ODISHA STATE ROAD PROJECT

PHASE II

JAGATPUR - CHANDBALI – 106 Kms
(Package - P04)

ENVIRONMENTAL MANAGEMENT PLAN




July - 2013 (Updated)

FINAL VERSION INCORPORATING ALL COMMENTS

Prepared By:

ODISHA WORKS DEPARTMENT
GOVERNMENT OF ODISHA

ABBREVIATIONS

ASI	Archaeological Survey of India
CAMPA	Compensatory Aforestation Fund Management and Planning Authority
CD	Cross Drainage
CGWB	Central Ground Water Board
CoI	Corridor of Impact
CPCB	Central Pollution Control Board
CPR	Common Property Resources
DFO	Divisional Forest Officer
DoE	Department of Environment
DoF	Department of Forest
DPR	Detailed Project Report
EA	Environmental Assessment
EAC	Expert Appraisal Committee
EE	Environment Expert
EIA	Environment Impact Assessment
EIAA	Environment Impact Assessment Authority
EMP	Environment Management Plan
FCA	Forest Conservation Act
FGD	Focus Group Discussion
GoI	Government of India
GoO	Government of Odisha
GP	Gram Panchayat
IER	Independent Environmental Review
IMD	Indian Meteorological Department
IRC	Indian Road Congress
ISAP	Institutional Strengthening Action Plan
LCV	Light Commercial Vehicles
MDR	Major District Road
MoEF	Ministry of Environment & Forests, Govt. of India
MoRTH	Ministry of Surface Transport
MOU	Memorandum of Understanding
NAC	Notified Area Council
NCDB	Noise Cum Dust (control) Barrier
NGO	Non Government Organization
NH	National Highway
NOC	No Objection Certificate
NTPC	National Thermal Power Corporation
O&M	Operation & Maintenance
OBCC	Odisha Bridge Construction Corporation
ODR	Other District Road
OFC	Optical Fibre Cable
OFDC	Odisha Forest Development Corporation
OP	Operational Policies
OSPCB	Odisha State Pollution Control Board

OSRP	Odisha State Roads Project
OT&OFPT Rules	Odisha Timber & Other Forest Produce Transit Rules
OWD	Odisha Works Department
PA	Protected Areas
PAPs	Project Affected Persons
PC	Priming Coat
PCC	Portland Cement Concrete
PCCF	Principal Chief Conservative Forest
PF	Protected Forest
PHC	Primary Health Center
PHD	Public Health Department
PIA	Project Influence Area
PIU	Project Implementation Unit
PMU	Project Management Unit
PRF	Proposed Reserved Forest
PRI	Panchayat Raj Institutions
RAP	Resettlement Action Plan
RCC	Reinforced Cement Concrete
RF	Reserved Forest
R&R	Rehabilitation & Resettlement
RD	Rural Development
ROB	Road Over Bridge
RoW	Right of Way
RPDAC	Resettlement and Periphery Advisory Committee
RWSS	Rural Water Supply and Sanitation
SC	Scheduled Caste, Supervision Consultant
SEZ	Special Economic Zone
SEIAA	State Environment Impact Assessment Authority
SH	State Highway
SHG	Self Help Group
ST	Scheduled Tribe
ToR	Terms of Reference
TW	Tube Well
VECs	Valued Environment Components
VF	Village Forest
WB	World Bank
ZOI	Zone of Influence

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CHAPTER 1
INTRODUCTION

1.1 PROJECT BACKGROUND

The Government of India has requested the assistance of the World Bank for upgrading and rehabilitation of State Highways, Major District Roads and Other District Roads in the State of Odisha at a total estimated project cost of US$ 265 million1. The International Bank for Reconstruction and Development shall fund US$ 196 million and remaining USD 69 millionshall be through the Odisha State funding. The Odisha Works Department (OWD) will be the executing agency for the Project.

The Odisha State Roads Project (OSRP) is a road upgrading and rehabilitation initiative of the Govt. of Odisha with financial assistance from the World Bank. The OSRP includes rehabilitation and improvement of existing roads by widening and strengthening pavements. In addition, minor realignments are being/will be carried out where found necessary. The intention is to remove transport bottlenecks in targeted corridors, thereby increase the capacity of the road, decrease travel time and reduce congestion thereby drawing greater investment and economic and social development activities in the state of Orissa.

The project was restructured in February 2013 and changes were made in "Road Corridor Improvement" component that includes widening, strengthening and selective realignment of about 310 km of existing roads in the State of Odisha to the double-lane standard, to be completed in two phases: (i) Phase I Roads, comprising about 204 km; and (ii) Phase II Roads, comprising 106 (Jagatpur - Chandbali) km.

Under Phase I of the Project, 204 km of State Highways have been selected for upgrading and rehabilitation and these works are currently under execution. These roads were short listed based on technical and economic evaluation studies conducted by Odisha Works Department (OWD) of Government of Odisha. The preparation of Detailed Project Reports for these State Highways under Phase I involved through on-site data collection on traffic volumes, existing pavement condition in terms of roughness and design, assets and resources within and outside the Right of Way. The technical and safeguard reports were prepared (including review by Independent Consultant) and disclosed in 2007. Also cost estimates, bid documents have been prepared along with measures to address environment and social issues in the light of World Bank guidelines, statutory requirements of Government of India and those of State Government.

1.2 PROJECT DESCRIPTION

The report pertains to widening and strengthening of Jagatpur-Chandbali road falling in districts of Cuttack, Kendrapara and Bhadrak. The total length of the corridor is 106 km which involves widening and strengthening into two lanes carriageway with hard/earthen shoulder at urban/rural area, raising of embankment and improvement in drainage systems at flood prone areas located along the road.

1.3 PROJECT INTERVENTIONS

The following activities are proposed to be carried out as detailed in **Table 1.2.** Typical Cross sections are shown in **Annex A.**

[1] As per the Project Restructuring carried out in January 2013. The figures in 2007 when the project was approved by the Bank were different.

Table – 1.2

S. No	Applicable Chainage (km)	Type of Cross section	Reference	Remarks
1	1.900-2.200, 2.400-2.530, 2.800-3.850, 4.300-5.800, 7.200-7.550, 7.950-9.300, 9.660-10.100, 10.480-10.600, 10.850-13.800, 14.000-16.600, 17.100-17.700, 20.800-22.150, 22.500-24.000, 24.250-26.600, 26.800-27.250, 28.400-32.650, 33.200-35.250, 35.900-38.600, 39.550-41.400, 41.600-43.300, 43.600-44.300, 45.150-47.950, 48.950-49.100, 52.200-53.200, 54.000-55.100, 56.250-56.450, 56.850-57.200, 57.400-58.050, 58.450-62.950, 63.200-65.400, 65.900-69.400, 71.500-72.050, 72.500-73.450, 73.650-74.000, 74.250-78.600, 78.700-84.400, 84.400-84.600, 84.600-84.950, 86.200-93.200, 93.200-93.350, 93.350-94.750, 95.400-98.200, 98.550-99.050, 99.050-99.800, 105.100-106.000.	Widening to avoid accidents through geometric curve corrections and additional land acquisition	Horizontal plan of the road design	As per IRC guidelines for curves and designed speed
2	New Alignments 69.700-71.500, 98.550-99.050	To maintain traffic speed as per IRC Guideline outside built up area.	Horizontal plan of the road design	
3	0.000-1.900, 2.200-2.400, 2.550-2.800, 3.850-4.300, 5.800-7.200, 7.550-7.950, 9.300-9.660, 10.100-10480, 10.600-10.700, 13.800-14.000, 16.600-17.100, 17.700-20.800, 22.150-22.500, 24.000-24.250, 26.600-26.800, 27.250-28.400, 32.650-33.200, 35.250-35.900, 38.600-39.550, 41.400-41.600, 43.300-43.600, 44.300-45.150, 47.950-48.950, 49.100-49.200, 49.200-51.550, 51.650-52.200, 53.200-54.000, 55.100-55.550, 56.600-56.850, 57.200, 57.400, 58.050-58.450, 62.950-63.200, 65.400-65.900, 69.400-69.650, 72.050-72.450, 84.950-85.850, 85.850-86.200, 94.750-95.400, 99.800-105.100.	In built up areas and residential zones for preventing R&R afflictions and reduce land, demolition of dwelling houses by keeping the ROW width between 18 to 20mtrs except at toll plaza 22mtrs with provision of covered line drain at both side.	Horizontal plan of the road design	Conforming to the R&R policy 2006 of Govt. of Odisha and general principles of mitigation avoidance and minimisation of impact
4	31.300-31.670	Toll plaza with parking bay	Horizontal plan of the road design and schedule of designs	For collection of toll tax from vehicles plying on the road
5	0.500, 1.183, 1.800, 2.853, 5.160, 7.641, 10.856, 13.900, 15.647, 16.900, 18.660, 19.644,	Major and minor (cross, Y & T) junctions on spur roads and major	Horizontal plan and detail design	To facilitate movement of traffic and

	24.120, 24.430, 33.125, 35.336, 36.781, 38.940, 41.446, 50.850, 51.280, 52.115, 55.971, 61.800, 69.700, 72.480, 75.180, 79.890, 85.905, 93.850, 94.700, 97.600, 100.565,	roads intersecting the SH. 7	for junctions	meet future developmental needs
6	3.802, 4.442, 5.792, 6.252, 7.502, 7.802, 9.252, 9.692, 13.032, 14.002, 16.802, 18.722, 20.352, 23.952, 24.352, 26.952, 27.212, 31.002, 32.902, 33.752, 37.852, 38.442, 38.622, 43.282, 43.374, 44.852, 48.152, 49.252, 50.452, 53.152, 55.252, 58.452, 61.652, 61.872, 62.902, 63.252, 65.352, 71.452, 77.552, 77.952, 79.802, 84.872, 85.602, 94.882, 95.452, 101.652, 103.072, 104.252, 104.472,	Bus bay for parking of buses and LCV etc. with passenger shed and site enhancement plantation, zebra crossings.	Horizontal plan and detail design for bus bay and passenger shed	To ensure safe embarking and alighting of passenger from vehicles and safe cross over without affecting the movement on highway and for safety /security of passengers

Proposed CD / Bridge Improvement Works

Structure Type	Replaced	Widened	New Construction	Total
Minor Bridges	5	Nil	3	8
Culverts	126	16	190	332

1.4 ENVIRONMENTAL IMPACT ASSESSMENT

The detailed design of the project has been closely coordinated with the preparation of the Resettlement Action Plan (RAP), Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP). The EIA preparation led to identification of potential environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements). Public consultations were conducted for both the Environmental and Social aspects and are reported in the EIA and the RAP. Based on these findings this EMP has been prepared for the implementation and will form the part of the Contract document between the Construction Contractor and OWD.

This project has been classified as Category 'A' and in accordance with the requirements of the World Bank. As per revised guidelines notified by Govt. of India, Ministry of Environment and Forest in their notification no. 1433, dated 14/09/2006 and in subsequent amendment to the Environment Protection Act vide Notification No.695 (A) Dtd 4th April 2011, this road project does not attract environment clearance from the MoEF because its 0 to 99 Kms road stretch has been categories as MDR and rest 7 Kms i.e. from 100 to 106 Kms as State Highway. In addition, the last 7 km road length of state highway does not fall under eco sensitive area (**Map 1: Project Influence Area within 10 km radius**). Environmental Assessment and Environmental Management Plan has been prepared based on field data and base line information gathered from the field considering the design parameters and locations of various activities as indicated in the foregoing tables. The main consequent actions that are required to mitigate negative impacts and monitor the measures taken are given in the following sections.

Map 1: Project Influence Area within 10 km radius

1.5 ENVIRONMENTAL MANAGEMENT PLAN

1.5.1 Scope

Based on the environmental impacts predicted, specific EMP for the contract package has been prepared. These have been incorporated into the bidding/contract documents. The EMP has been prepared as per the requirements of World Bank Operational Policy.

The Environmental Management Plan (EMP) consists of a set of management, mitigation, monitoring and institutional measures to be taken during pre-construction, construction and operation stages of the project to eliminate or reduce adverse environmental impacts. The plan also includes the specific actions needed to achieve these objectives.

The major components of the Environmental Management Plan are:

- Mitigation of potentially adverse impacts;
- Environment Enhancement Measures
- Monitoring during project implementation and operations;
- Institutional Capacity Building and Training;
- Implementation Schedule
- Integration of EMP with Project planning, design, construction and operation.
- Environmental Budget

1.5.2 Objectives of the EMP

The main aim of the Environmental Management Plan is to ensure that the various adverse impacts associated with the project are properly mitigated and appropriately managed to minimise damage to environmental resources. In the instant case major part of the road is either in embankment or in cutting besides deviations and diversions at several locations bringing in new land use and additional issues of drainage, irrigations, spurs road connectivity and movement of wildlife along the stretches.

The objectives of the EMP are as follows:

Design Stage

- To minimise impact on roadside trees, forests and ground cover.
- To provide inputs towards maximum safety of the highway users and road side communities, particularly in the congested areas, by preparing appropriate road designs.
- To develop a design that incorporates environmental management principles; and
- To define mitigating measures that effectively reduces the anticipated environmental degradation to an acceptable level.

Construction Stage

- To prevent and reduce the negative environmental impacts of the project by implementable & economically feasible mitigation measures, to be carried out by the Contractor.
- To ensure that the provisions of the EMP are strictly followed and implemented by strengthening implementation arrangements.

Operation Stage

- To prevent deterioration of environment components of air, water, soil, noise etc;
- To improve the safety of the highway users and road side communities

1.5.3 Meeting the EMP Objectives

The following commitments are important to effectively implement the EMP and have been adopted to achieve the various objectives of the EMP -

a) Commitment to address environmental health, safety and social impacts

To improve the environmental conditions, including areas such as environmental and social impacts, measures have been included as part of the EMP.

b) Commitment for constant dialogue with the public and interested stakeholders

The community consultation process was carried out right from the inception stage of the project. Continuous dialogue with local inhabitants and stakeholders including public agencies has been established on various environmental issues to obtain their feedback. Consultation would continue throughout the implementation stage of project.

c) Commitment related to training

For the effective implementation of the EMP measures proposed, sustainable institutional arrangements have been proposed. To educate and train the PMU, the personnel of the Construction Supervision Consultants and the Contractor, an extensive training schedule has been worked out as part of the EMP. The training programme will be implemented as per the schedule proposed.

d) Commitment to meet legal requirements

The legal clearance and permits those are necessary or mandatory for the commencement of the project will be met. The conditions stipulated by the various statutory authorities such as the State Pollution Control Board, State Forest Department, Ministry of Environmental and Forest (MoEF), etc. will be complied with in addition to the acts and rules governing mining activity, borrow area, collection of water, GSB, camping ground, petrol and lubricant bunks, explosives and fire control provisions, waste disposal sites, common property belonging to religious endowments and Wakf boards, burial grounds, irrigation canals and reservoirs, stockpiling, batch mix, hot mix and concrete mixing units, garages and over haulage centres, health and emergency, traffic & transport regulation etc.

1.6 REGULATORY AND CLEARANCE REQUIREMENTS

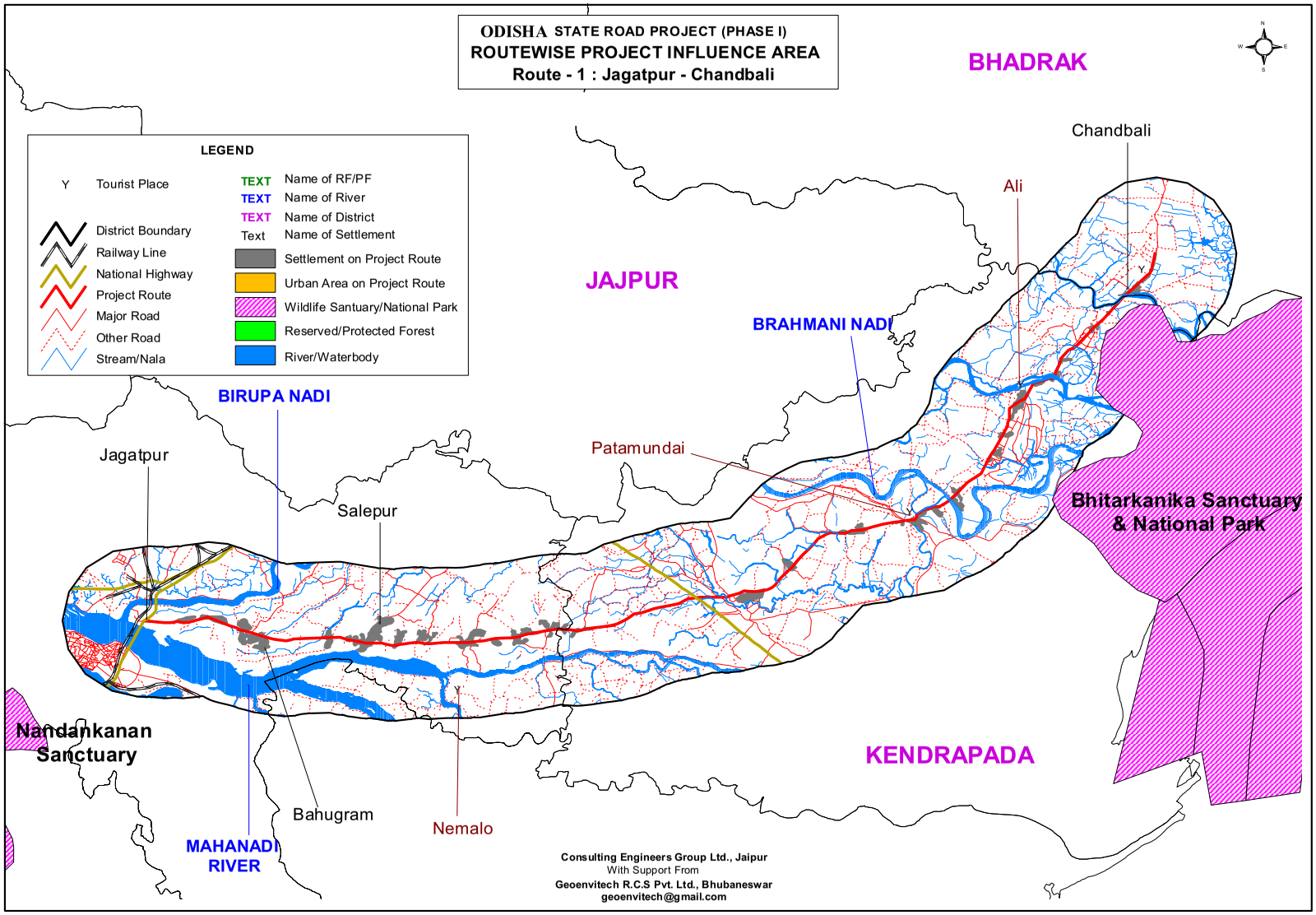
Regulatory Requirements are indicated below in the form of **Table – 1.3.**

Table – 1.3 Applicability of Regulatory and Clearance

S. No	Clearances	Acts	Approving Agency	Applicability to the Project	Responsibility	
					Execution	Supervision
PROJECT PREPARATION STAGE						
1	No Objection Certificate	Water (Prevention and Control of Pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981	Odisha Pollution Control Board	Applicable	OWD	CE, WB Projects, Project in charge PMU/SC
2	Environment Clearance	Environment Protection Act 1986 Notification dated,14 September 2006 and amendments till date.	Ministry of Environment and Forest, Govt. of India	Not Applicable	OWD	CE, WB Projects, Project in charge PMU/SC
3	Wild Life Clearance	Wild Life Act 1972	Chief wildlife warden, State /National wildlife advisory board	Not Applicable	OWD	CE, WB Projects, Project in charge

S. No	Clearances	Acts	Approving Agency	Applicability to the Project	Responsibility	
					Execution	Supervision
			/MoEF			PMU/SC
4	Diversion of forest land for Non forest use	Forest Conservation Act (1980) Forest Conservation Rules (2003) and Guidelines issued to date	Regional Office Eastern Region, MoEF, BBSR /MoEF, New Delhi	Not Applicable	OWD	CE, WB Projects, Project in charge PMU/SC
5	Permission for removal of tree growth within the PROW Felling conversion and removal from stump site	Odisha Forest Act. 1972 Odisha timber and other forest produce transit rules 1980	Local Divisional Forest Officer	Applicable	OWD	CE, WB Projects, Project in charge PMU/SC
PROJECT IMPLEMENTATION STAGE						
6	Permission for Withdrawal of Ground Water	Environment Protection Act 1986	Central Ground Water Board	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
7	Permission for Withdrawal of Surface Water from Rivers, Nala, Water harvesting structures /Reservoirs /Ponds /Irrigation Canals	State Water Act. 2002	Irrigation Authorities for use of water from Reservoirs, Irrigation tanks and large water bodies River Board / Authorities and the District Collectors for withdrawal of water from Rivers Panchayat Raj Institutions and Gram Sava for use of ponds, water bodies, irrigation tanks and irrigation channels, down stream users in case of rivers	To the Extent Possible Ground Water will be used without distressing the competitive users, where sub soil water table is low and conforms to the desired standards. Besides this after taking consent from the project in charge (OWD) SC and Environment expert of PMU, Surface water can be used conforming to desired standards	Contractor	CE, WB Projects, Project in charge PMU/SC
8	NOC from Archaeological Survey of India	The Ancient Monument and Archaeological sites and Remains Act. 1958	Department of Archaeology Govt. of Odisha /Archaeological Survey of India (ASI)	Not Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
9	Permission for Sand Mining from	Odisha Minor Minerals Concession Rules	District Collector /Tahasildar /Irrigation	Applicable	Contractor	CE, WB Projects, Project in

S. No	Clearances	Acts	Approving Agency	Applicability to the Project	Responsibility	
					Execution	Supervision
	river bed	2004	department			charge PMU /SC
10	Permission for Opening of New Quarry	Odisha Minor Minerals Act.	Department of Mines Govt. of Odisha / Odisha State Pollution Control Board /District Administration	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
11	Hot mix plant, Crushers, Cement Batching Plant	Air (Prevention and Control of Pollution) Act. 1981	Odisha State Pollution Control Board	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
12	Storage of Hazardous Chemicals	Hazardous Waste (Management and Handling) Rules 1989 and Manufacturing Storage and Import of Hazardous Chemicals Rules 1989	Odisha State Pollution Control Board	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
13	Disposal of Hazardous Waste	Hazardous Waste (Management and Handling) Rules 1989	Odisha State Pollution Control Board, with consent and approval from Local Administration and community	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
14	Disposal of Construction Waste and liquid effluent from Labour camps	Water (Prevention and Control of Pollution) Act 1974	Odisha State Pollution Control Board with consent from the Local Administration and Local community	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
15	Pollution Under Control Certificate	Central Motor Vehicles Act 1988	Department of Transport, Govt. of Odisha	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
16	Employing Labour	Executing Agency of Building and other construction act, 1996	District Labour Commissioner	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC
17	Registration of Workers	Labour welfare Acts.	District Labour Commissioner	Applicable	Contractor	CE, WB Projects, Project in charge PMU/SC


ODISHA STATE ROAD PROJECT (PHASE I)
ROUTEWISE PROJECT INFLUENCE AREA
Route - 1 : Jagatpur - Chandbali
LEGEND
Y Tourist Place
District Boundary
Railway Line
National Highway
Project Route
Major Road
Other Road
Stream/Nala
TEXT Name of RF/PF
TEXT Name of River
TEXT Name of District
Text Name of Settlement
Settlement on Project Route
Urban Area on Project Route
Wildlife Santuary/National Park
Reserved/Protected Forest
River/Waterbody
BHADRAK
JAJPUR
KENDRAPADA
Chandbali
Ali
BRAHMANI NADI
BIRUPA NADI
Jagatpur
Salepur
Patamundai
Bhitarkanika Sanctuary & National Park
Nandankanan Sanctuary
Bahugram
Nemalo
MAHANADI RIVER
Consulting Engineers Group Ltd., Jaipur
With Support From
Geoenvitech R.C.S Pvt. Ltd., Bhubaneswar
geoenvitech@gmail.com

CHAPTER 2

BASELINE ENVIRONMENTAL SETTING AND IMPACT SUMMARY

2.1 INTRODUCTION

The Baseline data and impacts summary on Physical, Biological and cultural resources for project corridor is presented below. A generic impact matrix for different activities placed at the end of chapter is given as Table 2.1. Corridor specific baseline and impacts summary on Physical, Biological and cultural environmental is presented below.

2.1.1 Physical Resources

The area has flat topography extending in the north-south direction along the coast and topographical gradient is towards east where the elevation is very negligible leading to persistent water logging during rains in all these tracts along the coast. The geology of the project area is mainly comprised of rock formations belonging to Archaean system of Pre-Cambrian geological age and Recent to sub-recent sediments deposited by various river systems built up at deltas at the river mouths. The soil types along project roads area are mainly lateritic, coastal saline and alluvial, and deltaic alluvial soil.

The soil of the area may be impacted because of construction activities, movement of heavy vehicles and Borrow areas. There will be some impact on topography of the area due to propose raising of embankment at water logging location.

2.1.2 Water Resources[1]

3 major rivers are crossing the road. There are 73 tube well, 36 stand post, 37 wells and 44 ponds along the road. The surface water and ground water quality was monitored at six locations along the road and all parameters monitored were found to be within, except for iron which was found above permission limit. The project area has both consolidated and un-consolidated hydrological units. Depth to water level varies from 0 to 2m in the post-monsoon and 2 to 4m in pre-monsoon periods.

During construction 73 tube wells, 36 stand posts and 37 wells needs relocation, 44 ponds are near to road, which may be filled partially and water quality may degrade during construction. The problem of water logging, overtopping may increase during construction.

During operation problem of overtopping and water logging will not be there and aesthetics of surface water body will be enhanced.

[1] Refer Annexure IV and VI

2.1.3 Water Quality

Water quality was monitored at six locations (4 ground and 2 surface water source). All parameters monitored were within permissible limit, except for iron which was above permissible level of IS: 10500. The water quality of surface water was falling in class B of CPCB surface water classification i.e. suitable for batting and domestic usages.

2.1.4 Air Quality

The air quality was monitored at four locations. All parameters were found to be within permissible limits.

