

BANK PROTECTION PILOT PROJECT FAP-21

TEST SITE I
KAMARJANI

CONTRACT DOCUMENTS FOR

CONSTRUCTION OF PERMEABLE GROYNES

VOLUME IV

CONTRACT DRAWINGS

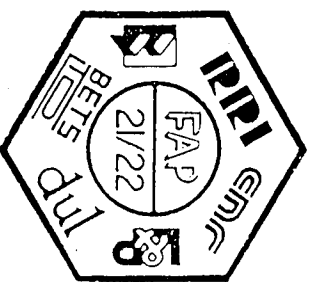
(AUGUST 1994)

JAMUNA TEST WORKS CONSULTANTS, JOINT VENTURE

CONSULTING CONSORTIUM FAP 21/22

RHEIN-RUHR ING.-GES.MBH, DORTMUND/GERMANY

COMPAGNIE NATIONALE DU RHONE, LYON/FRANCE
PROF.DR. LACKNER & PARTNERS, BREMEN/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS



In association with:

BANGLADESH ENGINEERING &
TECHNOLOGICAL SERVICES LTD.(BETS)
DESH UPODESH LIMITED (DUL)

BANK PROTECTION PILOT PROJECT
FAP-21

TEST SITE I
KAMARJANI

CONTRACT DOCUMENTS

FOR

CONSTRUCTION OF PERMEABLE GROYNES

VOLUME IV

CONTRACT DRAWINGS

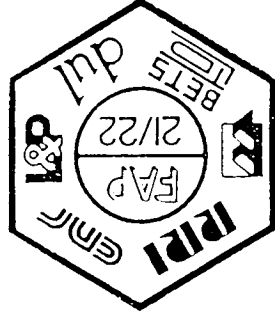
(AUGUST 1994)

JAMUNA TEST WORKS CONSULTANTS, JOINT VENTURE

CONSULTING CONSORTIUM FAP 21/22

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BANGLADESH ENGINEERING &
TECHNOLOGICAL SERVICES LTD.(BETS)
DESH UPODESH LIMITED (DUL)

In association with:

CONSTRUCTION OF PERMEABLE GROYNES
TEST SITE I
KAMARJANI

LIST OF CONTRACT DRAWINGS

GENERAL DRAWINGS

KA-001:	Location Map
KA-002:	General Layout
KA-003:	Layout of Groynes
KA-004:	Subsoil Conditions
KA-005:	Filter Gradation Curves
KA-006:	Stone Gradation and Layer Thicknesses
KA-007:	Project Sign Board
KA-008:	General Installation Method; Steel Sheet Pile Cofferdam
KA-009:	General Installation Method; Tubular Steel Piles (Off-Shore)
KA-010:	General Installation Method; Geotextile Filter Materials
KA-011:	General Construction Time Schedule
KA-012:	Monitoring Field Station; Layout, Plan, Elevation, Foundation
KA-013:	Monitoring Field Station; Septic Tank, Ground Water Well, Fresh Water Tank
KA-014:	BWDB-Embankment; Recommended Design Details

GROYNE G-1

KA-101:	General Arrangement; Elevation, Plan, Section
KA-102:	Steel Pile dia. 711 x 14.2 mm; Pile Schedule, Details
KA-103:	Steel Pile dia. 1016 x 20 mm; Pile Schedule, Details
KA-104:	Steel Pile dia. 1220 x 20 mm; Pile Schedule, Details
KA-105/I:	Pile Installation Plan
KA-105/II:	Pile Installation Report (Specimen Form)
KA-106:	Sheet Pile Cofferdam (Arbed PU-6); Pile Installation Plan, Pile Schedule
KA-107:	Sheet Pile Cofferdam (Arbed PU-6); Detailed Layout, Sections
KA-108/I:	Sheet Pile Cofferdam (Arbed PU-6); Details of Anchoring - Sheet I
KA-108/II:	Sheet Pile Cofferdam (Arbed PU-6); Details of Anchoring - Sheet II
KA-109:	Revetment and Bed Protection; Plan, Detailed Sections
KA-110:	Monitoring Gangway - Standard Unit
KA-111:	Monitoring Platform
KA-112:	Pile Head Connections
KA-113:	Navigation Aids "East Cardinal Mark"

GROYNE G-2

KA-201:	General Arrangement; Elevation, Plan, Section
KA-202:	Steel Pile dia. 711 x 14.2 mm; Pile Schedule, Details
KA-203:	Steel Pile dia. 1016 x 20 mm; Pile Schedule, Details
KA-204:	Steel Pile dia. 1220 x 20/14.2 mm; Pile Schedule, Details

KA-205:	Pile Installation Plan
KA-206:	Revetments, Falling Aprons; Plan
KA-207:	Revetments, Falling Aprons; Detailed Sections
KA-208:	Monitoring Gangway - Units No. 1-2
KA-209:	Pile Head Connections and Bracing

GROYNE G-3

KA-301:	General Arrangement; Elevation, Plan, Section
KA-302:	Steel Pile dia. 711 x 14.2 mm; Pile Schedule, Details
KA-303:	Steel Pile dia. 1016 x 20 mm; Pile Schedule, Details
KA-304:	Steel Pile dia. 1220 x 20 mm; Pile Schedule, Details
KA-305:	Pile Installation Plan
KA-306:	Pile Frame and Bracing
KA-307:	Revetments and Falling Aprons; Plan
KA-308:	Revetments and Falling Aprons; Detailed Sections

GROYNE G-A

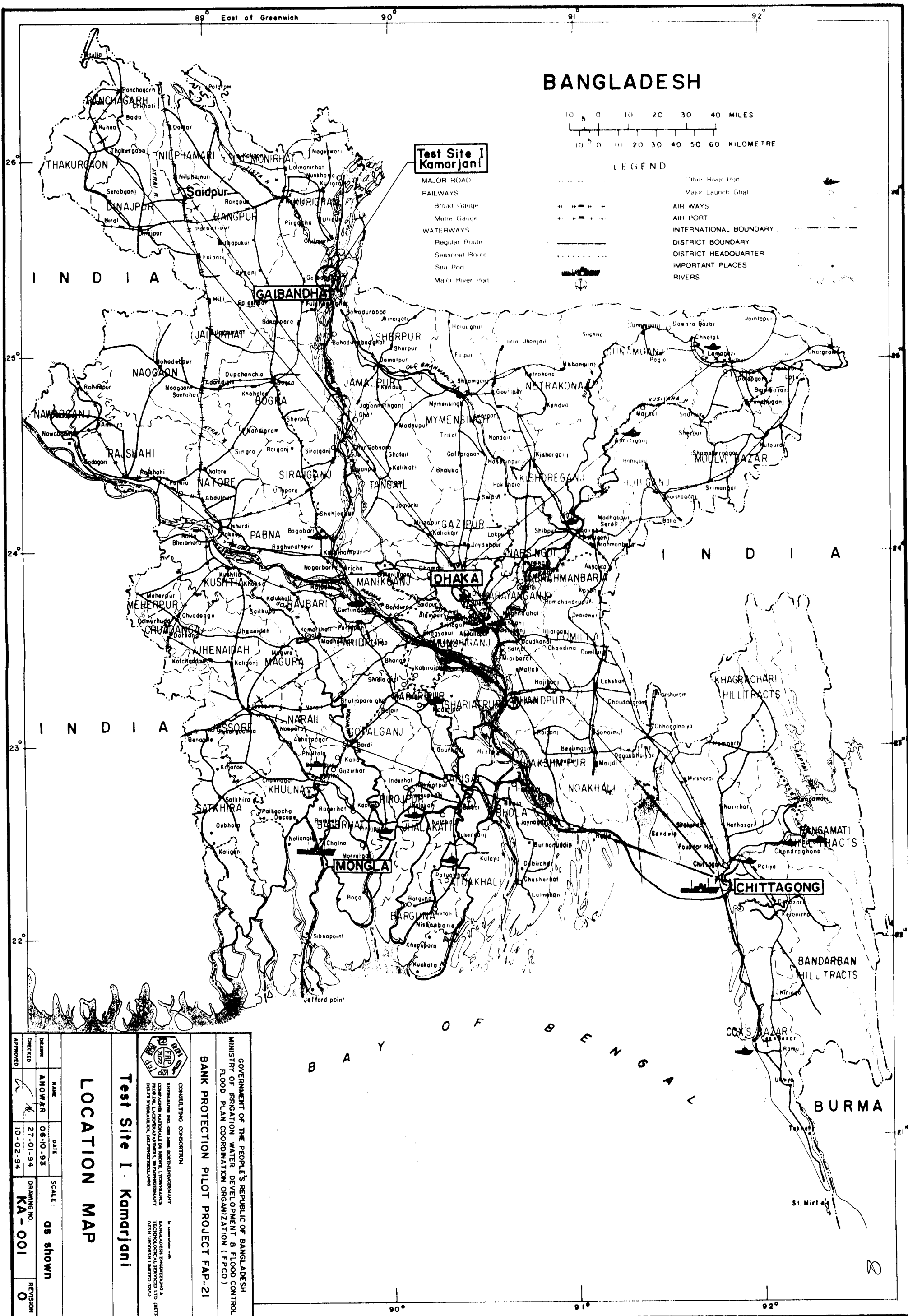
KA-401:	General Arrangement; Elevation, Plan
KA-402/I:	In-situ Concrete Pile dia. 914 mm (36"); (Bored Pile)
KA-402/II:	Bored Pile Production Report; (Specimen Form)
KA-403:	Prestressed Spun Concrete Pile; dia. 500/100 mm
KA-403/Alt:	In-situ Concrete Pile dia. 508 mm (20"); (Bored Pile)
KA-404:	Pile Installation Plan
KA-405:	Reinforced Concrete Sheet Piling
KA-406:	Concrete Sheet Pile Cofferdam; Pile Installation Plan, Details
KA-407/I:	Concrete Sheet Pile Cofferdam; Details of Anchoring-Sheet I
KA-407/II:	Concrete Sheet Pile Cofferdam; Details of Anchoring-Sheet II
KA-408:	Concrete Sheet Pile Cofferdam; Capping Beams, Waling Beams

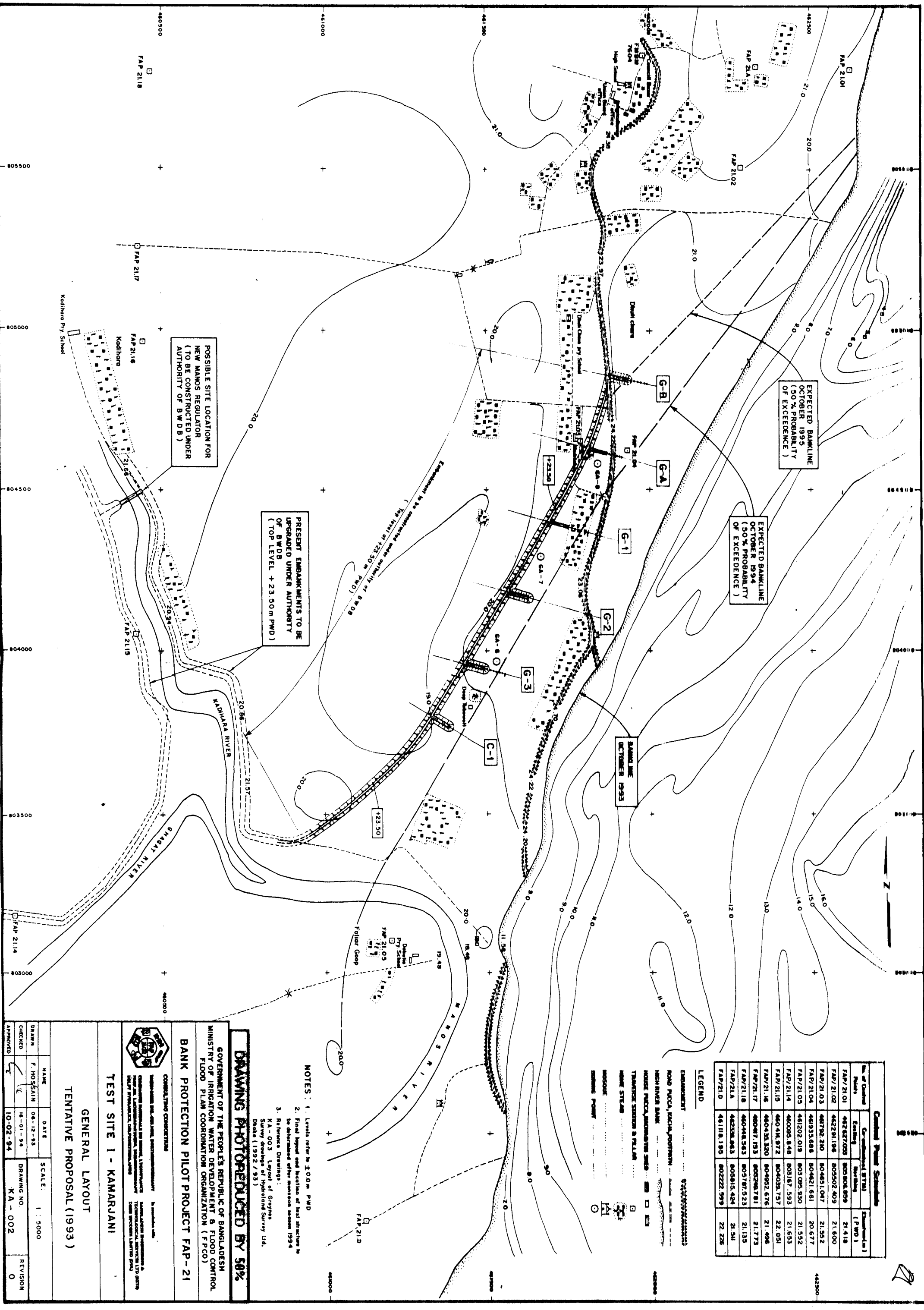
GROYNE G - B

KA-501:	General Arrangement; Elevation, Plan
KA-502:	In-situ Concrete Pile dia. 914 mm (36"), (Bored Pile)
KA-503:	Prestressed Spun Concrete Pile; dia. 500/100 mm
KA-503/Alt:	In-situ Concrete Pile dia. 508 mm (20"); (Bored Pile)
KA-504:	Pile Installation Plan

CROSS BAR C-1

KA-601:	Typical Design; Plan
KA-602:	Typical Design; Detailed Sections





Contract Price Schedule			
No. of Contract	Contracted (BTB)	Estimated (m)	
Part	Existing	New	
FAP/21.01	442 627.008	803 806.809	21.418
FAP/21.02	442 281.198	803 502.409	21.800
FAP/21.03	446 792.240	804 461.047	21.352
FAP/21.04	449 335.686	804 461.661	20.677
FAP/21.05	446 202.018	803 095.930	21.552
FAP/21.14	440 095.848	803 167.593	21.553
FAP/21.15	440 414.972	804 038.737	22.051
FAP/21.16	440 435.320	804 992.676	21.496
FAP/21.17	440 047.153	800 298.781	21.773
FAP/21.18	440 444.563	803 875.23	21.135
FAP/21.19	442 358.463	803 815.424	21.341
FAP/21.20	441 118.195	802 222.599	22.225

LEGEND

- EMBANKMENT
- ROAD P.W.C.A. / P.W.C.A. / P.W.C.A.
- HIGH RIVER BANK
- HOUSE P.W.C.A. / P.W.C.A. / P.W.C.A.
- THICKNESS SECTION & FILL
- HOUSE STEAD
- HOUSE
- HOUSE
- HOUSE

NOTES

1. Levels refer to 2.00 m P.W.D.
2. Final layout and location of test structure to be determined after monsoon season 1994
3. Reference Drawings:
KA-003 Layout of Groyne
Survey drawings of Hydrology Survey Unit,
Dhaka (1992 / 93)

DRAWING PHOTO REPRODUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONTRACT

TEST SITE 1 - KAMARIJANI
GENERAL LAYOUT
TENTATIVE PROPOSAL (1993)

NAME	DATE	SCALE	DRAWING NO.	REVISION
F. HOSAIN	08-12-93	1 : 5000	KA-002	0
CHECKED	18-01-94			
APPROVED	10-02-94			

✓



NOTES:

- NOTES:**

DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM



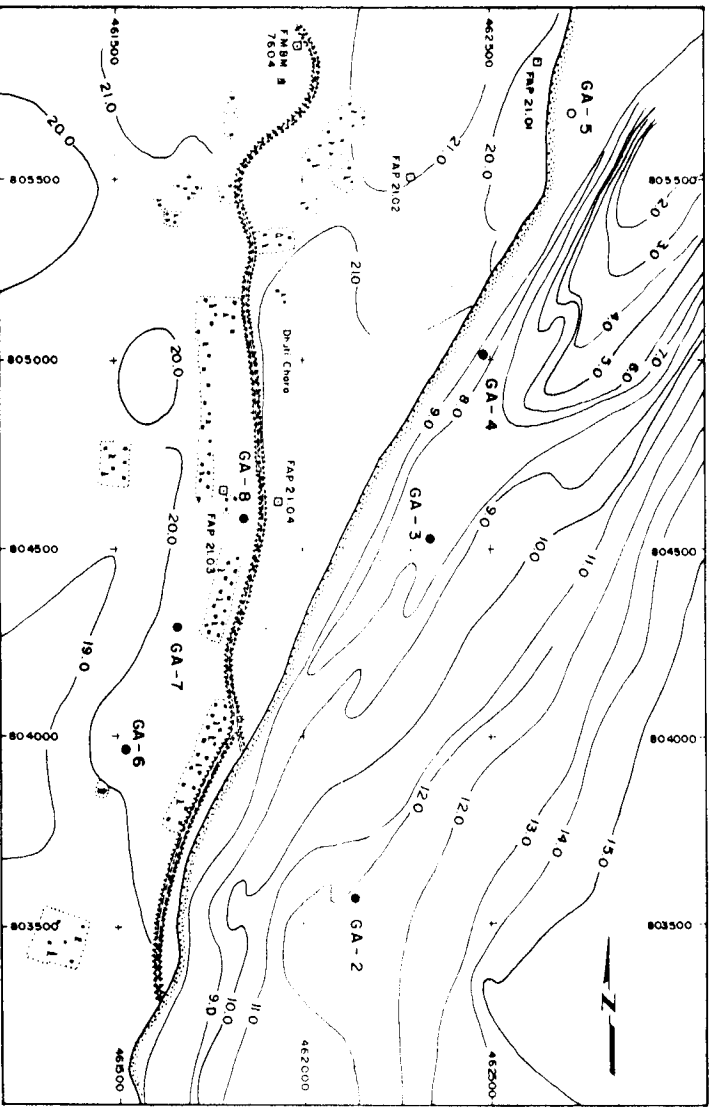
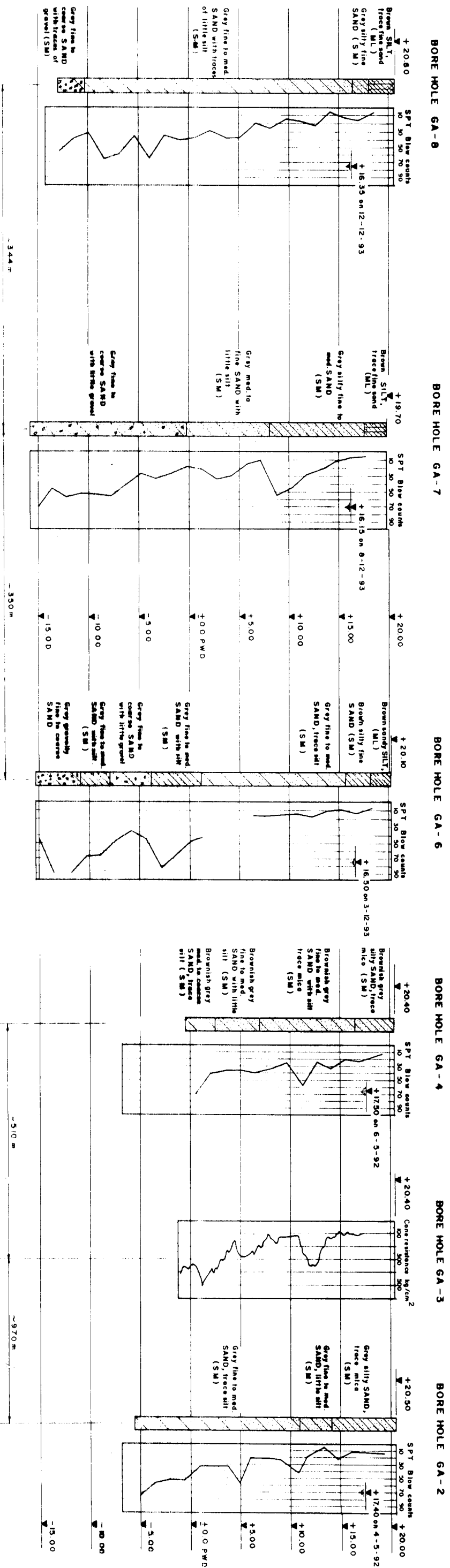
CONCRETE MATERIALS BY NAME, TYPE/FACTS
BY NAME, LOCATION/TYPE, INDEX/CLASSIFICATION
BY MATERIAL TYPE/CLASSIFICATION

BAKERDON INDUSTRIES &
TECHNOLOGICAL SERVICES LTD (PVT)
BOMBAY (INDIA)

TEST SITE 1 - KAMARJANI

LAYOUT OF GROYNES

	NAME	DATE	SCALE: 1:2000	
DRAWN	K.M.A. HALIM	01-12-93		
CHECKED		16-01-94	DRAWING NO. KA-003	REVISION 0
APPROVED	<i>[Signature]</i>	10-02-94		



Borehole No.	Location (B.T.M.)	
	Easting	Northing
GA-2	462132	803572
GA-3	462340	804520
GA-4	462490	805007
GA-6	461535	803961
GA-7	461675	804282
GA-8	461847	804580

- NOTES
1. Soil investigation for bore hole No GA-2, GA-3 and GA-4 were executed by Foundation Consultants Ltd between March '92 to May '92.
 2. Soil investigation for bore hole No GA-6, GA-7 and GA-8 were executed by Soiltech Int. Ltd between November '93 to December '93.
 3. Soil description for bore hole No. GA-5 has not been depicted on the drawing.
 4. Levels refer to ± 0.0 m P.W.D.
 5. All dimensions are in meter.

DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

BANK PROTECTION PILOT PROJECT FAP-21

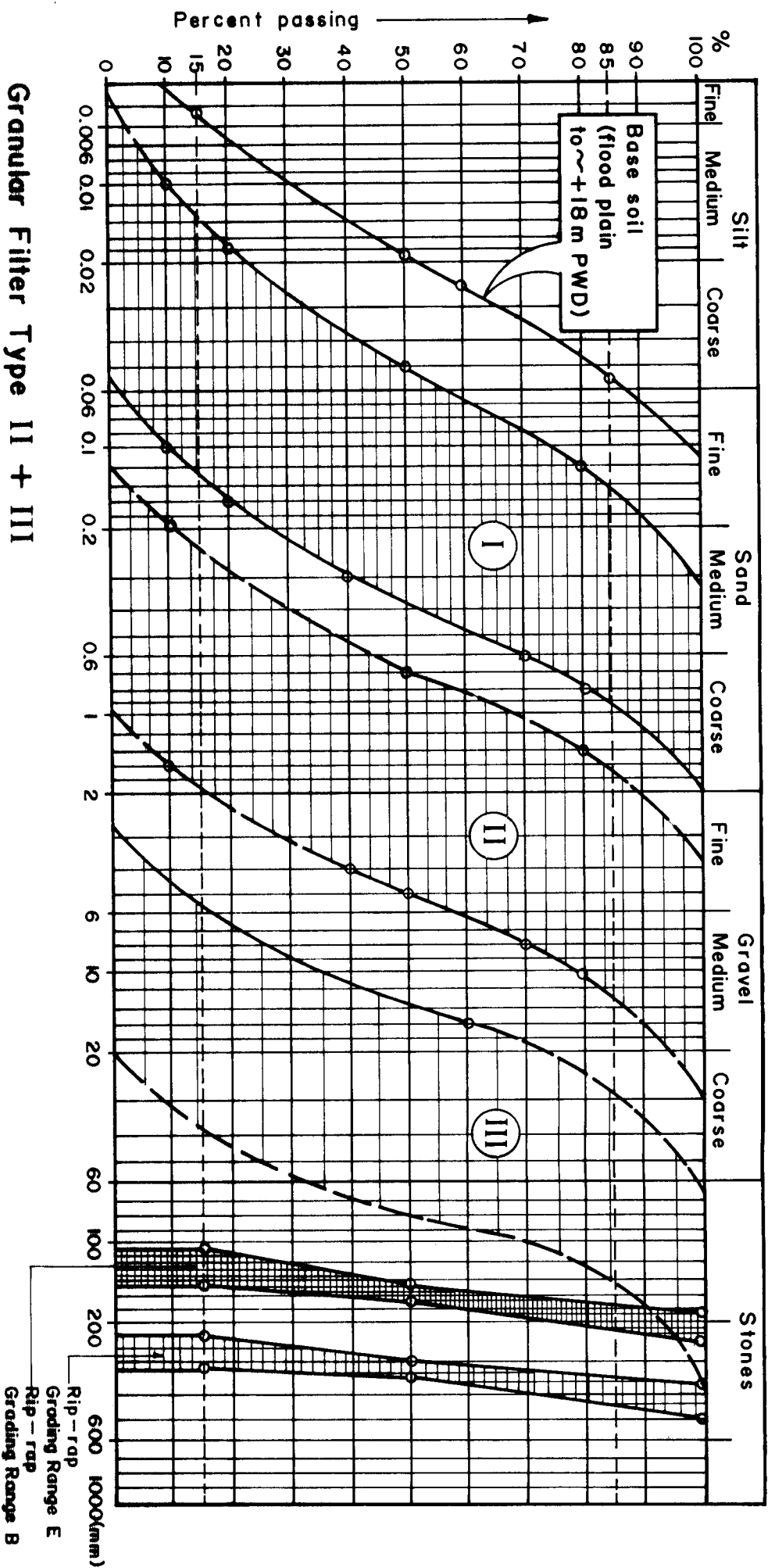
CONSULTING CORPORATION

TEST SITE 1 - KAMARJANI

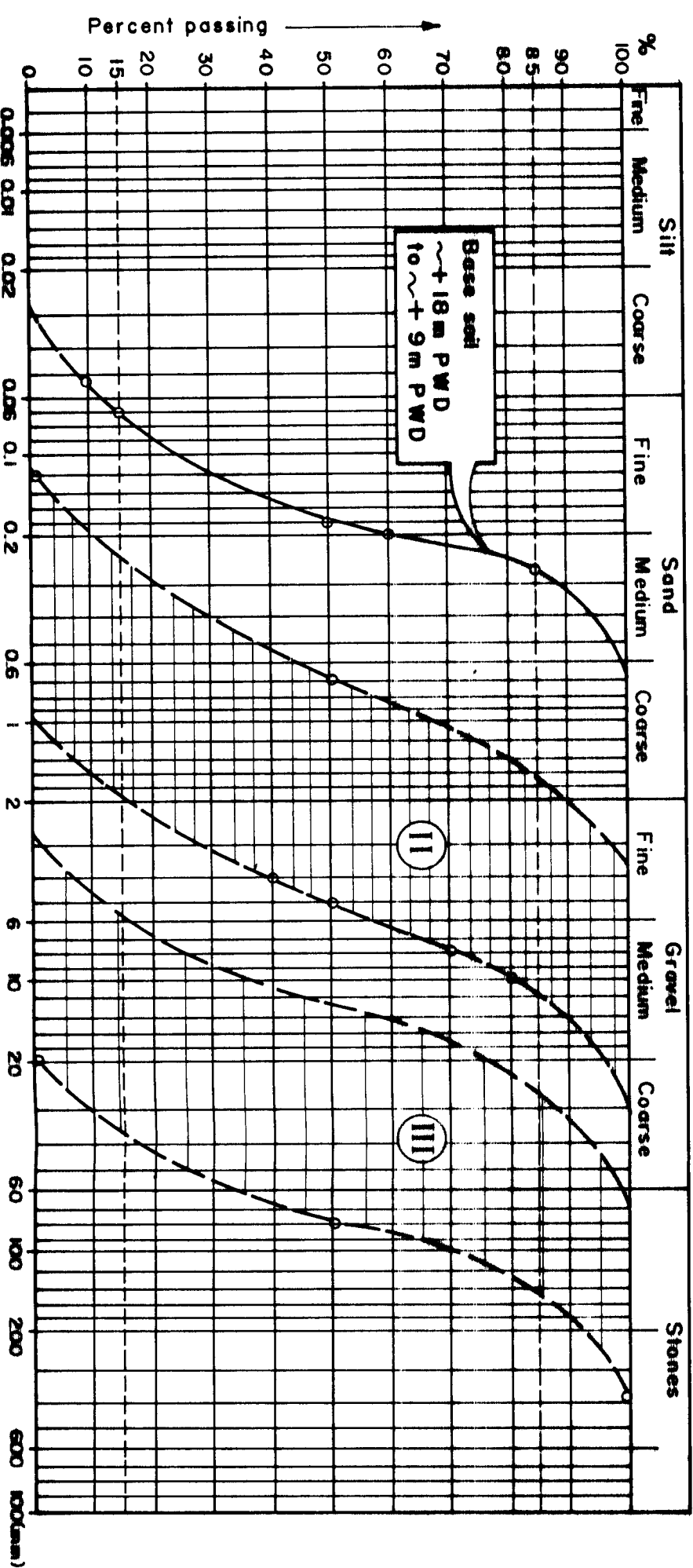
SUBSOIL CONDITIONS

NAME	DATE	SCALE	REVISION
F. HOSSAIN	21-12-93	1:2000	1
CHECKED	06-02-94	1:10000	
APPROVED	10-02-94	KA-004	

Granular Filter Type I + II + III



Granular Filter Type II + III



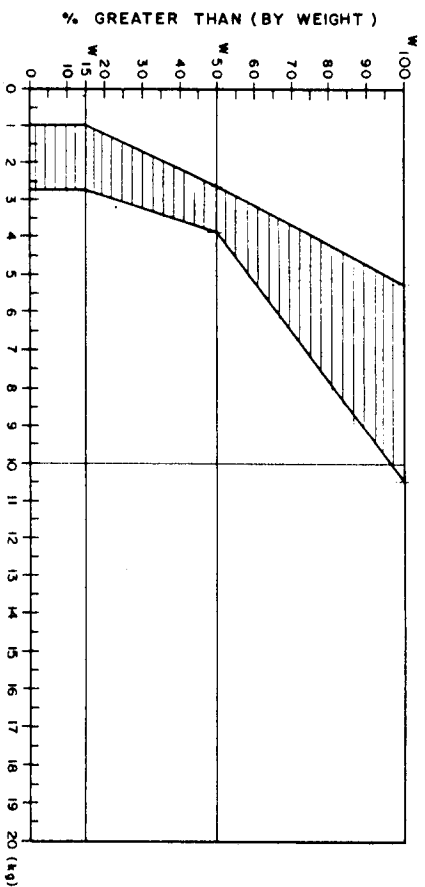
NOTES:

1. Granular filter gradation to be adjusted at site to meet with prevailing sub-soil conditions, reference to Subsection 10.10, Specifications.
2. Filter sand to be obtained only from borrow locations approved by the Engineer.
3. Filter gravel to be natural/crushed stone or knoc, subject to Engineer's approval.
4. The coefficient of uniformity of any filter gradation shall be in the range of $U = 5 \text{ to } 8 \left(\frac{d_{60}}{d_{10}} \right)$.
5. The granular filter materials shall be tested in Engineer's filter test equipment and the gradation be adjusted, if required.
6. Reference Drawing: KA-006 Stone Gradation and Layer Thickness.

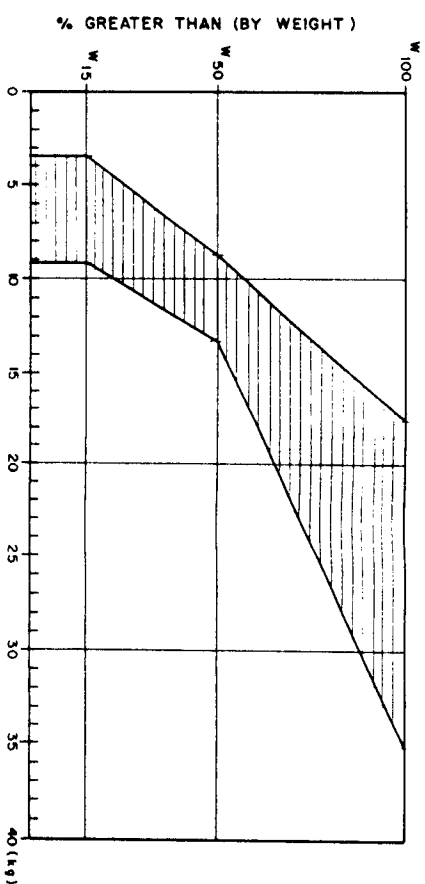
Granular Filter Type IV

Combined grading of
~34% filter Type II
~66% filter Type III
Subject to verification in Engineer's
filter test equipment.

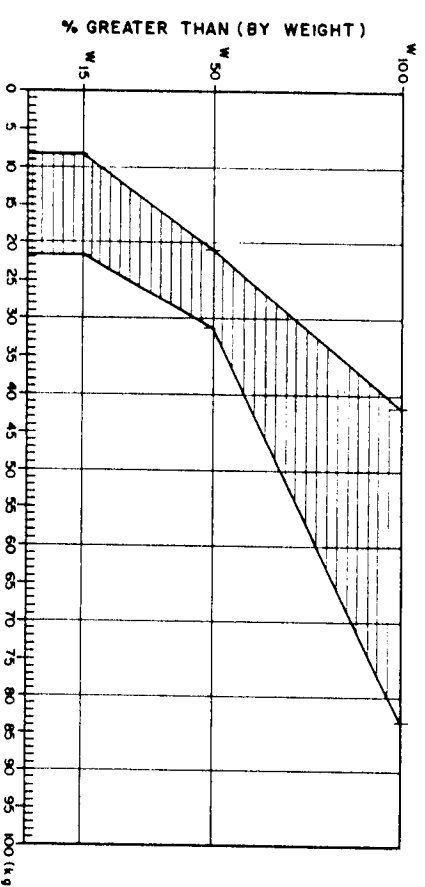
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FPCO)			
BANK PROTECTION PILOT PROJECT FAP-21			
CONSULTING CONSTRUCTION			
KHAJURAHI & SONS PVT. LTD. (INCORPORATED IN BANGLADESH) 10/1, LAKSHMI NAGAR, DAKSHIN KAPAS, DHAKA-1212 TEL: 9131, 9132, 9133, 9134, 9135, 9136, 9137, 9138, 9139, 9140, 9141, 9142, 9143, 9144, 9145, 9146, 9147, 9148, 9149, 9150, 9151, 9152, 9153, 9154, 9155, 9156, 9157, 9158, 9159, 9160, 9161, 9162, 9163, 9164, 9165, 9166, 9167, 9168, 9169, 9170, 9171, 9172, 9173, 9174, 9175, 9176, 9177, 9178, 9179, 9180, 9181, 9182, 9183, 9184, 9185, 9186, 9187, 9188, 9189, 9190, 9191, 9192, 9193, 9194, 9195, 9196, 9197, 9198, 9199, 9200, 9201, 9202, 9203, 9204, 9205, 9206, 9207, 9208, 9209, 9210, 9211, 9212, 9213, 9214, 9215, 9216, 9217, 9218, 9219, 9220, 9221, 9222, 9223, 9224, 9225, 9226, 9227, 9228, 9229, 9230, 9231, 9232, 9233, 9234, 9235, 9236, 9237, 9238, 9239, 9240, 9241, 9242, 9243, 9244, 9245, 9246, 9247, 9248, 9249, 9250, 9251, 9252, 9253, 9254, 9255, 9256, 9257, 9258, 9259, 9260, 9261, 9262, 9263, 9264, 9265, 9266, 9267, 9268, 9269, 9270, 9271, 9272, 9273, 9274, 9275, 9276, 9277, 9278, 9279, 9280, 9281, 9282, 9283, 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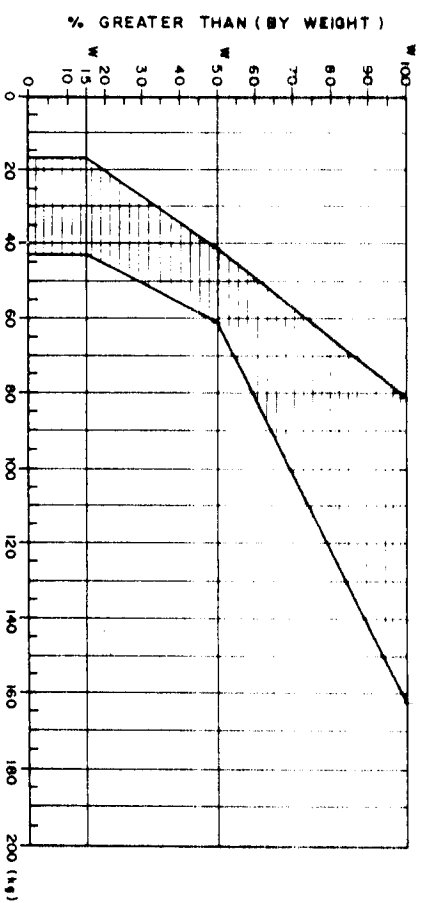
GRADING RANGE A
D₅₀ = 10 cm
Layer thickness = 20 cm



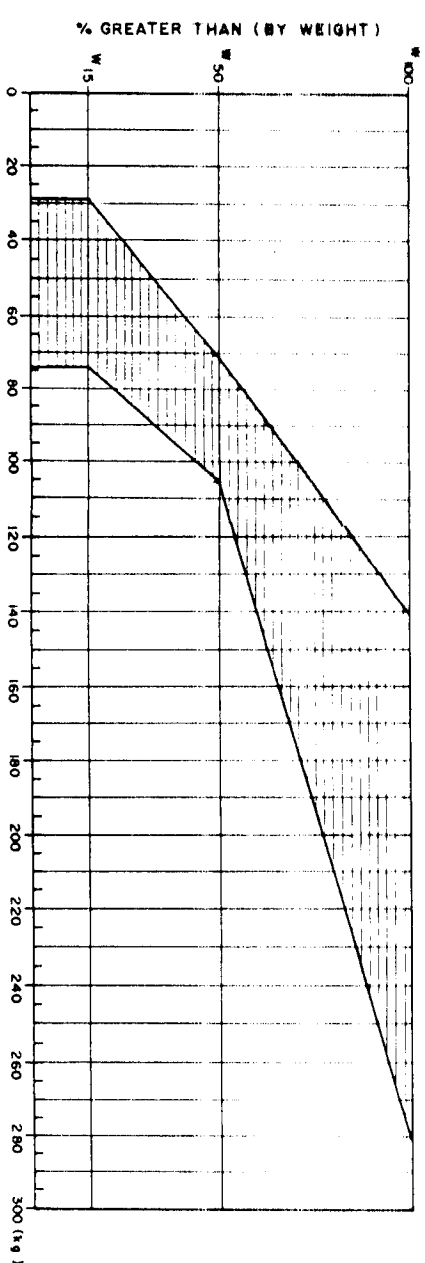
GRADING RANGE B
D₅₀ = 15 cm
Layer thickness = 30 cm



GRADING RANGE C
D₅₀ = 20 cm
Layer thickness = 40 cm



GRADING RANGE D
D₅₀ = 25 cm
Layer thickness = 50 cm



GRADING RANGE E
D₅₀ = 30 cm
Layer thickness = 60 cm

<p>GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)</p>			
<p>BANK PROTECTION PILOT PROJECT FAP-21</p>			
<p>CONSULTING CONTRACT</p>			
<p>TEST SITE I - KAMARJANI</p>			
<p>STONE GRADATION AND LAYER THICKNESS</p>			
NAME	DATE	SCALE	
DESIGNED	13-12-93		
CHECKED	16-04-94	DRAWING NO.	KA-006
APPROVED	10-02-94	REVISION	0

3.00 m

20

GOVERNMENT OF PEOPLES REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT AND FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION

KREDITANSTALT FÜR
WIEDERAUFBAU (KfW)

CAISSE FRANÇAISE DE
DEVELOPPEMENT (CFD)

JAMUNA RIVER BANK PROTECTION PILOT PROJECT
FAP 21

CONSTRUCTION OF PERMEABLE GROYNES AT KAMARJANI

EMPLOYER:

JAMUNA TEST WORKS CONSULTANTS, JOINT VENTURE
CONSULTING CONSORTIUM FAP 21/22

RHEIN-RUHR ING.-GES. MBH, DORTMUND / GERMANY

In association with

COMPAGNIE NATIONALE DU RHONE, LYON / FRANCE
PROF. DR. LACKNER & PARTNERS, BREMEN / GERMANY
DELFT HYDRAULICS, DELFT / NETHERLANDS

BANGLADESH ENGINEERING &
TECHNOLOGICAL SERVICES LTD. (BETS)
DESH UPODESH LIMITED (DUL)

PROJECT OFFICE: HOUSE 4, ROAD 125, GULSHAN-1, DHAKA-1212, BANGLADESH. TEL: (880-2) 600751, 881199, FAX: (880-2) 883390

CONTRACTOR:



2.00 m

2.50 m

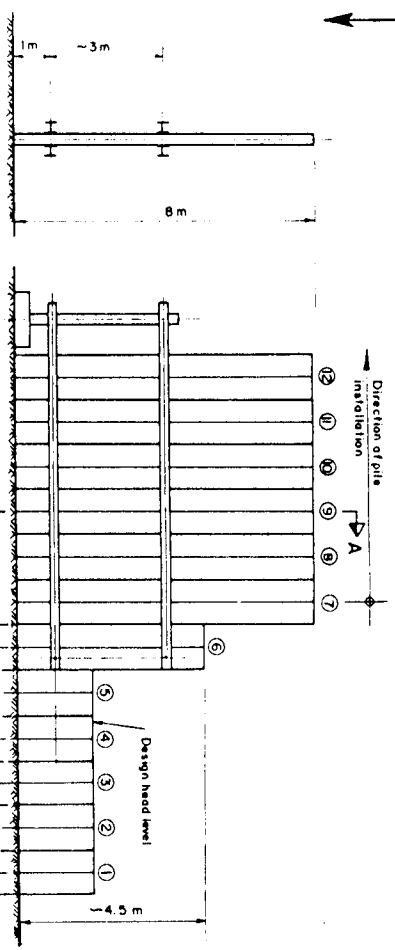
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH			
MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL,			
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)			
BANK PROTECTION PILOT PROJECT FAP-21			
CONSULTING CONSORTIUM			
RHEIN-RUHR ING. & GES. MBH, DORTMUND / GERMANY		IN ASSOCIATION WITH	
COMPAGNIE NATIONALE DU RHONE, LYON / FRANCE		BANGLADESH ENGINEERING &	
PROF. DR. LACKNER & PARTNERS, BREMEN / GERMANY		TECHNOLOGICAL SERVICES LTD. (BETS)	
DELFT HYDRAULICS, DELFT / NETHERLANDS		DESH UPODESH LIMITED (DUL)	

TEST SITE 1 - KAMARJANI

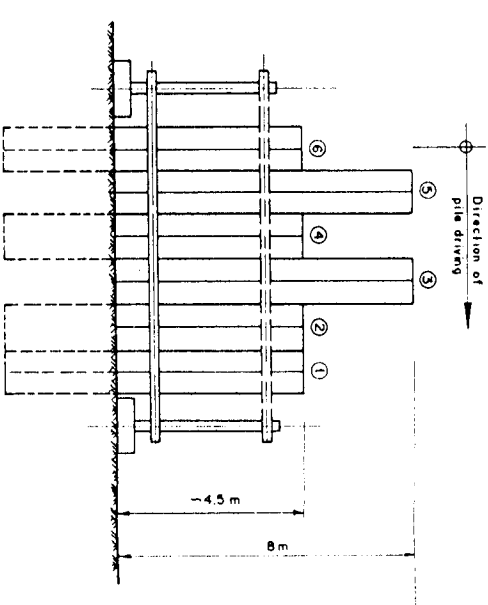
PROJECT SIGN BOARD

NAME	DATE	SCALE	1:20
F. MOSEFAR	13-01-94		
CHECKED BY	13-01-94	DESIGNING NO.	KA-007
APPROVED BY	16-02-94		0

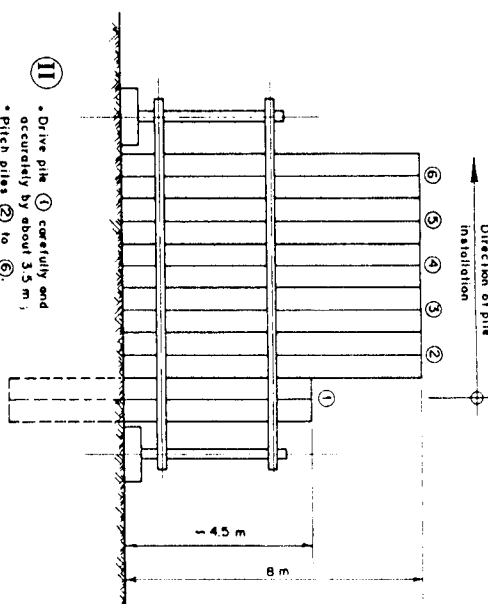
STEP IV



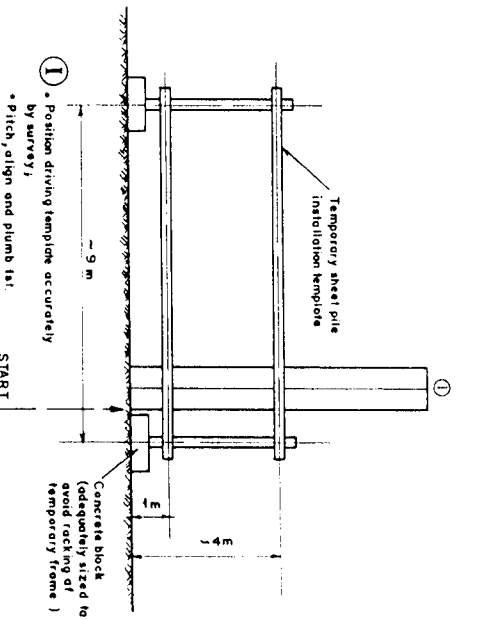
STEP III



STEP II



STEP I



SECTION A-A

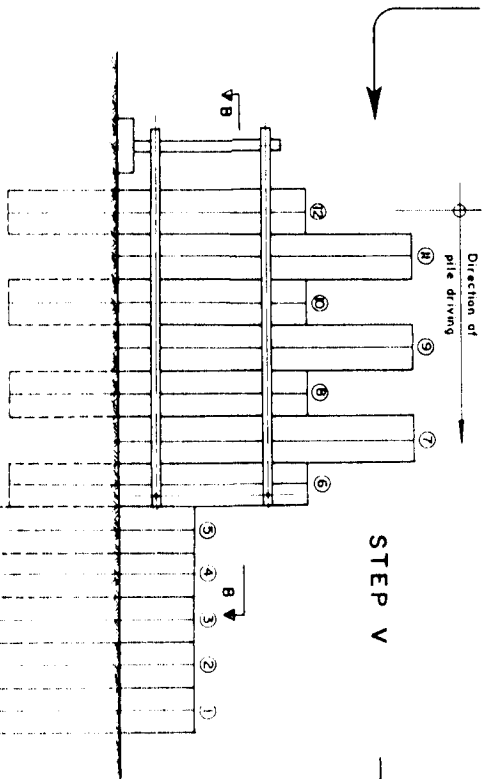
IV. Remove, shift and reinstall pile installation template, store end of template fixed to pile. Pitch piles 7 to 12.

III. Drive piles carefully in the sequence 5-4-3-2 by about 3.5 m. Remove upper horizontal beams of pile installation template. Continue pile driving in the sequence 3-2-1-4-5 to designed pile head level.

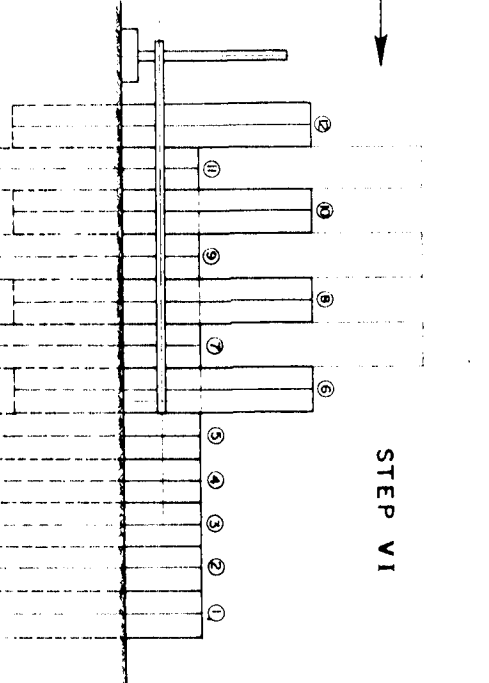
II. Drive pile 1 carefully and accurately by about 3.5 m. Pitch piles 2 to 6.

I. Position driving template accurately by survey. Pitch, align and plumb to: double pile.

STEP V



STEP VI

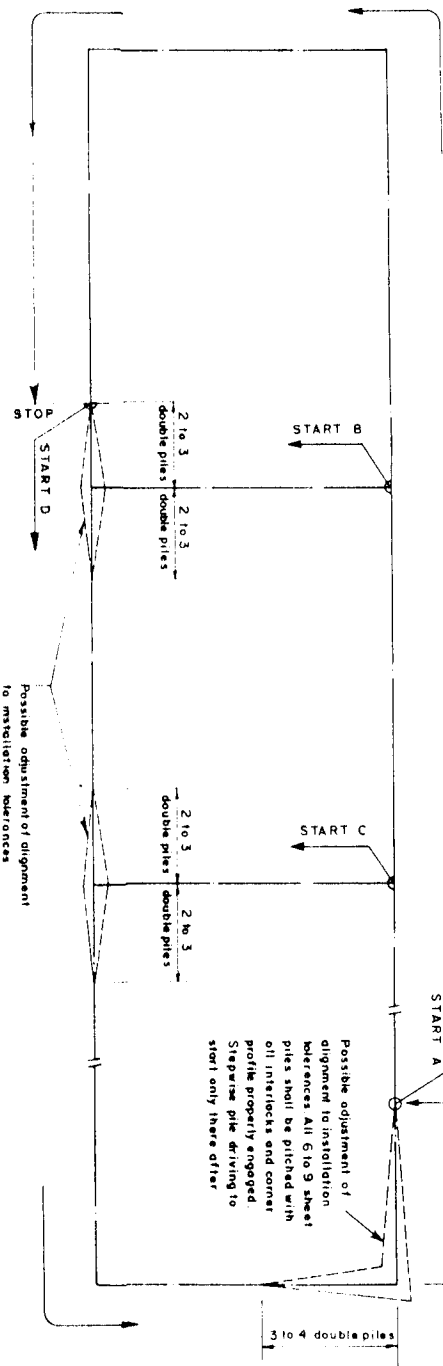


V. Drive piles carefully in the sequence 5-4-3-2 by about 3.5 m.

VI. Remove upper horizontal beams of template. Continue pile driving in the sequence 3-2-1-4-5 to designed pile head level. Drive 2 on upper pile for pitching. The next panel of 6 double piles, i.e. STEPS IV, V, VI to be repeated subsequently.

