PEOPLE'S REPUBLIC OF BANGLADESH

DEPARTMENT OF DISASTER MANAGEMENT (DDM)
MINISTRY OF DISASTER MANAGEMENT AND RELIEF (MoDMR)

THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH

FINAL REPORT

VOLUME II

APPENDICES

JUNE 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

CTI ENGINEERING INTERNATIONAL CO., LTD.
INGEROSEC CORPORATION
ORIENTAL CONSULTANTS GLOBAL CO., LTD

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THE PREPARATORY SURVEY ON
THE CAPACITY ENHANCEMENT ON
DISASTER RISK REDUCTION,
EMERGENCY RESPONSE AND RECOVERY PROJECT

FINAL REPORT

List of Reports

Volume I	:	MainReport
Volume II	:	Appendices
Volume III-1	:	Guidelines of Operation of Disaster Recovery Fund
Volume III-2	:	Manual of Operation of Disaster Recovery Fund

Exchange Rate

1 US$ = 77.8 BDT = 120.2 JPY

1 BDT = 1.55 JPY

November 2015

Source : United Nations (http://www.un.org/Depts/Cartographic/english/htmain.htm)

● Soil investigation areas by JICA

Source : The Project for Capacity Development of Management for Sustainable Water Related Infrastructure (JICA)

LOCATION MAP

THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT

FINAL REPORT

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ACRONYMS AND ABBREVIATIONS

Abbreviations	Official Name
AADT	Annual Average Daily Traffic
ACE / ADCE	Additional Chief Engineer
ADB	Asian Development Bank
ADG	Additional Director General
ADP	Annual Development Programme
ADRA	Adventist Development and Relief Agency International
ADSL	Associates for Development Services Limited
AGO	Accounting General Office
APD	Assistant Project Director
ARAP	Abbreviated Resettlement Action Plan
AusAID	Australian Agency for International Development
BBS	Bureau of Statistics
BCCRF	Bangladesh Climate Change Resilience Fund
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BCPR	Bureau for Crisis Prevention and Recovery (UNDP)
BCR	Benefit-Cost Ratio
BDP2100	Bangladesh Delta Plan 2100
BDT	Bangladesh Taka
BECA	Bangladesh Environmental Conservation Act
BMD	Bangladesh Meteorological Department
BPATC	Bangladesh Public Administration Training Centre
BRAC	Building Resources Across Communities
BWDB	Bangladesh Water Development Board
CAAB	Civil Aviation Authority of Bangladesh
CAT-DDO	Catastrophe Deferred Drawdown Option
CBC	Construction of Bridges & Culverts
CBN	Cost of Basic Needs
CC	Climate Change
CCA	Climate Change Agreement
CC-Block	Cement Concrete Block
CCC	Climate Change Cell
CCDMC	City Corporation Disaster Management Committee
CCKN	Climate Change Knowledge Network
CCTF	Climate Change Trust Fund
CDMP	Comprehensive Disaster Management Programme
CDSP-IV	Char Development and Settlement Project-IV
CE	Chief Engineer
CEGIS	Center for Environmental and Geographic Information Services
CEIP	Coastal Embankment Improvement Project
CHT	Chittagong Hill Tracts
CI	Corrugated Iron
CMCS	Construction of Multipurpose Cyclone Shelters
CMFS	Construction of Multipurpose Flood Shelters
CO	Computer Operator

Abbreviations	Official Name
CP	Contract Package
CPI	Consumer Price Index
CPP	Cyclone Preparedness Programme
CPPIB	Cyclone Preparedness Program Implementation Board
CPTU	Central Procurement Technical Unit
CSG	Cemented Sand and Gravel
CTII	CTI Engineering International Co., Ltd.
DAE	Department of Agriculture Extension
DC	Deputy Commissioner
DCF	Discounted Cash Flow
DDM	Department of Disaster Management
DDMC	District Disaster Management Committee
DEPC	Department of Environmental Pollution Control
DEX	Direct Execution
DFID	Department for International Development
DF/R	Draft Final Report
DG	Director General
DGHS	Directorate General of Health Services
DIDB	Disaster Incident Database
DLS	Department of Livestock Services
DMA	Disaster Management Act
DMB	Disaster Management Bureau
DMCs	Disaster Management Committees
DMIC	Disaster Management Information Center
DMIN	Disaster Management Information Network
DMRD	Disaster Management & Relief Division
DNA	Disaster Needs Assessment
DNCC	Dhaka North City Corporation
DSCC	Dhaka South City Corporation
DoE	Department of Environment
DoF	Department of Fisheries
DoF	Department of Forest
DPD	Deputy Project Director
DPHE	Department of Public Health Engineering
DPP	Development Project Proposal
DRR	Disaster Risk Reduction
DRF	Disaster Recovery Fund
DRMIS	Disaster Risk Management Information System
DRRO	District Relief and Rehabilitation Officer
EBBIP	Eastern Bangladesh Bridge Improvement Project
ECAs	Ecologically Critical Areas
ECC	Environmental Clearance Certificate
ECNEC	Executive Committee of National Economic Council
ECR	Environmental Conservation Rules
ECRRP	Emergency 2007 Cyclone Recovery and Restoration Project
EED	Education Engineering Department

Abbreviations	Official Name
EGPP	Employment Generation Program for the Poorest
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Monitoring Plan
E/N	Exchange of Notes
EOC	Emergency Operation Center
EPAC	Earthquake Preparedness and Awareness Committee
EPWAPDA	East Pakistan Water and Power Development Authority
EPZ	Export Processing Zone
ERD	Economic Relations Division
ERF	Early Recovery Facility
ESMS	Environmental and Social Management System
EU	European Union
FAO	Food and Agriculture Organization
FAP	Flood Action Plan
FD	Forest Department
FFW	Food for Work
FFWC	Flood Forecasting & Warning Center
FIDC	Forest Industries Development Corporation
FIDIC	International Federation of Consulting Engineers
FIRR	Financial Internal Rate of Return
F/R	Final Report
F/S	Feasibility Study
FSCD	Bangladesh Fire Service and Civil Defence
FY	Fiscal Year
FYP	Five Year Plan
GC	Governing Council
GDP	Gross Domestic Product
G.I.	Galvanized Iron
GIS	Geographic Information System
GOB	Government of Bangladesh
GOJ	Government of Japan
GLIDE	Global Disaster Identifier Number
GPS	Global Positioning System
GR	Gratuitous Relief
HAPIG	Humanitarian Assistance Programme Implementation Guideline
HBB	Harringbone Brick
HF	High Frequency
HFA	Hyogo Framework for Action
HIES	Household Income and Expenditure Survey
HP	Horse Power
HQ	Headquarter
IA	Implementing Agency
ICB	International Competitive Bidding
ICT	Information and Communication Technology
IDA	International Development Association

Abbreviations	Official Name
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
IFRC	International Federation of Red Cross and ed Crescent Societies
IMD	Indian Meteorological Department
IMDMCC	Inter-Ministerial Disaster Management Coordination Committee
IMED	Implementation Monitoring and Evaluation Division
IMF	International Monetary Fund
INGO	International Non-governmental Organizations
IPCC	Intergovernmental Panel on Climate Change
IRI	International Roughness Index
IRR	Internal Rate of Return
ISEC	INGÉROSEC Corporation
ISF	Informal Settler Families
ISO	International Organization for Standardization
IT	Information Technology
IT/R	Interim Report
IUCN	International Union for Conservation of Nature and Natural Resources
IWM	Institute of Water Modelling
JICA	Japan International Cooperation Agency
JICE	Japan International Cooperation Center
JMREMP	Jamuna Meghna River Embankment Mitigation Project
JPY	Japanese Yen
JV	Joint Venture
L/A	Loan Agreement
LCB	Local Competitive Bidding
LCS	Labor Contracting Society
LGD	Local Government Division
LGED	Local Government Engineering Department
LGI	Local Government Institutions
M&E	Monitoring and Evaluation
MBA	Master of Business Administration
MC	Management Committee
ME&DD	Mechanical Equipment & Dredger Directorate
MDGs	Millennium Development Goals
MDRU	Movable and Deployable ICT Resource Unit
MFI	Microfinance Institutions
MIM	Monitoring and Information Management
MMT	Mobile Maintenance Team
MoDMR	Ministry of Disaster Management and Relief
MoEF	Ministry of Environment and Forest
MoF	Ministry of Finance
MoFDM	Ministry of Food and Disaster Management
MoFOOD	Ministry of Food
MoHA	Ministry of Home Affairs
MoH&FW	Ministry of Health and Family Welfare
MoHPW	Ministry of Housing and Public Works

Abbreviations	Official Name
MoL	Ministry of Land
MoLGRDC	Ministry of Local Government, Rural Development and Cooperatives
MoP	Ministry of Planning
MoWR	Ministry of Water Resources
MRA	Microcredit Regulatory Authority
MRFBERMP	Main River Flood and Bank Erosion Risk Management Program
MRVA	Multi-hazard Risk Vulnerability Assessment
MT	Metric Tonne
NCMCCR	National Crisis Management Center and Control Room
NDMC	National Disaster Management Council
NDMAC	National Disaster Management Advisory Committee
NDRCC	National Disaster Response Coordination Centre
NDRCG	National Disaster Response Coordination Group
NEMAP	National Environment Management Action Plan
NEP	National Environmental Policy
NES	National Environmental Strategy
NETIS	New Technology Information System
NEX	National Execution
NGO	Non-governmental Organizations
NHA	National Housing Authority
NPDM	National Plan for Disaster Management
NPDRR	National Platform for Disaster Risk Reduction
NPV	Net Present Value
NWMP	National Water Management Plan
NWPo	National Water Policy
O&M	Operation and Maintenance
OCG	Oriental Consultants Global Co., Ltd.
ODA	Official Development Assistance
OSS	Office Support Staff
P&D	Planning and Development
PAP	Project Affected People
PARISHAD	Parishad
PC	Pre-stressed Concrete
PCMU	Project Coordinating and Monitoring Unit
PD	Project Director
PDB	Power Development Board
PEC	Project Evaluation Committee
PESAROEAOD	Procurement of Equipment for Search & Rescue Operation for Earthquake & Other Disaster
PG/R	Progress Report
PIC	Project Implementation Committee
PIO	Project Implementation Officer
PIU	Project Implementation Unit
PKSF	Palli Karma-Sahayak Foundation
PO	Partner Organizations
PPR	Public Procurement Rules

Abbreviations	Official Name
PQ	Pre-Qualification
PRS	Poverty Reduction Strategies
PRSP	Poverty Reduction Strategy Paper
PSB	Portable Steel Bridge
PSC	Project Steering Committee
PSTN	Public Switched Telephone Network
PWD	Public Works Datum
RAC	Regional Accounting Center
RAJUK	Rajdhani Unnayan Kartripakka
RAMS	Road Asset Management System
RC	Reinforced Concrete
RDEC	Rural. Development Engineering Center
REB	Rural Electrification Board
RERMP	Rural Employment & Road Maintenance Programme
RHD	Road and Highway Department
RMB	Rénmínbì
RMF	Risk Management Framework
RMRSU	Road Maintenance and Road Safety Unit
RSDMS	Road & Structure Database Management System
SAARC	South Asian Association for Regional Cooperation
SAE	Senior Assistant Engineer:
SAIWRPMP	South-west Area Integrated Water Resource Planning and Management Project
SCC	Sylhet City Corporation
SE	Superintending Engineer
SFYP	Sixth (Seventh) Five Year Plan
SIDA	Swedish International Development Cooperation Agency
SI	Site Inspector
SIMS	Scheme Information Management System
SOD	Standing Orders on Disaster
SOP	Standard Operating Procedure
SPEC	Special Project Evaluation Committee
SPT	Standard Penetration Test
SSWR	Small Scaled Water Resource
STD	Standard Tendering Document
SWC	Storm Warning Centre
TK	Taka
TOR	Terms of Reference
TR	Test Relief
TTC	Travel Time Cost
TU	Training Unit
UBSP	Urban Building Safety Project
UDMC	Union Disaster Management Committee
UHF	Ultra High Frequency
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund

Abbreviations	Official Name
UNO	Upazila Nirbahi Officer
UNV	United Nations Volunteers
URP	Urban Resilience Project
US$ / USD	United States Dollar
UzDMC	Upazira Disaster Management Committee
VGF	Vulnerable Grain Facility
VOC	Vehicle Operating Cost
V-SAT	Very Small Aperture Terminal
WARPO	Water Resources Planning Organization
WB	The World Bank
WFP	World Food Programme
WMA	Water Management Association
WMCA	Water Management Cooperation Association
WMF	Water Management Federation
WMIP	Water Management Improvement Project
WMOs	Water Management Organizations
XEN	Executive Engineer

Appendix 3

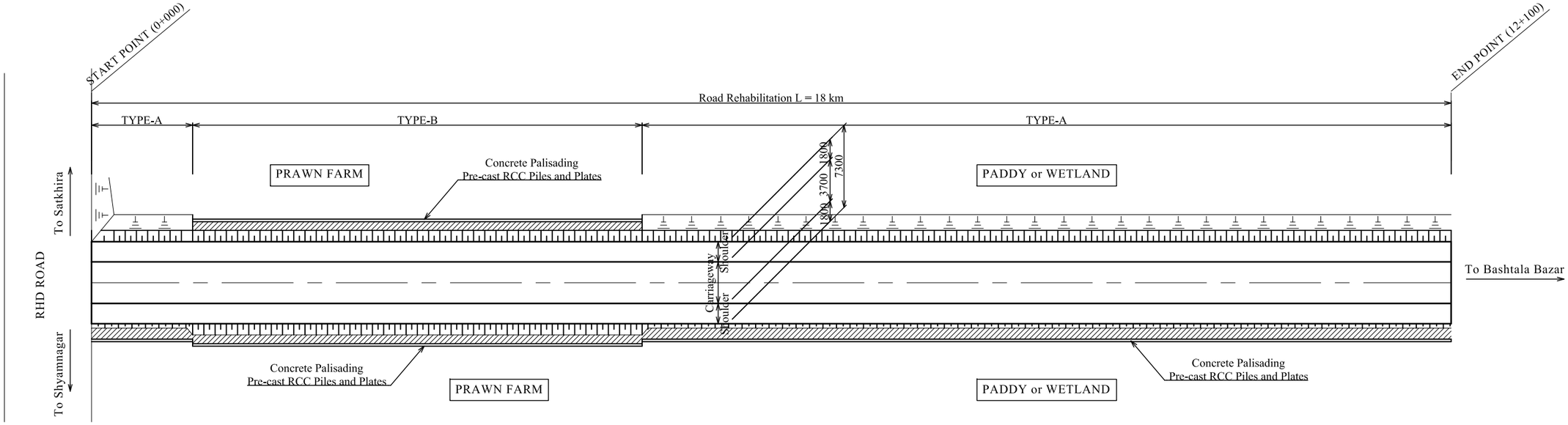
Preliminary Design Drawings for Component 1

LGED Part

Selected 3 Road Sub-projects for LGED

Code	District/ Upazila	Type	Road Length/ Width	Time of Disaster	Causes of Damage
HW1	Satkhira/ Kaliganj	Upazila	L=18.0km, W=5.5m	2008 flood and 2009 Aila	Slope scouring/erosion, settlement, wash out
HW13	Jhalokati/ Jhalokati Sadar	Upazila	L=3.0km, W=5.3m	2012 flood	Washout (0.5km)
HW16	Patuakhali / Patuakhali Sadar	Upazila*	L= 12.0km, W=5.5m	2007 Sidr	Slope erosion and failure (Embankment road)

HW-1



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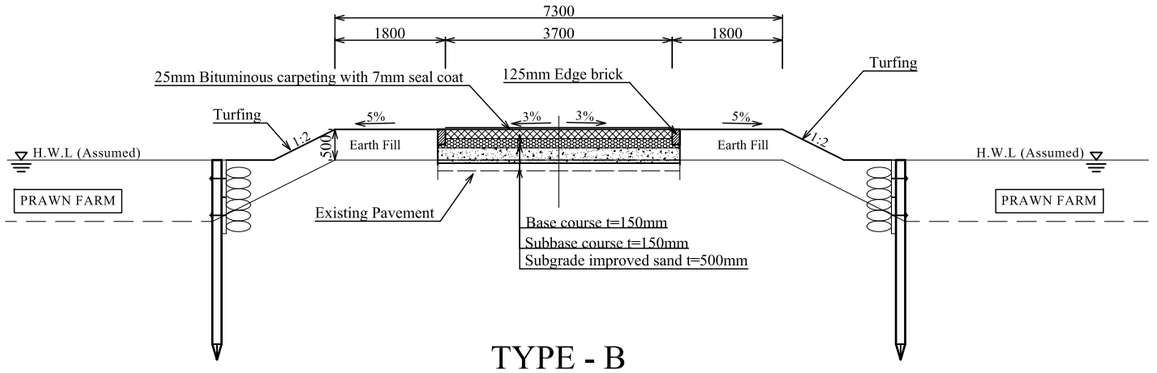

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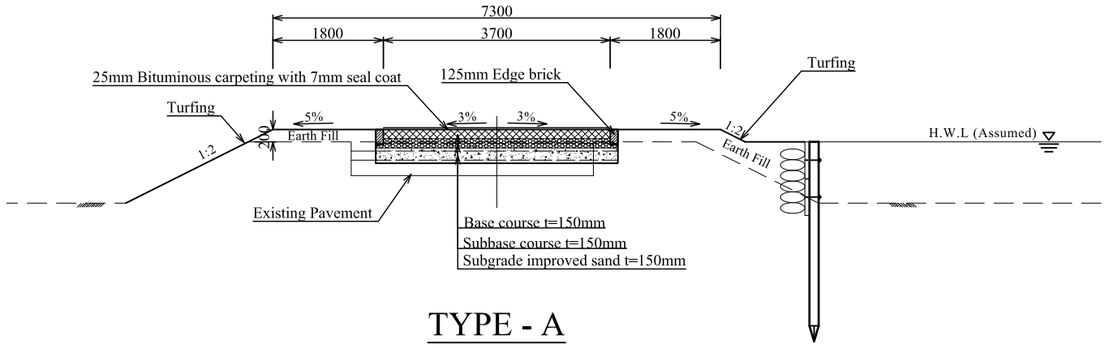

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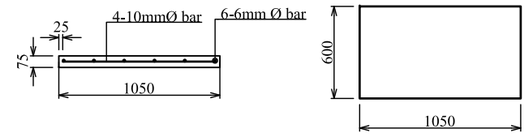
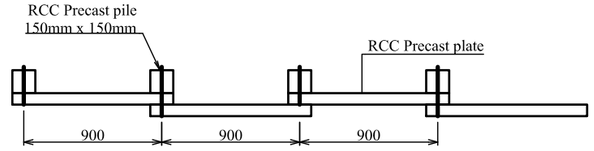


RCC Precast pile
150mm x 150mm



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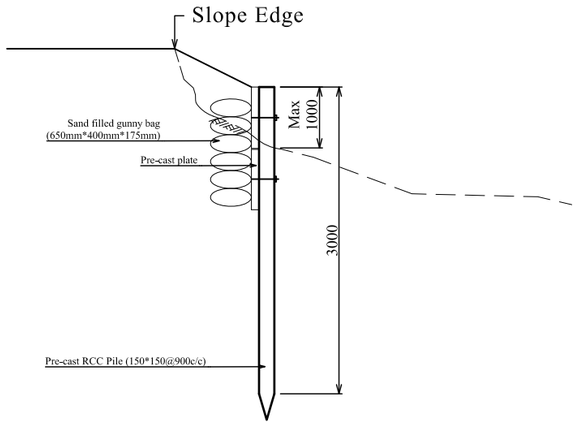

PRE-CAST PILE AND PLATE

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THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.1 : HW1 (287472010, Satkhira))

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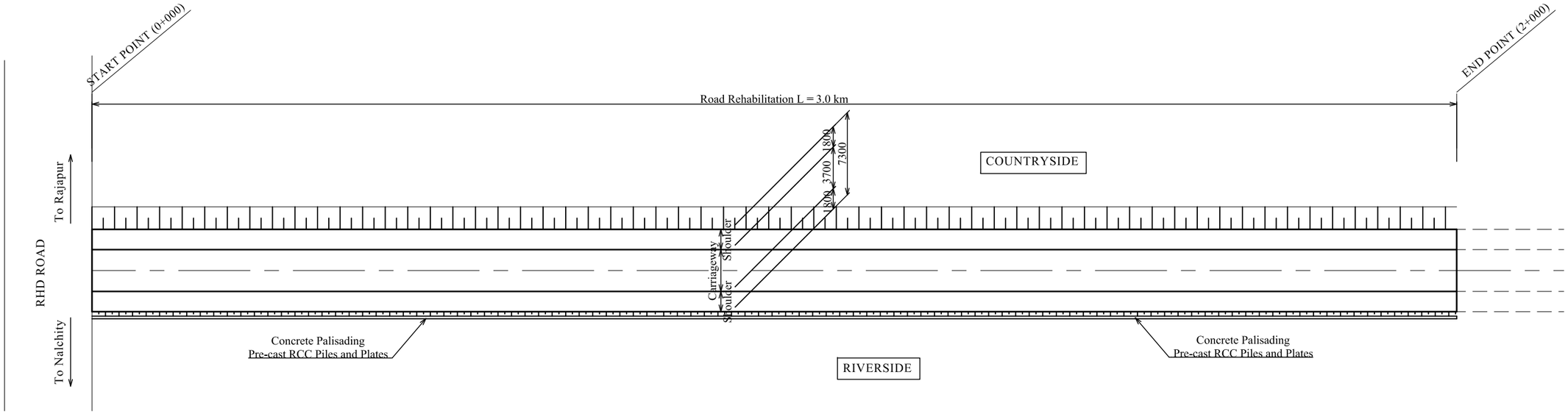

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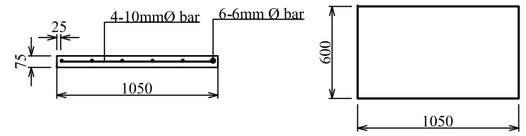

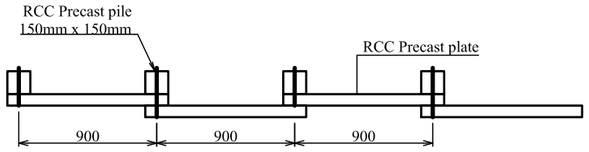

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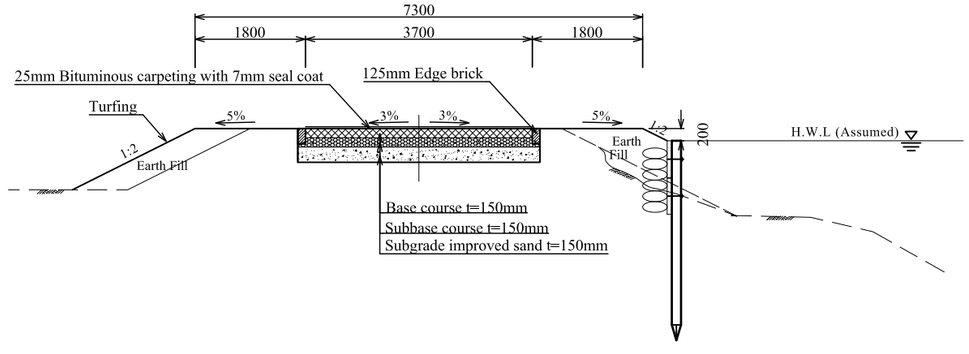

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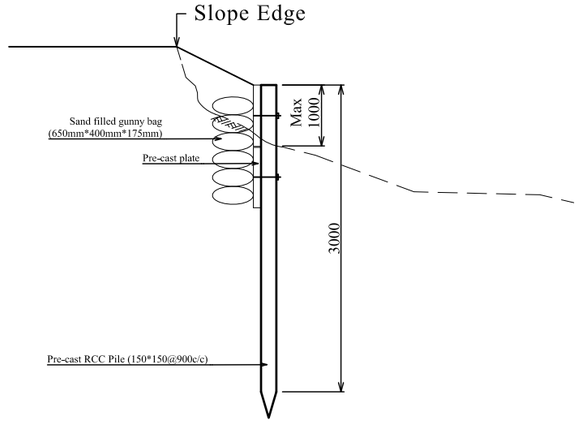

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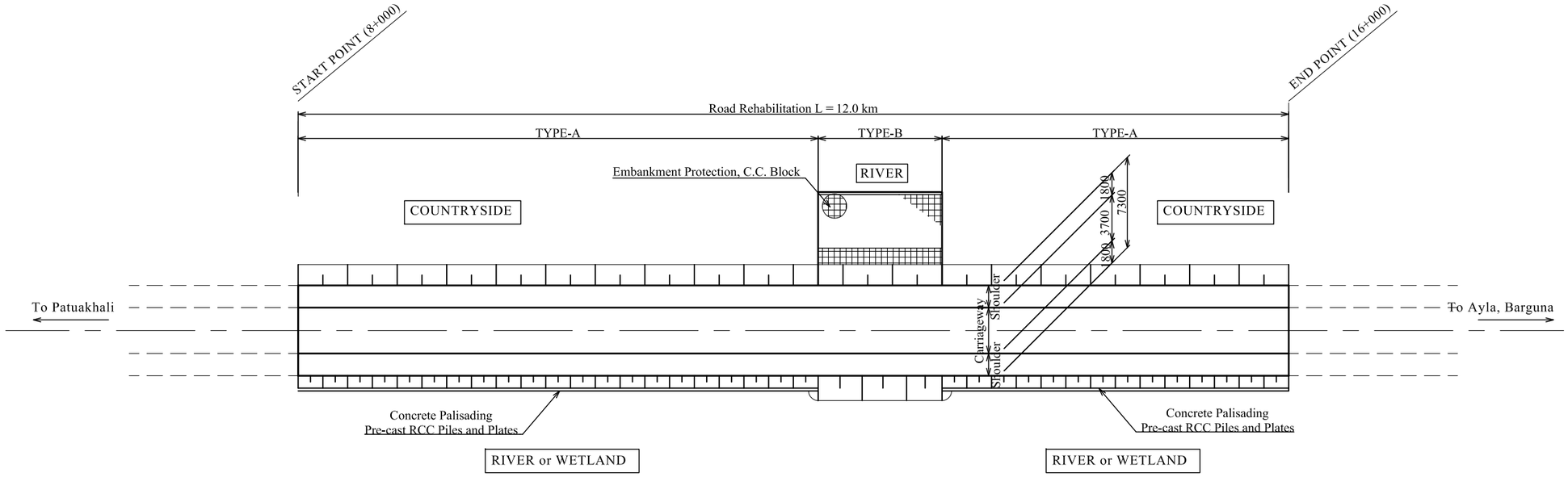

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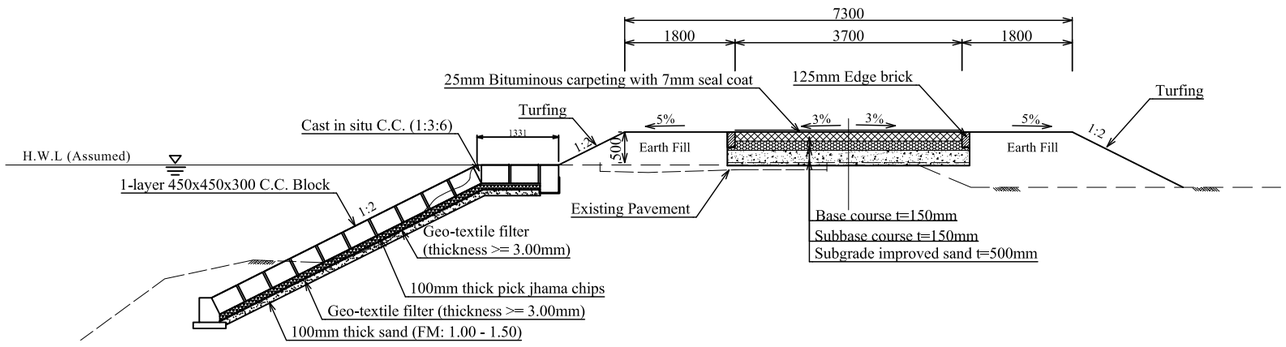