During construction air quality may deteriorate due to construction activities, fugitive emissions, whereas during operation stage air quality will improve due to smooth riding and uninterrupted flow of traffic.

2.1.5 Noise

The noise levels were monitored at five locations and were found be within permissible level at all locations.

Noise levels may increase during construction due to construction activities and movement of Heavy vehicles.

During operation Noise Levels will come down considerably due to Smooth riding surface and uninterrupted flow of traffic.

2.1.6 Protected Area within Area of Influence (10 km radius of project road)

Bhitarkanika wildlife sanctuary is situated within 10 km radius from the project road as per Wildlife (Protection) Act 1972 and necessary Wildlife Clearance needs to be obtained for the project road from Wildlife Department.

No specific wildlife movement zone confined to land on either sides of water body and rivers have been noted during survey, consultation with people and wildlife departments

2.1.7 Biological Environment[2]

Total 7568 nos. of trees existing within propose ROW. Roadside plantation along the road has been declared as protected forests and attracts provision of forest conservation Act 1980. There are fifteen stretches along the road where green tunnel exists.

Major tree species under avenue plantation in the road corridor includes *Anogeissus latifolia, Azadirachta indica (*Neem*),Eucalyptus, Acacia, Simul, White Simul, Patuli, Kuruma, Tentuli, Mango, Pepal (Ficus religiosa, Banyan (F.bengalensis, Kadamba, Ficus glumerata, F.infectoria, Palmyra palms, Date palms, Strebulus asper, Acacia nilotica, A.leucophlea, Buchanania lanjan (*Chiranji*), Butea monosperma (*Palas*), Careya arborea, Cassia fistula,*

[2] Annexure I and II

*Dalbergia Latifolia (*Sishu*), Diospyros melanoxylon (*Kendu*), Madhuca Indica (*Mohua*), Phyllanthus emblica (*Amli*), Scleichera oleosa (*Kusum*), Samecarpus anacardium (*Bhalia*), Semaruba glauca, Shorea robusta (*Sal*), Syzygium Cummini (*Jamum*), Tectona grandis, Terminalia arjuna (*Arjun*), Terminalia belerica (*Bahera*), Terminalia chebula, Wrightia arborea, Zizyphus oenoplia, albizia lebecs, cassia siamia, samania saman.*

Important medicinal plants found in the project along the road are chandan (*santalum album*), bija (*pterocarpus marsupium*), rohini (s*soyimida fabrifuga*), fanfana, (*oroxylon indicem*), kamalagudi (*malotus philipinansis*), patuli (*pterospermum swave*), chadeigodi (*vitex peduncularis*), bidanga (*embelia ribes*), modafal *(helioteres isora*), banapipali (*piper longum*), karpura haldi (*curcuma aromatica*), iswari (*aristolochea indica*), bridha daruka (a*argeyreia durvula*) etc.

Total 7568 number of trees will be felled in the process of widening of road. The numbers of trees are not substantial in numbers so, no major impact is envisaged.

2.1.8 Socio–Economic Environment[3]

The project corridor is passing through 116 Settlements. There are 165 Religious properties 14 Educational Institution, 19 government building, 19 passenger shed and 2 hospitals within PRoW along the road. The land use along the road is pre-dominantly agriculture, built-up area and commercial area. The road is passing through many residential areas and road safety is not good along the road.

During construction the environment along these settlements may degrade, Road safety may deteriorate and access to religious structures and educational institution may be disrupted. Additional stress on existing community because of establishment of labor camp may take place. No impact on Land use pattern is envisaged.

During operations Road safety will improve especially access to educational institutions.

2.2 SUMMARY OF IMPACT AND MITIGATION MEASURES

The summary of impacts due to proposed road widening is given in **Table 2.1**.

Table 2.1: Summary of Project Impact (Negative)

S.No	Parameters	Unit	Impact
Negative Impacts			
1	Land Acquisition	Ha	235.565
2	Construction Water Requirement (excluding domestic uses)	Cu.m	143856
3	Surface Water Bodies	Nos.	44
4	Religious Structures	Nos.	66
5	Government Structures (partially to fully)	Nos.	42
	Educational Institutions	Nos.	14

[3] Annexure III

S.No	Parameters	Unit	Impact
6	Hospital	Nos.	2
7	Tube Wells	Nos.	73
8	Wells	Nos.	37
9	Stand Posts	Nos.	36
10	Material Requirements		
i	Earth	Cu.m	1130432
ii	Aggregate	Cu.m	556741
iii	Sand	Cu.m	1017592
11	Tree cutting	Nos.	7568
12	Sitting Platform	Nos.	2
13	Resting Shed	Nos.	4
14	Private Structures (partially to fully)	Nos.	996
15	Project affected People		
i	Title Holder	Nos.	996
ii	Encroachers	Nos.	315

Table 2.2: Summary of Project Impact (Positive)

S.No	Parameters	Unit	Impact	Mitigation/Enhancement Measures Reference
Positive Impact				
1	Protection Works for the water bodies			
i	Retaining /Toe Walls	Cum	1900	Drg[4] No. OSRP/CEG/SH/ENV/03
ii	Stone Pitching	Cum	1900	
2	Silt fencing at/near water bodies	LM	7000	Drg No. OSRP/PMU/JD-49km/ENV/01
3	Oil and Grease trap	Nos.	2	Drg No. OSRP/CEG/SH/ENV/06
4	Slope/embankment protection measures			
i	Stone pitching	Cum	6296	
ii	Erosion control blankets/agro net mulch	Sqm	18000	Drg No. OSRP/ENV-14
iii	Turfing	Sqm	259611	
5	Biodiversity management measures			
i	Trap drains	Sqm	684	Drg No. OSRP/ENV-14
ii	300mm dia Pipes for safe passage	LM	1330	
6	Signage(Permanent) Environment /ecological information sign boards			
i	Big Size	Nos.	4	
ii	Regular Size	Nos.	12	

[4] Annex C EMP Drawings

S.No	Parameters	Unit	Impact	Mitigation/Enhancement Measures Reference
7	Road Safety measures (Permanent)	Nos.	4589	
8	Spillway for water bodies	Nos.	3	Drg No. OSRP/CEG/SH/ENV/10
9	Bathing Ghats cum washing platform	Nos.	4	Drg No. OSRP/CEG/SH/ENV/09
10	Noise Barrier, Dust Barrier, Interceptive measures			
	a. Boundary wall cum Noise Barrier along religious property	LM	75	Drg No. OSRP/CEG/SH/ENV/04-A
	b. Govt. Offices/Panchayat Bhawan/School/Colleges/ health Centers Boundary Wall cum Noise Barrier	LM	1165.5	Drg No. OSRP/CEG/SH/ENV/04-B
	c. Gate with dust barrier of Institutions	Nos.	21	Drg No. OSRP/CEG/SH/ENV/05-A
	d. Intercept Barricade	Nos.	16	Drg No. OSRP/CEG/SH/ENV/05
12	Wildlife Mitigation Measures	Rs.	5200000	
13	Drainage	LM	31720	
14	Provision of bus-bay/bus stop	Nos.	94	
15	Cross Drainage Structures			
i	Culverts			
	Replaced	Nos.	126	
	Widening	Nos.	16	
	New Construction	Nos.	190	
ii	Minor Bridge			
	Replaced	Nos.	5	
	New Construction	Nos.	3	
16	Cattle Underpass	Nos.	7	
17	Service Road	Km	4.75	
18	Utility Ducts	Nos.	66	Drg No. OSRP/ENV-14

Table 2.2 Impact Matrix

S.No	Activity	Magnitude			Reversible	Irreversible	Nature		Positive	Negative	Direct	Indirect
		Low	Medium	High			Long Term	Short Term				
PRE-CONSTRUCTION PHASE												
1	Land Acquisition	√				√	√			√		√
2	Relocation of Common Utilities and Common Property Resources	√				√		√		√	√	
3	Relocation of Affected Properties	√						√		√	√	
4	Construction Camps and Storage Areas		√		√			√		√	√	
5	Disposal Locations		√		√			√		√	√	
6	Borrow Areas		√		√			√		√	√	
7	Quarries		√		√			√		√	√	
8	Hot Mix / Cement Batching Plant		√		√			√		√	√	
9	Temporary Acquistion of Land		√		√			√		√	√	√
10	Arrangement for Construction Water	√			√			√		√	√	√
11	Arrangement of Labor		√					√	√		√	√
CONSTRUCTION PHASE												
1	Clearing of Site	√			√		√			√	√	
2	Felling of Trees	√			√		√			√	√	√
3	Disposal of Debris	√			√			√		√	√	
4	Stripping , Stacking and Preservation of Top Soil	√					√		√		√	
5	Borrow Areas operation		√		√			√		√	√	
6	Quarry Area Operation		√		√			√		√		
7	Traffic Management During Construction		√					√	√		√	
8	Operation of Hot Mix Plant/ Cement Batching Plant		√		√			√		√	√	
9	Labor Camp	√			√			√		√	√	
10	Construction of Road	√			√		√	√	√	√	√	√
11	Maintenance of Cross Drainage and	√					√		√		√	

S.No	Activity	Magnitude			Reversible	Irreversible	Nature		Positive	Negative	Direct	Indirect
		Low	Medium	High			Long Term	Short Term				
	Longitudinal Drains											
12	Use of Construction Water	√			√			√		√	√	
13	Rehabilitation of Borrow Areas/ Quarry/ Disposal location		√				√		√		√	√
14	Clean-up Operation, Restoration and Rehabilitation of Sites		√				√		√		√	√
15	Plantation		√				√		√		√	√

CHAPTER 3
ENVIRONMENTAL MANAGEMENT PLAN

3.1 Environnemental Management Plan

The Environmental Management Plan is a specific means to ensure effective implementation of the measures required for avoiding, minimizing, mitigating and managing the potential adverse environmental impacts identified during the environment impact assessment exercise. It is also a tool for enhancing the positive benefits of the project through effective environmental management.

The detailed environmental management plan to be followed during the different phases of the project, i.e. pre-construction, construction and operation stages is presented in this chapter.

3.2 Key Concerns Addressed

The management plan is based on the assessment of the natural, physical and social conditions in the influence area of **Jagatpur-Chandbali** road (including water bodies; drainage channels; road side tree/vegetation; forest land; presence of wildlife in the area; soil; temperature; rainfall; geological formations; availability of materials; socio-economic conditions of the people in the area; settlements along the road; sensitive receptors like schools and health centers; common property resources such as religious structures, hand pumps, water taps etc.) and the likely adverse impacts on these features due to the proposed project.

The management plan also addresses the issues pertaining to the likely adverse impact on the surrounding settlement areas due to water logging, position of cross drainage systems newly provided for on new alignments as well as existing alignments that may affect the agricultural fields and other properties on the down stream flow, operation of quarries, withdrawal of ground & river water for road construction activity, construction camp sites including batch mix and hot mix plant locations, waste disposal, disruption of common property resource usage, increase in traffic and speed, storage/use of hazardous chemicals and inflammable materials and traffic operations during road construction activity among other things.

The key negative impacts due to loss of trees and vegetation cover including food source for birds that will be lost, which may indirectly impact the agricultural and horticultural returns in the area and the movement of wildlife in the zone has been duly considered during the preparation of this environment management plan.

The other vital aspects related to the sustainability of the ecosystem such as those related to prevention of soil erosion and siltation of water bodies; pollution of water (surface and ground water), air and soil; damage during cyclones on account of removal of avenue plantation and giant trees have also been considered and remedial actions have been incorporated in this Environmental Management Plan.

The table given below enumerates / lists out, the likely environmental issues/concerns during pre-construction, construction and post-construction stages of the project and the required remedial measures for the same. Sections related to the activities that need to be adopted by the Contractor will be/have been integrated into the Bidding Documents of this Contract Package. This includes the management plan, reporting formats, drawings and the budget items.

Table 3.1

ENVIRONMENTAL MANAGEMENT PLAN

S. No.	Environmental Issue/Aspect	Management Measures
E.1	Tree Cutting	The Contractor under any circumstances shall not cut or damage trees. Tree cutting of identified 7568 nos. (**Annexure 1**) is to proceed only after all the legal requirements, including in-principle and formal clearances from the Forest Dept./MoEF have been obtained by OWD. Subsequent approval orders shall be obtained from the concerned Divisional Forest Officers to fell the trees in compliance with the Orissa Timber and Other Forest Produce Transit Rules, 1980 and Orissa Forest Act, 1972. Activities pertaining to tree felling, logging, stacking of fire wood and 'passing' of timber are to be synchronized and removal of the converted materials shall be taken-up as per tree cutting and removal rules prescribed by the Competent Authority. On the spot records shall be maintained for all trees felled and logs, fire wood, stacks, obtained from such trees in the conversion register, which shall be available for verification by any competent supervising authority such as the the Forest Department, OWD/PIU and the Engineer. No sooner the trees are felled, the same has to be kept under watch and ward. Vegetation above 30 cm girth will be considered as trees and the Contractor will be compensated, in the event of Engineer's written instruction to undertake tree cutting activity. Any tree between 30 to 45 cm girth at breast height shall be uprooted mechanically with ball of earth intact for relocation and transplantation at pre-identified site/s (near ponds, temples, market places, schools and along road corridor) for preventing complete loss of such vegetative cover at the direction of the Engineer. All workers involved in the cutting and removal of trees/stumps shall wear safety helmets, gloves, and protective shoes and shall provide with a batch of first aid facility for attending to basic unforeseen and freak accidents. Emergency numbers and details of nearest hospitals shall be identified during work in each stretch of the road corridor. This information shall be made available to workers, including the Site Supervisors in form of a Safety Pocket Diary.
E.2	Joint Field Verification	The Engineer and the Contractor will organize and carry out joint field verification to ascertain the possibility of saving trees, environmental and community resources wherever such representations or suggestions in writing have been received and forwarded by the project authority. The Joint Verification Team will also include representation from the PMU/PIU and/or NGO. The team will assess the pros and cons of such demands/suggestions to assess the need for any changes in the design and implementation plan for the activities earlier approved by the Project Authority. The complaints/suggestions together with the observations and expert opinion of the joint verification team containing the need for additional protection measures or changes in design/scale/nature of protection/management measures shall be well documented with other requisite details such as date, time, place and signature of the individuals involved. Approval will be accorded by the Engineer in consultation with the Project Authority. The Engineer shall maintain proper documentation and justifications/reasons in all such cases where deviation from the original design or the

S. No.	Environmental Issue/Aspect	Management Measures
		Environment Management Plan is proposed.
E.3	Location and installation of Crushers, Hot-mix Plants and Batching Plants	All plants (hot-mix, crushers, batching plan, WMM or any other) shall be located at least 1000 mts. away from habitations, forests and wildlife movement areas, preferably in the downwind direction. The application of this norm shall include the following locations: km 0 – Berhampur; km 0.500 Jagatpur; km 2.7 - Gunthubandha; km 4.1 Gujarpur km 4.7 – Lanjia; km 6.9 Madhubazar; km 7.7 Kazibazar; km 7.9 – Baghajhari km 9.5 Paga; km 10.3 Bahugram; km 16.9 Sisua; km 19.1 Salipur km 24.2 Kendupatana; km 24 to 26 km – Digapahandi; km 27.7 Nischintkoili; km 32.800 – Dengausta km 33.1 Sukarpara; km 35.6 Katikata; km 36.500 km – Pudamari; km 39.1 Danapur km 49.0 Duhuria; km 51.0 Kendrapara; km 55.5 Haladidiha; km 58.5 Trilochanpur km 65.6 Gogua; km 69.5 Patamundai; km 74.9 Gopalpur; km 77.9 Singiri km 85.2 Aul; km 95.2 Kantapara; km 100.3 Chandabali km 2.130, km 9.780 and bet. km 26.500 to 29.000 - Wildlife Movement Areas (Reptiles) The Contractor shall submit the proposed location plan (including survey number/s of the land parcel/s under consideration, area, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for setting-up such construction facilities. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer. The 'installation' of the plant/s shall commence after the contractor has obtained 'consent to establish' from the Orissa State Pollution Control Board. The 'operation' of the plant/s shall be permitted by the Engineer after the 'consent to operate' has been obtained from the SPCB. A copy of the application submitted to the SPCB and the consent/s received must be submitted to the Engineer, based on which the approvals will be accorded. Action/s by the Engineer against any non-compliance on this count shall be borne by the Contractor at his own risk and cost.
E.4	Construction Camp/s – Selection, Design and Lay-out	No construction camps, including material stack yards and storage facility will not be proposed within 500 mts. from: (a) a settlement/habitation; (b) water source and; (c) reserved or protected forest limits, to avoid conflicts and stress on the local infrastructure facilities and natural resources. In case the contractor proposes setting-up of plant/s within a construction camp, clause E.3 will apply. The Contractor shall submit the proposed location plan (including survey number/s of the land parcel/s under consideration, area, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for setting-up construction camps. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer. Once the location has been approved by the Engineer, the Contractor has prepare the lay-out plan and design of facilities to be provided within the

S. No.	Environmental Issue/Aspect	Management Measures
		construction camp and seek prior written approval of the Engineer before initiating any construction activity or storing materials on the approved land parcel/s. Complete details about the pre-dominant wind direction and design of facilities, including circulation area, parking, material storage, kitchen/mess, sanitation, waste collection and disposal, drainage, electrical utility placement and water supply shall be provided by the Contractor as part of the documentation seeking approval of the Engineer on this count.
E.5	Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery to be procured for construction shall confirm to the relevant Bureau of India Standard (BIS) norms. The Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm to the emission standards specified by the CPCB. Certification issued for such contrivances by the designated/approved authorities shall be submitted to the Engineer. The Contractor shall maintain a proper record of Pollution Under Control Certificates for all vehicles and machinery used for works under the contract. Copies of such records shall be kept at the site office and shall be made available to the Engineer when sought.
E.6	Identification, Operation and Rehabilitation of Borrow Areas	The Contractor shall submit the proposed location plan (including site details, survey number/s of the land parcel/s under consideration, area and quantum of material proposed for extraction, land-use and surrounding features) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s for opening borrow areas. The Contractor will formalize agreement with land owner/s only after a written approval has been accorded by the Engineer. The Engineer will be required to inspect every proposed borrow area location and evaluate (parallel with technical examination) such proposals in accordance to environmental requirements as laid down in the EMP prior to issuing the 'approval' for use of such sites. No borrow areas shall be opened within 500 mts. from wildlife (reptiles) movement zones and forest areas. The application of this norm shall include the following locations: • Km 2.130 • Km 9.780 and • Km 26.500 to 29.000 The borrow areas shall be at least 250 mts. from schools, human habitations (residential and commercial establishments), village access roads, state highways and other roads. No borrow area will be opened/operated without the written permission of the Engineer. The location, shape and size of the designated borrow areas will be as approved by the Engineer and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961). The 'format' for seeking Engineer's approval on environmental considerations will be as per the template provided in this EMP and will include a reference/location map; area, existing land use and haul road details; photograph of the site; and the proposed rehabilitation plan. The Contractor will not start borrowing earth from the approved borrow area/s until an agreement is signed between land owner/s and Contractor and a copy of this agreement is submitted to the

S. No.	Environmental Issue/Aspect	Management Measures
		Engineer. In borrow pits, the depth shall be regulated so that the sides of the excavation should not be stepper than 1:2, from the edge. All borrow areas whether in private, community or govt. land shall be restored as per the approved rehabilitation plan immediately after completion of the use of such a source. The Contractor shall plan and ensure rehabilitation work in such a manner that it is completed prior to the rainy season. 'Substantial completion' or 'completion' certificates for the civil work shall not be issued unless restoration and rehabilitation works have been completed by the Contractor and the same has been accorded a written approval by the Engineer. A Borrow Area Management Framework (with options to deal with various/typical field situations) has been provided for guidance in this EMP.
E.7	Identification, Operation and Rehabilitation of Stone Quarry	The Contractor shall submit the proposed location plan (including site details, survey number/s of the land parcel/s under consideration, area and quantum of material proposed to be used, land-use, photograph/s of the site and surrounding features within 500 mts.) and seek prior approval of the Engineer before entering into any formal agreement with land owner/s in case of a new quarry site or with the owner/operator in case use of an existing quarry is proposed. No quarry and/or crusher units shall be 'selected' or 'used', which is within 1000 mts. from a human habitation, forest boundary and wildlife habitats/movement areas. The application of this norm shall include the following locations: km 0 – Berhampur; km 0.500 Jagatpur; km 2.7 - Gunthubandha; km 4.1 Gujarpur km 4.7 – Lanjia; km 6.9 Madhubazar; km 7.7 Kazibazar; km 7.9 – Baghajhari km 9.5 Paga; km 10.3 Bahugram; km 16.9 Sisua; km 19.1 Salipur km 24.2 Kendupatana; km 24 to 26 km – Digapahandi; km 27.7 Nischintkoili; km 32.800 – Dengausta km 33.1 Sukarpara; km 35.6 Katikata; km 36.500 km – Pudamari; km 39.1 Danapur km 49.0 Duhuria; km 51.0 Kendrapara; km 55.5 Haladidiha; km 58.5 Trilochanpur km 65.6 Gogua; km 69.5 Patamundai; km 74.9 Gopalpur; km 77.9 Singiri km 85.2 Aul; km 95.2 Kantapara; km 100.3 Chandabali km 2.130, km 9.780 and bet. km 26.500 to 29.000 - Wildlife Movement Areas (reptiles) The Contractor shall obtain necessary legal permission/s from Department of Mines, Govt. of Orissa and the District Administration, SPCB and local Tehsildar and submit a copy of the same to the Engineer. The Contractor shall be permitted to use the quarry only after all necessary documents have been submitted and a written approval to this effect is given by the Engineer. The Contractor will develop a Quarry Redevelopment Plan, as per the Mining Rules of the State and submit a copy of the same to the Engineer as part of the documentation seeking his approval for the use of the quarry area/s. All quarry operations, including procurement, storage and use of blasting material/s will be undertaken within the rules and regulations in vogue.

S. No.	Environmental Issue/Aspect	Management Measures
E.8	Identification, and Operation of Sand Quarry	The Contractor shall submit the proposed location plan (including details of the site/s under consideration, proposed quantum of material extraction and surrounding features) and seek prior approval of the Engineer. No sand quarry shall be opened within 500 mts. from wildlife (reptiles) movement zones and forest areas. The application of this norm shall include the following locations: • Km 2.130 • Km 9.780 and • Km 26.500 to 29.000 In the event of selection of a new site for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority, the local Tehsildar and the Engineer keeping in view the objections and convenience of the local population. Where the supplier of sand is another party, the authentic copy of lease agreement that has been executed between the local Tehsildar and the supplier has to be submitted to the Engineer before any procurement of material is made from such a site. The procurement of material shall be allowed only from those sand quarry sites that are permitted by the local Tehsildar with the concurrence of the District Collector with due regard to Orissa Miner Mineral Concession Rules, 2004. To avoid accidents and caving in of sand banks at sand quarry sites, sand shall be removed layer by layer. Digging deeper than the permissible limit has to be completely avoided by the Contractor. Such quarry should be barricaded 10 mtr from the periphery on all sides except the entry/exit point, so as to prevent accidental fall of domestic cattle, wildlife or human beings. The flood (earthen) embankment on either side of the river shall not be used for movement of tippers and loaders, which is likely to damage such structures. Instead alternative haul road shall be provided, avoiding the embankment for safety and security of the vehicles, road users and the habitations along the banks of the river.
E.9	Arrangement for Construction Water	The Contractor shall submit the proposed location plan (including site details; type of the source under consideration; its usage by other consumers; proposed quantum of water extraction) and seek prior approval of the Engineer. To avoid disruption/disturbance to other water users, the Contractor will extract water only from the approved locations and shall seek a written approval of the Engineer before finalizing and using any such water source – whether ground or at surface. The Contractor should use surface water depending on the availability and quality by developing its own water storage units in a river bed during sand quarrying or by developing ponds during borrowing earth from where water can be lifted using diesel or electric pump sets. Use of ground water facility shall be subject to the local legislation; ground water availability in the area and the granting of necessary permission by the Competent Authority. The Contractor shall pay the royalty for use of such water as decided under the relevant norms. A copy of the permission obtained from the Competent Authority shall be submitted to the Engineer prior to the use of any such source. The possibility/ permission for sinking of bore wells adjacent to nalas and streams may be examined, such that while the water requirement for the road construction activity is met and these structures when abandoned can help in ground water recharge after suitable modification.

