G
SCALE 1:20
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHER WISE
2. DO NOT SCALE THE DRAWING READ DIMENSIONS ONLY
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
NAME OF AGENCY: BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY
PROJECT: IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM
DWG. TITLE: DETAILED DESIGN OF PILOT TELEMETRY NETWORK ANTENNA TOWER (TYPE II)
DESIGN
CHECKED
DRAWN: ABU ASHRAF MALIK
APPROVED
SCALE
DATE
DWG. NO. 14
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW ESKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
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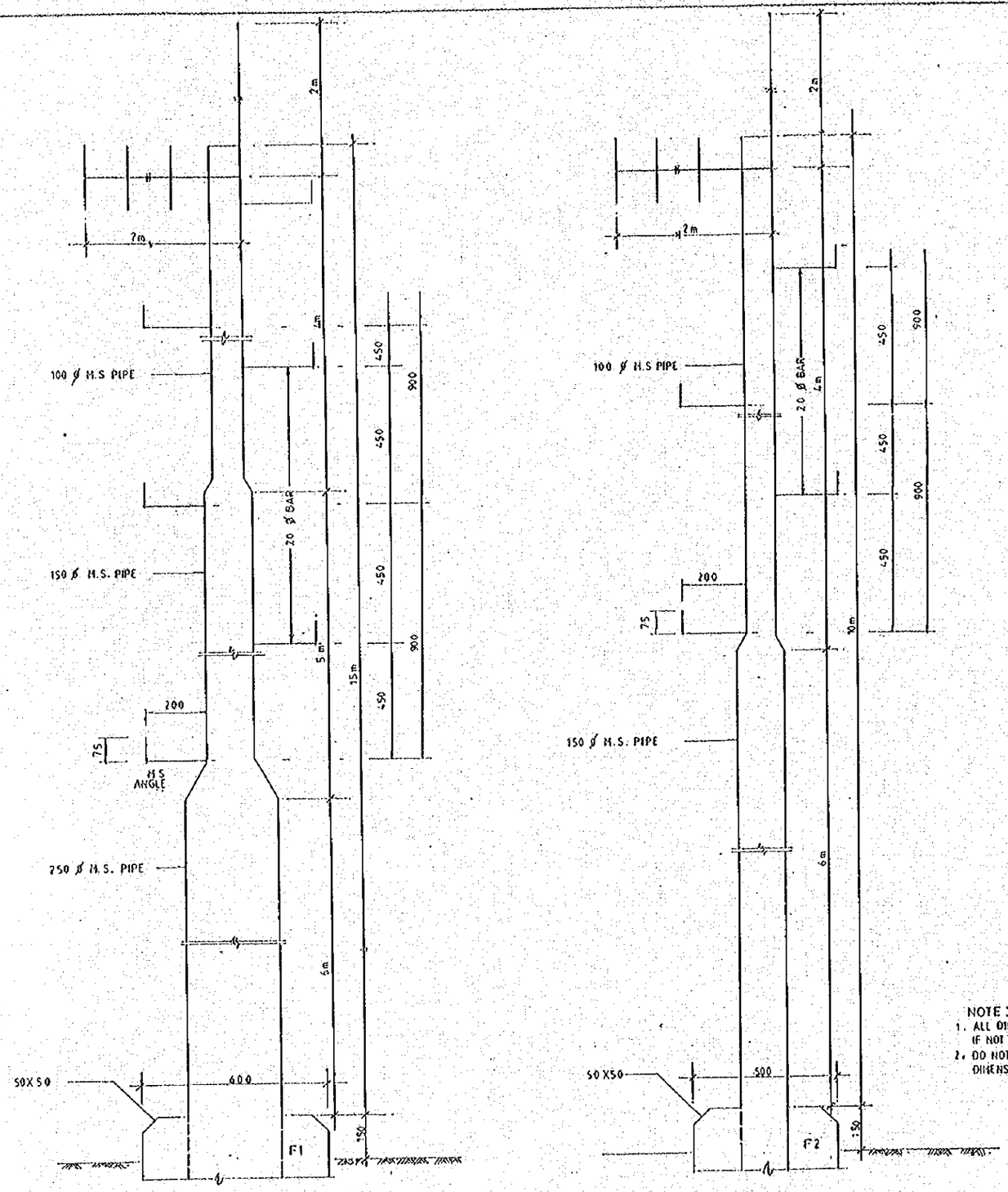