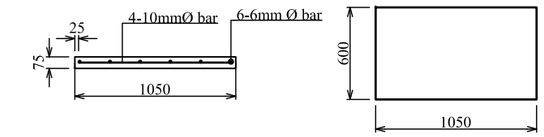

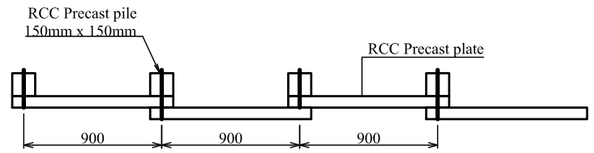

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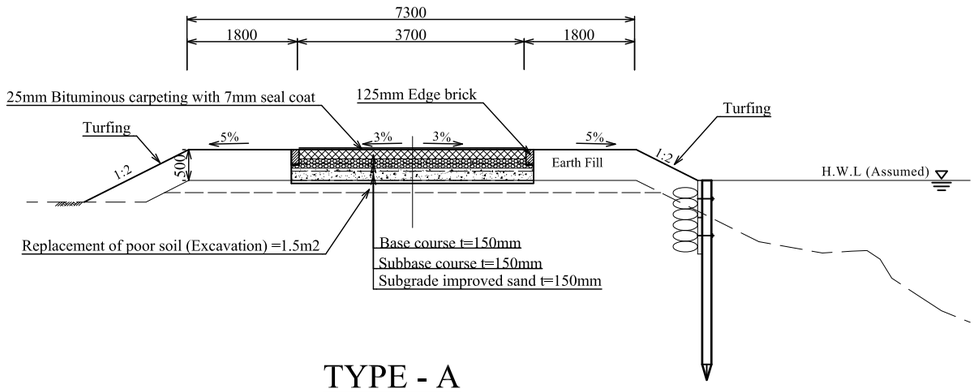

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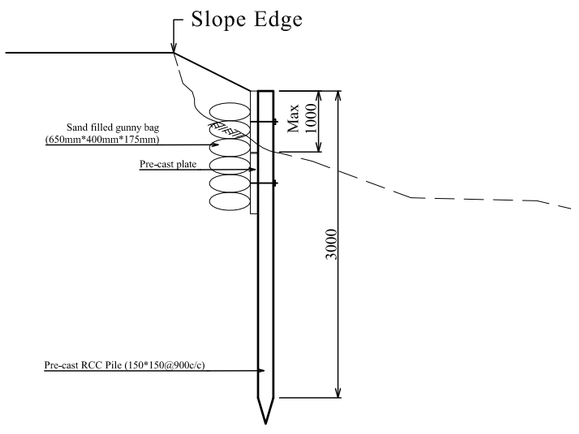

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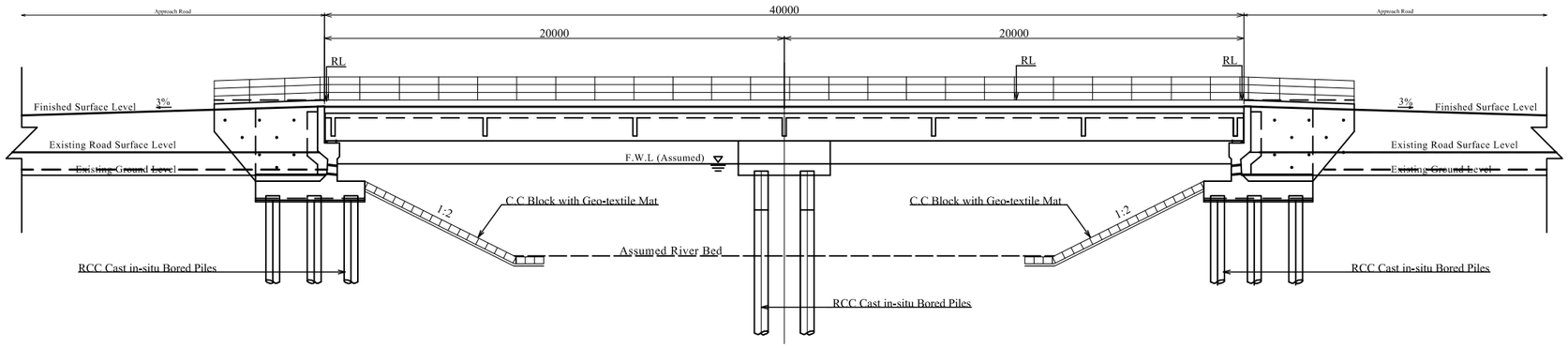
Selected 10 Road Sub-projects for LGED

Code	District/ Upazila	Type	Road Length/ Width	Time of Disaster	Causes of Damage
BR1	Bagerhat/ Bagerhat Sadar	Super: RC Slab Sub: Concrete	L=40m, W=5.35m	2007 Sidr、2009 Aila	Salt damage, settlement
BR2	Bagerhat/Mongla	Super: wooden planks Sub: Metal beams	L=30m, W=5.35m	2007 Sidr	Fatigue, Salt damage
BR3	Bagerhat/Mongla	Super: Bamboo Sub: Bamboo	L=51m, W=5.35m	2007 Sidr	No damage but substandard
BR4	Bagerhat/Mongla	Super: Wooden planks Sub: Metal beams	L=20m,W=5.35m	2007 Sidr	Fatigue, salt damage, collision
BR6	Jhalokati/Nalcity	Super: RC Slab Sub: Metal beams	L=20m,W=7.3m	2007 Sidr, 2009 Aila	Fatigue, salt damage, collision
BR11	Barguna/ Barguna Sadar	Super.: Wooden planks Sub: Metal beams	L=66m,W=7.3m	2007 Sidr	Fatigue, salt damage, collision
BR12	Bhola/Bhola Sadar	Super.: RC Slab Sub: Metal beams	L=96m,W=5.35m	2009 Aila	Collapsed (Not in use) due to flood

BR-1



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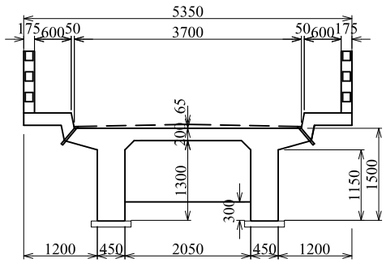

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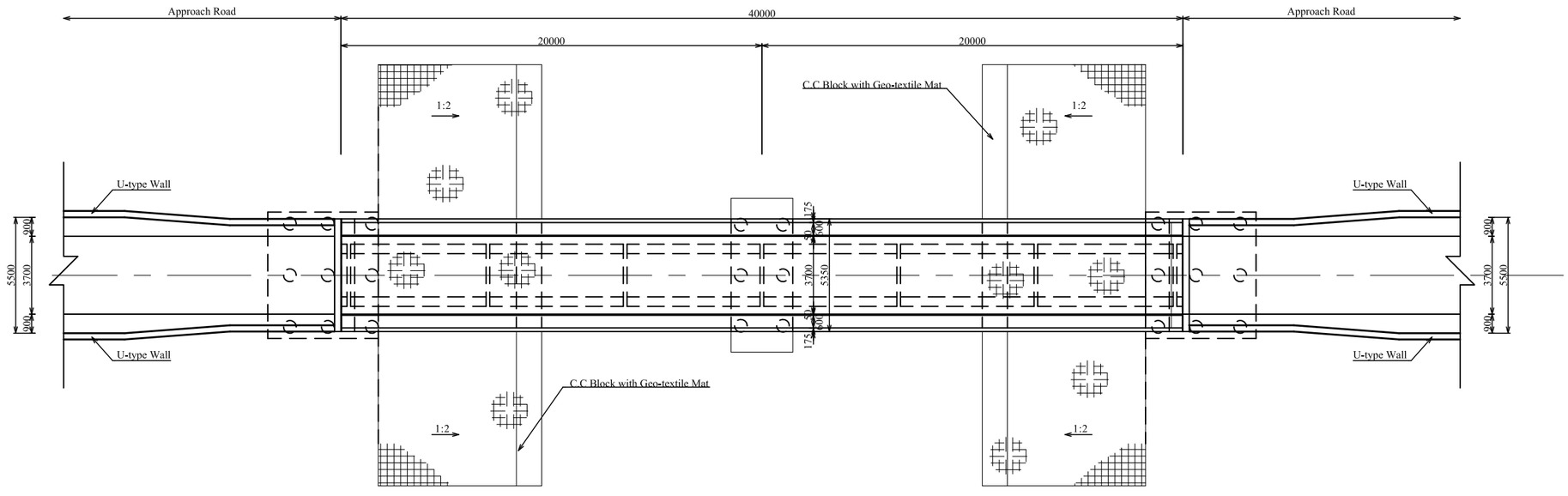

PLAN

GENERAL PLAN

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THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.9 : BR1 (Bagerhat, Sadar))

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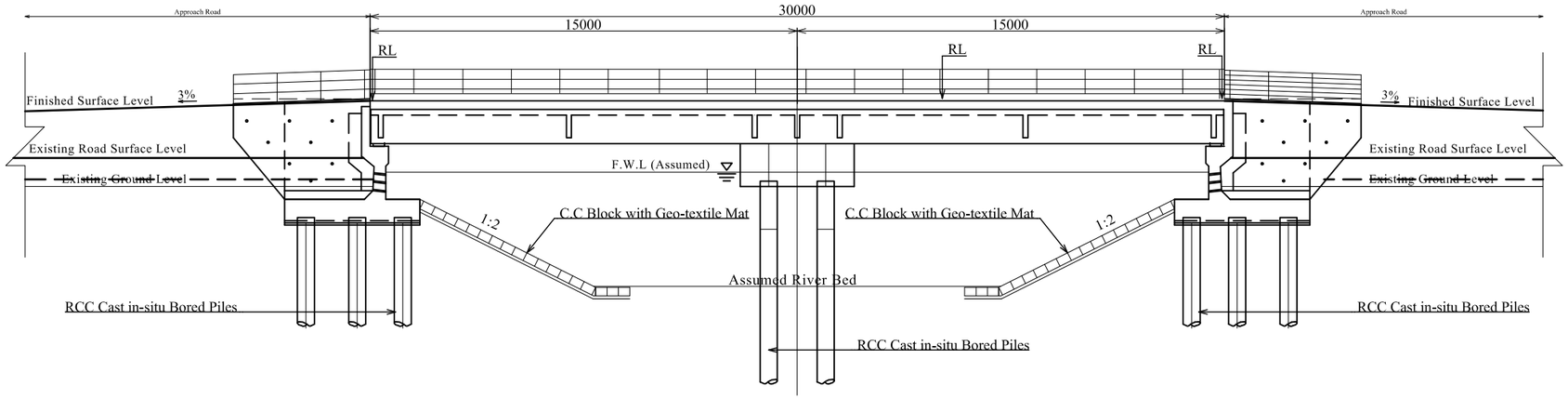

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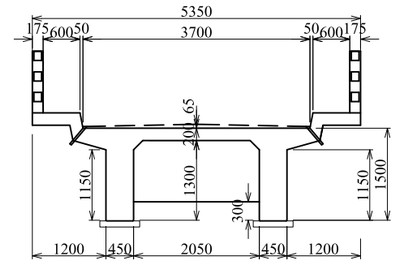

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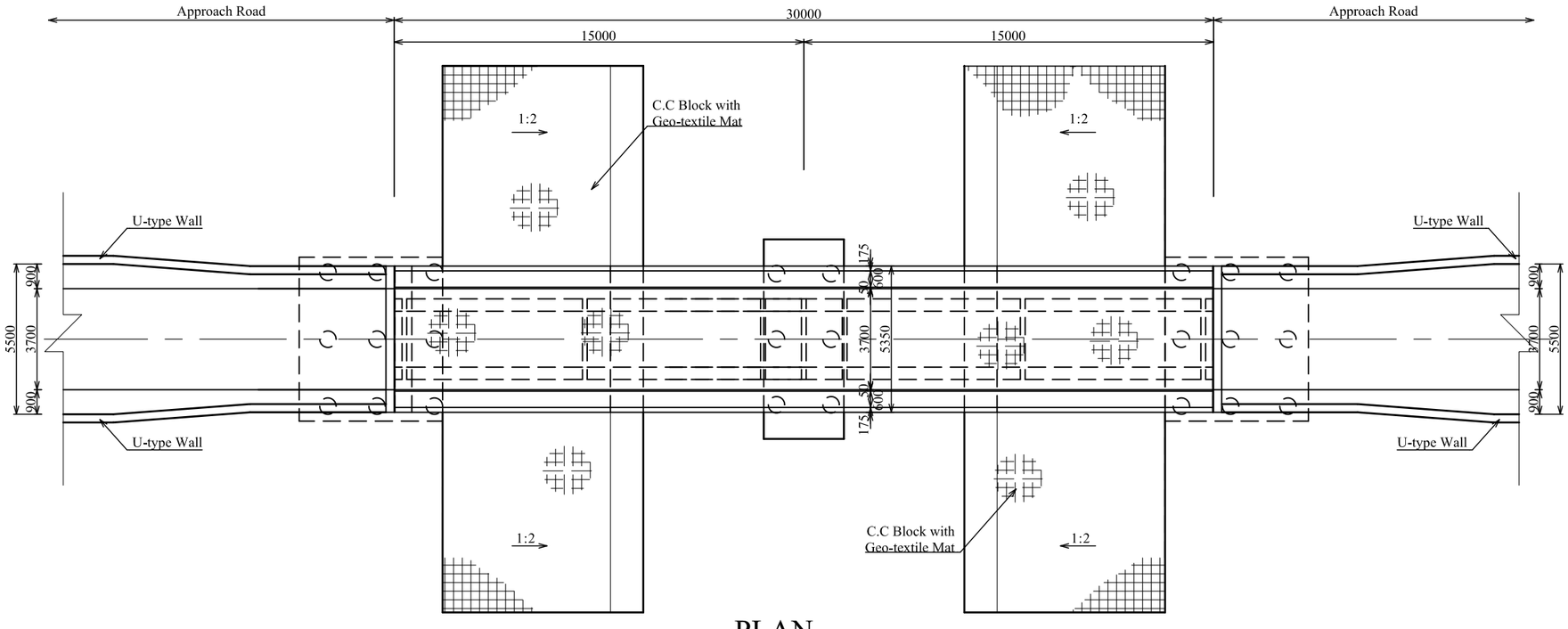

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GENERAL PLAN

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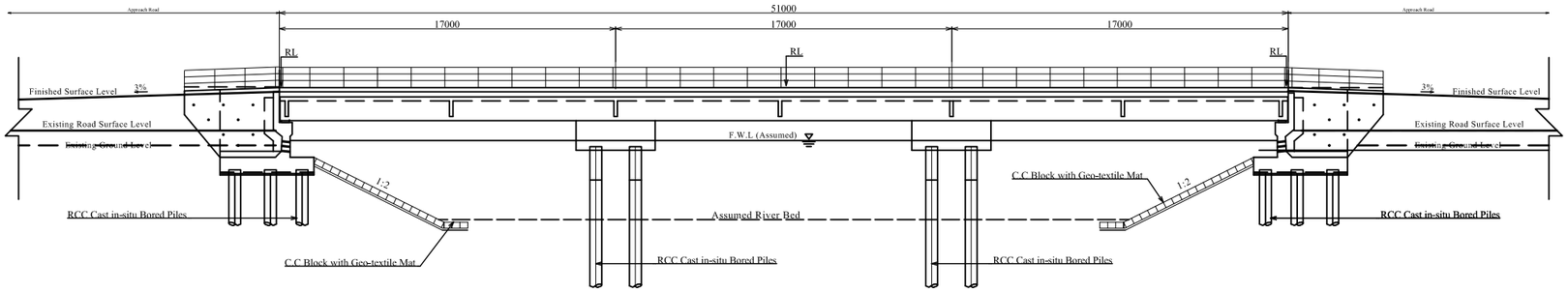

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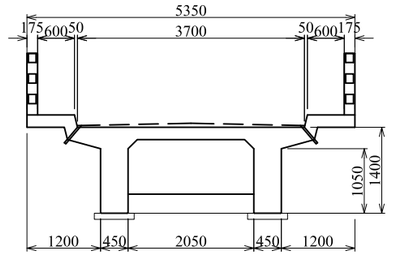
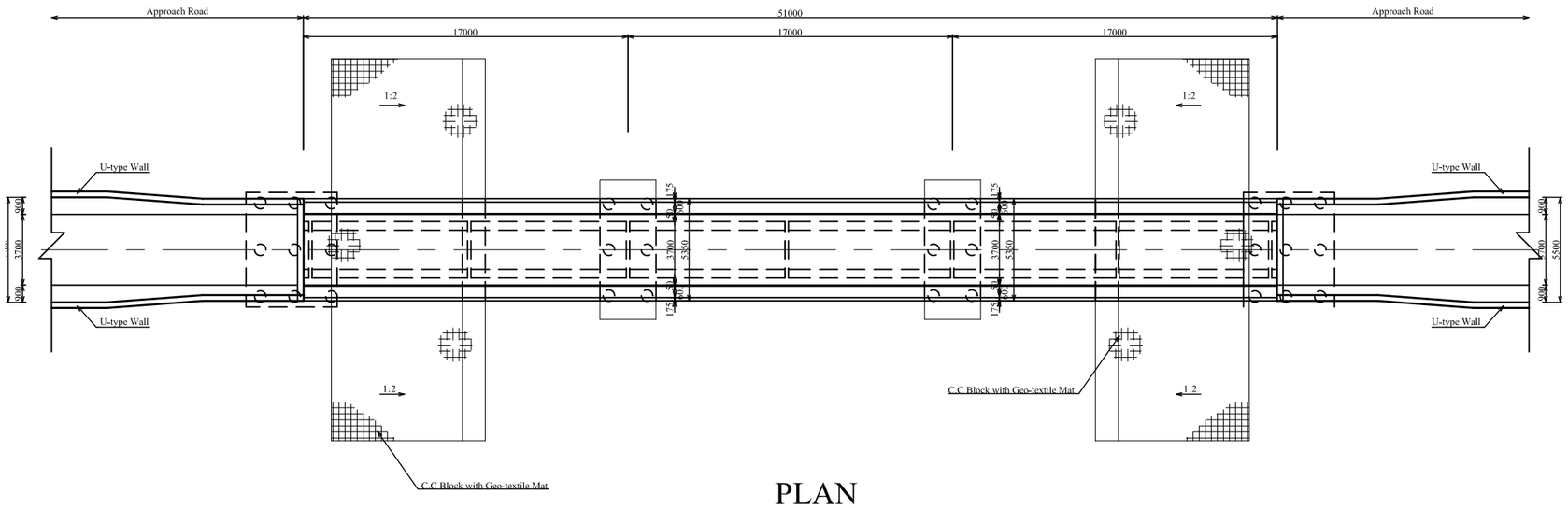


SECTION A-A

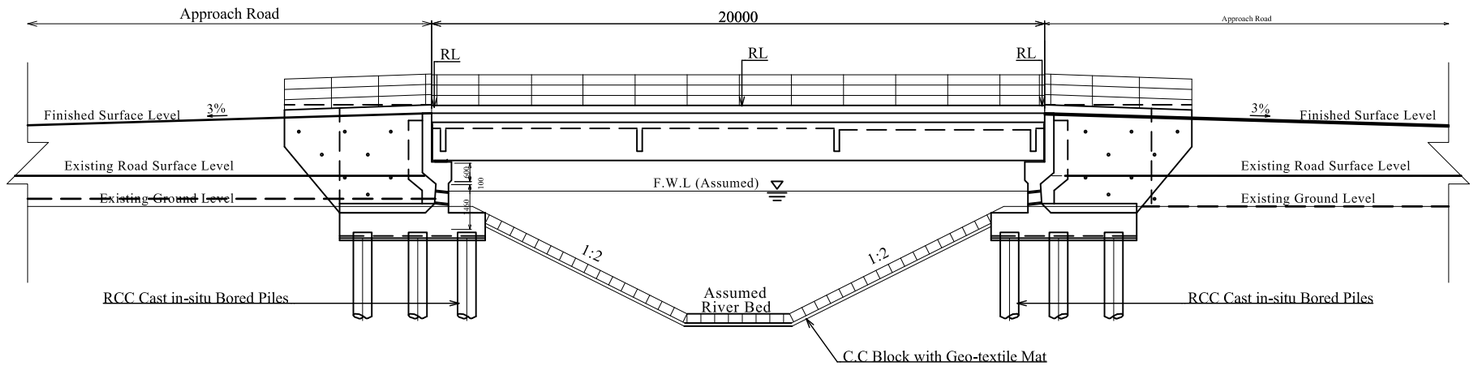


PLAN

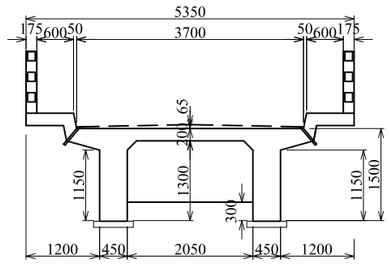
GENERAL PLAN

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL PLAN (NO.11 : BR3 (Bagerhat, Mongla))

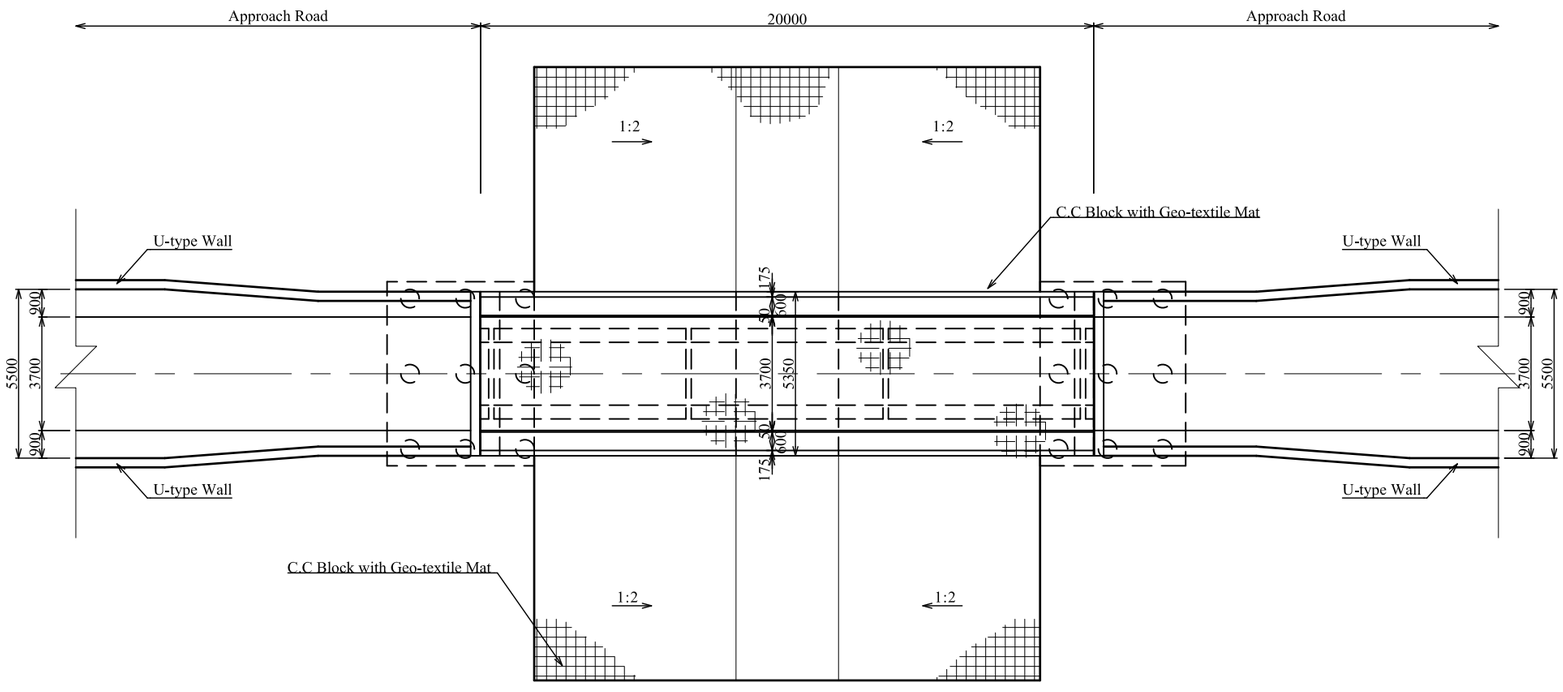
BR-4



ELEVATION



SECTION A-A

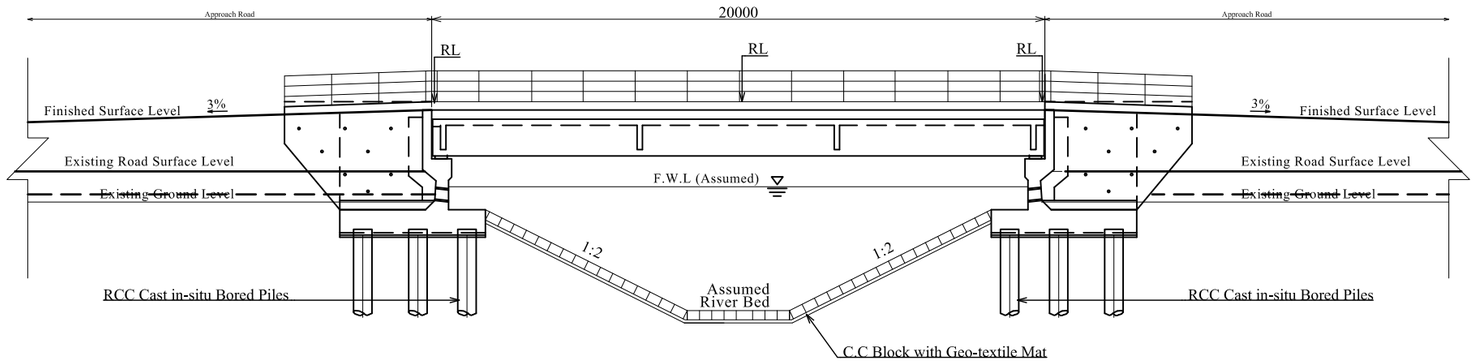


PLAN

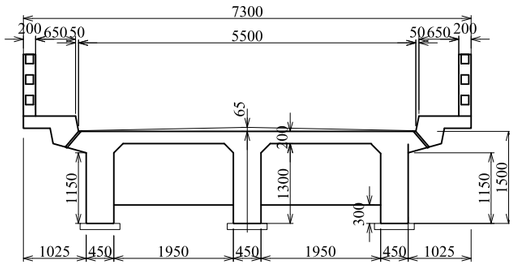
GENERAL PLAN

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL PLAN (NO.12 : BR4 (Bagerhat, Mongla))