S. No.	Environmental Issue/Aspect	Management Measures
		Use of any other water source such as irrigation canals, water harvesting structures and river/stream, which is likely to strain and deplete availability for surrounding and downstream inhabitants will not be allowed. Contractor can use ponds, which are not in use by the community/wildlife or have been identified for filling-in for the proposed works, but in such a case, he will obtain a written consent from the owner/s and submit a copy of the consent/s to the Engineer. The Contractor will take all precautions to minimize the wastage of water in the construction process and related operations.
E.10	Clearing and Grubbing	All works shall be carried out by the Contractor in a manner such that the damage or disruption to flora is minimal. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from Engineer.
E.11	Stripping, stacking and preservation of top soil	The top soil from all sites including road side widening and working area, cutting areas, quarry sites, borrows areas, construction camps, haul roads in agricultural fields (if any) and areas to be permanently covered shall be stripped to a specified depth of 150mm and stored in stockpiles for re-use. A portion of the temporarily acquired area (along the boundaries in a construction camp, borrow areas etc.) and along the road at the Right of Way edge will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of the Engineer. The following precautionary measures will be taken by the Contractor to preserve the stockpiles till they are re-used: (a) Stockpile will be such that the slope does not exceed 1:2 (vertical to horizontal), and height is restricted to 2 m. (b) To retain soil and to allow percolation of water, the edges of the pile will be protected by silt fence. (c) Multiple handling kept to a minimum to ensure that no compaction occurs. (d) Such stockpiles shall be covered with empty gunny bags or will be planted with grasses to prevent loss during rains. Such stockpiled topsoil will be utilized for - ➢ Covering reclamation sites or other disturbed areas including borrow areas (other than those in barren areas) ➢ Top dressing of road embankment and fill slopes ➢ Filling up of tree pits and ➢ In the agricultural fields of farmers, acquired temporarily that need to be restored. Residual topsoil, if there is any, will be utilized for the plantation works along the road corridor. The utilization as far as possible shall be in the same area/close to the same area from where the top soil was removed. The stripping, preservation and reuse shall be closely supervised and properly recorded by the Engineer.
E.12	Labour Camp Management	

S. No.	Environmental Issue/Aspect	Management Measures
12.1	Accommodation	Prior to setting-up such a labour/worker's facility, the location, lay-out and basic provision of facilities to be provided at each labour camp site shall be submitted to the Engineer for approval. The construction or hiring of such facilities shall commence only after the written approval from the Engineer has been received by the Contractor. The Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp/s. The Contractor will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent fuel wood cutting and burning by labour) in functional and hygienic manner.
12.2	Potable Water	The Contractor shall ensure the fulfillment of the following conditions: a) Supply of sufficient quantity of potable water within the precincts of every workplace in a cool and shaded area (as per IS/the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996) in every workplace/ labour camp site at suitable and easily accessible places shall be made. Such facilities shall be regularly maintained from health and hygiene point of view. b) All potable water storage facilities will be on a safely raised platform that is at least 1m above the surrounding ground level. c) In the camp sites, water purifier units shall be installed for providing potable water. d) As far as possible, shallow well will not be used as potable source of water. However, if water is drawn from any existing well, irrespective of its location from any polluting sources, regular disinfection of the water source (which may include application of lime, bleaching power and potassium permanganate solution) has to be ensured at weekly/fort nightly interval. e) All open wells will be entirely covered and will be provided with a trap door to prevent accidental fall and contamination from dust, litter etc. A reliable pump will be fitted to each covered well. f) A drain shall be constructed around the well to prevent flow of contaminated water into the well from road, camp or other sources. g) The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. h) Water quality testing of all potable water sources will be done every month as per parameters prescribed in IS 10500:1991. The Engineer is required to inspect the labour camp once in a week to ensure compliance to the health and hygienic standards prescribed in the Labour Regulations and in the EMP.
12.3	Sanitation and Sewage System	The Contractor shall ensure that - i) The provision of toilets and sewage system for the camp is to be designed, built and operated in such a fashion that no health hazard occurs and no pollution to the air, surrounding agricultural fields, ground water or adjacent water courses takes place. j) Separate toilets and bathrooms for women workers wherever required, screened from those of men, are provided with markings in vernacular language.

S. No.	Environmental Issue/Aspect	Management Measures
		k) All such facilities must have adequate water supply with proper drainage and disposal facility. l) All toilets in workplaces are to be maintained, cleaned and disinfected daily using proper disinfectants. m) Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. n) In the main camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site. All these facilities shall be inspected on a weekly basis by the Engineer to check the hygiene standards.
E.13	Transportation of Construction Materials and Haul Road Management	The Contractor shall maintain properly (as directed by the Engineer) all roads (existing or constructed for the project), used for transporting construction materials, equipment and machineries for the works under this contract. It shall be the responsibility of the Contractor to ensure that all roads used for transportation of construction materials are clear from any dust, sand, soil, aggregates etc. that may have fallen from the transporting vehicles. The Contractor will arrange for regular water sprinkling, at least three times in a day, for dust suppression of all such roads and surfaces. All vehicles delivering goods to the site shall be covered to avoid spillage of materials and air pollution. The unloading of all materials at construction sites will be limited to day time only to avoid accidents. Screens of hessian cloth, agro-net and such other barricading material are to be erected along all dumping and stockpiling sites, so that generation of the dust in the vicinity of such locations can be minimized to a great extent.
E.14	Worksite Safety Management	
14.1	Planning for Traffic Diversions and Detours	A detailed Traffic Management and Safety Plan shall be prepared and submitted to the Engineer for approval, minimum fifteen (15) days prior to commencement of work/s on any section of road. The Plan shall contain details of temporary diversion/s, traffic safety arrangement/s including night time safety measures, details of traffic arrangement after cessation of work each day, safety measures undertaken for transport of hazardous materials and arrangement of flagmen etc. to regulate traffic congestion. Temporary diversions shall be permitted only after the approval of the Engineer has been obtained by the Contractor. The temporary traffic detours will be kept free of dust by sprinkling of water, at least three times a day or as required under specific conditions (depending on weather conditions and location of the construction zone) and directed by the Engineer. The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Contractor will inform local community of changes in traffic routes and pedestrian access arrangements at least seven days in advance of the scheduled work. This will be done through placement of informatory signage (in English and in Oriya) at strategic locations.

S. No.	Environmental Issue/Aspect	Management Measures
14.2	Traffic Safety	Before any construction activity is permitted by the Engineer, proper implementation of the Traffic Management and Safety Plan by the Contractor is a must. Non or improper adherence to this requirement will attract contractual remedies, including stoppage of work and deduction from IPCs. The Contractor shall take all necessary measures for the safety of road users and workers during the construction period and provide, erect and maintain such barricades, including signage, markings, flags, lights, reflectors and flagmen as per the approved Traffic Management and Safety Plan. The Contractor shall ensure that all signs, barricades, pavement markings are provided as per the MoRTH/ IRC specifications.
14.3	Safety of Workers	The Contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The Contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The Contractor shall provide and ensure enforcement with zero tolerance on the following: a) Protective footwear and protective goggles to all workers employed handling asphalt materials, cement, mortar, concrete, blasting and crusher operations. b) Welder's protective eye-shields and protective footwear to workers engaged in welding works. c) Earplugs to workers exposed to high noise levels (above 65db) at quarries, crushers, compaction sites, dismantling, concrete mixing, batch mixing, drilling, fabricating and heavy machinery operations. d) Hard hat or helmets to all workers, supervising staff and inspecting officials entering a construction site, plant area, quarry and enagaged in loading/unloading operations. e) Protective goggles and clothing to workers engaged in stone breaking activities. f) Nettings below and on the sides of overhead construction and excavation work to prevent mishaps due to accidental fall of workmen and debris. g) The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. h) The Contractor will not employ any person below the age of 18 years for any work and no woman of productive age will be engaged in the work of painting containing lead in any form. The Contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. i) Contractor will provide facemasks to the workers engaged in spray painting or manual painting when lead based compound is one of the constituents of such surface to be scrubbed, cleaned and painted. These masks shall also be provided to workers to minimize risks from inhaling toxic fumes and dust. j) 'No smoking' and other 'high risk' areas are to be provided with warning signage besides strict enforcement of PPE with zero tolerance limits.
14.4	Risk from	All power transmission lines whether claded or sufficiently covered are potential hazards at construction sites. The Contractor shall take all required

S. No.	Environmental Issue/Aspect	Management Measures
	Electrical Equipment(s)	precautions to prevent danger from electrical cables, wires and equipment and ensure that – a) No material will be stacked or placed below/near power transmission lines, wires and equipment, which can be a potential danger to any road user, workman or public. b) All such electrical installations and wirings shall be barricaded in manner that ensures safety of the road users, workers, operating vehicles/equipment (such as cranes, excavators, loaders, fabricating units) and wildlife. c) Necessary fencing, illumination and proper insulation of the electrical lines shall be ensured by the contractor for safety and security of the general public, road users, workers and the wildlife. d) The contractor shall ensure proper maintenance of electrical supply lines/points. e) All such electrical operating units shall be switched off before operations are closed every day or night as the case may be. f) All electrical equipment/cables/wires to be used in the construction shall have to conform to the relevant BIS specifications/codes. g) The contractor will ensure that such equipment/cables/wires are free from patent defect, and maintained in good working order (as per the owner manual supplied by the manufacturer) through regular supervision, monitoring, maintenance and repair/ replacement from time to time.
14.5	First Aid	The Contractor shall arrange for - ▪ A readily available lifesaving first aid kits including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone. ▪ Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital. ▪ Equipment and trained nursing /paramedical staff at construction camps. ▪ Periodic health checks for workers.
14.6	Risk Force Majeure	The Contractor shall take all reasonable precautions to prevent danger of destruction to life and property of the public as well as the workers on account of flood, fire, explosion, accidents involving vehicles carrying hazardous materials etc. in an around work sites, camps, maintenance units, borrow areas, quarries, haul roads and in any other place associated with the project activity. The Contractor will make the required arrangements so that in case of any mishap all necessary steps can be taken for prompt on-the-spot first aid treatment. Arrangements shall be made for quick rescue operation including shifting of the injured to the nearest hospital Fire extinguishers/fire-fighting equipment and salvaging equipment for the recovery of hazardous chemicals on account of accidents or spillage are to be kept ready at camping sites or major construction sites to attend to such eventualities. A Construction Safety Plan to be prepared by the Contractor during the Mobilization phase shall identify all necessary actions in the event of an emergency. The actions shall include description of stand-by arrangements, rescue of workers/people and salvage of hazardous chemicals/ materials in case of such eventualities. This plan shall be prepared in accordance with the standard practice adopted under labour welfare activities and Factories Act

S. No.	Environmental Issue/Aspect	Management Measures
		and will be approved by the Engineer.
E.15	Accessibility	Construction activities that affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provision/s approved by the Engineer. The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from road sides and property accesses connecting the project road by providing safe temporary arrangements, including a connecting road, as necessary.
E.16	Disruption to Other Users of Water	While working across or close to any perennial water bodies, the Contractor shall not obstruct/prevent the flow of water. Construction over and close to the non-perennial streams shall be undertaken in dry season and if such activity is likely to disrupt, constrain or impact the community use of the water body, adequate prior information (at least two weeks in advance) will be provided to such a community. Such water body may be ponds, water harvesting structures (WHS), feeder channels to pond, irrigation sources etc. If the supply of water or access to a source is being completely cut off, then the Contractor shall make necessary arrangements to provide water in the interim period. Water quality test shall be done prior to providing / supplying the water. Wherever excavation for diverting water flow will be required as per the engineering designs, the Contractor will ensure that such diversion channels have no stepper slopes than 1:2 (V:H). Proper slope protection measures have to be taken as approved by the Engineer. Such an activity will be carried out with prior approval of the River Authority or Irrigation Department. The Engineer and OWD/PIU will ensure that Contractor has served the notice to the downstream users of water well in advance where such diversion of the flow is likely to affect the downstream population. However, under no circumstances the downstream flow shall be stopped putting the wildlife, the aquatic fauna and the shore line settlement under distress. Minimum eco-flow shall be maintained even during the construction stage by ensuring downstream connection to the main channel.
E.17	Labour Requirements	The Contractor preferably will use labour drawn from local areas to provide maximum benefit to the local community especially to the vulnerable individuals/groups living in the project area.
E.18	**Pollution Management**	
18.1	Dust Pollution	The Contractor will take every precaution to reduce the level of dust (SPM and RSPM) and make arrangements to minimize dust pollution through provision of wind screens/barriers, water sprinkling/mist spray units, and encapsulation of dust source shall be made at the plant sites. Dust screening vegetation such as Dwarf bamboo, Justiacea, Vitex negundo, Lawsonia inermis will be planted around the crusher sites besides provision of dust screen/s. The suspended particulate matter value at a distance of 40m from a unit located in such a cluster should be less than 500 $\mu g/m^3$. Specifications of crushers, hot mix plants and batching plants shall comply with the requirements of the relevant legislations and as laid out in the

S. No.	Environmental Issue/Aspect	Management Measures
		'Consents' issued by the OSPCB. The Contractor will provide necessary certificates to confirm that all crushers used for the works under the Contract conform to relevant dust emission control legislation. Air monitoring will be conducted as per the Pollution Monitoring Plan and results shall be used to strengthen/rectify problematic areas. Even if the Contractor chooses to use an existing crusher (already operating in the area), basic minimum standards stipulated under the Pollution Control Legislation will have to be met and dust control devices need to be installed and operated. Copies of the required certificates and 'consents' of such a plant shall be procured by the Contractor and submitted to Engineer prior to the procurement of material from a unit of this nature. The Engineer will ensure that the necessary documents have been submitted by the Contractor before the permission for material procurement is given.
18.2	Siltation of Water Bodies and Degradation of Water Quality	Release of wastes (non-toxic and toxic) by the Contractor into water bodies and drainage systems that may adversely impact the aquatic life both locally and in the downstream stretches shall be viewed as serious non-compliance of EMP since these may affect the eco-flow, aquatic life and livelihoods of people dependent on such resources. The Contractor will ensure that construction and excavated materials containing fine particles are stored in an enclosure, particularly during the rainy season, such that sediment-laden water does not drain into nearby water bodies. Construction materials containing fine particles like lime stone, lime, cement, fine aggregates etc. shall be stored in enclosures, preferably higher than the surrounding ground, to ensure that any run off from such locations does not drain into nearby water courses. The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system by providing proper septic tanks and soak pits. Spills, dust fines, waste oil, wastes and debris shall be cleared and disposed off as per the guidelines provided in the EMP under the supervision of the Engineer. The Contractor will avoid continuation of construction activity close to the streams or water bodies during monsoon. Stream courses and drains will be kept free from dumping of solid wastes, excavated earth, sludge and discharge of waste water from construction camps and sites. Liquid wastes arising from construction sites are to be impounded into proper collection pits. The construction of retaining walls in the ponds, bathing ghats, spillways, minor bridges etc., shall be in manner that causes minimal disturbance/damage to users and the aquatic life (like fish on which local people use for sustenance/livelihood). Silt fencing shall be installed prior to the onset of the monsoon at all the required locations (near/at water bodies) and as directed by Engineer. At such locations, silt fencing will be provided prior to the commencement of earthwork and continue till the stabilization of the embankment slope is complete on the particular sub-section of the road.
18.3	Water Pollution from Fuel, Lubricants and	Garage, service stations, refueling stations and equipment maintenance yards shall be so located at least 100 mts. away from kitchen, mess and drinking water facilities within the camp site. The Contractor shall ensure that all vehicles, machinery and equipment are operated (including re-fuelling) and maintained in such a fashion that any

S. No.	Environmental Issue/Aspect	Management Measures
	Chemicals	spillage (while working or accidental) of fuel and lubricants does not contaminate the land and water resources. There shall be lined drains and service ramps with oil and grease traps/oil interceptors in such areas to prevent liquid wastes from entering into soil, any aquifer, local water source, bore well, pond and other water bodies. Storage of drums (both filled and empty) and refueling shall be done on concrete platforms (impervious surface). Additionally, roofing (of any type other than asbestos) shall be provided to prevent contamination of land and water due to run-off from such sites during rains. Oil interceptors are also to be provided at vehicle parking areas. The contractor will arrange for collection, storage, reuse/disposal of spent oil, lubricants, grease, sludge, slurry, bitumen, chemicals and paints or other such material. Covered bins/drums (marked specifically regarding the contents) shall be kept separately at maintenance and refueling areas. Disposal shall be at pre-identified sites (as listed in the Waste Management Plan) as approved by the Engineer. All spills and collected petroleum products will be disposed off in accordance with the prevailing MoEF and SPCB guidelines issued for such purpose. The Engineer will certify that all arrangements comply with the guidelines of SPCB/ MoEF.
18.4	Noise Pollution	The Contractor shall ensure the following: a) All plants and equipment used in construction (including those of sub-Contractors and/or suppliers such as aggregate crushing plants) shall strictly conform to the MoEF/CPCB noise standards and shall have latest noise suppression mountings. b) All vehicles and equipment used in construction will be fitted with exhaust silencers. c) Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective, these shall be replaced. d) Limits for construction equipment used in the project such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment in the free field), as specified in the Environment (Protection) Rules, 1986. e) Maintenance of equipment, machinery and vehicles (including proper lubrication, tuning, checks for muffler effectiveness) shall be regular and up to the satisfaction of the Engineer to keep noise levels under control. f) Construction activity at sites within 100m habitations and hospitals shall not be carried out during night (10:00 pm to 06:00 am). g) Construction activity at sites within 500m from wildlife movement zones, reserved and protected forest areas shall not be carried out between 06:00 pm to 06:00 am. h) The Contractor will not take any construction activity around educational institutes within a distance of 100 m between the working hours of these sensitive receptors. i) Blasting operations, if any shall be carried out with full safety precautions and in compliance with measures as specified in the legal provisions. Monitoring shall be carried out by the Contractor in presence of the Engineer at the construction sites as per the Noise Monitoring Plan provided in this EMP and results shall be shared with the Engineer.

S. No.	Environmental Issue/Aspect	Management Measures
E.19	Drainage and Flood Control	The contractor will also ensure that no material (such as earth, stone, or other construction material or wastes) blocks the natural flow of water in any water course or cross drainage channel. All cross drainage and structure construction sites shall be cleared/cleaned-up prior to the rainy season. Also, prior to the monsoon season, the Contractor will provide either permanent or temporary drains to prevent water accumulation in residential, commercial and agricultural areas adjoining the under-construction zones of the road. Besides this, drainage shall be cleared to avoid accumulation of water within the construction sites, camp and plant sites and storage yard well in advance of the rainy season. A pre-monsoon joint inspection (in May first week) by Contractor and the Engineer will be conducted to identify all such areas which need to be cleared and restored before the onset of rains.
E.20	Slope Protection and Control of Soil Erosion	The Contractor will provide slope protection works as per design, or as directed by the Engineer to control soil erosion and sedimentation through use of dykes, sedimentation chambers, basins, fiber mats, mulches, grasses, slope drains and other devices as required under specific local conditions. All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earth work or other items of work and as such no separate payment will be made for them. The Contractor shall ensure the following: a) After construction of road embankment, the side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub, as per design specifications. b) Turfing works will be taken up as soon as possible provided the season is favorable for the establishment of grass sods. c) Other measures of slope stabilization may include mulching/netting with sowing of grass seeds and sprinkling of water on such slopes after the completion of the earth work. d) Along sections abutting water bodies, stone pitching, as laid out in the design, will be provided to protect slopes.
E.21	Waste Management	
21.1	Waste Management – Planning and Identification of Disposal Sites	All proposed disposal sites for waste material shall be identified by the Contractor and a Rehabilitation Plan (including details about pollution prevention and safety measures) for each such site shall be submitted to the Engineer using the template provided in this EMP. These sites and the rehabilitation plan shall be verified by the Engineer in consultation with the local community/ Local Competent Authority after joint site visits and approved, prior to allowing disposal of any debris or waste material by the Contractor. Disposal site/s shall be finalized prior to allowing initiation of any work on a particular section of the road. The Contractor shall then enter into an agreement with the concerned land owner/s and a copy of this document shall be submitted to Engineer. The Contractor will ensure that any spoils/materials unsuitable for embankment fill are not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests and pastures.

S. No.	Environmental Issue/Aspect	Management Measures
21.2	Re-use and Disposal of Debris Generated from Dismantling of Structures and Road Surface	Debris generated due to the dismantling of the existing road will be suitably re-used in the proposed construction as follows: ▪ Eighty percent (80%) of the sub-grade excavated from the existing road surface, excluding the scarified layer of bitumen, shall be reused in the civil works after improving the soil below the sub-grade through addition of sand and suitable cementing material for qualitative up-gradation. ▪ The dismantled scraps of bitumen will be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the corridor or in any other manner approved by the Engineer. ▪ At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water. ▪ The Contractor will suitably dispose off unutilized non-toxic debris either through filling up of borrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of the Engineer. ▪ Debris generated from pile driving or other construction activities along the rivers and streams drainage channels shall be carefully disposed in such a manner that it does not flow into the water body. Non-bituminous wastes may be dumped in borrow pits (preferably located in barren lands) where such borrow pits are not suitable to develop as a economic source like pisci-culture or a source of irrigation. Such borrow pits can be filled up with non-bitumen wastes and then covered with a minimum 30cm layer of the soil, where plantation of trees and shrubs is to be taken-up by the Contractor as a part of site rehabilitation. The species suitable for such re-habitation work shall be at least one-year-old saplings of Alstonea, Zizyphus, Bel, Papal, Banyan, Babool, Chirounji, Arjuna, Karanja, Samania etc. The Contractor at his own cost shall resolve any claim, arising out of waste disposal or any non-compliance that may arise on account of lack of action on his part.
21.3	Waste Disposal from Construction Camp/s and Plant Site/s	The Contractor will provide garbage bins in the construction camp/s and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Waste Management Plan approved by the Engineer. No incineration or burning of wastes shall be carried out by the Contractor. The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. The contractor may use the compost from such wastes as manure in the plantation sites. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tyres, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold/given out for recycling.
E.22	Chance Found Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or property.

S. No.	Environmental Issue/Aspect	Management Measures
		He will, immediately upon discovery thereof intimate the Engineer, PIU/OWD, local police and administration of such discovery and carry out the given instructions for dealing with the same. The Engineer will seek direction from the State Archaeological Department before instructing the Contractor to recommence the work at the concerned site. Till such time, the site and the findings shall be under strict watch and ward of the Contractor, Engineer and local administration to prevent any pilferage, alteration of the findings by the workmen or locals as the case may be.
E.23	Demobilization and Decommissioning	The Contractor shall prepare and submit a 'Site Rehabilitation Plan' to the Engineer for approval at least 60 days prior to the proposed 'substantial hand-over' of the 'milestone' in question. The Engineer will closely monitor the implementation of this plan. All clean-up and restoration operations, including road-side and structure construction site clean-up; borrow area rehabilitation; provision of drainage and slope protection measures and; restoration of top-soil shall be completed prior to the 'substantial hand-over'. In addition to the items listed in the paragraph above, prior to the closure of works of the last milestone, the Contractor shall clear all temporary structures and dispose all garbage, night soils and POL waste as per the approved Waste Management Plan. All disposal pits or trenches will be filled in disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly at plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW. All construction zones including river-beds, drainage channels, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be rehabilitated as per the approved plans. The Engineer shall ensure that all clean-up and restoration operations are completed satisfactorily and written approval is given to the contractor before the 'works completion certificate' is issued/recommended to the Client. The OWD/PIU shall ensure through site inspection that the Contractor and Engineer have complied with all these provisions prior to 'taking-over' the milestone stretch in question.

Table 3.2
BIODIVERSITY MANAGEMENT PLAN

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
PRE-CONSTRUCTION STAGE				
Activities to be Carried Out by the OWD/Forest Department, GoO/Contractor				
B.1	Preservation of road side trees	Cutting of trees along the avenue for road widening and strengthening, construction of bridges/culverts and for creating temporary diversions is required for the project. A total of 7568 trees will be cut along the route for the purpose of the project. Attempts to minimize tree cutting particularly of green tunnels, giant healthy trees and young avenue plantation have been done to reduce the impact of cyclones, which are common to this belt of the state. A total of 754 trees shall be saved from cutting in this contract package. The location, no. and side to be saved as per the fringe benefit of retention given to all sound and healthy plants above 30 cm girth at BH coming on the toe margin as per the horizontal drawing. Saving or retaining at least one side of the green tunnels, avenue plantation giant trees and young plantation has not been done for facilitating nesting, parching, hunting and vintage observation points of aviary fauna, which also provides resting and breeding habitat for rodents, reptiles and amphibians. Besides this, protection of fruit bearing trees used by human beings and wildlife offers additional economic and ecological benefits, which is not projected here. In the event of design changes during the course of the project, additional assessments including the possibility to save trees shall be made by the PMU/OWD and the SC. Documentation of such exercises shall be maintained by the EMU of PMU /OWD. This includes evaluation of on-the-spot minor design adjustments (as applicable) to save trees. In the instant case trees which are located within or on the toe line of the embankments have been retained.	PMU/OWD; DPR consultants; Tree Felling Contractor; Supervision Consultant	Project Director, PMU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		Specific attention will be given for protecting giant trees, green tunnels and locally important trees (religiously important etc.). However, if necessary removal of hollow, rotten and dismembered giant old trees from the corridor of impact may be allowed after site verification by the Forestry Expert of OWD/PMU. As necessary, separate proposals for felling of such trees will be submitted to the concerned Divisional Forest Officer. Systematic corridor level documentation for the trees to be cut and those retained shall be maintained by PMU. A separate list will be maintained by the PMU/OWD in a bound register for each contract package duly signed by the site-in-charge from OWD, the tree cutting Contractor and designed officer of the OFDC Ltd., so that no unmarked trees are cut or removed from the corridor.		
B.2	Transplantation	Wherever possible, all trees up to 30cm girth at breast height and naturally occurring medicinal shrubs/bushes/grass clumps within the ROW shall be uprooted mechanically with ball of earth intact for relocation and transplantation at various pre-identified locations such as degraded sites, embankments of road-side water bodies, temples, near-by market places, religious properties, schools and along road corridors for preventing loss of diverse vegetative cover and for reducing growth period subject to the choice of species, which are hardy and vigorous coppicers to with stand the shock of uprooting and relocation.	PMU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	Project Director, PMU/OWD
B.3	Tree Cutting	Trees with bird nesting shall not be felled between Augusts to mid-April to facilitate the young birds/new generations to fly out. Additionally, all provisions stated under **clause E.1 of Table 3.1** shall be adhered to.	PMU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	PMU/OWD
B.4	Nursery Creation	A nursery (preferably close to the road) will be created/raised for bud grafting, cleft grafting, rooting of off-sets of lesser found indigenous/exotic species available along the corridor so that these can be replicated and planted along the corridor for preserving biodiversity. Apart from this, saplings for plantation along the road or at various enhancement sites	PMU/OWD; Forest Dept., GoO	PMU/OWD; Forest Dept., GoO Supervision Consultant

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		shall be raised to meet the plantation targets in a time bound manner.		
B.5	Compensatory Afforestation	Though no forest land is involved in acquisition still as per the guidelines of Govt of Odisha circular, 10 times of number of trees to be cut in non-forest stretches are to be planted as compensatory measures either along the project road or adjacent feeder roads and in institutions along the project.	District Administration, DFO, Executive Engineer, Forest Department Govt. of Odisha, MoEF, PMU of OWD	PMU/OWD, Forest Department, GoO
B.6	Drainage	Adequate number of drainage structures shall be provided as per the summary of culverts and bridges indicated with treatment in **Chapter – 1 (for detail location of each CD structure is provided in DPR).** Sufficient vantage to enable smooth flow of storm water and flood water have been provided together with specific measures for controlling velocity and scour protection masonry walls to ensure safety and security of the agricultural land on the upstream and downstream. Construction of drains where necessary along the road to facilitate quick drainage as per design drawing for different section of the road. If additional requirements for drainage emerge during the construction period, these will be properly assessed. Water flow modifications and drainage alterations resulting from such exercises shall not affect the forest and water ecosystems of the region.	PMU/OWD; Supervision Consultant	PMU/OWD
B.7	Water holes for wildlife and birds	The existing water holes located scattered within the agricultural areas and drainage basins of river Baitarani and Mahanadi areas on either side of the package beside the irrigation canals and intertidal zones and ponds, which are the perennial sources of water for the wildlife and domesticated livestock. These are not going to be disturbed on account of development activity, except during storms and summer rains, when the water sources are likely to be affected due to surface erosions to which wildlife and domestic cattle are well acquainted in this zone. Since the forest department is taking	PMU/OWD; Forest Dept., GoO	PMU/OWD; Forest Dept., GoO