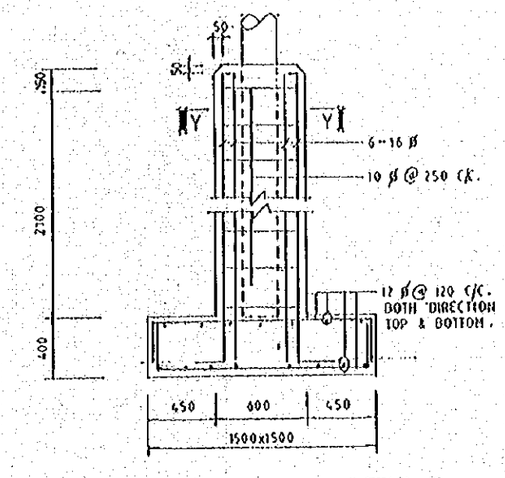

POLE FOUNDATION DETAIL F1
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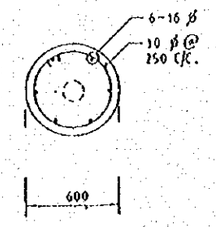

SECTION Y-Y
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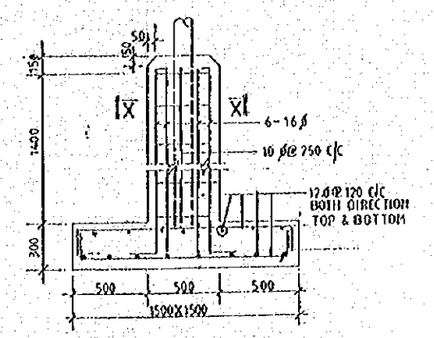

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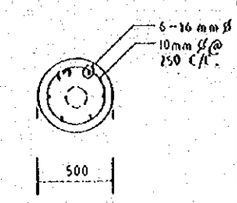

SECTION X-X
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NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETER IF NOT INDICATED OTHERWISE
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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
NAME OF AGENCY	BANGLADESH WATER DEVELOPMENT BOARD JAPAN INTERNATIONAL COOPERATION AGENCY		
PROJECT	IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM		
DRG TITLE	DETAILED DESIGN OF PILOT TELEMETRY NETWORK ANTENNA POLE (TYPE III, IV)		
DESIGN		SCALE	
CHECKED		DATE	
DRAWN	M. A. JALIL	DRG NO	15
APPROVED			

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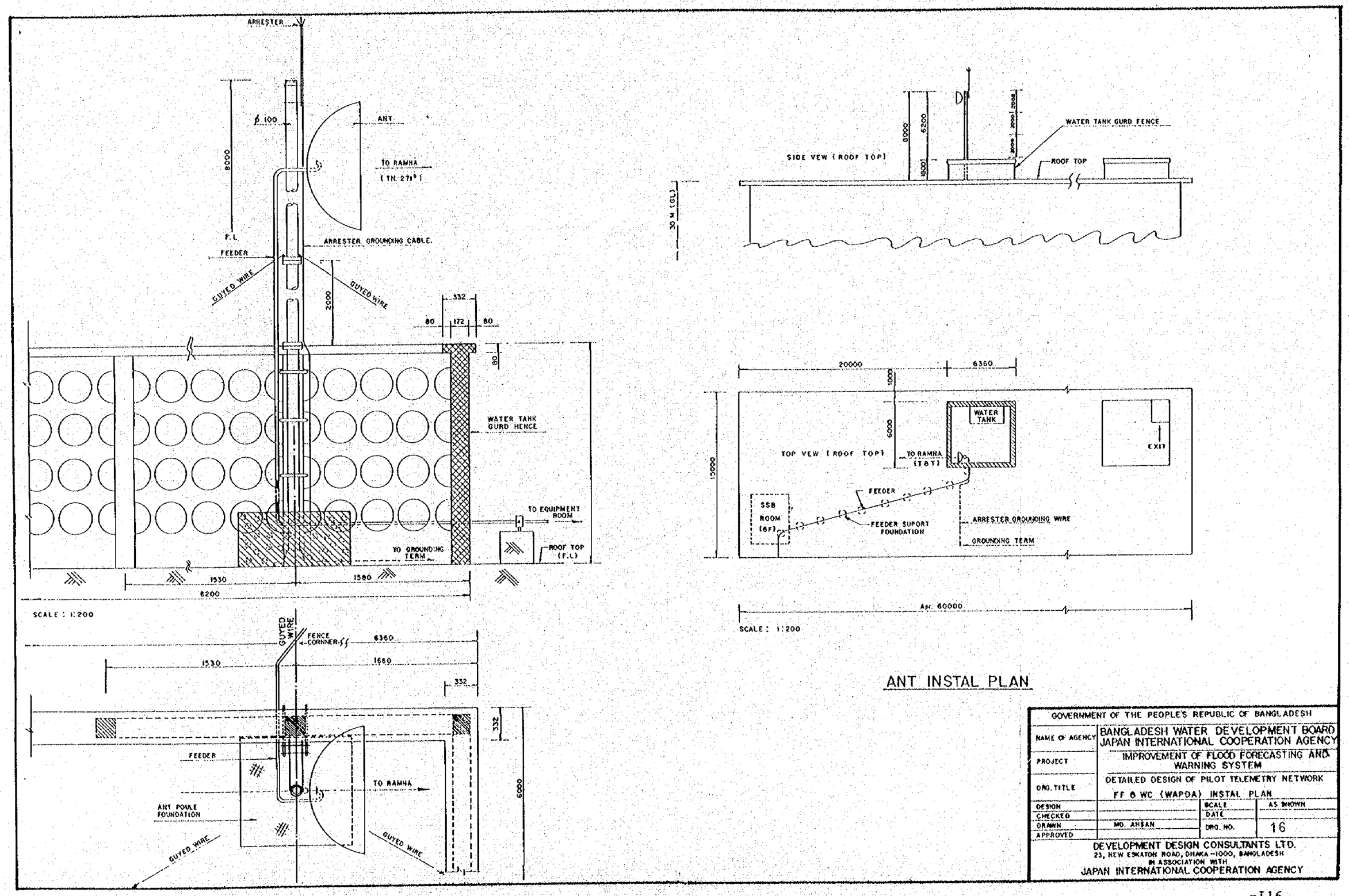
23, NEW ESKATON ROAD DHAKA-1000 BANGLADESH
In association with
JAPAN INTERNATIONAL COOPERATION AGENCY.