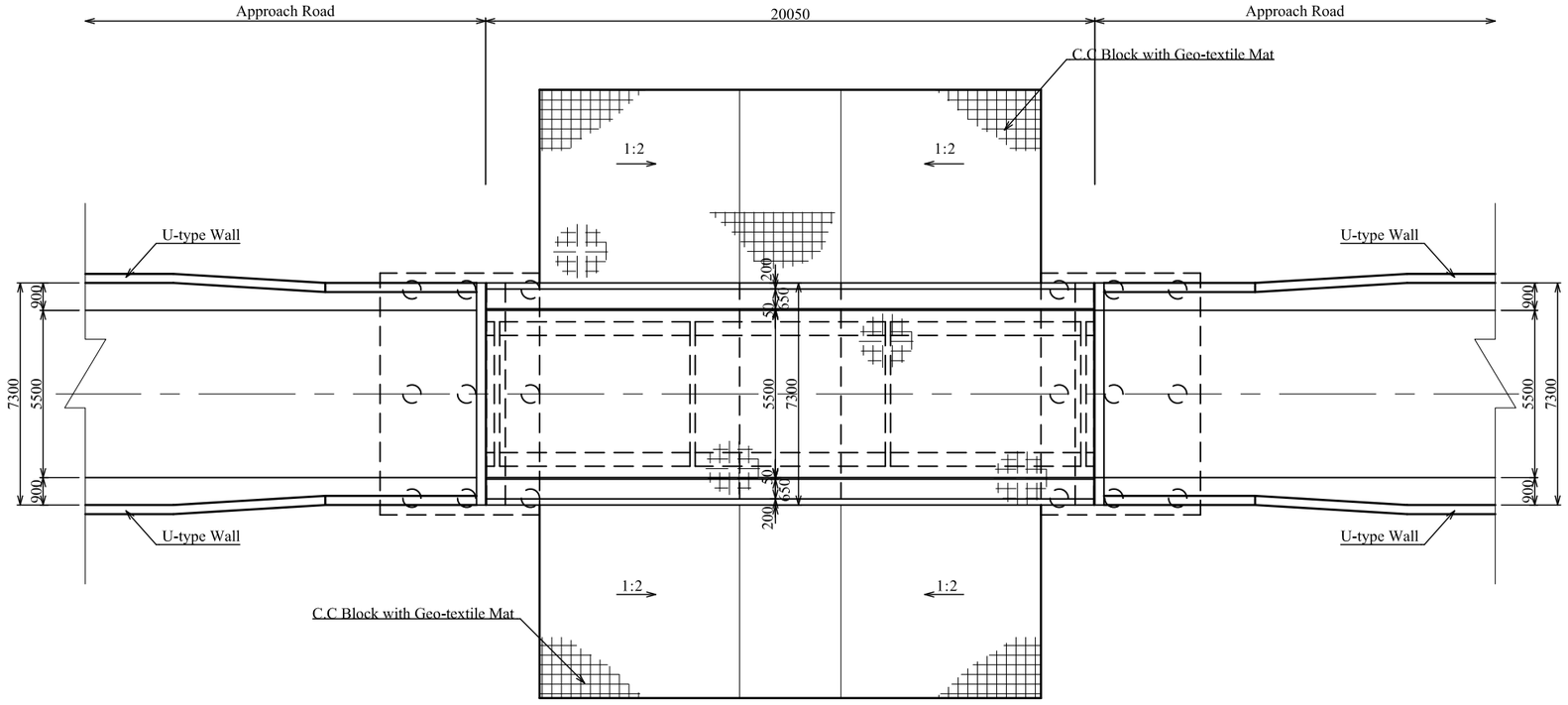
BR-6



ELEVATION



SECTION A-A

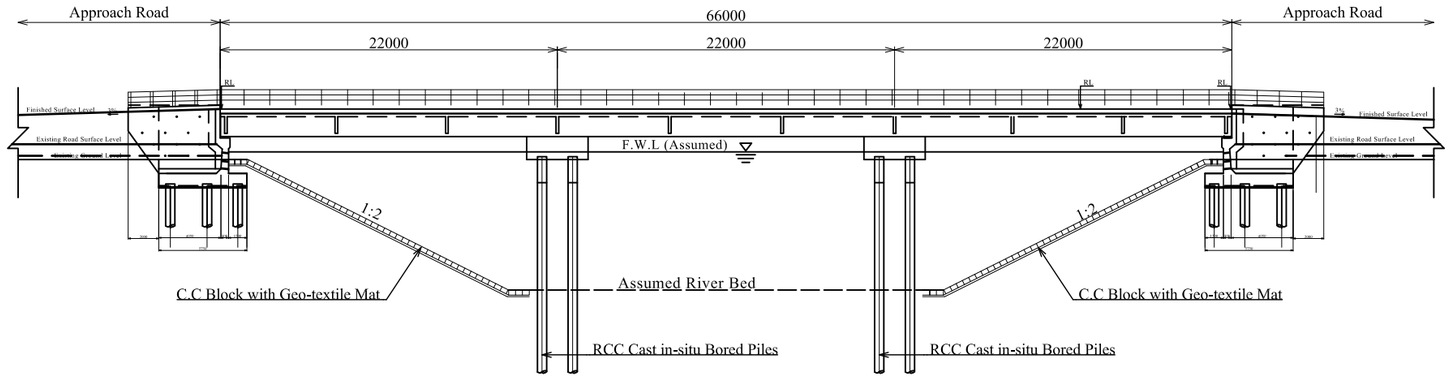


PLAN

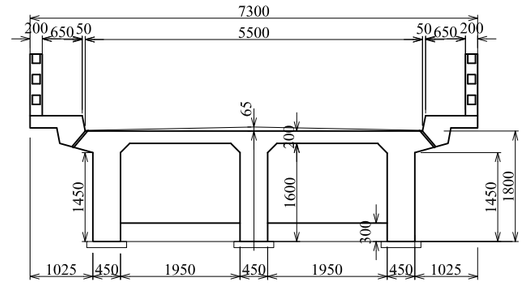
GENERAL PLAN

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL PLAN (NO.21 : BR6 (Jhalokati, Nalcity))

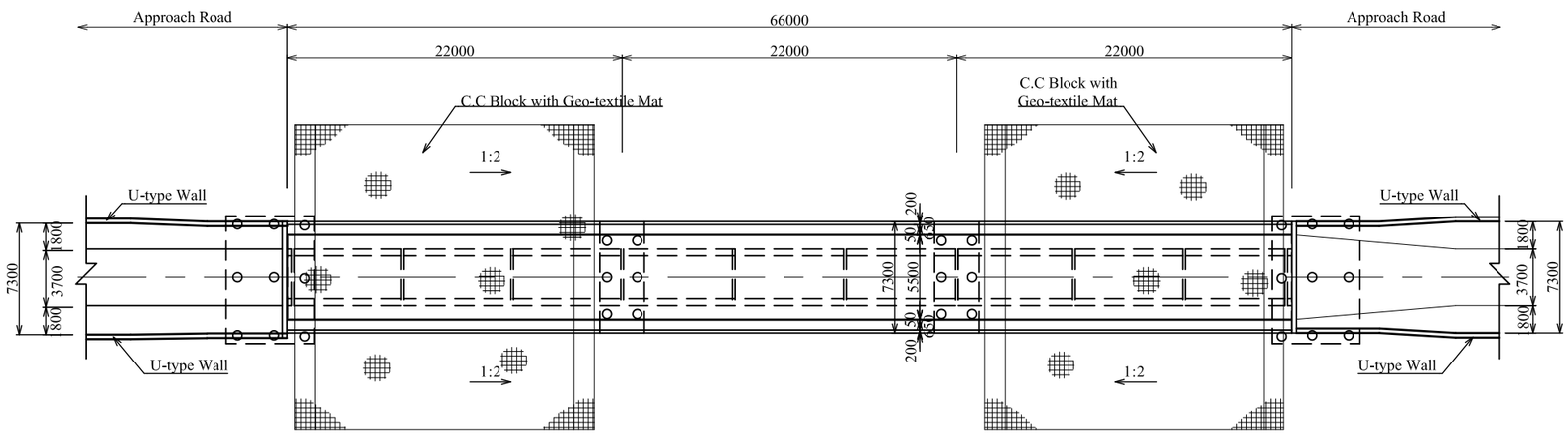
BR-11



ELEVATION



SECTION A-A

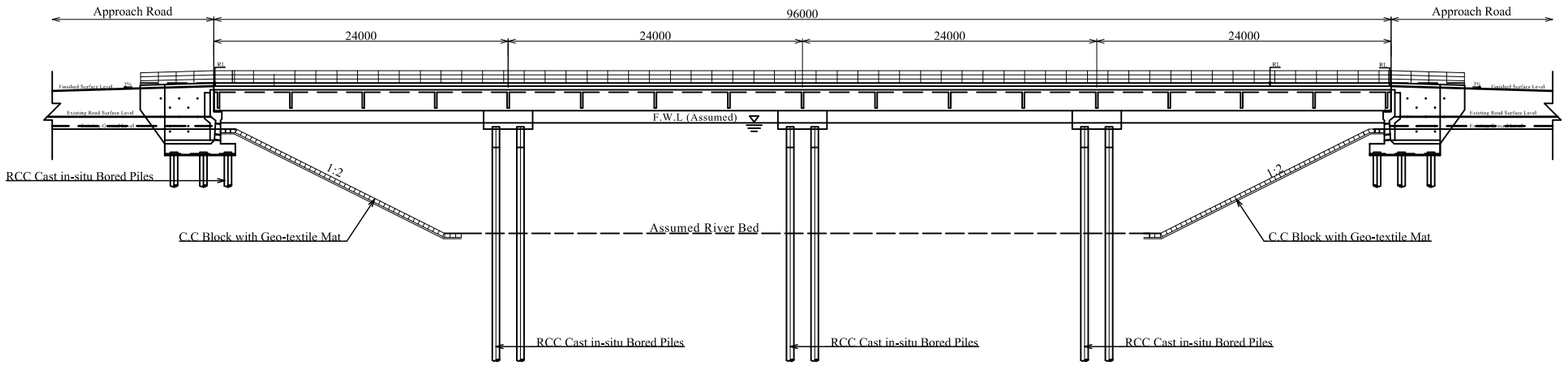


PLAN

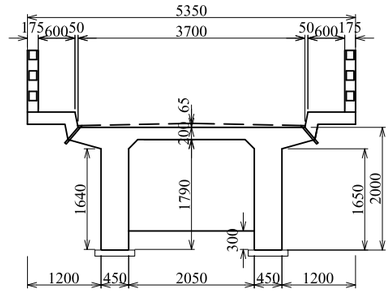
GENERAL PLAN

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL PLAN (NO.30 : BR11 (Barguna, Sadar))

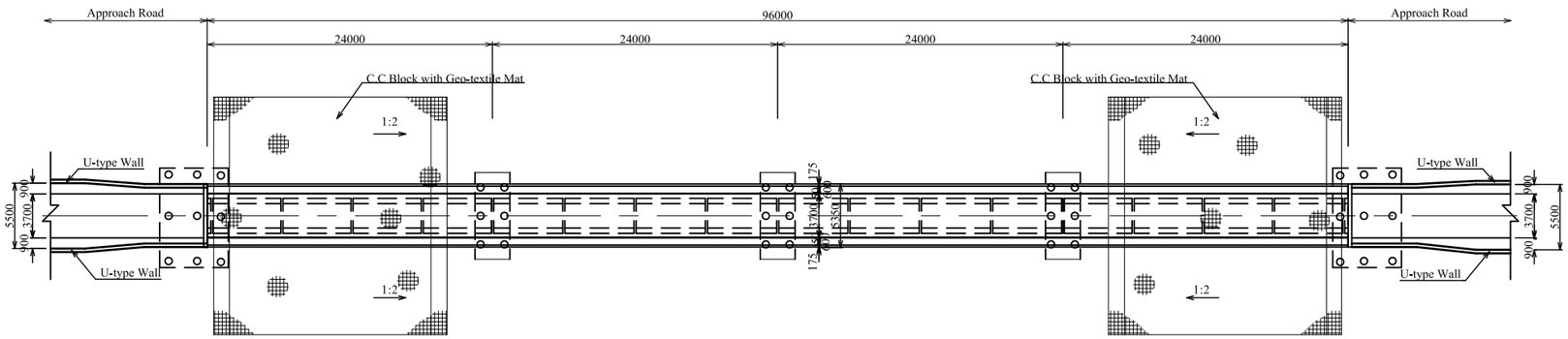
BR-12



ELEVATION



SECTION A-A



PLAN

GENERAL PLAN

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL PLAN (NO.32 : BR12 (Bhola, Sadar))

BWDB Part

Selected 8 Sub-projects forBWDB

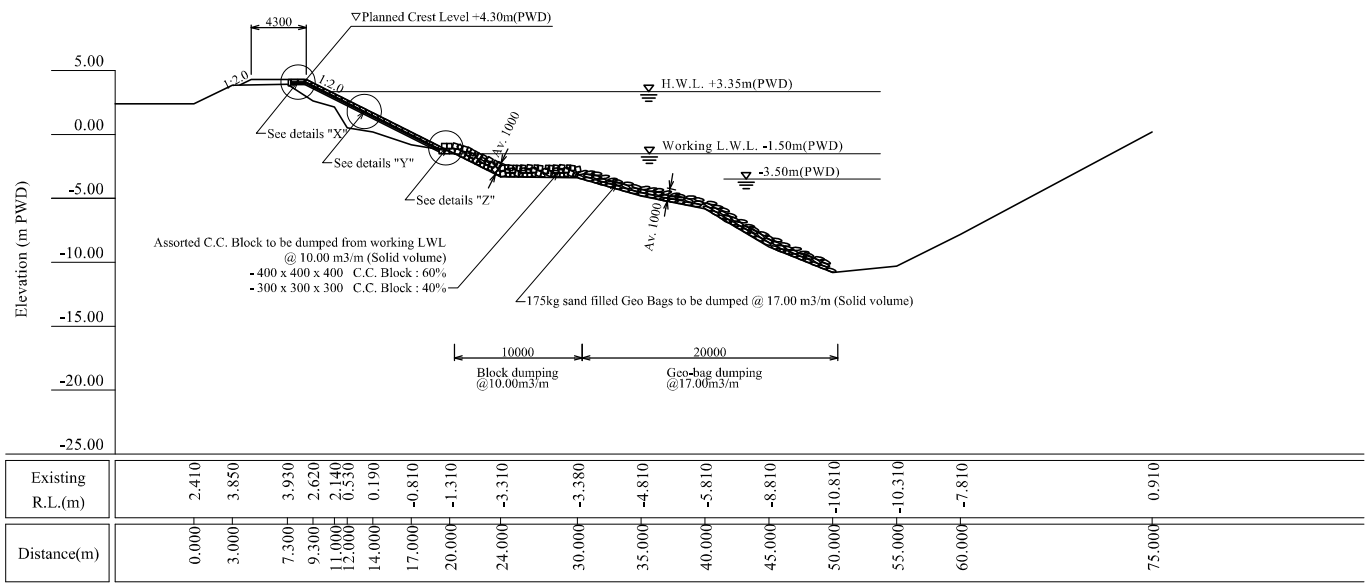
No.	District	Upazilla	Type of Structure	Main Damage and Process on Structure	Time of Disaster	Causes of Damage
5	Satkhira	Shyamnagar	Embankment	L=0.6km, (d)(e) Intensive damage	On-going damage	Bank erosion in line with riverbed scouring
6	Satkhira	Assa Suni	Embankment	L=1.0km, (d)(e) Intensive damage	On-going damage	Bank erosion in line with riverbed scouring
7	Satkhira	Assa Suni	Embankment	L=1.5km, (d) Intensive damage	On-going damage	Bank erosion caused by waves
10	Khulna	Koyra	Embankment	L=0.9km, (d) Intensive damage	On-going damage	Bank erosion caused by waves
19	Barisal	Babuganj	Bank Protection for Airport	L=2.3km, (d)(e) Intensive damage	On-going damage	Bank erosion in line with riverbed scouring
20	Barisal	Babuganj	Bank Protection for Bridge	L=0.4km, (d)(e) Intensive damage	On-going damage	Bank erosion in line with riverbed scouring
21	Barguna	Patharghata	Embankment	L=1.0km, (d) Intensive damage	Cyclone Sidr (2007), Aila (2009), Monsoon in June 2015	Bank erosion caused by waves
33	Patuakhali	Kalapara	Drainage Sluice Gate	1 place, Concrete crack; No steel gates; Intensive damage	-	Deterioration

GENERAL PLAN

NO.5

STANDARD CROSS SECTION (at KM 102.56)

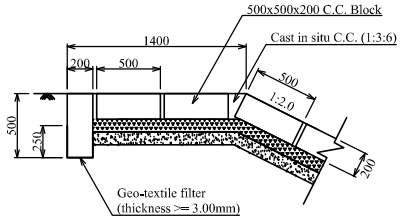
Scale 1 : 200 (A1)



Existing R.L.(m)	2.410	3.850	3.930	2.620	2.140	0.530	0.190	-0.810	-1.310	-3.310	-3.380	-4.810	-5.810	-8.810	-10.810	-10.310	-7.810	0.910
Distance(m)	0.000	3.000	7.300	9.300	11.000	12.000	14.000	17.000	20.000	24.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	75.000

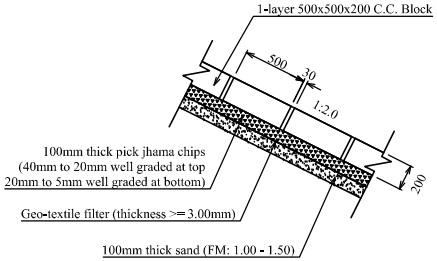
Details "X"

Scale 1 : 20 (A1)



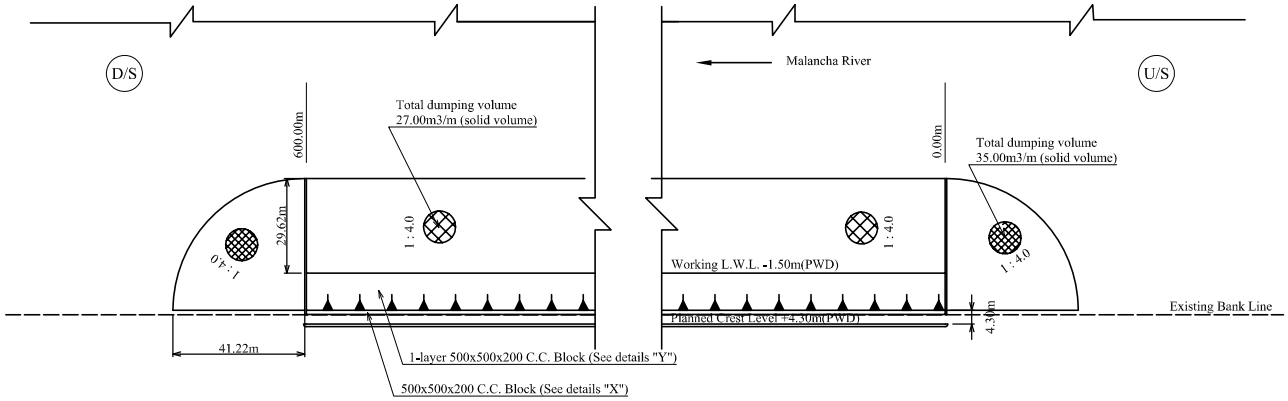
Details "Y"

Scale 1 : 20 (A1)



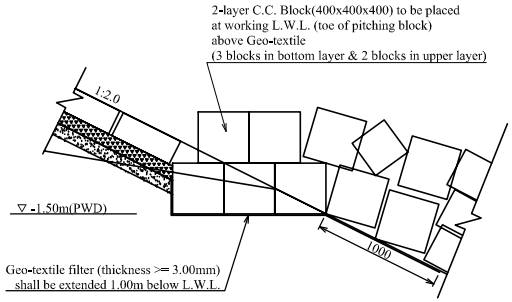
PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

Scale 1 : 20 (A1)



Remarks
1) Existing river bed level is measured by Satkhira O&M office BWDB on Aug. 2015
2) Anticipated scour depth is -16.00m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

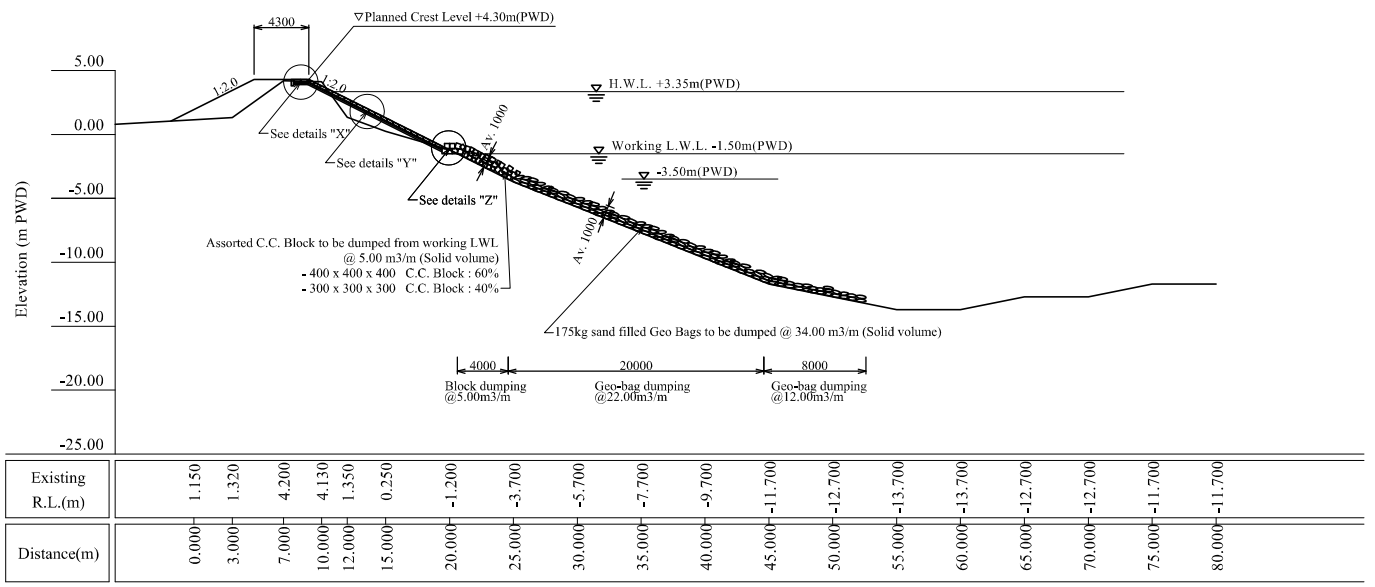
PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.5 : Bank Protection In Polder-5)

GENERAL PLAN

NO.6

STANDARD CROSS SECTION (at KM 16.660)

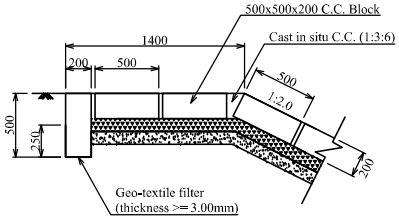
Scale 1 : 200 (A1)



Existing R.L.(m)	1.150	1.320	4.200	4.130	1.350	0.250	-1.200	-3.700	-5.700	-7.700	-9.700	-11.700	-12.700	-13.700	-13.700	-12.700	-12.700	-11.700	-11.700
Distance(m)	0.000	3.000	7.000	10.000	12.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	80.000

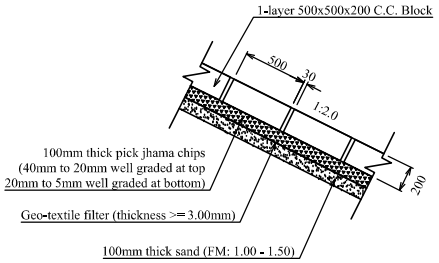
Details "X"

Scale 1 : 20 (A1)



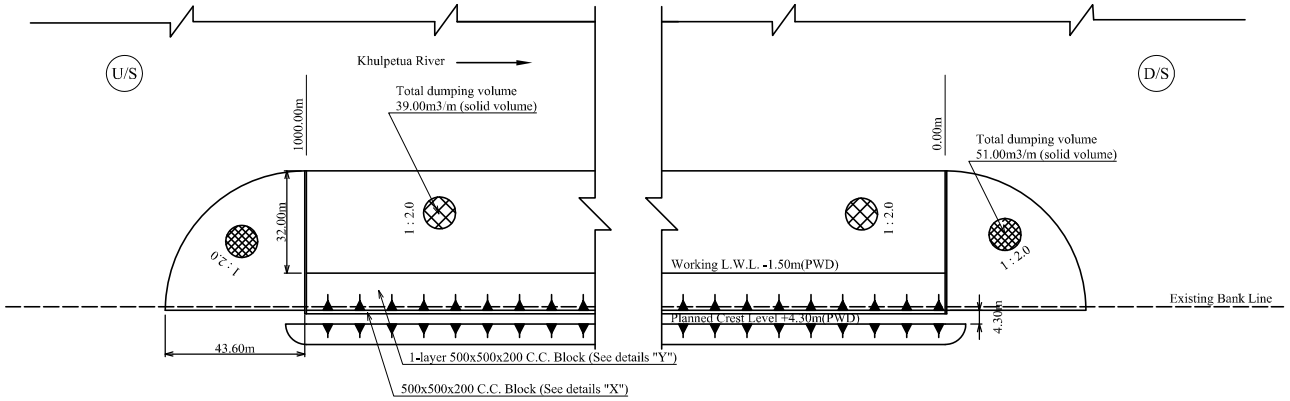
Details "Y"

Scale 1 : 20 (A1)



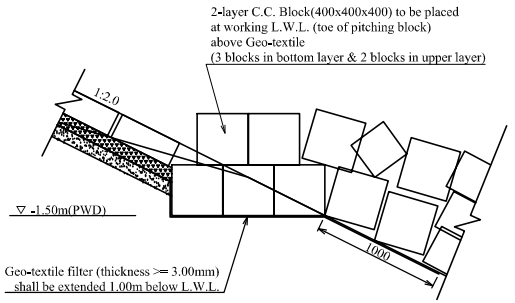
PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

Scale 1 : 20 (A1)



Remarks
1) Existing river bed level is measured by Satkhira O&M office BWDB on Aug. 2015
2) Anticipated scour depth is -17.00m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

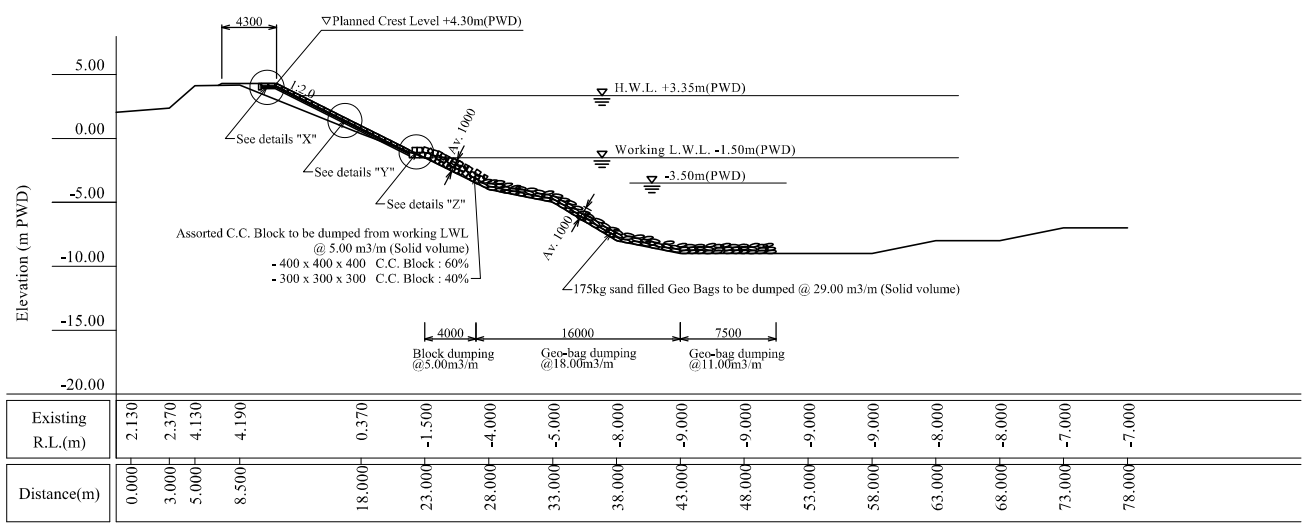
PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.6 : Bank Protection In Polder-4)

GENERAL PLAN

NO.7

STANDARD CROSS SECTION (at KM 4.300)

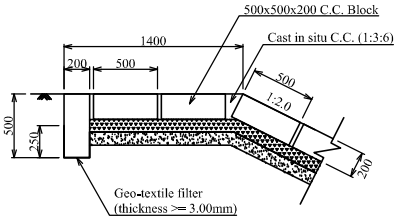
Scale 1 : 200 (A1)



Distance(m)	0.000	3.000	5.000	8.500	18.000	23.000	28.000	33.000	38.000	43.000	48.000	53.000	58.000	63.000	68.000	73.000	78.000
Existing R.L.(m)	2.130	2.370	4.130	4.190	0.370	-1.500	-4.000	-5.000	-8.000	-9.000	-9.000	-9.000	-9.000	-8.000	-8.000	-7.000	-7.000

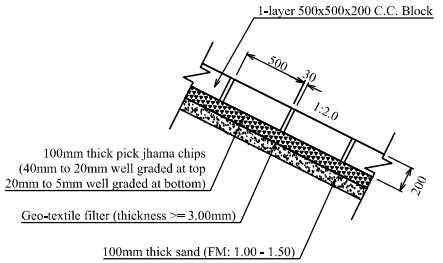
Details "X"

Scale 1 : 20 (A1)



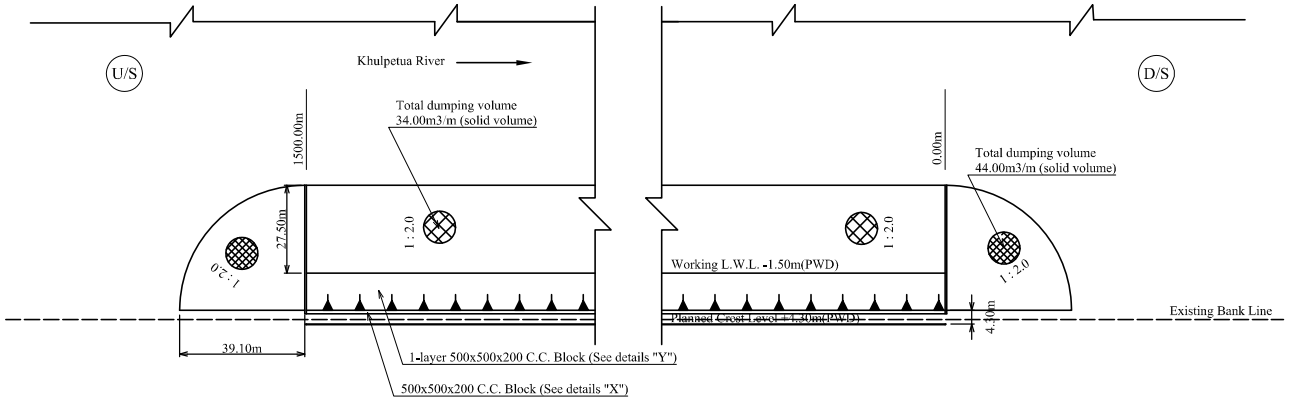
Details "Y"