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		up development of water holes and pasture within the forest areas under FDA activity, further repetition of the same from this road project has not been suggested.		
CONSTRUCTION STAGE				
Activities to be Carried Out by the OWD/Forest Department, GoO/Contractor				
B.8	Construction management and related aspects	The contractor shall adhere to all clauses /specifications covered under the contract including EMP requirements mentioned in Tables 3.1 (and the related frameworks). Any non-compliance in this regard may lead to suspension/withholding of works and stoppage/deduction of payments or any other action as deemed appropriate within the contractual framework.	Contractor	PMU/OWD; Supervision Consultant
B.9	Preservation of Trees and Vegetation	All existing trees within the RoW but beyond the corridor of impact shall be protected /preserved during the construction of the road as per the enumeration list of trees to be retained. The contractor shall ensure that damages resulting from operation of machinery, dumping and stacking of materials etc. do not occur. Trees within the construction camps, borrow areas and those close to haul roads shall not be cut. These shall be integrated into the lay-out plan for such operations.	Contractor	PMU/OWD; Supervision Consultant
B.10	Underpasses or crossing sites for wildlife	Provision for construction of the embankment at the following locations shall be so made that the slide slopes are gentle with natural grass turfing to give it a natural look, so that the wildlife movement is continue after the construction activities are over. Development of approaches to under mentioned corridors shall be by camouflage plantations within the forest either side, up to the base of the road, which will be taken up during construction activity in the area for an additional length of 20X50 mtr on such sites at 2.5mtr spacing from plant to plant with the help of forest department by use of indigenous spices of plants preferred by wildlife. This work should be taken up by the EMU wing of the PMU for implementation by Forest department.	PMU/OWD; Forest Dept., GoO ; Supervision Consultant	PMU/OWD; Forest Dept., GoO ; Supervision Consultant

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		The sequencing of construction activity for wildlife underpasses will be such that no two structures are opened for construction at the same point of time. Also, the construction timing and duration shall be closely monitored to reduce the distress period for wildlife. Advice and assistance will be sought from the Forest Department for undertaking plantation near wildlife underpasses and for the various soil and water conservation measures that will be required in the wildlife habitat/movement zones.		
B.11	Material Stacking and Debris Management	No materials or debris or silt (including excavated earth and waste materials) shall be stacked/dumped at the following locations at any point of time along Jagatpur-Chandbali road. km 0 – Berhampur km 0.500 Jagatpur km 2.7 - Gunthubandha km 4.1 Gujarpur km 4.7 – Lanjia km 6.9 Madhubazar km 7.7 Kazibazar km 7.9 – Baghajhari km 9.5 Paga km 10.3 Bahugram km 16.9 Sisua km 19.1 Salipur km 24.2 Kendupatana km 24 to 26 km – Digapahandi km 27.7 Nischintkoili km 32.800 – Dengausta km 33.1 Sukarpara km 35.6 Katikata km 36.500 km – Pudamari km 39.1 Danapur km 49.0 Duhuria km 51.0 Kendrapara km 55.5 Haladidiha km 58.5 Trilochanpur km 65.6 Gogua km 69.5 Patamundai km 74.9 Gopalpur km 77.9 Singiri km 85.2 Aul km 95.2 Kantapara km 100.3 Chandabali km 2.130, km 9.780 and bet. km 26.500 to 29.000 - Wildlife Movement Areas Debris shall be directly loaded into dumpers/tractors and disposed at the pre-identified	Contractor	PMU/OWD; Forest Dept., GoO ; Supervision Consultant

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		location/s. Construction management shall be such that operations are completed during the day and materials stacks are not left behind. All excavated boulders and rocks which are not fit for use in road construction should be used near streams, water bodies or wildlife underpasses to prevent scouring and to provide camouflage cover to animals. Uprooted stumps, discarded logs etc. can also be used at such locations without affecting the natural drainage or without causing pools of water by such activity, where accumulation of water is likely to induce slip circle and landslides. These stones and logs can also be placed at selected enhancement locations including abandoned roads to function as resting platforms.		
B. 12	Water Pollution	Release of wastes (non-toxic and toxic) by the contractor into water bodies and drainage systems that may adversely impact the aquatic life both locally and in the downstream stretches shall be viewed as serious non-compliance of EMP since these may affect the eco-flow, aquatic life and livelihoods of people dependent on such resources.	Contractor	PMU/OWD; Supervision Consultant
B. 13	Damage to aquatic life in ponds	The construction of retaining walls in the ponds, bathing ghats, spillways, minor bridges etc., shall be in manner that causes minimal disturbance/damage to users and the aquatic life (like fish on which local people use for sustenance/livelihood).	Contractor	PMU/OWD; Supervision Consultant
B. 14	Fire Safety	No lighting of fire or setting-up of labour camps within one kilometer of the forest areas and wildlife movement zones shall be permitted.	Contractor	PMU/OWD; Forest Dept.; Supervision Consultant
B. 15	Strengthening Forest Check Gates	The existing forest check gate will be reconstructed along with provision of lay bye to enable proper checking of vehicles and prevent congestion on the highway :	Plantation near underpasses and/or crossing sites	
B. 16	Informatory and	Signage regarding speed limits and protecting wildlife/environment shall be put-up	Contractor	PMU/OWD; Forest Dept.;

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
	Warning Signage	along the road. This may include information/warnings about for preventing forest fires, hunting, snaring, encroaching, smuggling, obstruction of natural water courses, confrontation with wildlife etc. The content of such signage (samples provided in Biodiversity Assessment Report and in this report as subject to any addition or alteration that may be effected by the forest department, while issuing the release order for non-forest use of forest land.		Supervision Consultant
B.17	Avenue Road side Plantation Strategy	Avenue plantation at the edge of the RoW shall be undertaken to improve highway side aesthetics, reduce micro-climatic impacts of loss of roadside vegetation and provide for some livelihood benefits to the local communities. Additionally, some species that provide shelter and food to birds and small organisms shall also be planted to reduce ecological stress on such species in the medium and long run. The tree planting along the corridor within the RoW (but outside Forest Areas) shall be taken up by plantation agency either state or private owned organisations assigned with the job of planting, which may be local Self-help groups (SHG) or any other independent party. This works shall be undertaken in a phased manner and tied-up with the civil works schedule. The contractor will take utmost care and play a proactive role in safeguarding the avenue planted seedlings along the road corridor during construction and post construction activities. The species, spacing, age and height of the plant together with condition of seedlings at the time of plantation, shall be as per the Tree Plantation Framework provided in **Framework - 1**. All other conditions as mentioned in this framework including those of transportation, plantation, and maintenance shall be strictly adhered to. The Environmental Officer of SC and Forestry Expert of OWD/PMU (EMU Unit) will inspect and monitor regularly the plantation works, survival rate of all such plantations and record their observations in the plantation register at the time of inspection, besides making official correspondence on deficiencies or improvements or changes, as warranted in specific situations.	PMU/OWD; Forest Dept, OFDC, or other plantation agency, Contractor.	Supervision Consultant; PMU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
B.18	Site Enhancement Plantation	Plantation of trees such as Banyan, Pipal, Mango, Samania, Champa, Karanja, Anla, Harida, Bahada, Kadamba, Gulmohar, Bengal almond, Arjuna, and Tamarind along with medicinal plants and shrubs such as Adhatoda, Cassia fistula, Harasingar, Dhatuki, Ganiary (Premna), Barakoli etc. shall be undertaken near ponds and community gathering areas. The final plantation number will depend upon the interest and involvement of local communities /groups / individuals. Plantations shall also be taken up by the contractor at demolition waste dumping mounds to erected at every 5th km on SH -9A and SH-9 to function as cyclone cum flood escape centers over Govt. land as has been discussed with the district Collectors Bhadrak,Kendrapara and Cuttack during public disclosure of the EMP document as a safe guard to prevent soil erosion and silting up of drainage systems.	PMU/OWD; Forest Dept, OFDC, or other plantation agency PRIs; Local Communities/SHGs / Individuals	PMU/OWD; Supervision Consultant
B.19	Flora and Chance found Fauna	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal whether in forest or non-forest land along the corridor. Only permissive activities like fishing may be allowed in the local non-forest areas with prior written consent of the local authorities and villagers. Copies of such permission shall be submitted to the Supervision Consultant. Collection of specimens, hunting, snaring, shooting, mining, fishing and burning fire in an around wildlife movement zones and, protected or reserved forest areas is strictly prohibited under law. Any such action by the contractor (and his staff) or the Supervision Consultant (and his staff) shall be reported to Forest Department, GoO and the local police/administration. If any wild animal is found near the construction site at any point of time, the contractor or his representative will immediately upon discovery thereof inform the Environmental Officer of SC, the Resident Engineer and the local forest authority and will abide by the necessary action/s as suggested by these officials. The Environmental Officer of SC will report to the nearby DFO, for all such activities, along with the local Forest Range Officer or Wildlife Warden and as per their advice	Contractor; Supervision Consultant	PMU/OWD; Supervision Consultant; Forest Dept., GoO

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		will take appropriate steps/measures, if required in consultation with the Forest Officials – this could include rescue, first-aid or sending back the animal towards the forest as would be decided.		
B.20	Involvement of Local Communities	As far as possible, employment to local people/communities/SHGs should be provided for the plantation (including raising of saplings in the nurseries and maintenance), enhancement and other environmental works along the corridor.	Contractor; Supervision Consultant	PMU/OWD; Supervision Consultant
B.21	Awareness Generation	Leaflets and/or booklets for generating awareness among the public including road users on do's and 'don'ts' during the various stages of the project shall be prepared and distributed.	PMU/OWD; Supervision Consultant	PMU/OWD
OPERATION STAGE				
Activities to be Carried Out by the OWD/Forest Department, GoO				
B.22	Immunization of Cattle	Mass immunization of cattle in villages within 5 km aerial distance on either side of the corridor, adjoining the forest and wildlife movement zones may be taken-up by the Forest Department, GoO in association with the local animal husbandry wing to prevent spread of communicable diseases.	Forest Department, GoO (District Level); Animal Husbandry Wing	Forest Department, GoO
B.23	Monitoring and Evaluation of Operational Performance of Biodiversity Protection Measures provided under the Project	o The completion of wildlife passage routes as per design and specifications with signage and development of camouflage plantation with its rates of success to be monitored together with placement of discarded near the approach into a wildlife corridor shall be closely monitored and evaluated. o Monitoring of the wildlife movement (type, frequency and season) along the identified wildlife corridors shall be undertaken at fixed intervals. o The function and stability of water holes provided to remove distress to the	PMU/OWD; Forest Department, GoO	EMU of PMU/OWD; Forest Department, GoO

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		wildlife shall be monitored for five years. o The avenue plantation and site enhancement plantation raised under the project and the old avenue trees retained /saved are to be checked every year with respect to the details in the plantation register for evaluating their survival and benefits to the local community. All these observations and data (including number, condition/status and utility/benefits) shall be systematically recorded for assessment and evaluation.		

CHAPTER 4
IMPLEMENTATION MECHANISM

4 INSTITUTIONAL ARRANGEMENT

The main function of the OWD is to maintain, improve and develop Odisha's State Highways, major district roads and other district roads. Planned Schemes include road and bridge construction projects such as municipal roads, rural roads and bridges, projects funded by Rural Infrastructure Development Fund of the National Bank for Agriculture and Rural Development (NABARD), Central Road Fund (CRF).

4.1 RESPONSIBILITIES OF OWD ARE AS FOLLOWS

- Construction, repair and maintenance of all buildings, roads, bridges and other related structures financed from the state and capital budget allocations in Odisha.
- Execution of original, renewal and repair works on the National Highway financed through MOST after levying agency charges at the rates agreed between GOO and the GOI.
- Construction of buildings, roads and bridges as relief works in the event of floods, cyclones or other natural disasters.
- Ensuring that no encroachment or structure, whether temporary or permanent is erected on the land and property under the control of OWD. It is also responsible for removal of such encroachments as per prevailing acts and rules.
- Maintaining a register of land, buildings and properties belonging to the GOO under the administration of OWD.

An Engineer-in-Chief (EIC) –cum - Secretary who reports to the Minister of Works heads OWD. As "Engineer-in-Chief" this position holds technical responsibility for OWD and as "Secretary" exercises administrative control over OWD.

There are seven CEs who report to the EIC – cum – Secretary and each is responsible for a different functional unit called a Wing. For administrative purposes each Wing is divided into Circles that are headed by Superintending Engineers. Each Circle in turn is divided into a number of Divisions that are headed by an Executive Engineer (EE).

The Head Office is responsible for overall coordination and monitoring activities, while execution of works is carried out by the EE at Divisional level.

Awareness on environmental and social issues of road management and construction and of the methods for undertaking environmental impact assessments and analyses is an essential part of the road infrastructure planning and development. Currently OWD does not have in-house expertise in this area.

OWD can do this by contracting in services, but it should have the necessary resources within its organization to audit and advise on environmental and social studies undertaken on its behalf by private or public sector Contractors.

Keeping this in view, it is suggested that the PMU of OWD need to have an Environment Management Unit (EMU) to look after and supervise the environmental issues of present road improvement work of OSRP. Gradually, this Unit will look after the environmental issues of all the activities of OWD. The objectives of EMU are to

- Ensure that the EMP recommendations are implemented effectively.
- Obtain all environmental clearances/approvals required from the various statutory authorities.
- Develop and strengthen OWD's environmental capabilities in highway design and maintenance.

Table – 4.1

Structure for the proposed EMU

Sl. No	Incumbent	Nos.	Responsibility	Minimum Educational Qualification & Experience
1	Nodal Environment Officer/Environment Head	1	In charge of EMU of OSRP	By deputation of suitable Gr-A Senior Branch Officer from FD.
2	Environment Officer	1	To assit the Nodal Environemnt Officer	M Sc. in Environment Science and 5 years experience
3	Research Assistants	5	Supervise the Environment Monitoring programme suggested in EMP and supervise the Contractors activities from Environment aspect	B Sc. in environment science /Botany /Zoology /Forestry and 2 years field experience
4	Office Assistant	1	Office work	Graduation with Computer Knowledge

4.2 CAPACITY BUILDING

The Environmental Management Unit (EMU), in addition to implementing and monitoring different environmental attributes, shall also be actively involved in organizing training and raising environmental awareness level of Contractors, field level engineers of OWD and the construction staff so as to enable them to take environmental aspects into consideration as and when required. Initially, environment experts may be hired to provide training, but in the long term, the EMU can impart additional and specialized training in the Environmental Management of the road system.

4.3 ENVIRONMENTAL MANAGEMENT MONITORING PROGRAM (EMMP)

Environmental Management Monitoring Program (EMMP) has been developed to provide information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures and to meet the legal responsibilities. This information would enable the OWD and the World Bank to evaluate the success of the mitigation measures incorporated in the project as per the Environmental Management Plan (EMP) and will allow corrective actions to be undertaken when needed. EMP will help in prescribing monitoring requirements to ensure the effectiveness of environmental safeguards/mitigation

measures during the construction period and post construction activities in the long term.

Monitoring will be done at two levels

- ❖ Monitoring of the components of environment
- ❖ Supervision & Monitoring of implementation of EMP

4.3.1 Monitoring of the Components of Environment

As suggested in the EMP, environment parameters will be monitored as per the details presented in **Table – 4.2.**

Table – 4.2

Monitoring of environment components during Construction and Operation Phase

Parameters	Location	Duration	Frequency
Air Quality: SPM, RPM, NOx, SO_2, and CO	Five locations where baseline monitoring was carried out and additional locations like borrow areas, quarries, hot mix and batching units, crushers and road excavating zones totaling to minimum 24 locations.	24 hours continuous sampling	Once in a season or thrice in a year
Noise Level: Leq (day) and Leq (night)	Five locations where baseline monitoring was carried out and additional locations like borrow areas, quarries, hot mix and batching units, crushers and road excavating zones totaling to minimum 24 locations.	24 hours continuously	Once in a season or thrice in a year
Soil Quality: Lead, oil and grease	Five locations where baseline monitoring was carried out and additional locations like borrow areas, quarries, hot mix and batching units, crushers and road excavating zones totaling to minimum 30 locations including the zones where limb will be used for strengthening the sub-base.	Sampling	Once in a season or thrice in a year
Water Quality: For different physical, chemical and biological	Five locations where baseline monitoring was carried out and additional locations like foundation excavation areas for	Sampling	Once in a season or thrice in a year

parameter	bridges, culverts under passes, bathing and hot mix areas, camp sites and waste disposal sites intertidal channels. Road excavating zones totaling to minimum 30 locations including the zones where limb will be used for strengthening the sub-base.		

The agency conducting the monitoring will submit its report to EMU. EMU shall keep a record of all information and shall suggest suitable measures to be adopted by Contracting Company if any aspect is found to be deviating from the anticipated values/standards. Monitoring shall be carried out during construction and operation phase.

In cases of specific requirement as would be desired by the statutory authority on account of extraneous reasons additional studies at specific locations may be under taken, evaluated and recorded for future reference.

4.3.2 Supervision & Monitoring of implementation of EMP Contractor's Self Audit

The Contractor will be responsible for conducting its activities in accordance with the contract documents and the EMP, and for undertaking self-assessment audits to determine such compliance.

Self assessment audits should be conducted by the Contractor at regular intervals and should include monitoring of the following factors:

- **Air Quality**
  - Dust impacts (Direct observation and indirect assessment by checking of surrounding vegetation for dust layer)
  - Exhaust emissions from vehicles and machinery
  - Availability of tankers carrying waters with sprinkling, mist spray equipments deployed in the field of activity.
- **Landscaping**
  - Site enhancement at strategic locations of water body, historical, cultural and religious nature.
  - Comments regarding implementation of landscaping requirements.
- **Management of erosion and sedimentation**
  - Protection of soil stockpiles
  - Rehabilitation of degraded embankment and cut slopes together with ditches and borrow area.
  - Available capacity and effectiveness of sediment collection devices
  - Water quality discharge from water harvesting structures and watercourses impacted by construction activity.

- Water quality of receiving waters
- Storage capacity of ponds, irrigation tanks and water harvesting structures with suitable provision for discharge of surplus water to safe guards the road embankment etc.
- Any other factor as mentioned in contract specification

- **Noise**
  - Acceptability of noise emissions
  - Deferred working hours to reduce the impact.
- **Flora and Fauna**
  - Scheduling of construction activity so as to provide escape and movement corridor for wildlife.
  - Avoiding disturbance to areas outside construction zone
  - Proper implementation of wildlife underpass construction design with signage and corridor plantation for movement.
  - Discipline the work force and prevent illicit felling, logging, collection of fire wood and specimens from the forest and protected areas obstruction to wildlife migration routes, poaching /hunting /snaring /fishing /baiting wildlife, trading and collection of wildlife trophy and body parts.
- **Archaeology**
  - Archaeological sites/material detected
- **Water Pollution**
  - Effectiveness of safeguards taken for maintaining water quality standards.
  - Functioning and effectiveness of sewage treatments, oil and grease trap, and solid waste management measures in construction camps and construction sites.
- **Public Utility**
  - Effective relocation of public utilities replaced from the RoW to reduce distress through stop gap arrangements during shifting the facilities.
  - Monitor and ensure proper sealing of potable water sources at abandoned wells, bore wells, over head tanks, stand posts, for preventing pollution of the scarce resources together with testing of the water quality and its suitability for human consumption.
- **Statutory Responsibilities**
  - Compliance with all specific conditions of permits and clearances issued by the State Govt. and the GOI.

These major self-audits are to identify any further remedial measures or actions required in compliance with contract specifications and EMP.

The Contractor's capacity to quantitatively monitor the surface water quality, particularly water sediments/turbidly (by suitable portable test equipment or kits) and

noise is always advantageous, but monitoring will primarily involve ensuring that actions taken are in accordance with contract specifications and specified mitigation measures. Some awareness training will be provided to the Contractor's personnel by the Supervision Consultant to ensure this occurs effectively.

- **Site Supervision**

The strict supervision of road construction activities is required prior to, during and following construction to ensure that the structures are constructed in accordance with the approved designs and that environmental impact is mitigated in accordance with the EMP.

4.4 STANDARD SYSTEM OF SITE INSPECTIONS, REPORTING AND APPROVALS SHALL BE UNDERTAKEN DURING THE LIFE OF THE PROJECT

The Supervision Consultant shall undertake the following site inspections, in conjunction with the Contractor where specified, to assist in site planning, to oversee construction and to certify (where necessary) the completed works and controls for payment.

4.4.1 Pre-Construction Stage

The Supervision Consultant and Contractor shall undertake two pre-construction inspections of each corridor and all ancillary sites.

Pre-construction Inspection 1 – the initial inspection shall involve a site review of 1,000 m of the pegged centerline of the alignment and any identified ancillary sites required by the Contractor. It will serve to:

- Identify site-specific construction or environmental problems;
- Identify borrow pits and quarry sites
- Identify services that are required to be reinstated;
- Identify fill disposal sites;
- Identify sources of rock for slope protection and stone pitching;
- Identity workforce camp sites; and
- Plan the phasing of construction along the project corridor

Prior to this inspection, the Supervision Consultant shall survey and clearly peg the centerline. During the inspection the Supervision Consultant and Contractor shall discuss and agree upon the factors listed above, including the services that are to be reinstated and acceptable.

The Supervision Consultant shall document the type and location of all services that are to be temporarily reconnected and reinstated by the Contractor, and provide a copy of this to the Contractor.

Pre-construction Inspection 2 – the second inspection shall occur after the Supervision Consultant has surveyed and pegged the crest and toe of all banks,

retaining wall sites and drains, and the Contractor has pegged all fill disposal areas and other ancillary sites. This shall occur along at least 1000 m of the previously inspected section of alignment.

The Supervision Consultant shall review the sites pegged by the Contractor and approve them for construction where appropriate, or request the Contractor to re-peg sites.

Follow-up Inspection – any specific sites that require re-pegging shall be inspected by the Supervision Consultant and Contractor. The Supervision Consultant shall approve these sites or request the Contractor to re-peg as necessary.

4.4.2 Construction Stage

The Supervision Consultant shall undertake daily, weekly and monthly supervision and inspections of road works during the period of construction, and monthly inspections of ancillary sites during their period of use, as specified below.

Daily Supervision – the Supervision Consultant shall supervise the following works under construction each day:

- Vegetation clearance;
- Excavation activities;
- Embankment construction;
- Soil disposal.
- Crushing and aggregate processing
- Asphalt mixing

If any activities are not being undertaken in accordance with the contract or EMP conditions, the Contractor shall be verbally requested by the Supervision Consultant to rectify the situation.

Weekly Inspections – the Supervision Consultant shall undertake weekly inspections, in conjunction with the Contractor, of all the works inspected during the daily inspections as well as the following works under construction:

- Gabions and wing wall construction;
- Drains construction;
- Reinstatement of services;
- Blasting;
- Quarries and borrow pits.
- Machinery and vehicles
- Storage of construction and explosive materials

If any activities are not being undertaken in accordance with the Contract conditions or EMP, the Supervision Consultant shall document these activities and specify corrective measures in the Weekly Report. The Supervision Consultant shall provide

a copy of the Week*ly Report* to the Contractor within 2 days of the inspection for action.

Note: the inspection of blasting activities will be undertaken when they are occurring. All drainage works and drain outlet areas will be inspected after each major event of storm.

Monthly Inspections – the Supervision Consultant shall undertake a monthly inspection of all ancillary sites in use over the preceding month, as well as any ancillary site activities currently in progress, at the end of each month in conjunction with the Contractor.

If any activities are not being undertaken in accordance with the contract conditions or EMP, the Supervision Consultant shall document these activities and specify corrective measures in the *Monthly Report*. The Supervision Consultant shall provide a copy of the *Monthly Report* to the Contractor within 2 days of the inspection for action.

Pre-monsoon Inspection - the Supervision Consultant shall undertake a pre-monsoon inspection of road construction sites in conjunction with the Contractor to review monsoon drainage controls. This shall be undertaken between 15-25 May or earlier in case of preponderance of precipitation in this month.

The Supervision Consultant shall specify the locations and types of additional monsoon drainage controls that are required. The Contractor shall install these drainage controls by 8 June for review by the Supervision Consultant in the following Weekly Inspection.

4.5 MONITORING AND SUPERVISION BY EMU

The Environmental Management Unit (EMU) of the OWD will be responsible for environmental management monitoring including site inspection following project hand-over. The EMU shall undertake a 6-monthly inspection of each road formation and related features over the initial 3 years following completion of road improvement works. Factors requiring ongoing inspection/visual assessment/monitoring/ compliance checking by the EMU of the OWD during the operational phase of the project will include the following:

- **Landscaping:** Ongoing monitoring of landscape treatment as per the EMP
- **Road batters:** Cut and fill stability, success of re-vegetation
- **Drains and drainage lines**: Drain stability, drainage line erosion
- **Erosion and sedimentation**: Periodic review of rehabilitation areas such as borrow pits, quarry sites and drainage system to ensure long term stability of previously disturbed land surfaces and proper maintenance and upkeep of drainage system
- **Ambient noise levels:** During project operation, should traffic flows significantly greater than predicted levels (thereby increasing associated noise levels), noise measurements should be made at representative locations to confirm compliance

with CPCB's ambient noise standards. Noise mitigation measures may subsequently be required to be adopted;

- **Ambient air quality:** Conduct ambient air quality monitoring as per Environmental Monitoring Program. Should the concentrations of ambient air quality along the project corridor deteriorate beyond the baseline ambient air quality, enforce policy decisions such as vehicle emissions standards, phasing out vehicles older than 15 years, introducing lead free gasoline etc. for bringing down the emission levels.
- **Road safety measures**
  - Maintenance of wayside amenities, noise barriers created at sensitive receptors of noise
  - Prevention of road side squatter development
  - Prevention of dumping up of recyclable and non recyclable wastes generated from construction activity along the road side.
- **Flora:** Review the restoration of vegetative cover along rivers, nalas, streams, water bodies, degraded waste lands and forests, road avenues and wildlife underpass corridor plantations, site enhancement plantations beyond RoW for reduction of noise and air pollution as well as soil and water conservation activities for monitoring progress and corrective actions to be taken as appropriate, for the habitat development.
- **Fauna:** Monitoring of the construction wildlife underpasses as per the standard designs along the development of the movement corridor approaches at culverts and bridges besides viaduct and trap drains so as to suggest and implement any modification additions as would be required under expert opinion to suit the field conditions.