ARRESTER
ANT
TO RAMNA
(TN. 271°)
ARRESTER GROUNDING CABLE
FEEDER
GUYED WIRE
GUYED WIRE
WATER TANK GURD HENCE
TO EQUIPMENT ROOM
TO GROUNDING TERM
ROOF TOP (F.L)
SCALE : 1:200
SIDE VEW (ROOF TOP)
WATER TANK GURD FENCE
ROOF TOP
30 M (GL)
TOP VEW (ROOF TOP)
WATER TANK
EXIT
TO RAMNA (TBT)
FEEDER
SSB ROOM (6F)
FEEDER SUPORT FOUNDATION
ARRESTER GROUNDING WIRE
GROUNDING TERM
SCALE : 1:200
GUYED WIRE
FENCE CORNNER
FEEDER
TO RAMNA
ANT POULE FOUNDATION
GUYED WIRE
GUYED WIRE
ANT INSTAL PLAN
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
NAME OF AGENCY
BANGLADESH WATER DEVELOPMENT BOARD
JAPAN INTERNATIONAL COOPERATION AGENCY
PROJECT
IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM
DRG. TITLE
DETAILED DESIGN OF PILOT TELEMETRY NETWORK
FF & WC (WAPDA) INSTAL PLAN
DESIGN
CHECKED
DRAWN
MD. AHSAN
APPROVED
SCALE
AS SHOWN
DATE
DRG. NO.
16
DEVELOPMENT DESIGN CONSULTANTS LTD.
23, NEW EKATON ROAD, DHAKA-1000, BANGLADESH
IN ASSOCIATION WITH
JAPAN INTERNATIONAL COOPERATION AGENCY

APPENDIX-J : FF&WC EXISTING HARDWARE/SOFTWARE

CONSULTANT MISSION REPORT 1

Flood Forecasting and Warning Centre

Hardware/Software Consultant

Mission report 1

Dhaka

11th July 1991

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1. Introduction

The first mission of the Hardware/Software consultant assigned to the Flood Forecasting and Warning Project, BGD/88/013 covered the period 12th May 1991 to 11th July 1991.

A summary of the main recommendation are as follows:

(1) A complete re-wiring of the computer room is required.

(2) The Local Area Network (LAN) should comprise a network of 6 PCs and 2 dumb terminals. A third dumb terminal is to be located in the Cheif Engineer's office.

(3) An second server should be purchased to provide a backup to the main server and to provide additional computing capacity.

(4) The operating system of the LAN should be UNIX in the form of SCO Open Desktop.

(5) A multi-user, UNIX, commercial hydrological database be purchased.

(6) All existing data should be transferred to the new hydrological database.

(7) Data should be stored in one place only and this should be hydrological database files.

(8) Applications which currently produce the forecast bulletin and graphical output should be transferred to the new system and abstract data directly from the hydrological database.

(9) MIKE 11 FF should access data directly from hydrological database files.

(10) FFWC staff should be given local training on the new system and the hydrological database.

(11) One person should be nominated to have overall responsibility for the operation and maintenance of the new computer system (Chief System Administrator). One or more other FFWC staff should have the ability to carry out system administration duties (Assistant System Administrators). These key staff should be at the level of Deputy Director or Executive Engineer.

(12) Chief and Assistant System Administrators should be given more advanced training.

(13) The computing facilities (hardware and software) to be installed at Surface Water Hydrology 2 (SWH-2) under UNDP Project BGD/88/054/D should be compatible with the FFWC system.

(14) BWDB should consider storage of FFWC relevant computerised hydrological data and software at the WAPDA and Green Road sites.

(15) Practical measures should be taken to improve the cleanliness of the FFWC computer room.