Scale 1 : 20 (A1)



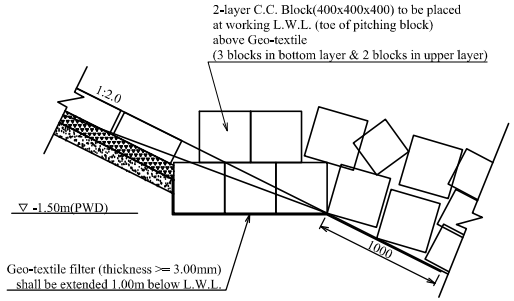
PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

Scale 1 : 20 (A1)



Remarks
1) Existing river bed level is measured by Satkhira O&M office BWDB on Aug. 2015
2) Anticipated scour depth is -14.00m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

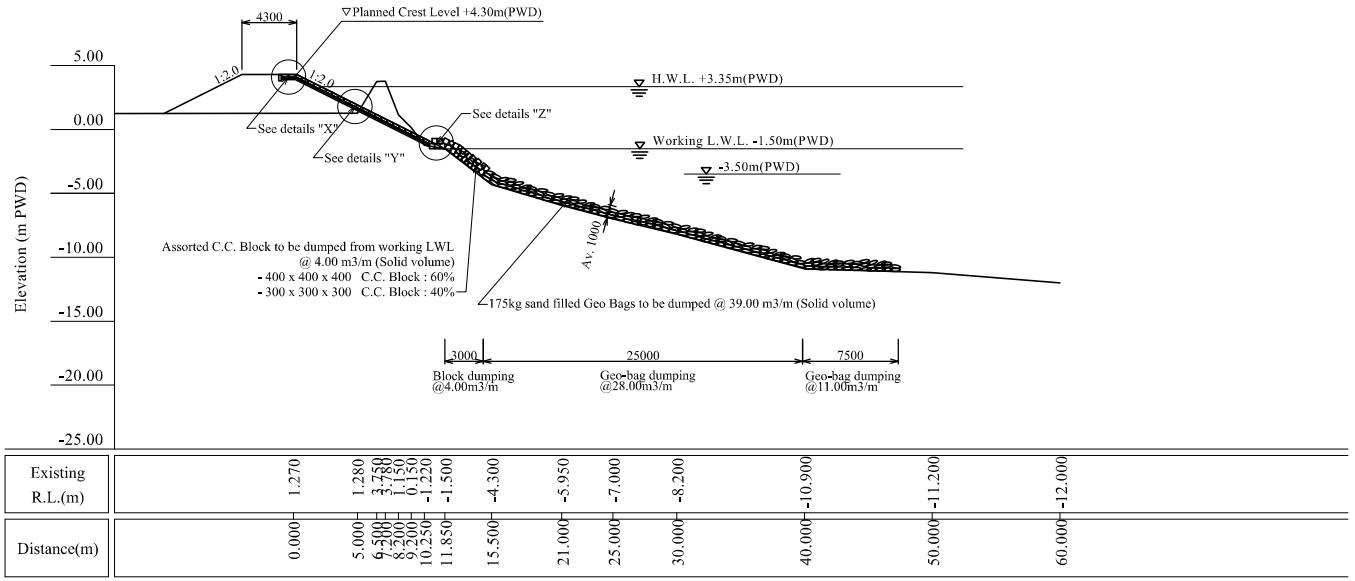
PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.7 : Bank Protection In Polder-4)

GENERAL PLAN

NO.10

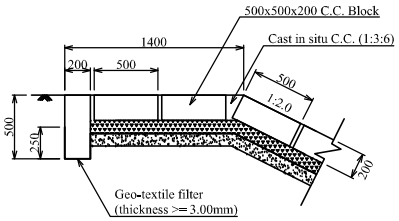
STANDARD CROSS SECTION (at KM 19+120)

Scale 1 : 200 (A1)



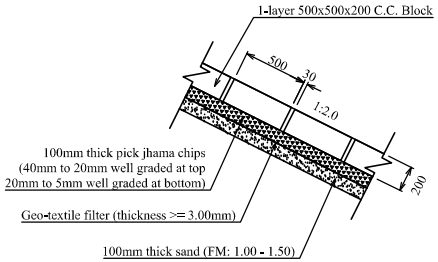
Details "X"

Scale 1 : 20 (A1)



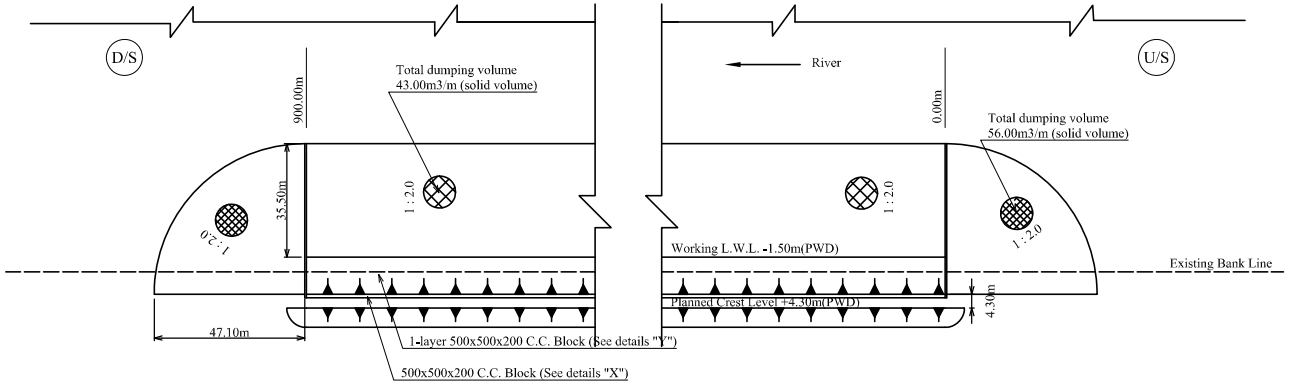
Details "Y"

Scale 1 : 20 (A1)



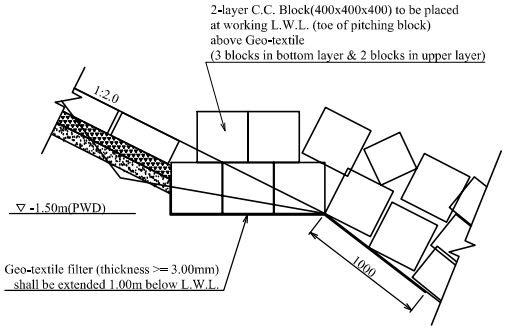
PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

Scale 1 : 20 (A1)



Remarks
1) Existing river bed level is measured by Satkhira O&M office BWDB on Aug. 2015
2) Anticipated scour depth is -16.00m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

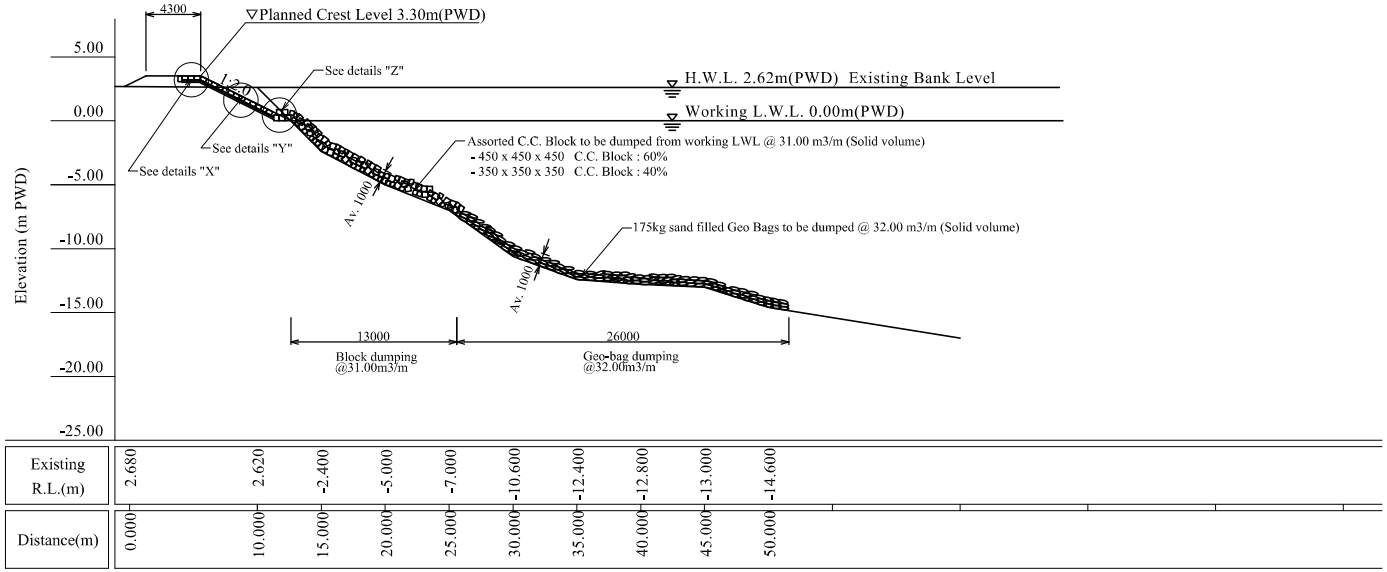
PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.10 : Bank Protection In Polder-13, 14/2)

GENERAL PLAN

NO.19

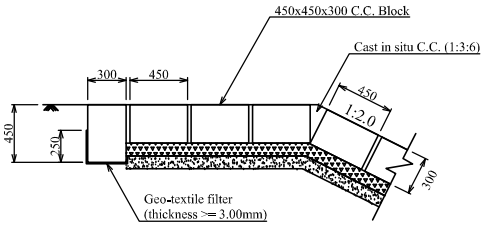
STANDARD CROSS SECTION
(at CH. 150.00m)

Scale 1 : 200 (A1)



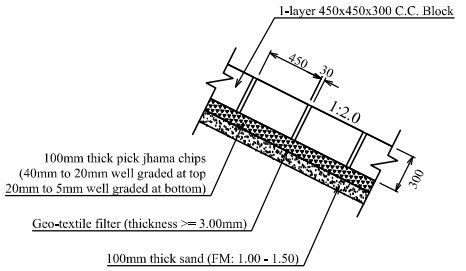
Details "X"

Scale 1 : 20 (A1)



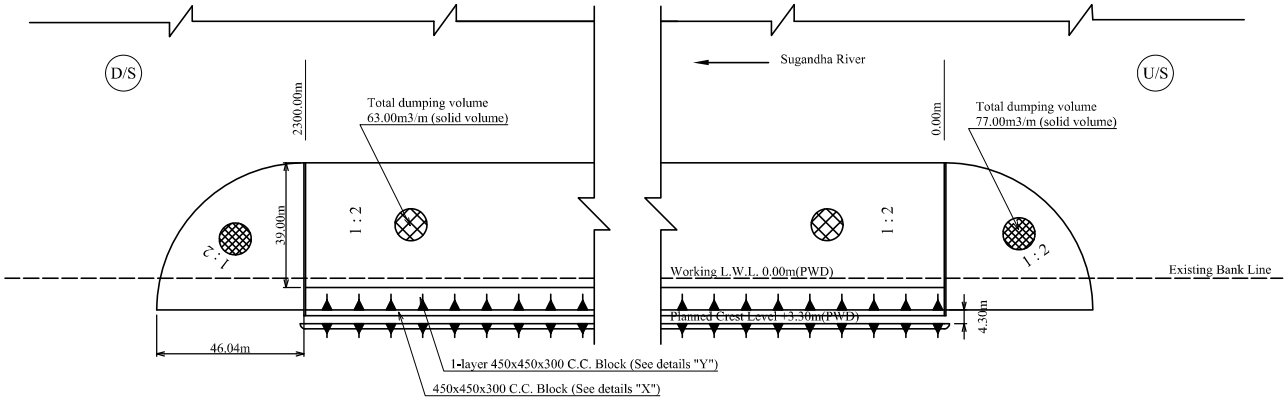
Details "Y"

Scale 1 : 20 (A1)



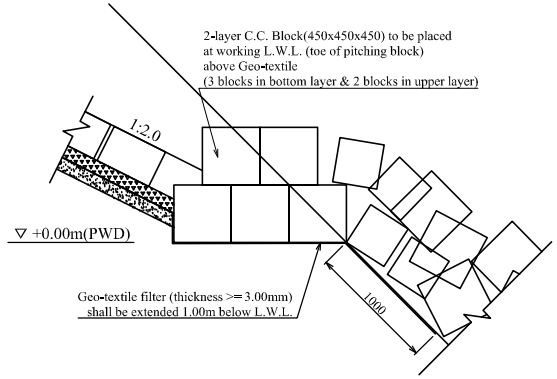
PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

Scale 1 : 20 (A1)



Remarks
1) Existing river bed level is measured by Barisal O&M office BWDB
2) Anticipated scour depth is -25.77m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

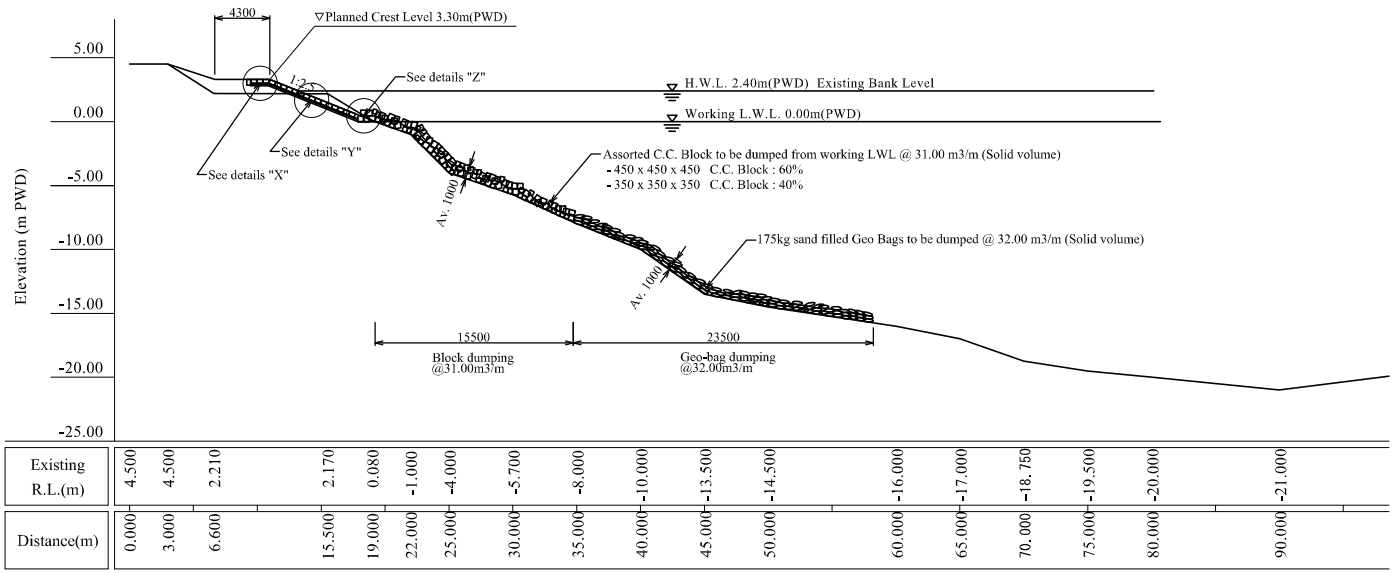
PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.19 : Bank Protection at Barisal Airport)

GENERAL PLAN

NO.20

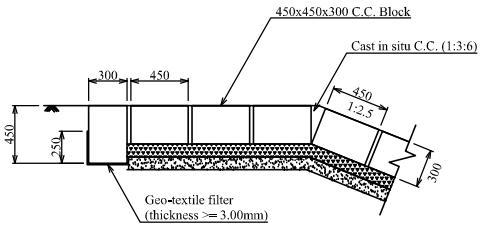
STANDARD CROSS SECTION (at C/S 100.00m)

Scale 1 : 200 (A1)



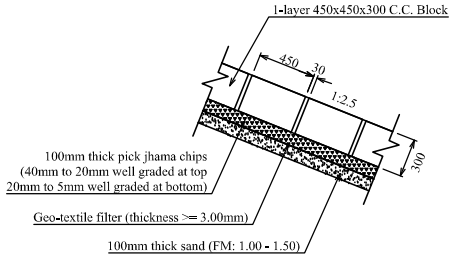
Details "X"

Scale 1 : 20 (A1)



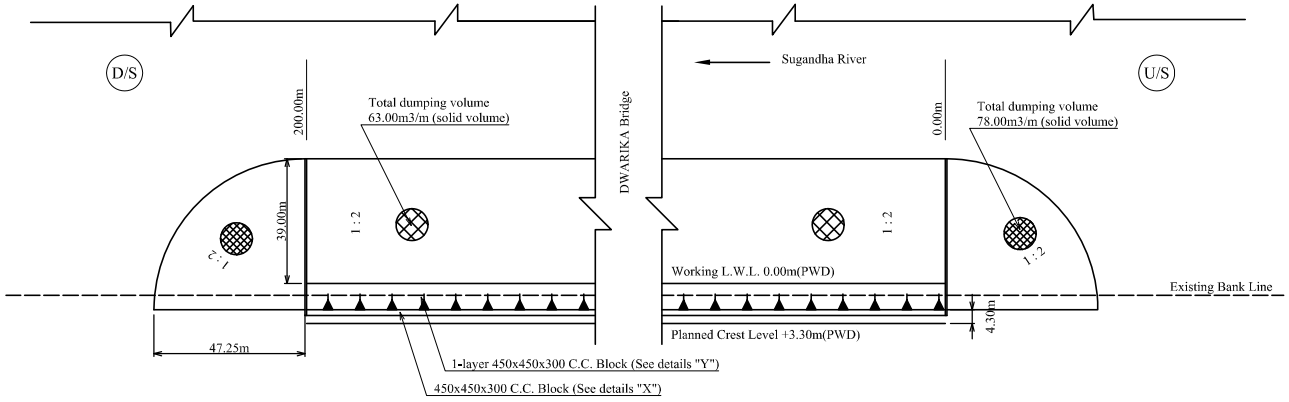
Details "Y"

Scale 1 : 20 (A1)



PLAN VIEW

Scale 1 : 800 (A1)



Details "Z"

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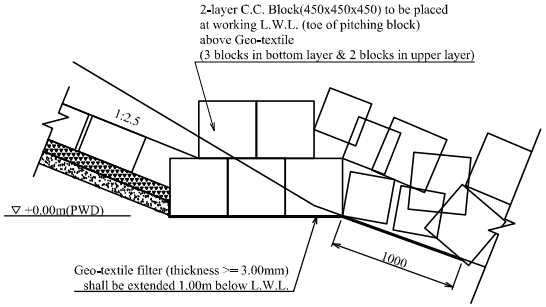


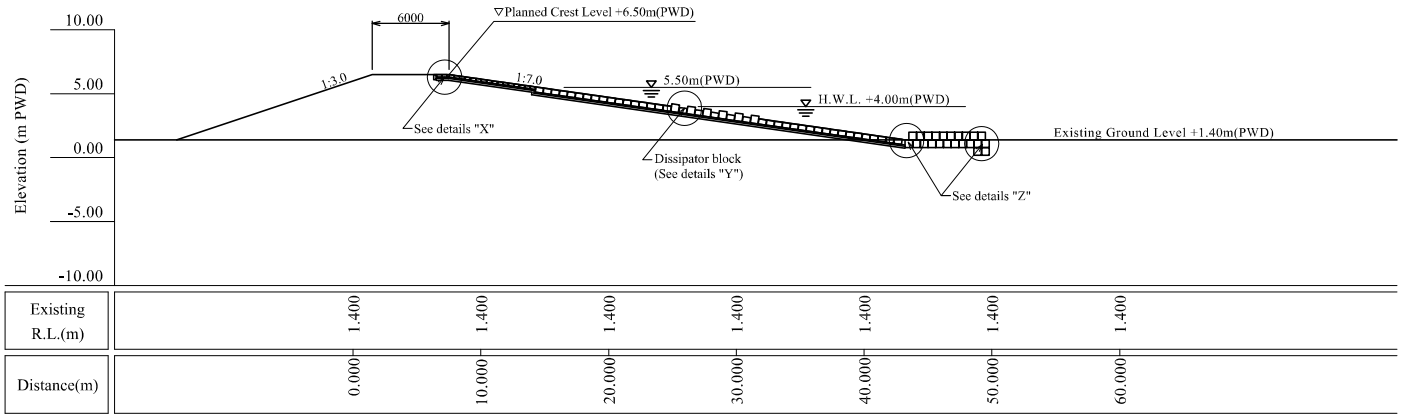
Remarks
1) Existing river bed level is measured by Barisal O&M office BWDB
2) Anticipated scour depth is -25.77m(PWD)
3) Topographic survey and soil investigation should be done at the detailed design stage.

PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.20 : Bank Protection at Dwarika Bridge)

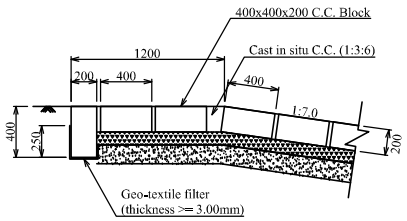
GENERAL PLAN

NO.21

STANDARD CROSS SECTION Scale 1 : 200 (A1)



Details "X" Scale 1 : 20 (A1)



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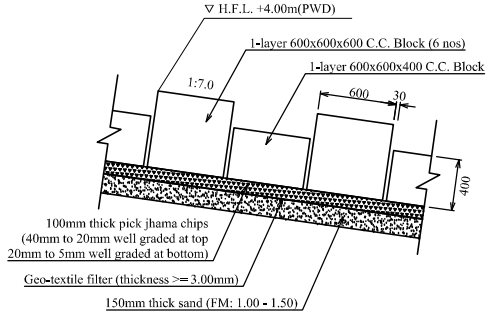
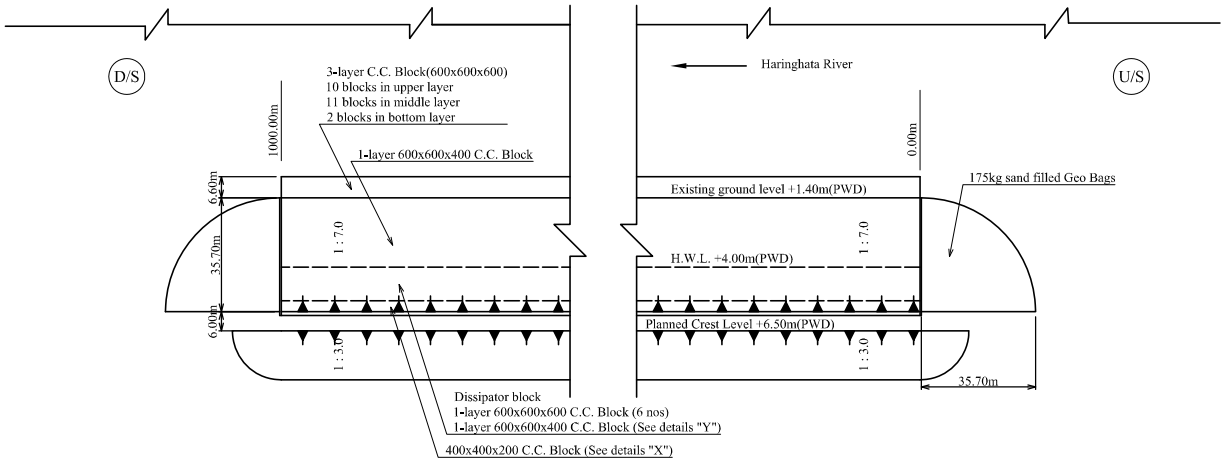


PLAN VIEW Scale 1 : 800 (A1)



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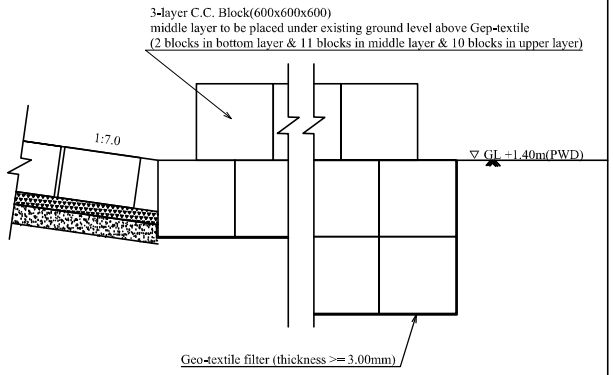
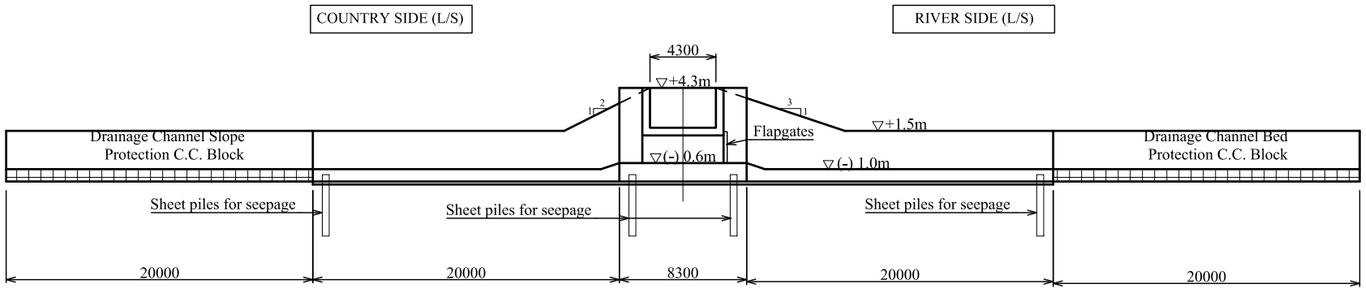


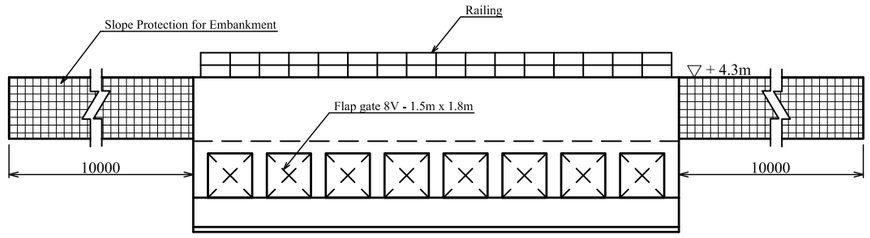
Remarks
1) Anticipated existing ground level is +1.40m(PWD)
2) Topographic survey and soil investigation should be done at the detailed design stage.