GENERAL SHEET PILE INSTALLATION SEQUENCE FOR A COFFERDAM

(Without scale)



NOTE:

The depicted installation and pile driving sequence serves for general information only. The method to be employed at site must be approved by the contractor to the local conditions, in consideration of site installation equipment and satisfactory methods used.

DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT
ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE

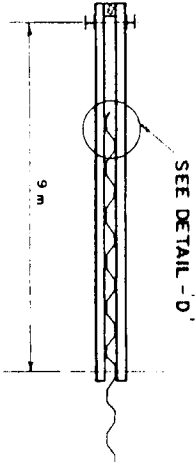
TEST SITE I - KAMARJANI

GENERAL INSTALLATION METHOD
STEEL SHEET PILE COFFERDAM

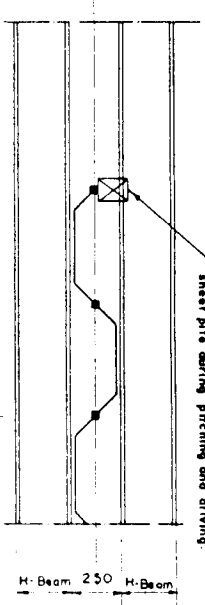
NAME	DATE	SCALE	REVISION
NAME	DATE	SCALE	REVISION
CHECKED	23-01-94	KA-008	2

SECTION B-B

Scale 1:100



SEE DETAIL 'D'

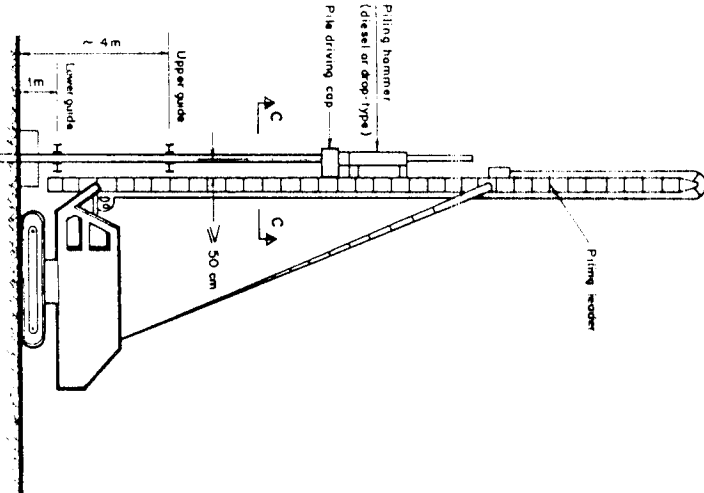
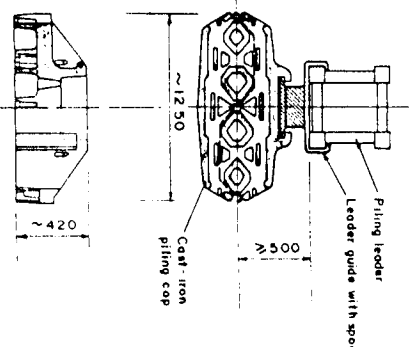


SECTION C-C (turned by 90°)

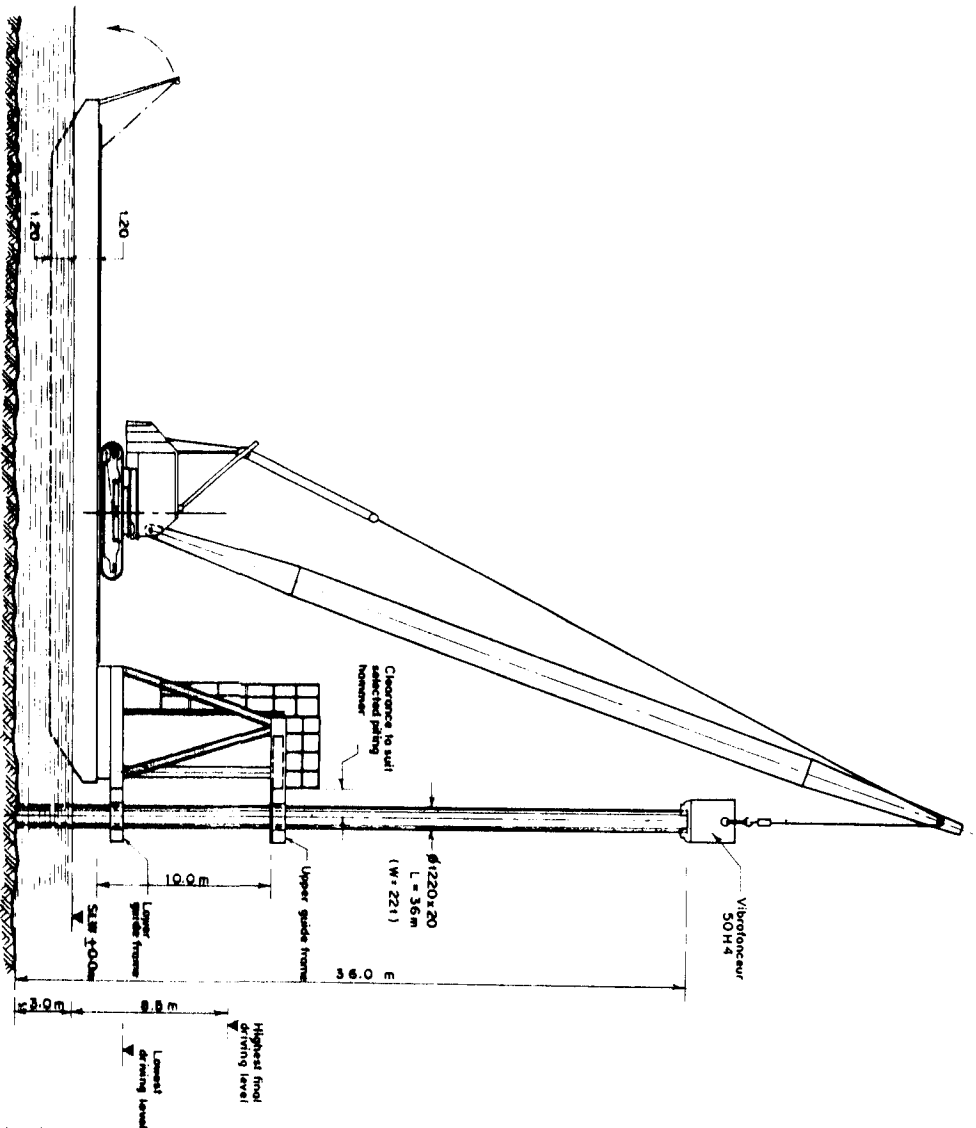
(Measurements in millimeters)

PILE DRIVING CAP FOR PROFILE ARBED PU-6

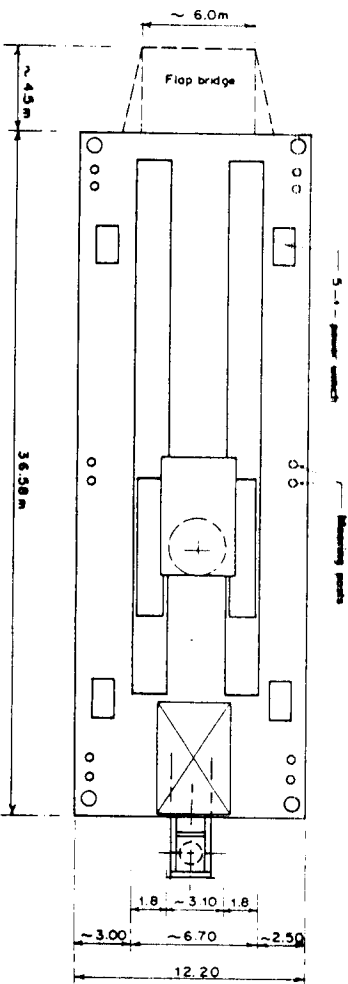
Scale 1:25



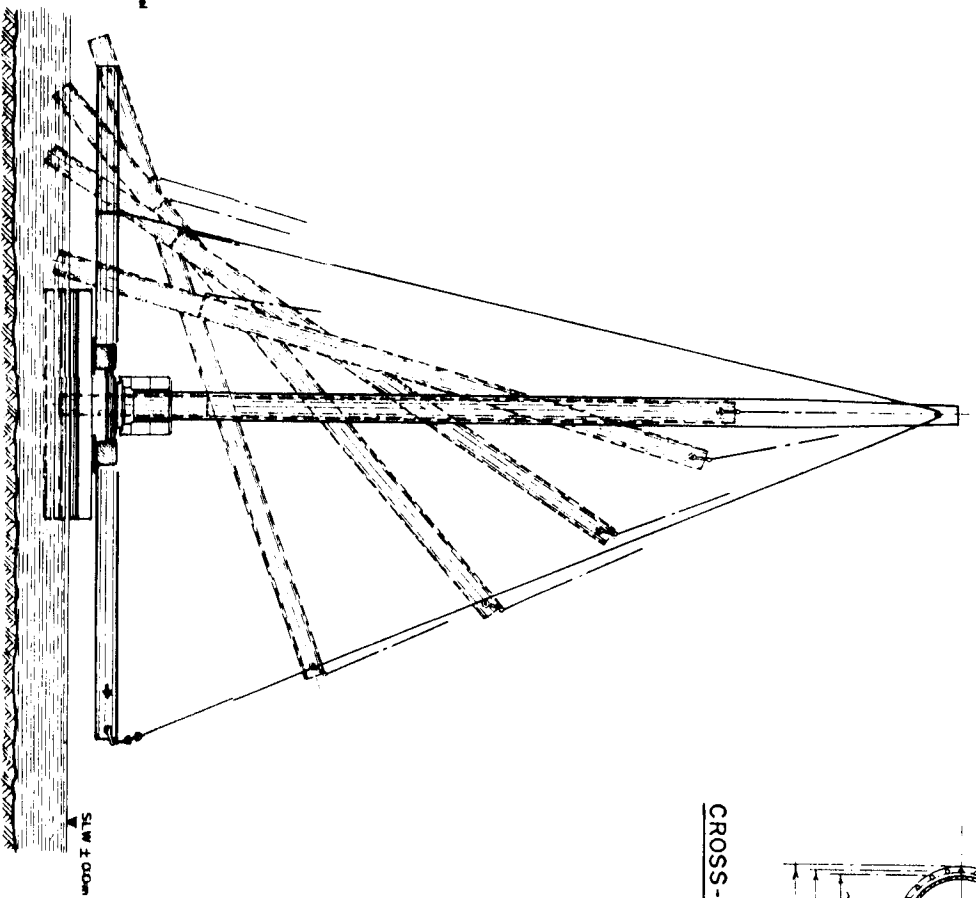
TYPICAL PILE DRIVING UNIT



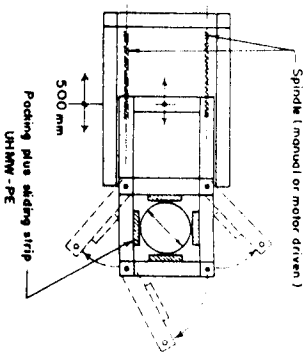
400-t FLAT TOP BARGE WITH 150-t CRAWLER CRANE
AND PILE GUIDE TOWER



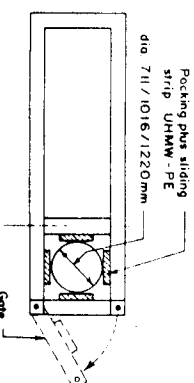
PLAN OF 400-t FLAT TOP BARGE



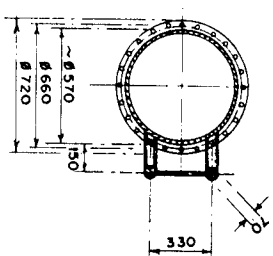
STAGES OF PILE LIFTING OFF SHORE
(analogously to be applied on-shore)



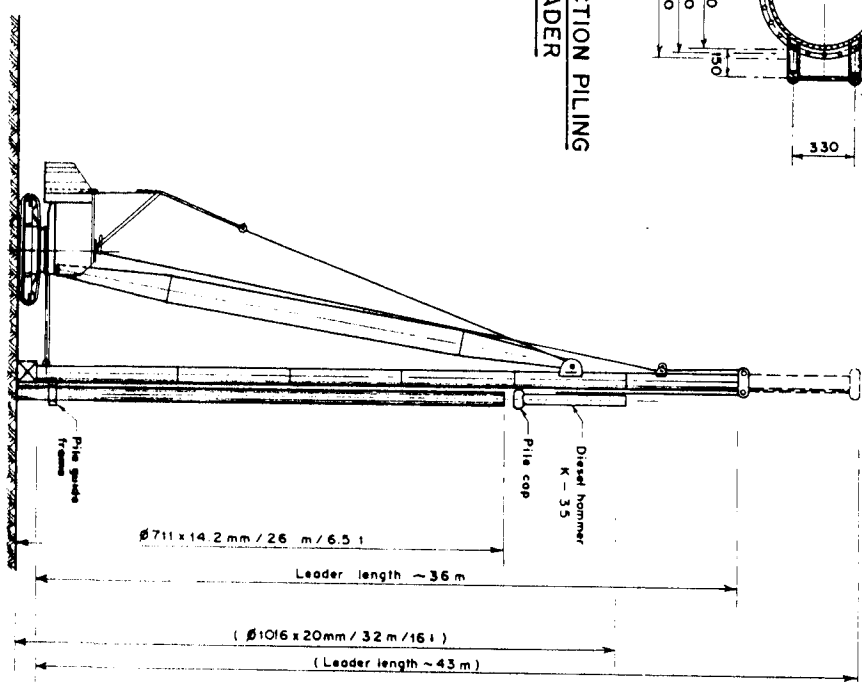
UPPER GUIDE FRAME
(movable)



LOWER GUIDE FRAME
(fixed)



CROSS-SECTION PILING
LEADER



60-t to 100-t CRAWLER CRANE WITH 100-t BOOM
AND PILING LEADER (L ≥ 36m)

DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT



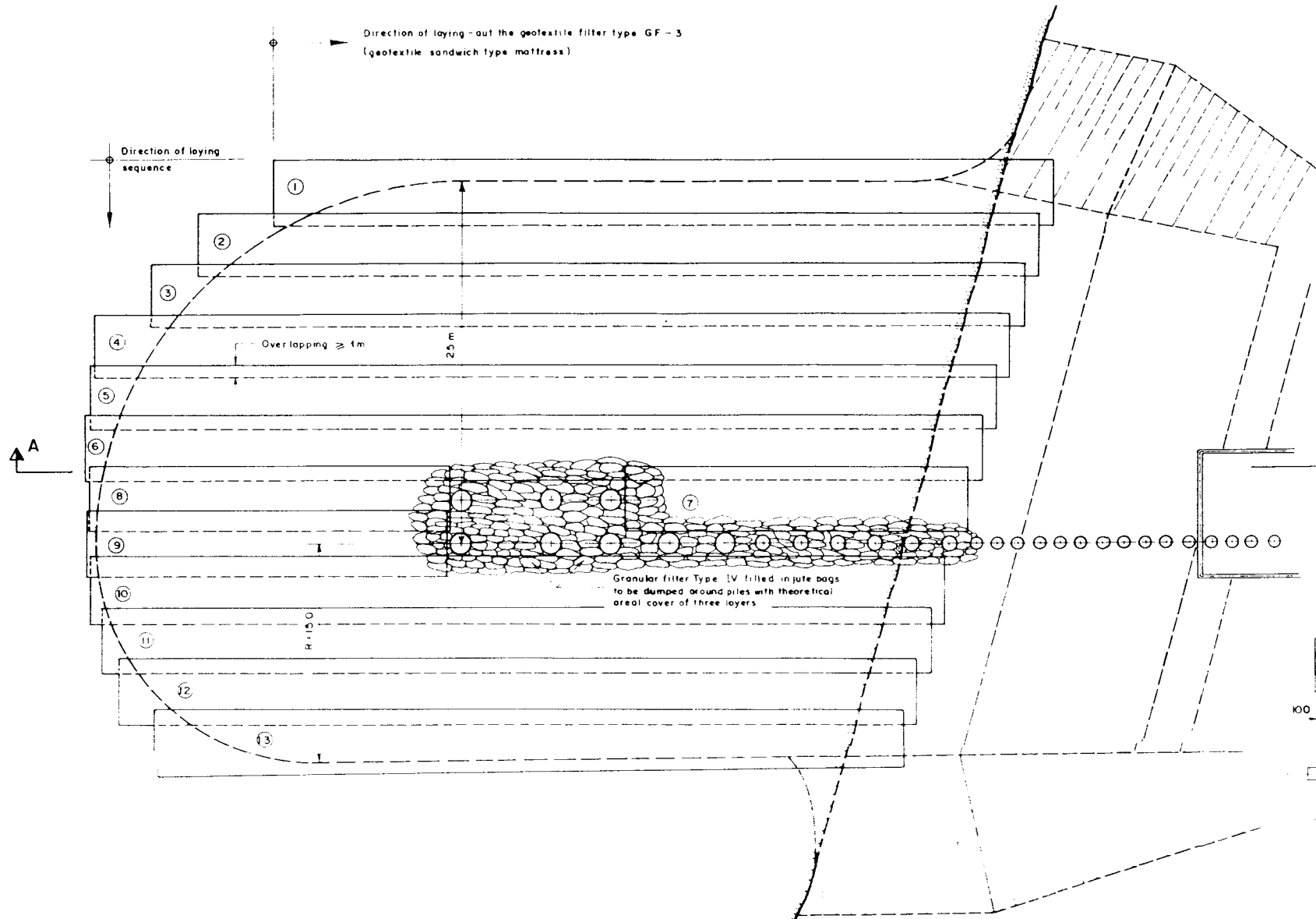
ENGINEERING AND DESIGN CONSULTANCY
COMPOSITE MATERIALS DIVISION, LYONS, FRANCE
PROF. DR. LACOMME/INSTITUT, BRUNNEN/BRUNNEN
DEUTSCHLAND, BRUNNEN/BRUNNEN

TEST SITE 1 - KAMARJANI

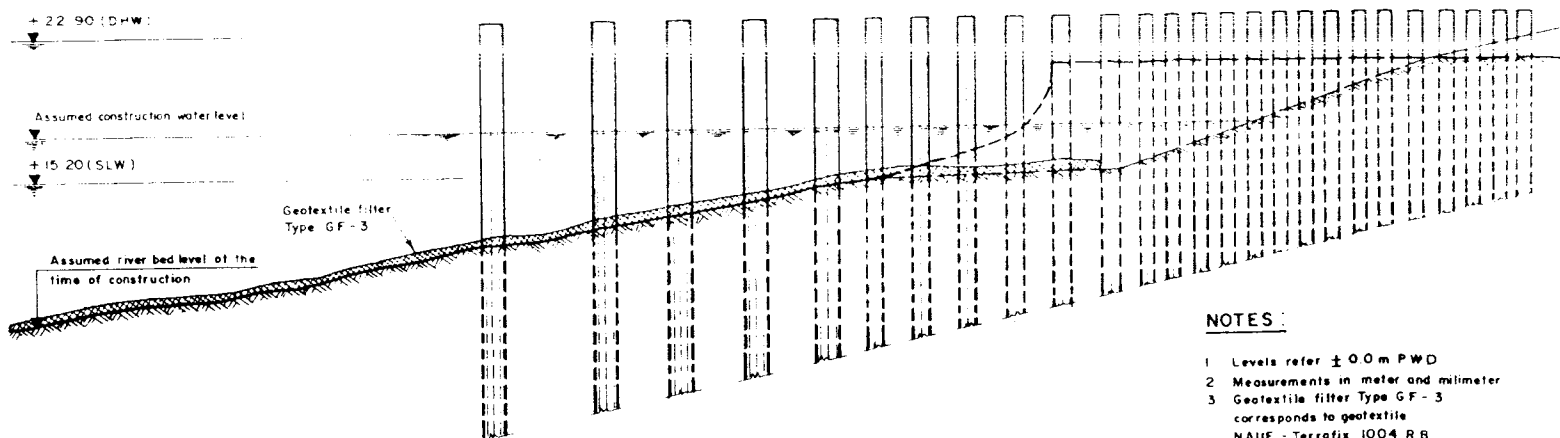
GENERAL INSTALLATION METHOD
TUBULAR STEEL PILES

DATE	SCALE	REVISION
07-02-94	1:200	
08-02-94		
10-02-94		

22



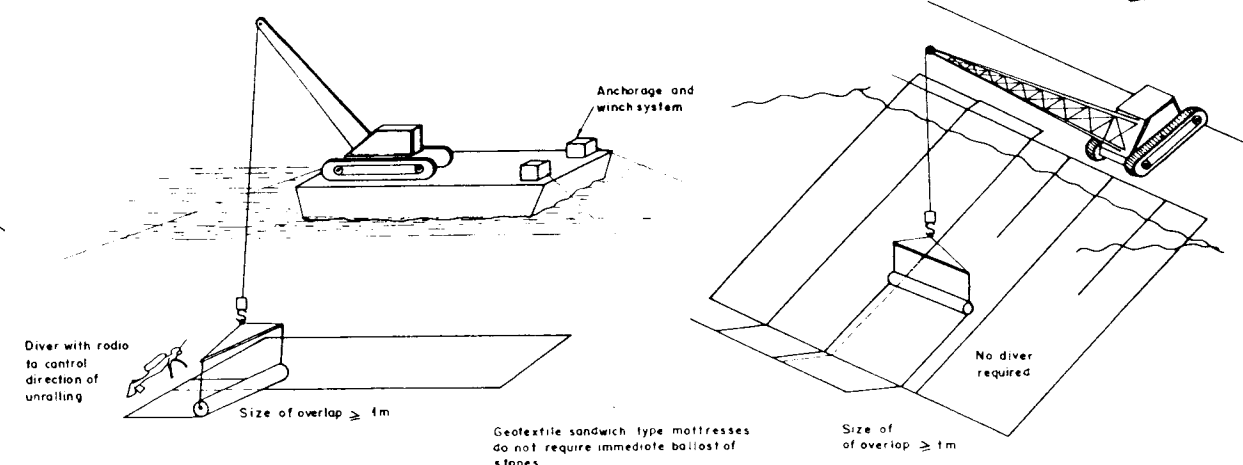
LAYOUT OF GEOTEXTILE FILTER MATTRESSES
FOR BED PROTECTION (GROYNE G-1)
Scale: 1:200



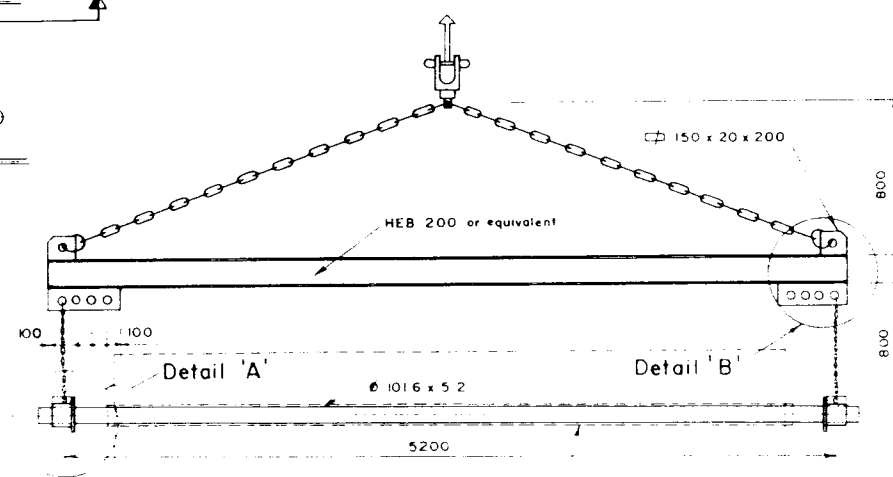
SECTION A-A
Scale: 1:200

NOTES:

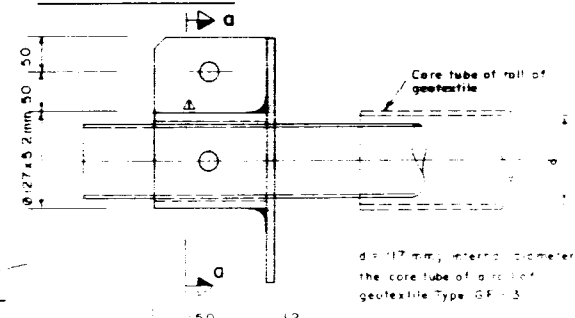
1. Levels refer ± 0.0 m PWD
2. Measurements in meter and millimeter
3. Geotextile filter Type GF-3 corresponds to geotextile NAUE - Terrafix 1004 RB which will be supplied by the Employer
4. Reference Drawings
KA - 109 Groyne G-1
Revetment and Bed Protection, Plan, Detailed Sections
KA - 005 Filter Gradation Curves



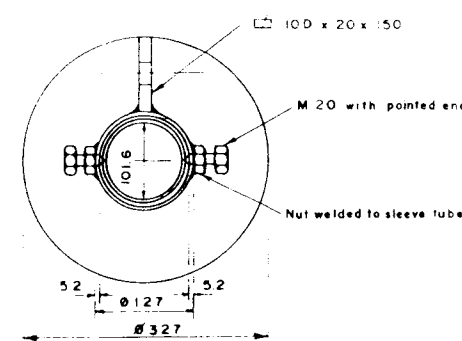
GENERAL SYSTEM OF INSTALLING GEOTEXTILE FILTER MATTRESSES
BELOW WATER LEVEL
Not to scale



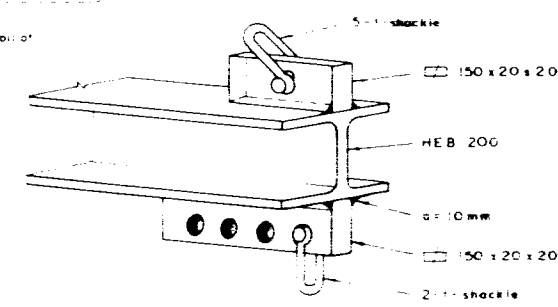
LIFTING BEAM FOR INSTALLATION OF
GEOTEXTILES
Scale: 1:25



DETAIL 'A'
Scale: 1:25



SECTION a-a
Scale: 1:5



DETAIL 'B'

DRAWING PHOTOREduced BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

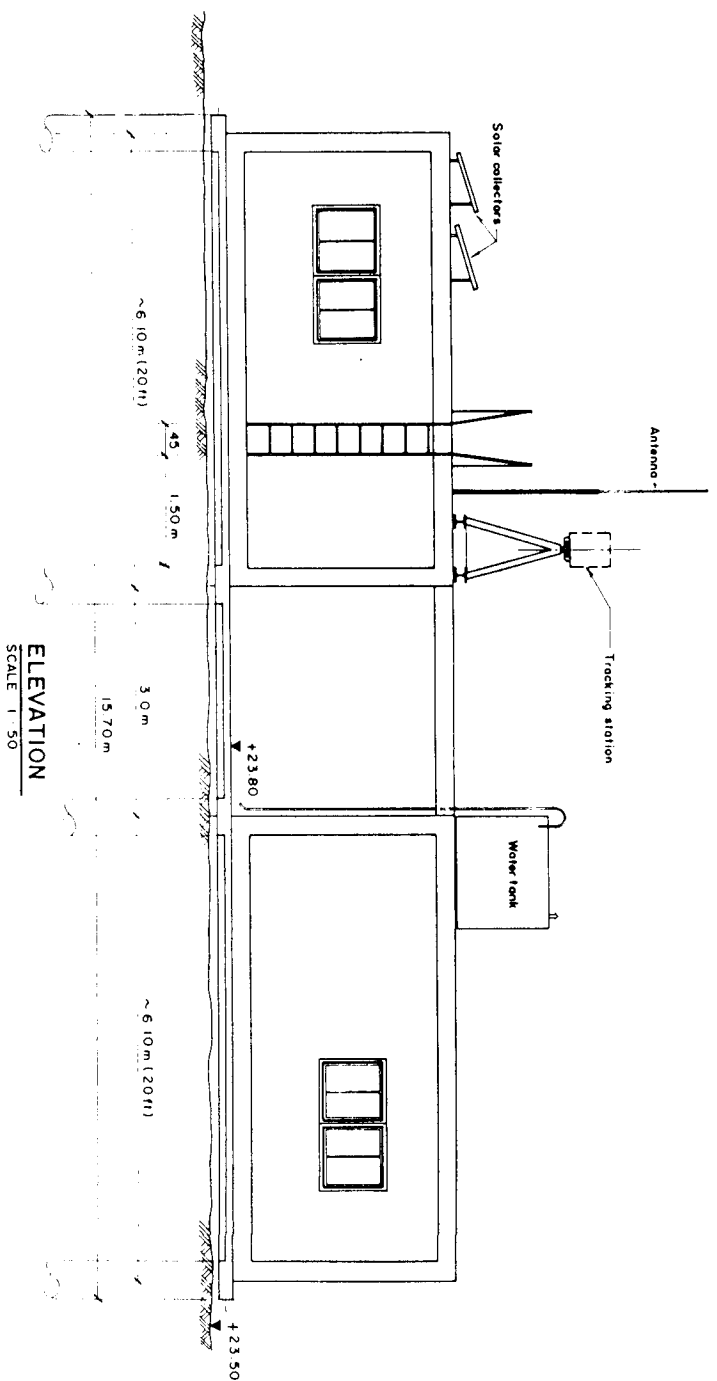
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM
RHEIN RUHR ING. GES. MBH, DORTMUND/GERMANY
COMPAGNIE NATIONALE DU RHONE, LYON/FRANCE
PROF. DR. LACKNER PARTNERS, BREMEN/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS
In association with
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DISH UPDATES LIMITED (DUL)

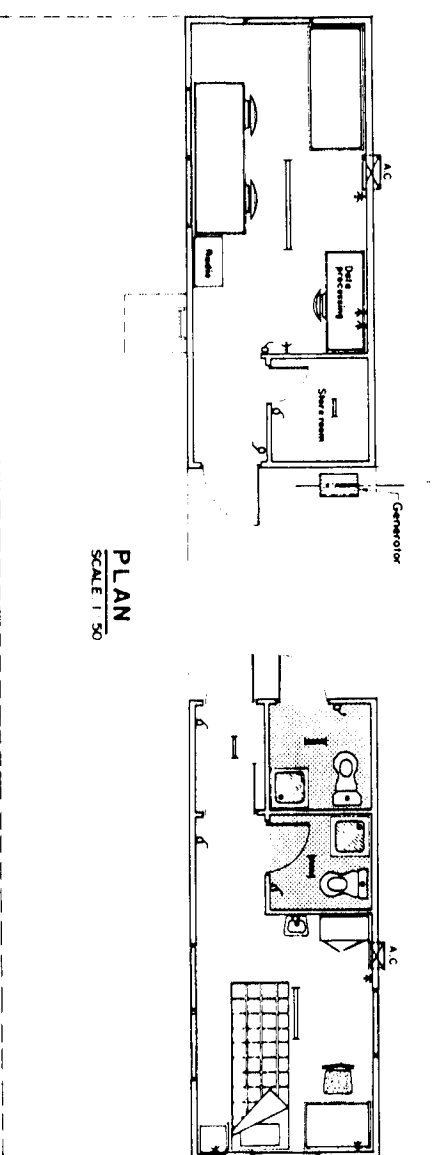
TEST SITE I - KAMARJANI

GENERAL INSTALLATION METHOD
GEOTEXTILE FILTER MATERIALS

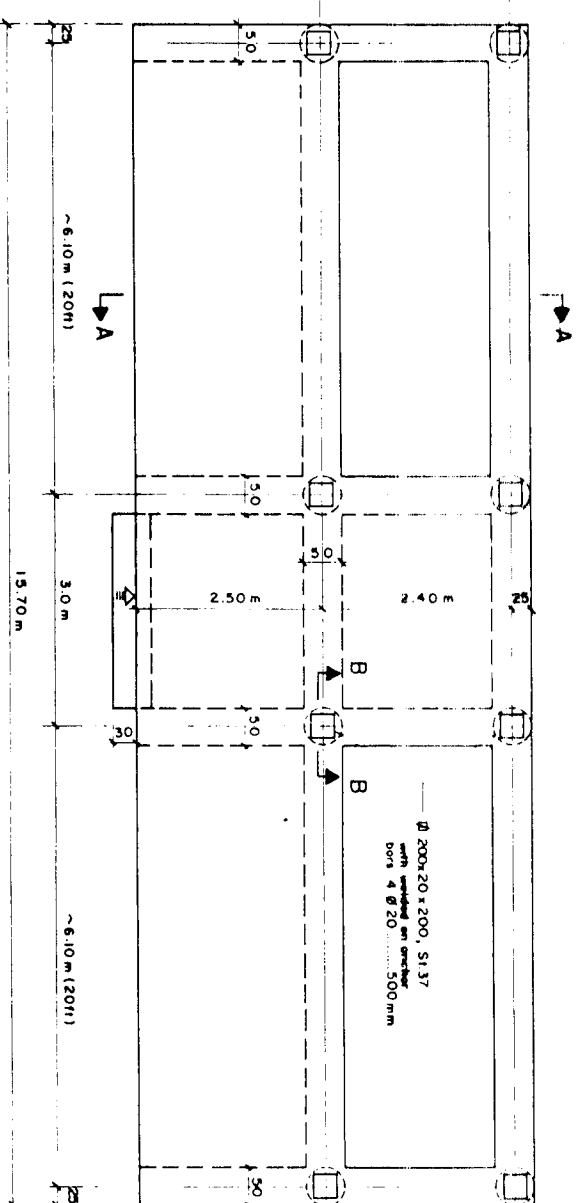
NAME	DATE	SCALE	REVISION
DRAWN: F. HOSSAIN	02-02-94	1:200	
CHECKED: F. HOSSAIN	08-02-94	DRAWING NO. KA-010	
	10-02-94		



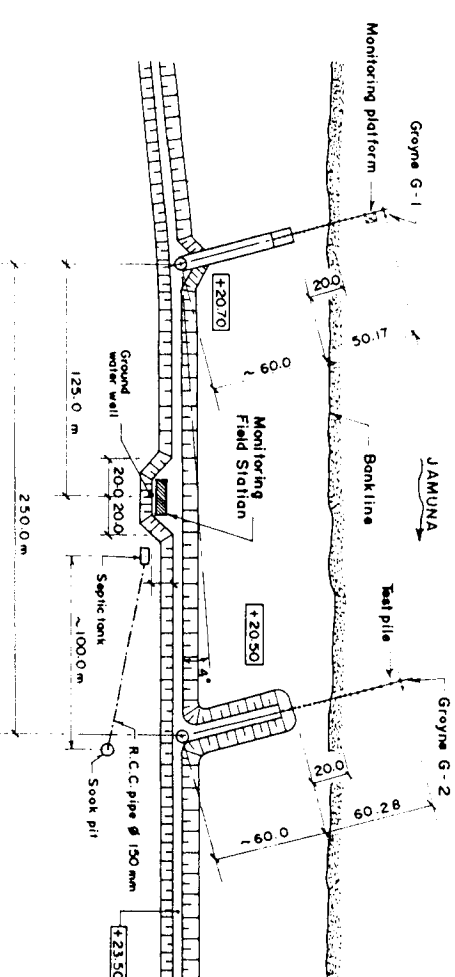
ELEVATION
SCALE 1:50



PLAN
SCALE 1:50

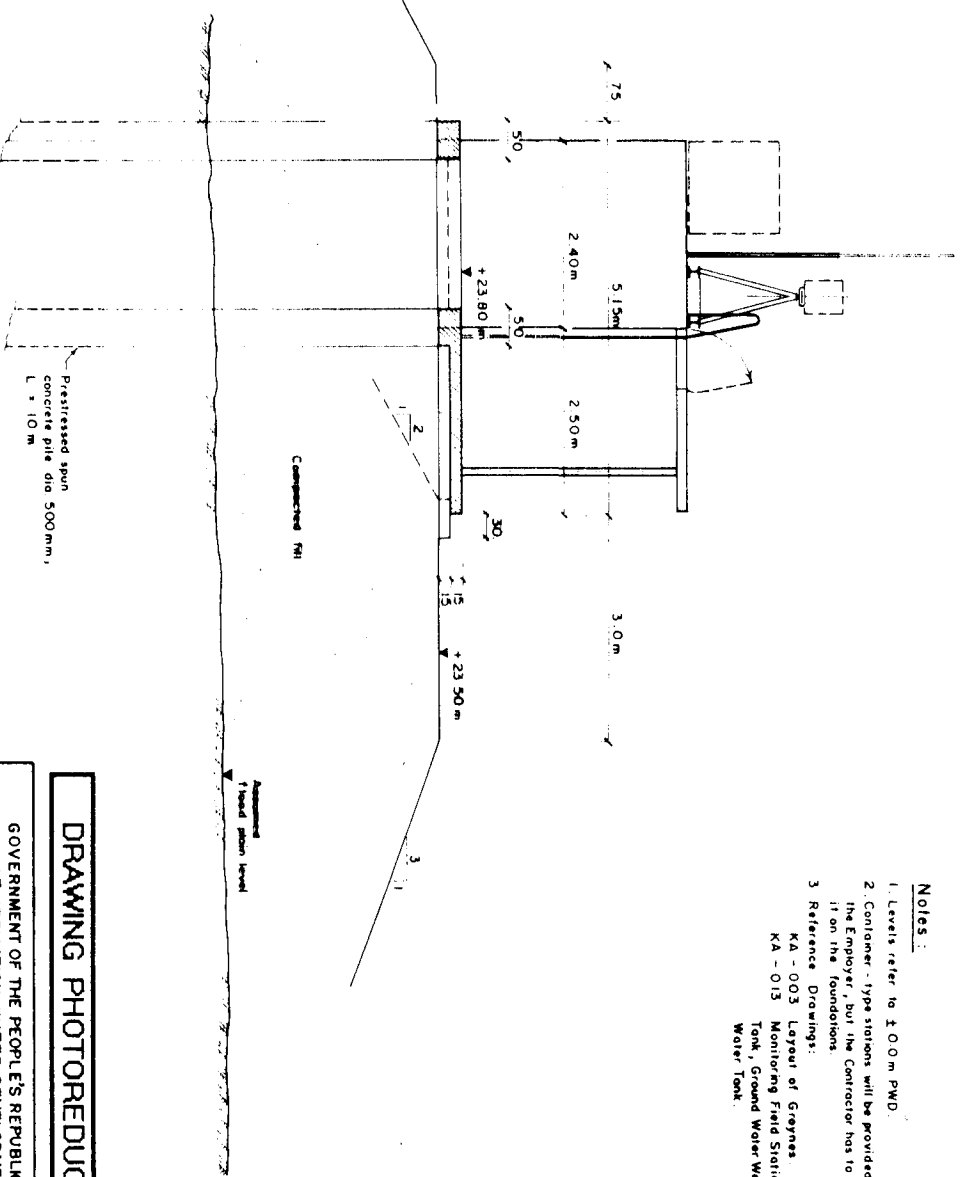


FOUNDATION PLAN
SCALE 1:50

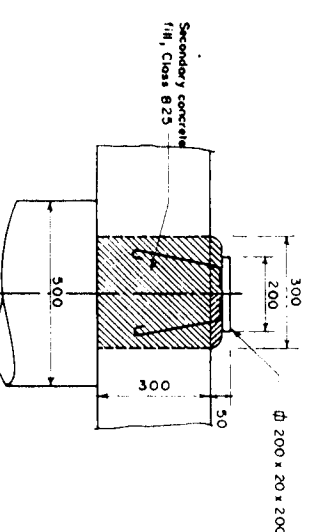


LOCATION PLAN
SCALE 1:2000

- NOTES:**
1. Levels refer to ± 0.0 m PWD.
 2. Container - type stations will be provided by the Employer, but the Contractor has to install it on the foundations.
 3. Reference Drawings:
KA - 003 Layout of Greyhens
KA - 013 Monitoring Field Station, Sepsic Tank, Ground Water Well, Fresh Water Tank.

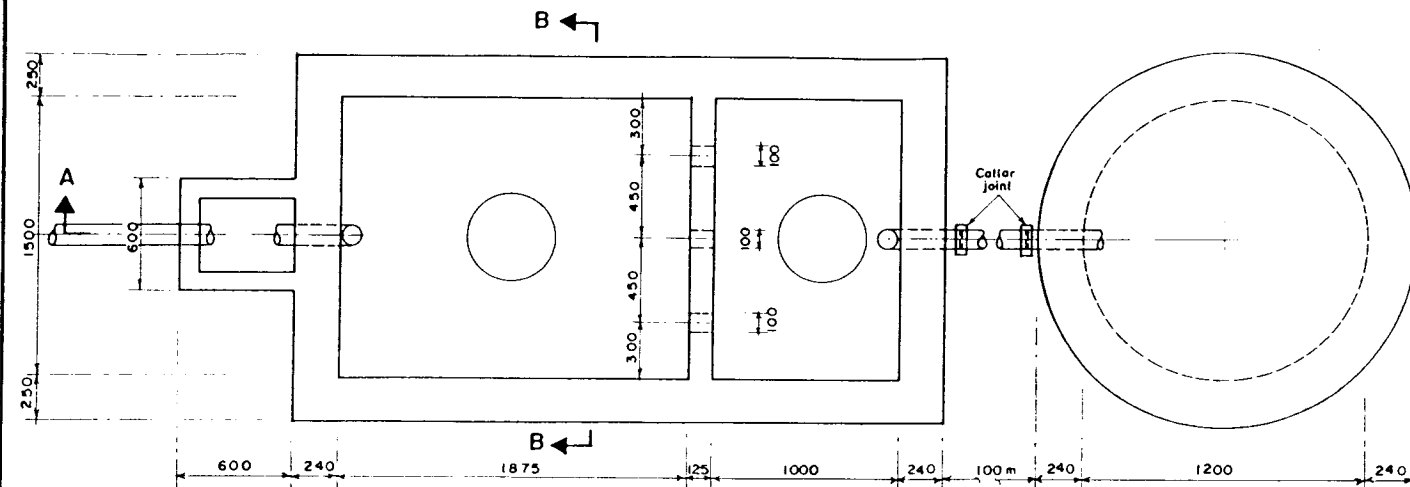


SECTION A-A
SCALE 1:50

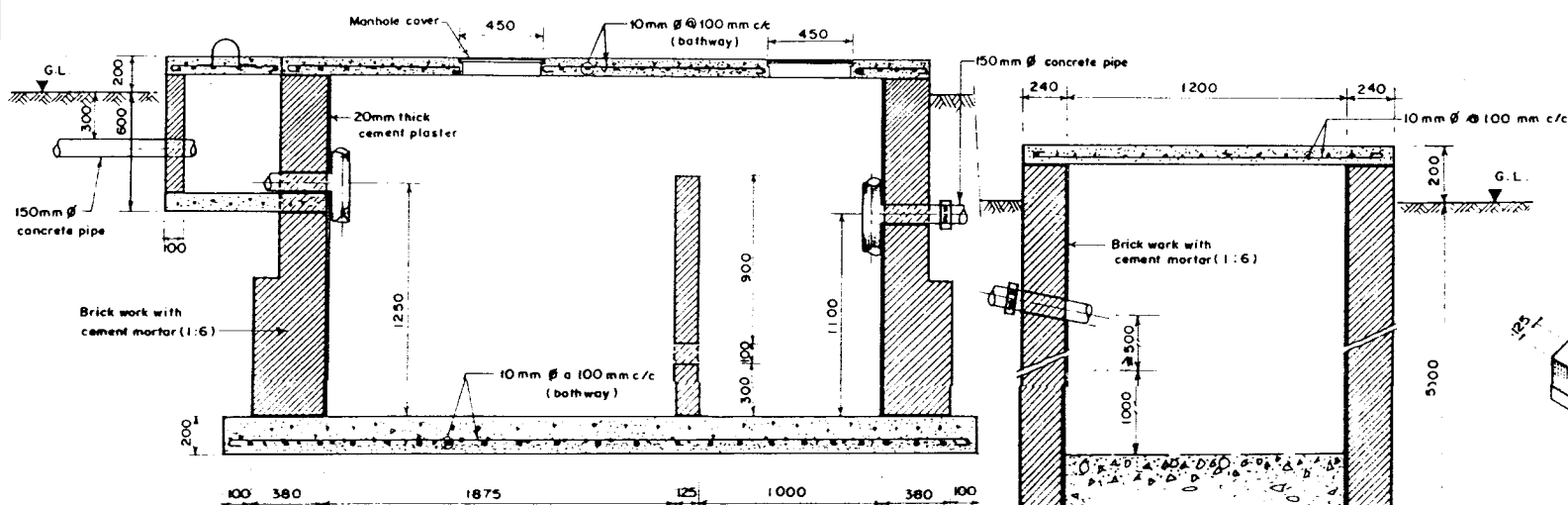


SECTION B-B
SCALE 1:50

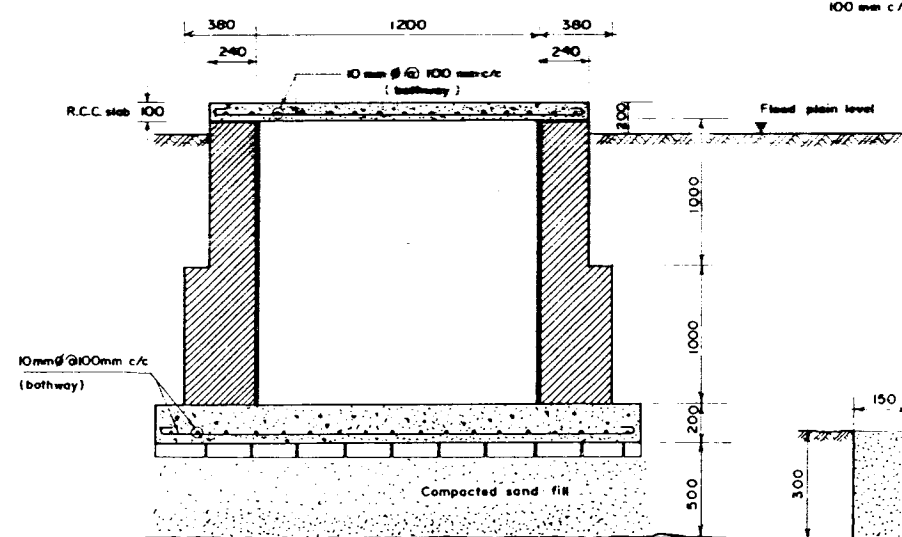
DRAWING PHOTOREDUCTION BY 50%			
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FP.CO)			
BANK PROTECTION PILOT PROJECT FAP-21			
CONSULTING CONSULTANT			
TEST SITE 1 - KAMARJANI			
MONITORING FIELD STATION			
LAYOUT, PLAN, ELEVATION, FOUNDATION			
NAME	DATE	SCALE	REVISION
ANOWAR	18-01-94	1:50, 1:2000	0
CHECKED	01-02-94	DRAWING NO.	REVISION
APPROVED	10-02-94	KA-012	0



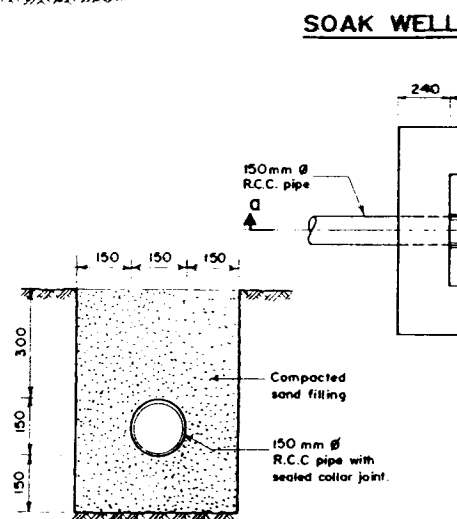
SEPTIC TANK PLAN
SCALE: 1:20



SECTION A-A
SCALE: 1:20

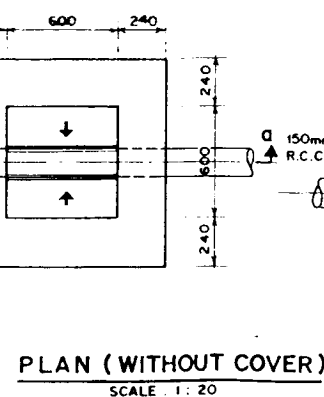


SECTION B-B
SCALE: 1:20



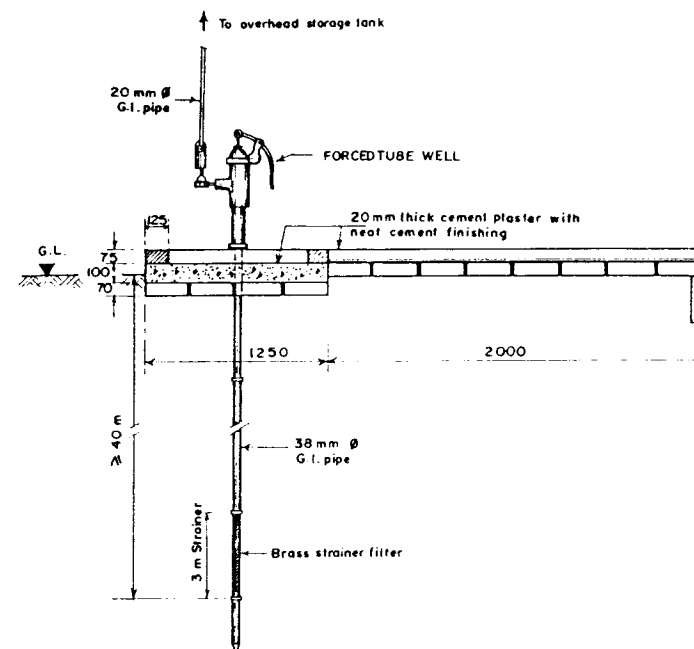
SOAK WELL

SAND BEDDING FOR SEWER PIPE
SCALE: 1:20

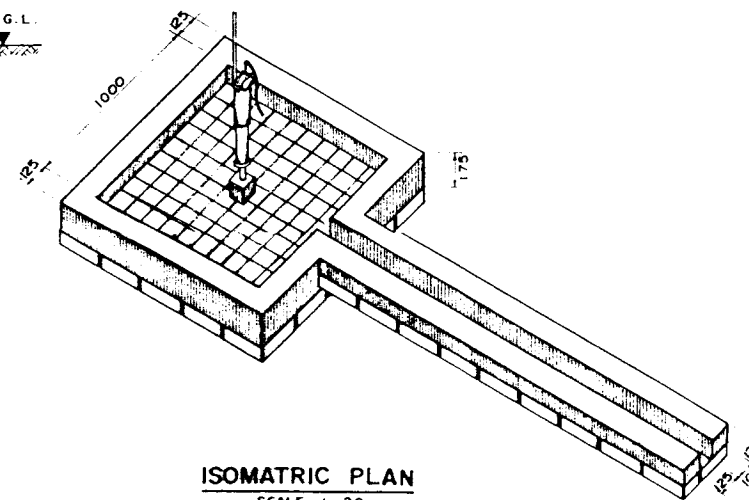


PLAN (WITHOUT COVER)
SCALE: 1:20

INSPECTION PIT (TYPICAL)

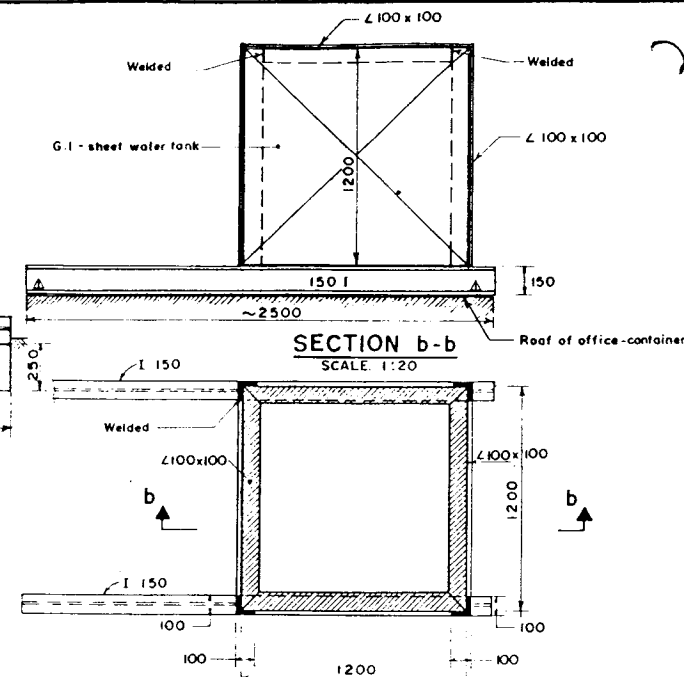


TUBEWELL SECTIONAL ELEVATION
SCALE: 1:20



ISOMETRIC PLAN
SCALE: 1:20

HAND TUBE WELL WITH PLATFORM



PLAN
SCALE: 1:20

**Fixing Arrangement of the G.I. Sheet Water Tank
FRESH WATER TANK
ON ROOF TOP OF MONITORING FIELD STATION**

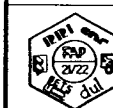
Notes:

1. All dimensions are in mm.
2. Inspection pit shall be constructed at every 20 meters.
3. Tube well shall be sunk up to a good sand layer.
4. Concrete Class B25, D10-45.
5. Reinforcing steel grade I, plain bars; concrete cover to reinforcing steel 20 mm. All bars to be provided with standard hooks.
6. Steel sections of steel grade St 37 or equivalent.
7. Welding seam thickness $s = 0.7 \times t$ min.
8. Steel structures shall receive corrosion protection coat Type II as per Specifications, Subsection 1452.
9. Reference Drawing: KA-012 Monitoring Field Station; Layout Plan, Elevation, Foundation.