Data should also be compiled regarding mortality rates for other smaller creatures, which crosses the road for food and water.

The relevant performance indicators are:

- Road batters - no landslides
  - No significant rill or sheet erosion;
  - Planted vegetation survival greater than 90% after one year.
- Gabions/ wing walls
  - No damage to walls from landslides or traffic;
  - No significant wall movement /slumpage.
  - No corrosion and damage to wire mesh gabion crates.
- Drains
  - Drainage along the road surface no greater than 200 m;
  - Side drains intact;
  - No significant gully erosion/undermining at drain outlets;

- Pipe culverts in place.

- No significant erosion or silt and sand deposit down stream on agricultural land at the culvert opening.

- **Re-vegetation/Plantation** – The desired species have been planted as per the specifications and maintenance schedule. No. of trees survival after 6 months, 1st year, 1.5 year & 2nd year.
- **Erosion and Sedimentation** - Periodic review of rehabilitated areas and drainage systems to ensure long term stability of previously disturbed surfaces and associated drainage channels.
- Physical environmental attributes such as noise, air and water quality will be monitored as per the Environmental Monitoring Plan.

The Environmental Monitoring Unit (EMU) following each inspection shall complete a standard report covering the above features. This report shall be submitted to the relevant Executive Engineer of the concerned OWD Division and to the OWD within two weeks of the inspection.

Table – 4.3

Monitoring Plans for Implementation

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Construction	CO, NOx, SPM, RPM, and SO_2	High volume sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis	Air (prevention and Control of Pollution) Rules, CPCB, 1994	Three seasons per year	24 hours Sampling	Along the road (refer table no 4.2) Hot mix / batching plant	Contractor, SC, OWD (EMU),
	Operation				Two seasons in a year for three years		Along the road (refer table no 4.2)	Contractor, SC, OWD (EMU),
Water	Construction	All essential characteristics and some of desirable characteristics as decided by the Environmental Specialist of the SC and OSRP	Grab sample collected from source and analyse as per Standard Methods for Examination of Water and Wastewater	Indian Standards for Inland Surface Waters (IS: 2296, 1982) and for Drinking Water (IS : 10500 - 1991)	Four seasons per year	Grab Sampling	Along the road (refer table no 4.2)	Contractor, SC, OWD (EMU),
	Operation				four seasons for three years		Surface water sources	Contractor, SC, OWD (EMU),
Noise	Construction	Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 from edge of pavement	MoEF Noise Rules, 2000	Three seasons per year	Leq in dB(A) of day time and night time	Along the road (refer table no 4.2) Hot mix / batching plant	Contractor, SC, OWD (EMU),
	Operation		Equivalent noise levels using an integrated noise level meter kept at a distance of 15 from edge of pavement		Three seasons per year for three years.		Along the road (refer table no 4.2)	Contractor, SC, OWD (EMU),

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Soil	Construction	Monitoring of Pb, SAR and Oil & Grease	Sample of soil collected to acidified and analysed using absorption spectrophotometer	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	Four seasons per year	Grab Sampling	Along the road (refer table no 4.2) Hot mix / batching plant	Contractor, SC, OWD (EMU),
	Operation				four seasons for three years		Along the road (refer table no 4.2)	Contractor, SC, OWD (EMU),
Borrow area	Construction	As per Guidelines	Visual Observation	-	Once in a month	-	Borrow area location	Contractor, SC, OWD (EMU),
Tree plantation	Operation stage	As per Rehabilitation Plan			Quarterly	-	Areas where plantation is being done	Plantation Agency, SC, OWD (EMU),

Format No.	Item	Stage	Contractor	SC Consultant		PMU, OSRP		Reporting from OWD to World Bank)
			Implementation and Reporting to TA Consultant	Supervision	Reporting to PMU,	Oversee Field Compliance Monitoring	Reporting to EO,	
P1	Identification for disposal locations	Pre - construction	One Time	One Time	One Time	One Time	One Time	One Time
P2	Setting up of Construction Camp	Pre-construction	One Time	One Time	One Time	One Time	One Time	One Time
P3	Establishment of Borrow areas	Pre-construction	Monthly	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
P4	Establishment of HMP/ BMP	Before start of construction	One Time	One Time	One Time	One Time	One Time	One Time
P5	Road Safety and Traffic Management	Pre-construction	Monthly	Monthly	Monthly	Monthly	Quarterly	Quarterly
P6	Arrangement for Temporary Land	Pre-Construction	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
P7	Pollution Monitoring	Pre-Construction	Quarterly	During Monitoring	Immediately on receipt of results	Quarterly	Quarterly	Quarterly
P8	Tree cutting/Stump Removal	During construction period	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
P9	Identification of Source of water for Construction	Pre-construction	One Time	One Time	One Time	One Time	One Time	One Time
C1	Details of earth work	During Construction period	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
C2	Details of Hot Mix Plant	During Construction period	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
C3	Details of landfill locations/	During Construction period	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
C4	Details of Machinery in Operations	During Construction period	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
C5	Redevelopment of borrow areas	During construction period	Monthly	Monthly	Monthly	Quarterly	Half Yearly	Quarterly
C6	Safety Check List	During construction period	Monthly	Monthly	Monthly	Quarterly	Half Yearly	Quarterly
C7	Accident Report	During construction period	After Accident	After Accident	Immediately on receipt of report	Quarterly	Half Yearly	Quarterly

C8	Pollution Monitoring	During construction period	Quarterly	During Monitoring	Quarterly	Quarterly	Quarterly	Quarterly
C9	Enhancement Measures	During Construction	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly
C10	Restoration of Construction Sites	Immediate after Construction	One Time	One Time	One Time	One Time	One Time	Quarterly
O1	Pollution Monitoring	During Operation	-	-	-	Quarterly	Quarterly	Quarterly
O2	Monitoring of culvert opening and longitudinal drains	During Operation	-	-	-	Twice a year Pre and Post monsoon	Twice a year Pre and Post monsoon	-
FORMS TO BE FILLED BY PMU/SC								
PMU1	Form for keeping records of Consent obtained by contractor (To be filled by SC Consultant)	Construction	Quarterly		Quarterly	Quarterly	Half Yearly	-
PMU2	Checklist for Environment Inspection	-	-	-	-	On each visit	On each visit	-
PMU3	Summary Sheet (To be filled by PMU)	Construction		-	-	Quarterly	Half Yearly	-

CHAPTER 5
BUDGETARY PROVISIONS FOR EMP IMPLEMENTATION

5. BUDGETARY PROVISIONS

The budgetary provisions for the implementation of the Environment Management Plan for **Jagatpur-Chandbali** section of the road corridor have been worked out on the basis of the following –

1. Engineering design and the strip plans provided for site verification
2. Location of CPRs with respect to the proposed centre line
3. Forest/Wildlife clearance requirements
4. Environment notification No-1433 dated 14th Sept 2006 by MoEF, Govt. of India and update amendments thereof.
5. Avenue plantation requirements in lieu of trees being cut and removed along the road
6. Relocation and restoration of Religious properties

These estimates cover the following –

- 239 spur roads out of which 33 minor and 2 major junctions will be provided with site enhancement which are being developed.
- 44 ponds (water bodies) for construction of Toe wall with stone pitching as silt fencing
- 74 new Hand Pumps replacing 74 fully affected tube wells with additional provision of drains and soak pit,
- 20 water taps replaced as against 20 fully affected stand posts with additional provision of drain and soak pit.
- 13 schools and one madrasa are affected by road development. Two schools where approach road and gate has been shifted 2mtr inside due to close proximity of gate and exit point to the carriage way. Boundary wall affected by road, replaced by new boundary wall with noise cum dust suppression facility and air pollutant screening. Provision of pedestrian tubular barricade for interception at schools with site improvement through providing noise and dust suppression cum new boundary wall. All the schools provided with new MS grill gates.
- 61 fully and 1 partially affected temples, out of which 61 shall be relocated as per the sites selected by the community or temple management, the cost of land construction to be compensated by the Government as per valuation to be assessed by the statutory committee formed in this regard. Construction to be completed before demolition of the existing structure and deity shifted to new location. Any new structures that will be constructed by the Government through the Contractor on any identified Govt. land shall be as per the existing structural design and inbuilt facilities to replicate the earlier one. For the remaining 61 temples, the boundary wall shall be replaced by new masonry

boundary wall as per design with flower vase fixed on the top and site enhancement plantations within the campus.

- Location of sites for setting up batching and mixing as well as bitumen hot mix units, top soil dumps to facilities capacity utilization of the coarse aggregates and GSB to be properly mixed, graded and carried to the site of utilizations has been suggested to reduce enhancement of construction period and cost there of. Quarry sites have been prescribed for suggested sites of activity, except any other site that may be additionally selected by the contractor and Supervision Consultant (SC) in agreement with the Site Engineer and TOR in the contract document, where such stock pilling shall be approved by the SC, Contractor, EMU and SPCB.

All structures of religious places, office buildings, mandaps, statues, huge trees with mandaps, forest check gates, existing toll collection gates etc. which have been fully affected with some schools and parts of offices has been kept separately for allowing the respective agencies to avail compensation as per the R&R policy of the State Govt., so that, they come up with new structures according to their own requirement, because a generalized planning and design would have affected their workability and up coming developmental necessities.

The schedule of cost for EMP structures is detailed below with reference to the standard specification and provisions in the drawings.

Table – 5.1 (A)
Detailed Abstract of Cost for mitigation measures under EMP to be done by contractor

S.No.	Description of Item	Unit	Quantity	Unit Cost (in INR)	Total Cost (in INR)
1.	Protection Works for the water bodies				
	a) Retaining Walls	Cum	1900	4970.00	9443000.00
	b) Stone Pitching	Cum	1900	2,445.00	4645500.00
2.	Silt fencing at/near water bodies	LM	7000	196.00	1372000.00
3.	Oil and Grease trap	Nos	2	143092.00	286184.00
4.	Traffic Safety and Management during construction	Incidental to the Civil Works			
5.	Construction stage-Pollution Monitoring (air, water, soil, noise)	Incidental to the Civil Works			
6.	Rehabilitation of Borrow areas	Incidental to the Civil Works			
7.	Rehabilitation of Quarry areas (in	Incidental to the Civil Works			
8.	Transportation and disposal of wastes and site rehabilitation	Cum	10802	150.00	1620300.00
9.	Slope/embankment protection measures				
	a) Stone pitching	Cum	6296	1399.50	8811252.00
	b) Erosion control blankets /agro net mulch	Sqm	18000	249.00	4482000.00
	c) Turfing	Sqm	259611	23.00	5971053.00
10.	Biodiversity management measures				
	a) Trap drains	Sqm	684	197.00	134748.00
	b) 300mm dia Pipes for safe passage	LM	1330	1362	1811460.00

11.	Signage(Permanent) Environment/ecological information sign boards				
	a) Big Size	Nos	4	10000	40000.00
	b) Regular Size	Nos	12	2500	30000.00
12.	Signage(Permanent)	Nos	4	50000	200000.00
13.	Road Safety measures(Permanent)	Nos	4589	472	2166147.00
14.	Drainage works	LM	31720	3152	99981440.00
15.	Junctions improvements -Spur Roads	Nos	177	0	0.00
16.	Provision of bus-bay/bus stop	Nos	94	80000	7520000.00

Table 5.1 (B)
Environmental Mitigation Measures Bill to be done by OWD through R&B Divisions

S.No.	Description of Item	Unit	Quantity	Unit Cost (in INR)	Total Cost (in INR)
1.	Strengthening/restoration/repair works for bunds along water bodies	LM	NIL	NIL	NIL
2.	Spillway for water bodies	Nos	3	140000.00	420000.00
3.	Bathing Ghats cum washing platform	Nos	4	300000.00	1200000.00
4.	Joint verification, enumeration, marking, identification of tree cutting requirement	Nos	8361	100	836100.00
5.	Tree Cutting/Removal	Nos	7568	2000	15136000.00
6.	Compensatory Plantation@ 10 times of number of trees to be cut and enhancement planting near ponds, canals, institutions along project road	Nos	80000	678	54240000.00
7.	Noise Barrier, Dust Barrier, Interceptive measures				
	a. Boundary wall cum Noise Barrier along religious property	LM	75	4935.00	370125.00
	b. Govt. Offices/Panchayat Bhawan/School/Colleges/ health Centers Boundary Wall cum Noise Barrier	LM	1165.5	4935	5751742.00
	c. Gate with dust barrier of Institutions	Nos	21	60310	1266510.00
	d. Intercept Barricade	Nos	16	118650	1898400.00
8.	Wildlife Mitigation Measures	Nos	paid		5200000.00
9.	Pollution Monitoring (throughout-sourced agency)				
	a. Air		**LS**		500000.00
	b. Water		**LS**		500000.00
	c. Noise		**LS**		500000.00
	d. Soil		**LS**		500000.00
10.	Publication/Printing of brochures/leaflets	Nos	LS		500000.00
11.	Workshop	Nos	LS		500000.00

Table 5.2: Summary of Environmental budget

Sl.No	Description of Item	Unit	Quantity	Rate	Amount	Remark
1.	Protection Works for the water bodies					
	a) Retaining Walls	Cum	1900	4970.00	9443000.00	in BoQ of Civil Work
	b) Stone Pitching	Cum	1900	2,445.00	4645500.00	in BoQ of Civil Work
2.	Silt fencing at/near water bodies	LM	7000	196.00	1372000.00	in BoQ of Civil Work
3.	Oil and Grease trap	Nos	2	143092.00	286184.00	in BoQ of Civil Work
4.	Transportation and disposal of wastes and site rehabilitation	Cum	10802	150.00	1620300.00	in BoQ of Civil Work
5.	Slope/embankment protection measures					
	a) Stone pitching	Cum	6296	1399.50	8811252.00	in BoQ of Civil Work
	b) Erosion control blankets /agro net mulch	Sqm	18000	249.00	4482000.00	in BoQ of Civil Work
	c) Turfing	Sqm	259611	23.00	5971053.00	in BoQ of Civil Work
6.	Biodiversity management measures					
	a) Trap drains	Sqm	684	197.00	134748.00	in BoQ of Civil Work
	b) 300mm dia Pipes for safe passage	lm	1330	1362	1811460.00	in BoQ of Civil Work
7.	Signage(Permanent) Environment/ecological information sign boards					
	a) Big Size	Nos	4	10000	40000.00	in BoQ of Civil Work
	b) Regular Size	Nos	12	2500	30000.00	in BoQ of Civil Work
8.	Signage(Permanent)	Nos	4	50000	200000.00	in BoQ of Civil Work
9.	Road Safety measures(Permanent)	Nos	4589	472	2166147.00	in BoQ of Civil Work
10.	Spillway for water bodies	Nos	3	140000.00	420000.00	To be in specific Environment Budget
11.	Bathing Ghats cum washing platform	Nos	4	300000.00	1200000.00	To be in specific Environment Budget
12.	Joint verification, enumeration, marking, identification of tree cutting requirement	Nos	8361	100	836100.00	To be in specific Environment Budget
13.	Tree Cutting/Removal	Nos	7568	2000	15136000.00	To be in specific Environment Budget
14.	Compensatory Plantation@ 10 times of number of trees t be cut and enhancement planting near ponds, canals, institutions along project road	Nos	80000	678	54240000.00	To be in specific Environment Budget
15.	Noise Barrier, Dust Barrier, Interceptive measures					
16.	a. Boundary wall cum Noise Barrier along religious property	LM	75	4935.00	370125.00	To be in specific Environment Budget
	b. Govt. Offices/Panchayat Bhawan/School/Colleges/ health Centers Boundary Wall cum Noise Barrier	LM	1165.5	4935	5751742.00	To be in specific Environment Budget

Sl.No	Description of Item	Unit	Quantity	Rate	Amount	Remark
	c. Gate with dust barrier of Institutions	Nos	21	60310	1266510.00	To be in specific Environment Budget
	d. Intercept Barricade	Nos	16	118650	1898400.00	To be in specific Environment Budget
17.	Wildlife Mitigation Measures	Nos	paid		5200000.00	To be in specific Environment Budget
18.	Pollution Monitoring (throughout-sourced agency)					
19.	Air	Nos	10	50000	500000.00	To be in specific Environment Budget
20.	Water	Nos	10	50000	500000.00	To be in specific Environment Budget
21.	Noise	Nos	10	50000	500000.00	To be in specific Environment Budget
22.	Soil	Nos	10	50000	500000.00	To be in specific Environment Budget
23.	Publication/Printing of brochures/leaflets	Nos	LS		500000.00	To be in specific Environment Budget
24.	Workshop	Nos	LS		500000.00	To be in specific Environment Budget
25.	**Total**				**130332521.00**	
Environment Cost in BoQ of Civil Work (A)					41013644.00	
Balance Environment Cost (B)					89318877.00	
Total (A+B)					**130332521.00**	

5.1 MONITORING PLANS FOR IMPLEMENTATION

5.1.1 PROJECT COST

The detail designs of mitigation as proposed in the EMP are provided with estimates of cost and the sum total of such cost comes to **Rs. 13,03,32,521/-,** which excludes the cost of passenger shed, traffic calming measures, spur road junctions, signage at junctions and built up areas, bus stops and speed regulators and slope protection for environmental mitigation measures which has been included in the detail cost estimate of the project.

This includes additional provision for preventing damage to agricultural land, scouring and soil erosion of embankment, sand casting and flooding of agricultural fields, protection of streams and nala banks alternate drainage systems against natural drainage system affected, besides the NPV and cost of demarcation, survey and preparation of individual maps for portions to be acquired and the cost of compensatory aforestation over suitable non forest lands covering 32ha.

Framework No. 1

Compensatory Afforestation and Avenue Plantation

Compensatory Afforestation

Compensatory afforestation sites shall be decided in consultation with the Divisional Forest Officer and a suitable map of the area mentioning the north, south, east and west boundary features, along with the plot number of the proposed non-forest land identified for the purpose shall be prepared. The Department of Forests, Govt. of Orissa will thereafter finalize the afforestation scheme providing therein details of work schedule, the specific cost structure for implementation of the same and proposed monitoring mechanism.

Funding for Compensatory Afforestation

The Ministry of Environment and Forests, GoI in their order dated. 24th April, 2004, have constituted an authority known as Compensatory Afforestation Fund Management and Planning Authority (CAMPA), for the purpose of managing money received from various user agencies for compensatory afforestation.

The OSRP of OWD being the user agency in this project (through the Chief Engineer, World Bank Project, Orissa) will be required to deposit the money with CAMPA as per the estimates provided by the Orissa State Forest Department. CAMPA will release funds to Orissa in pre-determined installments through the State Level Management Committee as per the Annual Plan of Operations drawn by the State Forest Department for compensatory aforestation.

Compensatory Planting : The Forest and Environment Department in Sate Government of Odisha

Selection of Tree Species

Selection of tree species for plantation should be based on site-specific conditions and features as per the scheme prepared by the forest department (concerned forest division, where the non-forest land has been identified for compensatory afforestation), with species as suggested there in to be taken up by forest department, subject to condition of utilization certificate in this regard submitted to OWD (OSRP) for audit and reference purposes, basing on the funds released during a specific financial year and works undertaken as per the provisions of the scheme.

Avenue Plantation

Trees with tomentoose leaves to absorb noise, dust particles and provide interception to stem flow of rain water shall be preferred to shining leaves as environment friendly species to be planted along road avenues along with some attractive flowering trees that would increase roadside aesthetics. How ever the choice of species being dependant on the type of soil and underground water table browsable or non browsable nature of species, there may be deviation to choose the trees /shrubs with signing leaves from out of the list of species indicated for corridor. Wire mesh tree guards shall be provided for browsable species only.

Sl. No	Species		Browsable/ Non Browsable	Growth Rate				
	Local Name	Botanical Name		1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Karanja	Derris indica	Non Browsable	1.5	2	3	3.5	3.5
2	Patuli	Lagerstroemia species	Non	1.8	2	2.5	3	3

Sl. No	Species		Browsable/ Non Browsable	Growth Rate				
	Local Name	Botanical Name		1st Year	2nd Year	3rd Year	4th Year	5th Year
			Browsable					
3	Baula	Mimosups elengi	Non Browsable	0.75	1	1.25	2.5	3
4	Pulanga	Callophylum innophyhum	Non Browsable	0.75	1.5	1.5	2	2.5
5	Chhatian	Alstonia scholaris	Non Browsable	1.5	2	3	3.05	3.5
6	Kendu (Mankada)	Diospirus peregrina	Non Browsable	0.45	0.75	1	1.5	2
7	Neem	Azadirachta indica	Non Browsable	0.75	1.25	1.5	1.75	2
8	Mahula	Madhuca latifolia	Non Browsable	0.5	1	1.25	1.5	2
9	Pani Jamu	Salix tetrasperma	Non Browsable	0.5	0.75	1	1.5	2
10	Baruna	Crateva religiosa	Non Browsable	1	1.5	1.75	2	2.5
11	Gandhana	Premna integrifolia	Non Browsable	0.75	1	1.05	2	3
12	Bhrusanga	Muraya koingi	Non Browsable	0.5	0.75	1	1.25	1.75
13	Begunia	Vitex negundo	Non Browsable	0.5	1	1.5	1.75	2
14	Bai Dimiri	Ficus hispida	Non Browsable	0.25	0.5	1.25	1.75	2
15	Kamini	Muraya exotica	Non Browsable	0.25	0.5	0.75	1	1.5
16	Tala/Palmyra Palm	Borossus flabelifer	Non Browsable	0.25	0.3	0.5	0.75	1
17	Dadmari	Cassia auriculata	Non Browsable	0.25	0.5	0.75	1	1.5
18	Krushnachuda	Delonix regia	Browsable	0.75	1	1.5	2	2.5
19	Harasingar	Nictanthes species	Non Browsable	0.5	0.75	1	1.5	2
20	Radhachuda	Peltoferum feruginum	Browsable	0.5	0.75	1.5	1.75	2.5
21	Salapa	Caryota urens	Browsable	0.5	0.75	1	1.25	2.5

Sl. No	Species		Browsable/ Non Browsable	Growth Rate				
	Local Name	Botanical Name		1st Year	2nd Year	3rd Year	4th Year	5th Year
22	Barakoli	Zizyphus zozoba	Browsable	0.5	1	1.5	1.75	2
23	Kamalagundi	Malotous phillippensis	Non Browsable	0.5	0.75	1	1.25	2

Bamboo (Bambussa arundinacea) or thorny bamboo, palms, shrubs and small trees could be chosen to reduce the effect of noise and dust pollution from the road. In the matter of selection of species for avenue planting, stakeholders need be consulted and their views should be accommodated within the purview of above mentioned species selection criteria.

Planting Pattern

Monoculture planting has to be avoided. Mixed culture of shade-giving, flowering and fruit-bearing species should be preferred.

The first row may be composed of a mix of species of flowering shrubs and trees of low height - such mix should consist of trees coming into bloom in different seasons depending on the site conditions. The second row may have representation of middle-sized evergreen and fruit bearing species. The third row wherever feasible (along most sections, there is not enough space to accommodate a third row), should consist of tall evergreen species of palms and trees with deep tap root system. The species should be so chosen as to make sure that they grow taller than tress planted in the first and second rows.

The possibility of a single row avenue on one side only, leaving the other side open for power transmission lines, has to be considered specifically in residential areas and near settlements/townships, where the transmission lines, high tension cables are drawn over head for avoiding non-compliance of the norms in vogue.

Mostly, a single row of mixed species of trees, shrubs, herbs, palms, bamboos and grasses, will be planted with a spacing of 5x5 mtr between each variety. Where open forest lands are available, the Department of Forests, GoO may after having identified the land beyond the ROW of the road, will delineate the proposed area for avenue plantation on a corridor strip map based on proposed centre line showing chainage-wise location of avenue planting area on left and right side of the road from the 0km onwards along with basic features of the proposed plantation scheme to continue with a green belt for compensating the loss of trees on account of road improvement and to cater to the needs of wildlife and local people, replicating the previously existing varieties in such cases. This cost has to be provided by the forest department as a corridor development and wildlife improvement measure from out of the FDA (Forest Development Agency funds).

Plantation Management and Monitoring

Strip plantations should be properly fenced/protected (GI barbed wire fencing with RCC fence posts and 6 strands of barbed wire or bamboo mats with bamboo prop support) to prevent damage by herbivores animals. Wherever required, live-hedges may be provided, particularly in stretches near sensitive receptors such as schools, colleges, hospitals etc to act as dust filters.

Two agencies that would be involved in the execution of the plantation activities will also undertake regular monitoring and supervision by OFDC and Forest Department involved , involvement of

communities along the roads for protection and maintenance of plantation/s would be explored through a mechanism of sharing of usufructs. Local voluntary organizations, sports/youth clubs, VSS units, religious property trusts, eco-clubs would be encouraged for protection and maintenance of such plantation carried out under the project.