PROJECT NAME:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.21 : Sea Dyke In Polder-40/1)

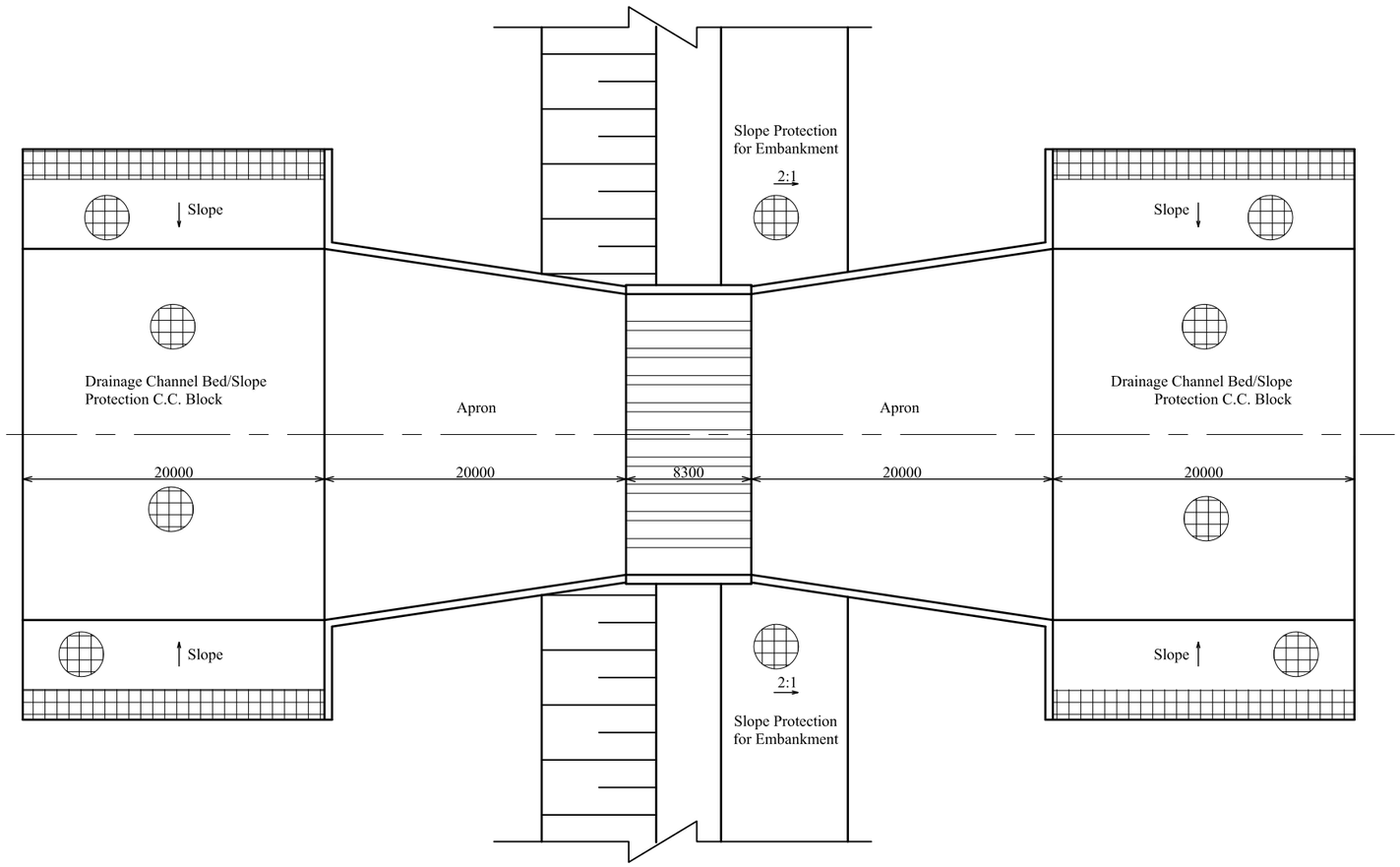
NO.33



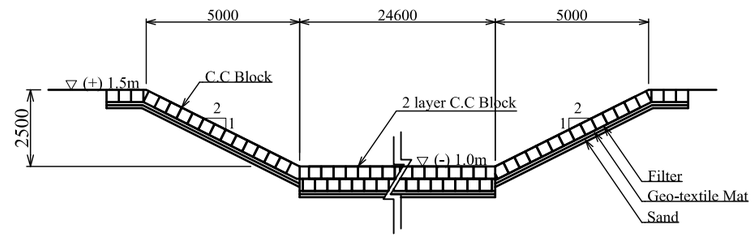
LONGITUDINAL PROFILE



ELEVATION (R/S)



PLAN



TYPICAL CROSS-SECTION OF DRAINAGE CHANNEL

PROJECT TITLE:	DRAWING TITLE:
THE PREPARATORY SURVEY ON THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION, EMERGENCY RESPONSE AND RECOVERY PROJECT IN THE PEOPLE'S REPUBLIC OF BANGLADESH	GENERAL DRAWING (NO.33 :SLUICE GATE (Polder-46, Patuakhali)

Appendix 4.1

Field Survey Notes of Component 2

Field Notes of Component 2 (Equipment Procurement)（June 21, 2015）

Interview-1

Interviewees：Mr. Ad Shawkat Deputy Officer, Barisal Sadar River Fire Station, FSCD, Barisal Division
Based on Introduction from FSCD-HeadQuarter in Dhaka

Interviewer of JICA Survey Team：ITO Keigo for Component 2

Place: Grand Park Hotel, Barisal

Date：2015/6/12 (Fri.)

Time: 20:00-22:00

Interview Contents

- The River Fire Station is mandated as **first responder** during emergency water-related disasters by cyclone, flood and storm surge for emergency disaster management response and rescue of people in the country.
- Through the activity of fire-fighting operation, the River Fire station also acts relief of inhabitants.
- The Barisal River Fire Station -FSCD owns two (2) boats; one fire float and one speed boat. Let's see them tomorrow morning.
- The major control/jurisdiction rivers are 7: Megna, Shahbazpur Channel, Tentulia, Kazal, Rabnabad, Burishwar, and Bishkhali.
- Due to the rollover accident outbreak such as ferry, boat and fishing boat, caused by the monsoon, the River Fire Station is active as far as the boats to own can work within their jurisdiction.
- It was informed that due to the rollover accident of the boat occurred in Manpura island /Bhola Division, eight people drowned yesterday. However, the float of Barisal FSCD was not able to go the spot in the boat because of much more distantly from Barisal (there is Shahbazpur channel more than 20km width of the river, and a river vortex seems to be easy to occur).
- About the river whirlpool, the dead by the drowning accident of a similar boat goes to even the Barishwar river (the river width of several km) of Barguna District. (detailed ignorance)
- In the past, The River Fire Station rescued for cyclones in 1970, 1991, Sidr 2007, and Aila 2009 within Barisal Division. (detailed ignorance)
- The staff member of Barisal River Fire Station constitution are 18 people (three divers).
- Mr. ITO Keigo is to be invited to inspect Barisal FSCD activity tomorrow.

Interview-2

Interviewees：Mr. Ad Shawkat Deputy Officer, Barisal Sadar River Fire Station, FSCD, Barisal Division

Interviewer of JICA Survey Team：ITO Keigo for Component 2

Place: Barisal Sadar River Fire Station, FSCD, Barisal Division

Date：2015/6/13 (Sat.)

Time: 6:00 -7:00 a.m.

Interview Contents

- A 2-story building in the River Fire Station in the riverside and a boat and float of the FSCD office property were inspected. It's being moored in the Bishkhali river which flows through Barisal city. (See photos below).
- The Barisal River Fire Station -FSCD owns two (2) boats; one fire float (about 16m long, 5m wide, year 1993 domestic manufacture) and one speed boat (about 5m long, 1.5m wide) (See photos below).
- There is no wireless communication system. The available communication tool is the private mobile phone only.
- The speed of the fire rescue float almost appears only as 15 knots (time of peace), 25 knots (fastest) (with the number of 30-45 knots with the specifications).
- It is obvious that the issues to be solved for the Barisal River Fire Station should be because of limited transportation due to poor capability of the rescue float and the Barisal River Fire Station needs not only the capability of the rescue float but also the enhancement of training of the ability up of the staff.

	
Photo 1- Barisal River Fire Station Office-FSCD	Photo 2- Fire rescue float (centre) and Rescue speed boat (left- white color)
	
Photo 3- A speed boat- Barisal	Photo 4- A speed boat- Barisal
	
Photo 5- A Fire Rescue Float-Barisal and Head of Barisal FSCD's River Station	Photo 6- A Fire Rescue Float-Barisal
	
Photo 7- A Siren and Water Gun of A Fire Rescue Float	Photi 8- A Steering Room of A Fire Rescue Float-Barisal (There is no wireless devise in the float.)

Interview-3

Interviewees：Mr. Amitab Sarker (Deputy Commissioner and District Magistrate Officer, Patuakhali District)

Companion：Mr. Ad Shawkat Deputy Officer, Barisal Sadar River Fire Station, FSCD, Barisal Division

Interviewer of JICA Survey Team：ITO Keigo for Component 2

Place: Residence House of DC, Patuakhali District

Date：2015/6/13 (Sat.)

Time: 20:00 -21:00

Interview Contents

- Traces of enormous damages by 2007-Cyclone "Sidr" and 2009-Cyclone "Aila" are seen in Patuakhali District.
- It was gathered that the most serious issues during the cyclone disasters above were lack of emergency rescue and relief daily necessities such as drinking water, dry foods, blankets, etc., and the blockage of access of local relief to villages and lack of means of communication to the communities.
- Based on the experiences learnt from the damages by the previous cyclones, the DC officer strongly desires that disaster information and communication technology (ICT) system by satellite shall be applied to the cyclone prone areas in the Coastal Area, and rescue boats with/without engines are also necessary.
- The coastal area including Patuakhali District is low-lying area and consists of many islands enclosed by wide rivers with big tidal river influence which may results in the erosion of river banks or sedimentation by river flow. During the monsoon seasons, the land which consists of silty clayed soils is affected by storm surges and the shape of the land can be changeable every day and vulnerable. The only means of access of residents who live in low-lying islands are the water related transportation system and communication method by any means.
- In the early the morning tomorrow, the DCO plans interview discussion talks with concerned people at the DC Office. CPP may not participate, but BDRCS(Bangladesh Red Crescent Society / young people's association) be able to participate.

Interview-4

Interviewees : Mr. Amitab Sarker (Deputy Commissioner and District Magistrate Officer, Patuakhali District), Other 8 persons from Patuakhali District（Patuakhali Unit of Bangladesh Red Crescent Society / youth people's association）

Companions : Mr. Ad Shawkat Deputy Officer, Barisal Sadar River Fire Station, FSCD, Barisal Division, other 1 person from the Patuakhali River Fire Station-FSCD

Interviewer of JICA Survey Team : ITO Keigo for Component 2

Place: DC Office, Patuakhali District

Date : 2015/6/14 (Sun.)

Time: 9:30 -11:30 a.m.

Interview Contents

- Ladies and Gentlemen, thanks for joining us this morning, My name is ITO Keigo, a member of JICA study team for the emergency disaster risk management project in Bangladesh, who is in charge of emergency response equipment for the project.
- Patuakhali District has met disaster damage during monsoon season under an influence by cyclones, floods and high tide/storm charge almost every year. In particular, the past cyclones Sidr of 2007 and Aila of 2009, Patuakhali had serious damages. That is why I invited you to join this interview discussion this morning, members of Patuakhali Bangladesh Red Crescent Society / youth people's association regarding disaster management by cyclones, leading by DC Office, Patuakhali District. Discussion on the disaster problems and issues were started.
- It is noted that lack of ICT (Information & Communication Technology) and local relief supplement are the serious problems, and neither fixed telephone lines nor cell phones are used at the time of cyclones.
- Lack of tools for early warning communication system to communities is also a serious issue.
- Every time it rains, the residents have to walk along the roads submerged in floodwater and move to evacuation centres or to safe housing and building for shelter (0.5 km - 1 km distance).
- The availability of sewage facilities and drinking water supply are also difficult. Inundations by flood last for several days.
- More systematic activity of PIO (Project Implementation Officer) and volunteers of CPP (Cyclone Preparedness Programme) are required for leading the residents to evacuation centres.
- Communication tools such as handy megaphones and speakers are also more needed.
- Since the roads are damaged by the disasters and people suffer from the floods, water boats (speed boats, engine boats, etc., are needed.
- Thank you very much today, DCO and all the attendants.

	
Photo-9 Patuakhali Deputy Commissioner Office	Photo-10 Interviews with Patuakhali Bangladesh Red Crescent Society / youth people's association at the Deputy Commissioner Office Room by JICA Study Team

Below is one of the straits which head Mr.Shawkat of Barisal River Station of FSCD wanted to show to me (ITO Keigo) as the river where had the whirlpool of the surface of the water near a ferry platform (Amtali, the photograph in Barguna District) as introduced at the "Interview 1" frequently.

	
Photo-11 The river strait where has the whirlpool of the water near a Ferry platform (Amtali, Barguna District). By cloudy sky, a wave stood on that day.	Photo-12 The river strait where has the whirlpool of the water near a Ferry platform (Amtali, Barguna District). By cloudy sky, a wave stood on that day.

Interview-5

Interviewees：Md. Md.Lokman Hossain, Assistant Director, FSCD, Patuakhali District
Md.Golam Sarwar, Senior Station Officer, FSCD, Patuakhali District

Companions：Mr. Ad Shawkat Deputy Officer, Barisal Sadar River Fire Station, FSCD, Barisal Division, other 1 person from the Patuakhali River Fire Station-FSCD

Interviewer of JICA Survey Team：ITO Keigo for Component 2

Place: River Fire Station Office, FSCD, Patuakhali District

Date：2015/6/14 (Sun.)

Time: 12:30 -13:30

Interview Contents

- The Patuakhali River Fire Station has one speed boat. Since 2013, the speed boat has been used for resident's emergency medical care at the opposite river shore. The condition of engines is erratic so that the boats are not in full operation.
- The engine of the speed boat is not in good condition but there is not the trouble in the present cover range activity.
- Training for capacity building of rescue members is required.
- The issue of training needs is to be informed to and discussed with FSCD in Dhaka (by ITO Keigo).

Photo-13 Patuakhali River Fire Station- FSCD

Photo-14 A rescue seed boat- FSCD Patuakhali

Photo-15 A rescue seed boat- FSCD Patuakhali

Photo-16 A rescue seed boat- FSCD Patuakhali

Interview-6

Interviewees：Mr.Md.Abdus Salam, Radio Operator, CPP, Barisal
Mr.Md.Sohag Hossain, Radio workshop assistant, CPP, Barisal

Interviewer of JICA Survey Team：ITO Keigo for Component 2

Place: CPP (Cyclone Preparedness Programme) Office, Barisal District

Date：2015/6/14 (Sun.)、2015/6/15 (Mon.)

Time: 15:30 -16:30(6/14)、9:30-12:00 a.m.(6/15)

Interview Contents

- The CPP acts only for the coastal area in the country.
- CPP's activity network area consists of 7 Zonal areas, 37 Upazila offices, 322 Union offices, 3,291 Unit offices, and has volunteers of 49,365 people (Males: 32,910; Females: 16,455) in the Coastal Area.
- In the communication network for CPP, there are the HF (High Frequency) & mobile phone between CPP HQ in Dhaka and Barisal City, HF wireless apparatus between Barisal and 4 Upazila（Galachipa, Dashmina, Mathbaria, Saronkhola, and VHF wireless apparatus between Upazila and Union, and partially VHF wireless apparatus & mainly mobile phone between Union and Unit Office.
- It is possible to establish contact within 24 hours by changing the fixed time of communication, i.e., the fixed time could be 19:00. In April-May, contact was made 3 times a day and in October-November, it was twice a day (9:30-10:30 and 14:30-15:30). During the cyclones in December-March and June-September, contacts were made during the fixed time contact.
- The volunteers of the Office, Union Office, and Unit Office used handy microphones/loudspeakers as information and communication tools. The loudspeakers are old (made in 1993 in Japan) but they are still working well and the volunteers admire the excellence and quality of the Japanese product. Some communication tools made in another country broke down after a few years.
- It was observed that people living in coastal areas are very poor and paddy/rice as the main crop has a low yield. Houses are also structurally fragile, and roads are not paved. Protection works against cyclones are very fragile.
- The present HF/VHF wireless radios are also made of used parts so that replacements are very necessary. Since 2011, equipment consisting of 32HF and 96VHF second-hand ones are used.
- Electricity is interrupted at the time of cyclone, and a solar system is effective after cyclone passage.
- The CPP team leaders of Upazila, Union and Unit hands information down to residents by the handy microphone o loudspeaker or by going around using a motorcycle or a bicycle as the means of disaster information management communication system. However, there are a lot of people who do not have a motorcycle or a car so that problems occur. For mobility in the communication of warning, machinery and materials are also required.

Photo-17 Cyclone Preparedness Programme (CPP), Barisal City

Photo-18 Barisal CPP Regional Office

Photo-19 The resident staff for communication equipment in charge of Barisal CPP office

Photo-20 Workshop of CCP Barisal City
HF/VHF Wireless Equipment

Photo-20 Workable wireless equipment
（HF/VHF）

Photo-21 Under the test of siren, hand microphone speaker group
Behind are hand microphone speaker group which mainly need non-available of spare parts.

Photo-22 Hand microphone speaker group after repaired with spare parts.（Mand in Japan 1993）

Photo-23 Repairing of Hand microphone speaker

Photo-24 Burn-in testby tester

Interview-7

Interviewees：Residences of Union Sadar, Upazila Morrelganj, Bagerhat District

Interviewer of JICA Survey Team : Mr. ITO Keigo for Component 2 and Mr. OWADA Kiyotaka for Component 3 of JICA Survey Team

Place: Residence house, Union Sadar, Upazila Morrelganj, Bagerhat District

Date：2015/6/16 (Tue.)

Time: 13:30 -15:30

Interview Contents

- Information on the occurrence of cyclones are conveyed by the fixed telephone or mobile phone as urgent cyclone disaster information, and information from the Upazila and Union offices of lower level of Unit office are communicated to the Unit office through the Bagerhat District office.
- In Sidr, information on the cyclone was disseminated as mentioned above. Time of communication is unclear.
- The information was first communicated to the Chairman and the Union Parishad members (9 members of committee) and the security and advisability of evacuation were disseminated to the Union residents.
- The communication means is the fixed telephone or mobile phone, and a PIO with a motorbike hands the information down to residents using a loudspeaker at the possible area of disaster.

Photo-25 Upazila Morrelganj Rest House

Photo-26 Lunch dining together with the Bagerhat DC at Upazila rest house (dak banglow)

Photo-27 A hering with the community inhavitants of Union Sadar, Upazila Morrelganj, Bagerhat District, by JICA survey team

Interview-8

Interviewees：Mr.Md.Musharof Hossain, Bagerhat District
Mr.G.M.Syful Islam, PIO, Bagerhat Upazila

Interviewer of JICA Survey Team：Mr. ITO Keigo for Component 2, Mr. OWADA Kiyotaka for Component 3 of JICA Survey Team：

Place: Bagerhat DC Office, DRR Officer Office, Bagerhat District

Date：2015/6/18 (Thu.)

Time: 9:30 -10:30

Interview Contents

- The Bagerhat DRR Office has one officer and two staff.
- The Upazila Bagerhat PIO also has two staff at the office of Upazila. One staff is temporary employment under annual contract. There are five-day workers a week.
- Bagerhat District has 9 Upazila: Bagerhat, Mullahas, Fakirhat, Rampal, Mongla, Chitalmari, Kachua, Morrelganj, and Saranhola.
- Four out of the 9 districts and their Upazilas are vulnerable. These are the Bagerhat District (Upazila of Sarankhola, Mongla, Morrelganj), Pirojpur District (Upazila of Mathbaria, Zianagor, Bhandaria), Patuakhali District (Upazila of Kalapara, Glachipa, Rangabali, Dashimina), Barguna District (Upazila of Pathrghata).
- Since 2012, DMIC Bagerhat has an emergency warning system at the office of DRR. According to the DRRO, however, a panel of the warning system has not been opened yet and the system is not functioning at all.
- At present the ICT system depends on the mobile phone correspondence only.
- This office has a speed boat donated by Holland in 2014 and is moored at the Vayrab River. The maintenance and fuel cost is paid by the district.
- One of the two engines of the boat is out of order at present.
- The roles of PIO are development management of each upazila, disaster warning management, and evacuation of people.

Photo-28 Bagerhat DC Office （DRR Office is the third floor.）

Photo-29
Poster 2015 for disaster

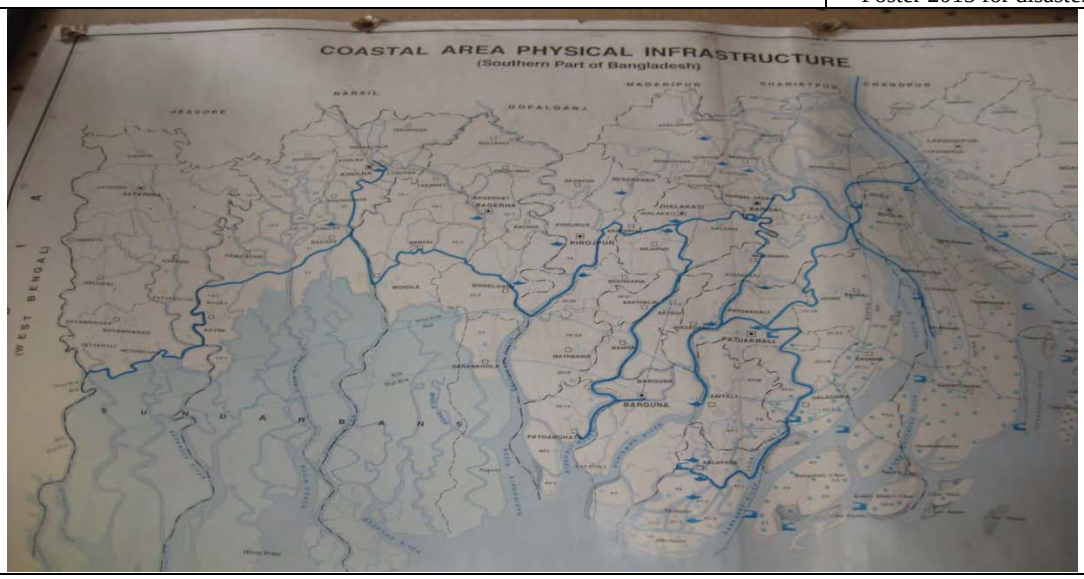


Photo-30 Bagerhat DRRO office, Coastal area physical infrastructure map

Photo-31 A interview with Bagerhat DRRO and PIO of Upazila Bagerhat by JICA survey team

Photo-32 Activity situation of Bagerhat DRRO

Photo-33 Bagerhat DMIC
The wall panel had not opened out since setting and does not seem to have used the radio equipment. It looks like no-proper maintenance and management of time when it is usual.

Photo-34 Being not able to close the door of DMIC.

Photo-35 A interview with PIO of Upazila Bagerhat and their handy micro-speaker (2 units)

Photo-36 A seed boat which Bagerhat District Office has jurisdiction over

Photo-37 A seed boat which Bagerhat District Office has jurisdiction over

Photo-38 Cabin inside of Speed boat (six-passenger)

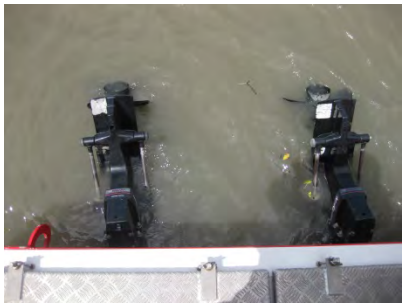


Photo-39 The left screw engine is break- down

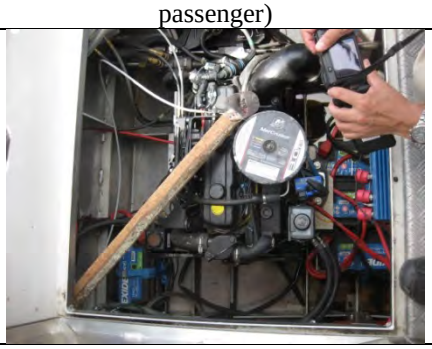


Photo-40 Inoperative engine

Appendix 4.2

Draft Technical Specifications of Equipment selected for Component 2

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Appendix 7

Terms of Reference for Survey of Livelyhood Restoration Support Activities for Disaster Victims and Proposal for Livelihood Restoration Plan

TERMS OF REFERENCE (TOR)
FOR
SURVEY OF LIVELIHOOD RESTORATION SUPPORT ACTIVITIES FOR DISASTER VICTIMS AND PROPOSAL FOR LIVELIHOOD RESTORATION PLAN
UNDER
THE PREPARATORY SURVEY ON
THE CAPACITY ENHANCEMENT ON
DISASTER RISK REDUCTION,
EMERGENCY RESPONSE AND RECOVERY PROJECT

TS 1. General

This specification shall be applied to the works for the Survey of Livelihood Restoration Support Activities for Disaster Victims and Proposal for Livelihood Restoration Plan (hereinafter referred to as "Livelihood Restoration Support Survey" or "Services") to be done by the Contractor under "The Preparatory Survey on the Capacity Enhancement on Disaster Risk Reduction, Emergency Response and Recovery Project" in the People's Republic of Bangladesh (hereinafter referred to as "JICA Survey") being carried out by the JICA Survey Team (hereinafter, referred to as "the JICA Survey Team").

TS 2. Background of the Survey

The People's Republic of Bangladesh (hereinafter referred to as "Bangladesh") is one of the most vulnerable countries to natural disaster. It is located in the world's largest delta, with 90% of land located in low lying areas of less than 12 meters above sea level. Twenty percent (20%) of its land area is inundated in the rainy season, and cyclones occur in almost every year. More than three thousand people lost their lives due to Cyclone Sidr in 2007 and extensive damage to houses and infrastructures was inflicted by Cyclone Aila in 2009. In the last half of the 20th century, the total number of deaths due to natural disasters was more than 700 thousand, and the aggregate number of victims in the last 10 years is more than 75 million people.

The Government of Bangladesh (GOB) had developed the Sixth Five Year Plan for FY2011-2015, in which disaster management is considered as one of the key sectors to address besides climate change and environmental management. The annual economic loss between 1990 and 2008 amounting to USD 12,984 million from natural disasters (World Bank, 2009),

particularly, accelerated the government's undertaking of disaster management. Comprehensive policy formulation and planning in disaster management has been in progress and the policy papers, such as the "Disaster Management Act (2012)", the "National Plan for Disaster Management (2010)", the "Bangladesh Climate Change Strategy and Action Plan (2009)", the "Flood Preparedness Plan of Bangladesh (2014)", the "Emergency Preparedness Plan for Cyclone (2013)", and the "Standing Order on Disaster (2010)", have been prepared.

Meanwhile, it is concerned that the responsibility for disaster management lies under different ministries, in which inter-ministerial coordination often does not work effectively. In Bangladesh, disaster rehabilitation and recovery is the responsibility of different ministries in charge of each infrastructure and the budget is allocated accordingly; whereas, disaster reduction is the responsibility of the ministry/department responsible for disaster relief. For the total coordination of disaster management, a coordination body to holistically view the activities done by all of the implementing agencies is required. In the National Plan for Disaster Management (2010), the GOB put importance on determining where the responsibility for disaster management, from disaster prevention to disaster response, should be laid in the Government, preparing contingency funds to meet the immediate needs and ensuring the coordinated management of costs for disaster relief and recovery so that the activities are to be carried out smoothly and efficiently.

The Japan International Cooperation Agency (JICA) has been supporting the GOB's efforts to reduce disaster risk through technical cooperation projects such as the dispatch of "Integrated Water Resource Management Advisor", "The Project for Capacity Development of Management for Sustainable Development of Water Related Infrastructure (The JICA Sustainable Water Related Infrastructure CDP)", and the "Research Project on Disaster Prevention/Mitigation Measures against Floods and Storm Surges", the Grant Aid for "The Project for Improvement of Meteorological Radar Systems in Dhaka and Rangpur", and the ODA loan for the "Haor Flood Management and Livelihood Improvement Project". Since disaster management covers disaster risk reduction, emergency response and recovery, the JICA Survey will make use of any or all related information from these projects which have been supported by JICA, further collect necessary information from concerned agencies, and carry out cross sectional study to examine the feasibility of the Project.

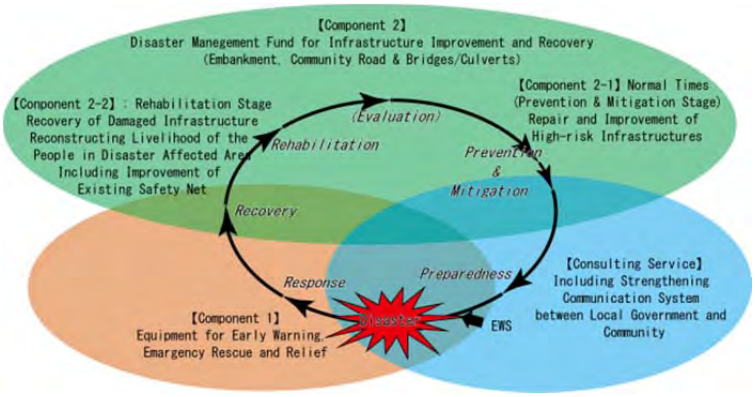
TS 3. Objectives of the JICA Survey

The objective of the JICA Survey is to formulate the Project which may be financed by JICA, through the examination of necessity of the Project, project scope, project implementation arrangement, project cost, and environmental and social considerations.

TS 4. Concept of the Project to be formulated in the JICA Survey

The Project to be formulated in the JICA Survey is as summarised in Table TS. 4-1.