(16) There should be close co-operation between the pilot telemetry project and the FFWC to ensure telemetry data is entered directly onto the hydrological database.

The primary outcome of the mission has been to provide a development path for the establishment of a computer Local Area Network (LAN) both in terms of software and hardware. Contracts have been drawn up to enable:

(1) The re-wiring of the computer room.

(2) Hardware, software, installation and basic training.

(3) Supply, installation and training connected with a commercial hydrological database.

The mission has also enabled the development of two new plotting programs and a graphics library.

A timetable for the activities to take place during the second mission of the consultant has been drawn up (Section 9.).

2. Other documents

A mission inception report was prepared shortly after the start of the visit ("Mission Inception Report - C S Green", 29th May 1991). This report describes the main items of computing equipment which had been delivered to the project for flood forecasting purposes. Initial ideas on the new computer system are also included in this report. However some refinement and modification to these original thoughts has since taken place.

Other documents produced during the mission are:

(1) "HPLIB Version 1.0 - FORTRAN HPGL Driver library" - 13th June 1991. (This describes a FORTRAN library written by the consultant for use by FFWC staff to enable new plotting programs to be written efficiently).

(2) "Plotting programs - Historic Water Level Plot WL10 and Historic and Predicted Water Level Plot WLFC" - 25th June 1991. (This describes two plotting programs written to enhance the interpretation of historic water level data and MIKE 11 forecasts).

(3) "Upgrade of FFWC computing facilities - Contract: Computer Local Area Network Installation" - 6th July

1991. (This provides the specification for hardware, software, installation and training required to establish the LAN).

(4) "Upgrade of FFWC computing facilities - Contract: Computer Room Re-Wiring" - 6th July 1991. (This provides the specification for the re-wiring of the computer room).

Copies of these documents are available at the FFWC.

3. Software setup

3.1 Introduction

The choice of software (and hence hardware) has been governed primarily by the need to run the MIKE 11 hydraulic model under UNIX and X Windows.

Consequently the operating system for the LAN will be SCO Open Desktop (ODT) which includes UNIX, X Windows and network facilities. ODT also has a useful MS-DOS emulator and facilities for transferring files between UNIX and MS-DOS. However experience has found the emulator not to be fully compatible with authentic MS-DOS (for example some Norton Utility programs cannot be run nor can Microsoft Windows).

In view of the popularity of MS-DOS and the cheapness of DOS applications, each PC on the LAN will be configured to have the ability to run MS-DOS as an alternative to UNIX. However UNIX will be required for network operations and will be the default operating system.

3.2 Choice of database

Since the new system will be multi-user, access to the database must be carefully controlled to preserve data integrity. This will be even more important in the future if data are being entered automatically in the background from telemetry.

The new system must therefore both support multi-user access and run under UNIX. It is also highly desirable that the database should be a commercial <u>hydrological</u> database. The benefits of this are:

(1) Many standard data entry, plot, print and hydrological analysis facilities are already built in.

(2) The system will be well tried and tested.

(3) The cost is much less than developing a bespoke system.

(4) Support may be obtained from the supplier, including bug fixing and new releases.

(5) Standard interfaces may exist to loggers, chart digitisers and telemetry.

There are several MS-DOS based commercial hydrological databases and the Belgian HOMS component system had already been obtained for the project. However the choice under UNIX is much more limited. Nevertheless two such systems were found and investigated:

(1) WIS (Water Information System). This is a relatively new development by the Institute of Hydrology (IH), UK offering a Geographic Information System (GIS) combined with a hydrological database.

(2) Micro - Tideda. This is an older and more established hydrological database developed by DSIR, New Zealand and in use in a number of Asian countries and is a HOMS component.

Replies to a number of questions regarding suitability to Bangladesh were sought from the suppliers. The reply from IH regarding WIS was not encouraging, whereas the response from New Zealand regarding Micro - Tideda was much more promising.

A demonstration of the PC version of Micro - Tideda for FFWC and SWH-2 staff is currently being arranged. If, after the demonstration, BWDB staff are assured of the benefits of moving to the system, it is recommended that Micro - Tideda be purchased for the FFWC and staff trained in its use.

An additional benefit of Micro - Tideda is that a FORTRAN data access library is available. This means that existing FFWC FORTRAN programs (such as the bulletin and plots) may be transferred to the new database.

Ease of transfer of data between SWH-2 and FFWC would of great benefit. This could be achieved if the database system to be installed under UNDP Project BGD/88/054/D for SWH-2 was compatible with the FFWC system.

3.3 MIKE 11

Currently the MS-DOS version of MIKE 11 is being used for forecasting at the FFWC. This will continue to be used for the remainder of the current flood season.

However the UNIX version will be available later in the year and it is recommended that this be installed during the next visit of the Hardware/Software Consultant when the hydrological database has been installed.