Framework No. 2

Tree Cutting and Transplantation

A. Enumeration and Documentation of Trees to be Cut

1. All trees above 30 cm girth at breast height (measured 1.35 mtr) above ground level shall be considered for the purpose of measurement/payment.
2. Trees which are finally selected to be felled as per offset from centre line shall be given a blaze mark at breast height (1.015 mtr.) and at the base of the tree by cutting and removing the bark portion. Blaze size will be 15x15 cm.
3. The blaze marked trees shall be then branded with a property hammer duly registered with the Local Divisional Forest Office for such purpose as per the Orissa Timber and other Forest Produce Transit Rules, 1982 to identify the ones to be felled.
4. Any tree, which is forked below the breast height (1.35 mtr.) shall be having blazes on as many numbers of trunks for branding each one separately as a separate tree.
5. All such blaze marks shall be painted with coal tar or black paint on the border of the blaze.
6. All trees marked for felling and removal shall be enumerated jointly by representatives of the PMU/PIU, Local Range Staff of Forest Dept., local divisional field staff of Orissa Forest Development Corporation Limited. All details of such trees shall be entered in a 'tree register' in triplicate as per the requirements given below in point 9, duly countersigned by the enumerators and their superior supervising officer, who are to counter check some of the measurements and other details at random, not below one percent of the total trees so marked.
7. Serial number as per the enumeration list shall be continuous and separately maintained for left and right side of the road from starting point of each (territorial/ wild life) divisional jurisdiction (forest division-wise), as the case may be.
8. The blazes at breast height and base of the tree shall be branded with digit hammer to impress the serial number on the tree trunk (digit hammers from 0 to 9) along with sound/unsound nature of the tree trunk (S/D).
9. The enumeration list shall contain the following information:
    - Chainage details (km)
    - Serial number of the tree.
    - Species of the tree.
    - Girth class in cm.

      (30-60, 60-90, 90-120, 120-150, 150-180, 180-210, 210-240 >240)
    - Approximate length of clear bole.
    - Condition of the tree trunk - sound, hollow/unsound (S/H/U).
10. To determine the sound and unsound nature for the trees to be felled, the following procedure to be followed:

1.	If there is any cavity or hollow visible at the base, middle or cut away portion of the clear bole or forked branches	H
2.	If the tree trunk when struck with axe or hammer gives a hollow sound or muffled sound.	H
3.	If the sound is like a drum.	H
4.	If the timber is rotten and visible to naked eye.	U
5.	If it is buttressed, ridged and furrowed with irregular protuberances and epichromic branches or cancerous out growths like warts on the tree at several places.	U
6.	If mushroom fruit bodies or out growths are visible at several places on the tree trunk, locally known as a "Chhatu" or sambar eye in shape of black or brown /dark brown colour.	U
7.	If the trunk is split, half burnt or half cut and removed.	U

11. At the end of the enumeration list, there shall be an abstract of total trees to be felled in each girth class.

12. The enumeration of trees to be removed from forest land has to be done and maintained separately, irrespective of its location, indicating the name of the forest (as per Govt. records and as mentioned in the forest clearance application, maintaining separate serial number for each forest block (Village Forest, Protected Forest, Reserved Forest, Proposed Reserved Forest).

13. In all such cases, the Forest Department marking hammer shall be used to brand the identified trees to be felled and the work shall be carried out meticulously counting only those trees coming within the Corridor of Impact, including some selected ones that may be required for diversion for traffic at the selected/identified locations.

14. All the copies of the enumeration list shall be compiled together in the Register of Trees to be felled and jointly signed on each page of original, duplicate and triplicate copy by the respective field staffs of Forest Dept., OFDC Ltd., PMU and the Supervising Officer who has checked the same. After enumeration the trees are to be handed over to OFDC and proper receipt shall be obtained from the designated officer(s) (the sub-divisional manager and section supervisor of OFDC Ltd) receiving such trees.

B. Tree Felling and Removal

15. Felling of trees shall commence in forest and non-forest land in phased manner so as not to obstruct the entire traffic flow. After the overhead transmission lines and entertainment cables are removed, the felling of trees shall be initiated. The Forest Corporation shall engage dozer/poclain or such other machines for the removal of heavy tree trunks from the work area and RoW including diversion zones to facilitate easy flow of traffic and use appropriate devices so as to control the direction of felling to avoid damage to trees, buildings and other infrastructure/assets that are to be retained along the road.

16. In case of trees to be felled which are adjacent to temples, schools, residential or community structures or govt. buildings/assets, the felling shall be executed after due compensation has been paid by PMU for the damages/acquisition and that such sites are vacated by the users/occupants. Till these conditions are met, tree cutting shall not be permitted.

17. In case of private property, the value of the tree shall be evaluated and compensation shall be paid prior to felling.

18. **Branch cuttings and offsets of all types of Ficus, Bamboo, Mango, Tamarind, Jack fruit etc. has to be taken/kept/preserved for bud grafting in the nursery to retain the genetic diversity. Cuttings are to be treated directly with rooting hormone and rooted offsets are to be grown in the nursery under mist chamber so that replica of the existing vegetation can be recreated in the adjacent degraded forest lands and wastelands along the corridor for the benefit of the wild life and for the purpose of site enhancement.**

19. **Felling of Ficus, Kadamba, Mango, Arjun trees having birds nesting area shall be delayed towards the end of winter or mid-April when the newborns are ready to fly out so as not to destroy the birdlife concentration along the corridor.**

20. No sale of any tree is allowed in favor of any individual/institution/community/ group/club etc. to avoid pilferage, duplication and misappropriation.

21. In all the cases after felling, the trees are to be converted into log sections and fire wood stacks of 1m x 4m x 1mtr. size on level ground and all logs are to be serially numbered with branding of tree no, log no on one end of each log. The log serial number of the total lot worked out/given by OFDC has to be written on the cut end of each log in black /blue paint, which should tally with the entries in the conversion register. The tree number, log serial numbers and log section numbers are to be written in English on the cut surface of the stump and the log ends. The same has to be copied into 4 spare copies and one original for 'passing' by the designated forest officer as decided by the concerned Divisional Forest Officer under whose jurisdiction the application for tree cutting was made as per Orissa Timber and other Forest Produce Transit Rules by OFDC. The fire wood stacks should also be serially numbered and stacks of size 1m x 1m x 1 m should be made near stump sites. All logs and fire wood billets which are more than 1m in girth are to be branded with the property hammer mark of OFDC registered for the said purpose. The conversion list/s shall be submitted to the officer for 'passing'. The conversion list/register should contain the list of firewood stacks obtained from a group of trees adjacent to each other.

22. The 'passing' has to be carried out by the designated officer of Forest Dept. on a priority basis so as to facilitate road construction activity.

23. After 'passing' is made, permits shall be issued by the concerned OFDC official or an officer of Forest Department specially engaged for the purpose of 'passing' and issue of permits towards immediate removal of the converted and passed material. Only after removal of these (passed) materials from the stump site, the contractor can go ahead with the uprooting of the stumps and road works.

24. Such stumps should be collected/stockpiled and can be sold in public auction (as fire wood) by the PMU/OFDC as the case may be. Some such stumps should be preserved in a designated manner for enhancement (as ornamental objects) at selected locations for the people/students to appreciate the colossal nature of the trees that once existed along the road. The PMU/OWD in consultation with the communities/people shall decide the location where these uprooted stumps will be placed.

25. Heavy cranes may be required for lifting and loading the huge logs into the trucks for transportation. OFDC shall be responsible for arranging the same and removing the logs within a fortnight to a month from the site after the materials are 'passed'. Felling operation should be started in order of priority starting with sites of bridges and culvert construction. Next priority shall be open country stretches with sufficient scope for movement/diversion of traffic.

26. Instead of continuous stretches, tree cutting should be carried in sections of one to two kilometers at a given point of time to prevent congestion on the highway and to maintain safety during such operations.

27. Trees that can damage property or pose risks to safety of residents in the vicinity are to be removed through dismembering of the top branches. After this has been done, the main tree truck should be felled and removed.

28. The OFDC shall be responsible for timely felling, logging and removal of logs firewood from the work place where as the Forest Dept shall be solely responsible for 'passing' of timber and the fine wood and issue of permits to that effect.

29. The expenses for tree cutting may differ from place to place depending on number and the girth class of trees. Estimate of working cost shall be submitted by the OFDC to the PMU/OWD after taking stock of trees to be felled. The same will be examined by the PMU/OWD prior to approval/sanction and release of funds. Where such funds are not released by PMU/OWD, the royalty value of the trees calculated on unit basis has to be assessed and deducted from the total working cost of the estimate and the balance has to be released in a phased manner on the basis of progress of work.

30. Only royalty for the trees to be removed from forestland has to be assessed along with natural tree growth beyond the existing RoW in forested areas. All other trees which are growing within the existing RoW and which are compensated for being the property of OWD should not be levied with any royalty by Forest Department. Therefore, separate tree serial, conversion and passing list has to be made for the calculation of royalty of forest trees and natural growth outside RoW within forested tracts and jungle blocks.

31. The royalty of the growing stock on acquired forest land is to be calculated by the PMU/OWD with the help of the District Forest Officer having jurisdiction in that area based on prevailing royalty as in vogue for other similar projects. The sale proceeds of the converted materials obtained from the trees minus the working cost as decided by the PMU/OWD and OFDC could be on sharing basis of 50%. Or else this could be decided jointly by the concerned departments - Public Works, Forest and OFDC management. This must be settled before the felling operations begin. The final royalty should be calculated on the basis of actual 'passing' of saleable materials in the field.

32. The OFDC will be held responsible for theft of trees or felled materials, if any. OFDC should employ watch and ward to ensure safety and security besides stock piling of such materials at strategic location or its depot.

33. The trees/felled materials that could not be sold, if any shall be finally inspected by a joint team of officers from OFDC, Forest Department and PMU/OWD and recorded in the conversion register and 'passing' list for reference and record.

34. The OFDC shall remove the materials to the nearest depots for disposal and deposit the royalty as agreed with the respective authorities.

35. All uprooting of stumps shall be done as follows - 60 cm to 1 mtr. deep below the formation level or 30 cm below the sub grade level, which ever is lower.

36. Agreement/MoU should be made between OWD/PMU, Forest Department, GoO and OFDC (at high level) on the operational details so as to avoid delays and communication gaps and mishandling, which may prove to be bottlenecks in the smooth and safe removal/retention of trees along the road.

C. Cutting of Trees on Private and Govt. Land

37. The trees on private land and those on the forest land that require removal for the project shall be counted separately. Separate records shall be maintained by PMU/OWD in both these cases. The trees on forest land shall be cut following the Forest Act provisions - only after the final/formal clearance has been received by the PMU/OWD. The project may seek the help of OFDC in cutting the trees on private land. Modalities (including distribution of sale proceeds) for the same should be as per the regular norms in the state and these too should be covered in the agreement/MoU mentioned in point 36.

D. Tree Preservation

38. All trees to be saved/ retained shall be serially numbered/marked from chainage 0 to end of the road. A register shall be maintained with the required details for reference (including chainage, species name, girth size and location with respect to CL), and follow-up monitoring.

39. For this, all trees shall be provided with an aluminum foil punch number/marks fixed by nailing it at a height above 1½ mtrs. from the ground level, which should be visible from the road.

40. The survey records shall include the following details:

- Name of the corridor/road
- Date of enumeration
- Serial number of the tree
- Chainage
- Side
- Distance from the CL
- Name of the Species
- Girth at BH on the date of enumeration
- Height of clear bole
- Condition of the tree (Hollow/Unsound/Sound)
- Estimated quantity of fire wood
- Remarks

41. In the event of the need for removal of such a saved/retained tree, the Environment Officer and Forestry/Wildlife Expert of PMU/OWD along with the Environment Officer of Supervision Consultant (if available on site) shall decide the final action. Records of the need for such a removal (justification) along with all details shall be maintained. For cutting of such trees, a separate list should be sent to the Forest Department/OFDC for obtained permission.

E. Relocation of the Young Avenue Trees, Shrubs and Bushes Along the Corridor

42. Compared to a 10-year waiting period and uncertainty over actual growth, the relocation/transplantation of young trees (lesser girth) and shrubs along or close to the road ensures better survival and reduces the waiting period to avail the benefits from such plantation. Apart from eco-friendliness, it also helps in reducing the ugly signs of destruction and denudation in the area.

43. Trees up to 45 cm girth size, all shrubs yielding NTFP or those that are evergreen and flowering type requiring removal from RoW are to be uprooted with roots and ball of earth intact through shovel operators after pruning the lower branches up to 2 mtrs (if required). The heavier side and lower branches of trees should be cut or pruned (to reduce the volume of biomass) for easier transplantation.

44. Such trees/shrubs shall be relocated/transplanted at the identified near-by locations including those near animal underpasses, along the water bodies and site enhancement locations along all

the corridor. If the timing permits,, the period just before monsoon or early rains should be preferred for such exercises.

45. The transplantation should be initiated at site enhancement locations such as temples, market places, hospitals, river/nala banks, approaches of feeder roads, schools, colleges, hostels, offices and near underpasses. In the second stage, improvement of barren and eroded patches should be taken-up. If there further scope, then the edge of RoW should be selected for this activity.

Species

46. The tree species which can be successfully relocated are Acacia, Eucalyptus, Sisoo, Strebulus asper, Crateva nurula, Terminalia arjuna, T.tomentossa, T.belerica, T.chebula, Phyllanthus emblica, Azadirachta indica, Ficus species, Albizia lebeck, Shorea robusta, Mimosops elengi, Feronea liminea, Tamarindus indica, Cizygium cumini, Bombax ceiba, Ceiba patendra, Peltoferum feruginum, Acacia nilotica, A.leocophlea, Aegle marmelus, Butea frondosa, Holoptilia integrifolia, Annogessus acuminata, Alstonea scholaris, Mytragyna parviflora, Adina cardifolia, Spathodia companulata, Putranjiva roxburghi, Mangifera indica, Ingadulsis, Buchnania lanjan, and Madhuca latifolia.

47. The medium trees, shrubs, bushes that need to be relocated are Nictanthes arbortistis, Soyimida fabrifoga, Cassiaria tomentosa, Delonix regia, Pongamea pinnata, Samania saman, Cleistanthes colinus Schleichera oleosa, Wood fordia fruiticosa, Embelia tsjeriam, E.ribes, Tabernamentana coronaria, Hibiscus rosasinensi, Hollarhaena antidysemterica, Combretum decandrum, Ixora, Gardenia gummifera, Lanea grandis, Murayya coingii, Muraya exotica, Messua farrea, Zizyphus and Cypedesa fruiticasa.

48. Bushes and grass varieties include the following: Eulaliopsis binata, Vetiver zizanoides, Sacchrum munj, Broom grass, Flaucortia catafracta, F.romantai, Randia dumetorum, R.tetrasperma, Adhatoda vasica or Justacea adhatoda, Jatropha curcas, Glycosmis pentaphylla

49. Streospermum acerifolium, Sterculia urens, Cyzigium cumini, Putranjiva can be planted in the one row and Long Bamboo, Semul, Mango, Palmyra palm, Caryota urens, Terminalia arjuna, T.alata, T.catappa, T.belerica, T.chebula, can be raised in the next row depending on the availability of land.

50. Depending on the area/site conditions and the enhancement plan, bamboo rhizomes/rooted bamboo off-sets (Dwarf thorny bamboos of Bambusa arundinacea, Cephalostachium, Salia,) can be planted in the gaps between two rows of plantation.

51. Narium oleander, Bignonea, Adanthera pavonina, Bauhinia variegata, B.racemosa, B.purpuria, B.retusa, Lagerstromea indica, L.parviflora, Michelia champaka, Mangifera indica, Mallotus phillipinensis, Madhuca indica, Nyctanthus, Schleichera, Alstonea can be used as site enhancers. These plants flower at different times of the year and therefore provide enhanced look to the site/corridor.

Method of Planting

52. Pits of 1mt3 at 2 mt. interval from edge to edge or 4 mtr interval (for trees) from centre to centre in the area to be vegetated (near nala, river banks, water harvesting structures, base of embankments, schools, govt. properties etc.) in a single or multiple row shall be dug up by shovel operator with the top soil on one side and the bottom soil on the other.

53. The locations/sites for transplantation should be close to the existing sites from where trees, shrubs, bushes or clumps of grass are to be relocated from the RoW. Such trees/shrubs should be marked with small red flags.

54. The shovel operator should dig up the tree/shrub/clump only after marking its surrounding ground with shovel while keeping a ball of earth (minimum 0.3^3 mtr wide) at the base so that when the tree/shrub is lifted the ball of earth remains intact. The ball of earth with the plant is

to be then lifted and covered with a thin Hessian cloth or similar material. It should be tied to the stem of the plant ar and lifted to the transporting vehicle.

55. The exposed roots outside the ball of earth should be pruned with sharp seckature or a bill hook and smeared with anti-fungal paint or coal tar.

56. These plants with ball of earth intact are to be unloaded at the planting site and transferred to the pit (kept ready beforehand) manually or through crane or shovel. The topsoil is to be then pushed into the pit. When the pit is half filled with the top soil, watering should be done.

57. The bottom soil heap together with compost/cow dung manure (one basket), Carbendazim and Mancozeb (5gms per pit) and Chloropyrophos (50 gms per pit) should be properly mixed together and filled into the pit and spread around the plant.

58. The soil around the plant is to be then pressed gently (with toe) so as to make a small depression and firm-up the base around the plant. The shape of a saucer at the base of the plant should be maintained to promote water accumulation, particularly in undulating/hilly terrain and drought prone areas.

59. The relocated plants are to be watered regularly.

60. Once the first row of plantation is done, similar process should be adopted for the second and third row (as planned).

61. Once the tree/plantation starts showing secondary growth (after about 30 days of planting), slurry containing 20 kg cow dung, 20 kg Bhuin Neem fermented in an open vat mixed with 2000 liters of water should be applied at the base of each plant @ 2 litre per plant twice a month for a period of about 4 months (say the transplantation has been done in July, then the slurry should be applied up to the end of October – this should be followed by summer watering (from mid-February onwards up to June) at fort nightly interval to encourage rapid growth during the first year).

Caution during Transplantation for Improving Results

62. Bent, deformed, damaged or diseased plants/shrubs should not be selected for relocation or transplantation.

63. No relocation activity should be undertaken below any power transmission line or over the fiber optic cable routes.

64. No relocation/transplantation of trees should be carried out in shallow soil and in areas with rocky out crops or in dry areas. In such areas, only grasses or selected should be considered.

65. In areas affected by high wind velocity, the relocated trees/shrubs are to be provided with forked bamboo “stay” to prevent their up-rooting in the first year.

66. No up-rooted plant for relocation should be kept under direct sunlight or dry condition. It should be planted the same day. In case of a delay (maximum of one day), it should be kept under shade with sprinkling of water and covered with wet jute gunny bags/wet paddy straw. The ball of earth with covered gunny bag should be sprinkled with water s to keep it moist.

67. Though it is best to relocate plants when these are leafless to reduce the stress and have minimum food and transpiration loss, this is not recommended on account of summer heat in the state.

Cost Estimate

The cost estimate for tree transplantation (up to the specified girth size) would be come Rs.500/- per plant. The same would be Rs.150/- per clump for shrubs. This includes the cost of shovel operation, transportation, re-plantation and maintenance for 3 years. Specific charges can be worked out

depending on the site condition and exact distance to be covered from the site of removal to the site of plantation.

These works could be taken-up by a State Agency/Department or through an independent agency. However, development of underpasses (wildlife movement areas) falling within forest areas should be done with the permission, help and advice of the Forest Department and such arrangements should be clearly specified in the agreement/MoU.

Implementation Arrangements

Success of this initiative entails close on-site guidance and supervision from the Forest/Wildlife Expert of the PMU/OWD (and his support staff). This group shall also be responsible for selection of transplantation locations and consultation with the concerned individuals/groups/communities. A specific plan reflecting target, timeframe, responsibility and budget (including fixing-up of the agency) shall be prepared by the PMU/OWD.

Precautions to be taken during Felling and Removal of Trees

- All workers must wear safety helmet or hard hat.
- Cleavages, sun hemp or HDPE ropes of required size depending on the girth and height of the tree with sufficient spare length have to be used for safety and reliability.
- Rescue and first aid kits, gumboots, goggles, tight fitting gloves are to be provided at the worksite.
- Traffic movement should be restricted and traffic control operators with red flags shall be posted so that they can warn the moving traffic and stop it, as necessary when tree cutting process is in progress.
- The flying splinters and broken branches at the time of felling of trees are window breakers and therefore workers, passers-by and on-lookers should be warned to remain at a at safe distance.
- One person shall be posted near the felling site, who will warn with a mouthpiece the traffic control operators to stop the traffic temporarily before the tree is finally brought down.
- As soon as the tree falls, the side branches must be cut down with power chain saw or axe and billhook and removed from the road. Portable generators and power chain saw, wedge and axe, raker tooth saw, bow saw should be kept ready at the work site for immediate action. Sufficient spare blades, chains, pulley and P.O.L should be available on site to make sure traffic is not held-up.
- There should be ropes tied to the tree trunk at reasonable height in order to control the fall by operating through chain pulley combination anchored to another stable tree or structure like pillars, posts, rocky outcrops, crow bars as iron pegs pushed into the ground at 30^0 incline.
- The supervisor, hand saw, axe or power chain saw operators should be so positioned that in case of a sudden fall of the tree or any unwarranted eventuality, they can leave the site for safety. The leaning direction and probable fall directions should be well estimated ahead of actual cutting to locate the vintage points for cutters and escape route/points for these workmen.
- No tree felling shall be carried out during rains and windy days to prevent accidental fall or mishaps.

Framework No. 3

Site Selection, Layout Plan and Basic Amenities at Construction Camp/s

Construction camps include, but may not be limited to, office space; laboratory; vehicle repair and maintenance workshop/s; fuel pumps and associated areas; parking spaces; accommodation or quarters for engineers, workers and labour; basic amenities such as mess, kitchen, potable water supply, first aid room, garbage collection and disposal facility, sanitation (toilets, bathrooms, washing areas and water supply for such needs) , material stack yards or storage areas, circulation areas, hot-mix plants, batching plants, crushers and any other space/area associated with similar activities.

Location or Siting of Construction Camp/s

The contractor shall identify the location of the construction camp/s, on the basis EMP clauses. Apart from these clauses, the Contractor shall adhere to the following provisions:

- To the extent possible, agricultural lands and fertile lands shall be avoided.
- Barren or wastelands are to be preferred during site selection.
- All such sites must be above the HFL with adequate drainage facility.
- In areas prone to floods, cyclones, cloud bursts or heavy rainfall, selection of the site shall be made keeping in mind the safety of the camp and its habitants.

The selected site/s shall be approved by Environmental Officer of SC and OWD/PMU after considering the compliance with the EMP clauses including the activities proposed for such a site. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the SC and OWD/PMU. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made be made good at his own cost.

Layout

The lay-out of a construction camp site has to be carefully planned and prepared keeping in view the various activities proposed for a particular site. The lay-out plan will contain details pertaining to, but not limited to, the cardinal points, wind direction, dimensions, surrounding features and proposed activities. This shall be submitted with complete details provided in the prescribed reporting format to the SC for written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site.

The SC will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary. Both the Resident Engineer and the Environmental Officer shall be responsible for satisfactory and timely completion of this EMP requirement.

Some of the principles governing a lay-out plan have been listed below:

- The prevailing wind direction shall be kept in mind while planning out the lay-out of internal facilities.
- No trees shall be cut and the existing ones need to be integrated into the lay-out plan with proper planning.
- The stripping, stacking and preservation of top soil will be mandatory in case of farm lands and fertile areas and absolutely no material stacking or equipment installment or vehicle parking or any other activity shall be allowed prior to the satisfactory completion of this activity.
- The proposed top soil stacking areas along with the quantity shall be clearly depicted on the lay-out plan.
- Proper circulation paths and parking spaces need to be provided.

- Fuel pumps, storage facility for inflammable and hazardous chemicals/ materials shall be provided at safe distance from office, mess and residential areas inside the camp.
- Proper fire safety precautions including safe exits, warning signs need to be provided at all locations including vulnerable areas like plant sites, kitchen, workshops, fuel pumps, stores etc.
- Electric safety practices shall be integrated/incorporated during the lay-out plan preparation.
- All sites must be graded and rendered free from depressions such that water does not get stagnant.
- Appropriate drainage shall be provided for.
- Fencing of the camp site is necessary.
- New plantation needs to be taken-up along the boundaries using guidance from the OWD's Forestry and Wildlife Expert.

Basic Amenities/Facilities

The Contractor will provide, erect and maintain necessary (temporary) living accommodation and ancillary facilities (including first-aid and emergency response arrangements) for the staff/workers/labour to the standards and scales mentioned in the EMP and relevant legislation. This includes maintaining facilities in such a fashion that uncontaminated water is available for drinking, cooking and washing.

Accommodation*:* The height of the workers and labour accommodation shall not be less than 3mt. from floor level to lowest part of the roof. Sheds shall be kept clean, with proper cross ventilation, and the space provided shall be on the basis of one sq.mt per head or as per the relevant regulation, which ever is higher. Fire and electrical safety pre-cautions shall be adhered to. Cooking, sanitation and washing areas shall be provided separately as per the EMP clauses.

Potable Water: Safe drinking water is be provided to the dwellers of the construction camps – periodic tests shall be conducted by the Contractor and independently by the OWD/PMU to ascertain this.

Mess and Kitchen Facilities: The Contractor shall adhere to the sanitary/hygiene requirements of local medical, health and municipal authorities and at all times adopt such precautions as may be necessary to prevent soil and water pollution at the site while operating mess or kitchen facilities.

Sanitation Facilities: Sanitation arrangements in the construction camp/s shall be provided as per the clauses mentioned in EMP. The required washing and bathing places shall be provided and kept in clean and drained condition. Drains and ditches should be treated with bleaching powder on a regular basis. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to. The SC shall take immediate action in case of any non-compliance and the Contractor shall rectify the situation as per EMP and regulatory requirements at his own cost.

Day Crèche Facility*:* At every construction site, provision of a day creche shall be made so as to enable women to leave behind their children while going to work. At least one attendant shall be provided to take care of the children at the crèche. At construction sites where 20 or more women are employed, there shall be at least one shelter for use of children under the age of 6 years belonging to such women.

Shelters shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Such areas shall be safely barricaded (not sharp sheets or barbed wires that may injure a child) from rest of the camp for the safety of children. Shelters shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision to keep the place clean. The size of a crèche may vary according to the number of children on a camp site.