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

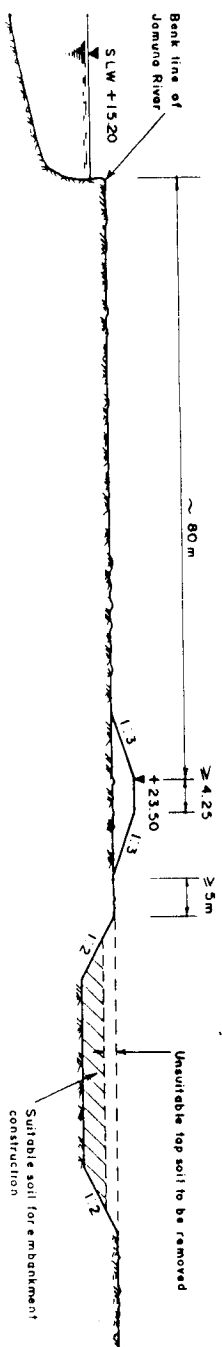
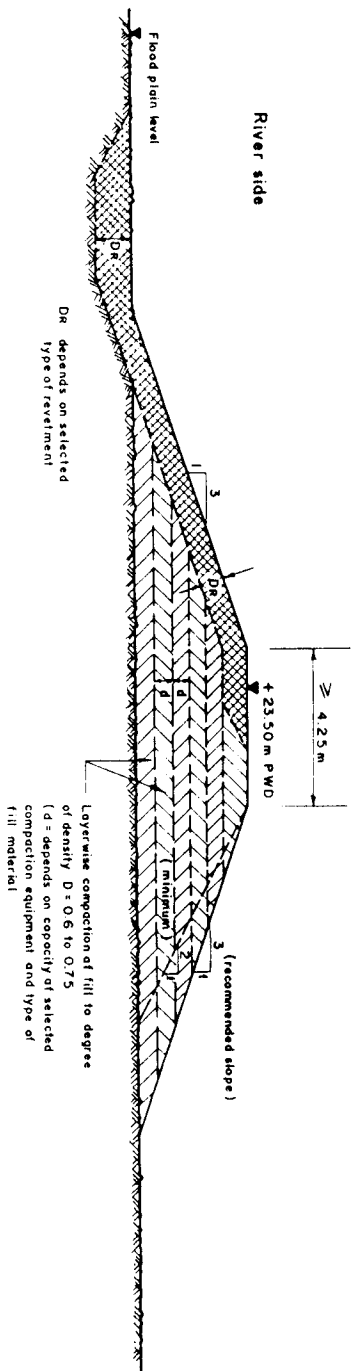


CONSULTING CONSORTIUM
RHEIN-RURER ING.-GES. MBH, DORTMUND/GERMANY
COMPAGNIE NATIONALE DU RHONE, LYON/FRANCE
PROF. DR. LACOMBERG PARTNERS, BREMEN/GERMANY
DELFT HYDRAULIC, DELFT/NETHERLANDS
In association with:
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD. (BETS)
DESH UPODESH LIMITED (DUL)

TEST SITE I - KAMARJANI

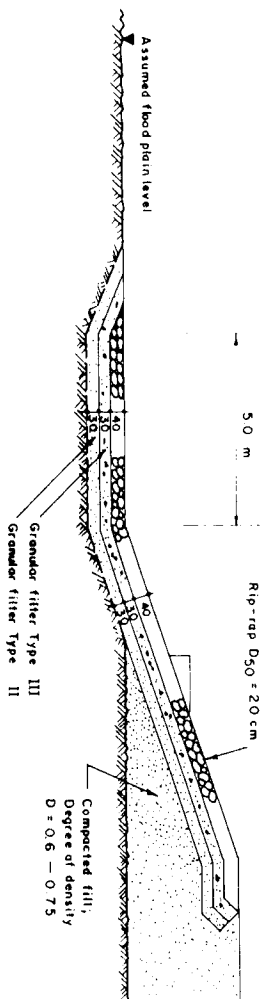
**MONITORING FIELD STATION
SEPTIC TANK, GROUND WATER WELL,
FRESH WATER TANK**

NAME	DATE	SCALE:
ANOWAR	02-02-94	1:20, 1:10
CHECKED	DATE	DRAWING NO.
A. O. P.	09-02-94	KA-013
APPROVED	DATE	REVISION
	10-02-94	0

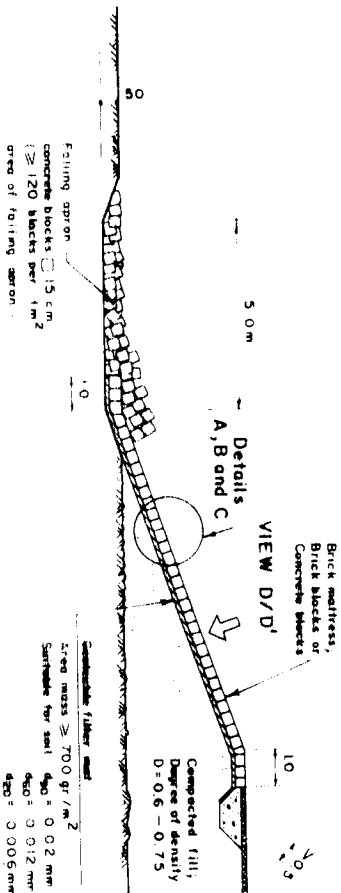


RECOMMENDED BUILT-UP OF EMBANKMENT

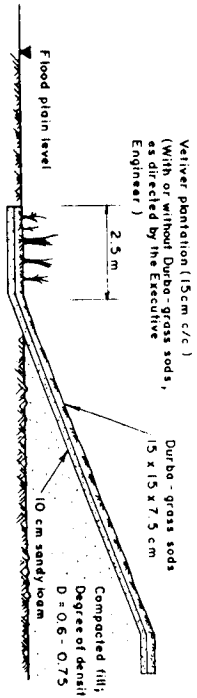
RECOMMENDED CROSS-SECTION OF EMBANKMENT AT TEST SITE I



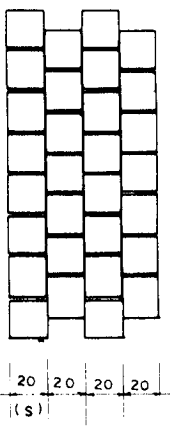
TYPICAL SECTION: GRANULAR FILTER, RIP-RAP



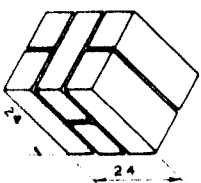
TYPICAL SECTION: GEOTEXTILE FILTER, BLOCKS/MATTRESSES



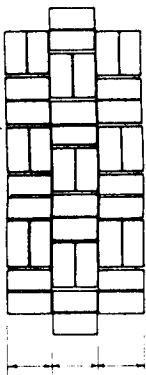
TYPICAL SECTION: BIOTECHNICAL REVEIMENT



VIEW D: LAYING PATTERN OF CONCRETE BLOCKS

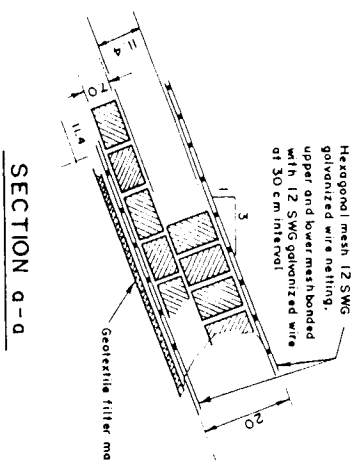


DETAIL OF BRICK BLOCK

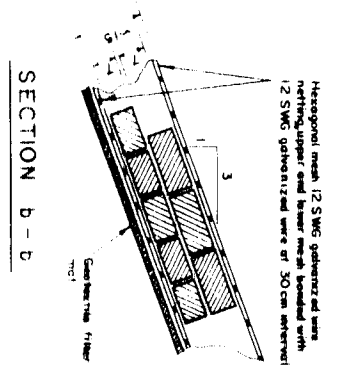


VIEW D: LAYING PATTERN OF BRICK BLOCKS

DETAIL 'C': BRICK BLOCKS WITH CEMENT MORTAR JOINTS



DETAIL 'A': BRICK MATTRESS, d = 20 cm (measurements in cm)



DETAIL 'B': BRICK MATTRESS, d = 15 cm (measurements in cm)

NOTES

1. Levels refer to ± 0.00 m PWD
2. Measurements in meter and centimeter
3. Selection of granular filter material to suit the type/gradation of fill material
4. Geotextile filter to be selected as per base soil/fill material and type/single unit weight of reveiment material
5. Unit/single weight of reveiment to be decided as per aspected hydraulic loads
6. References:
 - Section 900 Embankment Reveiment, Bed Protection and Felling Aprons
 - KA - 002 (Iterative Proposal 1993)
 - KA - 005 Filter Gradation Curves

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GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP - 21

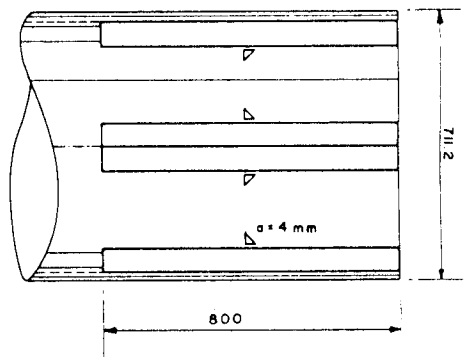
CONSULTING CONSULTANT
BANK PROTECTION PILOT PROJECT FAP - 21
BANK PROTECTION PILOT PROJECT FAP - 21
BANK PROTECTION PILOT PROJECT FAP - 21

TEST SITE I - KAMARJANI

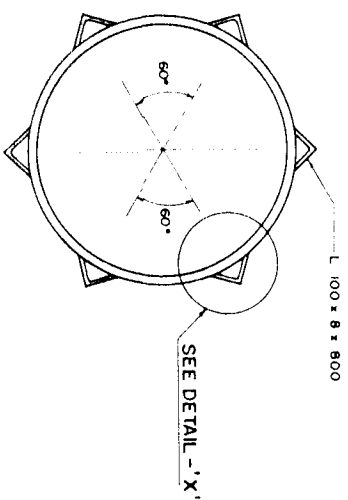
BWDB - EMBANKMENT

RECOMMENDED DESIGN DETAILS

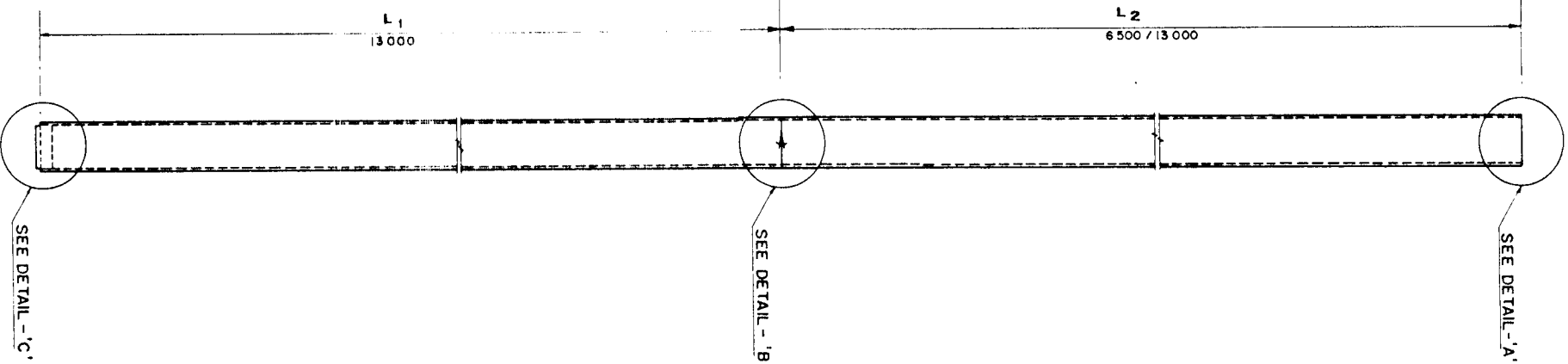
NAME	DATE	SCALE	REVISION
F HOSSAIN	06-02-94	1:100, 1:20, 1:10	0
CHANDRA	06-02-94		
APPROVED	10-02-94	KA-014	0



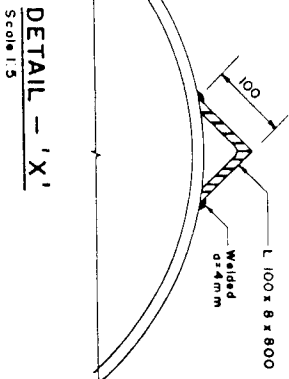
ELEVATION
Scale 1:10



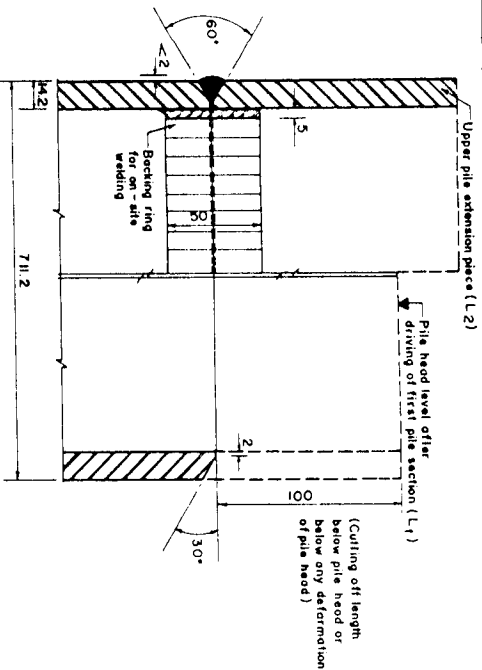
PLAN
Scale 1:10



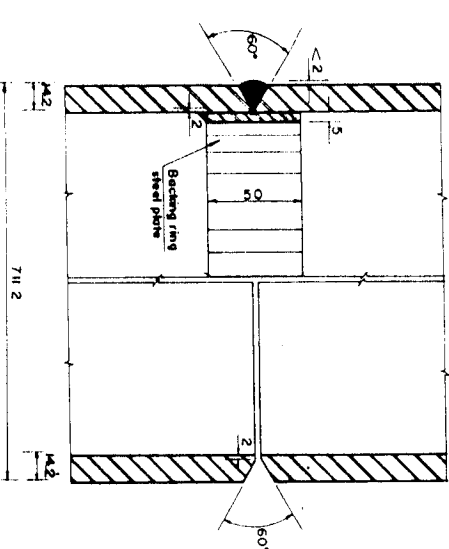
**GENERAL PILE
ARRANGEMENT**
Scale 1:50



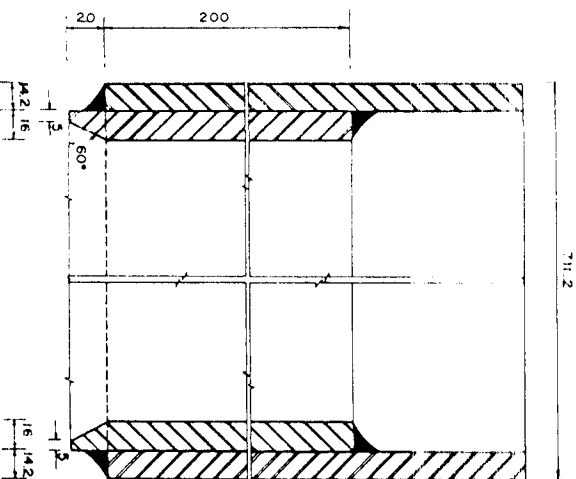
DETAIL - 'A'
Scale 1:5
**PILE HEAD REINFORCEMENT
(OPTIONAL ITEM)**



**PREPARATION OF PILE HEAD
FOR PILE BUTT JOINT DURING
PILE INSTALLATION (ALTERNATIVE ONLY)**
Scale 1:2



DETAIL - 'B'
PILE BUTT JOINT AT WELDING YARD
Scale 1:2



DETAIL - 'C'
**PILE POINT REINFORCEMENT
(OPTIONAL ITEM)**
Scale 1:2

STEEL PILE SCHEDULE (Material Supplied by Employer)						
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)			PILE POINT REINFORCEMENT (OPTIONAL)
			L1	L2	TOTAL	
Steel Pile	1	1	13.00	—	13.00	—
2	1	13.00	—	13.00	13.00	—
3	1	13.00	—	13.00	13.00	—
4	1	13.00	—	13.00	13.00	—
5	1	13.00	—	13.00	13.00	—
6	1	13.00	—	13.00	13.00	—
7	1	13.00	6.50	19.50	26.00	—
8	1	13.00	13.00	13.00	26.00	—
9	1	13.00	6.50	19.50	26.00	—
10	1	13.00	13.00	13.00	26.00	—
11	1	13.00	6.50	19.50	26.00	—
12	1	13.00	13.00	13.00	26.00	—
13	1	13.00	6.50	19.50	26.00	—
14	1	13.00	13.00	13.00	26.00	—
15	1	13.00	6.50	19.50	26.00	—
16	1	13.00	13.00	13.00	26.00	—
17	1	13.00	6.50	19.50	26.00	—
18	1	13.00	13.00	13.00	26.00	—
TOTAL	18	234.00	117.00	351.00	12	6

NOTES:

- All measurements in millimeters, except where otherwise stated.
- Welding specification as per direction of steel pile manufacturer.
- Welding materials including backing material to be provided by Contractor.
- Reference Drawing: KA-105 Pile Installation Plan.

DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

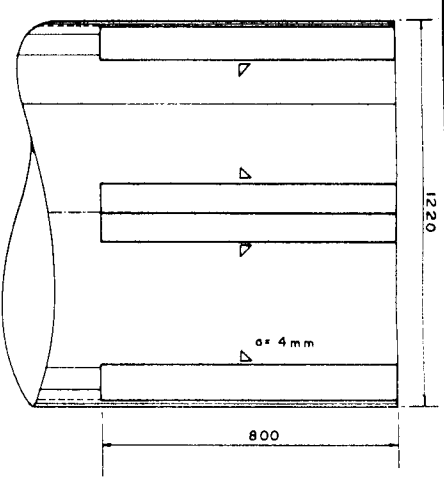
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
100, RAJSHAHI, DHAKA-1207

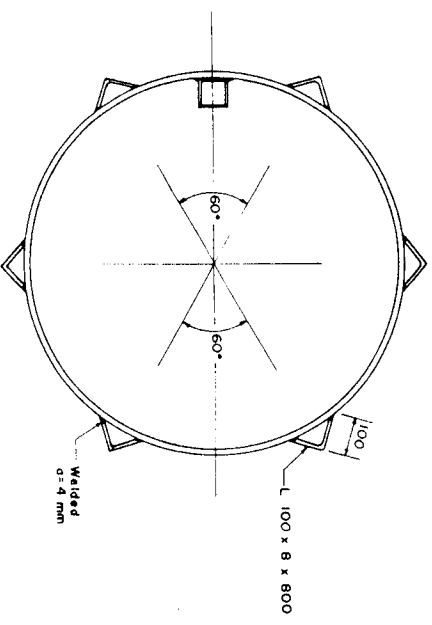
TEST SITE 1 - KAMARJANI

GROYNE G-1
STEEL PILE DIA. 711.2 x 14.2 mm
PILE SCHEDULE, DETAILS

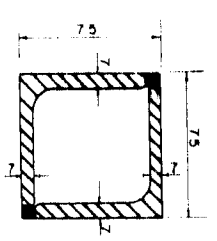
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CHECKED: [Signature]	16-01-94			
APPROVED: [Signature]	10-02-94			



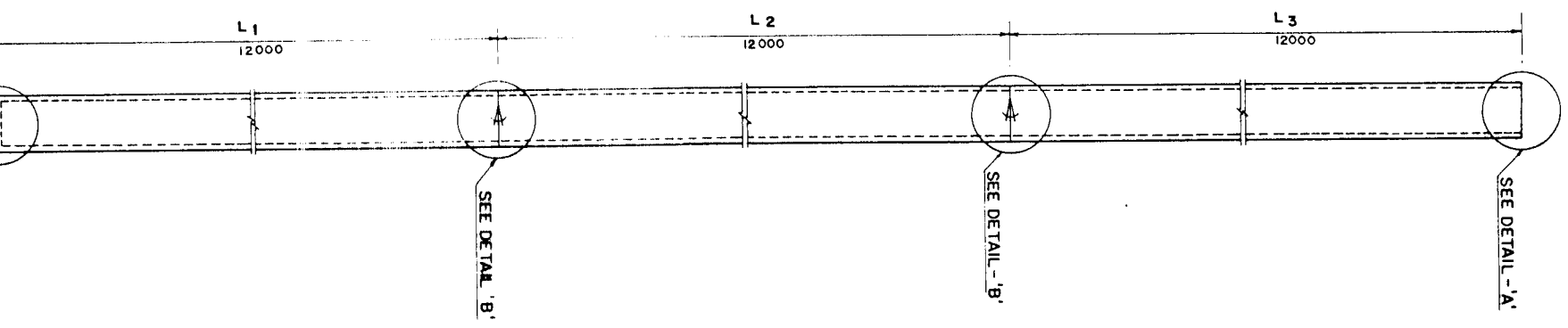
ELEVATION
Scale 1:10



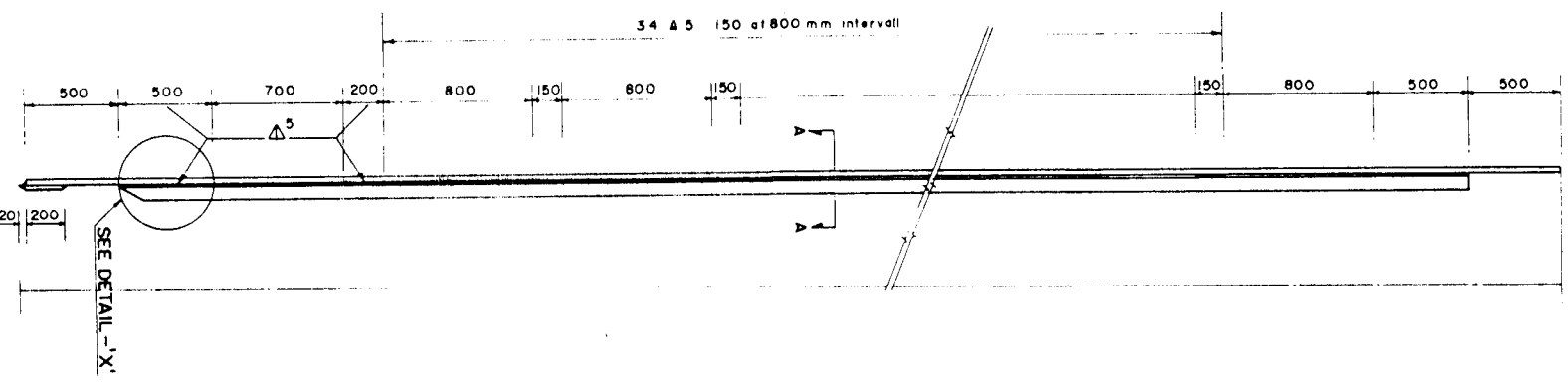
PLAN
Scale 1:10
DETAIL - 'A'
PILE HEAD REINFORCEMENT
(OPTIONAL ITEM)



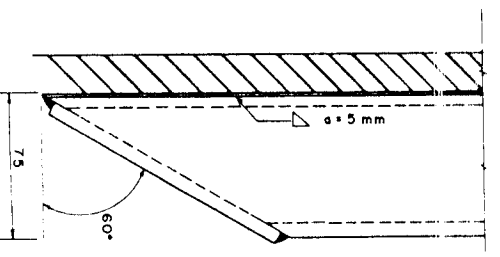
SECTION A-A
Scale 1:2



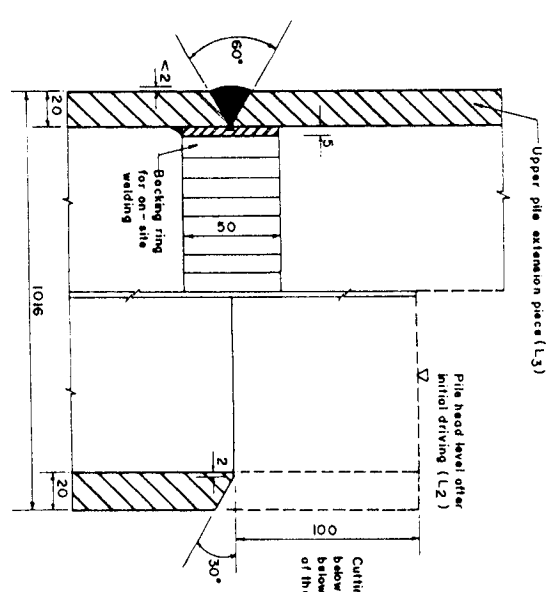
GENERAL PILE
ARRANGEMENT
(Without scale)



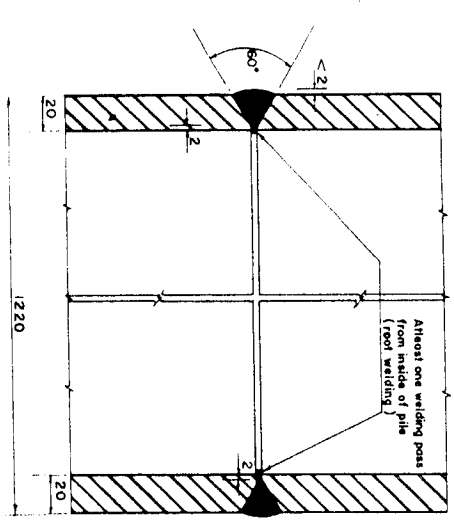
INCLINOMETER TUBE
(TO BE PROVIDED FOR
PILE NO. 29 B ONLY)
(OPTIONAL ITEM)
Scale 1:20



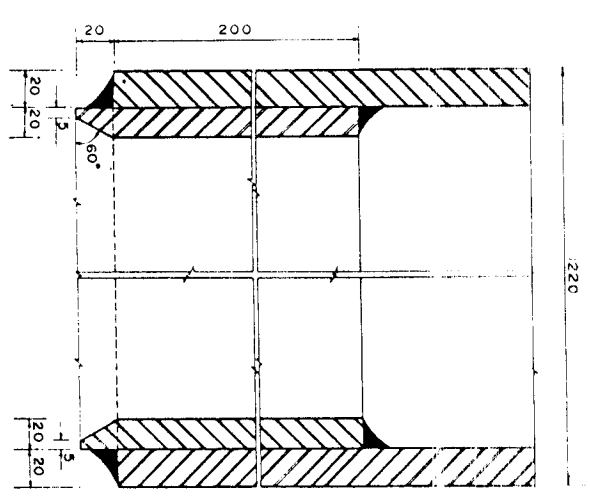
DETAIL - 'X'
Scale 1:2



PILE BUTT JOINT DURING PILE INSTALLATION
(ALTERNATIVE ONLY)
Scale 1:2



DETAIL - 'B'
PILE BUTT JOINT AT THE WELDING YARD
Scale 1:2



DETAIL - 'C'
PILE POINT REINFORCEMENT
(OPTIONAL ITEM)
Scale 1:2

STEEL PILE SCHEDULE (Material Supplied by Employer)									
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)			TOTAL	NO OF BUTT JOINT	PILE POINT (OPTIONAL)	REVISION
			L1	L2	L3				
Steel Piles	25	1	12.00	12.00	12.00	36.00	2	1	1
26	1	12.00	12.00	12.00	12.00	36.00	2	1	1
27 A	1	12.00	12.00	12.00	12.00	36.00	2	1	1
27 B	1	12.00	12.00	12.00	12.00	36.00	2	1	1
28 A	1	12.00	12.00	12.00	12.00	36.00	2	1	1
28 B	1	12.00	12.00	12.00	12.00	36.00	2	1	1
29 A	1	12.00	12.00	12.00	12.00	36.00	2	1	1
29 B	1	12.00	12.00	12.00	12.00	36.00	2	1	1
TOTAL	8	96.00	96.00	96.00	96.00	288.00	16	8	8

- NOTES:
- All dimensions are in millimeters, except where otherwise stated.
 - Welding specification as per direction of steel pile manufacturer.
 - Welding materials including backing material to be provided by Contractor.
 - Reference Drawing: KA-105 Pile Installation Plan.

DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CORPORATION
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DEPT. OF CIVIL ENGINEERING
100, RAJSHAHI, DAKSHIN, DHAKA-1215


TEST SITE 1 - KAMARJANI

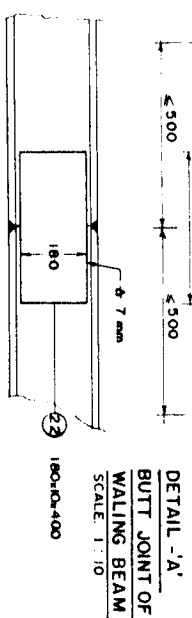
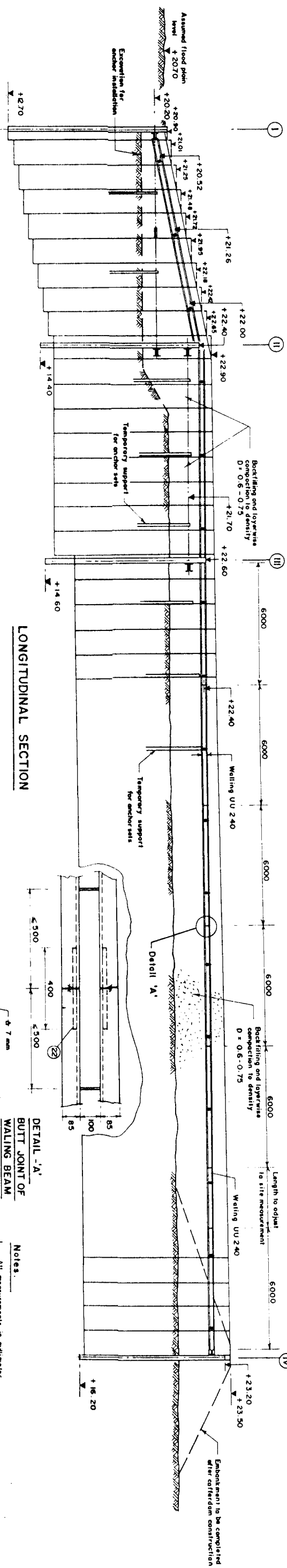
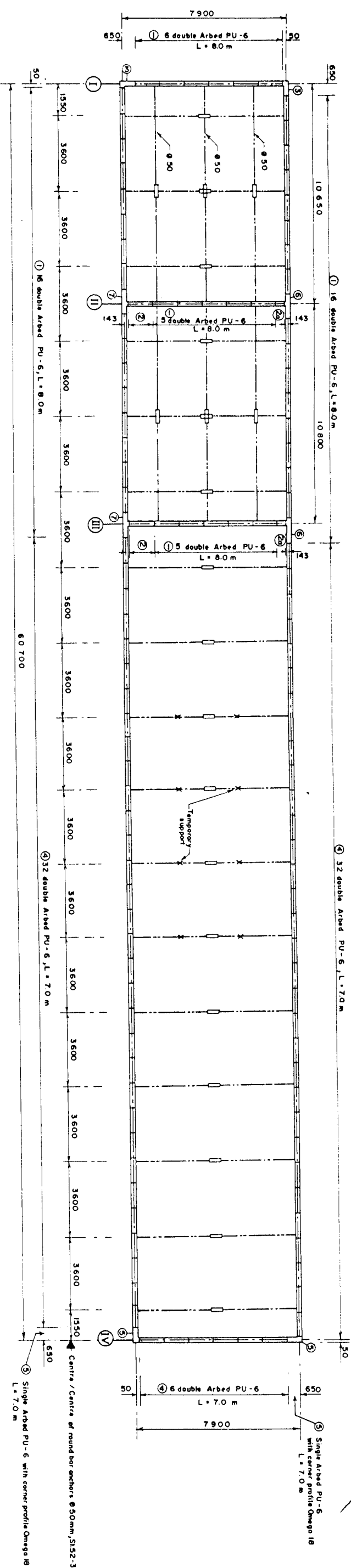
GROYNE G-1
STEEL PILE DIA. 1220 x 20mm
PILE SCHEDULE, DETAILS

NAME	DATE	SCALE	DRAWING NO.	REVISION
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CHECKED	16-01-94			
APPROVED	10-02-94			

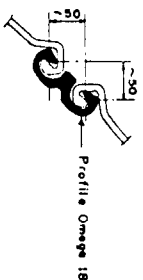
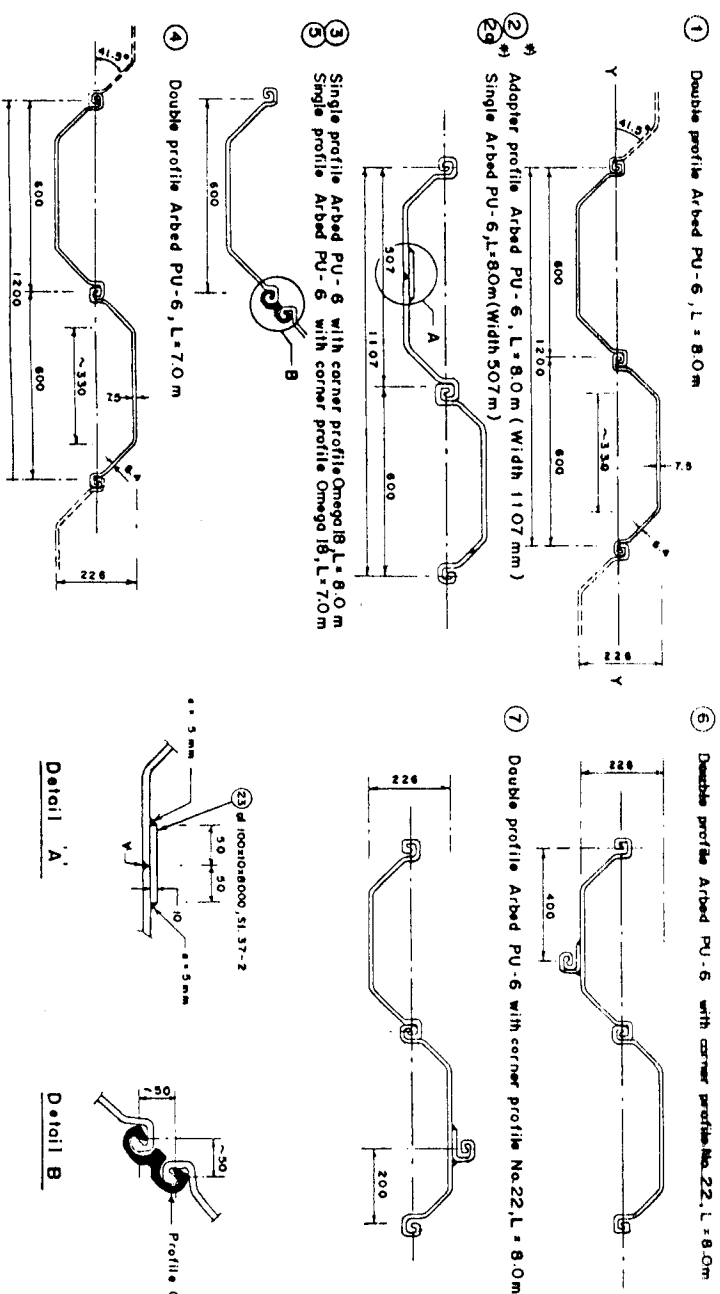
**BANK PROTECTION PILOT PROJECT - FAP 21
PILE INSTALLATION REPORT**


[illegible]

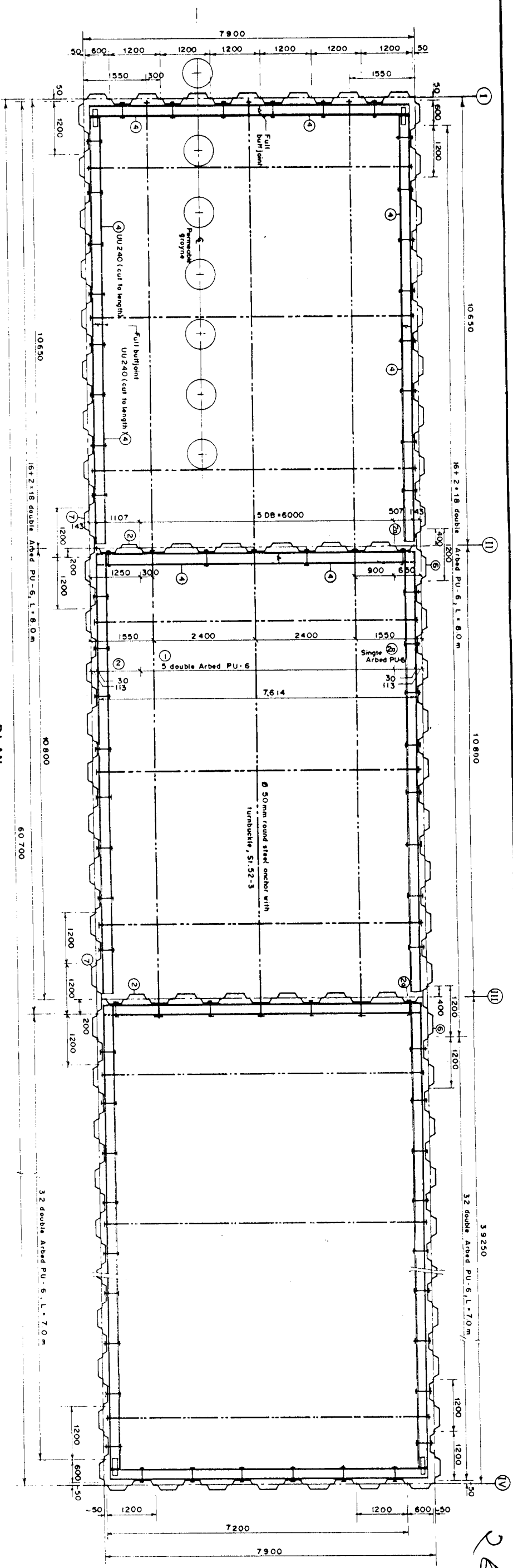
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FP-CO)					
BANK PROTECTION PILOT PROJECT FAP-21					
CONSULTING CONSORTIUM					
 MEMBERSHIP: MR. GELI HENR, CONSULTING ENGINEER CHAIRMAN: NATIONAL WATER DEVELOPMENT AUTHORITY MEMBER: DR. LAURENCE AUSTIN, SENIOR ENGINEER DEPUTY CHAIRMAN: DR. J. M. HANNAH, SENIOR ENGINEER					
TEST SITE I - KAMARJANI					
PILE INSTALLATION REPORT (Specimen Form)					
NAME		DATE		SCALE :	
ANWAR		23-01-94		—	
CHECKED		27-01-94		DRAWING NO.	
APPROVED		10-02-94		KA-105/II	
				REVISION	
				0	



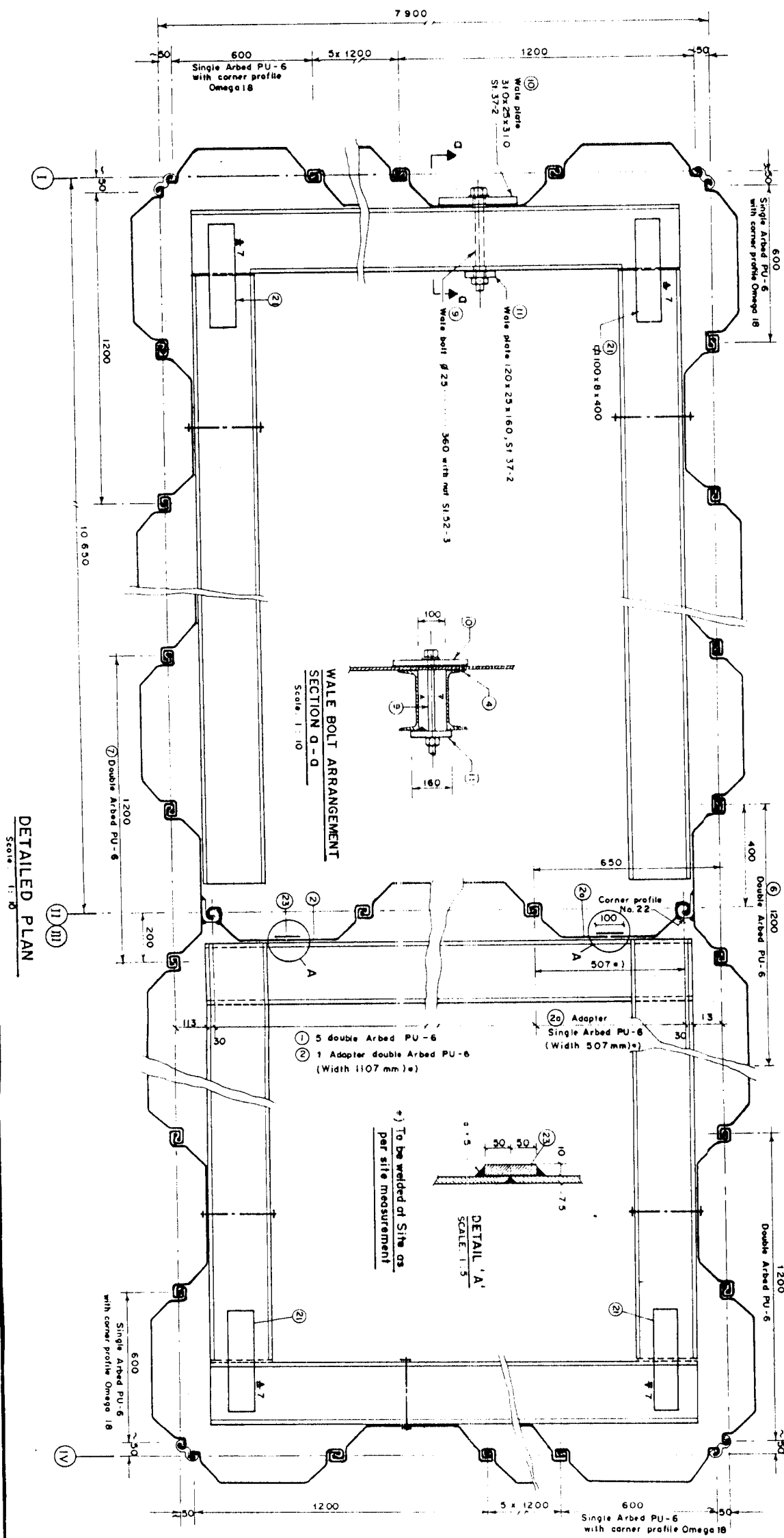
STEEL SHEET PILE ARBED PU-6 S/SP 37/ S/IE240 SP						
SCHEDULE OF MATERIAL SUPPLIED BY EMPLOYER						
ITEM	NOS.			DESIGNATION	SINGLE WEIGHT kg	TOTAL WEIGHT kg
	Requet.	Spore	Total			
1	48	2	50	Double profile , L = 8.0 m	724.80	36,240.00
2 a)	2	—	2	Double profile, L = 8.0 m, (to be used on adapter profile, p=107 mm)	724.80	1,449.60
2 a)	2	—	2	Single profile, L = 8.0 , (to be used on adapter profile, p=507mm)	362.40	724.80
3	2	1	3	Single profile with corner profile Omega 18, L = 8.0 m	506.40	1,519.20
4	70	2	72	Double profile , L = 7.0 m	634.20	45,652.40
5	2	—	2	Single profile with corner profile Omega 18, L = 7.0 m	443.10	886.20
6	2	—	2	Double profile with corner profile No.22, L = 8.0 m	809.60	1,619.20
7	2	—	2	Double profile with corner profile No.22, L = 8.0 m	809.60	1,619.20
					89,720.60	



<p style="text-align: center;">GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FP-CO)</p>					
BANK PROTECTION PILOT PROJECT FAP-21					
CONSULTING CONSULTANT					
			BANGLADESH WATER DEVELOPMENT CORPORATION COMPOUND MATERIALS DIVISION, TOWNSHIP, ROAD NO. 1, C/O. CHANDANMATH, MISRAKUNDA, DELTA BRANCH, RAJSHAHI DISTRICT		
			To: Consulting Office: BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS) HOUSE NUMBER LIMITED ROAD		
TEST SITE I - KAMARJANI					
GROYNE G-I					
SHEET PILE COFFERDAM (ARBED PU-6)					
PILE INSTALLATION PLAN, PILE SCHEDULE					
DRAWN	NAME	DATE	SCALE:		
ANOMAR		14-12-93	1 : 100 1:10		
CHECKED		16-01-94	DRAWING NO.		
APPROVED		10-02-94	KA-106		
			REVISION		1