In order to ensure data consistency, minimise disc storage and avoid duplication of effort, all time series data should be stored on one database. This database should be a commercial hydrological database (Section 3.2). However MIKE

11 has its own data storage system. It is therefore desirable to modify MIKE 11 so that it is able to abstract time series data directly from the hydrological database files.

Support from DHI will therefore be required for MIKE 11 (UNIX) installation and testing and for producing a version capable of accessing the hydrological database.

3.4 Compilers

FFWC staff have programs and programming experience in FORTRAN and BASIC. Operating system access and support in both UNIX and DOS is better achieved through 'C'. Consequently all three compilers have been ordered for both operating systems.

3.5 Other software

Other software posposed includes:

(1) Open Desktop Development System

(2) Lotus 123

(3) Word Perfect 5.1

(4) Norton Utilities

(5) Norton Anti-Virus

(6) Laplink III

3.6 Pilot Telemetry project

It will be important to obtain close co-operation with the pilot telemetry project to ensure telemetry data is transferred automatically to the hydrological database (after an automated quality check).

The transfer mechanism will require a joint effort since the combined knowledge of the telemetry system and the FFWC computer system will be required.

Although the pilot telemetry will not come on line until after the current project it will be important to hold these discussions at an early stage to ensure compatible development.

4. Hardware setup

4.1 Rewiring of computer room

The existing wiring and electrical supply system in the computer room is unsatisfactory.

It is recommended that:

(1) The existing old stabiliser and UPS be removed.

(2) A new main supply cable be run from the WAPDA building 8th floor supply to the computer room.

(3) The weather radar be supplied independently via surge protector, voltage stabiliser and existing SANUPS 001^{e} AFE UPS.

(4) A ring main consisting of 15 x 13 amp double square pin sockets be connected to the new main supply through a 3.5 kVA UPS, voltage stabiliser and surge protector.

(5) No other sockets be installed in the computer room except those offering a protected supply.

4.2 Computers

One additional 486 computer has been proposed to provide a backup to the main server in case of failure, and to provide additional computing capacity within the group. Its fast processor will help reduce the MIKE 11 execution time. Apart from the processor the machine will be similar to the current server.

It is recommended that the 486 be the second server in order that its fast processor may be devoted to producing MIKE 11 forecasts a quickly as possible. The primary server has several other duties which impede response time including serving requests for data from all PCs, running dumb terminal processes, printing and plotting.

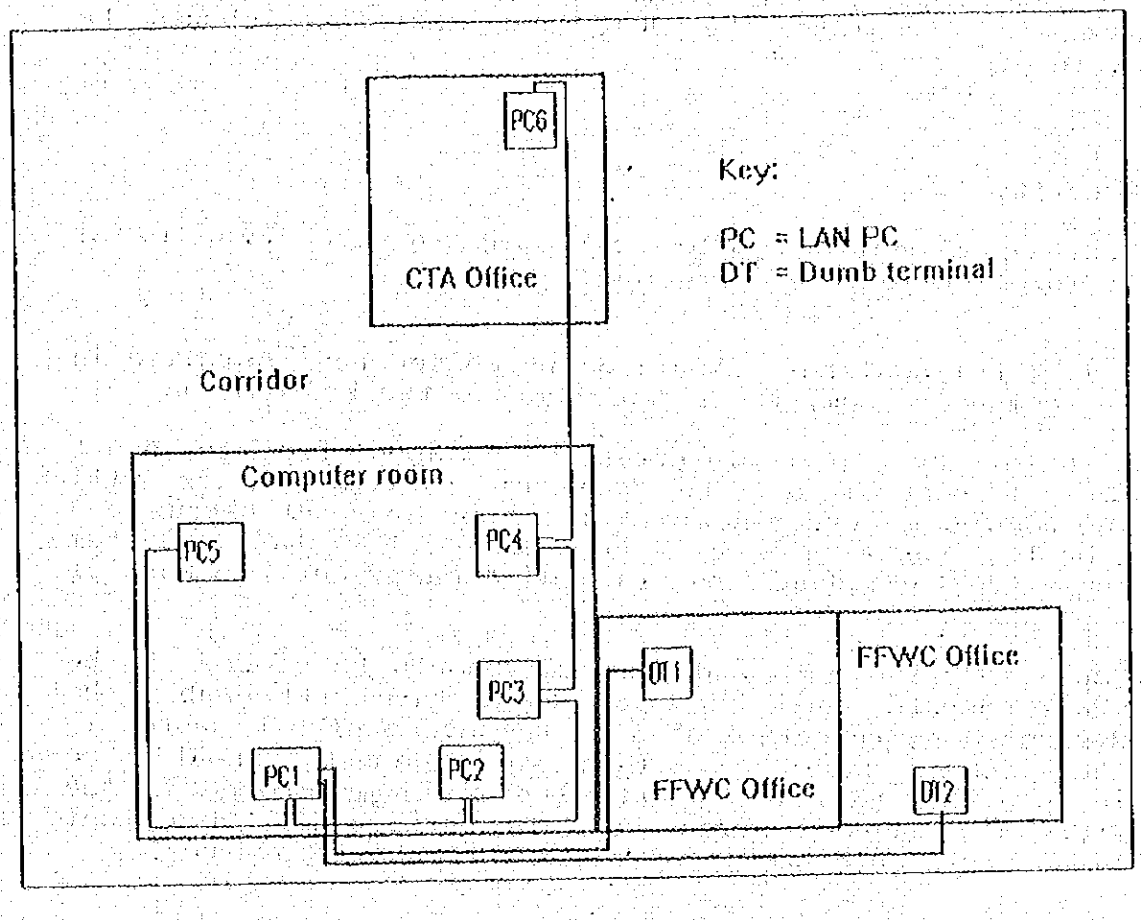
Four of the existing PCs have hard discs which are of insufficient size to install Open Desktop, a 32Mb MS-DOS partition and provide local UNIX storage. Consequently these four machines will have the hard discs upgraded to 200Mb by replacement.