Table TS.4-1 Outline of the Project to be formulated in JICA Preparatory Survey

TS 1. Items	Outline
Project Name	Disaster Risk Reduction, Emergency Response and Recovery Enhancement Project (The Project)
Project Objective	The objective of the Project is to strengthen mechanisms of comprehensive disaster risk reduction and early response and recovery, by implementing structural and non-structural measures in the areas which are highly vulnerable to water-related natural disasters, such as inland flood, storm surge or cyclone, thereby mitigating disaster risk, stabilizing local economy and adapting to climate change in the target areas.
Project Outline	The Project is supposed to be a comprehensive disaster management project covering the whole cycle from disaster risk reduction, emergency response to recovery, comprising of the three components:  <u>Component 1</u> Procurement of equipment and machinery for enhancement of early warning, emergency rescue and relief. <u>Component 2-1</u> The sub-projects for risk reduction of disaster-prone local infrastructure such as repair and improvement of embankment, local road, bridge and culvert. <u>Component 2-2</u> Preparing contingency fund to meet the immediate needs and ensuring the coordinated management of costs for disaster relief and recovery so that quick response and reconstructing livelihood of the people in disaster affected area to be carried out smoothly and efficiently. It is essential to establish conditions for fast-track delivery of ODA loan by adapting characteristics of this scheme.
Survey Area	Areas highly vulnerable to water-related floods, cyclone and storm surge.
Executing Agency	Major Executing Agencies: 1) Ministry of Disaster Management and Relief (MoDMR) 2) Department of Disaster Management (DDM) 3) Local Government Engineering Department (LGED) 4) Bangladesh Water Development Board (BWDB) 5) Fire Service and Civil Defence (FSCD)

TS 5. Scope of the Service (Livelihood Restoration Support Survey)

TS 5.1 General

The Contractor shall conduct a Survey of Livelihood Restoration Support Activities for Disaster Victims and Proposal for Livelihood Restoration Plan as specified in this clause (TS 5.2 to TS 5.5) in detail. The each activity in the Service shall basically be conducted in

accordance with Work Schedule of the Service specified in Clause TS. 7 in this TOR.
Note that the requirements /suggestions of support activities to be included in the Abbreviated/Simplified Resettlement Action Plan provided by the JICA Survey Team shall be also considered.
The contractor shall collect and analyse information about livelihood restoration support activities for disaster victims and make a proposal for LRP (Livelihood Restoration Plan). The scope of the LRP to be included in the Project shall include the following key components:

- Existing livelihood restoration support systems (Programme name and type, contents of activity (eligible target, quantity, duration), implementation mechanism, budget, source of the budget, etc. in Bangladesh
- Confirmation of Legal Framework
- Identification of disaster-affected areas and damaged assets, as well as the affected households; and Past records of livelihood restoration activities
- Conduct of Questionnaire Survey and Data Collection in Selected Upazilas
- Findings and Gaps of Livelihood Restoration Support identified through Data Collection and Questionnaire Survey
- Formulation of Livelihood Restoration Plan
- Support Activities Abbreviated Resettlement Action Plan

TS 5.2 Understanding Current Livelihood Restoration Support Systems

Existing livelihood restoration support systems (Programme name and type, contents of activity (eligible target, quantity, duration), implementation mechanism, budget, source of the budget, etc.) conducted by government (DDM, LGED, Ministry of Health and Family Welfare) and NGOs, in addition to these, the major and local microfinance institutions in the target area (TS5.5.1) shall be collected and summarized through Key Informant Interviews (KIIs);

TS 5.3 Confirmation of Legal Framework

The Contractor shall summarize the legal framework for Livelihood Restoration Activities for communities and/or personal affected by the disaster.

TS 5.4 Data Collection about Disaster-Prone Area, and Vulnerable Assets and Properties to Disaster

Disaster-affected areas and damaged assets, as well as the affected households by each type of disaster shall be identified, confirmed and summarized based on documents and reports being prepared by KIIs to national government agencies and donor agencies.
In addition, information of ad-hoc livelihood restoration activities conducted for particular disasters and/or specific locations in the past shall also be confirmed, if any.

TS 5.5 Questionnaire Survey and Data Collection in Four (4) Selected Upazilas

TS 5.5.1 Target Area (District / Upazila / Union / Word (Communities))

The Upazilas where the questionnaire surveys are conducted will be designated by JICA Survey Team at the beginning of the Service from the following Districts:

Table TS.5-1 Candidate Districts and Number of Upazila for Questionnaire Survey

Division	District	No. of Upazilas
Chittagong	Chittagong, Cox's Bazar	1
Khulna	Satkhira, Khulna, Bagerhat	1
Barisal	Pirojpur, Jhalkati, Patuakhali, Borguna Barisal, Bhola	2
Total		4

TS 5.5.2 Data Collection about Disaster-Prone Area, and Vulnerable Assets and Properties to Disaster in Target Areas

Disaster-affected areas and damaged assets, as well as the affected households by each type of disaster in the target area (TS5.5.1) shall be been identified, confirmed and summarized based on documents and reports being prepared by KIIs to local government agencies and NGOs being activated in Target Area, if any.

In this regards, the records of implementation of safety net programmes in the target area should be summarized in Upazila level.

TS 5.5.3 Questionnaire Survey in Target Areas

The Contractor shall conduct Questionnaire Survey in Four (4) Target Unions designated by JICA Survey Team.

The contractor shall conduct a questionnaire survey for 30 affected households as random sampling from each target union. Therefore, total number of questionnaire surveys is 120 (30 survey/each target area times 4 target areas) in Total. The questionnaire includes the following items on the questionnaire;

- Situation of Disaster (type of disaster, casualty, damage of house, inundation level and period, livestock, etc.);
- Received goods and food
- Household income (before and after the disaster);
- Received supports for restoration (Cash grants, Housing grants, Cash for work, etc.);
- Received assistance of microcredit and debt moratorium (before and after the disaster);
- Request for the build back better; and
- Others

The Questionnaire is attached as ANNEX-1 in this TOR.

The Contractor will improve and brush up Questionnaire together with JICA Survey Team

prior to the conduct of questionnaire survey.

TS 5.5.4 Findings and Gaps of Livelihood Restoration Support identified through Data Collection and Questionnaire Survey

The Contractor shall identify findings and gaps of current livelihood restoration support

TS 5.5.5 Formulation of Livelihood Restoration Plan

As shown in Table TS. 4-1, the contingency fund to meet the immediate needs and ensuring the coordinated management of costs for disaster relief and recovery may be prepared in the Project.

In this connection, the Contractor shall propose livelihood restoration support activities (Livelihood Restoration Plan (LRP)), such as Cash-for work, Cash grants, In-kind grants, Skills training, Employment services, Marketing services, Business development services (BDS) and other appropriate activities to be conducted in the Project based on the findings and gap analysis resulting from data collection and questionnaire surveys.

In regarding to the LRP, the loan mechanism for the above livelihood restoration support shall be proposed.

LRP shall include the following considerations but not limited to:

- Description of institutional arrangements for implementation in the Project;
- Collection, lending and repayment of the loan support mechanism
- Arrangements for monitoring and implementation; and
- Preparation of implementation schedule and the budget.
- Procedures for grievance redress;

TS 5.5.6 Support Activities Abbreviated Resettlement Action Plan (A-RAP)

In the Project, the sub-projects for risk reduction of disaster-prone local infrastructure such as repair and improvement of embankment, local road, bridge and culvert will be executed. In this regard, the Project may involve involuntarily house relocation and land acquisition activities. The Contractor shall conduct support activities on the Abbreviated/Simplified Resettlement Action Plan in case of land acquisition process for infrastructure facilities causing physical displacement of Project Affected Peoples;

TS 6. Reporting

TS 6.1 Report Submission

The Contractor shall submit the following reports to the Team in proper forms. The submitted reports shall be written in English and belong to the property of the Team. The expenses for the data arrangement shall be included in the contract amount.

Table TS.6-1 Reporting Schedule

No.	Name of Report	Description	Schedule
1	Progress Report (PR)	3 sets of hard copy (simple bookbinding) and 1 set soft copy (CD-R)	By September 03, 2015
2	Draft Final Report (DFR)	3 sets of hard copy (formal bookbinding) and 1 set of soft copy	By the end of September 2015
3	Final Report (FR)	3 sets of hard copy (formal bookbinding) and 1 set of soft copy	By the end of October 2015

TS 7. Work Schedule

The tentative work schedule for the Service is shown in Table TS. 6-1 below.

Table TS.6-1 Work Schedule (Tentative)

Service	July		August				September				October			
	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Contract			★											
Reporting						PG/R	★			DF/R	★			F/R ★
Understanding Current Livelihood Restoration Support Systems				■	■	■								
Confirmation of Legal Framework				■	■	■								
Data Collection (@Dhaka)				■	■	■								
Questionnaire Survey and Data Collection (@Target Area)						■	■							
Findings and Gaps								■						
Formulation of Livelihood Restoration Plan									■	■	■	■		
Support Activities for A-RAP											■	■	■	■
Meeting w/ JICA Team		●	●	●	●	●	●	●	●	●	●		●	●

Note: ●: One or more times at least

TS 8. Organization of the Team

In order to complete the tasks successfully within the period mentioned above and conduct the survey effectively, the Contractor shall organize the survey team for comprising sufficient number of experts not limited to but including as follows:

- Team Leader (who has enough knowledge of Safety Net Programmes and Livelihood activities in Bangladesh);
- Sociologist, Socio-economist, RAP Specialist and Other Experts; and
- Support Staff (Researchers, Encoders and etc.)

TS 9. Others

Even if the period of the contract will be finished, the Contractor shall respond sincerely to the request for further explanation or investigation on the results of the Services.

TS 10. General Requirements

The Contractor shall exercise great care during the progress of the investigation to avoid any accident on the site, and will be responsible for any faults during the investigation.
Accordingly, no claims will be accepted by the JICA Survey Team.
The Contractor shall acquire all permits required for the Questionnaire Survey in target area from appropriate governments or private agencies at his own expense.

TS 11. Measurement and Payment

Payment will be based on quantities measured as "Bill of Quantities" in TS.12 based on Quotation submitted by the Contractor. The payment shall include full compensation for all machinery for the study, including equipment, tools, labor, materials, and other incidentals required to complete record and present the results.
The time spent on re-surveying because of the Contractor's deficiency or failure shall not be subject to measurement and payment.

TS 12. Bill of Quantities

No.	Item	Unit	Quantity	Unit Rate (BDT)	Amount (BDT)
1	Remuneration				
1.1	Experts/Professionals				
	Team Leader (DRM Expert)	days	15	16,000	240,000
	Safety Net & Livelihoods Expert	days	15	14,000	210,000
	Socio-economist & Assessment Expert	days	15	14,000	210,000
	Technical Advisory Panel	person	3	10000	30,000
	Subtotal			**690,000**	
1.2	Support Staff				
	Senior Reseacher	days	20	8,000	160,000
	Reseach Associate	days	56	2,000	112,000
	Enumerator/Encoder	days	7	2,000	14,000
	~~CAD Operator /~~	~~M/M~~			
	Subtotal			**286,000**	
2	Other Costs				
2.1	Transportation	L.S.	1	50,000	50,000
2.2	Air Fair	round	2	10,000	20,000
	Subtotal			**70,000**	
2.2	Reporting				
	Progress Report (Sept. 05, 2015)	L.S.			0
	Draft Final Report (Sept. 30, 2015)	L.S.			0
	Final Report (Oct. 31, 2015)	L.S.			0
	Subtotal			**0**	
2.3	Printing of Reports				
	Progress Report (Sept. 05, 2015)	set	3	1,000	3,000
	Draft Final Report (Sept. 30, 2015)	set	3	1,000	3,000
	Final Report (Oct. 31, 2015)	set	3	1,000	3,000
	Subtotal			**9,000**	
2.4	Cost for Meetings and KIIs				
	Meetings with National Governments	LS	1	10,000	10,000
	Meetings with Local Governments	LS	1	10,000	10,000
	Meetings with International/National NGOs	LS	1	10,000	10,000
	Sharing Workshop with Stakeholders	LS	1	30,000	30,000
	Subtotal			**60,000**	
2.5	Data Collection / Supplies				
	Orientation Program for Research Associates (8 Persons)	L.S.	1	30,000	30,000
	Field Visit Costs for Reseach Associates (e.g. food, accommodation, logistic)	L.S.	1	50,000	50,000
	Field Visit Costs for Experts (e.g. food, accommodation, logistic)	L.S.	1	50,000	50,000
	Subtotal			**130,000**	
2.6	FDG	L.S.		0	
Total				**1,245,000**	
3	Overhead, etc				
	Overhead, ** %	%	10		124,500
	Profit, **%		10		124,500
Total before VAT and Other Taxes				**1,494,000**	
4	VAT and Other Duties				
	VAT	%	15		224,100
GRAND TOTAL AMOUNT				**1,718,100**	

Appendix 11

Project Evaluation

(1) Asset Value Exposed: Agriculture Upazila Wise

- Potential Production=Cropped Area (2014) x Average Yield for 3 years(2012-14) x Average Price for 3 years(2012-14)
- There is a cropping calendar for each crop. A year divided into three seasons generally, the pre-monsoon season (Kharif1:March-June), the monsoon season (Kharif2: July-October) and the post-monsoon season (Rabi:Nov-Feb)
- The Price data collected from Department of Agricultural Marketing, which is monitoring the prices of various commodities in Bangladesh. The wholesale prices of Khulna were employed in this study.

Project No.	Upazila	Crop Season	Item	Area (Ha) 2014	Yeild (MT/Ha) average for 3 years 2012-14	Potential Production (MT)	Price (Tk/MT) average for 3 years 2012-14	Total Potential Value (Tk)
				[a]	[b]	[c]=[a]*[b]	[d]	[c]*[d]
No.5	Shyamnagar	*Robi*	Boro HYV	1,600	3.94	6,306	16,883	106,470,604
			Wheat	10	2.15	22	22,446	482,580
			Potato	340	14.00	4,760	12,512	59,558,231
			Oil seed	52	1.11	58	45,368	2,619,232
			Spices	117	6.75	789	179,658	141,795,182
			Pulse	550	1.03	568	109,992	62,511,874
			Winter Vegetable	710	17.28	12,268	23,701	290,758,045
		Kharif 1	Aus	100	2.58	258	16,115	4,162,964
			Maize	12	9.00	108	17,916	1,934,924
			Water melon	30	33.33	1,000	74,208	74,207,500
			Oil seed	3	0.90	3	45,368	123,141
			Spices	55	13.51	743	179,658	133,512,779
			Pulse	8	0.96	8	109,992	849,125
			Summer Vegetable	550	16.35	8,992	23,701	213,122,096
		Kharif 2	Aman	16,000	3.13	50,103	17,484	875,981,952
			Grand total	20,137	-	85,986	-	1,968,090,229
No.5	Kaliganj	*Robi*	Boro HYV	5,610	4.18	23,437	16,883	395,675,684
			Wheat	80	2.65	212	22,446	4,759,125
			Potato	600	15.77	9,459	12,512	118,354,457
			Oil seed	245	1.15	282	46,034	12,970,202
			Spices	74	6.58	487	179,658	87,427,116
			Pulse	1,350	0.83	1,125	109,992	123,740,512
			Winter Vegetable	1,865	16.67	31,083	23,568	732,565,783
		Kharif 1	Aus HYV	500	2.62	1,308	16,115	21,083,399
			Jute	70	1.86	130	21,575	2,810,250
			Summer Vegetable	1,020	14.23	14,513	23,568	342,047,337
			Spices	90	2.83	255	179,658	45,812,824
		Kharif 2	Aman HYV	17,165	2.98	51,144	17,484	894,194,451
			Grand total	28,669	-	133,436	-	2,781,441,140
No.6 No.7	Ashashuni	*Robi*	Boro Hybrid	2250	4.53	10,200	16,883	172,204,560
			Boro HYV	4020	4.03	16,205	16,883	273,585,449
			Wheat	60	2.55	153	22,446	3,435,775
			Potato	95	18.57	1,764	12,512	22,071,580
			Oil seed	195	0.93	182	46,034	8,378,641
			Winter Vegetables	610	20.85	12,718	23,701	301,419,666
		Kharif 1	Aus Hybrid	10	3.03	30	16,115	488,813
			Aus HYV	160	2.60	416	16,115	6,703,715
			Jute	125	1.68	210	21,408	4,495,750
			Summer Vegetables	450	16.28	7,326	23,701	173,634,503
		Kharif 2	Aman HYV	9880	2.92	28,842	17,484	504,262,550
			Aman Local	250	1.68	421	17,484	7,354,570
			Grand total	18,105	-	78,466	-	1,478,035,572

Project No.	Upazila	Crop Season	Item	Area (Ha) 2014	Yeild (MT/Ha) average for 3 years 2012-14	Potential Production (MT)	Price (Tk/MT) average for 3 years 2012-14	Total Potential Value (Tk)
				[a]	[b]	[c]=[a]*[b]	[d]	[c]*[d]
No. 10	Koyra	*Robi*	Boro HYV	1,610	5.40	8,702	16,883	146,908,649
			Boro Hybrid	850	7.26	6,172	16,883	104,208,513
			Wheat	35	3.10	108	22,446	2,431,884
			Pulses	0		0		0
			Potato	59	16.98	1,002	12,512	12,535,706
			Oil seed	61	0.92	56	46,034	2,574,092
			Spices	90	6.80	612	179,658	109,950,778
			Winter vegetables	410	21.48	8,807	23,701	208,744,235
		Kharif 1	Aus HYV	25	4.34	108	16,115	1,744,824
			Pulse	3	1.13	3	109,992	374,411
			Fruits	80	41.33	3,307	74,208	245,379,467
			Oil seed	68	0.92	62	46,034	2,869,480
			Spices	55	12.50	688	179,658	123,514,967
			Summer vegetables	345	15.86	5,473	23,701	129,712,445
		Kharif 2	Amon Paddy HYV	14,117	4.79	67,683	17,484	1,183,353,918
			Aman Paddy Local	383	2.82	1,079	17,484	18,865,504
			Vegetables	350	17.24	6,035	23,701	143,045,509
			Grand total	18,541	-	109,898	-	2,436,214,380
No.21	Pathaghata	*Robi*	Boro HYV	2	3.57	7	16,883	120,431
			Wheat	3	1.20	4	22,446	80,804
			Potato	450	18.73	8,430	12,512	105,478,127
			Oil seed	263	1.30	341	46,034	15,706,889
			Pulse	6,395	0.80	5,092	109,992	560,125,292
			Winter vegetable	525	10.67	5,600	23,701	132,726,347
		Kharif 1	Aus HYV	250	2.83	708	16,115	11,414,579
			Sugarcane	50	55.00	2,750	3,000	8,250,000
			Spices	260	1.55	404	179,658	72,498,088
			Summer Vegetable	350	8.01	2,803	23,701	66,442,177
		Kharif 2	Aman HYV	5,125	3.59	18,399	17,484	321,678,839
			Aman local	13,340	1.90	25,302	17,484	442,365,262
			Grand total	27,013	-	69,840	-	1,736,886,834
No.33	Kalapara	*Robi*	Boro Hybrid	306	5.50	1,684	16,883	28,427,259
			Boro HYV	506	3.85	1,947	16,883	32,872,236
			Wheat	27	2.33	63	22,446	1,414,071
			Potato	180	16.88	3,039	12,512	38,027,522
			Pulse	16,639	0.86	14,357	109,992	1,579,139,282
			Oil seed	297	1.00	298	46,035	13,701,578
			Ground Nut	205	1.83	376	62,333	23,418,510
			Winter Vegetable	1,457	14.30	20,830	23,701	493,688,988
		Kharif 1	AUS Hybrid	35	3.71	130	16,115	2,092,482
			Aus HYV	565	3.03	1,713	16,115	27,599,515
			Aus Local	360	1.73	623	16,115	10,044,062
			Maize	165	5.00	825	17,916	14,780,673
			Summer Vegetable	409	10.70	4,376	23,701	103,723,684
			Spices	200	1.27	253	179,658	45,513,394
		Kharif 2	Aman Hybrid	0	0.00	0	17,484	0
			Aman HYV	28,050	3.51	98,530	17,484	1,722,667,698
			Aman Local	11,050	2.05	22,704	17,484	396,944,276
			Grand total	60,451	-	171,747	-	4,534,055,230

Source: JICA Survey Team

(2) Asset Value Exposed: Fisheries Upazila Wise

- Potential Production=Area (2014) x Average Yield for 3 years(2012-14) x Average Price for 3 years(2012-14)
- The Price data collected from Department of Agricultural Marketing, which is monitoring the prices of various commodities in Bangladesh. The wholesale prices of Khulna were employed in this study.

Project No.	Upazila	Item	Area (Ha) 2014	Yeild (MT/Ha) average for 3 years 2012-14	Potential Production (MT)	Value (Tk/MT) average for 3 years 2012-14	Total Potential Value (Tk)
			[a]	[b]	[c]=[a]*[b]	[d]	[c]*[d]
No. 5	Shyamnagar	White Fish	8,625	0.817	7,049	185,737	1,309,232,330
		Golda	104	0.288	30	511,415	15,237,384
		Bagda	17,407	0.289	5,037	545,767	2,749,155,456
		Other	12	75.167	902	375,000	338,250,000
		Total	26,148	-	13,018	-	4,411,875,170
No.5	Kaliganj	White Fish	17,254	0.413	7,131	185,737	1,324,544,510
		Golda	69	0.361	25	511,415	12,688,198
		Bagda	15,987	0.241	3,850	545,767	2,101,200,595
		Other	4	96.487	424	375,000	158,841,250
		Total	33,314	-	11,430	-	3,597,274,553
No. 6 No. 7	Assasuni	White Fish	15,037	0.388	5,841	185,737	1,084,825,046
		Golda	812	0.662	538	511,415	275,084,587
		Bagda	17,073	0.349	5,959	545,767	3,252,234,975
		Other	83	2.008	167	375,000	62,486,979
		Total	33,005	-	12,504	-	4,674,631,587
No. 10	Koyra	White Fish	988	0.891	880	185,737	163,437,645
		Golda	270	0.482	130	511,415	66,548,396
		Bagda	6,030	0.245	1,480	545,767	807,583,073
		Other	54	6.752	361	375,000	135,467,860
		Total	7,341	-	2,851	-	1,173,036,974
No. 21	Pathaghata	White Fish	619	2.225	1,378	185,737	255,865,181
		Golda	115	0.157	18	511,415	9,266,834
		Bagda	0	0.000	0	545,767	0
		Other	0	0.000	0	375,000	0
		Total	734	-	1,396	-	265,132,015
No. 33	Kalapara	White Fish	4,060	2.422	9,831	185,737	1,826,002,659
		Golda	0	1.123	0	511,415	0
		Bagda	12	0.994	12	545,767	6,506,759
		Other	0	0.000	0	375,000	0
		Total	4,072	-	9,843	-	1,832,509,419

Source：JICA Survey Team

(3) Asset Value exposed: Properties Upazila wise

(i) Asset Value (Unit Price)

House by structure type	Building Unit Price (000BDT)	Asset inside Building Unit Price (000BDT)
Pucca	960,000	90,000
Semi Pucca	216,500	71,600
Kucha and Others	42,000	15,000

Source: JICA study team

(ii) No.of households related data

Project No.	Upazila	Total No. of population (2011)	Average fimily size (2011)	Annual Growth Rate (2001-2011)
		[a]	[d]	[c]
No.5	Shyamnagar	318,254	4.4	0.14%
No.5	Kaliganj	274,889	4.2	0.70%
No.6,7	Ashashuni	268,754	4.3	0.76%
No.10	Koyra	193,931	4.2	0.07%
No.21	Patharghata	163,927	3.8	0.12%
No.33	Kalapara	237,831	4.1	1.64%

Population Census 2011, BBS

(iii) Percentage of Type of Structure

District	Upazila	Percentage of Type of Structure (2011)			
		Pucca	Semi-pucca	Kutcha	Jhupri
Satkhira	Shyamnagar	7.6	8.6	82.9	0.9
	Assasuni	11.1	14.3	73.9	0.7
	Kaliganj	15.1	25.4	58.2	1.3
Khulna	Korya	4.4	5.5	86.9	3.3
Barguna	Patharghata	6.4	49.8	43.8	0.0
Patuakhali	Kalapara	1.6	3.3	85.1	9.9

Population & Housing Census 2011:BBS

Correction made by JICA Study Team. Percentage of Jhupri in Patharghata changed from 31% to 0%

(4) Damage rate from D- Form: Agriculture

Project No.	Upazila	Cyclone	Loss of Crops (ha)	Partial Loss of crops (ha)	*1Damage to crops on partially damaged land area (%)	Transforming partially damaged into totally damaged land area (ha)	Total damaged land area (ha)	*2Total crop land area (ha)	Damage rate (%)
			[a]	[b]	[c]	[d]=[b]*[c]	[e]=[a]+[d]	[f]	[e]/[f]
No.5	Shyamnagar	Aila	194.0	0.0	38%	0	194	17,241	1.1%
		Sidr	600.0	10,688.0	38%	4,061	4,661	17,241	27.0%
No.5	Kaliganj	Aila	152.0	245.0	38%	93	245	20,726	1.2%
		Sidr	105.0	15,945.0	38%	6,059	6,164	20,726	29.7%
No.6 No.7	Ashashuni	Aila	74.1	17.3	38%	7	81	12,614	0.6%
		Sidr	550.0	4,755.0	38%	1,807	2,357	12,614	18.7%
No.10	Koyra	Aila	1,242.2	49.4	38%	19	1,261	11,589	10.9%
		Sidr	165.0	4,195.0	38%	1,594	1,759	11,589	15.2%
No.21	Patharghata	Aila	0.0	2,718.2	38%	1,033	1,033	17,205	6.0%
		Mohasen	16,061.8	3,014.7	38%	1,146	17,207	25,730	66.9%
No.33	Kalapara	Mohasen	2,705.8	1,045.3	38%	397	3,103	56,031	5.5%
		Sidr	18,540.0	22,658.0	38%	8,610	27,150	43,242	62.8%

*1: Cyclone Sidr in Bangladesh Damage, Loss and Needs Assessment for Disaster Recovery and Reconstruction, 2008

*2: Gross cropped area data from Agriculture Census 2008, BBS

In Mohasen case, "Total Crop Area in 2013 from survey data" converted into "Gross cropped area" using " data from Agriculture Census 2008, BSS"

Source: JICA Survey Team

(5) Damage rate from D-Form: Properties

Project No.	Upazila	Cyclone	No of fully destroyed house	No of partially affected house	*1Total No. of population Year of Cyclone	*2Average fimily size 2011	Total No. of houses Year of Cyclone	Damage rate of fully destroyed house	Damage rate of partially affected house
			[a]	[b]	[c]	[d]	[e]=[c]/[d]	[a]/[e]	[b]/[e]
No.5	Shyamnagar	Aila	87,342	9,574	317,365	4.4	72,128	121.1%	13.3%
No.5	Kaliganj	Aila	2,268	3,900	271,081	4.2	64,543	3.5%	6.0%
No.6,7	Ashashuni	Aila	11,675	25,700	264,715	4.3	61,562	19.0%	41.7%
No.10	Koyra	Aila	23,820	18,620	193,660	4.2	46,109	51.7%	40.4%
No.21	Patharghata	Aila	1,204	3,502	163,534	3.8	43,035	2.8%	8.1%
No.21	Patharghata	Mahasen	1,083	15,010	164,321	3.8	43,242	2.5%	34.7%
No.33	Kalapara	Mahasen	5,248	19,790	230,218	4.1	56,151	9.3%	35.2%
No.33	Kalapara	Sidr	18,540	22,658	222,849	4.1	54,353	34.1%	41.7%

*1: Population Census 2011, BBS converted with annual growth rate from 2001 to 2011

*2: Population Census 2011, BBS

Source: JICA Survey Team

(6) Damage rate from D- Form: Affected area

Project No.	Upazila	Cyclone	Total Affected (km2)	*Total Land Area (km2)	Damage rate (%)
			[a]	[b]	[a]/[b]
No.5	Shyamnagar	Aila	360	429	83.7%
No.5	Kaliganj	Aila	198	324	61.0%
No.6,7	Ashashuni	Aila	205	349	58.8%
No.10	Koyra	Aila	No data	261	-
No.10	Koyra	Sidr	220	261	84.4%
No.21	Patharghata	Aila	160	234	68.3%
No.21	Patharghata	Mohasen	136	234	58.1%
No.33	Kalapara	Mohasen	336	467	71.9%
No.33	Kalapara	Sidr	No data	467	-