PLAN
Scale 1:50

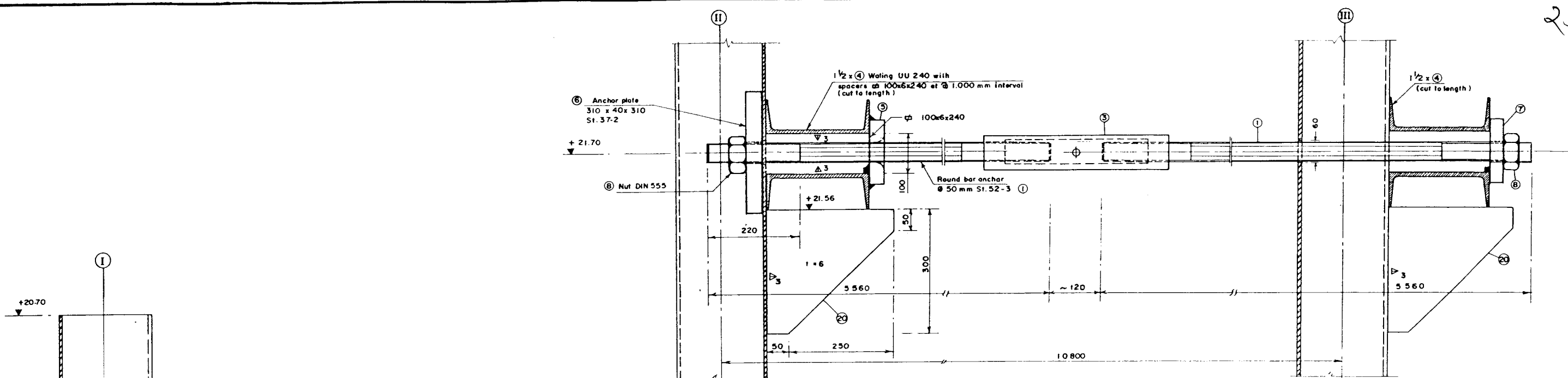


WALE BOLT ARRANGEMENT
SECTION A-A
Scale 1:10

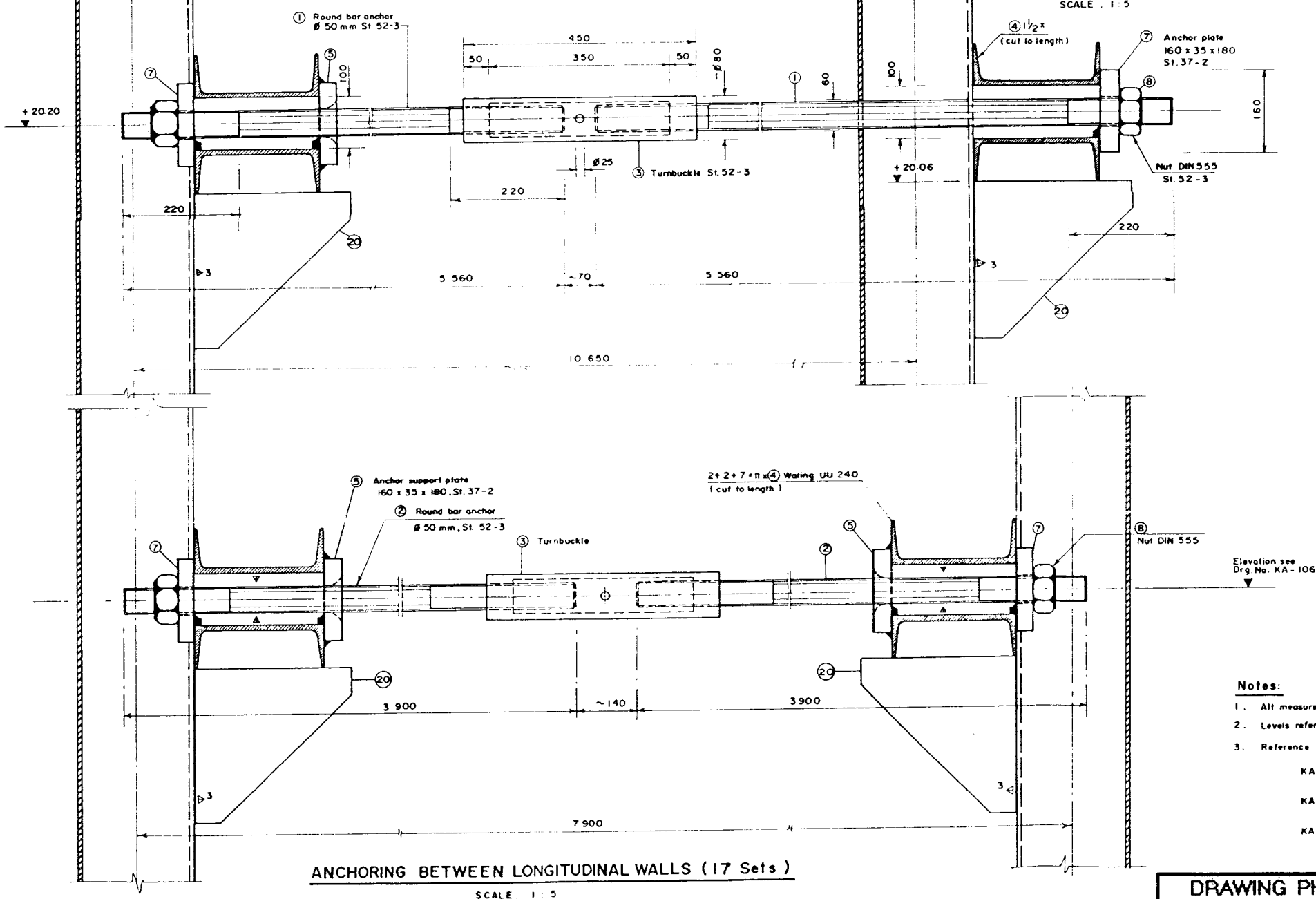
DETAILED PLAN
Scale 1:10

DRAWING PHOTOREDUCTION BY 50%			
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FPCO)			
BANK PROTECTION PILOT PROJECT FAP-21			
CONSULTING CONSULTANT			
TEST SITE I - KAMARJANI			
GROYNE G-1			
SHEET PILE COFFERDAM (ARBED PU-6)			
DETAILED LAYOUT, SECTIONS, DETAILS			
NAME	DATE	SCALE	1:10, 1:50
DRAWN	14-12-93		
CHECKED	16-01-94	DRAWING NO.	KA-107
APPROVED	10-02-94	REVISION	1

- Notes:**
- All measurements in millimeter.
 - Levels refer to 10.0 m P.W.D.
 - Sheet grades as indicated on the reference drawings.
 - Item Nos. (1) to (23) refer to Dwg. KA-108/1.
 - Reference Drawings:
 - KA-106 Sheet Pile Cofferdam, Pile Schedule
 - KA-108/1 Sheet Pile Cofferdam, Details of Anchoring



ANCHORING OF TRANSVERSE WALL
(Axis I - II = 3 Sets, II - III = 3 Sets)
SCALE: 1:5



ANCHORING BETWEEN LONGITUDINAL WALLS (17 Sets)
SCALE: 1:5

MATERIAL SCHEDULE (Supplied by Employer)									
Item No.	Nos			Section / Dimensions	Steel Grade	Single Weight (kg)	Total Weight (kg)		
	Requir.	Spore	Total						
1	12	2	14	Round bar anchor ϕ 50 --- 5560	St. 52-3	85.62	1,198.68		
2	34	4	38	Round bar anchor ϕ 50 --- 3900	St. 52-3	60.06	2,282.28		
3	23	4	27	Turnbuckle ϕ 80 --- 450	St. 52-3	9.80	264.60		
4	28	2	30	Walings UU 240 --- 6 000	St. 37-2	405.18	12,155.40		
5	40	4	44	Anchor support plate 160x35x180	St. 37-2	8.06	354.64		
6	3	1	4	Anchor plates 310x40x310	St. 37-2	30.18	120.72		
7	43	4	47	Anchor plates 160x35x180	St. 37-2	8.06	378.82		
8	46	10	56	Nut DIN 555	St. 52-3	1.10	61.60		
9	124	16	140	Wale bolt with nut ϕ 25 --- 360	St. 52-3	1.75	245.00		
10	124	16	140	Waling bolt plate 310x25x310	St. 37-2	18.85	2,639.00		
11	124	16	140	Waling bolt plate 120x25x160	St. 37-2	3.77	527.80		
Total							20,228.54		

MATERIAL SCHEDULE (Supply by Contractor)									
Item No.	Nos			Section / Dimensions	Steel	Single Weight (kg)	Total Weight (kg)		
	Requir.	Spore	Total						
20	133	—	133	Brackets 310x6x310	St. 37-2	4.24	563.92		
21	4	—	4	ϕ 100 x 8 x 400	St. 37-2	2.51	10.04		
22	42	4	46	ϕ 180x10x400	St. 37-2	5.65	259.90		
23	4	2	6	ϕ 100x10x8000	St. 37-2	62.80	376.80		
Total							1,210.66		

Notes:

- All measurements in millimeter.
- Levels refer to ± 0.0 m PWD.
- Reference Drawings:

KA-106 Sheet Pile Cofferdam, Pile Installation Plan, Pile Schedule.
KA-107 Sheet Pile Cofferdam, Detailed Layout, Sections.
KA-108/ II Sheet Pile Cofferdam (Arbed PU-6) Details of Anchoring-Sheet II

DRAWING PHOTOREduced BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

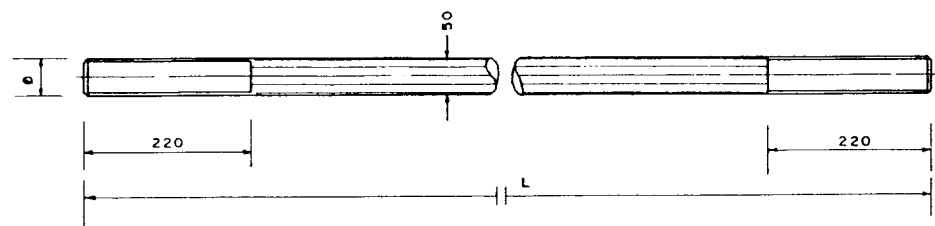
BANK PROTECTION PILOT PROJECT FAP-21



TEST SITE I - KAMARJANI

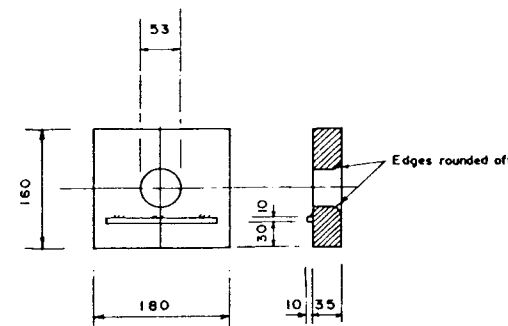
GROYNE G-1
SHEET PILE COFFERDAM (ARBED PU-6)
DETAILS OF ANCHORING - SHEET I

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CHECKED	18-01-94	DRAWING NO.		
APPROVED	10-02-94	KA-108/1		
			REVISION	1

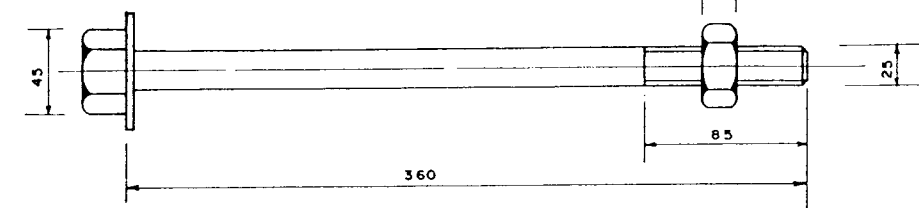


① ROUND BAR ANCHOR DIA 50mm, St 52-3
14 Nos, L = 5,560 mm
Scale 1:5

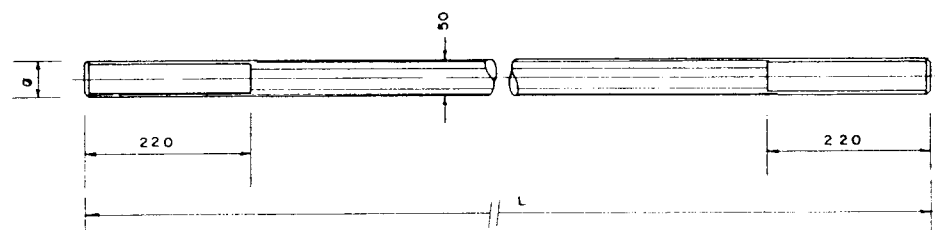
⑧ NUT DIN 555,
St. 52-3
(56 Nos)



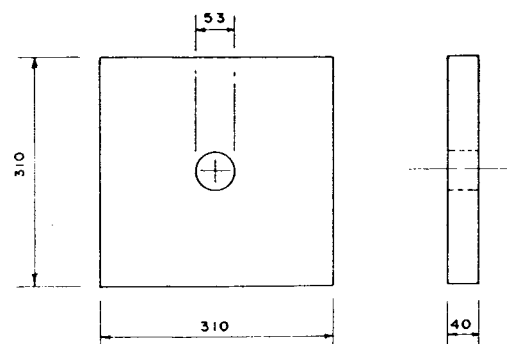
⑤ ANCHOR SUPPORT PLATE
St. 37-2 (44 Nos)
Scale 1:5



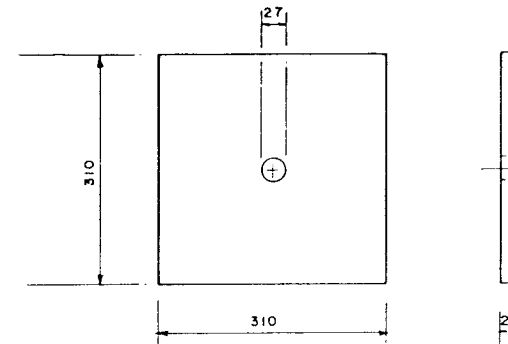
⑨ WALE BOLT WITH NUT, St. 52-3
(140 Nos.)
Scale 1:2



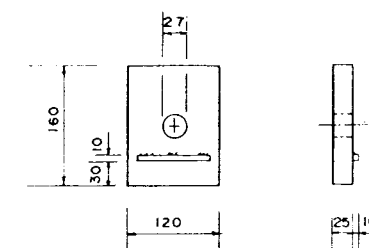
② ROUND BAR ANCHOR DIA 50 mm, St 52-3
38 Nos, L = 3,900 mm
Scale 1:5



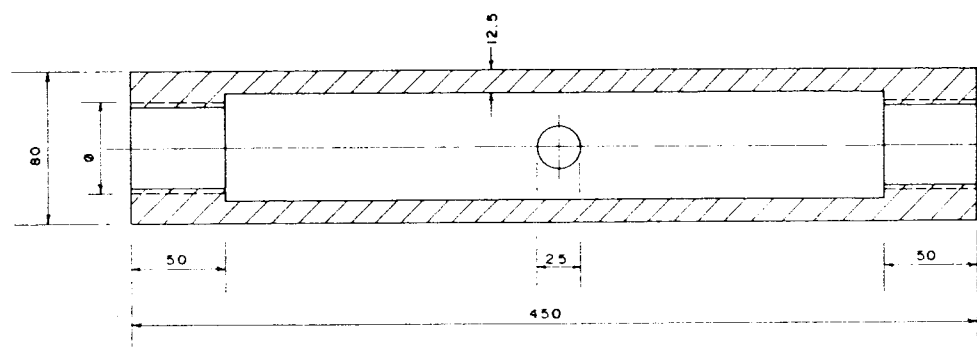
⑥ ANCHOR PLATE, St. 37-2
(4 Nos.)
Scale 1:5



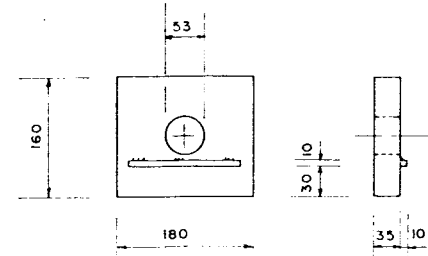
⑩ WALING BOLT PLATE, St. 37-2
(140 Nos.)
Scale 1:5



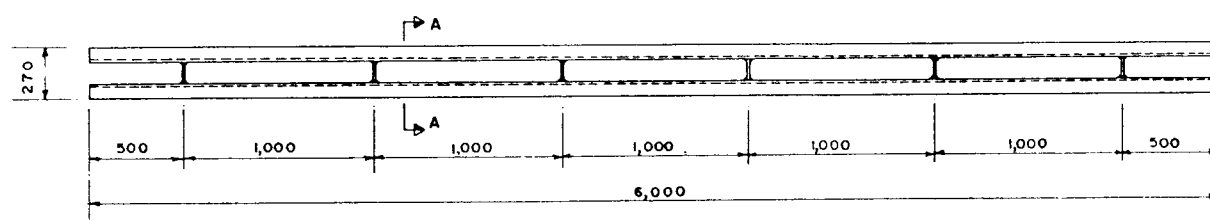
⑪ WALING BOLT PLATE, St. 37-2
(140 Nos)
Scale 1:5



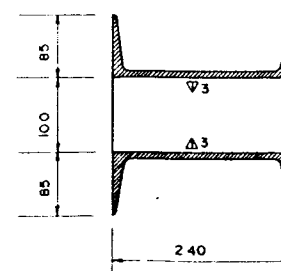
③ TURNBUCKLE, St. 52-3
27 Nos.
Scale 1:2



⑦ ANCHOR PLATE, St. 37-2
(47 Nos)
Scale 1:5



④ WALING U U 240, St. 37-2
30 Nos.
Scale 1:20



SECTION A-A
Scale 1:5

NOTES

- All dimensions are in millimeters
- Steel grades as shown
- All exposed edges to be chamfered, anchor holes to be cut by mechanical tools.
- Material schedule depicted on Drawing KA-108 / Sheet-I
- Reference Drawings
KA-106 Sheet Pile Cofferdam - Arbed PU-6
Pile Installation Plan, Pile Schedule
KA-107 Sheet Pile Cofferdam
Detailed Layout, Sections.

DRAWING PHOTOREduced BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

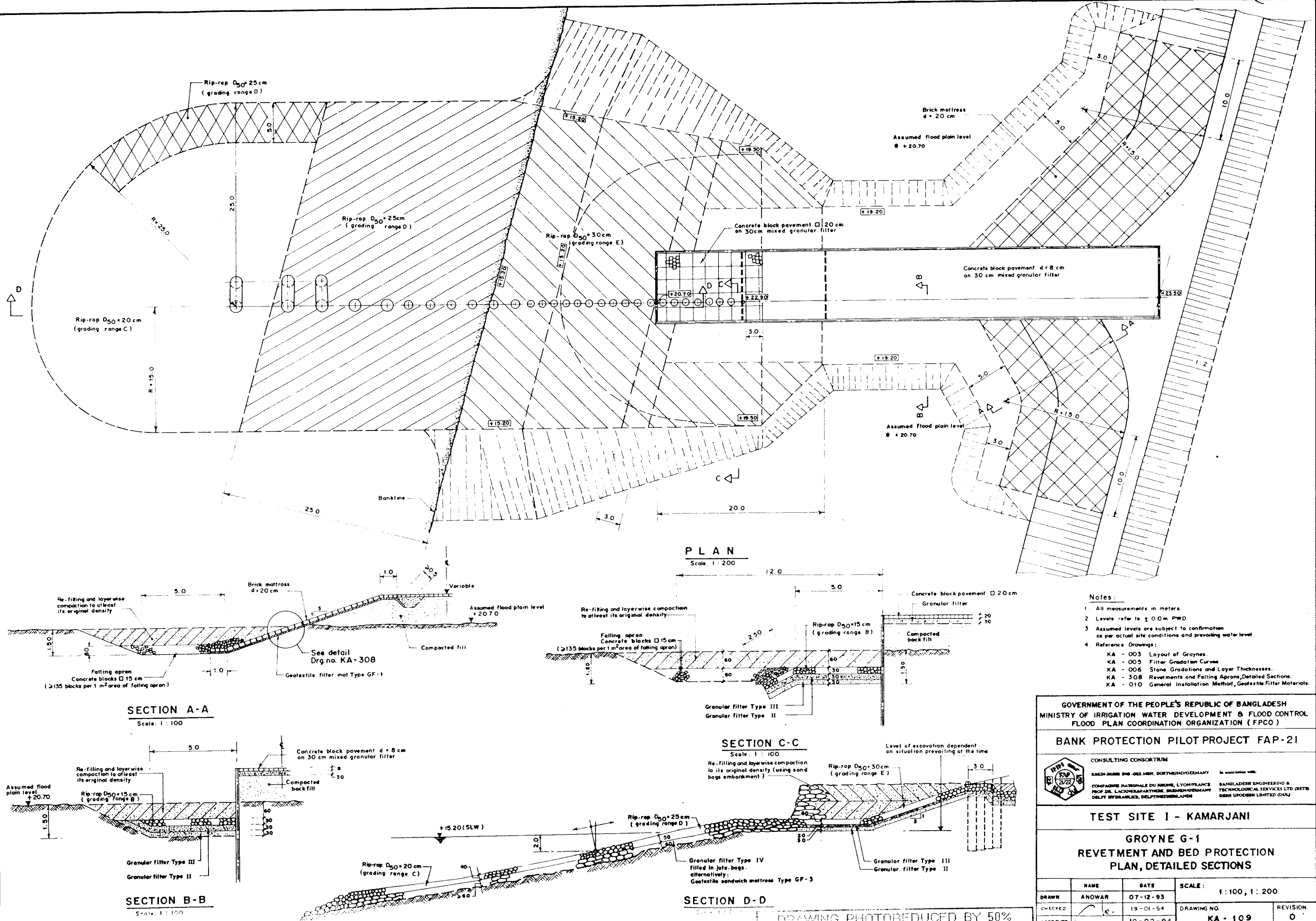
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM
RHEIN-ENER INC., GERMANY, DORTMUND, GERMANY
COMPAGNIE NATIONALE DU BRONZE, LYON/FRANCE
PROF. DR. LACONER & PARTNERS, DORTMUND/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS
In association with:
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DASH UPONESH LIMITED (DUL)

TEST SITE I - KAMARJANI

GROYNE G-1
SHEET PILE COFFERDAM (ARBED PU-6)
DETAILS OF ANCHORING - SHEET II

NAME	DATE	SCALE	REVISION
DRAWN F. HOSSAIN	11-01-94	1:20, 1:5, 1:2	
CHECKED	11-01-94	DRAWING NO.	
APPROVED	10-02-94	KA-108 / II	0

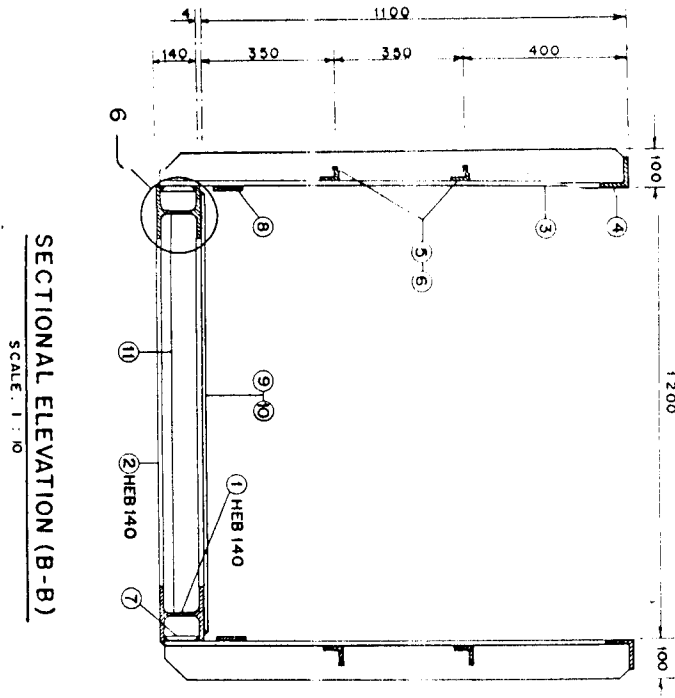
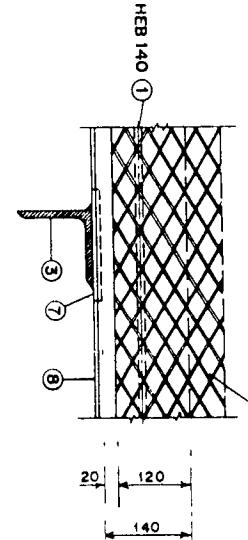
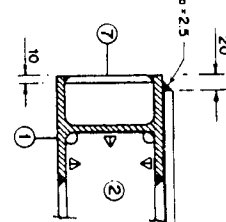
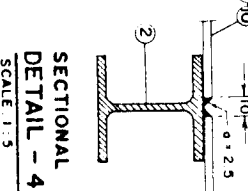
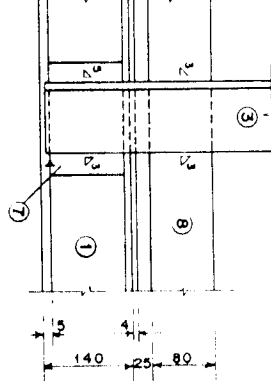
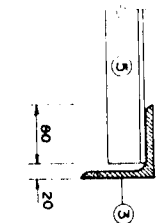
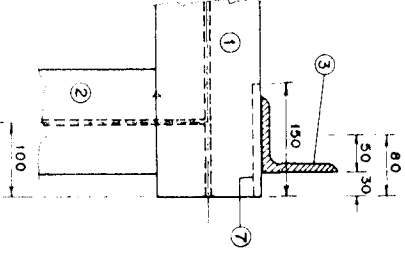
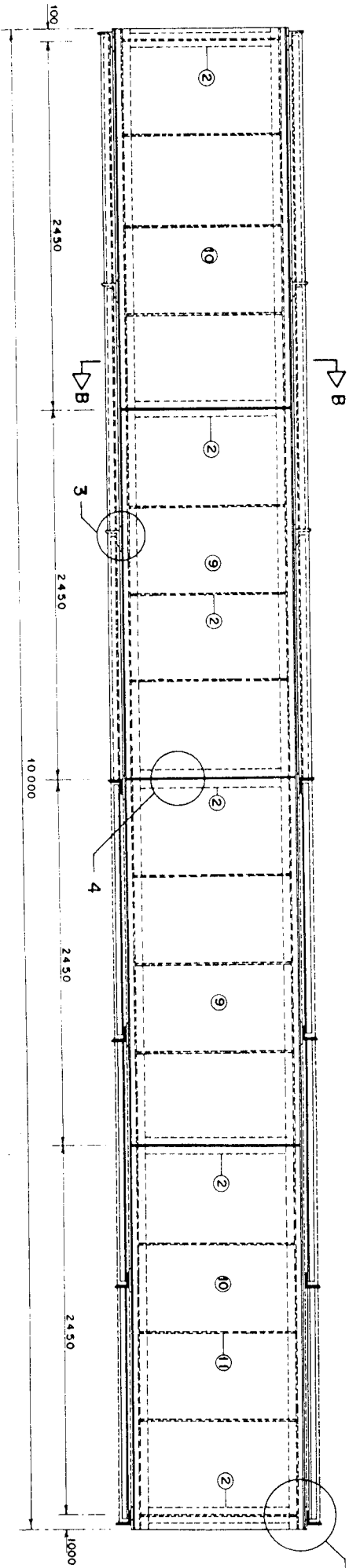
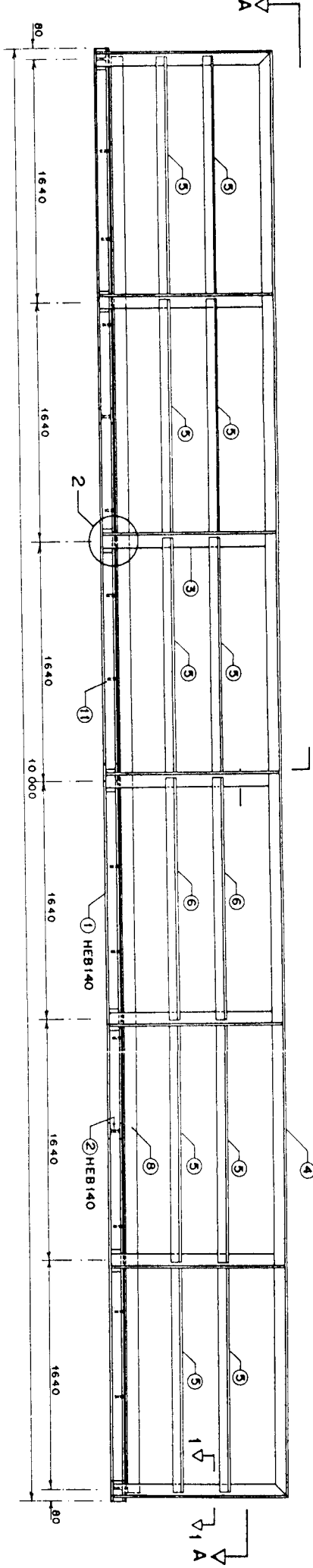


Material Schedule

Item No.	No.	Section / Size	Weight Unit (kg/m)	Weight (kg)	Remarks
1	2	HEB 140	33.7	674.0	Material supplied by Employer
2	5	HEB 140	33.7	168.5	
3	14	4.100 x 8	12.2	211.78	
4	2	4.75 x 8	9.03	179.52	
5	20	4.50 x 6	4.47	144.83	
6	4	4.50 x 6	4.47	30.40	
7	14	4.150 x 10 x H4	7.851/m ³	18.79	
8	2	4.80 x 6 x 9940	7.851/m ³	74.91	
9	2	Chambered piles 1180 x 4 x 2440	36 kg/m ²	203.79	Material supplied by Employer
10	2	Chambered piles 1180 x 4 x 2545	36 kg/m ²	212.56	
11	12	4.80 x 10 x 1046	7.851/m ³	78.83	
Total Weight of Unit				2,006.01	Excluding waste and allowance for welding
Total Weight 5 Units				10,030.05	

Notes:

- All measurements in millimeters.
- Steel grades: S37-2, DIN 17100, or equivalent grade.
- Welding seam thickness $\alpha = 0.7$ min. or as shown in the drawing.
- Measurement of fillet weld thickness.
- All exposed steel edges shall be chamfered.
- Steel structure shall receive corrosion protection by Type II, Subsection 1452 of Specifications.
- Reference Drawings:
KA - 101 General Arrangement.
KA - 112 Pile Head Connections and Bracings.



DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)



BANK PROTECTION PILOT PROJECT FAP-21

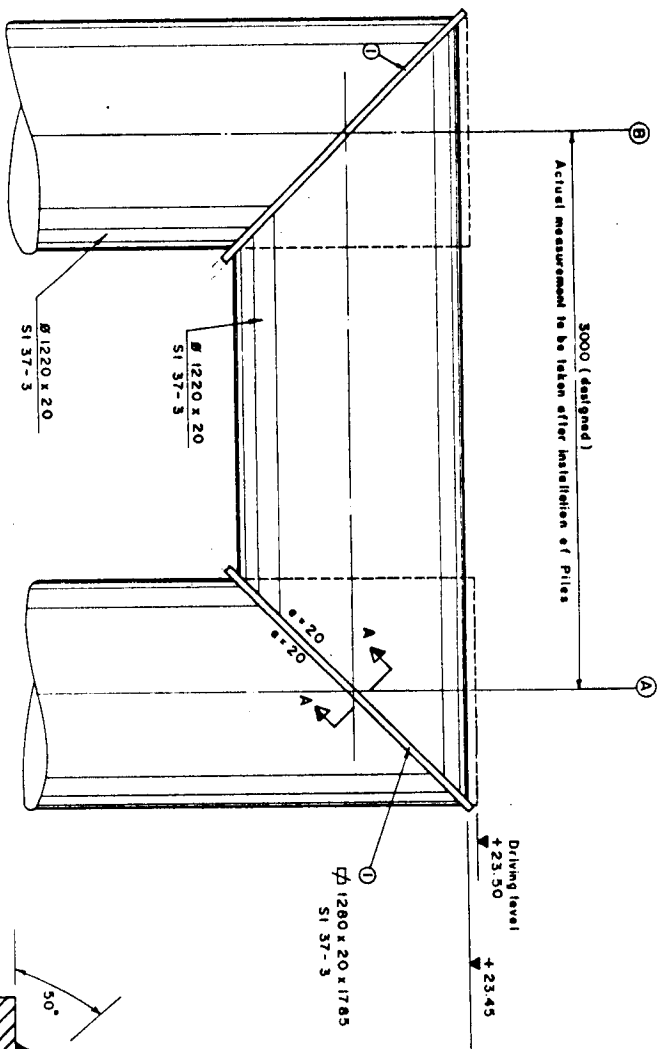
CONSULTING ORGANIZATION
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
RAJSHAHI, DHAKA-10
DEPT. OF WATER RESOURCES, GOVT. OF BANGLADESH

TEST SITE 1 - KAMARJANI

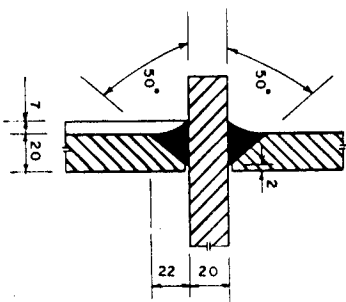
GROYNE TYPE G-1
MONITORING GANGWAY
STANDARD UNIT

NAME	DATE	SCALE	DRAWING NO.	REVISION
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CHECKED	20-01-94			
APPROVED	10-02-94			

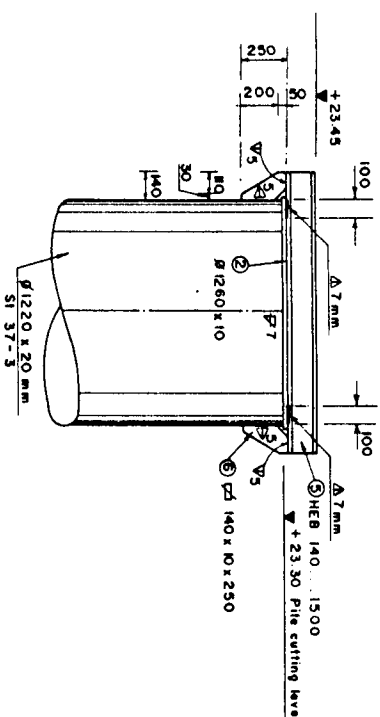
	NAME	DATE	SCALE: 1:50, 1:20, 1:5
DRAWN	F. Hassel	06-12-93	1:2
CHECKED		24-01-94	DRAWING NO
APPROVED		10-02-94	KA - 111
			REVISION
			0



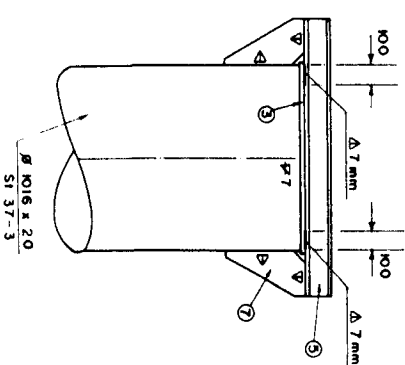
PILE HEAD CONNECTION PILE AXIS 27-28-29
Scale 1:20



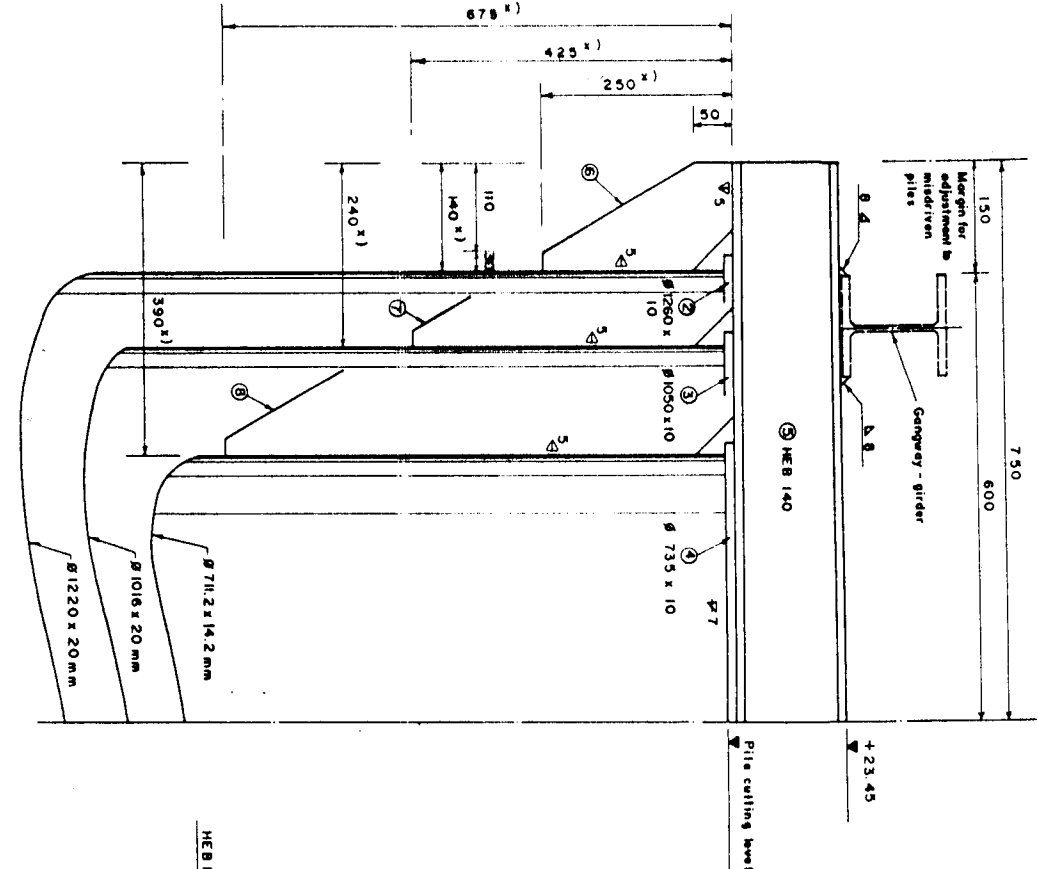
SECTION A-A
Scale 1:2



PILE HEAD SUPPORT FOR GANGWAY
AXIS 25-26 (2 NOS)
Scale 1:20

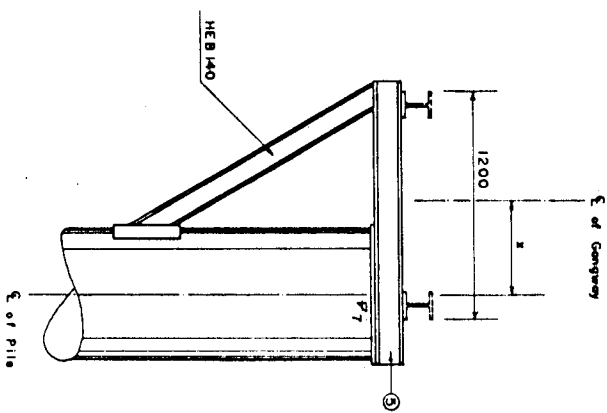


PILE HEAD SUPPORT FOR GANGWAY
AXIS 19-24 (6 NOS)
Scale 1:20

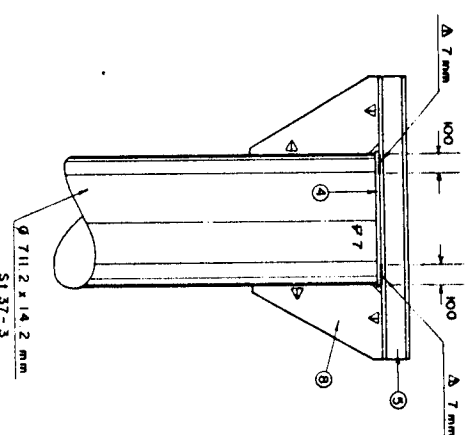


x) These measurements must be taken at site as per actual pile position along center line of gangway.

DETAIL OF PILE HEAD SUPPORT
Scale 1:5



MODIFICATION OF PILE HEAD SUPPORT
IN CASE OF ACCIDENTAL
MISALIGNMENT OF A PILE
Scale 1:20



PILE HEAD SUPPORT FOR GANGWAY
AXIS 1-18 (18 NOS)
Scale 1:20

MATERIAL SCHEDULE				
Item No.	Section / Dimensions	Single Weight kg	Total Weight kg	Remarks
1	1280 x 20 x 1785	358.71	2,152.26	SI 37-3
2	1260 x 10	124.63	249.26	SI 37
3	1050 x 10	86.55	519.30	SI 37
4	735 x 10	42.41	763.38	SI 37
5	HEB 140.....1500	50.55	1314.30	Material Supplied by Employer SI 37
6x)	140 x 10 x 250	2.75	11.00	SI 37
7x)	240 x 10 x 425	8.01	96.12	SI 37
8x)	390 x 10 x 675	20.66	743.76	SI 37
Total			5,949.36	

x) Actual measurements must be taken at site as per actual pile position along center line of Gangway

NOTES

- All levels refer to ± 0.0 m P.W.O
- All measurements in millimeters
- Steel grade SI 37-3 and SI 37, Q191700 as shown in the Schedule or equivalent grade
- Welding some thickness $a = 0.7 \times t$ min or as shown on the drawings.
- Measurement of fillet weld thickness
- All exposed steel edges shall be chamfered
- Reference Drawings: KA - 101 General Arrangement KA - 105 Pile Installation Plan



DRAWING PHOTOREDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21



TEST SITE 1 - KAMARJANI

GROYNE G-1

PILE HEAD CONNECTION AND BRACING

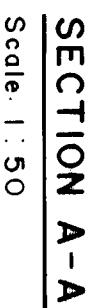
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DRAWN F. HOSSAIN	08-12-93	1:20, 1:5
CHECKED	24-12-94	DRAWING NO. KA-112
APPROVED	10-02-94	REVISION 0

MATERIAL SCHEDULE				
Item No.	Nos.	Section / Size	Weight per No. kg	Weight kg
1	1	Ø 508 x 8 ... 2900	—	2 85.93
2	1	Ø 219 x 6.3 ... 3000	—	99.10
3	2	Ø 350 x 6 ... 900	14.84	29.68
4	2	Ø 400 x 6 ... 400	5.02	10.04
5	8	Ø 890 x 4 ... 1000	21.67	173.36
6	1	Ø 508/219 ... 200	—	15.00
7	1	Ø 220 x 4	—	1.19
Total (4 Nos.)				614.30

MATERIAL SCHEDULE				
Item No.	Nos.	Section / Size	Weight per No. kg	Weight kg
1	1	Ø 508 x 8 ... 2900	—	2 85.93
2	1	Ø 219 x 6.3 ... 3000	—	99.10
3	2	Ø 350 x 6 ... 900	14.84	29.68
4	2	Ø 400 x 6 ... 400	5.02	10.04
5	8	Ø 890 x 4 ... 1000	21.67	173.36
6	1	Ø 508/219 ... 200	—	15.00
7	1	Ø 220 x 4	—	1.19
Total (4 Nos.)				614.30

- GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)
-
- BANK PROTECTION PILOT PROJECT FAP-21**

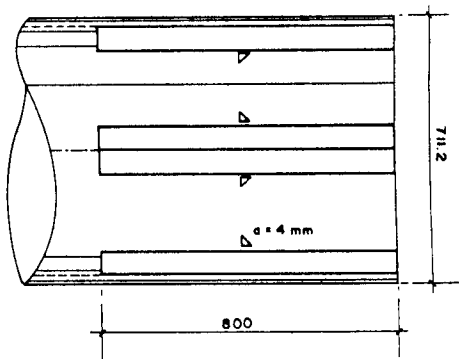
NAME		SCALE :	
DRAWN	F. NOSSAIN	1 : 50	
CHECKED	16-01-94	DRAWING NO.	KA-113
APPROVED	10-02-94	REVISION	0



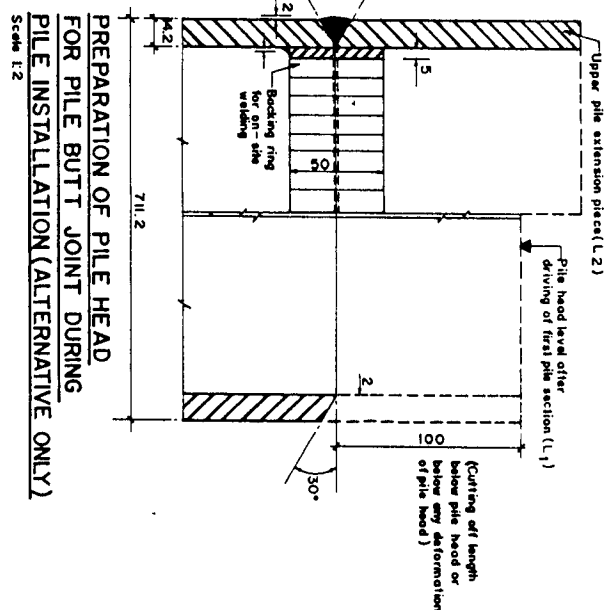
SECTION A-A
Scale: 1 : 50

Scale 1:50

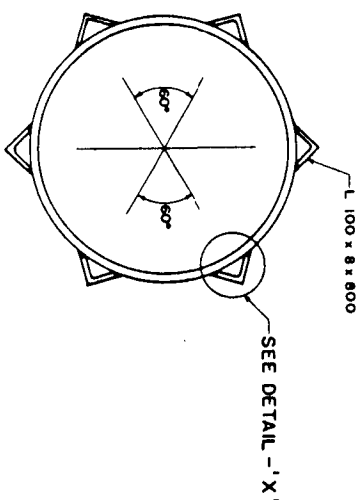
<p>GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FPCO)</p>			
<p>BANK PROTECTION PILOT PROJECT FAP-21</p>			
<p>CONSULTING CONSULTANT</p>			
<p>BAHAR-UTTAH BUREAU OF ARCHITECTURE AND PLANNING CONSULTING NATIONALISTS 100 BARAKA, 1, THAKURPALLY ROAD, DAKSHIN KAPASHA, DISTRICT, DHAKA TEL: 8763400, 8763401, 8763402, 8763403</p>		<p>By: <i>(Signature)</i> SAHABUZZAMAN ENGINEERING & TECHNICAL SERVICES LTD. (PVT) DESH BANGLA DHAKA 1204</p>	
<p>TEST SITE I - KAMARUJANI</p>			
<p>GROYNE G-2 GENERAL ARRANGEMENT ELEVATION, PLAN</p>			
<p>NAME</p>		<p>DATE</p>	
<p>DRAWN: ANOVAR</p>		<p>07-12-93</p>	
<p>CHECKED: <i>(Signature)</i></p>		<p>20-01-94</p>	
<p>APPROVED: <i>(Signature)</i></p>		<p>10-02-94</p>	
<p>SCALE</p>		<p>1 : 200</p>	
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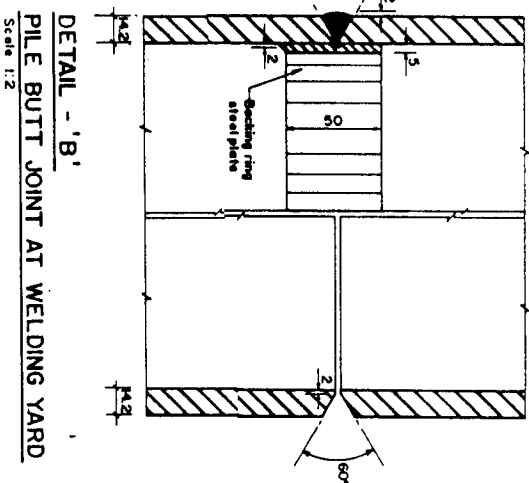
ELEVATION
Scale 1:10



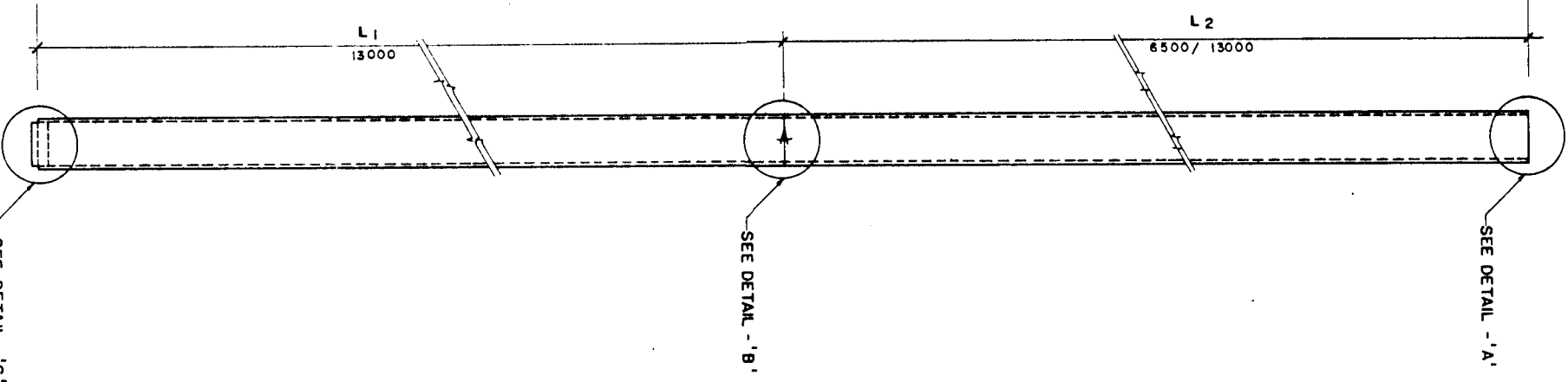
PREPARATION OF PILE HEAD
FOR PILE BUTT JOINT DURING
PILE INSTALLATION (ALTERNATIVE ONLY)
Scale 1:2



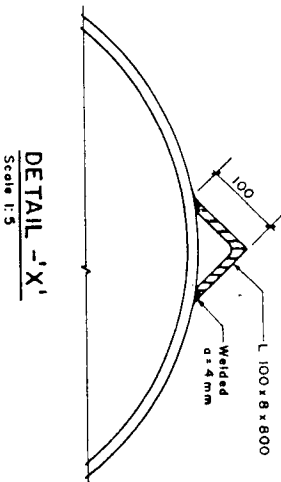
PLAN
Scale 1:10



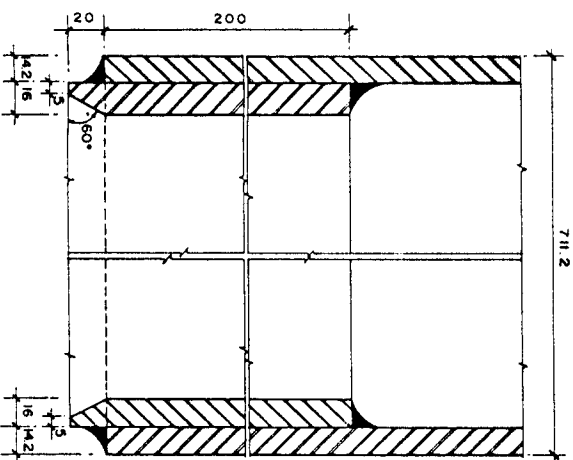
DETAIL - 'B'
PILE BUTT JOINT AT WELDING YARD
Scale 1:2



GENERAL PILE
ARRANGEMENT
Scale 1:50



DETAIL - 'X'
PILE HEAD REINFORCEMENT
(OPTIONAL ITEM)
Scale 1:5



DETAIL - 'C'
PILE POINT REINFORCEMENT
(OPTIONAL ITEM)
Scale 1:2

STEEL PILE SCHEDULE (Material Supplied by Employer)						
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)			PILE POINT BUTT JOINT (OPTIONAL)
			L1	L2	TOTAL	
Steel Pile	1	1	13.00	6.50	19.50	1
dia. 711.2 mm	2	1	13.00	13.00	26.00	1
±14.2 m	3	1	13.00	6.50	19.50	1
Unit length 13.00 m	4	1	13.00	13.00	26.00	1
Steel grade S137-5, DIN 17120	5	1	13.00	6.50	19.50	1
	6	1	13.00	13.00	26.00	1
	7	1	13.00	6.50	19.50	1
	8	1	13.00	13.00	26.00	1
	9	1	13.00	6.50	19.50	1
	10	1	13.00	13.00	26.00	1
	11	1	13.00	6.50	19.50	1
	12	1	13.00	13.00	26.00	1
	13	1	13.00	6.50	19.50	1
	14	1	13.00	13.00	26.00	1
	15	1	13.00	6.50	19.50	1
	16	1	13.00	13.00	26.00	1
	17	1	13.00	6.50	19.50	1
	18	1	13.00	13.00	26.00	1
	TOTAL	18	234.00	175.50	409.50	18