The total load of the computer equipment is 3.0 kVA (excluding the weather radar). The additional 0.5 kVA capacity will allow for the installation of one more PC in the future.

4.3 Local Area Network (LAN)

The FFWC LAN will comprise 6 PCs and 2 dumb terminals connected to the main server. The suggested layout is given below. It is proposed to locate a third dumb terminal in the Chief Engineer's office.

Suggested layout of LAN PCs and dumb terminals



The computer system which is being replaced is illustrated in Appendix B.

5. Computer room cleanliness

The computer room is currently too dirty and has one of its two air conditioners out of order. The working life of the new computer system will be extended significantly if simple measures are taken to remedy this situation.

The following recommendations should be implemented to improve the cleanliness and working environment of the computer room:

(1) Closing springs should be fitted to the computer room door and the two doors of the entrance lobby.

(2) A shoe cleaning mat should be purchased and located in the entrance lobby.

(3) The defective air conditioner should be repaired if possible or replaced if not.

(4) The floor and work surfaces of the computer room should be cleaned daily with a damp cloth. Dry brooms and vacuum cleaners circulate the dust and therefore should be avoided.

6. Security

The recommendations below will improve the security of BWDB hydrological data and programs:

(1) 5 fire extinguishers should be purchased and installed in the computer room, the radio room and the WMO office.

(2) A Chief System Administrator be appointed to exert overall control of the computer system. Duties will include user authorisation, data and program backup and trouble shooting. One or more Assistant System Administrators should be trained to carry out the work of the Chief.

(3) Copies of FFWC data and programs should be stored at the SWH-2 computer unit at Green Road. This will enable the system to be re-established in the event of a disaster in the WAPDA building. This arrangement should be reciprocated with SWH-2 data and programs stored in the FFWC. This second arrangement is particularly important since SWH-2 data set is of major national importance.

7. Software development

Software development undertaken during the mission comprised:

(1) Modification of existing FFWC programs to use the new Roland plotter.

(2) Writing of a FORTRAN driver library (HPLIB) to enable efficient development of new graphics programs.

(3) Development of a plotting program to plot the last 10 day water levels at selected sites (program WL10). An example of WL10 output is given in Appendix A.

(4) Development of a plotting program for presentation of MIKE 11 forecasts (program WLFC). An example of WLFC output is given in Appendix A.

8. Tandy - PC link

With the help of SWH-2, a link has been established between the existing Tandy equipment and a PC. It is now possible to transfer data and program source code between the two systems.

The major use of this link will be in transferring all historic data from the Tandy to the new system. Important programs will also be transferred.

Since the transmission speed is relatively low, this transfer will take some time. A programme is in hand to complete the exercise over the next few weeks.

9. Timetable for next visit

The installation work for the new system will start with the computer room re-wiring. Since the Tandy Xenix equipment will be used for forecasting purposes until the end of the flood season, it will not be possible to start work on the new system until then. The normal finish date for the flood season is 30th September, but this may be extended under exceptional circumstances.

The project completion date is in January 1992.

There is therefore a three month window in which installation, commissioning and training must take place, starting at the beginning of October and finishing at the end of December.

If the end of the flood season is delayed, it will be necessary to arrange temporary placement of the Tandy equipment so that re-wiring can commence.

The following external contracts must fit in with the timetable in order to guarantee completion within time:

(1) Re-wiring the computer room.

(2) Installation of the LAN and basic training.

(3) Training on the hydrological database.

(4) Installation of MIKE 11 and modification to access data from the hydrological database.

The second visit of the Hardware/Software Consultant should commence at the end of September 1991.