Monitoring and Reporting

The SC and OWD/PMU shall closely monitor and record compliance with regard to setting-up and operation of construction camp/s in the agreed formats and shall immediately take action in case non-compliance is observed. The SC needs to be specifically vigilant during the initial stages so as to avoid issues pertaining to improper site selection and poor lay-out planning.

Framework No. 4

Borrow Area Management

Borrow Area Selection

Borrow areas for the project will be selected by the Contractor. All provisions stipulated in the EMP and other contract specifications shall be strictly adhered to. The finalization of all such locations depends upon the approval given by the Supervision Consultant on technical and environmental grounds (including haul road network). This includes on-site verification by the SC to cross-check the correctness of details provided by the Contractor in the prescribed format. Only after receipt of the written approval from the SC, the Contractor shall enter into a formal agreement with landowner.

If any environmental, safety or community concerns come into light during the site verification process, either appropriate mitigation measure/s shall be provided, as suggested by the Environmental Officer of SC or alternative arrangements for locating other sources of supply of material for road construction will be made by the Contractor.

Compliance with environmental requirements/legal provisions with respect to excavation and rehabilitation of borrow areas, as stipulated by the Ministry of Environment and Forests, Government of India, Indian Roads Congress guidelines and local authorities shall be adhered to by the Contractor, for which he shall bear the sole responsibility.

Criteria for Site Selection

The contractor in addition to the established practices, rules and regulation shall also use the following criteria before finalizing the locations of borrow areas :

1. The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available. In case borrowing needs to be done on an agricultural land, top-soil stripping, stacking and preservation is a must. Damage to productive and fertile areas has to be minimum. This includes appropriate planning of haul roads.
2. Borrow pits shall not be located within a distance of 100 mts. from any NH, SH or other roads.
3. Borrow pits shall be preferably located 500 mts. away from settlements/ habitations.
4. No borrow pits shall be located within 250 mts. from schools, colleges, playgrounds, religious structures and health centers.
5. No borrow area shall be opened within 500 mts. from a reserved or protected forest area, protected sites, wildlife movement zone and cultural heritage site.
6. No tree cutting shall be undertaken.
7. Borrow area near any surface water body will be at least 100mts. away from the toe of the bank or high flood level, whichever is maximum.

After identification of borrow area location/s, the Contractor will fill the prescribed reporting format and submit the same for approval to the "Site Engineer" at least 7 working days before commencement of earth works. A written approval from SC shall be necessary before any activity/work is commenced.

Borrow Area Management

Before the start of operations, the area to be borrowed shall be marked by the contractor with wooden or stone pegs to ensure that the land required for slope stabilization or bund creation is maintained. Supervision Consultant has to ensure that this marking is done on the ground to avoid issues at a later

date. Any disregard of this condition shall be made good at the contractor's and/or consultant's own expense.

The following principles shall be adhered to during borrow area operations in specific conditions:

a. Borrow Areas located in Agricultural Lands

(i) A 15 cm topsoil layer will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area with a height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(ii) Borrowing of earth will be allowed upto a depth of 1.5 mtr from the existing ground level only.

(iii) Ridges of not less than 8m width will be left at intervals not exceeding 300m. Small drains will be cut through the ridges, if necessary, to facilitate drainage.

(iv) The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).

(v) Rehabilitation shall be satisfactorily undertaken immediately after the use has ceased and at least three weeks prior to monsoon.

(vi) Preserved top soil has be spread uniformly over the section of the farmland used as a borrow area.

b. Borrow Areas located in Elevated Lands

(i) A 15 cm topsoil will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(ii) Silt fencing at the base of the top soil stockpile shall be provided for preventing wash out or loss of top soil.

(iii) The borrowing shall not be permitted beyond a depth of 1.5 mt below the adjacent ground level.

(iv) Preserved top soil has be spread uniformly over the land used as a borrow area.

c. Borrow Areas near Riverside and Structures

(i) A 15 cm topsoil will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(ii) Silt fencing at the base of the top soil stockpile shall be provided for preventing wash out or loss of top soil.

(iii) Borrow areas should be at least 250 mts. away from the toe of the embankment, flood control structures, culverts, bridges, unlisted cultural property etc., to prevent any damage to the stability of such structures.

(iv) The borrowing shall not be permitted beyond a depth of 1.5 mt below the adjacent ground level.

(v) Preserved top soil has be spread uniformly over the land used as a borrow area.

d. Borrow Areas near Settlements and Roads

(i) A 15 cm topsoil will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(ii) Borrow areas should be at least 250 mts. away from the settlements including schools, colleges, hospitals, playgrounds and religious structures.

(iii) Borrow area should be at least 100 mt. away from the toe line of an access road or a highway.

(iv) Preserved top soil has be spread uniformly over the land used as a borrow area, is is being rehabilitated as a farmland or a plantation area. Or else it should be used in the plantation zone along the highway.

(v) Bunds and temporary fencing (using barbed wire) along with plantation should be provided in case the borrow area is developed as a pond to ensure safety of the residents and the cattle. However, the depth shall not exceed 1.5 mts.

Rehabilitation or Re-development of Borrow Areas

The objective of the borrow area rehabilitation is to return the borrowing sites to a safe and environmentally sound condition. The concept entails enhancing benefits (including those linked to livelihood) for the community and individuals. Top soil preservation (and its re-use) and proper stabilization of slopes are the fundamental requirements of the rehabilitation process.

Re-development plan shall be prepared and submitted along with reporting format by the contractor before the borrowing operation is permitted by the Supervision Consultant. The redevelopment is to be prepared in consultation with land owner/s (whether public, private or institutional) and by within the environmental and safety requirements of the EMP.

Some key points on borrow area rehabilitation are presented in the table provided below. However, the contractor is free to prepare other rehabilitation scheme/s subject to the approval by the Environmental Officer of the Supervision Consultant.

S. No.	Type/Form of Rehabilitation	Re-use of Top Soil	Actions required for Rehabilitation
(i)	Farm land	Yes	➢ Leveling ➢ Slope Stabilization along the edges if there is a level difference
(ii)	Ponds including creation of new ones and enhancing capacity of existing ones (for irrigation; pissiculture and general uses by people and/or cattle)	No	➢ Slope Stabilization (angle/benching) ➢ Access / Approach Ramp ➢ Bund creation and Temporary Fencing ➢ Plantation in the periphery
(iii)	Water recharging areas/percolation tanks (depth up to one meter)	No	➢ Slope Stabilization ➢ Small bund creation
(iv)	Leveled lands that can be developed later for various uses (such as residential areas, parking lots, community grounds etc.)	Generally No	➢ Leveling ➢ Top soil re-use depends on the type of developmental work envisaged
(v)	Construction waste disposal sites (for non-toxic/non-hazardous wastes) (reinstated with top-soil with plantation over the rehabilitated site)	No	➢ Depression after filling-in of wastes to be leveled-up ➢ Top soil re-use depends on the type of developmental work envisaged
S. No.	**Type/Form of Rehabilitation**	**Re-use of Top**	**Actions required for Rehabilitation**

		Soil	
(vi)	Plantation Zones	Yes	➢ Leveling ➢ Selection of Species as per OSRP Project Guidelines
(vii)	Water holes for animals and birds (outside forest and protected areas)	No	➢ Gentle Slopes on all sides ➢ Plantation in the periphery ➢ Depth upto 1.5 mt.

Top soil that cannot be re-used in rehabilitation of borrow areas shall be used in the plantation belt/zone along the road.

Rehabilitation works shall be undertaken immediately upon the exhaustion of the approved quantity and shall not be delayed. The Supervision Consultant shall take appropriate action in case delays are observed.

Documentation

The reporting format for seeking approval for the borrow area on environmental and safety aspects shall include a pre-operation photograph. Likewise, at the end of the operation, photographic documentation after rehabilitation works are completed shall be maintained both by the contractor and the Supervision Consultant.

Certification/documentation including approval for rehabilitation works and thereafter hand-over to the owner shall be properly maintained by the contractor, Supervision Consultant and OWD/PMU.

FRAMEWORK 5

Quarry Area Management

Quarry Area Selection

Quarry areas for the project will be selected by the Contractor. All provisions stipulated in the EMP and other contract specifications shall be strictly adhered to. The finalization of all such locations depends upon the approval given by the Supervision Consultant on technical and environmental grounds (including haul road network). This includes on-site verification by the SC to cross-check the correctness of details provided by the Contractor in the prescribed format. Only after receipt of the written approval from the SC, the Contractor shall proceed with the preparation of operational plans/permissions for the quarry area.

If any environmental, safety or community concerns come into light during the site verification process, either appropriate mitigation measure/s shall be provided, as suggested by the Environmental Officer of SC or alternative arrangements for locating other sources of supply of material for road construction shall be made by the Contractor.

Compliance with environmental requirements/legal provisions with respect to selection/operation/rehabilitation of quarry areas, as stipulated by the Ministry of Environment and Forests, Government of India, Indian Roads Congress guidelines and local authorities shall be adhered to by the Contractor, for which he shall bear the sole responsibility.

The Contractor may finalize the location/s of the quarry from the list given by DPR Consultants for procuring materials. The Contractor can be allowed to open a new quarry only with the prior consent of the Mining Department, District Administration, PMU/OWD, Supervision Consultant in cases when:

(i) lead from existing quarries is uneconomical and

(ii) alternative/other material sources are not available for his use.

Quarry Area Operations

After the required permissions are sought, the operation plan for the quarry is to be submitted by the contractor to the PMU/OWD and the Supervision Consultant prior to commencing any work at the quarry site with complete details of the work programme including procurement of materials, transportation and haul road management, storage of quarry materials, safety plan and pollution control measures. The Supervision Consultant and the PMU/OWD have to ensure that operations are not initiated without the said submission.

Apart from the stipulations in the EMP, the following measures shall be undertaken to minimize the adverse impacts during excavation of material:

i) Quarry boundaries shall be properly demarcated on the ground using fence posts.

ii) The top soil to a depth of 15 cm to 20 cm shall be stripped, stored in stockpiles and preserved for re-use in plantation sites. If the plantation sites are ready, the top soil should be directly taken to these areas for spreading, which saves the time and resources required for handling and preservation.

iii) Adequate drainage system shall be provided to prevent the water logging or flooding in the excavated area.

iv) At the stockpiling locations, the Contractor shall construct sediment barriers/silt traps to prevent the loss of excavated material (and subsequent siltation) due to the run-off.

ii) Construction of offices, laboratory, workshop, accommodation and rest areas shall be done in the up-wind of the quarry and crusher plant to minimize the adverse impact due to dust and noise.

iii) The access road to the crusher plant shall be constructed and maintained properly to prevent dust generation. The lay-out shall be such that minimal compaction of fertile land takes place.

iv) In case of storage of blasting material, all precautions shall be taken as per The Explosive Rules, 1983.

v) The contractor shall ensure that all safety measures for the workers and the residents along the haul roads shall be done as required under the law of the land and as specified in the EMP.

vi) The contractor shall ensure provision and regular maintenance of pollution control measures at crushers regularly as per manufacturer's recommendation and as per Environmental Officer's (of SC) instructions.

vii) Overburden shall be removed and reused/disposed in line with approved Comprehensive Waste Management Plan.

viii) Slope stabilization requirements as per the characteristics of the strata and the depth of excavation shall be implemented.

ix) The PMU/OWD and the Supervision Consultant shall be responsible for regularly reviewing the compliance of environmental (including pollution norms), health and safety aspects during quarry operations.

Quarry Area Rehabilitation/Redevelopment

The Contractor shall prepare a Redevelopment Plan for the quarry site, which will be approved on technical, environmental and safety grounds by the concerned Regulatory Authorities, Environmental Officers of the Supervision Consultant and the PMU/OWD. This plan shall be submitted along with the request for opening of the site. Any request for opening/operating quarry without a rehabilitation plan shall not be accepted by the Supervision Consultant.

The contractor shall also restore all haul roads constructed for transporting the material from the quarry to the construction camps/sites.

Rehabilitation includes both the under-mentioned scenarios -

1. Redevelopment of new quarry opened by the contractor for the project
2. Redevelopment of existing quarry operated by other agencies/individuals

In the first case, the contractor shall be responsible for the redevelopment/rehabilitation which must be completed prior to the handing-over of the works. These sites shall be maintained though out the Defect Liability Period. The compliance certificate shall be issued upon site verification through joint inspection of the Supervision Consultant and PMU/OWD.

In the second case, the redevelopment of the exhausted quarry shall be the responsibility of the agency/department that has provided the permission/consent for initiation and operation.

Possible re-development options

Option A: Re-vegetation of the quarry to merge with surrounding landscape with reuse of top soil mixed together with farm yard manure.

Option B: Development of exhausted quarries as water bodies, where the quarry pit is developed into pond or a rainwater harvesting structure. In this case, the rock system, the stability of the structure, location of the habitation down hill (which might be impacted in case of any breach - necessary re-enforcement of the weaker areas by masonry structures or spill way to drain out excess water) has to be considered. The slopes of the quarry may require benching (depends on depth and strata) to prevent

slips. Plantation along the boundary, erosion control measures and access ramps also need to be introduced as a part of the rehabilitation plan.

Documentation

The reporting format for seeking approval for the quarry area on environmental and safety aspects shall include a pre-operation photograph. Photographic records shall also be maintained during the operation of the quarry. Likewise, at the end of the operation, photographic documentation after rehabilitation works are completed shall be maintained both by the contractor and the Supervision Consultant.

Certification/documentation including approval for rehabilitation works and thereafter hand-over to the owner shall be properly maintained by the contractor, Supervision Consultant and OWD/PMU.

FRAMEWORK 6

Worker's Safety in Common Operations during Construction

A. Tree Felling

- Use hard hats during tree felling
- Ensure safe use and storage of tools such as axes, power chain saw, hand saw of different types, HDPE ropes of approved thickness to drag felled trees and logs.
- Keep the saw blades in proper lubrication and sharpened state for efficient workability.
- Determine proper foot and body position when using the implements for felling, cutting and dragging.
- Wear appropriate foot protection
- Avoid cutting branches overhead.
- Keep first aid kits ready at the site.
- Determine possible hazards in the area, e.g. electrical or telephone or other utility lines, buildings, vehicles and domestic cattle that may create unsafe work situations.
- Prior to felling, determine the safest direction of fall and orient fixing of ropes and cutting positions accordingly.
- Determine the proper hinge size before directing the fall.
- Keep machineries and workers ready for speedy removal of the tree from the main traffic movement area.
- Keep flag men and warning signal signage at either end of felling area to control movement of traffic and warn passers-by.
- Use loud noise signals for warning by-standers and workmen about the impending fall, so as they move away from the direction of fall.

B. Plant Sites, Construction Camp and Quarry Areas

- Install perimeter fencing.
- Ensure good visibility and safe access at site entrances.
- Provide adequate warning signs at the entrance and exit, as necessary.
- Provide adequate space/area for loading and unloading, storage of materials, plant and machinery.
- Display emergency procedure and statutory notices at conspicuous locations.
- Provide areas for collecting garbage and other waste material, and also arrange for their regular/periodic disposal.
- Arrange appropriate storage, transportation and use of fuel, other flammable materials and explosives in line with the license requirements obtained from concerned authorities.
- Provide defined access roads and movement areas within the site.
- Ensure availability of first aid facilities and display notices at various work places showing the location of first aid facilities and emergency contact numbers.
- Provide and enforce use of PPE at plant and quarry sites.

C. House Keeping Practices

- Provide proper slope in kitchen, canteens, washrooms, toilets and bathrooms for easy and immediate draining of water.
- Keep all walkways and circulation areas clear and unobstructed at all times.
- Ensure that spillages of oil and grease are avoided and in case of accidental spills, these are immediately collected.
- Use metal bins for collection of oily and greasy rags.
- Stack raw materials and finished products out of walkways.
- Do not leave tools on the floor or in any location where they can be easily dislodged.
- Keep windows and light fittings clean.
- Maintain the workplace floors dry and in a non-slippery condition
- Provide and maintain proper drainage system to prevent water logging and unhygienic conditions.
- Ensure that protruding nails in boards or walls are moved or bent over or removed so that they do not constitute a hazard to people.
- Store all flammable materials in appropriate bins, racks or cabinets with proper cover and labels – as required for various products.
- Make sure that hazardous/dangerous chemicals are kept in the goods stores with the appropriate labeling, display of the material-safety-data-sheet (MSDS) and other precautionary measures.
- Display 'no smoking' signs in areas with high risks of fire, (eg. near fuelling areas, diesel/oils/lubricant/paint storage area, hessians, rubber, wood and plastic etc.) in and around working area.

D. Traffic Safety and Roads Works

- Delineate advance warning zones, transition zones and construction zones at both ends of a work front. Use devices such as regulatory signs, delineators, barricades, cones, pavement markings, lanterns and traffic control lights, reflectors and signal men in appropriate manner round the clock.
- No work front should be 'touched' without putting appropriate safety measures in place. SC will be responsible to ensure that the permission for any activity is not given without the required safety plan and practices in place.
- Put signage at appropriate locations as per the road construction activity plan to warn the road users, construction vehicles/equipment operators, pedestrians and local residents about the work in progress, speed controls, hinderances/ blockages, diversions, depressions etc. in lines with contract requirements and IRC guidelines.
- Express a regret signage for the inconvenience caused and alert about the dangers ahead on account of construction activity.
- Signage has to be: (i) simple, easy-to-understand and should convey only one message at a time; (ii) has florescent and reflective properties of the paints; iii) broad, prominent and with appropriate size of letters and figures; (iv) placed at the appropriate 'point/s' as specified in the IRC guidelines to allow proper stoppage/reaction time to approaching vehicles.
- Different sign boards shall have a mix of pictorial signs and messages in Oriya, Hindi and English.
- While using barricades, ensure that traffic is kept away from work areas and the road user is guided to the safe, alternative movement track.

- Ensure that excavation sites are provided with effective barriers and reflecting signage to prevent any accidental approach by vehicles during the day or night.
- Prevent entry of cattle and wildlife through proper fencing/barrication around the excavation sites.
- Provide proper uniform (light reflecting garments) to flagmen engaged in traffic control at diversions so that they can be singled out from the moving traffic
- Provide wide red and green flags or red and green lights to flagmen for controlling traffic.
- In high traffic zones and congested areas, use of wireless communication devices with protective headgear and shoes by flagmen has to be ensured to prevent confusion and minimize the risk of accidents.

E. Saftey during Excavation

1 The risk of accidents involving people and vehicles remains high in excavated sites. All pits or excavations shall to be barricaded to warn the road users and residents and to avoid any unauthorized entry of persons, children, domestic cattle or wildlife. For deep excavations and culvert construction sites, painted GI sheets, delineators, lamps (as required) and retro-reflective signage shall be used.

- Excavation in soft loose & slushy soil (above 2.00 m depth where sliding of earth or collapsing of sides may occur)

  Excavation more than 1.5 mt. is to be done in steps of minimum 500 mm offsets with plank and stuttering support, as required under contract clauses.

- Excavation in slippery or water logged area (labour or machinery may slip or get caught in slush)

  Try to dewater the area and spread minimum 150 mm thick sand layer to avoid slipping.

- Excavation in rock where chiseling is involved (hammer or stone pieces fall may injure the hand, eyes or legs)

  For hammer work, only experienced and skilled labour should be employed. Chisel should be held with a tight fitting grip. Goggles and leg cover should be provided to protect the labour.

- Excavation in rock where blasting is involved (risk of injury to workers and passer-by)

  Blasting is to be carried out where absolutely necessary following all explosive handling regulations with mines safety principles including use of hooters, signage, protective gear, safety fuse, detonators, ignition coils and wires, exploder dynamo etc.

  The danger zone has to be vacated at least 20 minutes before the actual firing. Sufficient warning through positioning of red flags, dander signs, painted drums and sirens for safety of men at work and for any passer-by is to be provided. After a lapse minimum 15 minutes when a clear signal is given by the site-in-charge through use of whistle or horn or light, the blasting charge should be ignited. After blasting a minimum of 30 minutes gap is to be given for the rocks and earth or blocks of loose boulders to fall of so that safety and security of the staff at the operation zone is ensured. Heavy charges shall not be used in fragile rock systems, where rock disintegrating machinery could be brought to use.

  The entire operation shall be conducted under the strict supervision of qualified staff and in the presence of safety officers.

- Excavation for drain or manhole (risk of a passer-by falling into the excavated portion)

  The area should be properly barricaded with sign boards and illumination/lamps for night time safety. In congested stretches, watchmen/guards can also be placed for vigil.

- Snake bites or Scorpion Stings during excavation

  In areas with vegetation, tall grasses and forest cover, the contractor shall provide the labour with gum boots and gloves. He shall also make snake antidotes available on site. Emergency vehicles should also be kept ready to rush the patient to the nearest hospital.

F. Saftey during Some Typical Construction Work

- **Centering and scaffolding (risk of framework collapse while construction, concreting or just before concreting especially when wooden ballies are used)**

Many a times ballies joined together give away due to weak joints. Use of metal scaffolding and centering plates with metal fasteners are the safest and highly recommended materials for use in all road construction works for ensuring safety, stability and casting of structures. All such scaffolding should be placed on a firm and a level base on the ground for ensuring stability. No wooden scaffolding or bamboo scaffolding is to be used for any casting of heavy (RCC) structural construction as the risk to safety of workers is higher.

Railings are to be provided along working platforms and ladders for better safety. Nets shall be hung below the scaffolding or structures where work is on-going to prevent fall of debris, stones, bricks, equipments and other heavy objects and even workmen, which could be fatal.

- **Form-work for small/light beams and slabs**

2 The collapse of bottom of the beam that may bring down the slab as well is a risk in such operations, which may injure the labour or supervision staff. Slender ballies without bracing are not be allowed for such works. No concreting should be allowed without bracing at 300 mm above ground and at mid way for normal beams and slabs. The bracings should be for the support of beams as well as the slabs.

3 Direct ballies support from the ground and the practice of tying planks with binding wire to the steel reinforcement shall not be allowed. A temporary railing and properly based working platforms along the periphery of slab reduces risk to the life of labour and supervision staff.

- **Dismantling of Scaffoldings**

Dismantled materials may fall on passer-by and workers. Workers could also get injured during the removal of such materials. Prior to dismantling of scaffoldings/working platforms, the area of operation should be closed for all outsiders. No one should be allowed within 50 mt. from the place of demolition. Helmets, safety belts and other PPE must be worn by all the workers engaged in such a work. This work requires careful handling by an experienced supervisor/work force and should be executed with utmost caution. Gradual dislodging and use of PPE is required.

- **Column Reinforcements**

4 The tendency of bar-benders is to tie the vertical steel with coir rope or 8 mm steel rods as ties on all four sides of the column reinforcements. Reinforcement to columns shall be by welding MS rods with metal scaffolding to keep it in position till the final casting of RCC is done.

- **Fall of Objects or Debris from a Height**

5 At bridges construction sites (or in work areas at a height above ground level) thick nylon net or hessian barriers shall be used to prevent any splinter, debris, mortar or concrete from falling onto the passers by or workmen around.

- **Water Storage Tanks (for General Use, Curing etc.)**

6 A child of a worker or that of a near-by resident falling into the water tank is also a risk associated with construction sites. The water tanks therefore shall be provided with protective cover/lid with locking arrangement at every site of activity to prevent accidental drowning.

➢ **Site Cleaning**

7 Throwing of waste materials, broken concrete pieces, brick bats, sand etc. straight from the top of a structure onto the ground can injure a worker or a passerby. Such materials should be brought to the ground with the help of lift or the use of rope over pully with a bucket.

G. Operation of Excavators

- Ensure that excavators are operated by authorized persons who have been adequately trained. Prevent any unauthorized use of the excavators.
- Ensure that only experienced and competent persons are engaged in supervising all excavations and leveling activity.
- Check and maintain as per the manufacturer's manual.
- Issue relevant information, including that related to instructions, training, supervision and safe system of work in writing and provide expert supervision for guidance.
- Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of the mechanics, service engineers or other safety personnel during periodic maintenance, inspection and examination.
- During tipping or running alongside the trenches, excavators must be provided with stop blocks. Avoid operating the machine too close to an overhang, ditch or hole, potential carving in edges, falling rocks and land slides, rough terrain with undulating obstacles.
- Excavators must be rested on firm ground after field operation away from the road.
- Locate and identify underground services including telephone cables, OFC cables, sewerage and drainage lines, water supply, electrical cables etc by checking with all concerned underground utility providers.
- When reversing or in cases where the operator's view is restricted, adequate supervision and signaling arrangements shall be provided.
- Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
- Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator and ensure replacement/ repair to avoid mishap and break down.
- Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use improper linkage pins.
- Never dismount from or mount on a moving machine.

H. Operation of Trucks and Dumpers

- Ensure that only trained, authorized and licensed drivers operate the vehicles.
- Enlist help of another worker before reversing the vehicle.
- Switch-off the engine when not in use to save fuel, prevent accidents and unnecessary noise and air pollution.
- Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall by fixing a sturdy support below.
- Carryout periodic servicing as per the manufacturer's requirements. All records of maintenance and repairs should be in writing and available for verification.

- Keep the vehicle tidy and the cabin free from clumsy utilities, which might obstruct the controls and create hazards.
- Follow safe driving principles including speed limits as per traffic signage.
- Avoid carrying additional passengers in the cabin or on the body of the dumper, while in field operation other than the connected workers.
- Provide stop blocks when the vehicle is tipping into or running alongside excavations or when it is parked.
- Do not overload the vehicle.
- Carry only well secured loads and use proper covers and fasteners.

L. Manual Handling and Lifting

- Avoid manual handling of heavy and hazardous objects and chemicals.
- Pre-assess the actual requirement of manpower in case of emergency situations.
- The hazardous and poisonous materials should not be manually handled without proper equipments/gears and prior declaration of the risks needs to be made to the involved workers.
- All concerned persons shall be trained in proper methods of lifting and carrying.
- In all manual operations where groups of workers are involved, a team leader with necessary training to handle the entire work force in unison has to be provided for.
- Watch and ward to control/supervise/guide movement of equipments and machineries, loading and unloading operations, stability of the stockpiled materials and irregularly shaped objects have to be provided for safety and security of workers.
- Carriageway used by the workers must be free from objects, which are dangerous.
- Loading and unloading from vehicles shall be under strict supervision.