- NOTES:
- All measurements in millimeters, except shown otherwise
 - Welding specification as per direction of steel pile manufacturer
 - Welding materials including backing material to be provided by Contractor
 - Reference Drawing: KA-205 Pile Installation Plan

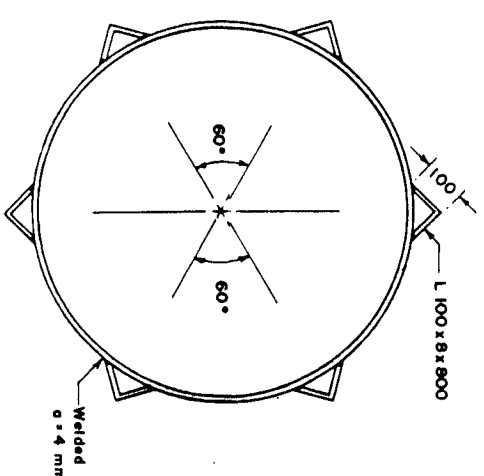
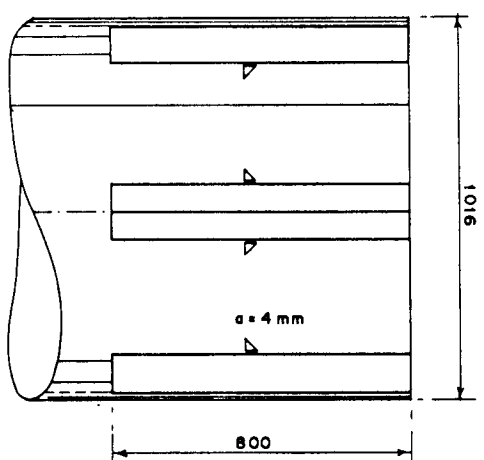
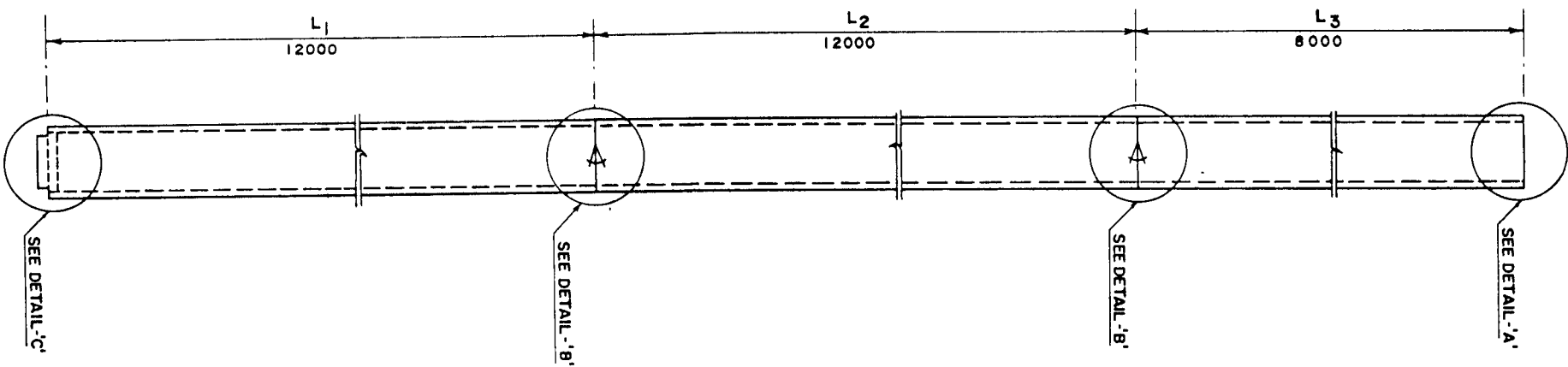
DRAWING PHOTOREPRODUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)
BANK PROTECTION PILOT PROJECT FAP-21

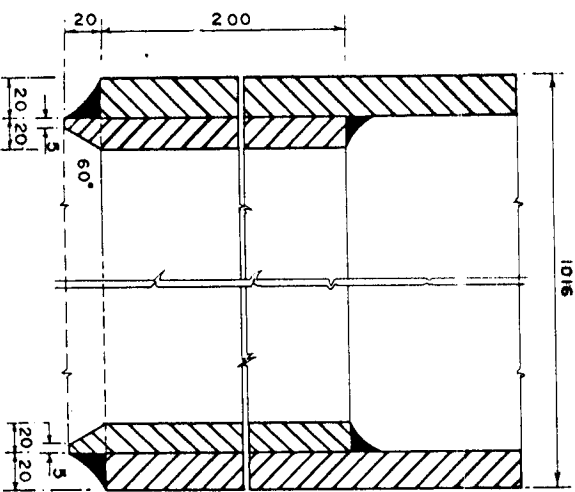
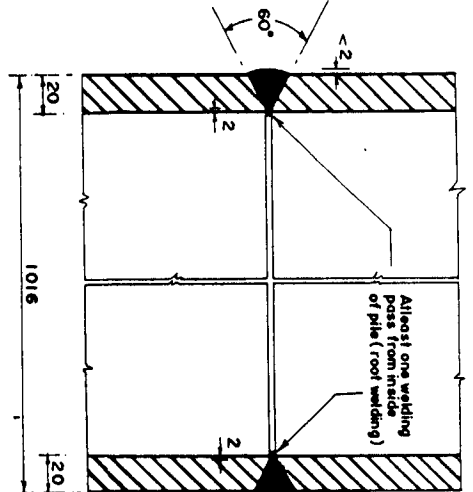
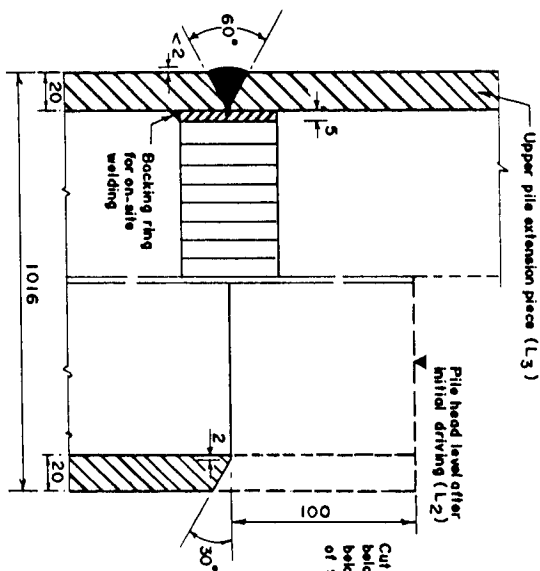
CONSULTING ENGINEER
BANK PROTECTION PILOT PROJECT FAP-21
TEST SITE 1 - KAMARJANI

STEEL PILE DIA. 711.2 x 14.2 mm
PILE SCHEDULE, DETAILS

	NAME	DATE	SCALE:	
DRAWN	K. M. AHMED	23-12-93	1:50, 1:10, 1:5, 1:2	
CHECKED	K. M.	17-01-94	DRAWING NO.	REVISION
APPROVED		10-02-94	KA-202	0



DETAIL 'A'
PILE HEAD REINFORCEMENT
(OPTIONAL ITEM)



STEEL PILE SCHEDULE (Material Supplied by Employer)									
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)				NO. OF BUTT JOINT	PILE POINT REINFORCEMENT (OPTIONAL)	
			L ₁	L ₂	L ₃	TOTAL			
Steel Piles dia 1016mm	19	1	12.00	12.00	8.00	32.00	2	1	
	20	1	12.00	12.00	8.00	32.00	2	1	
	21	1	12.00	12.00	8.00	32.00	2	1	
1 x 20 mm	22	1	12.00	12.00	8.00	32.00	2	1	
Steel grade SI 373 DIN 17120	23	1	12.00	12.00	8.00	32.00	2	1	
	24	1	12.00	12.00	8.00	32.00	2	1	
TOTAL	6		72.00	72.00	48.00	192.00	12	6	

- Notes**
1. All measurements in millimeters, except shown other wise.
 2. Welding specification as per direction of steel pile manufacturer.
 3. Welding materials including backing material to be provided by Contractor.
 4. Reference Drawing 1.
- KA - 203 Pile Installation Plan

DRAWING PHOTOREDUCTION BY 50%

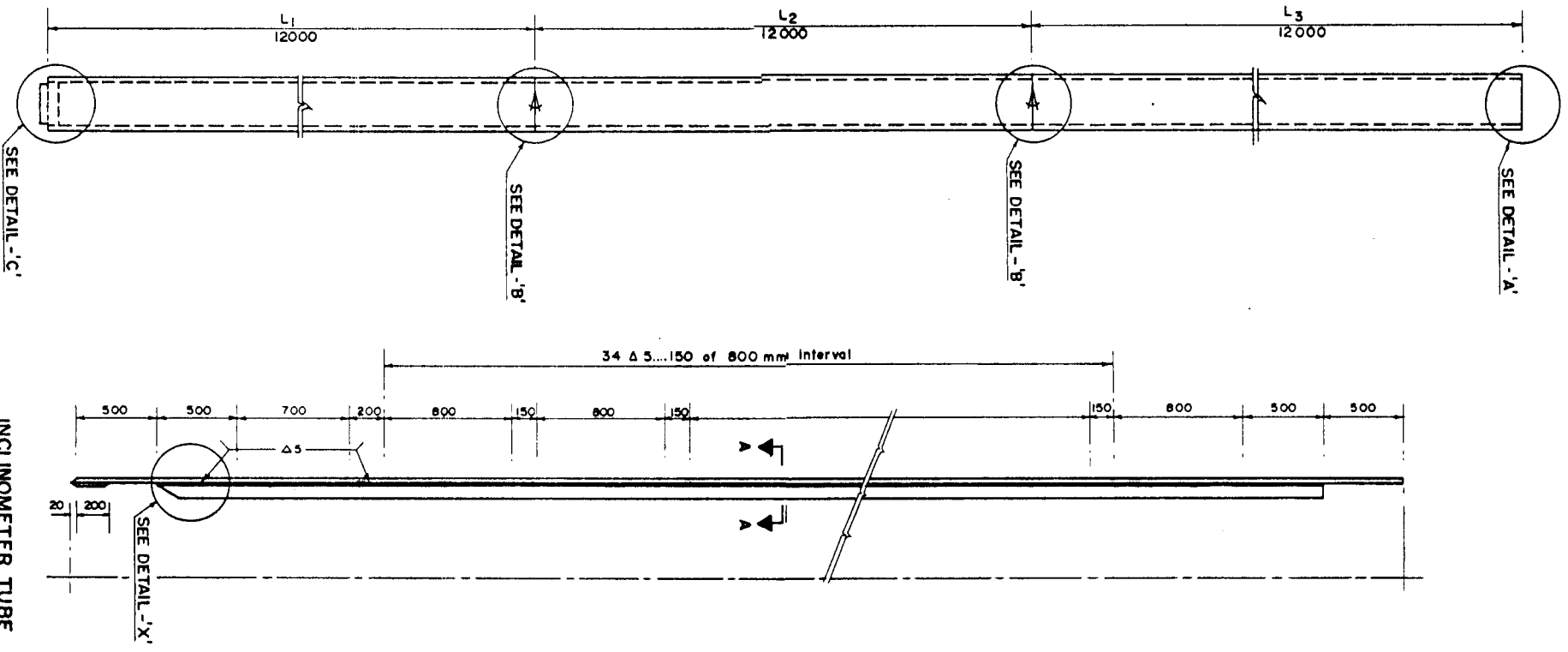
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

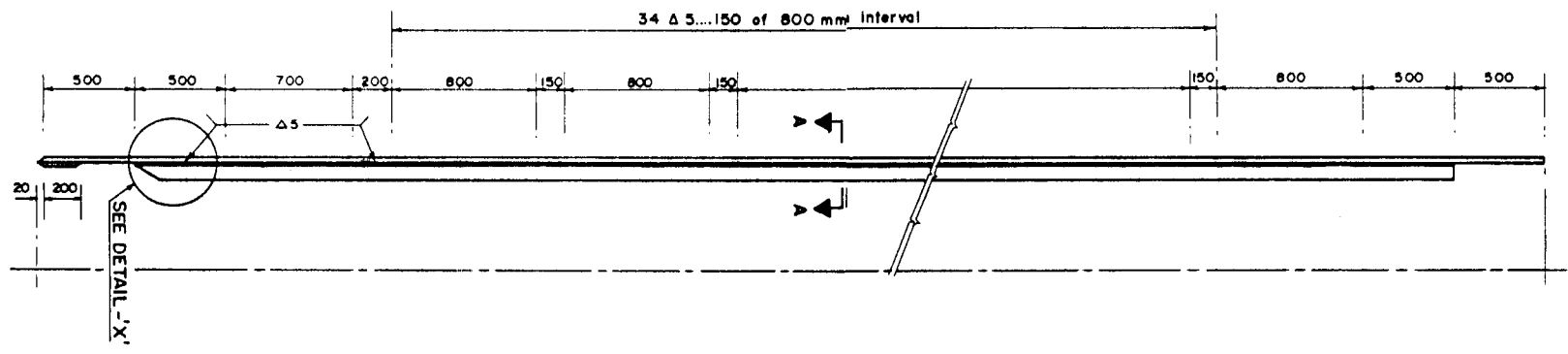
CONSULTING CONSULTANT
BANK PROTECTION PILOT PROJECT FAP-21
TEST SITE 1 - KAMARJANI

STEEL PILE DIA. 1016 x 20 mm
PILE SCHEDULE, DETAILS

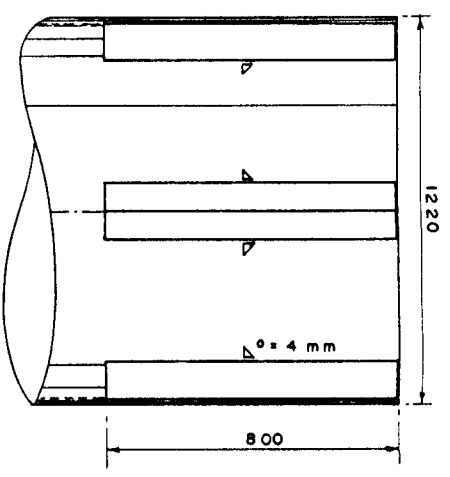
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ANWAR	21-12-93	1:20, 1:10, 1:2	KA - 203	0
CHECKED	20-01-94			
APPROVED	10-02-94			



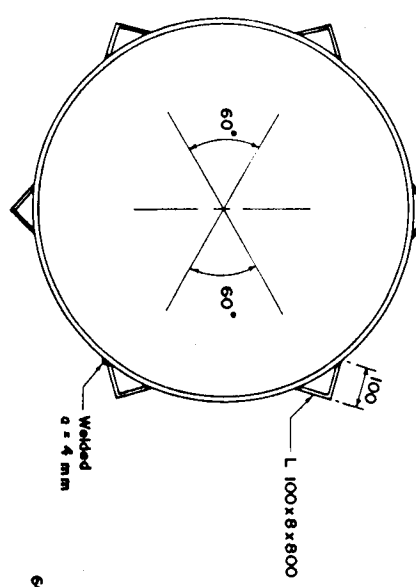
GENERAL PILE
ARRANGEMENT
(Without scale)



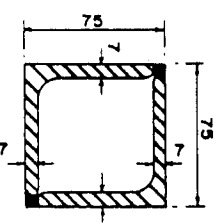
INCLINOMETER TUBE
(TO BE PROVIDED FOR
PILE NO. 30 ONLY)
SCALE: 1:20



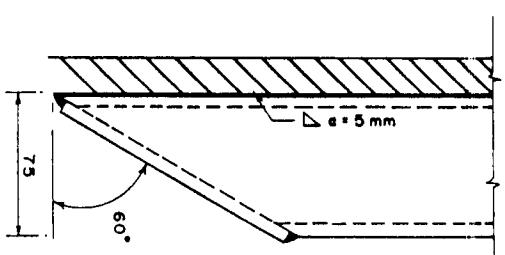
ELEVATION
SCALE: 1:10



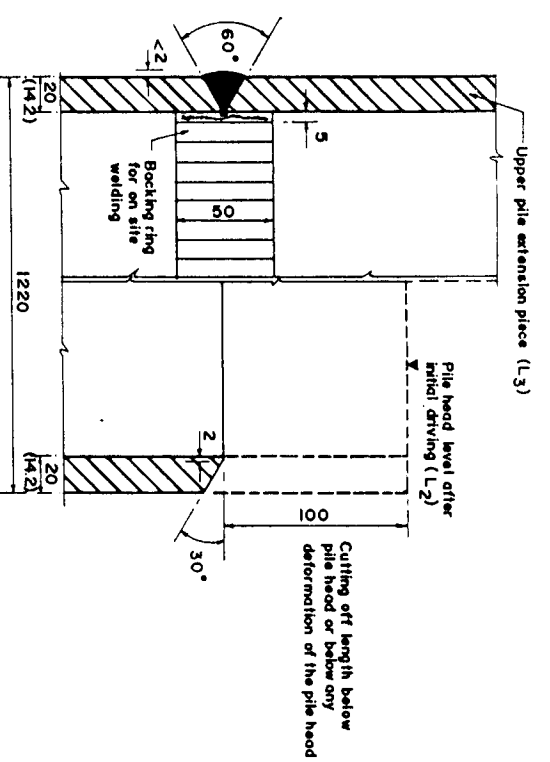
PLAN
SCALE: 1:10



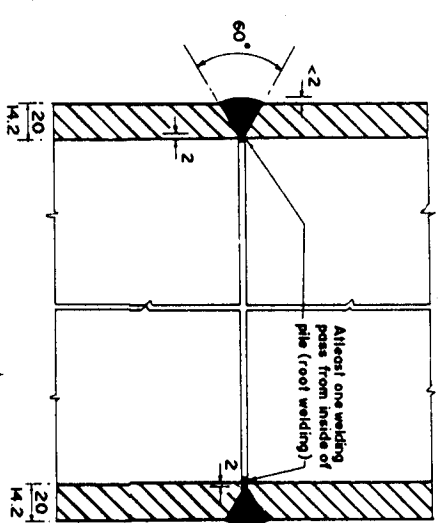
SECTION A-A
SCALE: 1:2



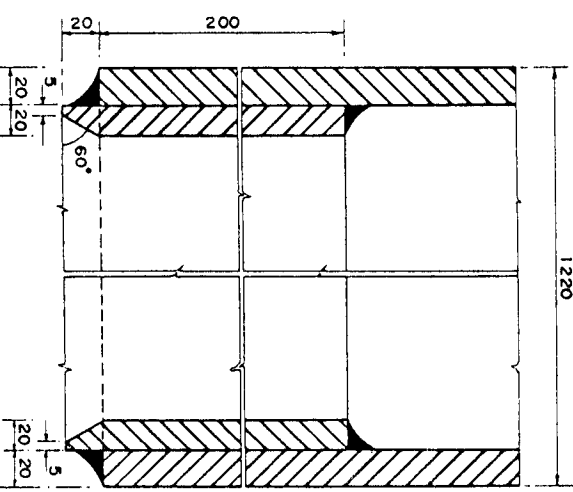
DETAIL - 'X'
SCALE: 1:2



PILE BUTT JOINT DURING PILE INSTALLATION
(ALTERNATIVE ONLY)
SCALE: 1:2



DETAIL - 'B'
PILE BUTT JOINT AT THE WELDING YARD
SCALE: 1:2



DETAIL - 'C'
PILE POINT REINFORCEMENT (OPTIONAL ITEM)
SCALE: 1:2

STEEL PILE SCHEDULE (Material Supplied by Employer)									
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)			TOTAL	NO. OF BUTT JOINT	PILE POINT REINFORCEMENT (OPTIONAL)	PILE POINT REINFORCEMENT (OPTIONAL)
			L ₁	L ₂	L ₃				
25	1	1	12.00	12.00	12.00	36.00	2	1	1
26	1	1	12.00	12.00	12.00	36.00	2	1	1
27	1	1	12.00	12.00	12.00	36.00	2	1	1
28	1	1	12.00	12.00	12.00	36.00	2	1	1
29	1	1	12.00	12.00	12.00	36.00	2	1	1
30	1	1	12.00	12.00	12.00	36.00	2	1	1
31	1	1	12.00	12.00	12.00	36.00	2	1	1
32	1	1	12.00	12.00	12.00	36.00	2	1	1
33	1	1	12.00	12.00	12.00	36.00	2	1	1
34	1	1	12.00	12.00	12.00	36.00	2	1	1
35	1	1	12.00	12.00	12.00	36.00	2	1	1
36	1	1	12.00	12.00	12.00	36.00	2	1	1
37	1	1	12.00	12.00	12.00	36.00	2	1	1
38	1	1	12.00	12.00	12.00	36.00	2	1	1
39	1	1	12.00	12.00	12.00	36.00	2	1	1
40	1	1	12.00	12.00	12.00	36.00	2	1	1
41	1	1	12.00	12.00	12.00	36.00	2	1	1
42	1	1	12.00	12.00	12.00	36.00	2	1	1
43	1	1	12.00	12.00	12.00	36.00	2	1	1
44	1	1	12.00	12.00	12.00	36.00	2	1	1
45	1	1	12.00	12.00	12.00	36.00	2	1	1
46	1	1	12.00	12.00	12.00	36.00	2	1	1
47	1	1	12.00	12.00	12.00	36.00	2	1	1
48	1	1	12.00	12.00	12.00	36.00	2	1	1
49	1	1	12.00	12.00	12.00	36.00	2	1	1
50	1	1	12.00	12.00	12.00	36.00	2	1	1
51	1	1	12.00	12.00	12.00	36.00	2	1	1
52	1	1	12.00	12.00	12.00	36.00	2	1	1
53	1	1	12.00	12.00	12.00	36.00	2	1	1
54	1	1	12.00	12.00	12.00	36.00	2	1	1
55	1	1	12.00	12.00	12.00	36.00	2	1	1
56	1	1	12.00	12.00	12.00	36.00	2	1	1
57	1	1	12.00	12.00	12.00	36.00	2	1	1
58	1	1	12.00	12.00	12.00	36.00	2	1	1
59	1	1	12.00	12.00	12.00	36.00	2	1	1
60	1	1	12.00	12.00	12.00	36.00	2	1	1
61	1	1	12.00	12.00	12.00	36.00	2	1	1
62	1	1	12.00	12.00	12.00	36.00	2	1	1
63	1	1	12.00	12.00	12.00	36.00	2	1	1
64	1	1	12.00	12.00	12.00	36.00	2	1	1
65	1	1	12.00	12.00	12.00	36.00	2	1	1
66	1	1	12.00	12.00	12.00	36.00	2	1	1
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82	1	1	12.00	12.00	12.00	36.00	2	1	1
83	1	1	12.00	12.00	12.00	36.00	2	1	1
84	1	1	12.00	12.00	12.00	36.00	2	1	1
85	1	1	12.00	12.00	12.00	36.00	2	1	1
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90	1	1	12.00	12.00	12.00	36.00	2	1	1
91	1	1	12.00	12.00	12.00	36.00	2	1	1
92	1	1	12.00	12.00	12.00	36.00	2	1	1
93	1	1	12.00	12.00	12.00	36.00	2	1	1
94	1	1	12.00	12.00	12.00	36.00	2	1	1
95	1	1	12.00	12.00	12.00	36.00	2	1	1
96	1	1	12.00	12.00	12.00	36.00	2	1	1
97	1	1	12.00	12.00	12.00	36.00	2	1	1
98	1	1	12.00	12.00	12.00	36.00	2	1	1
99	1	1	12.00	12.00	12.00	36.00	2	1	1
100	1	1	12.00	12.00	12.00	36.00	2	1	1

- NOTES
- All measurements in millimeters, except shown otherwise.
 - Welding specification as per direction of steel pile manufacturer.
 - Welding materials including backing material to be provided by Contractor.
 - Reference Drawing: KA-205 Pile Installation Plan.

DRAWING PHOTO REDUCED BY 50%

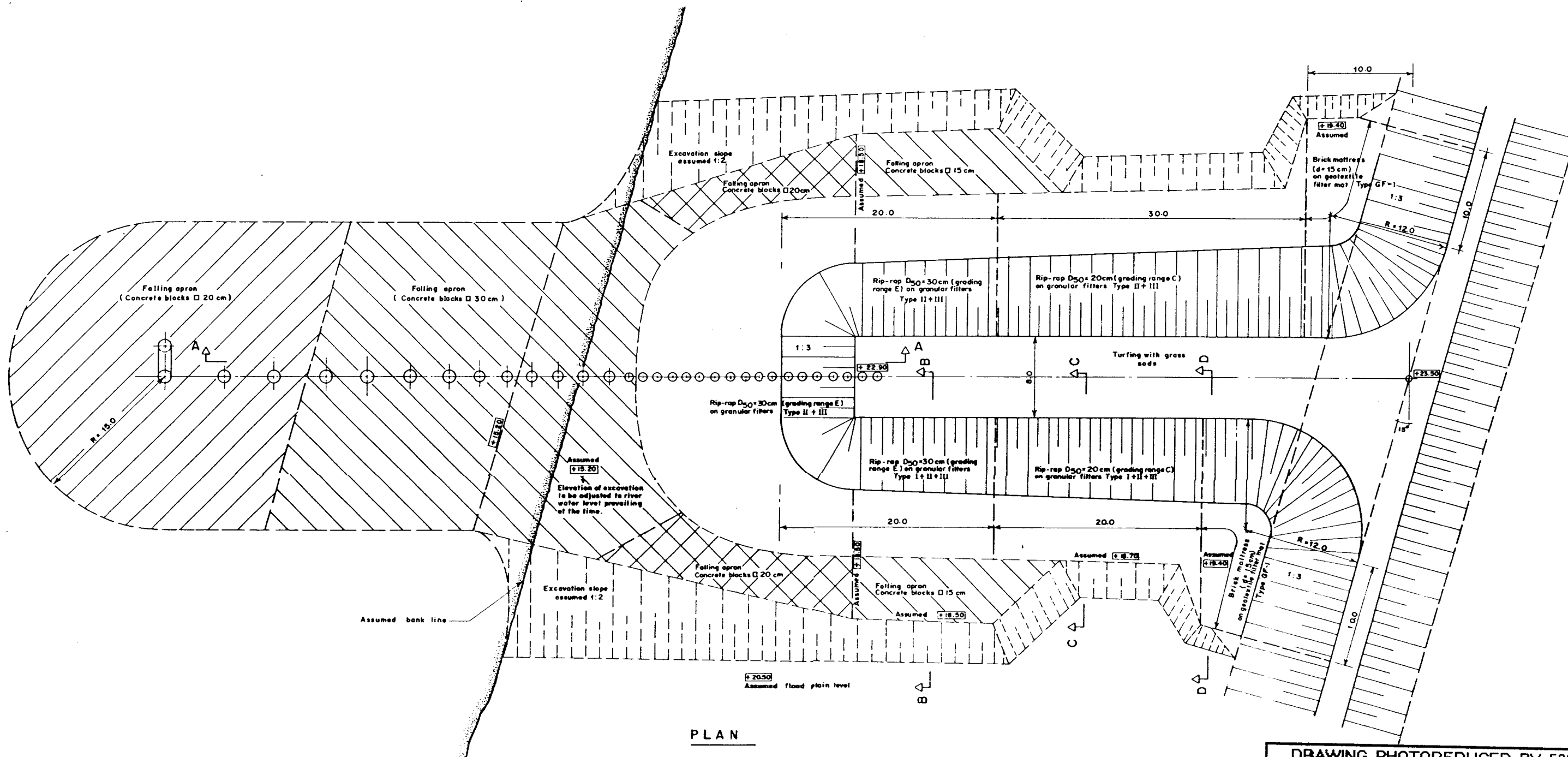
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT
BANK PROTECTION PILOT PROJECT FAP-21
TEST SITE 1 - KAMARJANI

STEEL PILE DIA. 1220 x 20 mm/14.2 mm
PILE SCHEDULE, DETAILS

NAME	DATE	SCALE	REVISION
ANOWAR	23-12-93	1:20, 1:10, 1:2	
CHECKED	23-01-94	DRAWING NO.	
APPROVED	10-02-94	KA-204	0

6f



DRAWING PHOTOREduced BY 50%

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21



CONSULTING CONSORTIUM

DESIGN-BUILD-OPERATE (DBO) CONTRACT, BOETTCHER/GERMANY
In association with:
COMPAGNIE MATERIALE DE BORDS, LYON/FRANCE
PROF. DR. LACONER/GERMANY, BRESCHEN/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD. (BETS)
DESIGN UPDATES LIMITED (DUL)

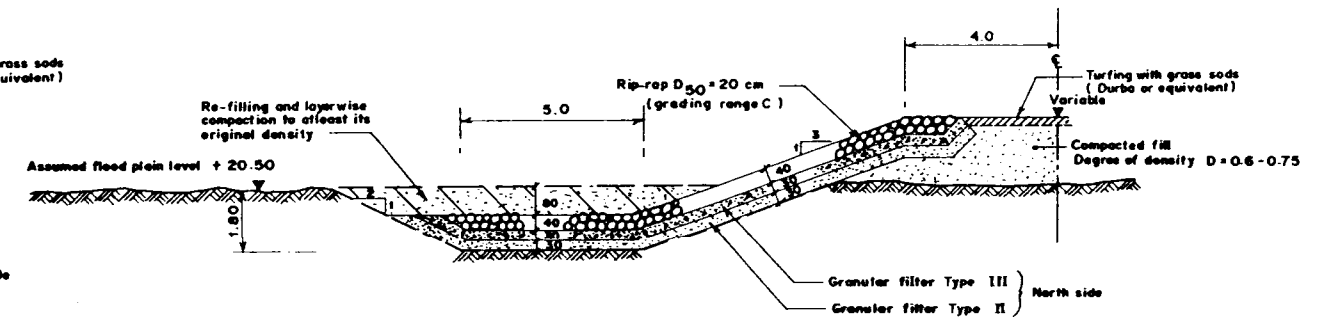
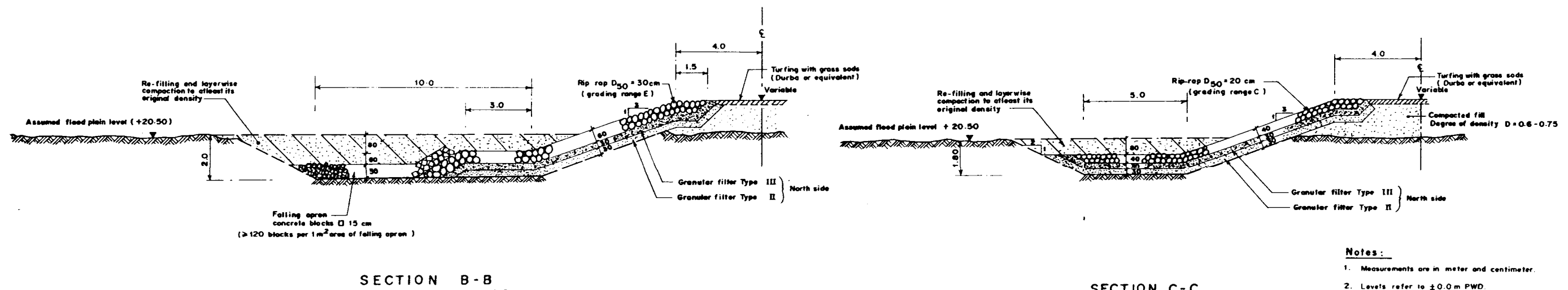
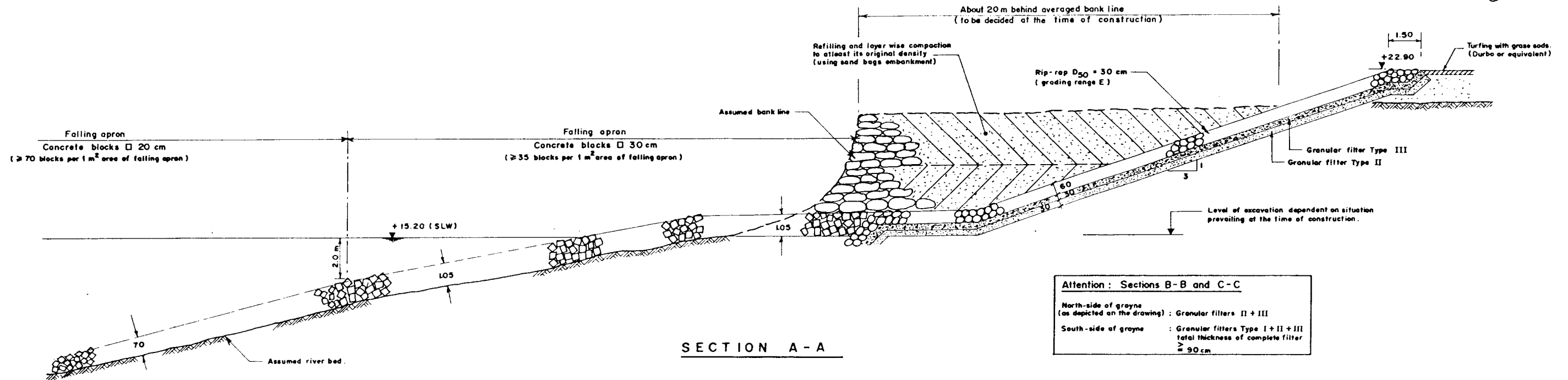
TEST SITE I - KAMARJANI

GROYNE G-2
REVTMENTS, FALLING APRONS
PLAN

Notes:

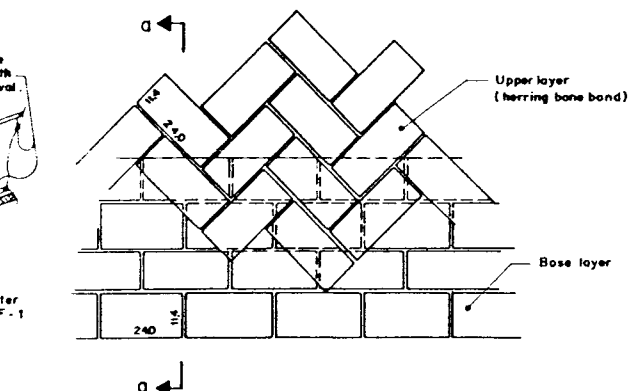
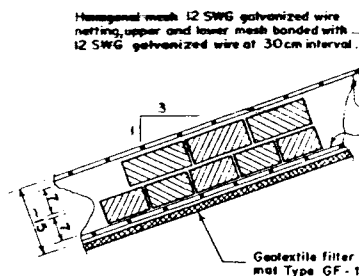
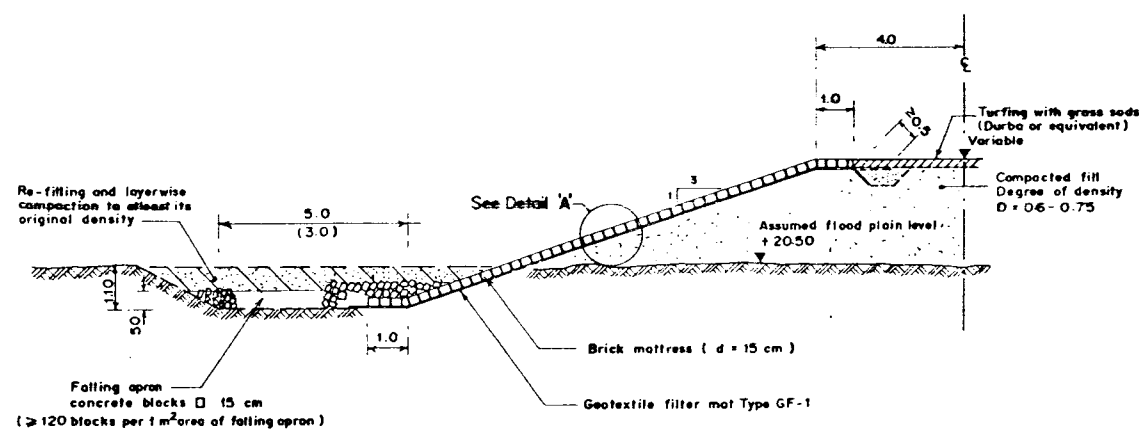
- All measurements in meter.
- Levels refer to ± 0.0 m PWD.
- Assumed levels are subject to confirmation as per actual site conditions and prevailing water level.
- Reference Drawings :
KA - 003 Layout of Groynes.
KA - 006 Stone Gradation and Layer Thickness.
KA - 207 Revetments and Falling Aprons, Detailed Sections.

NAME	DATE	SCALE:	REVISION
DRAWN ANOWAR	08-12-93	1:200	
CHECKED [Signature]	24-01-94	DRAWING NO. KA-206	
APPROVED [Signature]	10-02-94		0



Notes:

- Measurements are in meter and centimeter.
- Levels refer to ± 0.0 m PWD.
- Reference Drawings:
 - KA - 206 Revetments, Falling Aprons, Plan.
 - KA - 005 Filter Gradation Curves.
 - KA - 006 Stone Gradation and Layer Thicknesses.



DRAWING PHOTOREduced BY 50%

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

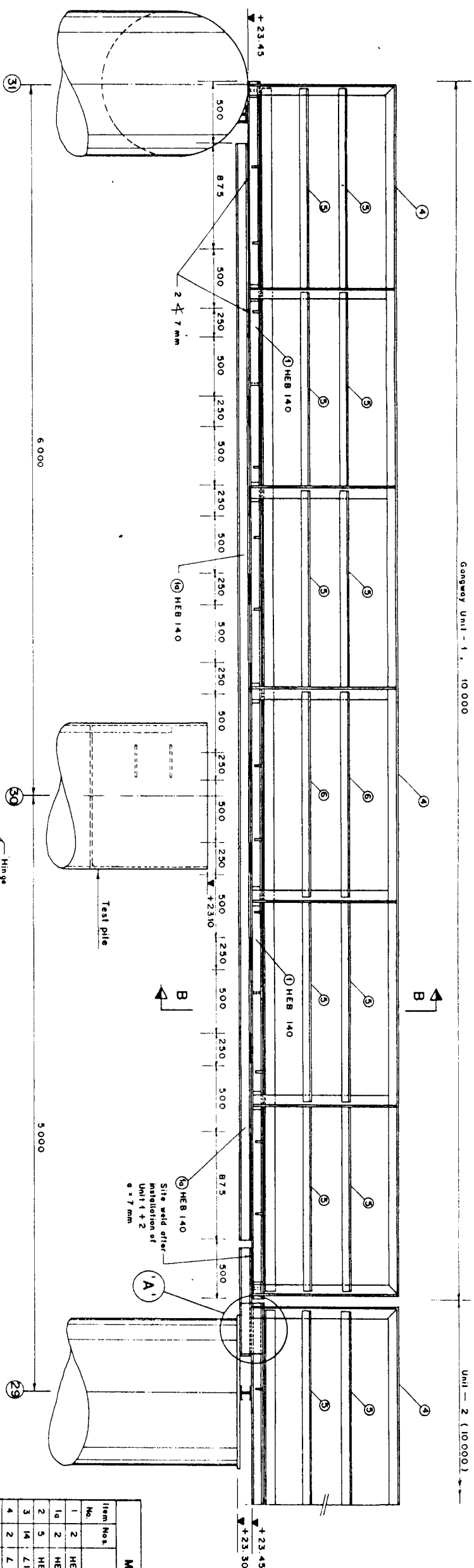
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM
BENTON & BOWEN, INC., BOSTON, MASSACHUSETTS, U.S.A.
in association with
GOVERNMENT ENGINEERING RESEARCH, LYON, FRANCE
DR. J. L. LACROIX, PARIS, FRANCE
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD. (BETS)
DELTA HYDRAULICS, DELFT, NETHERLANDS
DISH UPDATES LIMITED (DUL)

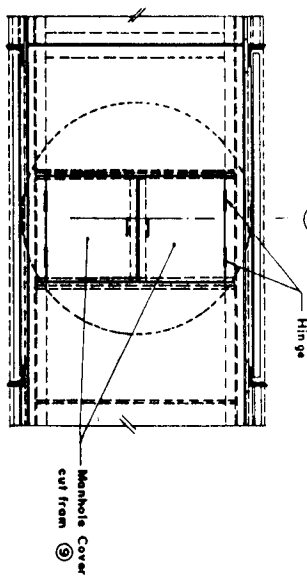
TEST SITE I - KAMARJANI

GROYNE G-2 REVTMENTS FALLING APRONS DETAILED SECTIONS

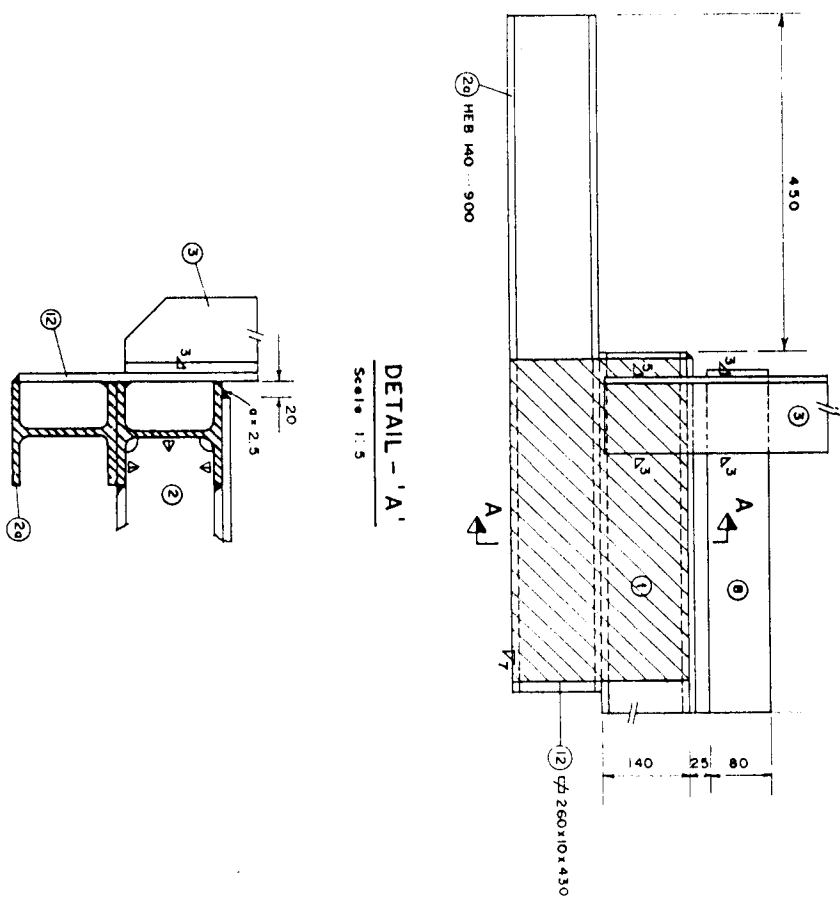
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CHECKED		24-01-94	DRAWING NO.	REVISION
APPROVED		10-02-94	KA-207	0



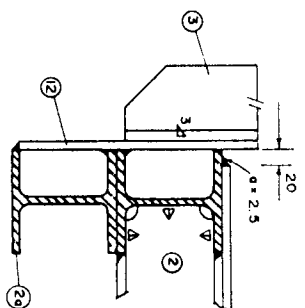
ELEVATION
Scale 1 : 20



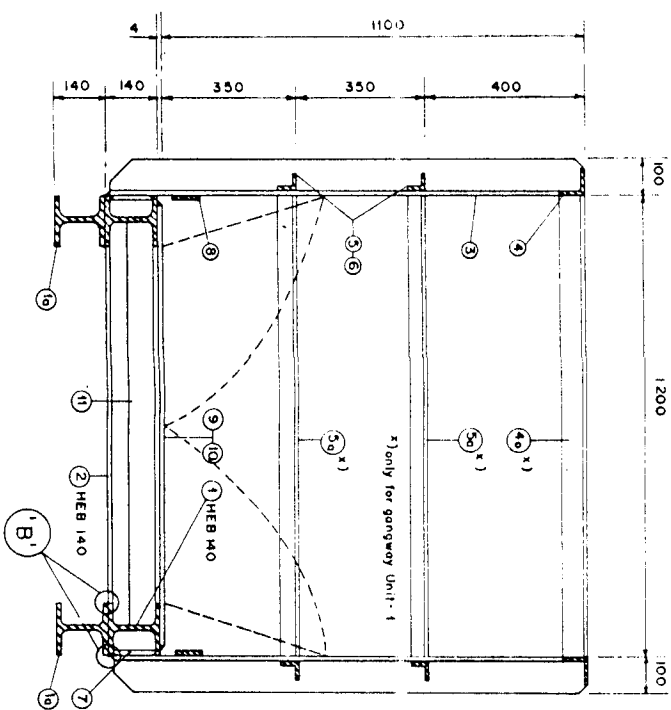
PARTIAL TOP VIEW
(Manhole Test Pile No. 30)



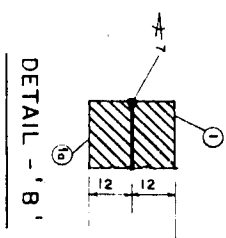
DETAIL - 'A'
Scale 1:5



SECTION A-A



SECTION B-B



DETAIL - 'B'

- ## NOTES :
1. All measurements in millimeters
 2. Basic structure and details of gateway as shown on Dwg. KA - 110
 3. Steel grade St. 37 - 2, DIN 17000, or equivalent grade.
 4. Welding joint thickness = 0.71mm or as shown in the drawing. Measurement of fillet weld thickness: $\frac{1}{2}t$

MATERIAL SCHEDULE - GANGWAY UNIT - 1				
Item No.	Section / Size	Weight Unit (kg/m)	Weight (kg)	Remarks
1	HEB 140 9000	33.7	674.0	Material Supplied by Employer
1a	HEB 140 9000	33.7	606.60	
2	HEB 140 1048	33.7	176.59	
3	L100 x 8 1240	12.2	211.79	
4	L 75 x 8 9940	9.03	179.52	
4a	L 75 x 8 1200	9.03	10.84	
5	L 50 x 6 1620	4.47	144.83	
5a	L 50 x 6 1200	4.47	10.73	
6	L 50 x 6 1700	4.47	30.40	
7	∅ 130 x 10 x 1114	7.831/m ³	18.79	
8	∅ 80 x 6 x 9940	7.831/m ³	74.91	
9	Characterised plates 1160 x 4 x 2440	36kg/m ²	203.79	
10	Characterised plates 1160 x 4 x 2545	36kg/m ²	212.56	
11	∅ 80 x 10 x D 46	7.631/m ³	78.83	
12				
Total Weight of Unit - 1			2,634.18	Excluding waste and allowance for welding

MATERIAL SCHEDULE - GANGWAY UNIT - 2					
Item No.	Section / Size	Weight Unit (kg/m)	Weight (kg)	Remarks	
1	HEB 140	100.00	674.0	Material Supplied by Employer	
2	HEB 140	104.8	176.59		
2a	HEB 140	9.00	60.66		
3	HEB 140	9.00	60.66		
3a	HEB 140	9.00	60.66	Material Supplied by Employer	
4	2.75 x 8	12.40	211.79		
4	2.75 x 8	9.940	179.52		
5	2.75 x 8	16.20	144.83		
6	4.50 x 6	17.00	30.40	Material Supplied by Employer	
6	4.50 x 6	17.00	30.40		
7	Ø 120 x 10 x 14	7851/m ³	16.11		
7	Ø 120 x 10 x 14	7851/m ³	16.11		
8	Ø 80 x 6 x 3940	7851/m ³	74.91	Material Supplied by Employer	
8	Ø 80 x 6 x 3940	7851/m ³	74.91		
9	Ø 80 x 6 x 3940	7851/m ³	74.91		
9	Ø 80 x 6 x 3940	7851/m ³	74.91		
10	Checkered plates	36 kg/m ²	212.56	Material Supplied by Employer	
10	1160 x 4 x 12545	36 kg/m ²	212.56		
11	Ø 80 x 10 x 1046	7851/m ³	79.83		
11	Ø 80 x 10 x 1046	7851/m ³	79.83		
12	Ø 260 x 10 x 330	7851/m ³	17.53	Material Supplied by Employer	
12	Ø 260 x 10 x 330	7851/m ³	17.53		
12	Ø 260 x 10 x 330	7851/m ³	17.53		
12	Ø 260 x 10 x 330	7851/m ³	17.53		
Total Weight of Unit - 2				2081.54	Excluding waste and allowances for welding

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

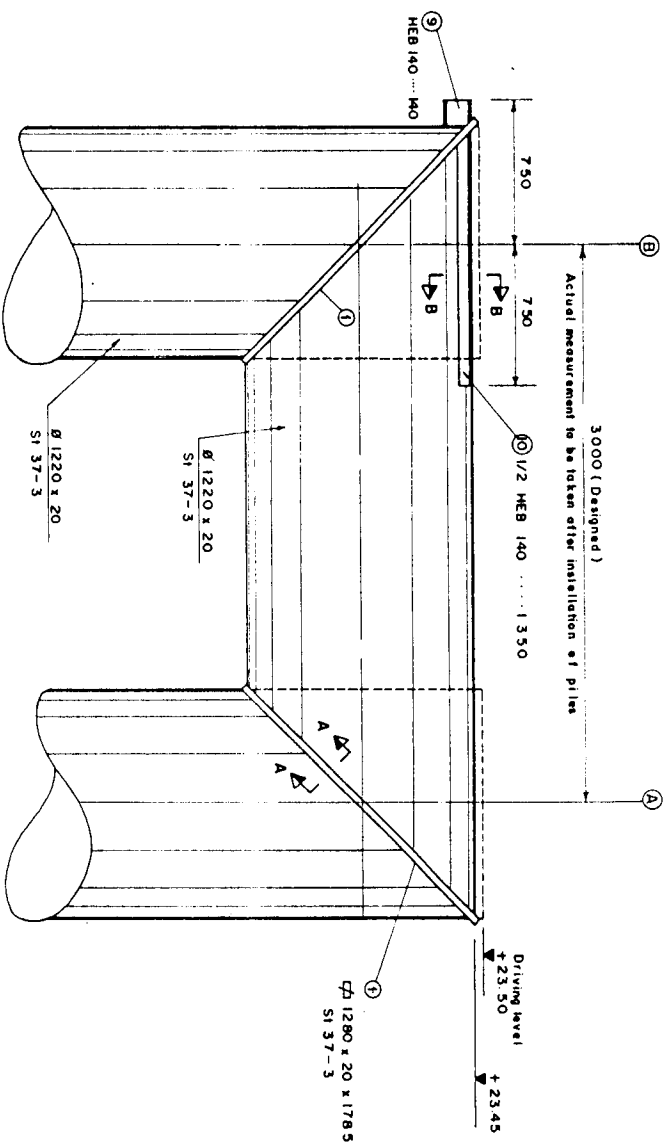


<p>BALMER-HEWITT, INC., 4055 JAMES, DORTMUND-GERMANY</p> <p>COMPTON NATIONAL BU BRANCH, LYONFRANCE</p> <p>PIRCE, HILL, LACHANCE & PATRICK, 1808 EISENHARTMAN</p> <p>DEUT. VERFAHRTECH., BELTSTRASSE 10, DORTMUND</p>	<p>IN ASSOCIATION WITH:</p> <p>BAUM, LADEN, ENGINEERING & TECHNOLOGICAL SERVICES LTD. (AUSTRIA)</p> <p>DESIGN WORKS LIMITED (ENGLAND)</p>
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TEST SITE I - KAMARJANI