The proposed timetable is as follows:

October 1991

Date	A	B	C	D	E	F	G	H	I	J	K	L	M
1	X	X											
2	X	X											
3	X	X											
(4)													
5	X	X											
6	X	X											
7	X	X											
8	X	X											
9	X	X											
10	X	X											
(11)													
12			X										
13			X										
14			X										
15			X										
16			X										
17			X										
(18)													
19				X					X				
20				X					X				
21				X					X				
22				X					X				
23				X					X				
24				X					X				
(25)													
26				X									
27				X									
28				X									
29				X									
30				X									
31				X									

Key:

A = Re-wire computer room
B = Upgrade existing computers
C = Install LAN
D = Basic training
E = Advanced training
F = Hydrological database installation
G = Hydrological database training
H = MIKE 11 FF (UNIX) installation/modification
I = Write data conversion program
J = Data transfer to hydrological database
K = Conversion of FFWC programs
L = Training on the complete system
M = Reporting

November 1991

Date	A	B	C	D	E	F	G	H	I	J	K	L	M
(1)													
2					X								
3					X								
4					X								
5					X								
6					X								
7					X								
(8)													
9					X	X							
10					X	X							
11					X	X							
12					X	X							
13					X	X							
14					X	X							
(15)													
16							X			X			
17							X			X			
18							X			X			
19							X			X			
20							X			X			
21							X			X			
(22)													
23							X	X		X			
24							X	X		X			
25							X	X		X			
26							X	X		X			
27							X	X		X			
28							X	X		X			
(29)													
30													

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December 1991

Date	A	B	C	D	D	F	G	H	I	J	K	L	M
1								X					
2								X					
3								X					
4								X					
5								X					
(6)													
7											X		
8											X		
9											X		
10											X		
11											X		
12											X		
(13)													
14											X		
15											X		
16											X		
17											X		
18											X		
19											X		
(20)													
21												X	
22												X	
23												X	
24												X	
25												X	
26												X	
(27)													
28												X	X
29												X	X
30												X	X
31												X	X