*: District Statistic 2011, BBS deducted "Reserved forest area" and " River area" from Total Upazila area

Source: JICA Survey Team

[Total Land area by Upazila]

(km2)

Upazila	Total Area	Land area	Reserved forest	River area
Koyra	1,775.40	260.56	1,512.36	2.47
Shyamnagar	1,968.23	429.43	1,534.88	3.92
Kaliganj	333.78	324.33	0.00	9.45
Ashashuni	374.81	348.88	0.00	25.93
Patharghata	387.36	234.11	37.29	115.96
Kalapara	491.89	467.11	21.05	3.73

District Statistic 2011BBS

Source: JICA Survey Team

(7) Damage rate: Loss rate for Fisheries

The fisheries production loss in affected area by Upazila

	White fish		Golda		Bagda	
	Proportion	Loss rate	Proportion	Loss rate	Proportion	Loss rate
Sundarban area						
Koyra (Aila)						
100% loss	20%	20.0%	25%	25%	20%	20.0%
70% loss	30%	21.0%	20%	14%	20%	14.0%
50% loss	30%	15.0%	40%	20%	25%	12.5%
20% loss	15%	3.0%	10%	2%	20%	4.0%
No loss	5%	0.0%	5%	0%	15%	0.0%
	100%	59%	100%	61%	100%	51%
Shyamnagar (Aila)						
100% loss	20%	20.0%	25%	25%	20%	20.0%
70% loss	20%	14.0%	30%	21%	30%	21.0%
50% loss	25%	12.5%	15%	8%	25%	12.5%
20% loss	10%	2.0%	20%	4%	10%	2.0%
No loss	25%	0.0%	10%	0%	15%	0.0%
	100%	49%	100%	58%	100%	56%
Kaligonj (Aila)						
100% loss	10%	10.0%	10%	10%	10%	10.0%
70% loss	15%	10.5%	20%	14%	25%	17.5%
50% loss	40%	20.0%	30%	15%	20%	10.0%
20% loss	10%	2.0%	10%	2%	10%	2.0%
No loss	25%	0.0%	30%	0%	35%	0.0%
	100%	43%	100%	41%	100%	40%
Ashashuni (Aila)						
100% loss	15%	15.0%	10%	10%	10%	10.0%
70% loss	15%	10.5%	20%	14%	25%	17.5%
50% loss	20%	10.0%	25%	13%	20%	10.0%
20% loss	10%	2.0%	10%	2%	10%	2.0%
No loss	40%	0.0%	35%	0%	35%	0.0%
	100%	38%	100%	39%	100%	40%
Non-Sundarban						
Patharghata (Sidr)						
100% loss	25%	25.0%	25%	25%	20%	20.0%
70% loss	30%	21.0%	20%	14%	20%	14.0%
50% loss	25%	12.5%	30%	15%	25%	12.5%
20% loss	10%	2.0%	10%	2%	20%	4.0%
No loss	10%	0.0%	15%	0%	15%	0.0%
	100%	61%	100%	56%	100%	51%
Kalapara (Sidr)						
100% loss	20%	20.0%	10%	10%	10%	10.0%
70% loss	15%	10.5%	15%	11%	25%	17.5%
50% loss	20%	10.0%	25%	13%	20%	10.0%
20% loss	10%	2.0%	20%	4%	10%	2.0%
No loss	35%	0.0%	30%	0%	35%	0.0%
	100%	43%	100%	37%	100%	40%

Source: JICA Survey Team consulting with Local Fisheries Expert

(8) AADT assumption

[Raw Data]

Type	Project No.	District/Upazila	Road Class	Road ID	Weekend/Weekday	Truck	Large Bus	Mini Bus/Micro Bus	Car	Auto Rickshaw	Pick Up	Motor Cycle
Road	HW1	Satkhira/Kaliganj	Upazila	287472010	non-hatday	80	15	37.5	60	60	120	350
					hat-day	100	20	50	100	75	150	400
	HW13	Jhalokati/Sadar	Upazila	542402001	non-hatday	0	0	0	18	600	20	500
					hat-day	0	0	0	15	900	25	700
	HW16	Patuakhali/Sadar	Upazila	578952004	non-hatday	7	5	12.5	2	70	15	400
					hat-day	15	5	12.5	5	120	50	600
Bridge	BR1	Bagerhat/Sadar	Village	5034	non-hatday	1	0	0	5	15	5	450
					hat-day	1	0	0	5	30	5	600
	BR2	Bagerhat/Mongla	Union	201583003	non-hatday	0	0	0	1	15	2	250
					hat-day	0	0	0	3	30	3	400
	BR3	Bagerhat/Mongla	Union	201583005	non-hatday	1	0	0	2	35	2	150
					hat-day	0	0	0	2	50	5	200
	BR4	Bagerhat/Mongla	Village	201584060	non-hatday	1	0	0	5	30	25	150
					hat-day	5	0	0	5	125	100	200
	BR6	Jhalokati/Nalcity	Upazila	542732003	non-hatday	70	30	75	80	150	25	400
					hat-day	150	30	75	100	200	100	500
	BR11	Barguna/Sadar	Upazila	2003	non-hatday	5	4	10	50	50	20	250
					hat-day	15	10	25	100	75	40	400
	BR12	Bhola/Sadar	Village (Imp)	4035	non-hatday	2	0	0	10	150	20	300
					hat-day	10	0	0	17	200	100	250

*Hat-day is the day a matket open. Usually twice a week.The traffic volume of hat-day is higher than that of non hat-day.
*12 hour data (8:00 a.m. to 8:00 p.m.)

[AADT]

Type	Project No.	District/Upazila	Road Class	Road ID		Truck	Large Bus	Mini Bus/Micro Bus	Utility	Car	Auto Rickshaw	Motor Cycle
Road	HW1	Satkhira/Kaliganj	Upazila	287472010	AADT	107	19	52	59	21	219	448
	HW13	Jhalokati/Sadar	Upazila	542402001	AADT	0	0	0	14	5	801	686
	HW16	Patuakhali/Sadar	Upazila	578952004	AADT	12	6	16	2	1	124	563
Bridge	BR1	Bagerhat/Sadar	Village	5034	AADT	1	0	0	4	1	28	606
	BR2	Bagerhat/Mongla	Union	201583003	AADT	0	0	0	1	0	24	360
	BR3	Bagerhat/Mongla	Union	201583005	AADT	1	0	0	2	1	48	202
	BR4	Bagerhat/Mongla	Village	201584060	AADT	3	0	0	4	1	117	202
	BR6	Jhalokati/Nalcity	Upazila	542732003	AADT	116	35	96	71	25	239	527
	BR11	Barguna/Sadar	Upazila	2003	AADT	10	7	18	53	19	94	360
	BR12	Bhola/Sadar	Village (Imp)	4035	AADT	5	0	0	10	4	235	352

*Two hatdays and five non hatdays in a week
*The 12 hour data converted to the 24 hour data using coefficient factors based on past studies of LGED
*To avoid seasonal bias, the coefficient factors for Octorber were used
* The conversion has not been done for "Pedestrian" because LGED did not have coeffient facotors for it

Source: JICA Survey Team

(9) Route length and road surface condition

	Regular Route		Detour Route	
	km2	IRI	km2	IRI
(LGED)				
HW1	10.7	6	16.6	9
HW13	5.6	6	7.5	6
HW16	4.6	6	9.9	9
BR1	4.9	12	7.8	12
BR2	1.1	9	6.7	9
BR3	2	9	7.9	12
BR4	1.2	9	7.1	9
BR6	9.1	9	10	9
BR11	0.3	6	3	9
BR12	2.4	9	7.4	12
(BWDB)				
20	20.2	6	20.9	8

(10) RHD Road User Cost Annual Report for FY 2004/2005

- Converted into 2015 price

Unit VOC(BDT/km)

Road Surface Condition	IRI	Truck	Large Bus	Mini Bus/Micro Bus	Utility	Car	Auto Rickshaw	Motor Cycle
Good	4	25.37	30.99	25.71	20.92	21.05	5.24	2.94
Fair	6	27.47	33.70	27.41	22.70	22.32	5.51	3.03
Bad	8	29.59	36.66	29.29	25.25	23.58	5.83	3.07
V. Bad	10	31.88	40.77	31.64	28.82	25.10	6.19	3.09

Unit TTC(BDT/hr)

Vehicle Category		Truck	Large Bus	Mini Bus/Micro Bus	Utility	Car	Auto Rickshaw	Motor Cycle
TTC per passenger	(BDT/hr)	-	39.8	48.0	69.8	69.8	37.0	51.7
Average Occupancy	(Person / Veh)	-	36.4	22.2	3.0	3.0	4.0	1.0
TTC per Vehicle	(BDT/hr)	-	1447.1	1065.6	209.4	209.4	148.2	51.7

Vehicle Operating Speed (Km/hr)

Road Surface Condition	IRI	Truck	Large Bus	Mini Bus/Micro Bus	Utility	Car	Auto Rickshaw	Motor Cycle
Good	4	65.50	74.00	70.50	85.00	84.00	50.00	70.00
Fair	6	63.00	73.00	69.00	82.00	81.00	48.00	69.00
Bad	8	59.00	65.00	65.50	71.00	72.00	45.00	65.00
V. Bad	10	53.00	54.00	58.00	60.00	60.00	42.00	58.00

(11) Cost benefit flow

[Component1 Total]

Confidential

[BWDB Part]

Confidential

[LGED Part]

Confidential

Confidential

Component 1 Total: Breakdown by Subproject

(12) Summary of Discussion on Operation and Effect Indicator

(a) BWDB

(i) Embankment

Maximum water level of observation point (m): Operation Indicator

BWDB has placed gauging stations at various places. By monitoring the water level near the each project site periodically, the operational condition of the output can be monitored. The methodology will be determined after the selection of the subprojects.

Decreasing in frequency of inundation inside the subproject area caused by embankment breach (times/year): Effect Indicator

It is inevitable for the embankments repaired or rehabilitated to be overtopped by flooding because their designed return period is once in six to seven years. Thus, it is reasonable to evaluate the effect with the above mentioned indicator which shows frequency of inundation caused by embankment breach inside the area. The target figure is assumed to be zero, which means no inundations will occur there. The baseline will be determined in the baseline survey in which the vulnerability of the embankment will be evaluated, which was assumed to be once in two years as the premise of the economic analysis in this report. The baseline, target figure, methodology will be determined after the selection of the subprojects.

(ii) Revetment

Monitor eroded points of the revetments (Number): Operation Indicator

The operation condition of the output can be monitored by checking and recording of the condition of the revetment repaired or rehabilitated.

The method to check and record the condition is assumed that checking on the ground if there are river bank erosions occurring in the revetment and then recording what are found with the date and photos of the conditions. Regarding to the frequency of the monitoring, it is preferable to be the similar frequency as that of current periodic check of the revetment. The methodology will be determined after the selection of the subprojects.

Decreasing of distance in riverbank shifting (m): Effect Indicator

The critical infrastructures of airport and bridge will be protected by the revetment repaired or rehabilitated from river bank erosions. The effect of the outputs can be evaluated using distance of movement of the riverbank line arise from the riverbank erosion. The length of the shortest straight line, which connects a point of the riverbank and a point of the critical infrastructure where needed to be protected, would become shorter as time proceeds if the revetment was not repaired or rehabilitated. If it repaired or rehabilitated, it would not change because the risk of the riverbank erosion was eliminated. The baseline is considered to be the length of move per

year. For the subproject No.19 of Barisal airport, it is estimated to be 20 to 25 meters per year based on the satellite images available. As for the subproject No.20, it is estimated 7 to 8 meteres per year. The baseline, target figure and methodology will be determined after the selection of the subproject.

(b) LGED

(iii) Bridge and Road

Annual average daily traffic (vehicle / day): Operation Indicator

The operational condition of the outputs can be monitored by counting the traffic of each subproject site. It is possible for LGED to conduct such a traffic count survey every subproject site in every year.

Decreasing of impassable day caused by disasters (day / year): Effect Indicator

The effect of the outputs can be measured by counting the decreased number of the impassable days especially in the case of bridges. There has been already hazards occurring to move traffic on each subproject site, it is assumed that the baseline is 365 days. Although the target figure is assumed to be zero, it will be determined after taking into account of actual site condition. According to LGED, how to count impassable days is not difficult because there are reports issued namely "Flood Disaster Report" at LGED local offices which are issued when a hazard occurs on the roads and bridges under the control of LGED and then assembled at the HQ of LGED and one can tell easily the impassable days from the description in the reports such as the date of incident happened and explanation of the road or bridge condition. The impassable days can take as the period starting from the date stated in the report and ending up to the date the hazard are resolved. There may be a case that the report is not issued despite there is a hazard occurs on a road or bridge, but even in such a case it is possible to check whether there is a hazard or not through the traffic count survey mentioned above. Each hazard of the subprojects must be varied to some extent, thus it may be needed that baseline will be determined based on the actual site condition such as a hazard to move traffic by vehicle types. The baseline, target figure and methodology will be determined after the selection of the subprojects.

Shortening time to travel (hour): Effect Indicator

The required time to travel will be shortened due to the improvement in the travel performance of the vehicles passing through on the roads or bridges especially in the case of roads. The vehicle operation cost can be used instead, if it is difficult to measure the time. Especially in the case of bridges, it can be expected that the required time to move for emergency response will be shortened. For example, the required time for passing through an evacuation route from a village to a cyclone shelter, on which there is a bridge similar to the subproject bridges, will be shortened. Engineers of LGED can measure such a required time with the man-power and

equipment currently they have, but they need a lecture of how to measure it when they do for the first time. The baseline, target figure and methodology will be determined after the selection of the subprojects

Annual average daily traffic (vehicle/ day): Effect Indicator

Although this indicator is proposed as the operation indicator, it can be used as an effect indicator as well on the condition that the AADT before implementation of the subproject is counted. One can confirm the effect of the output through the comparison of AADTs before and after the implementation. It is recommended that a complicated analysis method should not been employed to set the target figure when it will be determined, but easier way like just confirming if the traffic volume is increased.

(c) DDM

(iv) Communication Network System

Maintenance report (times/year): Operation Indicator

The operational condition of the output can be monitored from the maintenance report of the equipment. DDM seems to be preparing a procedure manual for operation and maintenance of the equipment allocated at its upazila offices under the Cyclone Preparedness Program (CPP). The procedure includes the process of reporting on periodical maintenance. Although the communication network system has not been covered by the manual yet, but the maintenance report for this equipment can be available by employing the similar procedure.

Training Report (times/year): Operation Indicator

The operational condition of the output can be monitored from the training report which records execution of the training which uses the communication network system in the process. DDM seems to have conducted an emergency training for upazila level operations under CPP, and have a plan to conduct advanced emergency training which requires cross-sectoral operations from HQ of DDM to volunteers in near future. The training report was prepared at the time. It can be considered that execution of such a periodical training and reporting are possible.

Increasing of number of equipped office (number): Effect Indicator

Installing the communication network system will ensure the more redundant mean of communication between district office (DRRO) and upazila office (PIO) than using mobile phones. The effect of the output can be measured by counting the expanded area where the communication network systems with high redundancy are equipped. In concrete terms, counting the increased number of equipped offices was assumed as the method of measurement. The baseline, target figure will be determined after the selection of the equipment, which are basically considered to be the same figures stated in the Chapter 4.

Reduction of response time for emergency (hour): Effect indicator

The response time for emergency which starts from the occurrence of an emergency situation and ends at the completion of the rescue will be reduced by installing the communication network systems. For example, the current communication network system are depending on only mobile phones and there is high probability of disruption of the communications at the time of disaster. In this case the reduction of the response time can be measured by a comparison of the two response times; one is the response time for a rescue activity with the current communication network system under disruption of communications. Another is with the equipment which will be installed under this project. It is assumed that such a demonstration of rescue activity will be conducted to measure the reduced time. The baseline and target figure will be determined after the discussion among stakeholders.

(v) Equipment for Emergency Rescue

Maintenance report (times/year): Operation Indicator

The operational condition of the output can be monitored from the maintenance report of the equipment. As described previously, DDM seems to be preparing a procedure manual for operation and maintenance of delivered equipment at upazila office. By using the similar procedure, it is considered that the maintenance report will be available.

Operation report （times）: Operation Indicator

The operational condition of the output can be monitored from the operation report of the equipment. As described above, DDM seems to be preparing a procedure manual, thus the operation report is considered to be available by following to the procedure manual.

Training report (times/year): Operation Indicator

The operational condition of the output can be monitored from the training report which records execution of the training which uses the equipment for emergency rescue in the process. As described in the previous section, DDM seems to have conducted an emergency training which used the equipment delivered under CPP. And the result of this training was recorded as the training report. Thus it is considered to be available such a training report, if DDM conduct periodical emergency trainings continuously.

Increasing of number of equipped office (number): Effect Indicator

Installing the equipment for emergency rescue to the district offices and the upazila offices will fulfill the necessities of the equipment described in Chapter 4, and then will strengthen DDM's abilities for emergency response in the areas. The effect of the output can be measured by counting the expanded area where the equipment for emergency rescue is delivered. In concreate term, counting the increased number of offices equipped was assumed as the method of measurement. The baseline, target figure will be determined after the selection of the

equipment, which are basically considered to be the same figures stated in the Chapter 4. Additionally, as the equipment can be transported or transferred, it is recommended that the equipped office should be defined as the office which has the equipment in its own jurisdictional area.

The table below shows the summary of the interview with a PIO conducted by JICA Survey Team about assumed usages of the equipment for emergency rescue in terms of strengthening DDM's abilities. The answers from the PIO were given on the condition that the assumptions of the usage were made under the constrain of insuffient information about the equipment (ex. without any detail spec information) and the case study approach assuming that if the equipment were allocated under PIO's coverage. The findings were a number of concreate ideas of how the installation of the equipment will strengthen DDM's abilities.

Table Assumed Usage of Equipment's for emergency rescue

Name of equipment	Assumed Usage
Solar Panel	Solar panel is assumed to be utilized as an alternate power source for PIO's office at the time of disaster. There are often electricity outages happening during that time, it requires an alternative power source to supply the office equipment which are needed for emergency response such as communication facilities or computers and its peripherals e.g. with electricity. The abilities for emergency response will be strengthened by installing independent power source which maintains the function of PIOs office during electricity outages.
Rescue Speed Boat & Life Jacket	One of the usages of a rescue speed boat is the usage in rescue activities at the time of flooding. At the time, the people affected often escape on roofs of housing from water on a temporary basis. To rescue those who escape on roofs, rescue speed boats can be used even in a river with high waves. Because the number of such a rescue speed boat is insufficient, it is not rare case that rescuers are forced to wait on roofs for 2 -3 days. It will be earlier to rescue, if rescue speed boats are added. As for life jackets, it is necessary for peoples to move from a roof to a boat safely when they are rescued.
Portable Generator	One of the usages is to use as a back-up power supply at the time of disaster. The fact is that there was an electricity outage continuing for 2-3 months in a certain Union in the past disaster. Thus a portable generator will strengthen the abilities for both emergency response and reconstruction livelihood after disaster.
Megaphone/Siren	The pieces of equipment are being utilized for the purpose of giving a warning, and assumed to be delivered the places where those has not delivered yet. Sirens are installation type and megaphones are portable type. The time required to transmit warnings to the target people will be earlier and the covered area of the warning will be expanded, if the equipment is installed.
First aid kit	When getting injured or getting worse the symptom of illness during emergency, if urgent medical treatments are available, it will be avoidable that the situations become even worse. Thus it increases the probability of survival of rescuers and strengthens the abilities for emergency response.
Stretcher	One of the usages is to use for carrying disable or older persons who cannot escape by themselves from disaster. Evacuation of the vulnerable people will be earlier by delivering stretchers.
Radio set	When the time of disaster, any troubles such as disable mobile phones can happen and then it becomes difficult to get information from outside. Radio sets enable people to get information needed to make appropriate decisions,

	and increases the probability of survival of rescuers.

Source: JICA Survey Team

Additionally, with regard to the equipment for emergency rescue, it is more likely to be needed additional man-power at the upazila offices for the purpose to manage and maintain the equipment delivered, when above mentioned tasks such as preparing maintenance report, operation report and training report are added to their routine works. According to the information from the interview, it is needed two additional staffs or at least a staff to manage equipment in accordance with the procedure manual prepared under the CPP. Although the methodology will be determined after discussion among the stakeholders, it is recommended to pay much attention to take care of man-power needed.

Increasing of number of people rescued by the equipment (number): Effect Indicator

The number of people rescued can be measured by recording the number of rescuers in the operation report mentioned above. And then the effect of the output can be evaluated. The baseline and target figure will be determined after the selection of the equipment and determination of the operational procedure for the operation report.

Reduction of response time for emergency response (hour): Effect Indicator

The response time for emergency which starts from the occurrence of an emergency situation and ends at the compleation of the rescue will be reduced by installing the equipment. For example, the shortage of the rescue boats make the required time for the rescue much longer but installing a sufficient number of boats minimizes the time. It is assumed that a demonstration of rescue activity will be conducted to measure the reduced time. The baseline and target figure will be determined after the discussion among stakeholders.

(d) FSCD

(vi) Communication Network System

Maintenance report (times/year): Operation Indicator

The operational condition of the output can be monitored from the maintenance report of the equipment. According to the discussion with FSCD, some pieces of the similar type of the equipment have been already delivered to fire stations, and periodical maintenance is being conducted, and the maintenance reports are being retained. The frequency of periodical maintenance, although it depends on the type of equipment actually, is basically every month. The maintenance report for the equipment which FSCD has less experience to use will be available on the condition that the instructions of how to conduct the maintenance are given to FSCD's staffs at the time of introduction. FSCD has an intention to assign those who have been engaging maintenance works with those new maintenance tasks. The equipment which FSCD has less experience to use is "Field communication vehicle". It is required to give instruction

about the maintenance method to the FSCD staffs, let them understand and make sure that the maintenance report will be delivered.

Operation report (only for movable system) (times): Operation Indicator

The operational condition of the output can be monitored from the operation report of the equipment. To avoid the case that it will be disturbance in the regular operations of FSCD, it is assumed that the pieces of the equipment subject to be reported are only movable systems, namely "Field communication vehicle" and "VHF car mobile set". The operational condition of movable systems considered to be easier to monitor because FSCD is monitoring the usage of fuel strictly with making records in each time of the usage.

Training report (only for movable system) (times/year): Operation Indicator

The operational condition of the output can be monitored from the training report. FSCD conducts such training sessions regularly, and there are the official letter which is issued in each training session and the record of the fuel usage for the training. FSCD mentioned that the training report will be available by using those information and data. The fixed type of communication network systems is considered to be excluded, because FSCD conducts training for the fixed type of equipment not regularly but only when operation beginners need it.

Increasing of number of equipped Fire Station (own area basis number): Effect Indicator

Installing the communication network system will ensure the more redundant and more efficient mean of communication than using mobile phones at the time of emergency. The effect of the output can be measured by counting the expanded area where such communication network systems are equipped. In concrete terms, counting the increased number of equipped offices was assumed as the method of measurement. The baseline, target figure will be determined after the selection of the equipment, which are basically considered to be the same figures stated in the Chapter 4. Additionally, as the equipment can be transported or transferred, it is recommended that the equipped office should be defined as the office which has the equipment in its own jurisdictional area.

Reduction of response time for emergency (hour): Effect indicator

The response time for emergency which starts from the occurrence of an emergency situation and ends at the completion of the rescue will be reduced by installing the communication network systems. For example, the current communication network system are depending on only mobile phones and there is high probability of disruption of the communications at the time of disaster. In this case the reduction of the response time can be measured by a comparison of the two response times; one is the response time for a rescue activity with the current communication network system under disruption of communications. Another is with the equipment which will be installed under this project. It is assumed that such a

demonstration of rescue activity will be conducted to measure the reduced time. The baseline and target figure will be determined after the discussion among stakeholders.

(vii) Equipment for Emergency Rescue

Maintenance report (times/year): Operation Indicator

The operational condition of the output can be monitored from the maintenance report of the equipment. According to the discussion with FSCD, some pieces of the similar type of the equipment have been already delivered to fire stations, and periodical maintenance is being conducted, and the maintenance reports are being retained. The frequency of periodical maintenance, although it depends on the type of equipment actually, is basically every month. The maintenance report for the equipment which FSCD has less experience to use will be available on the condition that the instructions of how to maintain the equipment are given to FSCD staffs at the time of introduction. FSCD has an intention to assign those who have been engaging maintenance work to do those new maintenance tasks. It is required to explain the maintenance method to FSCD staffs, let them understand and make sure that the maintenance report will be delivered.

Operation report (times): Operation Indicator

The operational condition of the output can be monitored from the operation report of the equipment. To avoid the case that it will be a disturbance for the regular operations of FSCD, the usage of the equipment should be recorded in the report in an easier way like that recording the usage of some pieces of equipment as one-package or using the record of the fuel usage so that one can reduce the work volume to make a report.

Training report (times/year): Operation Indicator

The operational condition of the output can be monitored from the training report which records execution of the training which uses the equipment for emergency rescue. FSCD conducts such training sessions regularly, and there are the official letter which is issued for each training session and the record of the fuel usage needed for the training. FSCD mentioned that the training report will be available by using those information and data. In order to reduce the burden for preparing the report, it is assumed that the usage of the equipment can be recorded as a package. For example, a boat and its accompanying equipment can be considered as a package.

Increasing of number of equipped Fire Station (own area basis number): Effect Indicator

Installing the equipment for emergency rescue will make it available to deliver quicker responses for emergency rescue, strengthening FSCD's avilities. The effect of the output can be measured by counting the expanded area where the pieces of equipment for emergency rescue are delivered. In concreate term, counting the increased number of offices equipped was

assumed as the method of measurement. The baseline, target figure will be determined after the selection of the equipment, which are basically considered to be the same figures stated in the Chapter 4. Additionally, as the equipment can be transported or transferred to the damaged areas in the case of disaster, it is recommended that the equipped fire station should be defined as a station which has the equipment in its own jurisdictional area.

Reduction of response time for emergency response (hour): Effect Indicator

The response time for emergency which starts from the occurrence of an emergency situation and ends at the compleation of the rescue will be reduced by installing the equipment. For example, the shortage of the rescue boats make the required time for the rescue much longer but installing a sufficient number of boats minimizes the time. It is assumed that a demonstration of rescue activity will be conducted to measure the reduced time. The baseline and target figure will be determined after the discussion among stakeholders.

Increasing of number of people rescued by the equipment (number): Effect Indicator

A number of people can be rescued by installing the equipment at the time of disaster. The effect of the output can be measured by the number of people rescued. There were a lot of dead in the past disasters who would have survived if the rescue activity has conducted earlier. Since there have never been most of the pieces of the equipment delivered in the areas, the number of death in the areas will surely be decreased, if the equipment is installed. It is possible to compare the death number with what it was in the past because FSCD has the historical record regarding number of death by disasters. However it is necessary to develop a measuring method for the target figure because it is difficult to predict an occurrence of disaster. It may be adjusting the measured number with the frequency or scale of disaster or the operating rates of the equipment. The baseline and target figure will be determined after the discussion among the stakeholders.

(e) Disaster Recovery Fund

(viii) Stengthen Bangladesh government's capacity on comprehensive disaster risk reduction (DDM)

Number of disaster recovery and reconstruction projects implemented through coordination between ministries under the scheme of DRF (Number): Operation Indicator

(ix) Early response and recovery (DDM)

The number of disaster recovery and reconstruction projects that are completed within a year of disaster stricken under the scheme of DRF (number): Operation Indicator

The number of days which are required a recovery and reconstruction project to be approved under the scheme of DRF (day): Operation Indicator

Appendix 12.1

Environmental Check List

Environmental Checklist: 7. Roads (1)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) (b) (c) (d)
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y,Y,Y (b) Y	(a) Meetings in the communities along the road were held in Sept. 2015. Adequately explained to the local stakeholders based on appropriate procedures. The consensus concerning construction was established between them. Stakeholder meetings will be held in the process of IEE/EIA. (b) Comments from the public and authorities will be properly responded.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) They are examined at the feasibility study.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(a) Y (b) NA	(a) They will affect ambient air quality since improvement of road increases traffic and speed of vehicles. If ambient air quality does not comply with the Bangladesh air quality standards, some mitigating measures will be taken. (b) The sites of proposed projects are far from industrial areas.
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?	(a) Y (b) N (c) Y,N	(a) Due to potential declining quality of water in downstream areas, monitoring of water quality in the areas will be conducted. (b) - (c) Effluents from facilities such as construction camp comply with the effluent standards of Bangladesh.
	(3) Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) Wastes generated along the improved road due to increase in the number of developments, employees, and activities and retail (cafes, restaurants, etc.) are properly treated and disposed of in accordance with the Bangladesh regulations.
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) Y	(a) Operational noise levels are predicted. In the areas where noise levels exceed the standard, mitigation measures should be taken by traffic

Environmental Checklist: 7. Roads (2)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) -
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?	(a) N (b) N (c) NA (d) Y (e) N,NA (f) NA	(a) - (b) - (c) - (d) Prior to the commencement of construction works onsite of road, an Environmental Management Plan (EMP) will be produced to minimize potential impacts upon habitats and species. (e) - (f) -
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a) N	(a) The project does not affect surface water and groundwater flows.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) N, NA (b) N (c) Y,Y	(a) It is reported that there is no soft ground in the project area according to the road engineer of the JICA Team. (b) The route is located on the flat land where slope failures or landslides may not be caused. (c) Construction practices should be under measures for controlling soil erosion prior to excavation, in addition special measures will be taken to prevent soil erosion by certain construction equipment.