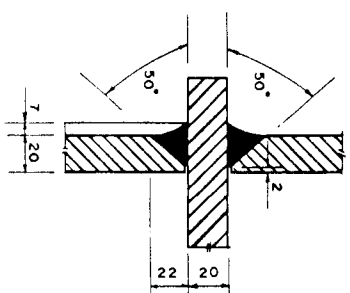
GROYNE G-2
MONITORING GANGWAY
UNITS 1 + 2

NAME	DATE	SCALE: 1"=20', 1"=10', 1"=5'
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CHECKED	24-01-94	DRAWING NO.
APPROVED	10-02-94	KA-208
		REVISION
		0



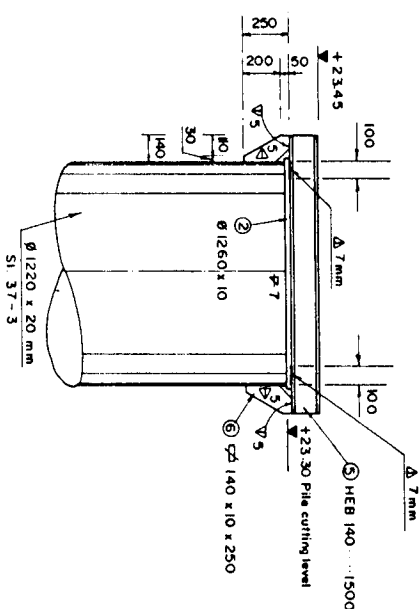
PILE HEAD CONNECTION PILE AXIS 31

Scale 1:20



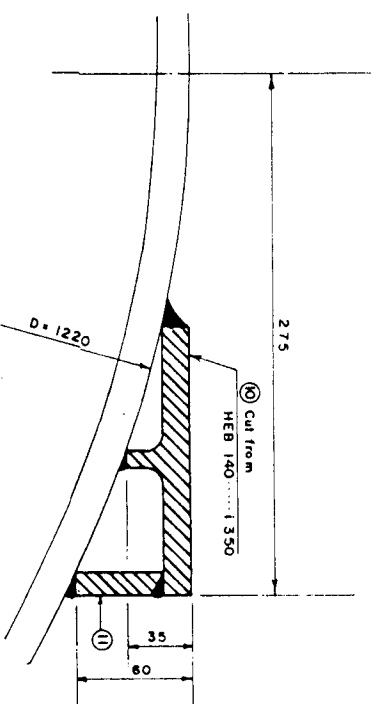
SECTION A-A

Scale 1:20



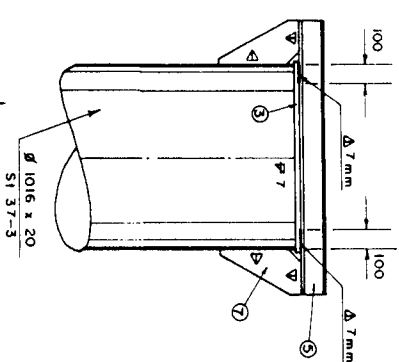
PILE HEAD SUPPORT FOR GANGWAY
AXIS 25 - 29 (5 NOS)

Scale 1:20



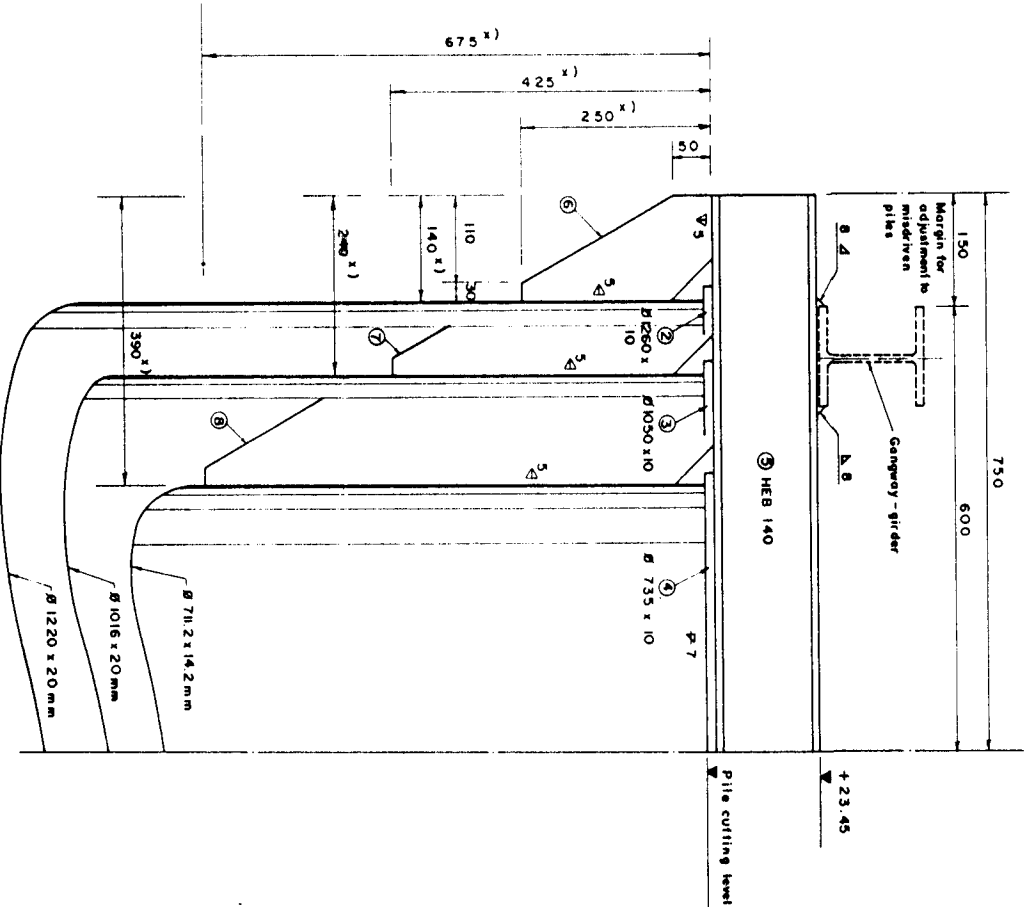
SECTION B-B

Scale 1:20



PILE HEAD SUPPORT FOR GANGWAY
AXIS 19 - 24 (6 NOS)

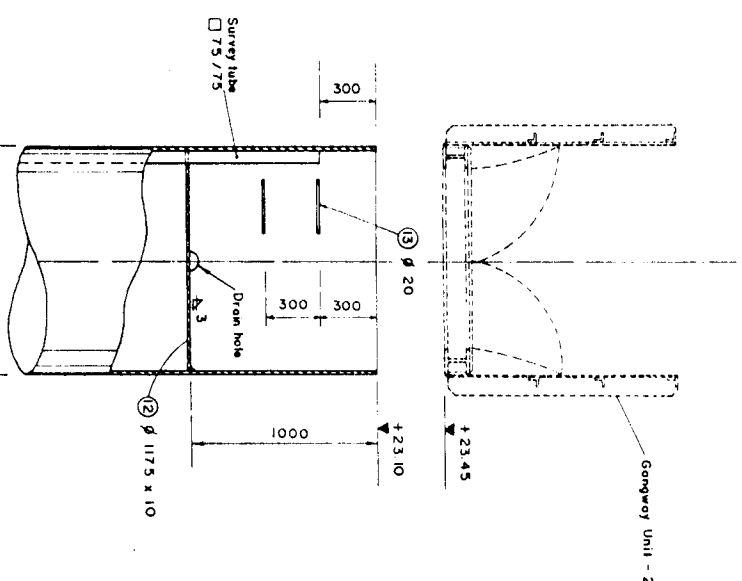
Scale 1:20



x) These measurements must be taken at site as per actual pile position along center line of gangway.

DETAIL OF PILE HEAD SUPPORT

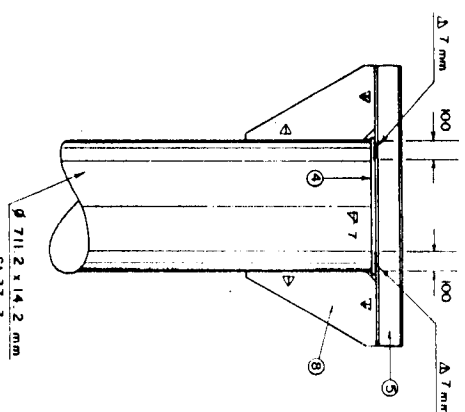
Scale 1:5



TEST PILE NO. 30

PILE HEAD ARRANGEMENT

Scale 1:20



PILE HEAD SUPPORT FOR GANGWAY
AXIS 1 - 18 (18 NOS)

Scale 1:20

MATERIAL SCHEDULE				
Item No.	Nos.	Section / Dimensions	Single Weight kg	Total Weight kg
1	2	1280 x 20 x 1785	356.71	717.42
2	5	1260 x 10	12.4.63	62.315
3	6	1050 x 10	86.55	519.30
4	18	735 x 10	42.41	763.38
5	29	HEB 140 1500	50.55	1465.95
6 x 1	10	140 x 10 x 250	2.75	27.50
7 x 1	12	240 x 10 x 425	8.01	96.12
8 x 1	36	390 x 10 x 675	20.66	743.76
9 x 1	1	HEB 140 140	4.72	4.72
10	1	1/2 HEB 140 1350	45.50	45.50
11	1	45 x 10 1350	4.77	4.77
12	1	1175 x 10	108.38	108.38
13	2	20 600	1.88	3.77
Total			5123.72	

NOTES:

- All levels refer to ± 0.0 m PWD
- All measurements in millimeters
- Steel grade SI 37-3 and SI 37, DIN 17100 as shown in the Schedule or equivalent grades
- Welding seam thickness $\phi = 0.71$ mm, or as shown in the drawings.
- Measurement of fillet weld thickness
- All exposed steel edges shall be chamfered
- Reference Drawings: KA - 201 General Arrangement KA - 205 Pile Installation Plan

DRAWING PHOTOREDUCTION BY 50%

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

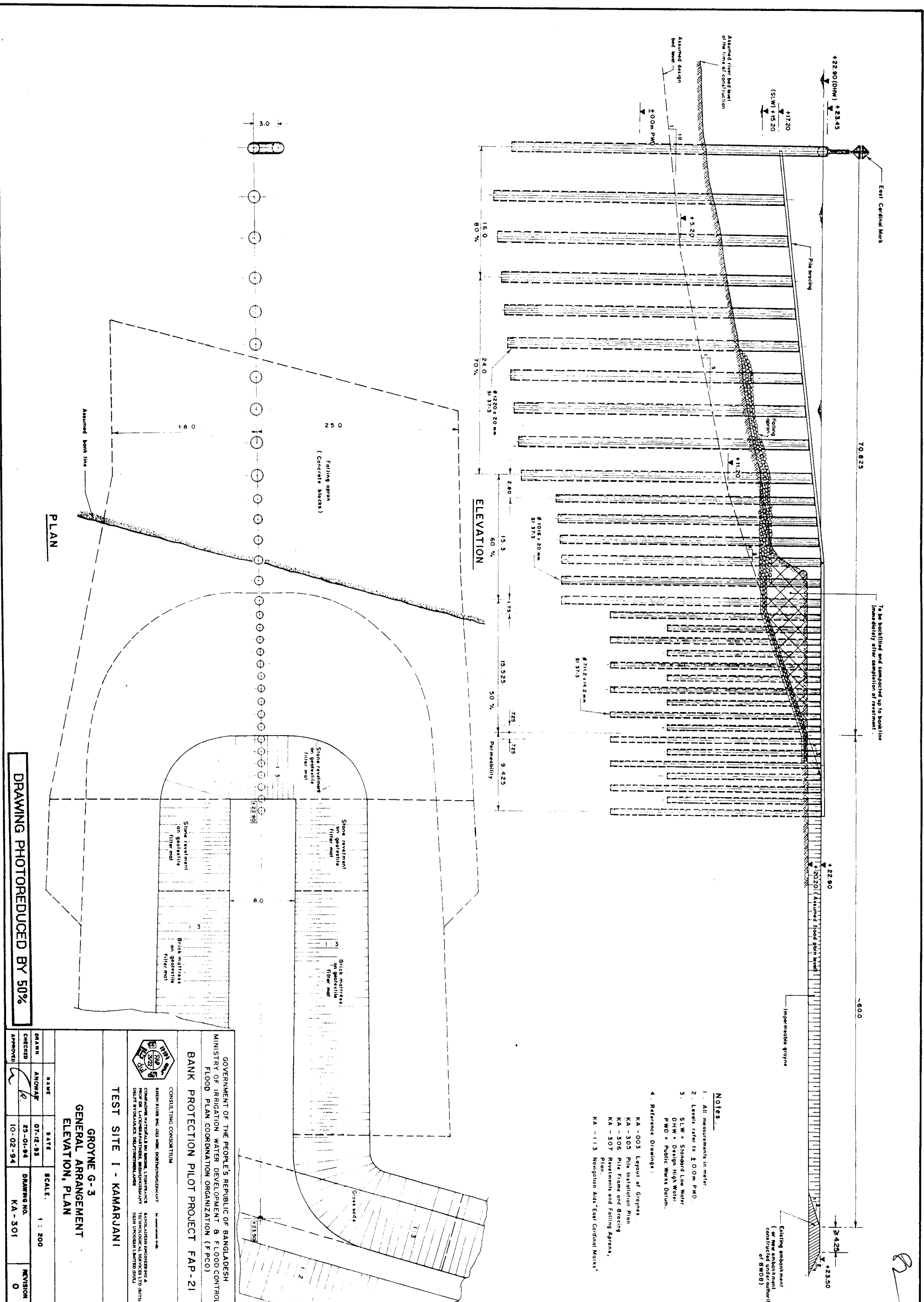
CONSULTING CONTRACTOR
BANGLADESH ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE
BANGLADESH ENGINEERING & ARCHITECTURE

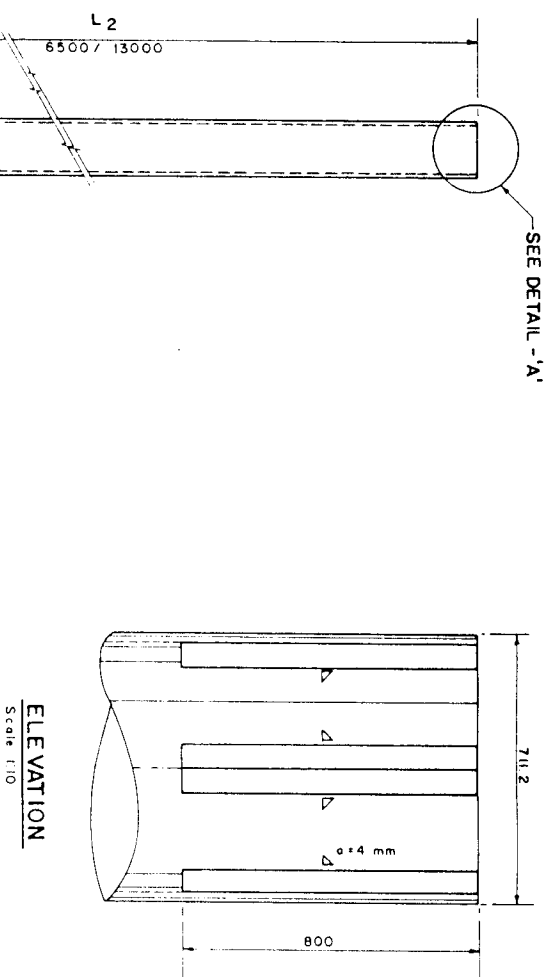
TEST SITE I - KAMARJANI

GROYNE G-2

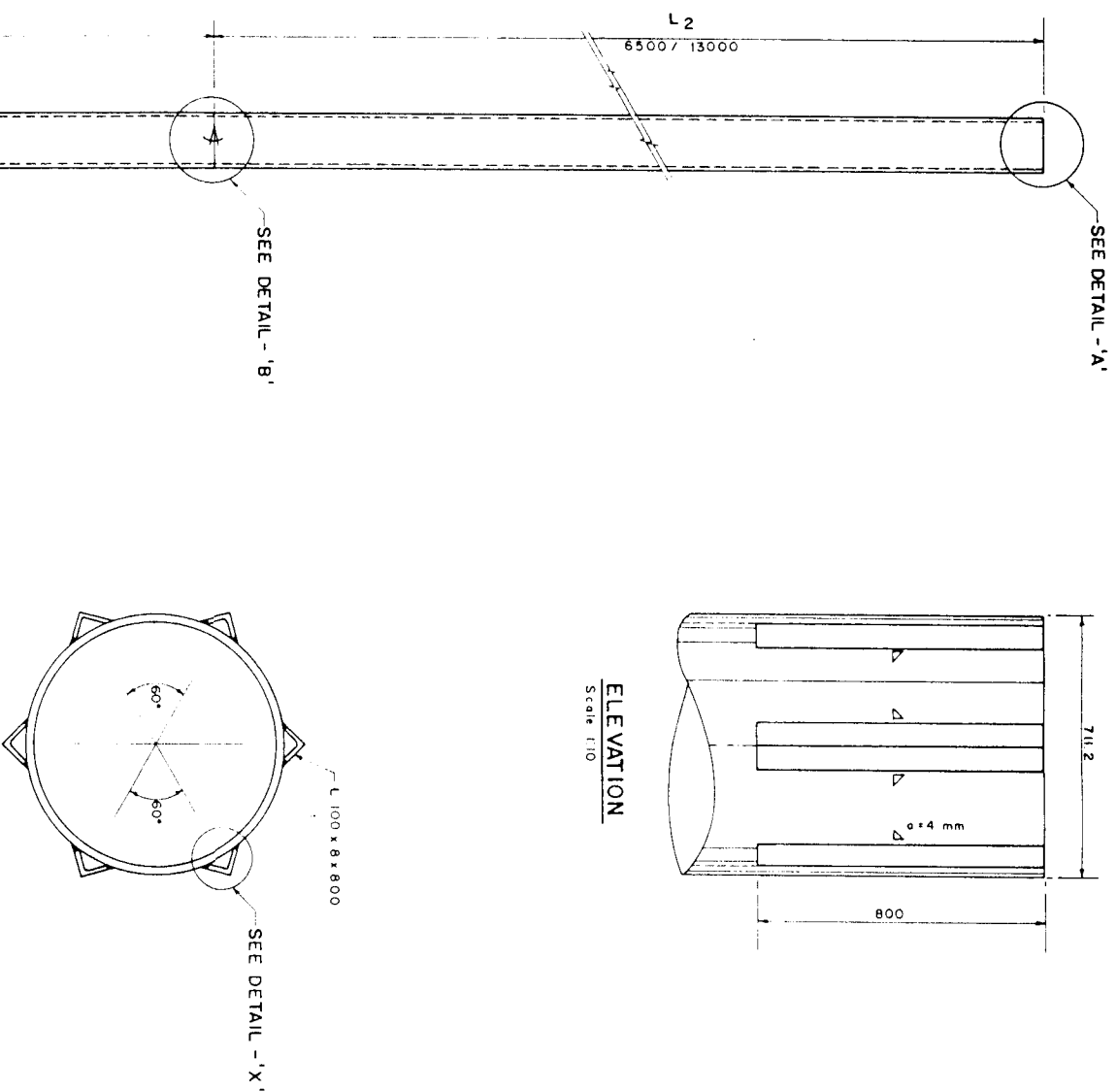
PILE HEAD CONNECTION AND BRACING

NAME	DATE	SCALE	DRAWING NO.	REVISION
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CHECKED	24-01-94			
APPROVED	10-02-94			

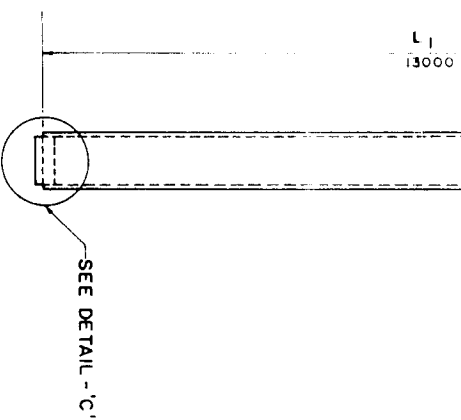




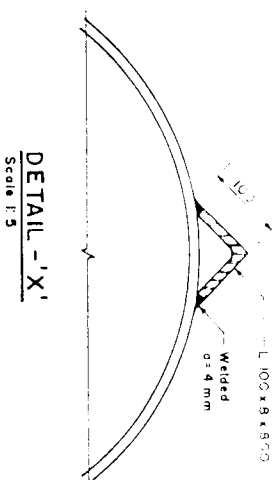
ELEVATION
Scale 1:10



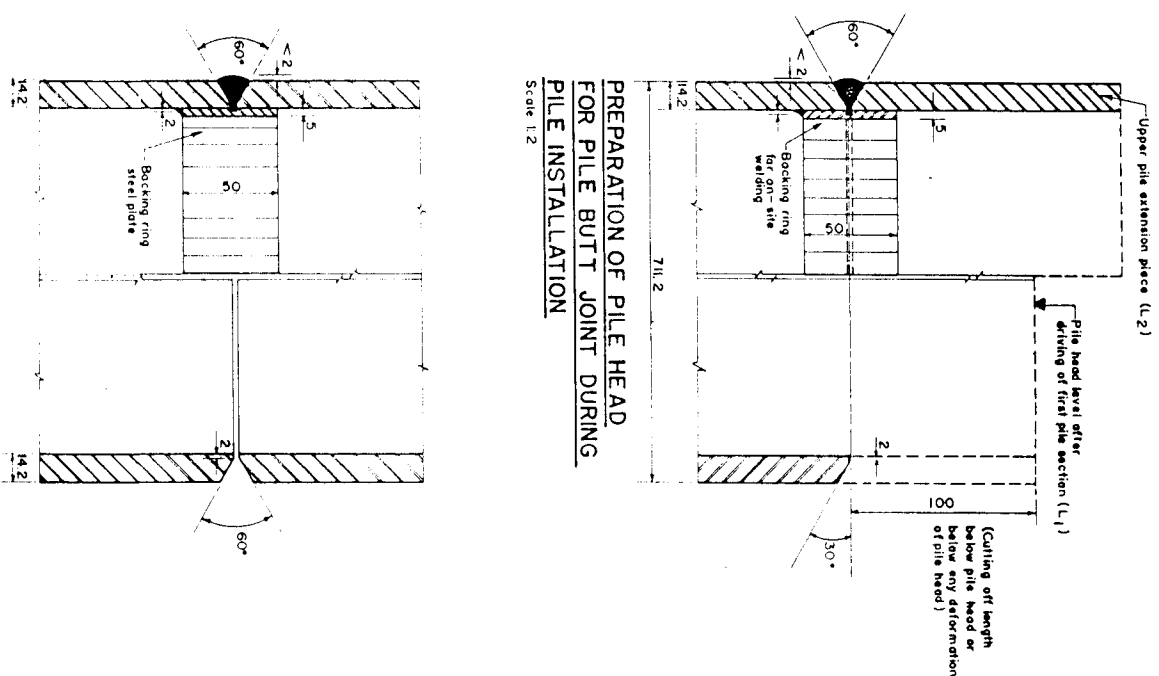
PLAN
Scale 1:10



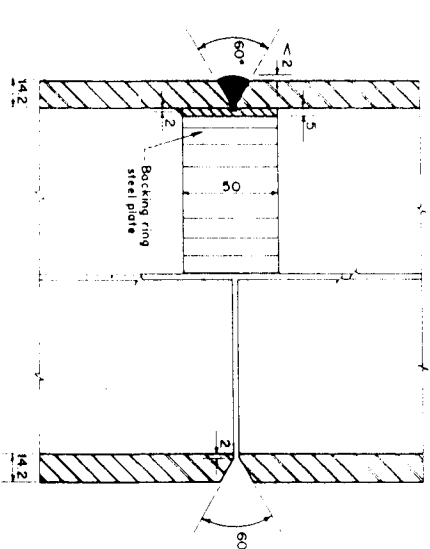
**GENERAL PILE
ARRANGEMENT**
Scale 1:50



DETAIL - 'A'
PILE HEAD REINFORCEMENT
(OPTIONAL ITEM)



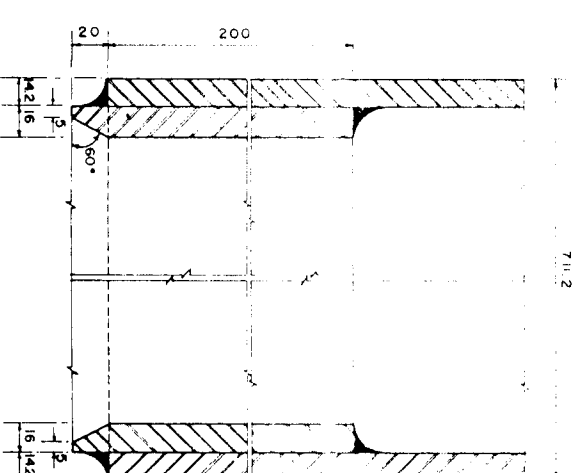
PREPARATION OF PILE HEAD FOR PILE BUTT JOINT DURING PILE INSTALLATION



DETAIL - 'B'

PILE BUTT JOINT AT WELDING YARD

Scale 1"=2'



DETAIL - 'C'
PILE POINT REINFORCEMENT
(OPTIONAL ITEM)
Scale 1:2

STEEL PILE SCHEDULE (Material Supplied by Employer)							
PILE TYPE	LOCATION NO.	NOS.	PILE LENGTH (m)			NO OF BUTT JOINT	PILE POINT REINTE (OPTIONAL)
			L 1	L 2	TOTAL		
Steel Piles dia 711.2 mm t=14.2mm	—	—	—	—	—	—	—
	2	1	13.00	13.00	26.00	1	1
	3	1	13.00	6.50	19.50	1	—
	4	1	13.00	13.00	26.00	1	1
Unit length 13.00 m	5	1	13.00	6.50	19.50	1	—
	6	1	13.00	13.00	26.00	1	1
Steel grade S1 37-3, DIN 17120	7	1	13.00	6.50	19.50	1	—
	8	1	13.00	13.00	26.00	1	1
	9	1	13.00	6.50	19.50	1	—
	10	1	13.00	13.00	26.00	1	1
	11	1	13.00	6.50	19.50	1	—
	12	1	13.00	13.00	26.00	1	1
	13	1	13.00	6.50	19.50	1	—
	14	1	13.00	13.00	26.00	1	1
	15	1	13.00	6.50	19.50	1	—
	16	1	13.00	13.00	26.00	1	1
17	1	13.00	6.50	19.50	1	—	
18	1	13.00	13.00	26.00	1	1	
TOTAL	17	221.00	169.00	390.00	9		

NOTES:

1. All measurements in millimeters, except shown otherwise
2. Welding specification as per direction of steel pile manufacturer
3. Welding materials including backing material to be provided by Contractor
4. Reference Drawing: KA-305 Pile Installation Plan

DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

BANK PROTECTION PILOT PROJECT FAP-21

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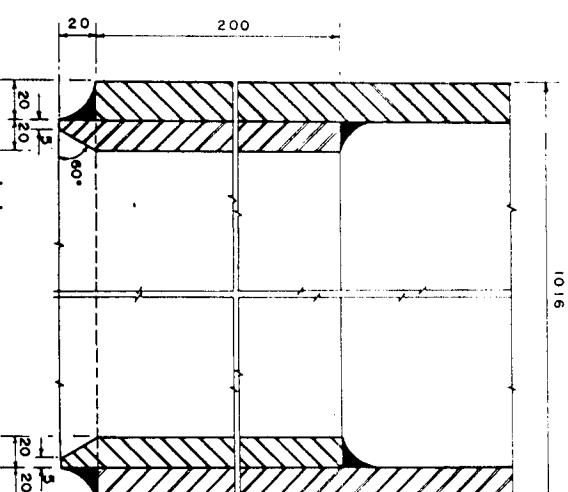
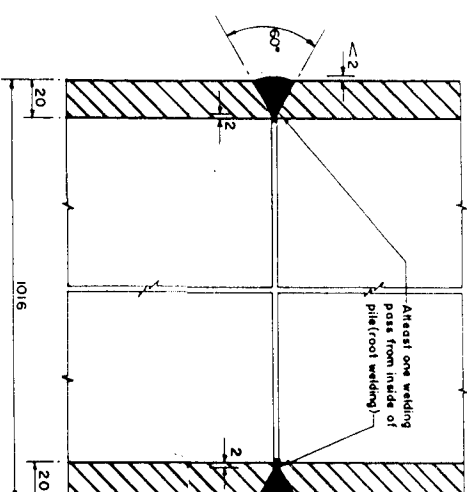
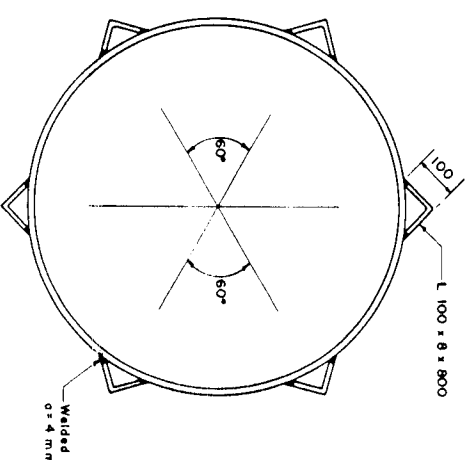
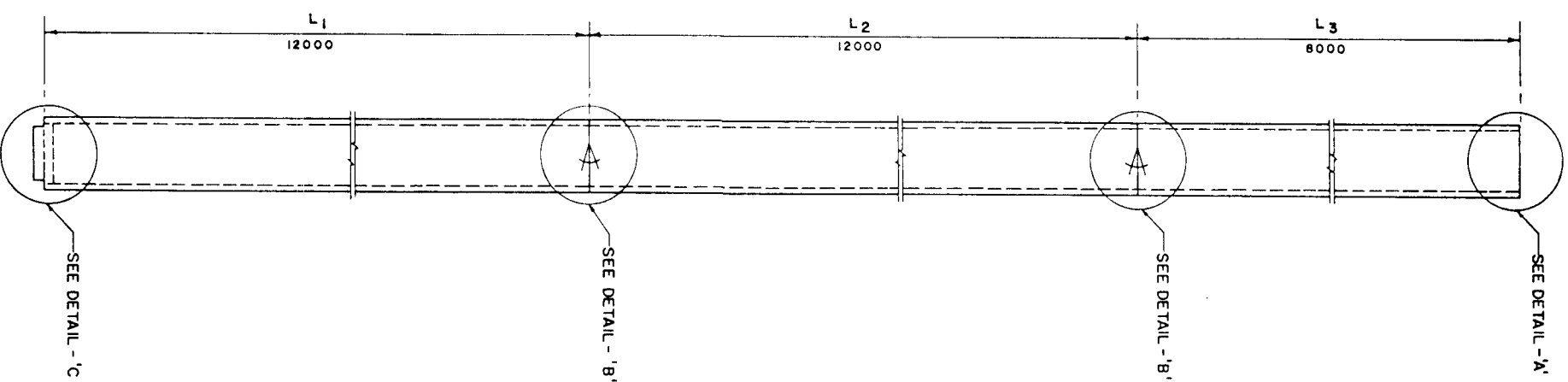
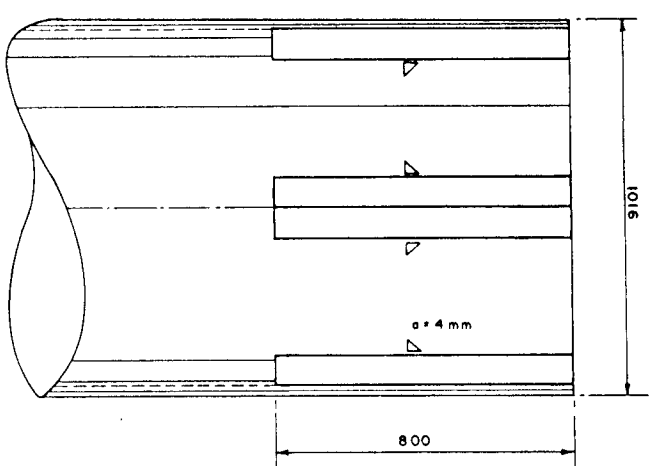
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TEST SITE I - KAMARJANI

GROYNE G-3

STEEL PILE DIA. 711.2 x 14.2 mm
PILE SCHEDULE, DETAILS

NAME	DATE	SCALE:	1:50, 1:10, 1:5, 1:2
DRAWN K. A. HALL	27-12-93		
CHECKED	17-01-94	DRAWING NO.	KA-302
APPROVED	10-02-94	REVISION	0



1. All measurements in millimeters, except shown otherwise
2. Welding specification as per direction of steel pile manufacturer
3. Welding materials including blocking material to be provided by Contractor
4. Reference Drawing : KA-305 Pile Installation Plan

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

CONSULTING CONSORTIUM

BHASKAR RAO, CHAIRMAN, DORTMUND/DOBERMANN
COMPARING MATERIALS BY INFRARED, VIBRATIONS
FOR LASER APPLICATIONS, SUBSIDIARIES
OF LASERTECHNICAL, DORTMUND, GERMANY

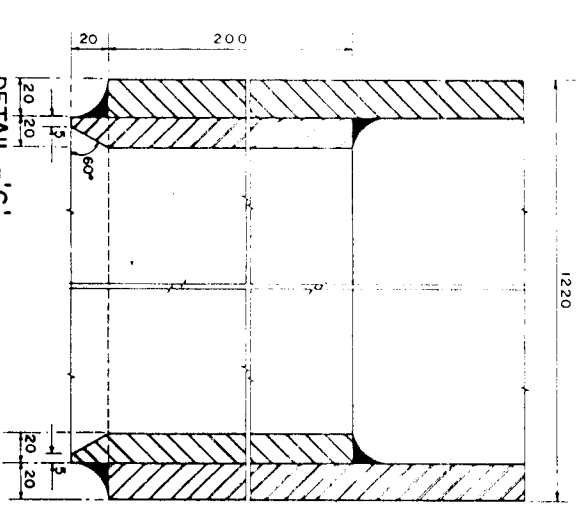
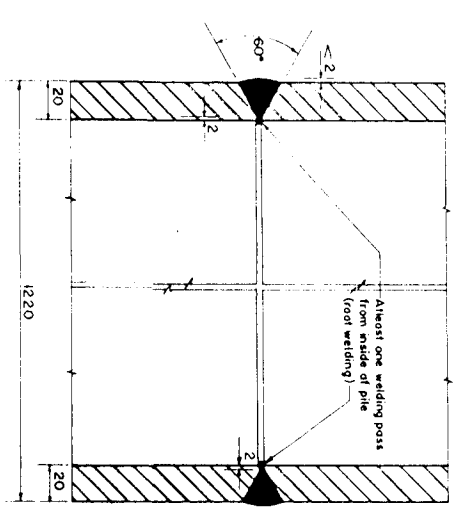
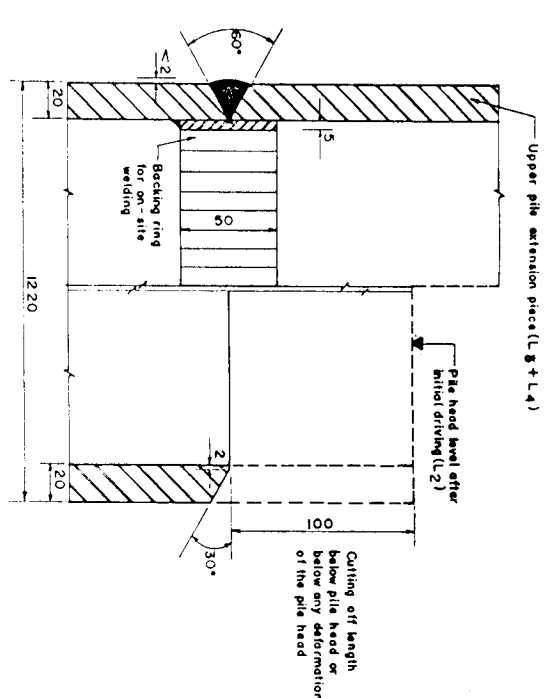
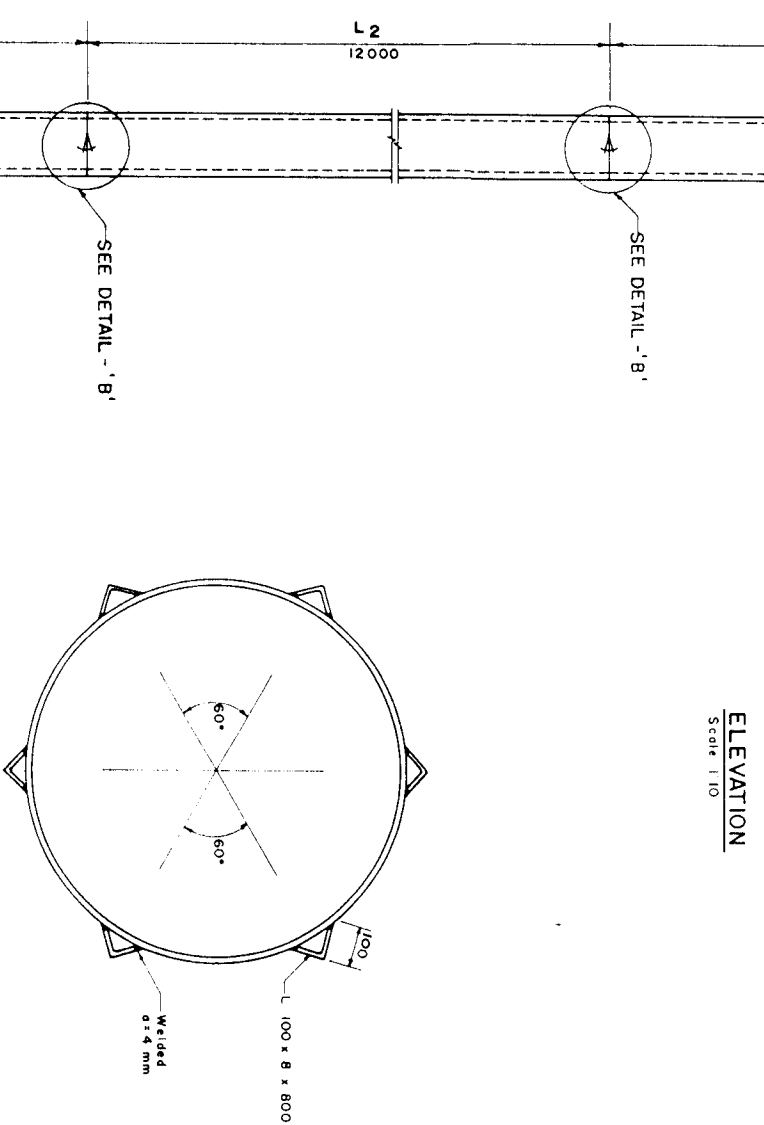
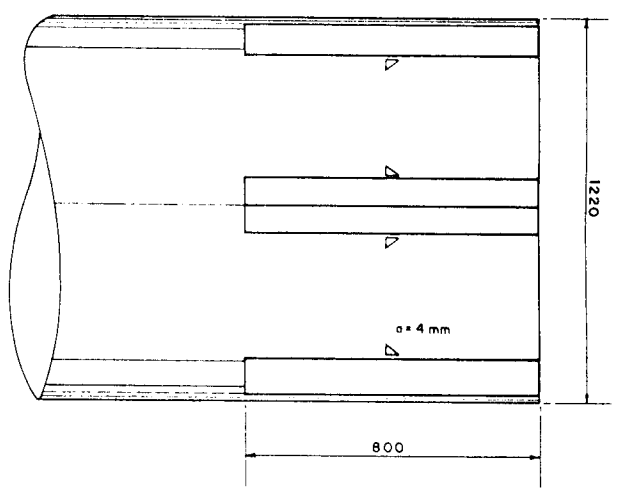
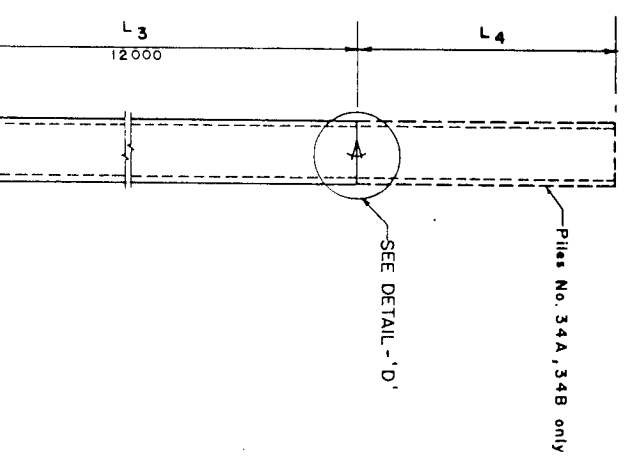
BAU-LODESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (ATTORNEY GENERAL'S OFFICE)
FROM UNDER LIMITED (GULF)

In association with:

GROYNE G-3
STEEL PILE DIA. 1016 x 20 mm
PILE SCHEDULE, DETAILS

APPROVED	DATE	NAME	SCALE:	REVISION NO.	DRAWING NO.
<i>u</i>	10-02-94		1:20, 1:10, 1:2	0	KA-303
CHECKED	DATE	NAME			
	17-01-94	K. M. A. HAJIM			
DRAWN	DATE	NAME			
	30-12-93				

80



STEEL PILE SCHEDULE (Material Supplied by Employer)									
PILE TYPE	LOCATION NO.	NOS	PILE LENGTH (m)				TOTAL	NO. OF BUTT JOINT	PILE POINT REIN. (OPTIONAL)
			L ₁	L ₂	L ₃	L ₄			
Steel Piles	25	1	12.00	12.00	12.00	—	36.00	2	1
1220 mm dia. ± 20 mm	26	1	12.00	12.00	12.00	—	36.00	2	1
Steel grade S1 37-3 DIN 17120	27	1	12.00	12.00	12.00	—	36.00	2	1
	28	1	12.00	12.00	12.00	—	36.00	2	1
	29	1	12.00	12.00	12.00	—	36.00	2	1
	30	1	12.00	12.00	12.00	—	36.00	2	1
	31	1	12.00	12.00	12.00	—	36.00	2	1
	32	1	12.00	12.00	12.00	—	36.00	2	1
	33	1	12.00	12.00	12.00	—	36.00	2	1
	34 A	1	12.00	12.00	12.00	3.00	39.00	3	1
	34 B	1	12.00	12.00	12.00	3.00	39.00	3	1
	TOTAL	11	132.00	132.00	132.00	6.00	402.00	24	11

- NOTES:**
- All measurements in millimeters, except shown otherwise
 - Welding specification as per direction of steel pile manufacturer
 - Welding materials including backing material to be provided by Contractor
 - Reference Drawing: KA-305 Pile Installation Plan

DRAWING PHOTO REDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

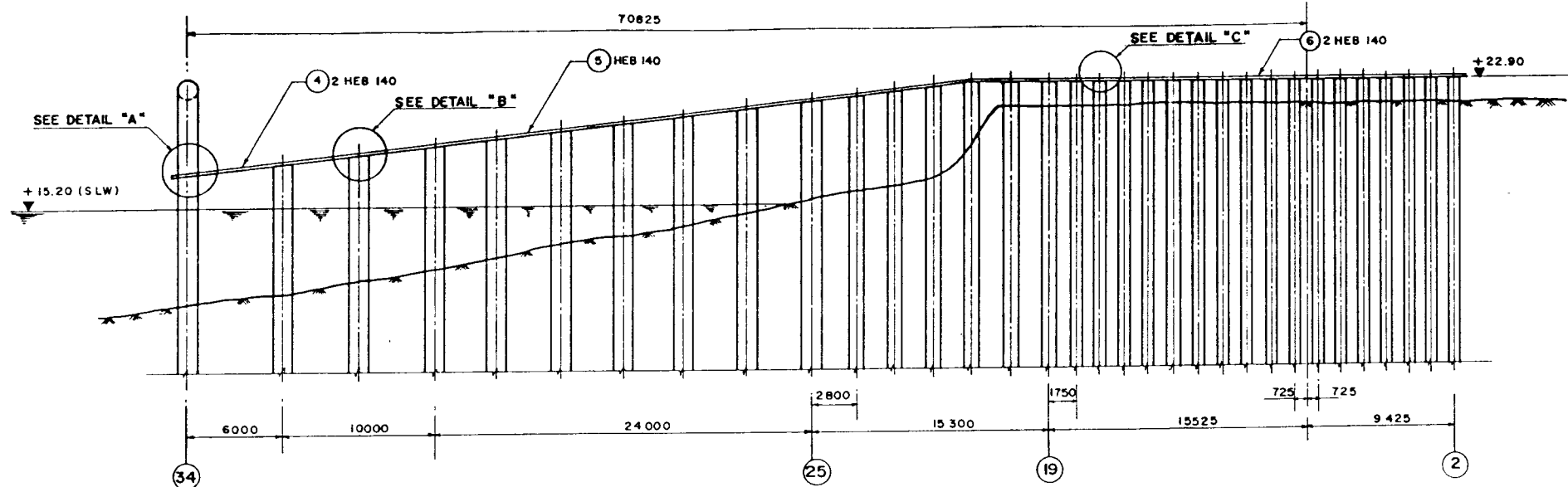
BANK PROTECTION PILOT PROJECT FAP-21

BECC
BANGLADESH ENGINEERING & CONSTRUCTION CORPORATION LIMITED
COMPOUNDING NATIONALS OF KHORR, LYON, FRANCE
PROF. DR. LACHENKARTNER, BERGHOFFER, GERMANY
DELT INTRAMAL, DELFT/NETHERLANDS

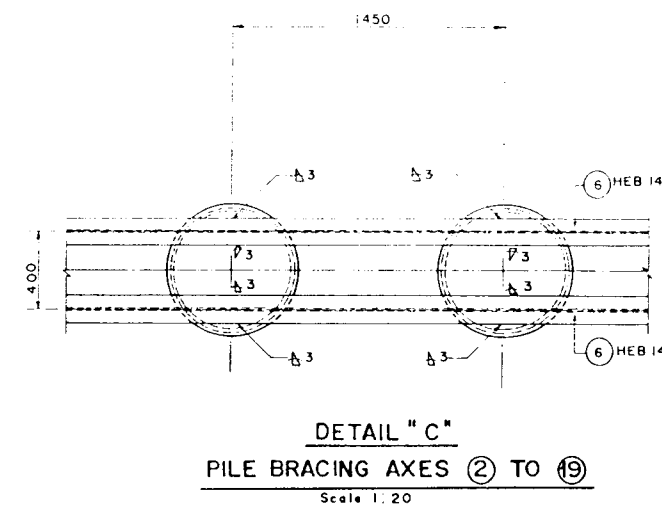
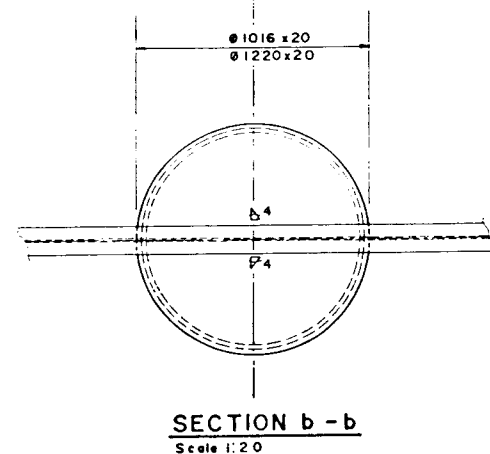
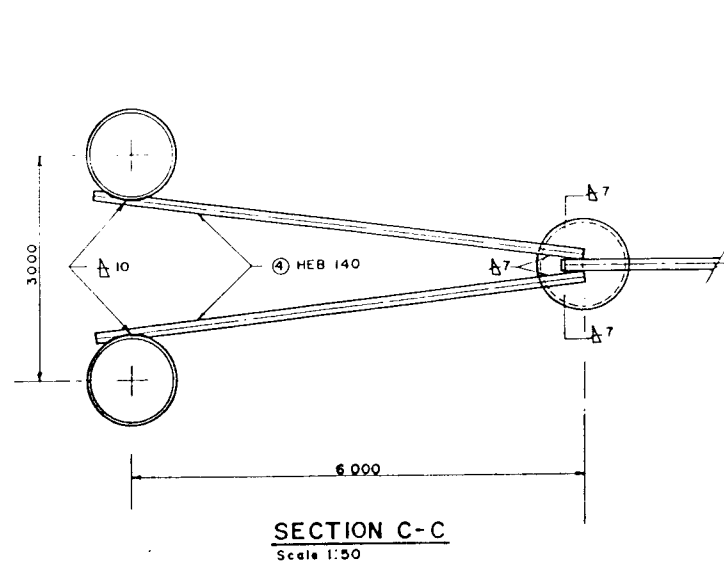
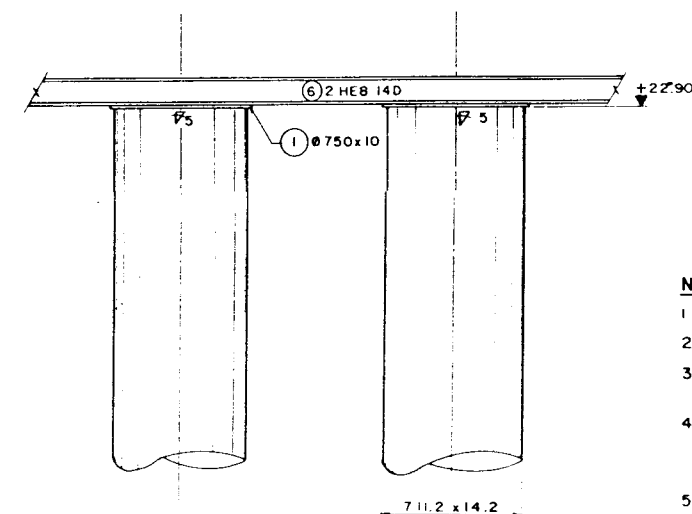
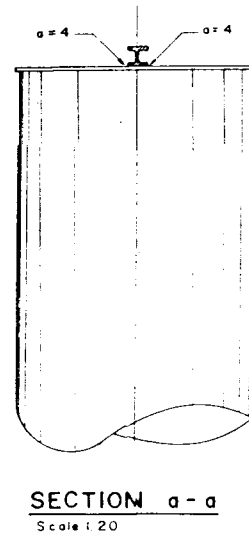
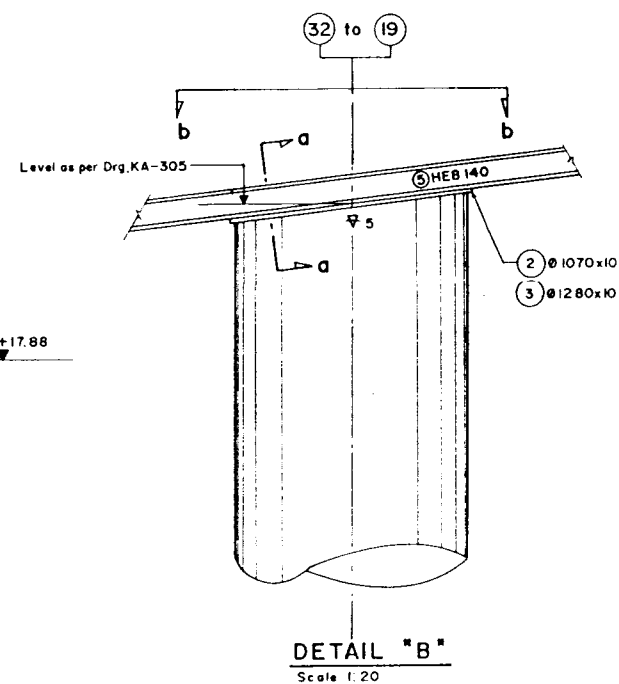
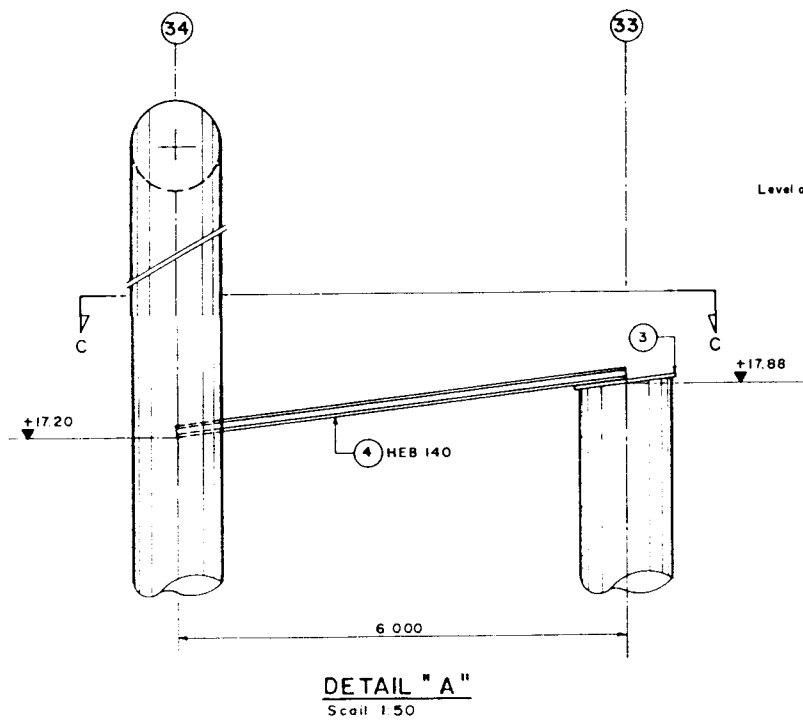
TEST SITE 1 - KAMARJANI