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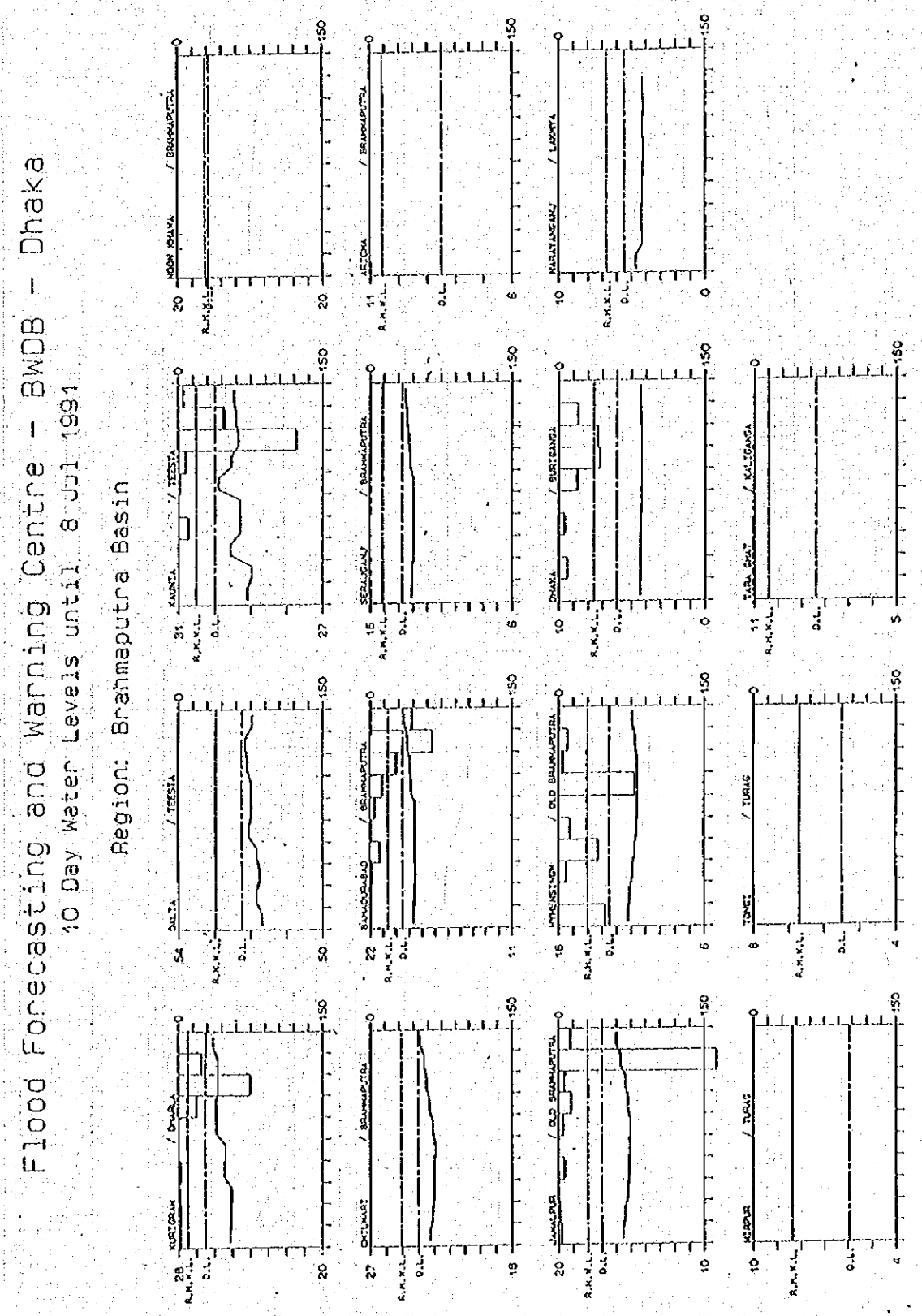
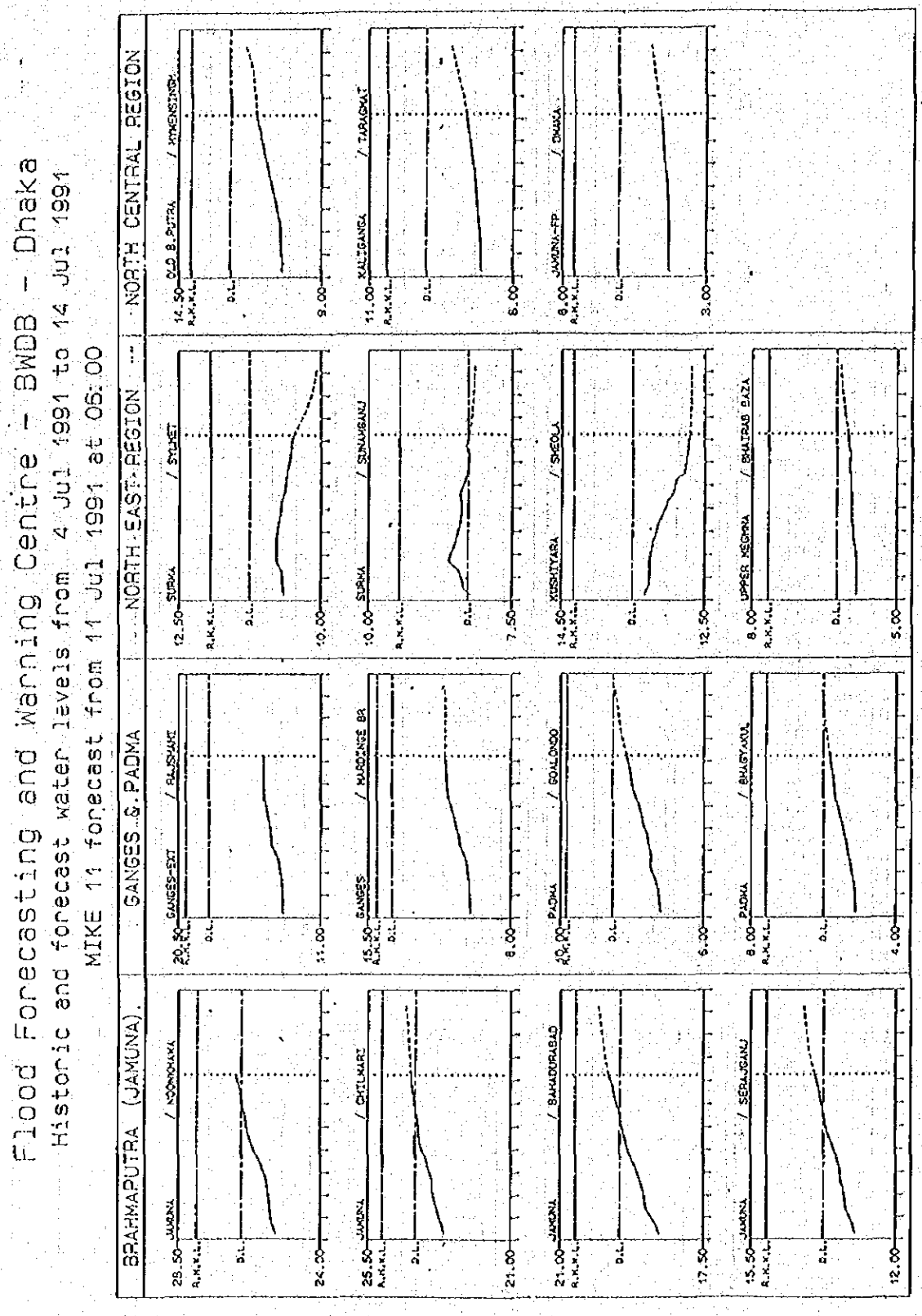
Appendix A - Example output from new plotting programs

WL10 - 10 day historic water levels



WLFC - Historic and forecast water levels



Appendix B - Existing computer layout