Environmental Checklist: 7. Roads (3)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Are the compensations going to be paid prior to the resettlement? (e) Are the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) NA (c) NA (d) NA (e) NA (f) NA (g) NA (h) NA (i) NA (j) NA	(a) The project implementation does not cause involuntary resettlement since there is no alteration of road alignment and widening. (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -
	(2) Living and Livelihood	(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that roads will impede the movement of inhabitants? (f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?	(a) Y,N,NA (b) N,NA (c) N,Y (d) N (e) N (f) N	(a) Example: Benefitted (travel time reduction, access improvement) by approx. 10,000 population of locals of Unions (Bhadrakali, Sreepur, Bishnupur Union) alongside and contribute to enhancement of prawn transportation. (b) - (c) Local workers associated with the project will be employed. Regular health inspection will be carried out. (d) - (e) Traffic safety campaign is necessary to reduce accidents. (f) -

Environmental Checklist: 7. Roads (4)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N,NA	(a) According to "List of All Archaeological Sites in Bangladesh", the project sites are far from those archaeological sites.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N,NA	(a) Location of reconstruction is proposed almost at the same location as before.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a) Y (b) Y	(a) If some impacts of the projects are expected on them, considerations are given to reduce the impacts. (b) Yes, they are to be respected.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) No, never. (b) A safety and health plan for workers is implemented and personal protective gear is provided suitable to the type of work being performed. (c) ditto (d) Appropriate measures are being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y (c) Y	(a) Adequate measures are considered to reduce impacts during construction. (b) Adequate measures are considered to reduce impacts regarding the natural environment (ecosystem). (c) Adequate measures are considered to reduce impacts regarding the social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	(a) The proponent develops and implements monitoring program for the environmental items that are considered to have potential impacts. (b) Refer to 6.2.3 Environmental Management. The tangible monitoring program is proposed by conducting IEE/EIA of the projects. (c) 1) The implementing entities of monitoring during construction stage are construction contractors and the proponent. 2) The implementing entity of monitoring during operation stage is the proponent. 3) The proponent will establish an adequate monitoring framework. (d) Methodology and frequency of a report to the Department of Environment will be listed in IEE/EIA reports.

Environmental Checklist: 7. Roads (5)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N/A (b) N/A	(a) Not applicable (b) Not applicable
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)	(a)

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

Environmental Checklist: 11. River and Sand Erosion Control (1)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) (b) (c) (d)
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y,Y,Y (b) Y	(a) Meetings in the communities along the road were held in Sept. 2015. Adequately explained to the local stakeholders based on appropriate procedures. The consensus concerning construction was established between them. Stakeholder meetings will be held in the process of IEE/EIA. (b) Comments from the public and authorities will be properly responded.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) They are examined at the feasibility study.
2 Pollution Control	(1) Water Quality	(a) Is there a possibility that changes in river flow downstream (mainly water level drawdown) due to the project will cause areas that do not comply with the country's ambient water quality standards?	(a) N	(a) The project does not cause change in river flow downstream.
	(2) Wastes	(a) In the case of that large volumes of excavated/dredged materials are generated, are the excavated/dredged materials properly treated and disposed of in accordance with the country's standards?	(a) Y	(a) The excavated/dredged materials will be reused for construction materials.
	(3) Subsidence	(a) Is there a possibility that the excavation of waterways will cause groundwater level drawdown or subsidence? Are adequate measures taken, if necessary?	(a)	(a)
	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country' s laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) Y,N	(a) Three sub-project sites at Shyamnagar, Koyra and Patharghata are located in Sundarban ECA (Ecologically Critical Area) designated by Environment Conservation Act'95. In compliance with the latest NOTIFICATION, adequate measures will be take to implement those sub-projects.

Environmental Checklist: 11. River and Sand Erosion Control (2)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that hydrologic changes, such as reduction of the river flow, and seawater intrusion up the river will adversely affect downstream aquatic organisms, animals, vegetation, and ecosystems? (e) Is there a possibility that the changes in water flows due to the project will adversely affect aquatic environments in the river? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) Y (d) N (e) N	(a) Those project sites are located near primeval forests, tropical rain forests, and ecologically valuable habitats such as mangroves and tidal flats. (b) Those project sites are located near the protected habitats of endangered species designated by the Bangladesh laws, international treaties and conventions. (c) Although significant ecological impacts may not be anticipated since the projects are to reconstruct embankments, adequate protection measures will be taken to reduce the impacts on the ecosystem. (d) There may be no possibility that hydrologic changes since the projects are to reconstruct embankments. (e) Although there may be no possibility that the changes in water flows since the projects are to reconstruct embankments, adequate measures will be taken to reduce the impacts on aquatic environments.

Environmental Checklist: 11. River and Sand Erosion Control (3)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) N	(a) There is not such a possibility since the projects are to reconstruct embankments.
	(4) Topography and Geology	(a) Is there a possibility that excavation of rivers and channels will cause a large-scale alteration of the topographic features and geologic structures in the surrounding areas?	(a) N	(a) There is not such a possibility since the projects are to reconstruct embankments.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) NA (c) NA (d) NA (e) NA (f) NA (g) NA (h) NA (i) NA (j) NA	(a) The project implementation does not cause involuntary resettlement since there are no affected houses at the project site. (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect the downstream fisheries and other water uses? (c) Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced?	(a) N,NA (b) N (c) N	(a) Example: Protection residents, agricultural land, aquacultural land, roads, etc., from disaster. To secure the air-route between Dhaka of national center and Barisal of reginal center. Air-route is very important for disaster relief activities and rehabilitation works when disasters occur. Protection residents, agricultural land, roads, etc., from disasters. Also, it is effective for smooth drainage inside of polder. (b) The project does not use a large amount of water. (c) The project is not to construct dam or reservoir.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N,NA	(a) According to "List of All Archaeological Sites in Bangladesh", the project sites are far from those archaeological sites.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N,NA	(a) Location of reconstruction is proposed almost at the same location as before.

Environmental Checklist: 11. River and Sand Erosion Control (4)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a) Y (b) Y	(a) If some impacts of the projects are expected on them, considerations are given to reduce the impacts. (b) Yes, they are to be respected.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) No, never. (b) A safety and health plan for workers is implemented and personal protective gear is provided suitable to the type of work being performed. (c) ditto (d) Appropriate measures are being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y (c) Y	(a) Adequate measures are considered to reduce impacts during construction. (b) Adequate measures are considered to reduce impacts regarding the natural environment (ecosystem). (c) Adequate measures are considered to reduce impacts regarding the social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	(a) The proponent develops and implements monitoring program for the environmental items that are considered to have potential impacts. (b) Refer to 6.2.3 Environmental Management. The tangible monitoring program is proposed by conducting IEE/EIA of the projects. (c) 1) The implementing entities of monitoring during construction stage are construction contractors and the proponent. 2) The implementing entity of monitoring during operation stage is the proponent. 3) The proponent will establish an adequate monitoring framework. (d) Methodology and frequency of a report to the Department of Environment will be listed in IEE/EIA reports.

Environmental Checklist: 11. River and Sand Erosion Control (5)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry checklist should also be checked.	(a) N/A	(a) Not applicable
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)	(a)

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience)
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Environmental Checklist: 12. Bridges (1)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) (b) (c) (d)
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y,Y,Y (b) Y	(a) Meetings in the communities along the road were held in Sept. 2015. Adequately explained to the local stakeholders based on appropriate procedures. The consensus concerning construction was established between them. Stakeholder meetings will be held in the process of IEE/EIA. (b) Comments from the public and authorities will be properly responded.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) They are examined at the feasibility study.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) If air quality already exceed country's standards near the route, is there a possibility that the project will make air pollution worse?	(a) Y (b) NA	(a) They will affect ambient air quality since improvement of road increases traffic and speed of vehicles. If ambient air quality does not comply with the Bangladesh air quality standards, some mitigating measures will be taken. (b) The sites of proposed projects are far from industrial areas.
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that the project will contaminate water sources, such as well water?	(a) Y (b) N	(a) Due to potential declining quality of water in downstream areas, monitoring of water quality in the areas will be conducted. (b) -
	(3) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards? (b) Do low frequency sound from the vehicle and train traffic comply with the country's standards?	(a) Y (b) NA	(a) Operational noise levels are predicted. In the areas where noise levels exceed, the standard mitigation measures should be taken by traffic control. (b) There is no standard regarding low frequency sound set in Bangladesh. However, in the areas where such low frequency sounds

Environmental Checklist: 12. Bridges (2)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) Y,N	(a) Two sub-project sites at Mongla are located in Sundarban ECA (Ecologically Critical Area) designated by Environment Conservation Act' 95. In compliance with the latest NOTIFICATION, adequate measures will be take to implement those sub-projects.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of bridges and access roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (non-native invasive) species and pests? Are adequate measures for preventing such impacts considered?	(a) N (b) N (c) Y (d) N (e) N	(a) Those project sites are located near primeval forests, tropical rain forests, and ecologically valuable habitats such as mangroves and tidal flats. (b) Those project sites are located near the protected habitats of endangered species designated by the Bangladesh laws, international treaties and conventions. (c) Although significant ecological impacts may not be anticipated since the projects are to reconstruct bridges, adequate protection measures will be taken to reduce the impacts on the ecosystem. (d) There may be no possibility that hydrologic changes since the projects are to reconstruct bridges. (e) Although there may be no possibility that the changes in water flows since the projects are to reconstruct bridges, adequate measures will be taken to reduce the impacts on aquatic environments.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the installation of structures will adversely affect surface water and groundwater flows?	(a) N	(a) The project is to reconstruct the bridges destroyed by previous cyclones.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) N, NA (b) N (c) Y,Y	(a) It is reported that there is no soft ground in the project area according to the road engineer of the JICA Team. (b) The route is located on the flat land where slope failures or landslides may not be caused. (c) Construction practices should be under measures for controlling soil erosion prior to excavation, in addition special measures will be taken to prevent soil erosion by certain construction equipment.

Environmental Checklist: 12. Bridges (3)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) NA (c) NA (d) NA (e) NA (f) NA (g) NA (h) NA (i) NA (j) NA	(a) The project implementation does not cause involuntary resettlement since there are no houses around the bridges to be reconstructed. (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -
	(2) Living and Livelihood	(a) Where bridges and access roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts? (b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary? (c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)? (e) Is there any possibility that project will impede the movement of inhabitants? (f) Is there any possibility that bridges will cause a sun shading and radio interference?	(a) Y,N,NA (b) N,NA (c) N,Y (d) N (e) N (f) N	(a) Example: Benefitted (improved access, connectivity of severed communities) by approx. 18,000 people of the nearby village (resettled by the GOB). Also contributes to safe and reliable evacuation access during disaster. (b) - (c) Local workers associated with the project will be employed. Regular health inspection will be carried out. (d) - (e) Traffic safety campaign is necessary to reduce accidents. (f) -

Environmental Checklist: 12. Bridges (4)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N,NA	(a) According to "List of All Archaeological Sites in Bangladesh", the project sites are far from those archaeological sites.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N,NA	(a) Location of reconstruction is proposed almost at the same location as before.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) Y (b) Y	(a) If some impacts of the projects are expected on them, considerations are given to reduce the impacts. (b) Yes, they are to be respected.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) No, never. (b) A safety and health plan for workers is implemented and personal protective gear is provided suitable to the type of work being performed. (c) ditto (d) Appropriate measures are being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents.

Environmental Checklist: 12. Bridges (5)

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y (c) Y	(a) Adequate measures are considered to reduce impacts during construction. (b) Adequate measures are considered to reduce impacts regarding the natural environment (ecosystem). (c) Adequate measures are considered to reduce impacts regarding the social environment.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	(a) The proponent develops and implements monitoring program for the environmental items that are considered to have potential impacts. (b) Refer to 6.2.3 Environmental Management. The tangible monitoring program is proposed by conducting IEE/EIA of the projects. (c) 1) The implementing entities of monitoring during construction stage are construction contractors and the proponent. 2) The implementing entity of monitoring during operation stage is the proponent. 3) The proponent will establish an adequate monitoring framework. (d) Methodology and frequency of a report to the Department of Environment will be listed in IEE/EIA reports.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways and Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) Y (b) N/A	(a) Pertinent items described in the Roads checklist was also checked. (b) Not applicable
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)	(a)

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropria environmental considerations are required to be made.
In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experien
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Appendix 12.2

Terms of Refernce for Initial Environmental Examination Study

TERMS OF REFERENCE (TOR)
FOR
PROVISION OF CONSULTING SERVICE TO CONDUCT
INITIAL ENVIRONMENTAL EXAMINATION STUDY
FOR 5 SUB-PROJECTS
UNDER
THE PREPARATORY SURVEY ON
THE CAPACITY ENHANCEMENT ON DISASTER RISK REDUCTION,
EMERGENCY RESPONSE AND RECOVERY PROJECT

SECTION-1 INTRODUCTION

1.1 General

This specification shall be applied to the Preparatory Survey on *"The Capacity Enhancement on Disaster Risk Reduction, Emergency Response and Recovery Project"*. The Consulting Service for preparation of Initial Environmental Examination (IEE) to be carried out by the Sub-consultant under the Contract for the Preparatory Survey being carried out by the Survey Team.

1.2 Background

The People's Republic of Bangladesh (hereinafter referred to as "Bangladesh") is one of the most vulnerable countries to natural disasters. It is located in the world's largest delta, with 90% of land located in low-lying areas of less than 10 meters above sea level. Twenty percent (20%) of its land area is inundated in the rainy season, and cyclones occur in almost every year. In 1998, about 70 % of the land area is inundated. More than three thousand people lost their lives due to Cyclone Sidr in 2007 and extensive damage to houses and infrastructures was inflicted by Cyclone Aila in 2009. In the last half of the 20th century, the total number of deaths due to natural disasters was more than 700 thousand, and the aggregate number of victims in the last 10 years was more than 75 million people.

The Japan International Cooperation Agency (JICA) has been supporting the GOB's efforts to reduce disaster risk through several technical cooperation projects. This preparatory survey is initiated to formulate a comprehensive Yen-Loan project for the improvement of disaster management of Bangladesh through support to the 'Department of Disaster Management (DDM)' under the 'Ministry of Disaster Management and Relief (MODMR)'. The project shall comprise three (3) components. Repair and improvement of selected existing damaged

infrastructures (Embankment, Sluice, etc) of Bangladesh water Development Board (BWDB) and infrastructures (road and bridge) of Local Government Engineering Division (LGED) would be funded under Component-1.

In sequence, JICA has assigned a Survey Team headed by CTI Engineering International Co. Ltd to carry out the preparatory survey.

1.3 Objectives

1.3.1 Preparatory Survey

The objective of the preparatory survey is to formulate the project which may be financed by JICA, through examination of the necessity of the project, scope, implementation arrangement, project cost and environmental and social considerations.

1.3.2 Environmental and Social Survey

The objective is to meet the requirement of "JICA Guidelines for Environmental and Social Considerations, April 2010". The JICA Survey Team has decided to carry out the 'Initial Environmental Examination (IEE)' studies for selected 5 representative sub-projects of BWDB and LGED under the preparatory survey project

SECTION-2 ABOUT THE SUB-PROJECTS

JICA has initially selected 5 (five) representative sub-projects to examine further under the Preparatory Survey Project. Out of 5 sub-projects, 2 sub-projects belong to LGED and rest 3 sub-projects belong to BWDB. Description of 5 sub-projects is mentioned below in brief.

2.1 Sub-project 1- Revetment to Protect River Bank Erosion

Executing Agency: BWDB

Location: Union- Rahmatpur, Upazila- Babuganj, Dist-Barisal.

River channel is located northern Barisal Airport meanders. According to record of Google Earth (2006 and 2015), progress of bank erosion ranges 150 m to 200 m at concave, which is 20 m to 25 m per year. Without any countermeasure, erosion will reach to the airport area in 20 years. This river is located 120km far from Bay of Bengal and still within tidal-river. Movement of water level is big and bank erosion is serious.

Rehabilitation work shall include 2.3 km long embankment of BWDB.

2.2 Sub-project 2- Reconstruction of Sluice Gate

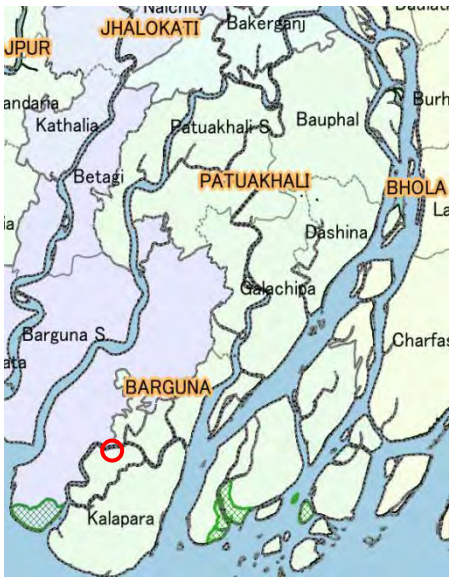
Executing Agency: BWDB

Location: Mouza- Tungi Baria, Union- Nilganj, Upazila- Kalapara, Dist-Patuakhali

This structure is a part of Polder 46 which has 40 km long embankment, 12 drainage sluices, 4 intake sluices and 4,697ha area for residents and paddy field. This sluice is an important one for a major drainage canal flowing into river.

This structure was constructed in 1960'/70', more than 50 years ago. Crushed bricks were used for concrete aggregate. Structure is already deteriorated and partly severely damaged resulting in holes in embankment.

The rehabilitation work shall include reconstruction of sluice as same as existing drainage channel.



2.3 Sub-project 3- Embankment Rehabilitation -Construction of Revetment

Executing Agency: BWDB

Location: Mouza- Dashali, Union- Maharajpur, Upazila- Koira, Dist-Khulna

A part of embankment of Polder No. 13-14/2 which is located at the concave of river channel has been eroded by wave action. Once, big wave by cyclone, etc., occur, this portion will easily collapse and river water will enter inside polder

0.9㎞ long embankment has been eroded and sectional 40% of embankment body is lost.

Sub-project intervention shall include rehabilitation of Embankment and Construction of Revetment

2.4 Sub-project 4- Rehabilitation of existing Feeder Road

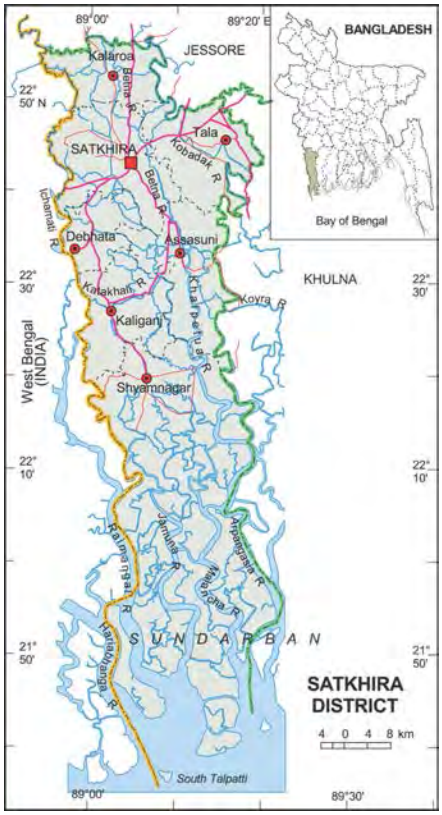
Executing Agency: LGED

Location: Union- Kushulia, Daskin Sripur, Bishnupur, Upazila- Kaliganj, Dist-Satkhira

This is an important Upazila Road (L=12.1 km), constructed by RHD in 2001-2002 and handed over to LGED in 2006. Existing road is severely damaged due to overflow and subsidence causing huge upheavals severe surface distress and is deemed to require replacement of sub grade at subsided section and raising surface level (50cm-100cm) including slope protection along the prawn farm area.

Major portion of the road runs across prawn farm (pond) where 1mdeep water is required to be maintained for culturing of prawn. This harvested water increases risk of inundation of the road during monsoon.

Rehabilitation shall include rising of surface and slope protection.



2.5 Sub-project 5- Reconstruction Bridge

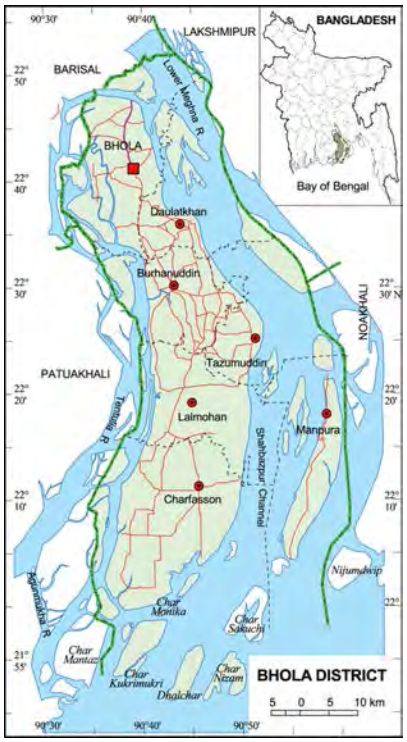
Executing Agency: LGED

Location: Mouza- Char Gazi, Union- 10 No Velu Mia, Upazila- Bhola Sadar, Dist-Bhola

This bridge (L= 95m, W= 3.7m) was constructed in 1995 on an important village road. It has a RC slab which is supported by metal beams. Several spans in the middle of the bridge collapsed during Aila in 2007 possibly due to overflow and scouring of the river bed. The access from/to the village on the other side is severed after the collapse of the bridge.

The river is deep and river bed is easily scoured. The approach road on the right bank is sharply bent and needs to be improved.

As the bridge is completely collapsed, it has to be reconstructed. Reconstruction can be done at the same location. To avoid damage from overflow, the surface should be raised (0.5m – 1.0m). Protection work of river bed around the piers should be considered. The prevailing design standard should be satisfied.



SECTION 3 SCOPE of WORK

3.1 Scope of Consulting Service

The sub-consultant shall conduct Initial Environmental Examination (IEE) study and prepare stand-alone IEE report for 5 sub-projects according to "JICA Guidelines for Environmental and Social Considerations, April 2010"

3.2 Major Tasks of IEE Study

The sub-consultant shall undertake the following major tasks:

- Filled up the Environmental Checklist form of JICA Guidelines in consultation with the JICA Survey Team. In this regard, the Environmental Checklist will be provided to the sub-consultant by the JICA Survey Team.
- Review of legal and organizational framework along with analysis of Gap between National Laws and JICA Guidelines and its solution
- Baseline survey shall include preparation of schematic drawing of existing land use covering 2 sq km area from the site using LGED map, collection of available secondary data on quality of environmental components and socio-economic aspects, procurement of metrological and hydrology data of last 10 years, history of last 10 year's natural disaster occurrences.

- Identification of potential impacts in particular, the impacts on natural ecosystems and protected species under the relevant laws and regulations in Bangladesh shall be taken into consideration.
- Analysis and evaluation of identified/predicted impacts for each alternative plan. In this regard, the Feasibility Study Report will be provided to the sub-consultant by the JICA Survey Team.
- Formulation of Mitigation Measures
- Develop the Environment Management Plan (EMP) that should include
    - Mitigation and enhancement plan
    - Monitoring plan
    - EMP Implementation Arrangement along with budget
- KII, FGD (maximum 2) and stakeholder consultations (maximum-2) shall be carried out during IEE study. Sub-consultant shall assist BWDB and LGED to hold the stakeholders meetings. All meeting shall be led by BWDB and LGED for their respective sub-projects and sub-consultant shall play the role of facilitator. The stakeholder consultation process shall be assisted and supervised by the JICA Survey Team.

3.3 Composition of Study Team and Qualification

The IEE study team shall include the qualify experts/specialist for the following positions.

Position	No of Position	Input require (man-month)	Qualification
Team Leader-EIA Expert	1	3	The Team Leader must have- -Bachelor degree in any engineering discipline/ environmental engineering / environmental science/ geography and environment/ soil and environment. -Minimum 8 years experience in conducting and preparing environmental assessment study report.
Ecologist	2	4	-Bachelor degree in Fishery/ Agriculture/ Zoology/ Botany / environmental science/ geography and environment/ soil and environment discipline -Minimum 8 years experience in conducting terrestrial and aquatic ecological assessment.

Position	No of Position	Input require (man-month)	Qualification
Social Expert	2	4	-Bachelor degree from Social science discipline/ economic/ statistics/ population and demography/ management. -Minimum 6 years experience in conducting socio-economic survey, community mobilization and participation.
Supporting Field Staff	4	6	- having enough experience in similar project.

3.4 Study Period

Study shall be commenced from 2nd week of October 2015 and shall be end by the 1st week of January 2016 (3 months in total).

3.5 Reporting Schedule

Consultant shall submit all deliverables of 5-subprojects according to the following reporting schedule:

Item No	Stand alone Deliverables of 5 sub-projects	Submission schedule	Remarks
1	Detail Table of Contents along with schedule of stakeholder consultation meetings	Within 1st week of contract execution	JICA survey team expects that consultant shall submit the deliverable immediate following day of kick-off meeting
2	Weekly progress reports	Only during first month of study	Using Simple check list that shows target and achievement. Reasons in case of falling behind the target schedule
3	Baseline Sections/Chapters	On 5th week	
4	Stakeholder consultation Sections/Chapters	On 7th week	JICA survey team expects that consultant shall submit the summary of minutes within a week after each consultation.
5	Draft IEE Reports	On 9th week	
6	Draft Final IEE Reports	On 12th week	

3.6 Expected Output

The study should produce concise Initial Environmental Examination (IEE) Report containing following:

a. Project description containing the proposed interventions
b. Environmental and social baseline condition of the Project area
c. Environmental and social impacts of the proposed interventions
d. Environmental management plan which should include:
    - Mitigation and Enhancement plan
    - Compensation plan
    - monitoring plan
    - EMP Implementation Plan with budget

3.7 General Requirement

- The Sub-Consultant shall exercise great care during the progress of the Survey to avoid any accident on the site, and will be responsible for any faults during the Survey. Accordingly, no claims will be accepted by the sub-consultant.
- The Sub-Consultant shall acquire all permits or licenses required for the IEE Study from appropriate government or private agencies at his own expense.

3.8 Material, Equipment and Facilities

- The Sub-Consultant shall provide all equipment, materials and labors necessary for the Services.
- The Sub-Consultant shall provide all transportation to and from the survey sites.
- All per diems and other expenses shall be borne by the Sub-Consultant.
- All performances of the Services shall be accomplished in accordance with the reporting schedule, and in full coordination with the JICA Survey Team.
- Other condition not specified in the Technical Specifications shall be settled by mutual agreements between the Survey Team and the Sub-Consultant.

3.9 Insurance

The Sub-Consultant shall at his expense purchase accident and injury insurance for experts of the study team and shall keep the JICA Survey Team free from any claims for the compensation of any accident and/or injury that occurs.

3.10 Tax and Related Charges

All taxes, levies, deductions, charges, fees, and similar assessments imposed, assessed, levied, or collected by the Services, or any sub-divisions thereof or any taxing authority therein, upon the Sub-Consultant and his staff shall be paid and/or borne by the Sub-Consultant.

3.11 Measurement and Payment

Payment will be based on quantities measured as mentioned in Annex-1 "Bill of Quantities". The payment shall include full compensation for equipment, tools, labor, materials, transportation, allowance, per diem and other incidentals required to complete record and present the results. The time spent on re-surveying because of the Sub-consultant's deficiency or failure shall not be subject to measurement and payment.

3.12 Others

The sub-consultant shall respond sincerely to the request for further explanation or review on the results of the IEE study or report even if the period of the contract had finished.