GROYNE G-3
STEEL PILE DIA. 1220 x 20 mm
PILE SCHEDULE, DETAILS

NAME	DATE	SCALE	DRAWING NO.	REVISION
K.M.A.HALIM	05-01-94	1:10, 1:20, 1:2	KA-304	0
CHECKED	17-01-94			
APPROVED	10-02-94			



MATERIAL SCHEDULE					
ITEM NO.	NOS.	SECTION/DIMENSIONS	SINGLE WEIGHT (kg)	TOTAL WEIGHT (kg)	REMARKS
1	17	Ø 750 x 10	44.16	750.72	
2	6	Ø 1070 x 10	89.87	539.22	
3	9	Ø 1280 x 10	128.61	1,158.21	
4	2	HEB 140 ... 6 500	219.05	438.10	Material supplied by Employer
5	1	HEB 140, 45 m		1,516.50	
6	2	HEB 140, 30 m	1,011.00	2,022.00	
		TOTAL		6,424.75	



- NOTES:**
- All levels refer to ± 0.0 m P.W.D.
 - All measurements in millimeters.
 - Steel grade St. 37, DIN 17100 as shown in the Schedule or equivalent grades.
 - Welding seam thickness $a = 0.7t$ min. or as shown on the drawing. Measurement of fillet weld thickness:
 - All exposed steel edges shall be chamfered.
 - Reference Drawings:
KA - 305 Pile Installation Plan

DRAWING PHOTOREduced BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

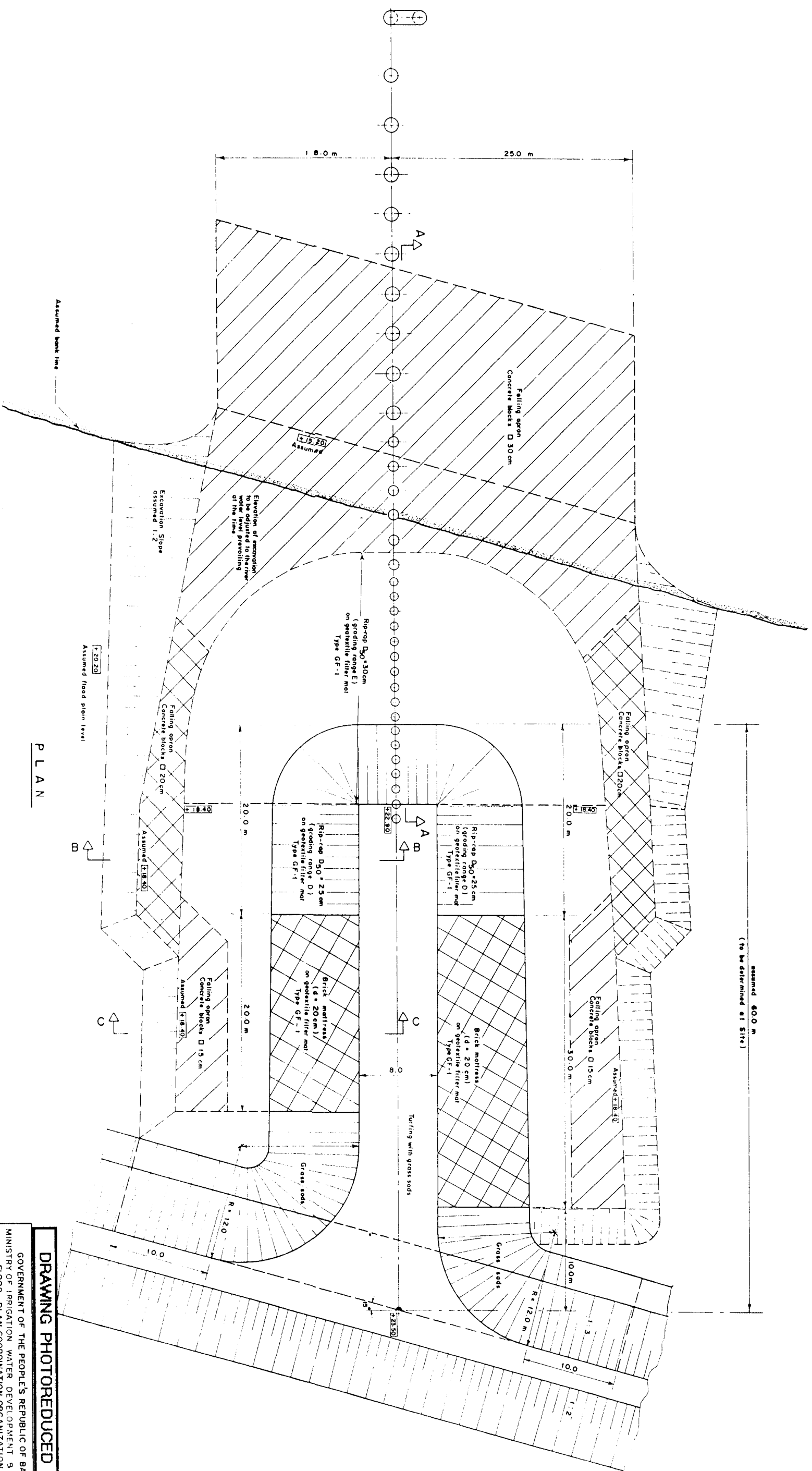
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM
BMBH-BURH ENG.-GEH. MBH, DORTMUND/GERMANY
COMPAGNIE NATIONALE DU RHONE, LYON/FRANCE
PROF. DR. LACONERAPARTNER, BERLIN/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS
In association with:
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DESH UPADESH LIMITED (DUL)

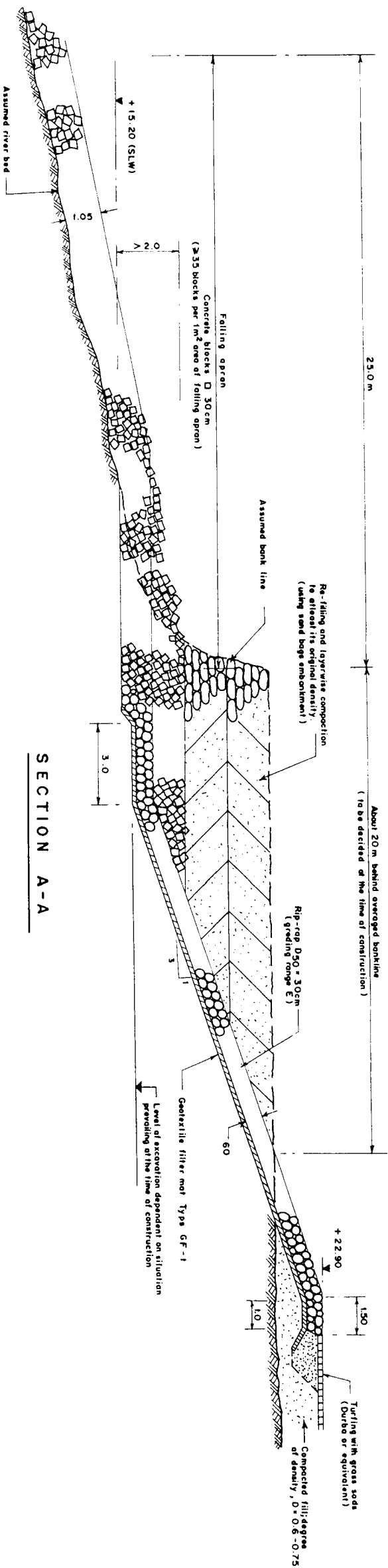
TEST SITE I - KAMARJANI

**GROYNE G-3
PILE FRAME AND BRACING**

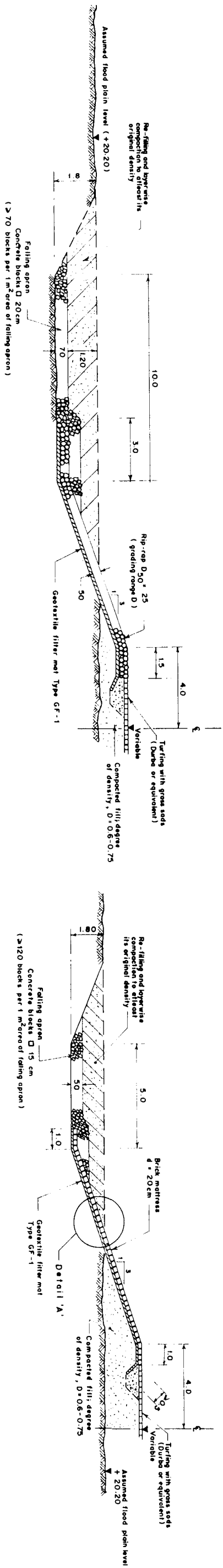
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CHECKED	25-01-94	DRAWING NO.	REVISION
APPROVED	10-02-94	KA-306	0



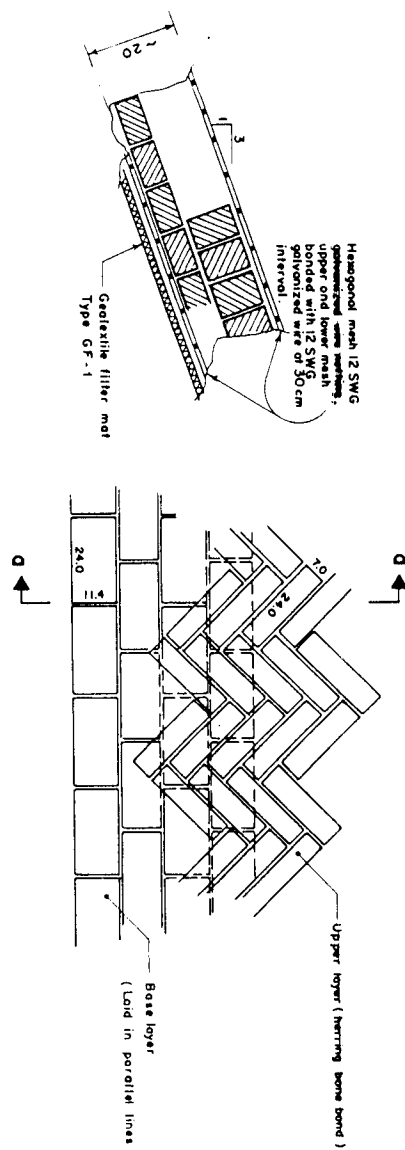
GROYNE G - 3
REVENEMENTS AND FALLING APRONS
PLAN



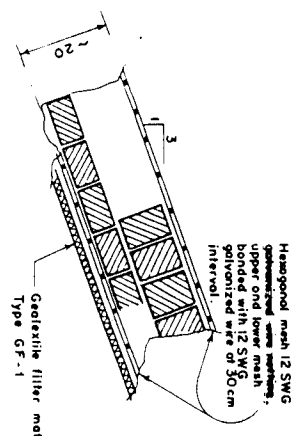
SECTION A-A



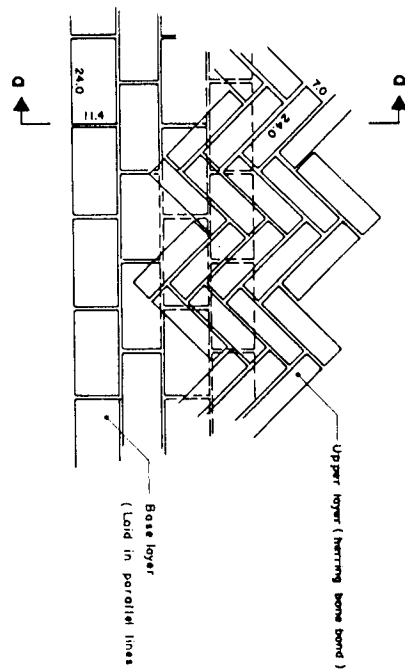
SECTION B-B



SECTION C-C

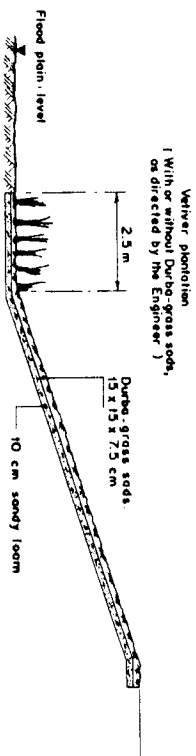


SECTION D-D



DETAIL 'A'
BRICK MATTRESS (d = 20 cm)

SCALE: 1:10



TYPICAL SECTION WITH BIOTECHNICAL REVELMENT

SCALE: 1:100

- Notes**
- All measurements in meter and centimeter.
 - Levels refer to ± 0.0 m PMD.
 - Reference Drawings:
 - KA-005 Filter Gradation Curves.
 - KA-006 Stone Gradation and Layer Thickness.
 - KA-307 Revetments and Falling Aprons, Plan.

DRAWING PHOTOREduced BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM

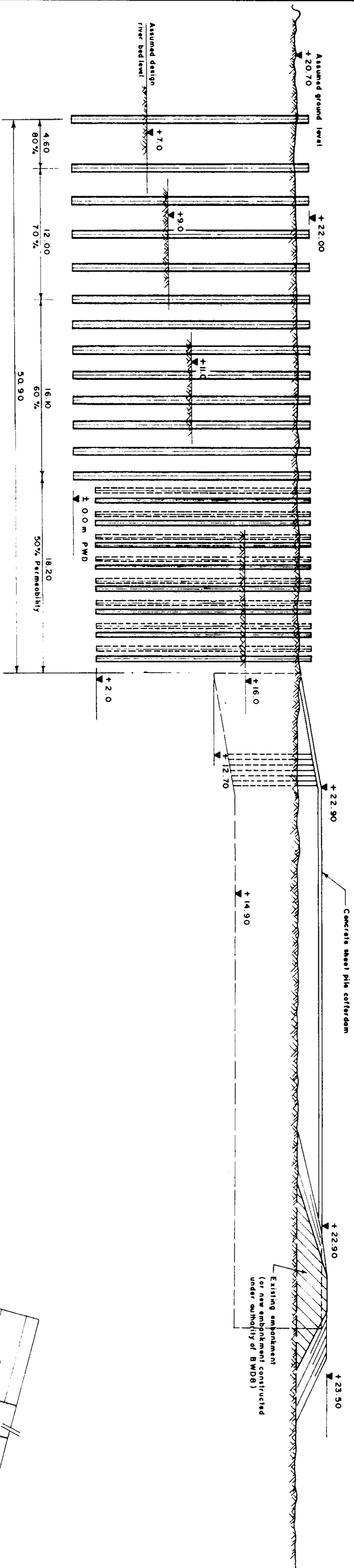


BAHAR KHURRUM AND ASSOCIATES, DOKKHA/NOVAPUR
COMPARISON NATION ALLIANCE DU BANGOR, LYON/FRANCE
MOFIR DR. LACHINERAPATTHAN, BANGKOK/THAILAND
DELTAT HYDRAULICS, DELTAT/NETHERLANDS

TEST SITE I - KAMARJANI

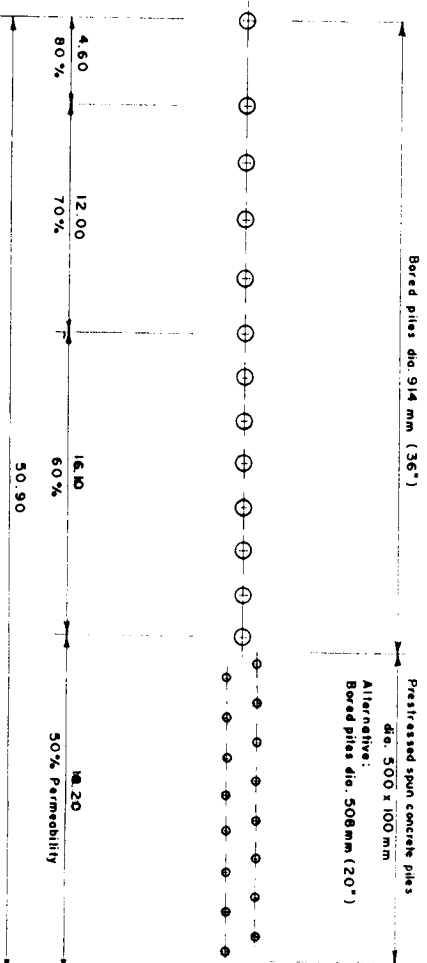
GROYNE G-3
REVELMENTS AND FALLING APRONS
DETAILED SECTIONS

NAME	DATE	SCALE	1:10, 1:100	REVISION
DRAWN	ANOWAY	07-12-93		
CHECKED		25-01-94	DRAWING NO.	KA-308
APPROVED		10-02-94		0



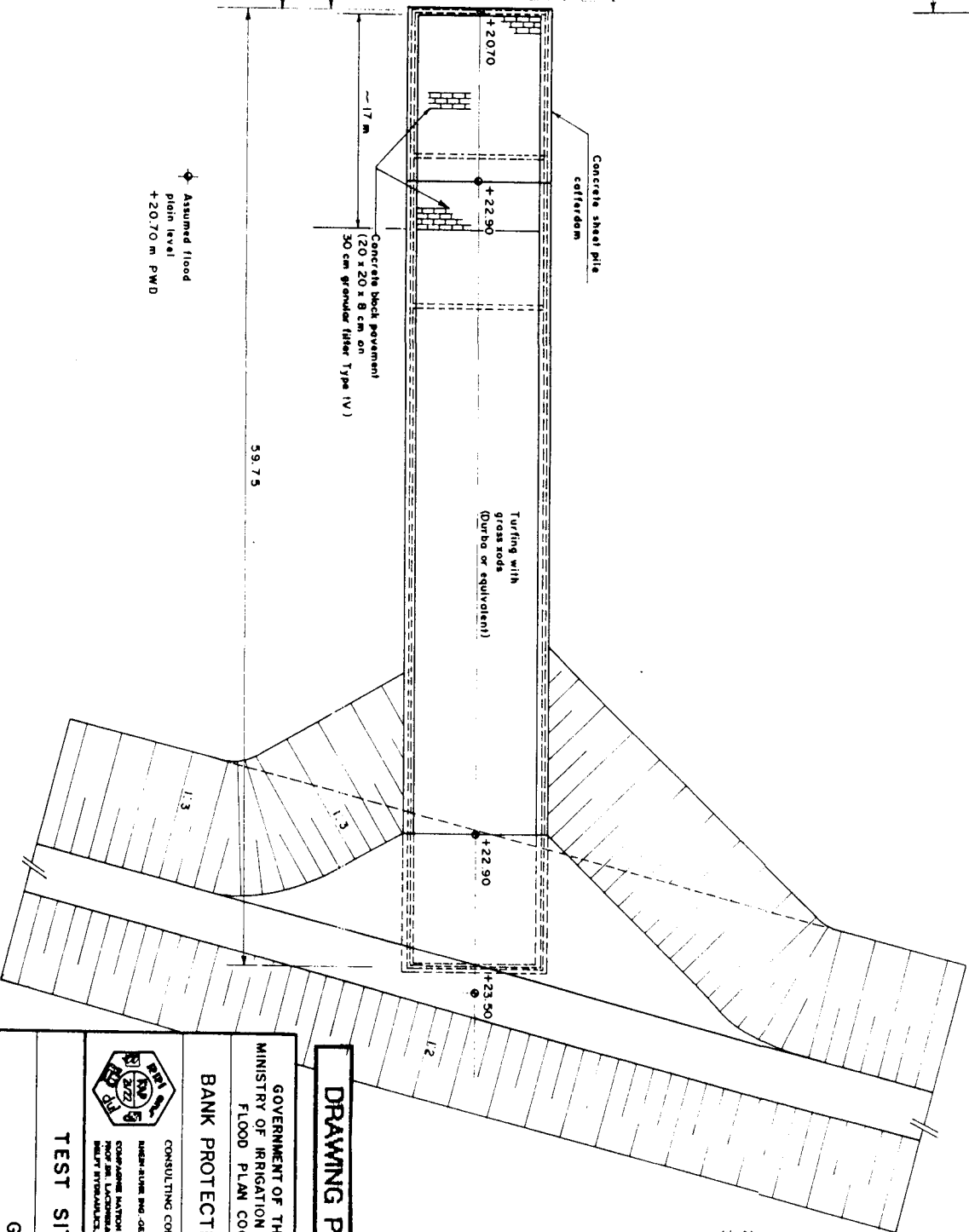
ELEVATION

Scale 1:200



PLAN

Scale 1:200



- NOTES
1. All measurements in meter
 2. All levels refer to ± 0.0 m PWD
 3. Reference Drawings:
KA - 404 Pile Installation Plan
KA - 406 Concrete Sheet Pile Cofferdam
KA - 003 Layout of Groynes

DRAWING PHOTOREDUCED BY 50%

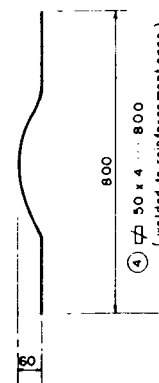
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

TEST SITE 1 - KAMARJANI

GROYNE G-A GENERAL ARRANGEMENT PLAN AND ELEVATION

NAME	DATE	SCALE
F. MOSSAM	08-12-93	1:200
CHECKED	20-01-94	DRAWING NO.
APPROVED	10-02-94	KA - 401
		REVISION
		0



DRAWING PHOTOREDUCTION BY 50%

**GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)**

BANK PROTECTION PILOT PROJECT FAP - 21

CONSULTING CONSORTIUM

RHEIN-SUNG INC.-GES MBH, DORTMUND/GERMANY

In association with:

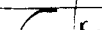
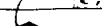
**COMPAGNIE ATOMALE DU RUHRE, LYON/FRANCE
PROF. DR. LAUBERGER PARTNERS, BREMEN/GERMANY
DELFT HYDRA. WLICS, DELFT/NETHERLANDS**

**BANGLADESH ENGINEERING &
TECHNOLOGICAL SERVICES LTD. (BETS)
DESH UPODESH LIMITED (DUL)**

TEST SITE 1 - KAMARJANI

GROYNE G - A

IN-SITU CONCRETE PILE DIA.914mm(36") (BORED PILE)

	NAME	DATE	SCALE:	
DRAWN	K. M. A. HAKIM	30-11-93	1:50, 1:10	
CHECKED		25-01-94	DRAWING NO.	REVISION
APPROVED		10-02-94	KA - 402/1	0

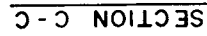
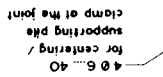
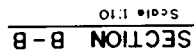
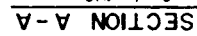
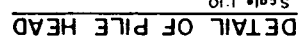
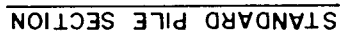
☐ Tick-mark where applicable

NOTE :

Refer to Section 1200 of Specifications for construction of bored concrete piles.

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BORED PILE PRODUCTION REPORT (SPECIMEN FORM)			
	NAME	DATE	SCALE : _____
DRAWN	FHOSSAIN	27-01-94	
CHECKED	<i>h.</i>	27-01-94	
APPROVED	<i>h.</i>	10-02-94	
DRAWING NO KA-402/II		REVISION 0	



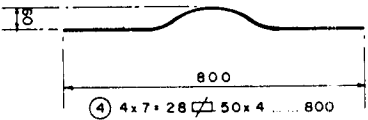
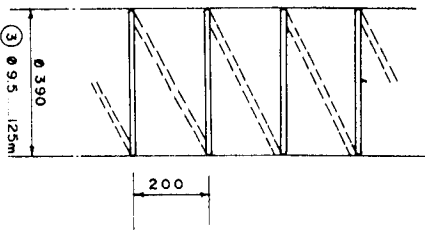
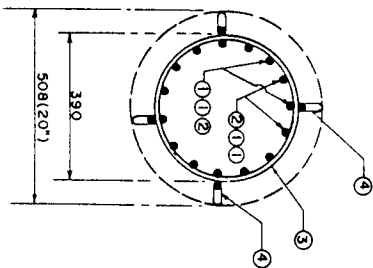
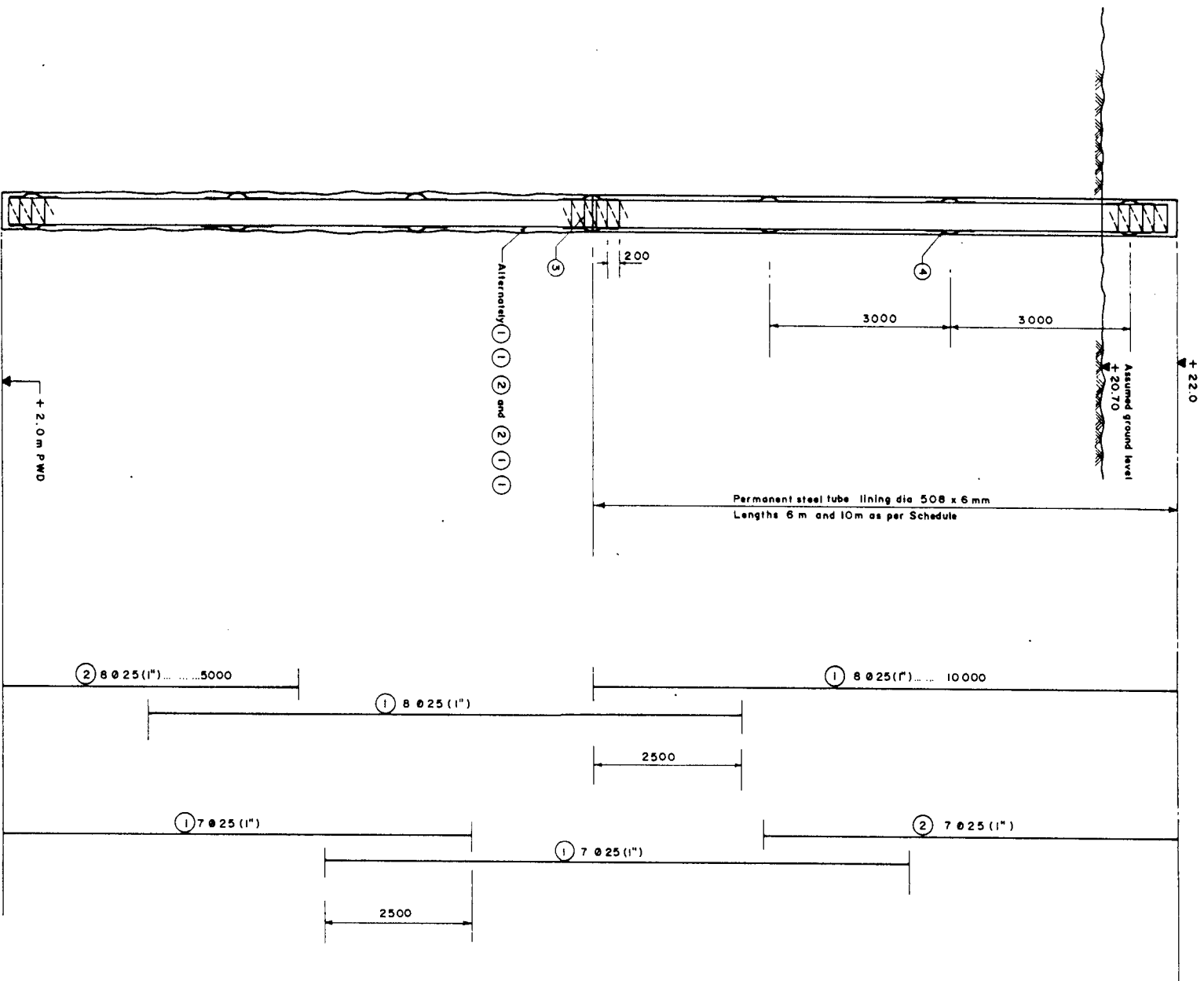
DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

TEST SITE I - KAMARJANI

GROUPE G - A
PRESTRESSED SPUN CONCRETE PILE
DIA. 500 X 100 mm

NAME	DATE	SCALE: 1/50, 1/20, 1/10, 1/1	DRAWING NO.	KA - 403	REVISION	0
DRAWN	K.M. MALINI	24-11-93	CHECKED			
APPROVED		10-02-94				



REINFORCEMENT BAR SCHEDULE (Steel Grade 60)				
ITEM NO.	BAR DIA (mm)	BAR SHAPE (MEASURES IN METER)	NOS.	CUTTING LENGTH (m)
1	25 (1")	—	30	10.00
2	25 (1")	—	15	5.00
3	9.5 (3/8")	—	125.00	69.4
4	50 x 4 mm	—	28	35.2
TOTAL WEIGHT PER PILE			—	1,582.1
TOTAL WEIGHT FOR 16 NOS. BORED PILES			—	25,313.6 kg

MATERIAL SCHEDULE-STEEL TUBE LINING			
dia. 508x6mm, Steel grade St. 37			
LOCATION	LENGTH OF STEEL TUBE LINING (m)	NOS.	WEIGHT/NO. (kg)
10/b	6.0	10	4,457.0
5a/b	6.0	6	742.8
6a/b	10.0	6	4,456.8
8a/b	10.0	6	4,456.8
TOTAL			8,913.6

- NOTES:
- All measurements in millimeter, except shown otherwise.
 - Levels refer to ± 0.00 m P.W.D.
 - Reinforcing steel grade 60, ASTM A-615, deformed bars.
 - Concrete to be placed by tremie pipe method (underwater concrete). Minimum cement content 400 kg/m³ (ready mixed concrete). Aggregate size max. 32mm (only crushed stone material). Water-cement ratio max. 0.6.
 - Permanent steel tube lining of steel grade St. 37 or equivalent. Individual lengths and butt joints as per Contractor's requirement. Diameter to be adjusted to Contractor's requirement.
 - Reference Drawings:
KA - 402/II Bored Pile Production Report
KA - 404 Pile Installation Plan

DRAWING PHOTO REDUCED BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

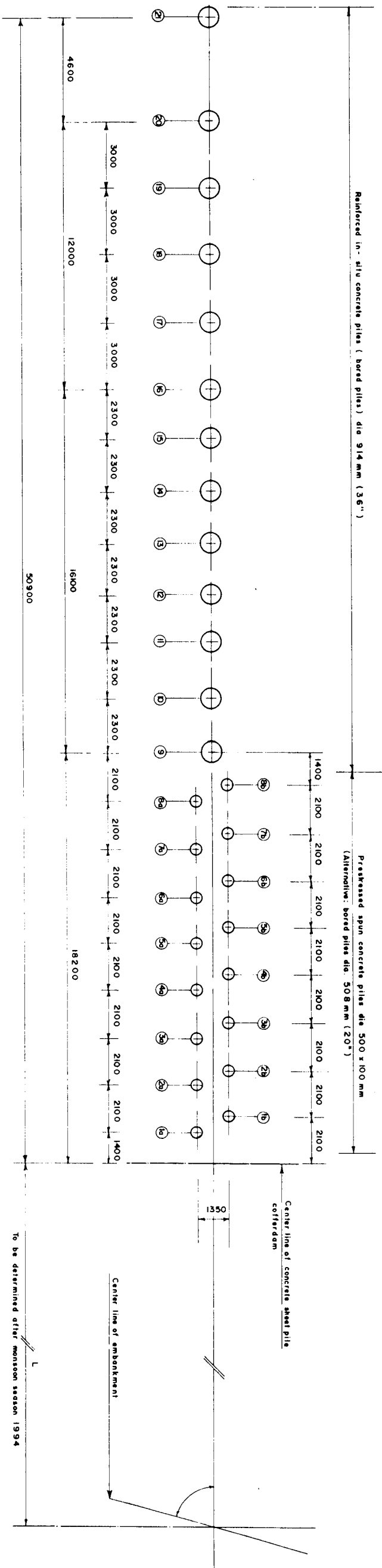
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT
BENEFIT INC. (PVT) LTD. DORTMUND, GERMANY
COMPARING MATERIALS FOR THE
DESIGN OF THE PILOT PROJECT
DEPT. OF CIVIL ENGINEERING, DORTMUND
UNIVERSITY, GERMANY

TEST SITE I - KAMARJANI

GROYNE G - A
IN-SITU CONCRETE PILE DIA. 508mm(20")
(BORED PILE)

NAME	DATE	SCALE	DRAWING NO.	REVISION
K.M.A. HALIM	06-02-94	1:50, 1:10	KA-403/II	0
CHECKED	07-02-94			
APPROVED	10-02-94			



PLAN
Scale 1:100

REINFORCED IN-SITU CONCRETE PILE SCHEDULE					
Location No.	Nos.	Diameter mm	Head level (m PWD)	Tip level (m PWD)	Pile length m
9 to 15	7	914	+22.00	±0.0	22.00
16 to 19	4	914	+22.00	±0.0	22.00
20, 21	2	914	+22.00	±0.0	22.00
Total	13	—	—	—	286.0

PRESTRESSED SPUN CONCRETE PILE SCHEDULE					
Location No.	Nos.	Diameter mm	Head level (m PWD)	Tip level (m PWD)	No. of joints of Site
1a to 8a	8	500	+22.00	+2.00	1
1b to 8b	8	500	+22.00	+2.00	1
Total	16	—	—	—	16

NOTES

- Measurements in millimeters, except shown otherwise
- Levels refer to ±0.0 m PWD
- Center line of Groyne G-A to be determined finally after monsoon season in 1994
- Construction of reinforced in-situ concrete piles as per Specifications, Subsection 1200 and Drawing KA-402/KA-403/AIT.
- Butt joint of prestressed spun concrete piles to be carried out as per Specifications, Subsection 1526 and Drawing KA-403
- Reference Drawings:
KA-401 Groyne G-A
General Arrangement
KA-402 In-situ Concrete Pile dia. 914 mm (36") (Bored Pile)
KA-403 Prestressed Spun Concrete Pile
Dia. 500 x 100 mm
KA-403/AIT In-situ Concrete Pile dia. 508 mm (20") (Bored Pile)

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL

FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING 3 CONSORTIUM

ENGINEERING 1 TO DES. JAWA. DORTANUNDEKAR

ENGINEERING 2 TO DES. JAWA. DORTANUNDEKAR

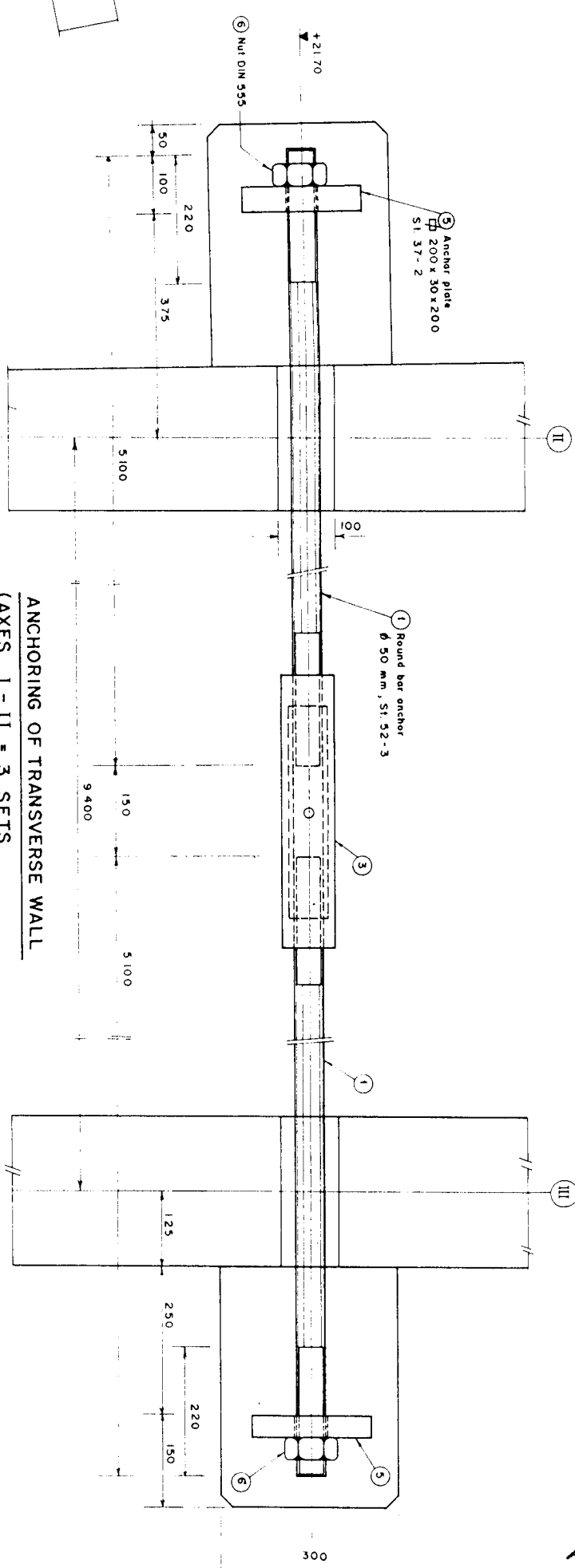
ENGINEERING 3 TO DES. JAWA. DORTANUNDEKAR

TEST SITE 1 - KAMARJANI

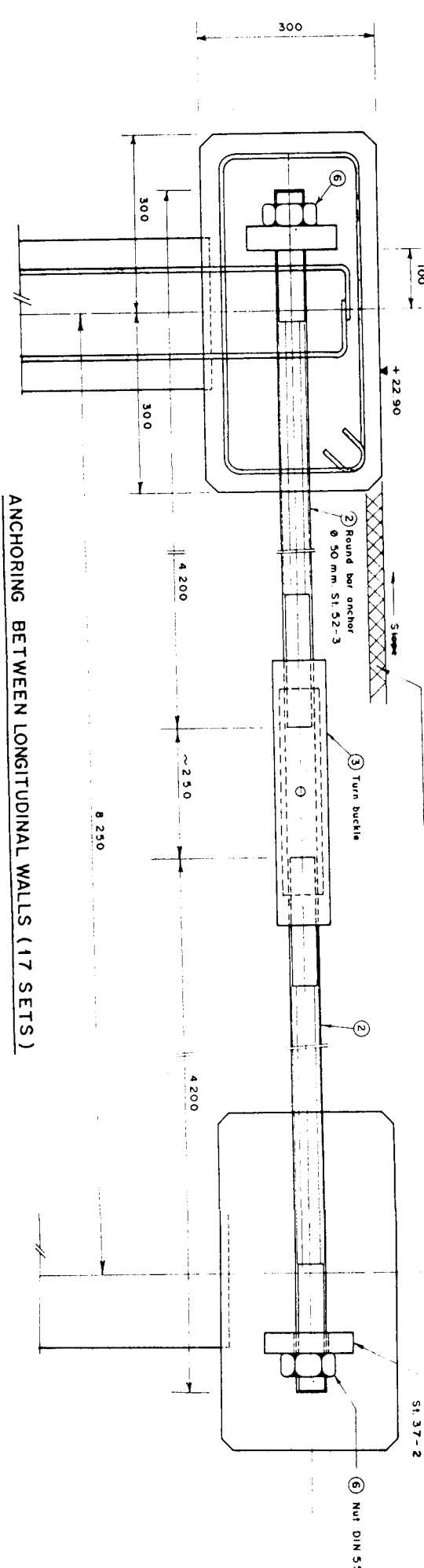
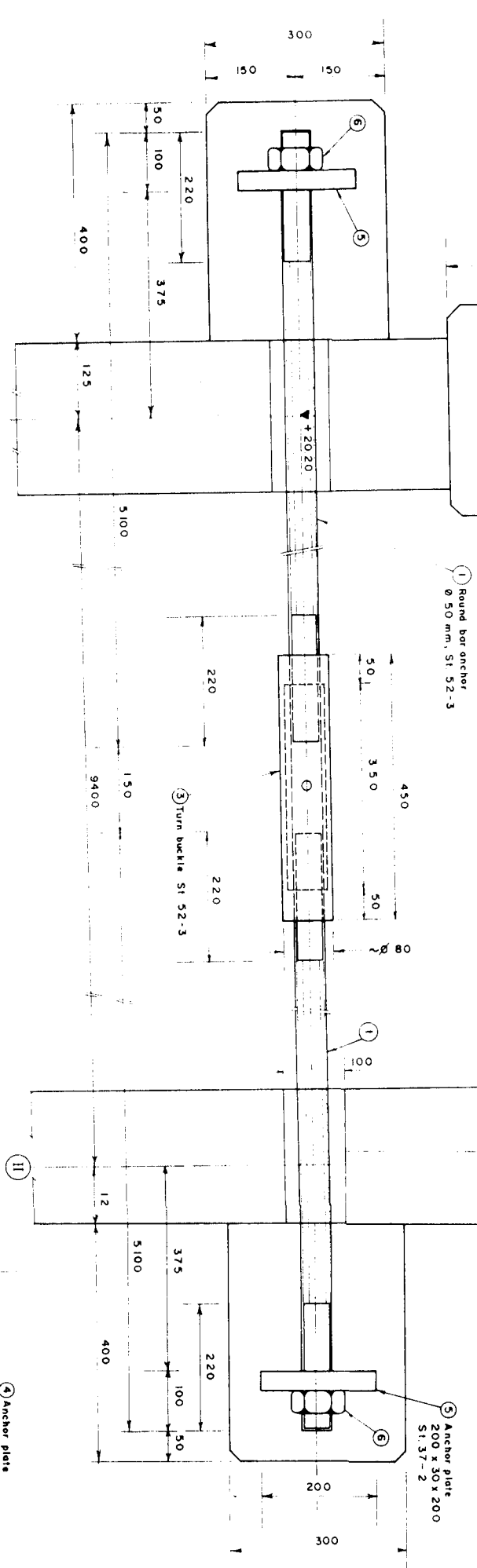
GROUYNE G-A

PILE INSTALLATION PLAN

NAME	DATE	SCALE	DRAWING NO.	REVISION
F. HOSSAIN	08-12-93	1:100	KA-404	0
CHECKED	20-01-94			
APPROVED	10-02-94			



ANCHORING OF TRANSVERSE WALL
(AXES I - II = 3 SETS
II - III = 3 SETS)



MATERIAL SCHEDULE (Supplied by Employer)					
Item	No.	Section / Dimensions	Steel Grade	Single Weight (kg)	Total Weight (kg)
1	12	Round bar anchor Ø 50	St. 52-3	78.54	1,039.56
2	34	Round bar anchor Ø 50	St. 52-3	64.68	2,328.48
3	23	Turn buckle Ø 80	St. 52-3	9.80	245.00
4	34	Anchor plates 150x40x150	St. 37-2	7.07	254.52
5	12	Anchor plates 200x30x200	St. 37-2	9.42	131.88
6	46	Nut DIN 555	St. 52-3	1.10	55.00
Total				110	4,114.44

- NOTES:
- All measurements in millimeters
 - Levels refer to ± 0.00 P.W.D.
 - Reference Drawings:
KA - 406 Pile Installation Plan, Details
KA - 407/II Concrete Sheet Pile Cofferdam, Details of Anchoring - Sheet II
KA - 408 Capping Beams, Mooring Beams:
Typical Reinforcement

DRAWING PHOTO REDUCED BY 50%

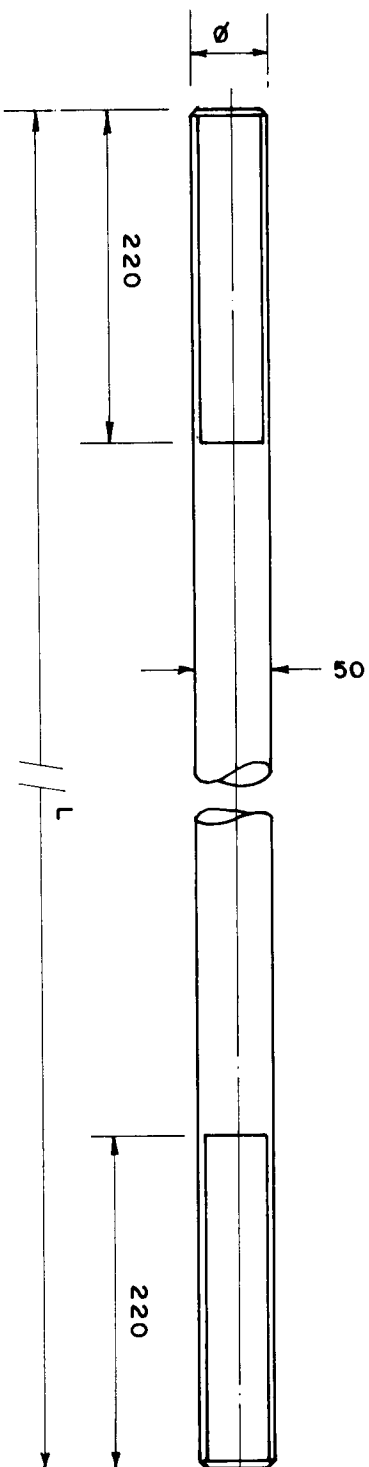
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)
BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSULTANT
RIVERBOND INC. (PVT) LTD. DOKKATUNGCEDARAY
COMPAGNE NATIONALE DU RIPORE, LYON/FRANCE
PROF. DR. LACHENNA/ASTRELL, BREMEN/GERMANY
BENT STROMMACK, DELFT/NETHERLANDS
In association with
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DEEN DROOSH LIMITED (DRL)

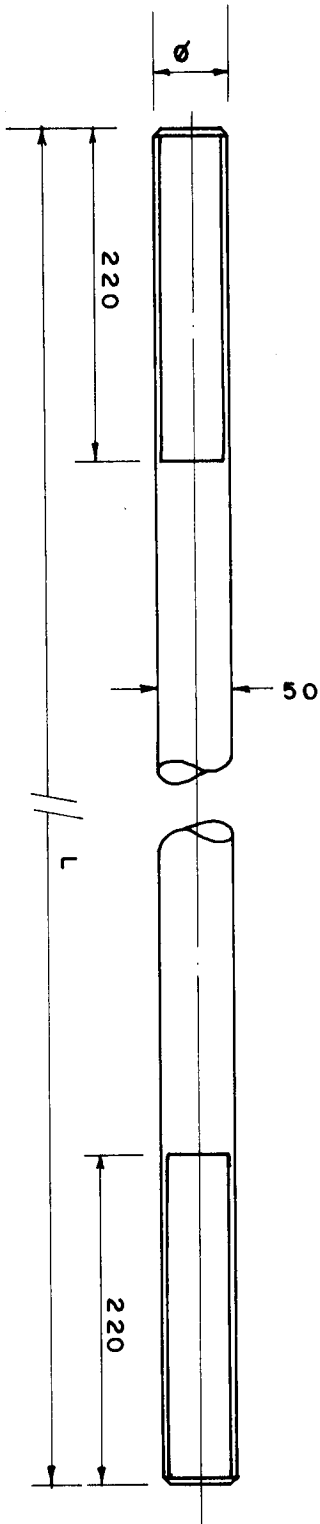
TEST SITE I - KAMARJANI
GROYNE G-A
CONCRETE SHEET PILE COFFERDAM
DETAILS OF ANCHORING - SHEET I

NAME	DATE	SCALE	DRAWING NO.	REVISION
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CHECKED	12-01-94			
APPROVED	10-02-94			

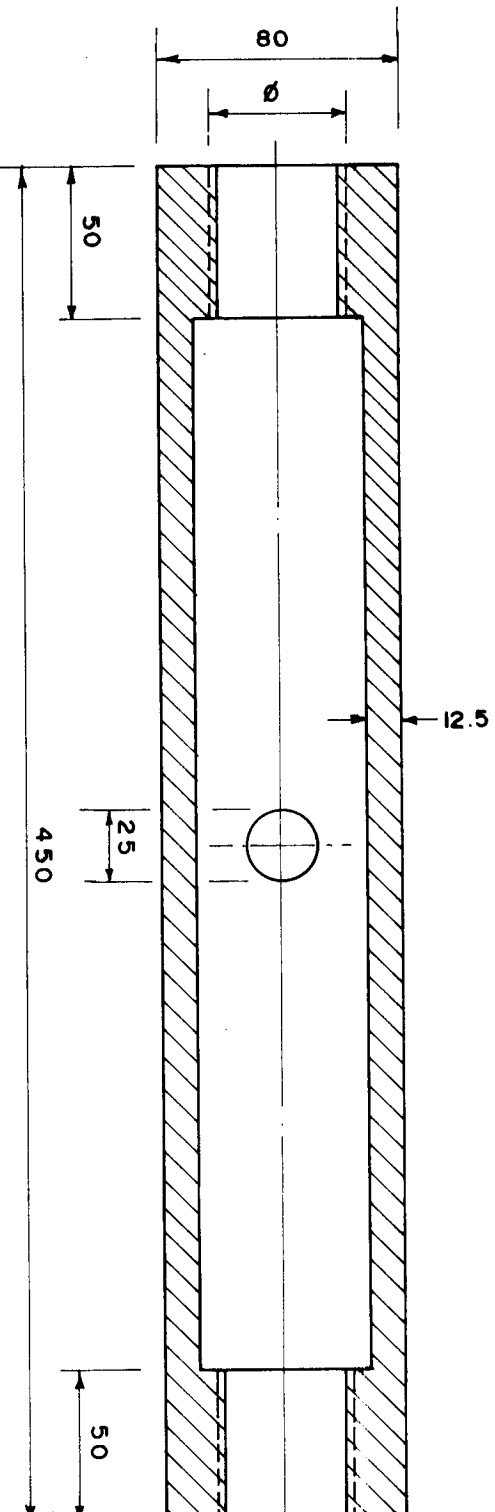
ANCHORING BETWEEN LONGITUDINAL WALLS (17 SETS)
Scale 1:5



① ROUND BAR ANCHOR DIA 50mm, St. 52-3
(14 Nos.) L = 5,100mm
Scale 1:5



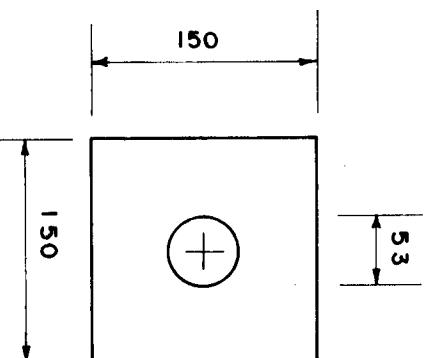
② ROUND BAR ANCHOR DIA 50mm, St. 52-3
(36 Nos.) L = 4,200mm
Scale 1:5



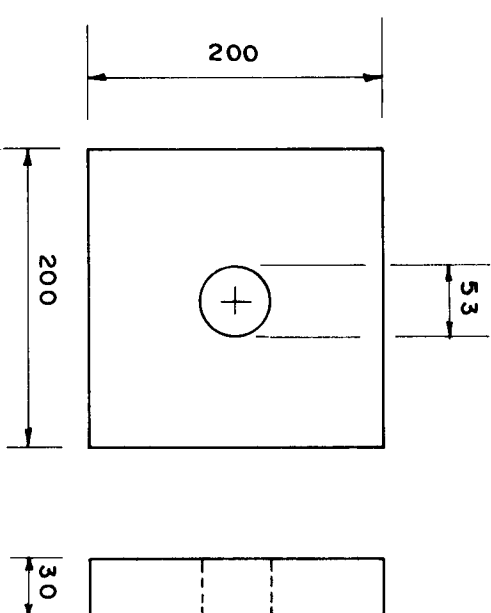
③ TURNBUCKLE St. 52-3
(25 Nos.)
Scale 1:2.5



⑥ NUT DIN 555
St. 52-3
(50 Nos.)



④ ANCHOR PLATE, St. 37-2
(36 Nos.)
Scale 1:5

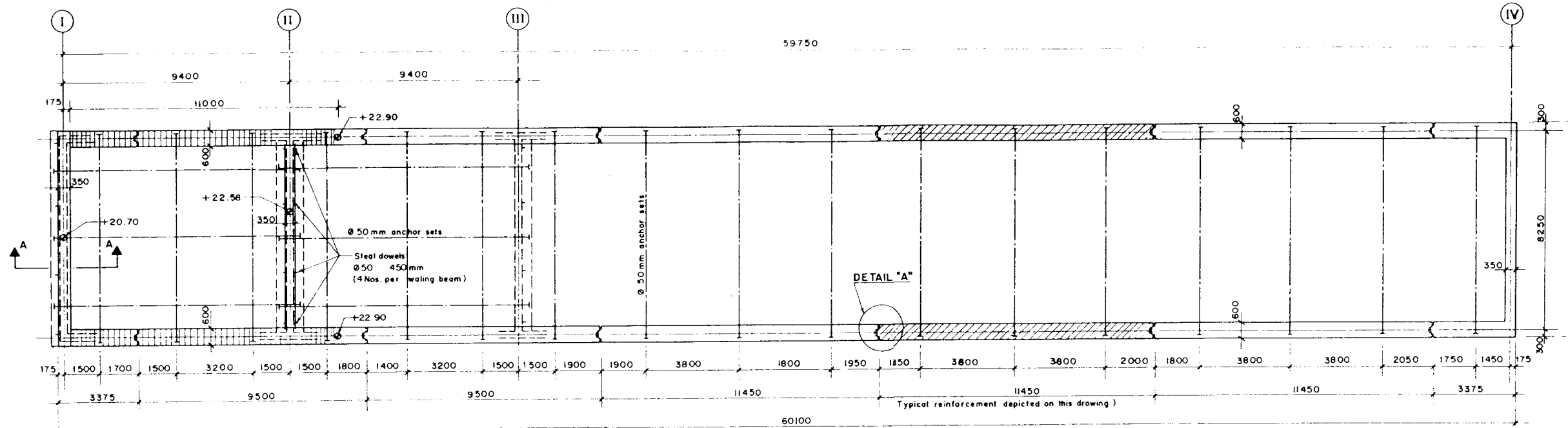


⑤ ANCHOR PLATE, St. 37-2
(14 Nos.)
Scale 1:5

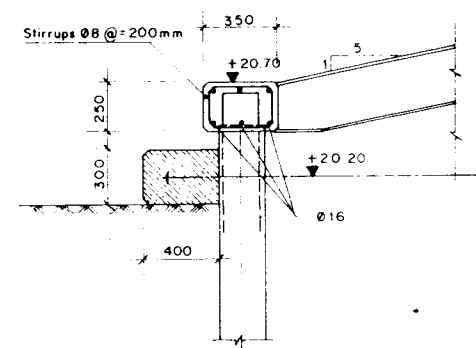
NOTES

1. All dimensions are in millimeters
2. Steel grades as shown
3. All exposed edges to be chamfered, anchor holes to be cut by mechanical tools.
4. Material schedule depicted on Drawing KA-407/Sheet-I

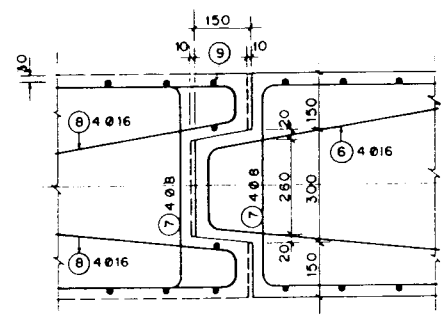
GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL FLOOD PLAN COORDINATION ORGANIZATION (FPCO)			
BANK PROTECTION PILOT PROJECT FAP-21			
CONSULTING CONSORTIUM BANK PROTECTION PILOT PROJECT FAP-21 BANK PROTECTION PILOT PROJECT FAP-21 BANK PROTECTION PILOT PROJECT FAP-21			
TEST SITE I - KAMARJANI			
GROYNE G - A CONCRETE SHEET PILE COFFERDAM DETAILS OF ANCHORING - SHEET II			
NAME	DATE	SCALE	REVISION
F. HOSSAIN	12-01-94	1:5, 1:2.5	0
CHECKED	12-01-94	DRAWING NO.	REVISION
APPROVED	10-02-94	KA-407/II	0



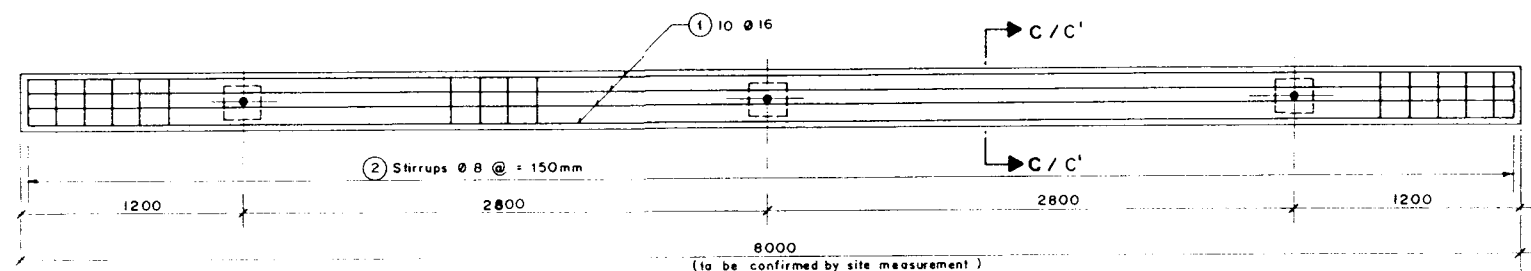
PLAN
Scale 1:100



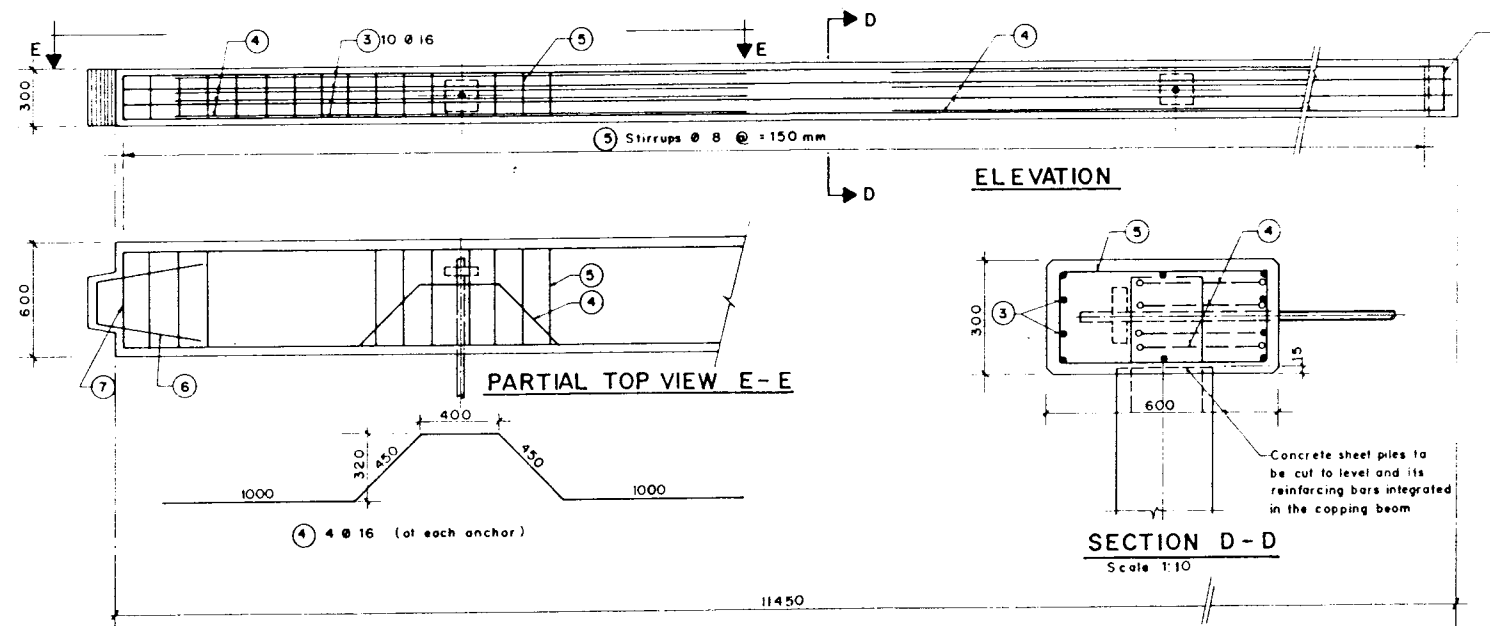
SECTION A - A
Scale 1:20



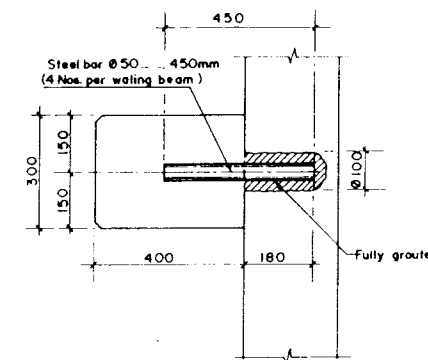
DETAIL "A"
EXPANSION JOINT
Scale 1:10



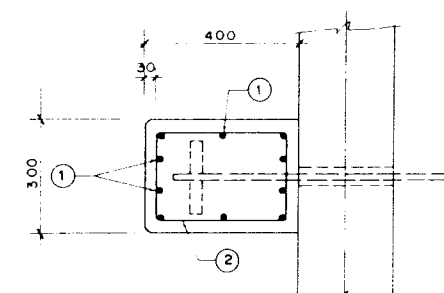
WALING BEAM - TYPICAL REINFORCEMENT
Scale 1:20



LONGITUDINAL CAPPING BEAM - TYPICAL REINFORCEMENT
Scale 1:20



SECTION C' - C'
Scale 1:10



SECTION C - C
Scale 1:10

- NOTES**
- Measurements in millimeter
 - Levels refer to ± 0.00 m PWD
 - Reinforcing steel Grade 60, ASTM A 615, deformed bars
 - Concrete Class B 25, DIN 1045, Cement Type 1
Mix proportion as per Subsection 1632 (2) of Specifications
 - Concrete over to reinforcing steel 30 mm
 - Formwork Type FF (fair-faced) for all capping beams
Edges to be chamfered 15 x 15 mm
 - Reference Drawings:
KA - 406 Pile Installation Plan, Details
KA - 407 Details of Anchoring

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP - 21

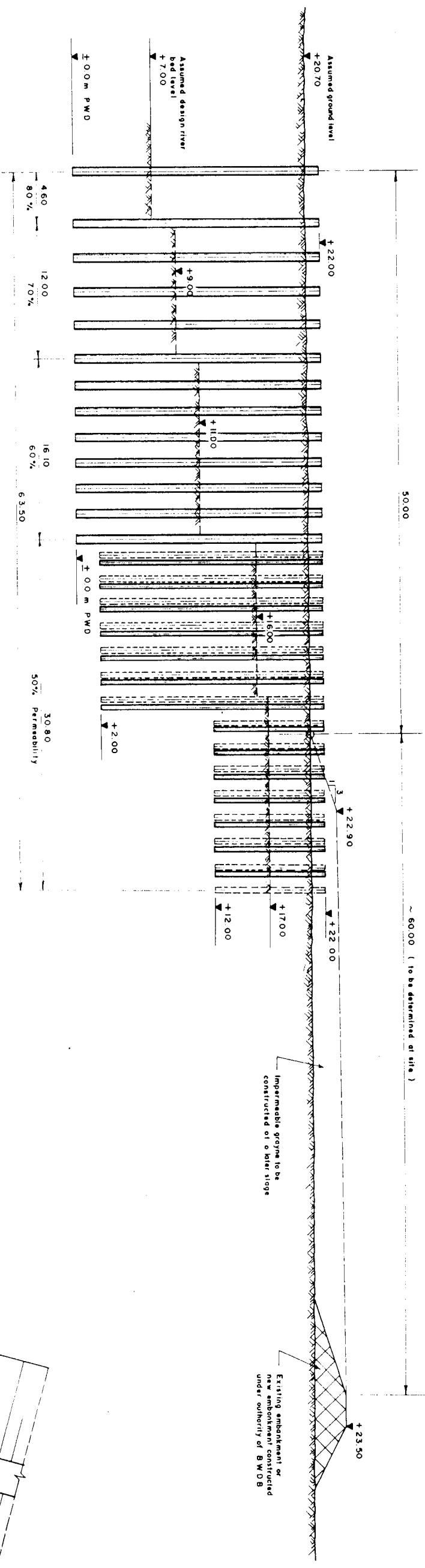
CONSULTING CONSORTIUM
RHEIN-RUHR-ING. GES. MBH. DORTMUND/GERMANY
COMPAGNIE NATIONALE DU RHONE, LYON/FRANCE
PROF. DR. LACKNER PARTNER, BREMEN/GERMANY
DELFT HYDRAULICS, DELFT/NETHERLANDS
BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)
DISH UPDATES LIMITED (DUL)

TEST SITE I - KAMARJANI

GROYNE G - A
CONCRETE SHEET PILE COFFERDAM
CAPPING BEAMS, WALING BEAMS
TYPICAL REINFORCEMENT

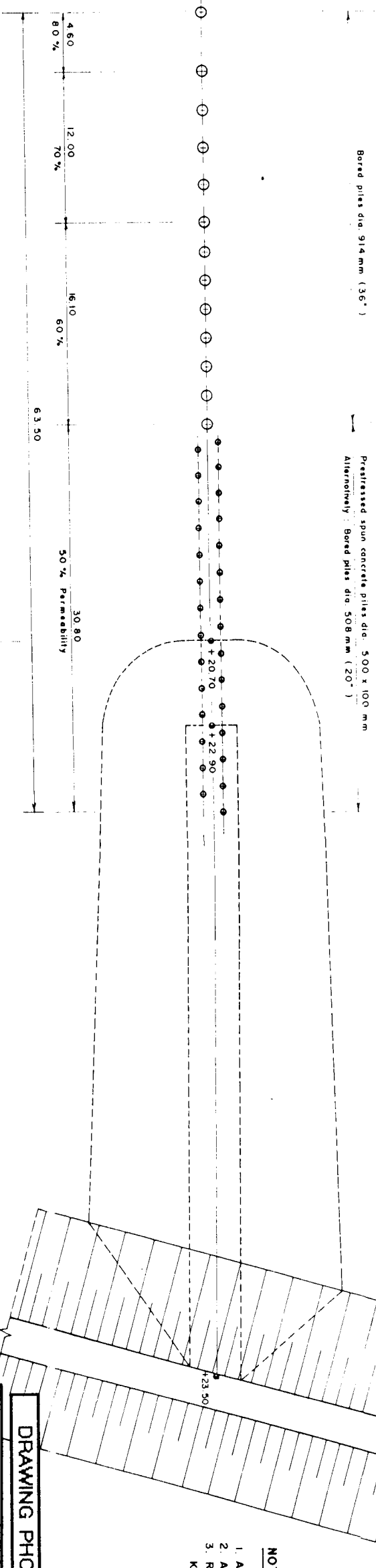
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DRAWN K.M.A. HALIM	15-12-93		
CHECKED G. K.	20-01-94	DRAWING NO.	REVISION
APPROVED G. K.	10-02-94	KA - 408	0

52



ELEVATION

Scale 1:200



PLAN

Scale 1:200

- NOTES**
1. All measurements in meter
 2. All levels refer to ± 0.00 m PWD
 3. Reference Drawings:
KA - 504 Pile Installation Plan

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MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP-21

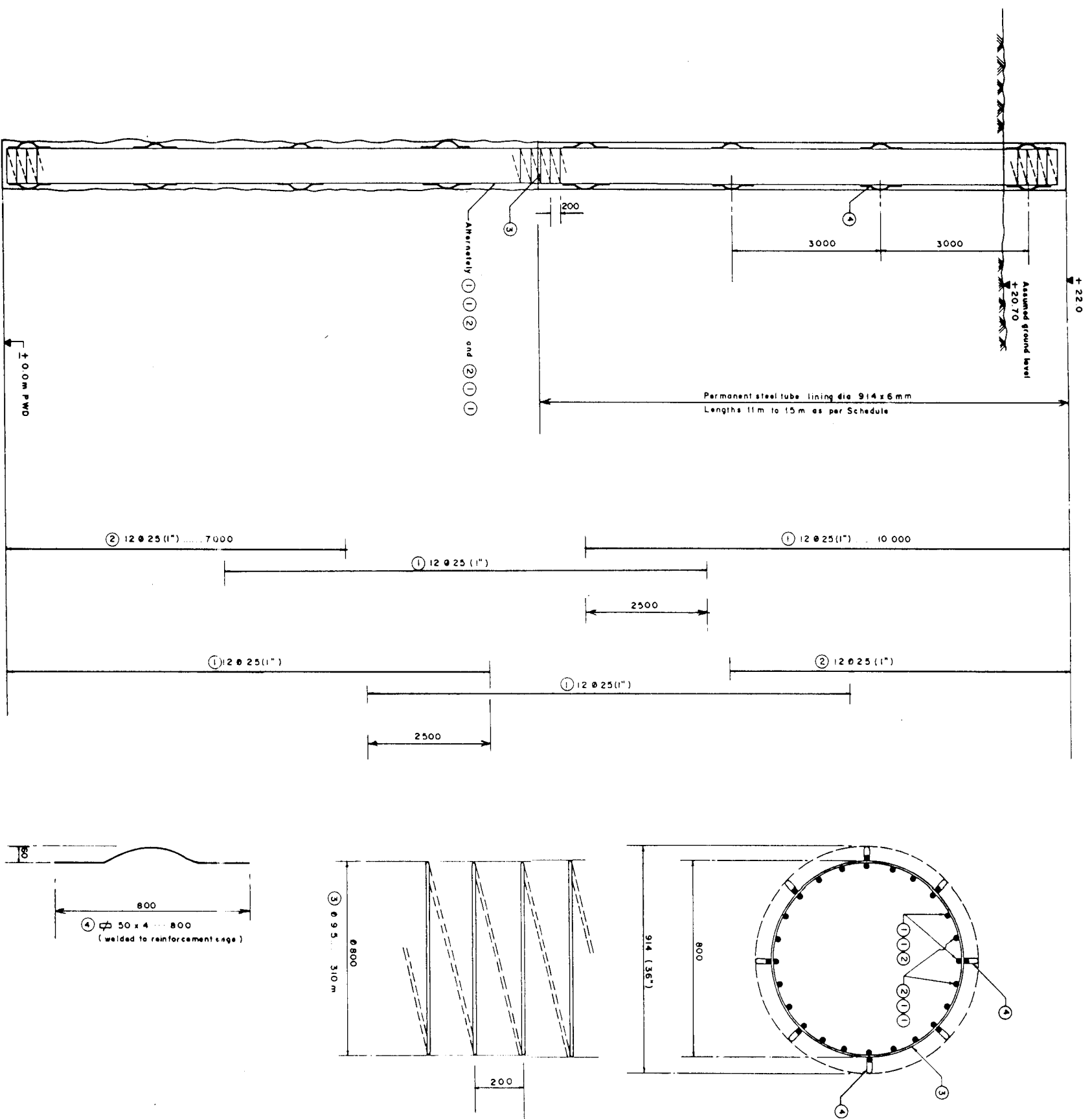


CONSULTING CONSULTANT
M/S. BUREAU OF CONSULTING ENGINEERS
100, LAKSHMI NAGAR, DAKSHIN KAPASHAN, DHAKA
TECHNICAL SERVICES LTD (BETS)
DRAFTSMAN: DR. ABU HASNAT ALI
DRAWN BY: DR. ABU HASNAT ALI

TEST SITE 1 - KAMARUJANI

GENERAL ARRANGEMENT
PLAN, ELEVATION

NAME	DATE	SCALE	REVISION
F. HOSSAIN	06-12-93	1:200	
CHECKED	26-01-94	DRAWING NO.	
APPROVED	10-02-94	KA-501	0



REINFORCEMENT BAR SCHEDULE (Steel Grade 60)				
ITEM NO.	BAR DIA (mm)	BAR SHAPE (MEASURES IN METER)	NOS.	CUTTING LENGTH (m) WEIGHT (kg)
1	25 (1")	—	48	10.00 1891.20
2	25 (1")	—	24	7.00 661.92
3	9.5 (3/8")	MM 81 (Spiral)		310.00 172.05
4	50 x 14 mm	—	64	0.80 80.38
TOTAL WEIGHT PER PILE				2805.55
TOTAL WEIGHT FOR 13 NOS BORED PILES				36,472.15 kg

MATERIAL SCHEDULE-STEEL TUBE LINING dia 914 x 6 mm, Steel grade St 37			
LOCATION PILE NO	LENGTH OF STEEL TUBE LINING (m)	NOS	WEIGHT/ NO (kg) TOTAL WEIGHT (kg)
17 to 22	11.00	7	1,478 10,346
23 to 26	13.00	4	1,747 6,988
27 to 28	15.00	2	2,015 4,030
TOTAL			21,364

NOTES:

- All measurements in millimeter, except shown otherwise
- Levels refer to ± 0.00 m PWD
- Reinforcing steel grade 60, ASTM A-615, deformed bars
- Concrete to be placed by tremie pipe method (underwater concrete). Minimum cement content 400 kg/m³ ready mixed concrete. Aggregate size max. 32 mm (only crushed stone material)
- Water-cement ratio max. 0.6
- Permanent steel tube lining of steel grade St 37 or equivalent. Individual lengths and butt joints as per Contractor's requirement. Diameter to be adjusted to Contractor's requirement
- Reference Drawings:
KA - 402/II Bored Pile Production Report
KA - 504 Pile Installation Plan

DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

BANK PROTECTION PILOT PROJECT FAP - 21

CONSULTING ENGINEER

CONSULTING ENGINEER

CONSULTING ENGINEER

CONSULTING ENGINEER

CONSULTING ENGINEER

CONSULTING ENGINEER

CONSULTING ENGINEER

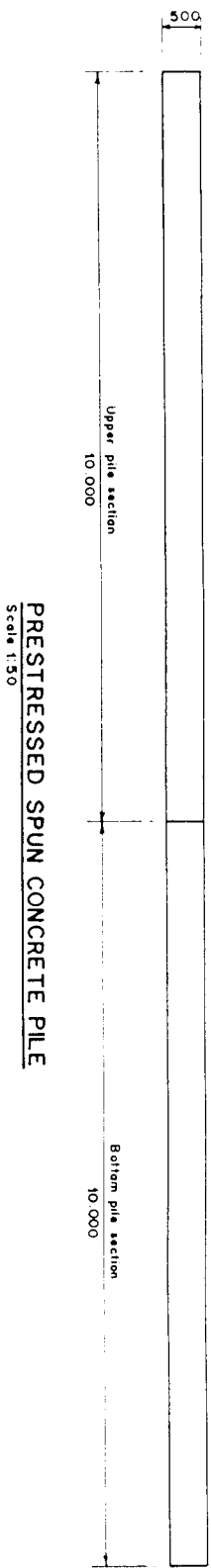
CONSULTING ENGINEER

CONSULTING ENGINEER

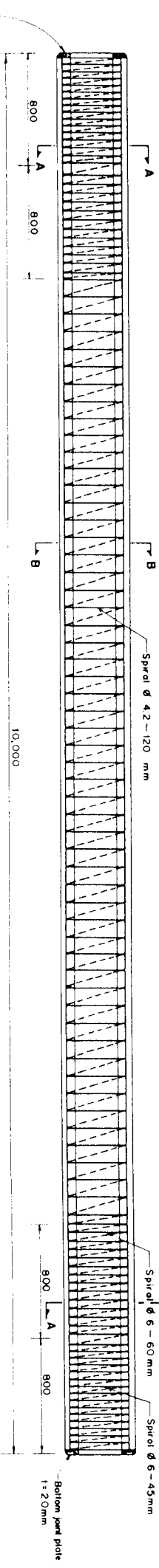
TEST SITE 1 - KAMARJANI

GROYNE G - B
IN-SITU CONCRETE PILE DIA. 914mm(36")
(BORED PILE)

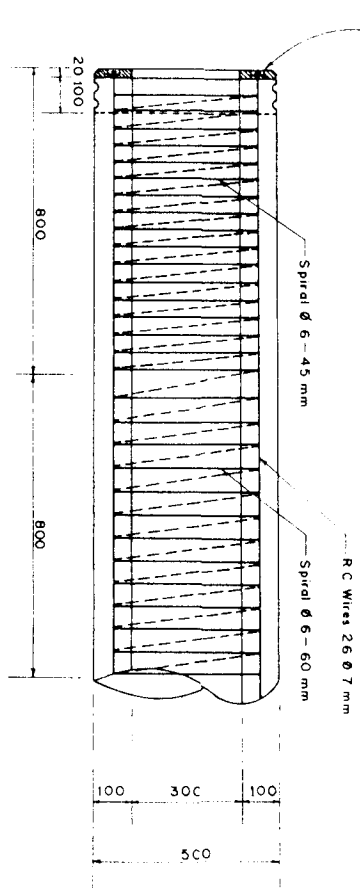
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CHECKED	23-01-94			
APPROVED	10-02-94			



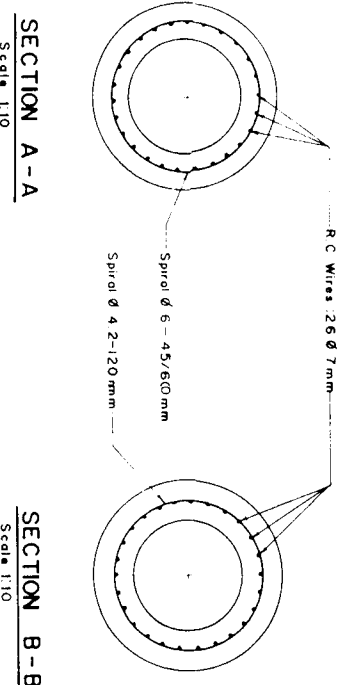
PRESTRESSED SPUN CONCRETE PILE
Scale 1:50



STANDARD PILE SECTION
Scale 1:20

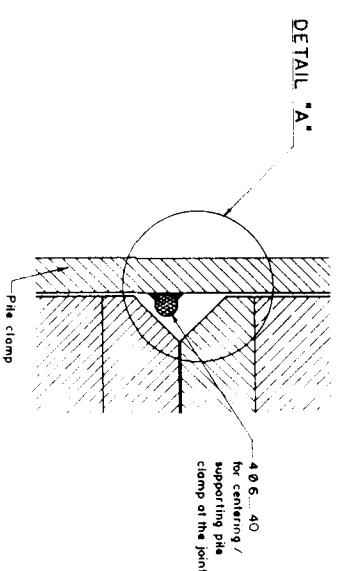


DETAIL OF PILE HEAD
Scale 1:10

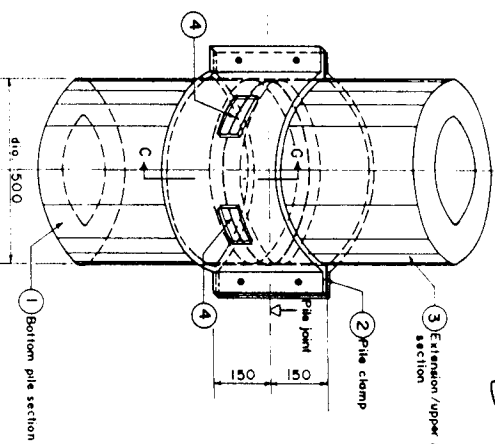


SECTION A-A
Scale 1:10

SECTION B-B
Scale 1:10

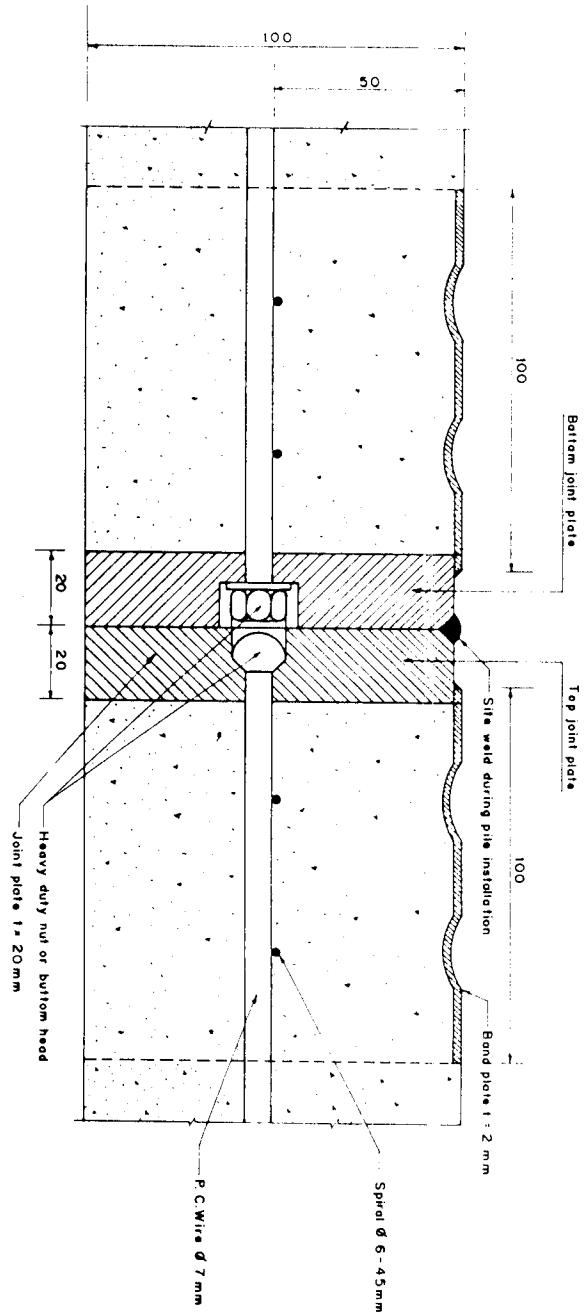


SECTION C-C

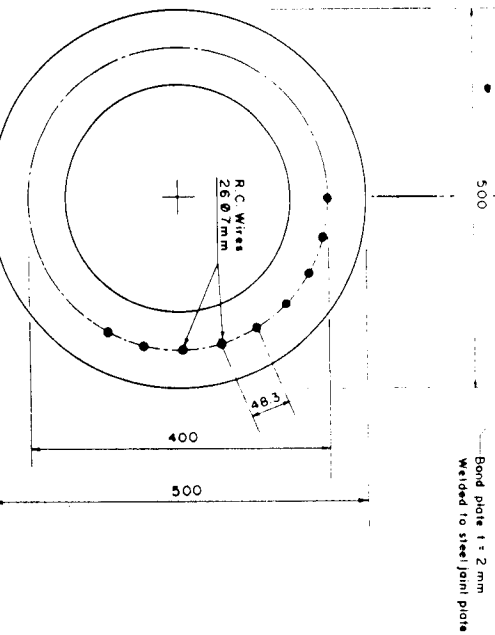


PILE CLAMP FOR JOINTING
OF PRESTRESSED SPUN CONCRETE
PILES DURING PILE INSTALLATION

- 1) Drive first pile section to a top level convenient for welding a joint
- 2) Fix pile clamp
- 3) Place, align and secure pile extension
- 4) Tack-weld the pile joint at the four corners of the pile clamp
- 5) Remove pile clamp and weld the complete pile joint (V-weld 12 mm)



DETAIL OF PILE JOINT
Scale 1:1



DETAIL OF STEEL ELEMENT FOR PILE JOINT
Scale 1:30

- NOTE:
1. Prestressed spun concrete piles are produced by GEMCON Ltd., Panhagar
 2. Concrete quality grade B 45, DIN 1045
 3. Prestressing wire > 1600 N/mm² tensile strength
 4. Piles shall not be handled/lifted unless the concrete has reached compressive strength of atleast 3.5 N / mm²
 5. Reference Drawing KA-504 Pile Installation Plan.

DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCO)

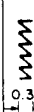
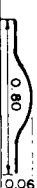
BANK PROTECTION PILOT PROJECT FAP-21


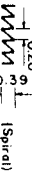

CONSULTING CONSULTANT
ENGINEERING AND ARCHITECTURE
100, LAKSHMI NAGAR, LAKSHMI NAGAR
NEW DELHI, INDIA
TELEPHONE: 26111111
FAX: 26111111
E-MAIL: 26111111

TEST SITE 1 - KAMARJANI

GROUPE G-B
PRESTRESSED SPUN CONCRETE PILE
DIA. 500 X 100 mm

NAME	DATE	SCALE	DRAWING NO.	REVISION
K.M.A. HALIM	24-11-93	1:50, 1:20, 1:10, 1:1	KA-503	0
CHECKED	20-01-94			
APPROVED	10-02-94			

REINFORCEMENT BAR SCHEDULE (Steel Grade 60)					
ITEM NO.	BAR DIA (mm)	BAR SHAPE (MEASURES IN METER)	NOS.	CUTTING LENGTH (m)	WEIGHT (kg)
1	25 (1")	_____	30	10.00	1,182.0
2	25 (1")	_____	15	5.00	295.5
3	9.5 (3/8")			125.00	69.4
4	50 x 4 mm		28	—	35.2
TOTAL WEIGHT PER PILE					1,582.1
TOTAL WEIGHT FOR 20 NOS. BORED PILES (L = 20 m)					31,642 kg

REINFORCEMENT BAR SCHEDULE (Steel Grade 60)					
ITEM NO	BAR DIA (mm)	BAR SHAPE (MEASURES IN METER)	NOS.	CUTTING LENGTH (m)	WEIGHT (kg)
1	25 (1")		15	10.00	591.0
2	—	—	—	—	—
3	9.5 (3/8")			62.50	34.7
4	50 x 4 mm		16	—	20.1
TOTAL WEIGHT PER PILE					645.8
TOTAL WEIGHT FOR 9 NOS. BORED PILES (L = 10 m)					5,812.2 kg

MATERIAL SCHEDULE-STEEL TUBE LINING				
dia:508x6mm, Steel grade St 37				
LOCATION PILE NO	LENGTH OF STEEL TUBE LINING (m)	NOS	WEIGHT/ NO (kg)	TOTAL WEIGHT (kg)
1b, 2a/ b to 5a/ b	4.0	9	297.2	2,674.8
6a/ b to 10a/ b	6.0	10	445.7	4,457.0
11a/ b to 15a/ b	10.0	10	742.8	7,428.0
TOTAL				14,559.8

- NOTES:
- All measurements in millimeter, except shown otherwise.
 - Levels refer to ± 0.00 m PWD.
 - Reinforcing steel grade 60, ASTM A-615, deformed bars.
 - Concrete to be placed by tremie pipe method (underwater concrete). Minimum cement content 400 kg/m³ ready mixed concrete. Aggregate size max 32mm (only crushed stone material). Water-cement ratio max 0.6.
 - Permanent steel tube lining of steel grade St 37 or equivalent. Individual lengths and butt joints as per Contractor's requirement. Diameter to be adjusted to Contractor's requirement.
 - Reference Drawings:
KA - 402/11 Bored Pile Production Report
KA - 504 Pile Installation Plan

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

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BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM

SHREE KIRAN ENG. & DES. W&A, DORTMUND/GERMANY

COMPAGNIE MATERIALE DU BORD, LYON/FRANCE

PROF. DR. LACROIX/PAULIN, BRUSSELS/BELGIUM

DR. GUY/RODOLPH, DRESDEN/GERMANY

DR. GUY/RODOLPH, DRESDEN/GERMANY

By association with:

BANGLADESH ENGINEERING & TECHNOLOGICAL SERVICES LTD (BETS)

DR. GUY/RODOLPH, DRESDEN/GERMANY

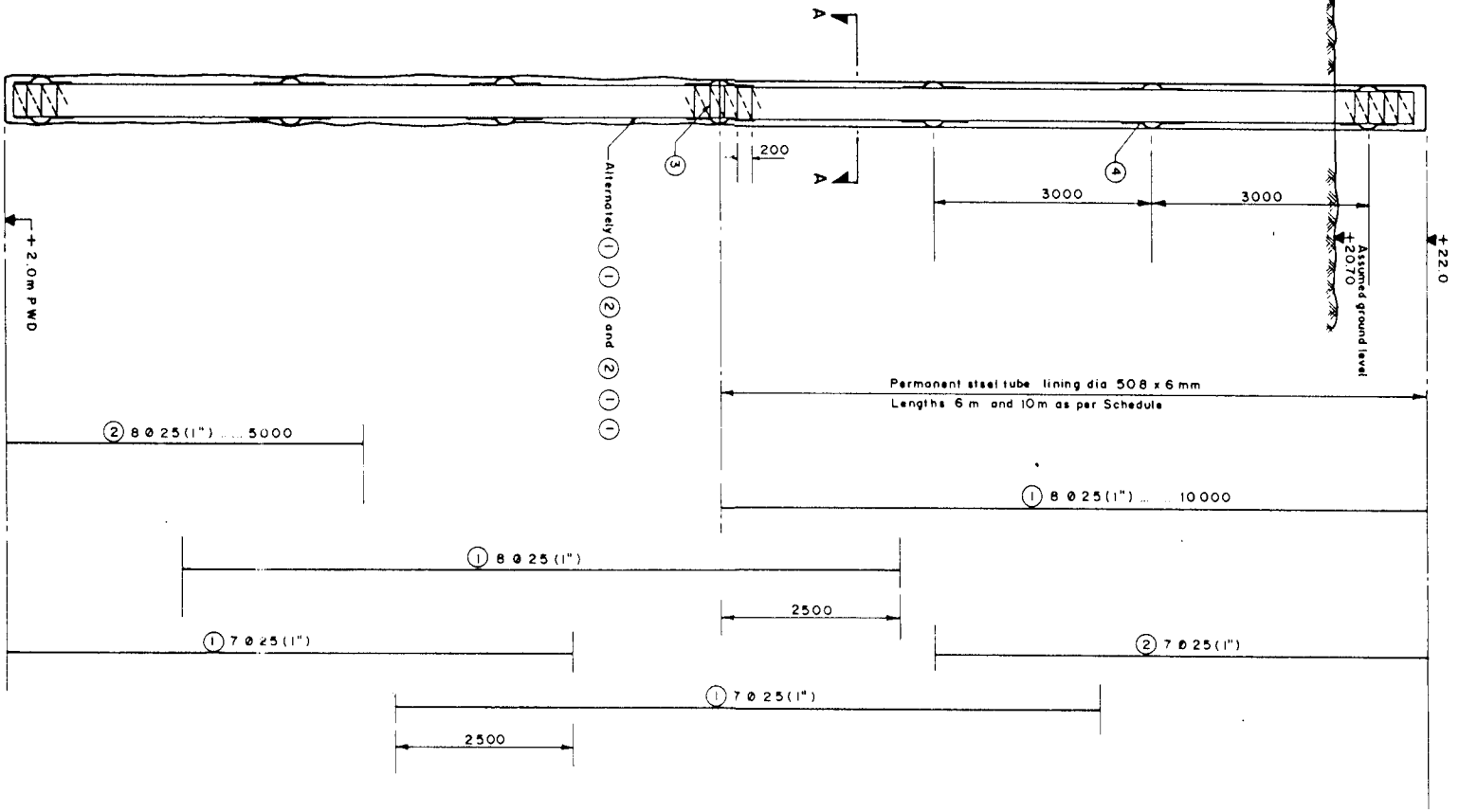
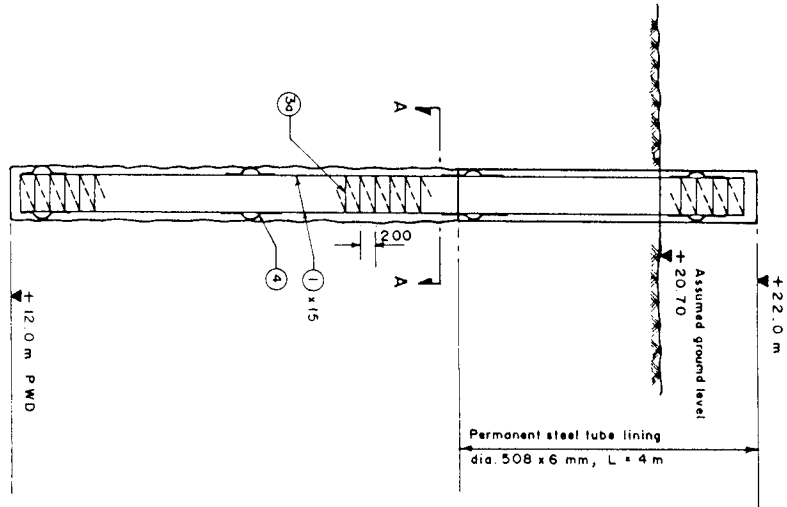
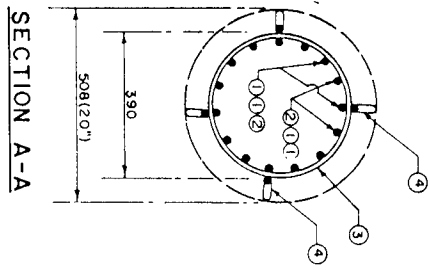
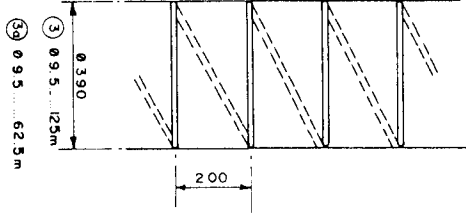
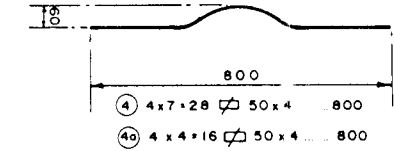
TEST SITE 1 - KAMARJANI

GROYNE G - B

IN-SITU CONCRETE PILE DIA. 508mm (20")

(BORED PILE)

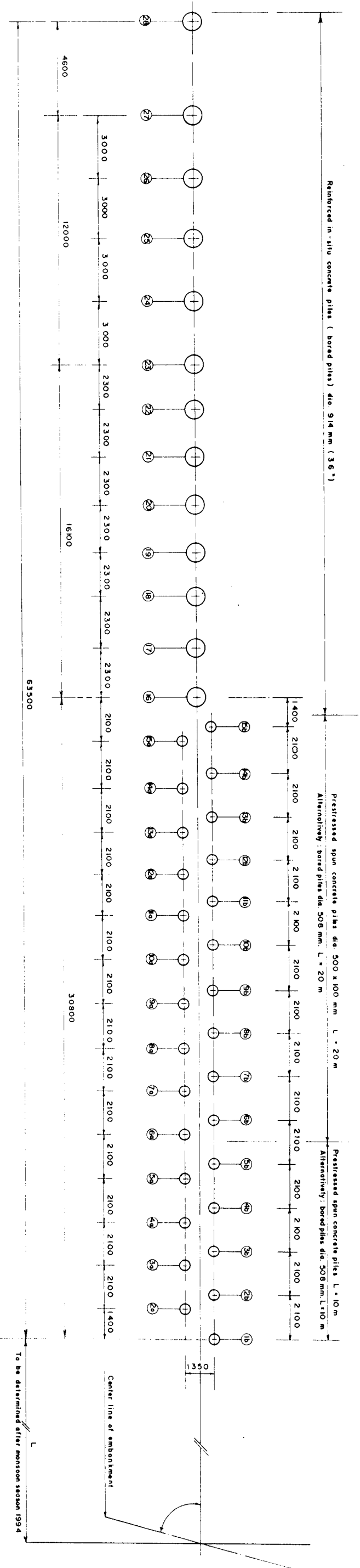
NAME	DATE	SCALE	DRAWING NO.	REVISION
K.M.A. TALIM	09-02-94	1:50, 1:10	KA-503/All	0
CHECKED	10-02-94			
APPROVED	10-02-94			



BORED PILE L = 20 m

BORED PILE L = 10 m

DRAWING PHOTOREDUCTION BY 50%



PLAN
Scale 1:100

REINFORCED IN-SITU CONCRETE PILE SCHEDULE					
Location No.	Nos	Diameter m m	Head level (m PWD)	Tip level (m PWD)	Pile length m
16 to 22	7	914	+22.00	± 0.0	22.00
23 to 26	4	914	+22.00	± 0.0	22.00
27, 28	2	914	+22.00	± 0.0	22.00
Total	13	—	—	—	286.00

PRESTRESSED SPUN CONCRETE PILE SCHEDULE					
Location No.	Nos.	Diameter m m	Head level (m PWD)	Tip level (m PWD)	No. of Joints of Pile length m
26 to 54	4	500	+22.00	+12.00	—
16 to 56	5	500	+22.00	+12.00	—
60 to 154	10	500	+22.00	+2.00	1
66 to 156	10	500	+22.00	+2.00	1
Total	29	—	—	—	20

NOTES

- Measurements in millimeters, except shown otherwise
- Levels refer to ± 0.0 m PWD
- Center line of Groyne G-B to be determined finally after monsoon season in 1994
- Construction of reinforced in-situ concrete piles as per Specifications, Subsection 1200 and Drawing KA-502 / KA-503 / AII
- Butt joint of prestressed spun concrete piles to be carried out as per Specifications, Subsection 1526 and Drawing KA-503
- Reference Drawings:
KA-501 Groyne G-B
General Arrangement
KA-502 In-situ Concrete Pile dia. 914 mm (36") (Bored Pile)
KA-503 Prestressed Spun Concrete Pile Dia 500 x 100 mm
KA-503/AII In-situ Concrete Pile dia. 508 mm (20") (Bored Pile)

DRAWING PHOTOREDUCTION BY 50%

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT & FLOOD CONTROL
FLOOD PLAN COORDINATION ORGANIZATION (FPCCO)

BANK PROTECTION PILOT PROJECT FAP-21

CONSULTING CONSORTIUM
BANK PROTECTION PILOT PROJECT FAP-21
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TEST SITE 1 - KAMARJANI

GROYNE G-B
PILE INSTALLATION PLAN

NAME	DATE	SCALE	DRAWING NO.	REVISION
F. HOSSAIN	08-12-93	1:100	KA-504	0
CHECKED	26-01-94			
APPROVED	10-02-94			