J. Electrical Hazards in Construction Areas

- Statutory warning leaflets/posters are to be distributed/displayed by the Contractor in the vicinity of work sites for the benefit of all workers, officers and supervisors as well as the public, indicating the do's and don'ts and warning related to electrical hazards associated with operations to be executed/in progress.
- All wires shall be treated as live wires.
- Report about dangling wires to the site-in-charge and do not touch them.
- Only a qualified electrician should attempt electrical repairs.
- Train all workers about electrical safety.
- Shut down the equipment that is sparking or getting over heated or emitting smoke at the time of operation, if it is not the normal way of working of such machines. Inform technical person/s for required maintenance.
- Never used damaged wires for electrical connection.
- Demolition, tree felling and removal of overhead transmission lines shall be undertaken with strong, efficient and closely monitored arrangements to avoid accidents.

K. Use and Storage of Gas(LPG)

- Store filled gas/LPG cylinder in a secure area – mark this as a no smoking area.
- Transport, store, use and secure cylinders in upright position.
- Ensure proper ventilation at the ground level in locations where LPG is in use.

- Avoid physical damage to the cylinders.
- Never weld or cut on or near the cylinder.
- Store empty cylinders secured and upright.
- Make sure that the cylinder is closed immediately after use.
- Investigate immediately if there is the smell of LPG or gas.
- Never use destenched gas/LPG on site.
- Make sure that there is no other unrelated fire in the vicinity of the cylinder.

L. Gas Welding

- The welders and welding units should follow all the basic principles of welding for safety and security.
- Use face shield to protect the eyes.
- Use goggles, particularly when chipping slag and cutting strips.
- Use gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation hazards.
- Use high-top boots/gum boots to prevent sparks, splinters, sharp edges of metal and hot welded strips, welding rods, electric cables etc. from injuring the legs.
- Avoid inhaling the noxious fumes and gasses from burning electrodes by using gas masks and screen of the work area to prevent the glair moving outside it.
- Keep the key hung from the regulator control for split seconds operations to stop the valve in case of any accidental damage or leakage to supply pipeline that may catch fire and cause accidents in case acetylene or LPG cylinder.
- The welding area should have sufficient openings with fixed exhaust ventilators or adequate air flow openings to remove poisonous fumes and gases.
- Take precautions of wearing hard hats or fiber helmets to prevent injury due to fall of any object and accidental injury from projections while welding.
- Welders operating above ground should have adequate safety belt secured to stable platform to prevent accidental fall or injury from the scaffold. All electrical and gas connection lines up to the welder should be sufficiently insulated and protected from sharp edges and sharp objects. These shall not come into contact with hot metal.
- Do not use gas cylinders for supporting work or as rollers.
- While using LPG or CNG cylinders for welding, follow all safety precautions as has been prescribed by the supplier company.
- Avoid fire hazards and accidents by posting safety supervisors to oversee the activities of workers.
- Do not store explosives, high inflammable materials, loose hanging overhead objects, hot welded strips etc. near gas cylinders.
- Close all valves, switches and circuits while leaving the work place under proper lock and key. In case of mobile units, proper carriage procedure have to be followed for safety and security of men and materials.

M. Fire Safety Practices

Before fire breaks cut

- Designate fire officers.

- Store flammable material in proper areas having adequate fire protection systems.
- Display sufficient warning signs.
- Install fire alarm wherever required and test regularly.
- Inspect fire extinguishers regularly and replace as necessary.
- Train selected personal on use of fire extinguishers
- Fire escape route should be kept clear at all times and clearly indicated
- Display escape route maps prominently on each side.
- Provide sufficient exit signs at prominent locations for directing people to the escape staircases and routes.
- Train workers about the escape route and assembly point/s.
- Carryout fire drill periodically.

When fire breaks out.

- Alert all persons through fire alarms or other methods.
- Put off the fire with appropriate fire extinguishers only when you are sure that you are safe to do so.
- Escape if you are in danger through the fire escape route to assembly point.
- Call-up Fire Service.
- Fire officers to carryout head count at the assembly point.

N. Noise Hazards and its Control

- Plan camp lay-out in a manner that ensures barriers/buffers between residential/ office units and high noise generating zones.
- Use sound meters to measure the level of noise and if it exceeds 75 dB(A), then ensure preventive measures.
- Make personnel aware of noisy areas by using suitable warning signs and insist on use of ear protectors/ear plugs to prevent excess noise affecting the workmen.
- Reduce noise at source by: use of improved equipments; regular and proper maintenance the machinery as per the manufacturer's manual; by replacing rickety and noisy equipments and machineries. Screening locations with noise absorbing material; making changes in the process/equipment; controlling machine speeds; ensuring that two noise-generating machines are not running at the same time close to each other at same location; using cutting oils and hydraulic noise breakers; providing vibration and noise absorbing platform and firm embedding of equipments with fasteners.
- Appoint a competent person to: carryout a detailed noise assessment of the site; designate ear protection zone/s; give training/instructions on the necessary precautionary measures to be observed by site personnel including using suitable type of ear protection equipments.

O. Personal Protective Equipment

General

- Provision of personal protective equipment has to be made over and above all measures taken for removing or controlling safety hazards on a work site.

- Ensure that sufficient personal protective equipments are provided and that they are readily available for every person who may need to use them.
- The Contractor's Project Manager shall ensure that all persons make full and proper use of the personal protective equipment provided.
- Provide instruction/s and training for the proper use and care of personal protective equipment.
- Ensure that the personal protective equipments are in good condition.
- Train workers to report unintentional damages for replacement and to always keep the personal protective equipment clean.
- PPE includes, but may not be limited to, hard hats, goggles, ear plugs, gloves, air filters/masks, boots, ropes etc.

Eye Protection

- Road construction work sites, quarries and crushers are full of dust particles, sand, splinter, harmful gases, bright light and welding arc lights, which are injurious for the eyes. Therefore, eye protection and adequate lighting in work areas is required.
- All workers, supervisors and inspection officers and dignitaries coming over for study of works should compelled to wear eye protecting glasses/goggles properly fitting the eye sockets to prevent damage due to dust, gases and other particles.

Head Protection

- Hard hats are compulsory for all workers, supervisors and managers/officials while working and/or inspecting a work sites.
- Hard hat areas shall be demarcated clearly.

Hearing Protection

- Provide ear plugs or ear muffs to the workers and to those who need to get in and out of a high noise area frequently. Use re-usable earplugs when the reduction required (15-25 dBA) is not excessive. Use earmuffs where a large attenuation of upto 40 dBA is demanded.
- Do not use dry cotton wool for hearing protection because it doesn't provide any such protection.
- Provide disposable ear plugs for infrequent visitors and ensure that these are never re-used.
- Replenish ear plugs from time to time for those who need to work continuously for a long period in a high noise area/s.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs.
- Use soap and water or the recommended solvent for cleaning ear muffs.

Respiratory (Protective) Equipment

- Wear suitable maks for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags, working at crusher sites etc.
- Provide training to all persons using the masks/respirators for their correct fitting, use, limitations and symptoms of exposure.

- Clean and inspect all respirators before and after use.
- Store respirators properly when not in use.

Safety Footwear

- Wear suitable footwear for work
- Use safety footwear on site or in other dangerous areas.
- Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.
- All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.
- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
- Keep shoelace knots tight.

Hand Protection

- Wear suitable gloves for selected activities such as welding, cutting and manual handling of materials and equipment.
- Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
- Wash hands properly with disinfectant soap and clean water before drinking or eating.
- Wash hands immediately after each operation on site when the situation warrants.

P. First Aid

- Provide first aid boxes at every work site in a cool and shaded place.
- Ensure that training on the use of the first aid box is provided to at least every supervisor on the site.
- Display the list of persons along with their contact numbers who are trained on providing first aid.
- Ensure that every first aid box is marked "First Aid" in English and in Oriya.
- Check for expiry dates and replace the contents, as necessary.
- Maintain a register on health records including injuries/accidents.

Q. Accident Investigations

- Carryout the investigation/s as quickly as possible.
- Invetatigation should be carried out both internally as well as through third party.
- Conduct interviews with as many witnesses as necessary including the affected persons and supervising officials.
- Do not rely on any one/limited source of evidence.
- Check all the log books, stock registers, issue registers, movement registers on site safety regulations, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio-visual and electronic medium for presenting an evaluation of the incident/s.
- After completion of the investigation/enquiry, a summary of the facts recorded, sequence of happenings, persons-in-charge, persons examined, equipments and machineries tested,

follow-up of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations etc. to be prepared with a comparative analysis for proper assessment.

8 FRAMEWORK 7

9 Storage, Handling, Use and Emergency Response for Hazardous Substances

Handling Hazardous Substances (including Chemicals)

- As far as practicable the hazardous materials will be stockpiled under proper mechanical loading, unloading and stacking aided by manual labour where necessary.
- Exercise great care in the storage and use of chemicals because they may be explosive, poisonous, corrosive or combustible.
- Separate different chemicals physically and store accordingly after proper labeling.
- Stock taking of all hazardous will be mandatory together with enforcement of manufacturer's or supplier's safety standard/s and drill exercises.
- New and less known chemicals and building materials, for which toxicological studies are wanted, need to be properly evaluated prior to their inclusion in the materials list.
- All containers should be clearly labeled to indicate contents.
- Maintain the Material Safety Data Sheet of all chemicals for reference on safety precautions to be taken and the use of suitable PPE.
- Ensure use of correct personal protective equipment before allowing workers to handle chemicals.
- When opening containers, ensure holding of a rag over the cap/lid or use of safety gloves, as some volatile liquids tend to spurt up when released.
- Eye fountain, emergency shower and breathing apparatus should be available near the workplace.
- Ensure immediate medical attention in case of spill/splash of a chemical.
- Safety instructions for handling emergency situations shall be displayed prominently at both the storage and use locations.

10 Transportation, Refueling and Maintenance Procedure

- Truck or suitable containers will bring in all fuel and fluids.
- There will be no storage of fuel, oil or fluids within 200m of a water line.
- Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment.
- Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.
- All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities.
- Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 100m (or 50m) wide area.

Emergency Spill Procedure

Should a spill occur, either though accidental spillage or equipment failure, the applicable emergency spill procedure as outlined in sections below and/or as directed by the manufacturer/supplier shall be followed:

Spill Procedure (Inside a Stream)

In the case of a spill, overflow or release of fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, while sending SOS for help from the technical wings and fire brigade or any other govt. agency.

- **Stop the flow**
  - Stop the release into the waterway
  - Shutdown the equipments.
  - Close valves and pumps.
  - Plug leaking of damage hosepipes or containers with suitable sealants or temporary plugs at the holes..
- **Remove Ignition Sources**
  - Cut off the supply sources and shut down the sources of power supply.
  - Cordon up the area and salvage the spilled materials for recycling or disposal as would be suggested by the technical experts or as per the manufacturer's guidelines for the product.
  - In case of inflammable materials, mobile phones, electrical switches and heat generating machines, sparking electrodes etc. shall not be operated.
  - Portable fire extinguishers need to be kept handy in such vehicles for immediate use as a damage control measure.
- **Clean-up and Disposal**

  Emergency Services shall be engaged for the containment, clean-up and disposal of contaminants released into the environment.
- **Reporting**

  The Contractor's Environmental Officer will document the event and submit the reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board.
- **Procedure Review**

  The Engineer will review the report, determine if changes are required to be incorporated in the plan of activity under the revised guidelines and recommendation/s that have been suggested by the technicians/manufacturer/ supplier /fire brigade /SPCB /environment officer of the PMU, as the case may be.

Spill Procedure (On Land)

All types of spills are hazardous - whether liquid or amorphous or solid and accordingly the spill has to be dealt with. For liquids, sealing the leakage or emptying the container into another empty vessel may be considered. For solid or semi-solid or viscous products, special salvage equipments are to be used. For fine particles and water soluble chemicals, neutralizing or scraping the affected soil from the area has to be resorted to with mechanical removal and depositing at a safe site as would be recommended by experts.

- **Notification**

  All legal authorities such as civil administration including the district Collector, the sub-divisional officer, Tehsildar, the local SHO of the police station, the SP, Divisional Forest Officer, the Inspector of Factories and Boiler, the SPCB authority monitoring the pollution in the area, site engineer/supervision consultant and environmental officer of OWD/PMU, local gram panchayat and people's representatives have to be informed about the incident, the probable damage, current and after effects, precautionary measures to be taken and already taken and restrictions imposed on movement of men, material, live stock etc in an around the site of spill.

- **Cleanup and Disposal**

  The Engineer's Environmental Officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.

- **Reporting**

  The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board(s).

- **Procedure Review**

  The Engineer will review the report; determine, if changes are required to procedures and; recommend implementation of all required changes.

FRAMEWORK 8

Soil Erosion and Sedimentation Control

All materials shall meet commercial grade standards and shall be approved by the Engineer before being used in the work.

Construction Operations

Prior to the start of the construction work, the contractor shall submit to the Supervision Consultant/Engineer the plan, methodology and time schedule for carrying out temporary and permanent erosion/sedimentation control works for approval. as are applicable for the items of clearing and grubbing, roadway and drainage excavation, embankment/sub-grade construction, bridges and other structures across water courses, pavement courses and shoulder. This plan shall also submit for approval his proposed method of erosion/sedimentation control on service road and borrow pits and his plan for disposal of waste materials. Work shall not be started until the erosion/sedimentation control schedules and methods of operations for the applicable construction have been approved by the Engineer and the Supervision Consultant's Environment Export.

The surface area of erosion prone earth exposed by clearing and grubbing, excavation, borrow and fill operations shall be limited to the extent practicable. The contractor may be directed to provide immediate control measures to prevent soil erosion and sedimentation that will adversely affect construction operations, damage adjacent properties, or cause contamination of nearby streams or other watercourses. Such work may involve the construction of temporary berms, dikes, sediment basins, slope drains and use of temporary mulches, fabrics, mats, seeding, or other control devices or methods as necessary to control erosion and sedimentation.

The Contractor shall be required to incorporate all permanent erosion and sedimentation control features into the project at the earliest practicable time as outlined in his accepted schedule to minimize the need for temporary erosion and sedimentation control measures.

Temporary erosion /sedimentation and pollution control measures will be used to control the phenomenon of erosion, sedimentation and pollution that may develop during normal construction practices, but may neither be foreseen during design stage nor associated with permanent control features on the project.

Where erosion or sedimentation is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion or sedimentation control features can follow immediately thereafter if the project conditions permit; otherwise temporary erosion or sedimentation control measures may be required between successive construction stages. Under no conditions shall clearing and grubbing or excavation without prior approval of the Engineer and Environment consultant expose a large surface area of credible earth material at one time.

The Engineer may limit the area of excavation, borrow and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding and other such permanent erosion, sedimentation and pollution control measures, in accordance with the accepted schedule.

Temporary erosion is sometimes caused due to the Contractor's negligence, carelessness or failure to install permanent controls. Sedimentation and pollution control measures then become necessary as a part of the work as scheduled or ordered by the Engineer, and these shall be carried out at the Contractor's own expense. Temporary erosion, sedimentation and pollution control work required, which is not attributed to the Contractor's negligence, carelessness or failure to install permanent controls, will be performed as ordered by the Engineer.

Temporary erosion, sedimentation and pollution control may include construction work outside the right of way where such work is necessary as a result of road construction such as borrow pit operations, service roads and equipment storage sites.

He shall maintain the temporary erosion, sedimentation and pollution control features installed by the Contractor till these are needed, unless otherwise agreed by the Engineer.

FRAMEWORK 9

Waste Disposal Site Management

A comprehensive waste management plan shall be prepared by the contractor prior to initiation of any works. This plan should at least contain the following information:

- Estimated quantity of waste
- Type of wastes
- Disposal Plan

shall be in line with the work progr

Criteria for Site Selection

The locations of waste disposal have to be selected such that:

- Residential areas are located on the up-wind direction of the site.
- The site is minimum 500 mts. away from sensitive locations like settlements, ponds/lakes or other water bodies, wetlands, protected areas, forests, wildlife movement areas, seasonal streams, rivers, canals, flood plains, educational institutions, medical centers, religious sites, cultural or heritage sites and play grounds.
- No hazardous and contagious waste material will be disposed at such locations.
- The selected site meets with the local regulatory requirements (including those of SPCB, Municipalities etc.).
- The sites selected by the contractor shall be assessed and approved by the environmental, health and safety grounds by the Environmental Officer of the Supervision Consultant. The Resident Engineer shall be responsible to ensure that approval/s for work programme are not provided without the environment, health and safety plan submission.
- While disposing debris / waste material, the contractor will take into account the wind direction and location of settlements to ensure against any dust problems.

Proper barricading is made to prevent spread of the waste material through action of wind, water, scavengers or rat pickers.

Precautions to be Adopted during Disposal of Debris/Waste Material

The contractor shall take the following precautions during transportation and disposal disposing of debris/waste material:

- During the site clearance for disposal of debris, the contractor will take full care to ensure that public or private properties are not damaged/affected and that the traffic is not interrupted.
- Contractor will dispose off debris only at the identified places only after prior written permission of Supervision Consultant and OWD/PMU has been received.
- In the event of any accidental spill or spread of wastes onto adjacent parcels of land, the contractor will immediately remove all such waste material/s and restore the affected area to its original state to the satisfaction of the Engineer-in-charge of works.

- The contractor will at all times ensure that the existing ponds, canal and drains within and adjacent to the site are kept free from any debris/wastes.
- Contractor will ensure effective water sprinkling during the handling and transportation of materials when dust is likely to be created.
- Materials having the potential to produce dust will not the loaded not beyond the side and tail board level and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after discussion with the local people and as approved by the Engineer-in-charge of works.
- During the debris disposal, contractor will take care of surrounding features and avoid any damage to trees and properties.

Rehabilitation of Waste Disposal Sites

- Along with the format seeking permission/approval for the disposal site/location from the Engineer/Supervision Consultant, the contractor shall also submit a rehabilitation plan for the area.
- The dump sites shall be suitably rehabilitated by planting local species of shrubs and other plants. The species (region specific) shall be chosen from the list suggested in the EA/EMP. Local species of trees should be selected so that the landscape is coherent and is in harmony with the surrounding environment.
- Rehabilitation can also include conversion into farm land, playground, parking area, block plantation area etc.
- Some of the dumpsites could be used either for plantation or for growing agricultural produce such as ginger, turmeric or oranges etc.
- Care should always be taken to maintain the hydrological flow in the area.

FRAMEWORK 10

Avenue Plantation and Grass Turfing

Avenue Plantation

- The species to be planted in the first row along the road would be of low or medium height trees, shrubs and palms depending on the location and availability of water. This will be mixed with ornamental plants.
- The percentage of non-browsable species shall be more than 70 percent to keep down the cost of maintenance and tree guards.
- In areas where dust generation is a problem, dwarf bamboos shall be planted on either side at 1mtr spacing to lower the impact of noise and dust generated due to road operation. These plantations of bamboo shall be either from off-set planting or rhizome planting with barbed wire fencing.
- The trees and shrubs will be at spacing of 5mtr from plant to plant with inter planting of dwarf bamboo and flowering shrubs in between two trees /shrubs that is to say this spacing in the row shall be 2.5mtr from each plant to plant.
- At road intersections or junctions, the islands erected with PCC road curb shall be planted of with dwarf Duranta varigata species and its spacing shall be 45cm to 1mtr apart with trimming of the plant to a height of 0.7mtrs.

Scope of Work

Contractor will furnish all materials, labour and related items necessary to complete the work assigned in the Contract with regards to plantation.

Plantation Mechanism

- All plants supplied must be planted within three days of removal from the nursery.
- The relocated plants shall be placed in pits of 1x1x1mtr size and shrubs and bamboos shall be put in 30x30x30cm size pits. The pit size will be 45x45x45 for medium and tall trees.
- The manuring and watering will be carried out according to seasons - manuraing during early rains and late rains (early winter) and watering from mid-February to mid-June.
- No. of plants per km at (a) 5mtr spacing 400 (200 each on both sides)
  (b) 2.5mtr spacing 800 (400 each both side)
  (c) 1mtr spacing 2000 (1000 each both side)
- Use of compost/farm yard manure/cow dung manure – 5kg per pit thoroughly mixed the soil.

Materials

- Saplings/seedlings shall be well-formed and free from defects such as knots, sun-scaled, windburn, injuries, abrasion or disfigurement. All saplings shall be healthy; sound; free from plant diseases, insects and pests; and with well-developed root systems.
- Plants suitable for planting must be healthy with average height upto 0.25mtr, free from diseases, broken branches or as per the forest expert's written recommendation in special cases.
- All plants should bear an identification tag when final planting is complete after the first year of planting and casualty replacement. This shall be in form of aluminum foil identification tag plates fixed to the plant with small GI nails or tags of GI wire fixed loosely around any branch of the tree /shrub/bush/bamboo clump containing the tag bearing the name of the plant variety in English

and in Oriya punched over it. The size of the tag should be 70mmx50mm with eyelets at either end for fixing.

- While planting the exposed loose routes and broken/damage roots will be trimmed and treated with anti-fungal solutions such a mancozeb or carbendazim mixed with water in ratio of 2gm per liter.

Soil

It should be loam or sandy loam or clayey loam mixed with manure and fine sand in the proportion of 1:1:1 together with Chlorop pyrophos (20%EC) @ 25 to 50 gms per pit depending upon the size of the pit.

Manure

Only organic manure will be used for plantation. Composts from municipal solid wastes and distillery waste may be used. Manure shall be free from extraneous matter, insects or grubs.

Addition of Alteration in the Scope of Work

No plant material which is exotic or has not been recommended for avenue planting or site enhancement, shall be planted unless and until the Forestry Expert agrees in writing for such a change in species with sufficient justification. Specific requests of the public and institutions for special type of plants may be considered, only if these are not exotic and can be easily grown in the area, provided a written note to this effect is issued by the Forestry Expert.

While procuring the plants from any commercial nursery instead of the site nursery, it shall be mandatory for the Contractor to furnish the copy of registration certificate of the supplier to recognize that the nursery is impaneled with the State Govt. as a plant supplier to OWD or Forest Department, subject to certification of being free from contagious diseases and pests.

Planting

As has been described in the planting mechanism, all saplings shall be supplied with adequate protection as approved. After delivery, if planting is not to be carried out immediately, plants should be placed under shade and bottoms covered with moist paddy straw or moist leaves through sprinkling of water.

Back Filling

The soil will be back filled and watered thoroughly and gently pressed down when semi-dry up to half of the pit. Plant will be then placed in the centre of the pit and filled with the mixed soil and manure up to the beam and pressed around gently. Taller saplings after planting bend to one side or tilt backwards. In all such cases arrangement should be made to ensure stability of the plant. The soil shall be pressed down by treading it down, leaving a shallow depression all around for watering.

Planting

- No pits shall be dug until final position has been pegged out for approval.
- Care shall be taken that the plant sapling when planted is not be buried deeper than in the nursery, or in the pot.
- Planting should not be carried out in waterlogged soil.
- Plant shrubs at the original soil depth; soil marks on the stem is an indication for this – this should be maintained on the finished level, allowing for setting of the soil after planting.
- All plastic and other imperishable containers should be removed before planting.
- Any broken or damaged roots should be cut back for sound/healthy growth.
- The bottom of the planting pit should be covered with 50 mm to 75 mm of soil.

- Bare roots should be spread evenly in the planting pit; and small mound in the center of the pit should be created on which the roots are well laid and evenly spread.
- Soil should be placed around the roots, gently shaking it to allow the soil particle to shift into the root system to ensure close contact with all roots and prevent air pockets.
- Back fill soil should be firmed as filling proceeds, layer by layer with care being taken to avoid damage to the roots.

Staking

The stacks put for spaying the location of the pits before digging shall be reused for providing support to the trans planted seedlings by placing it near the plant and tying a rope around the stack and plant to keep it stable.

Methods

The main methods of staking shall be:

(A) A single vertical shake, 900mm longer than the clear stem of the shrubs driven 600mm to 900mm into the soil.

(B) Two stakes as above driven firmly on either side of the shrubs with a cross bar to which the stem is attached. Suitable for bare – rooted or ball material.

(C) A single stake driven in at an angle at 45 degrees and leaning towards the prevailing wind, the stem just below the lowest branch being attached to the stake. Suitable for small bare- rooted or Ball material.

(D) For plant material 3m to 4.5m high with a single stem a three- wire adjustable guy system may be used in exposed situations.

The end of stake should be pointed and the lower 1m to 1.2m should be coated with a non-injurious wood preservative allowing at least 150mm above ground level.

Tying

Each shrub should be firmly secured to the stake so as to prevent excessive movement. Abrasion must be avoided by using a buffer, rubber or Hessian, between the shrubs and stake. The shrubs should be secured at a point just below its lowest branch, and also just above ground level; normally two ties should be used for shrubs. These should be adjusted or replaced to allow for growth.

Grass Turfing

The specifications for grass turfing are to be referred from 'specifications for Roads and

Bridge works' by MOST, Section300, Clauses 307.1, 307.2, 307.3.

Preparation of Ground

All locations where grass turfing for landscape development as suggested should have to be sprayed weedycide and planted in rose close to each other. During period prior to planting, the ground shall be maintained free from weeds. Grading and preparation of the area shall be completed at least three weeks prior to the actual sowing. Regular watering shall be continued until sowing by dividing the area into portions of approximately 5 m squares by constructing small bunds to retain water. These 'bunds' shall be leveled just prior to sowing of grass plants; it shall be ensured that the soil has completely settled.

Soil

The soil itself shall be ensured to the satisfaction of Landscape Architect to be a good-Fibrous loam, rich in humus.

Showing the grass roots

Grass roots (cynodon dactylon or a local genus approved by the Landscape Architect) shall be obtained from a grass patch, seen and approved before hand.

The grass roots stock received at site may be stored and shall be manually cleared of all weeds with water sprayed over areas.

Small roots shall be dibbled about 5 cm apart into the prepared grounds. Grass will only be accepted as reaching practical completion when germination has proved satisfactory and all weeds have been removed.

Maintenance

As soon as the grass is approximately 3 cm high, it shall be rolled with a light wooden roller, - in fine dry weather – and when it has grown to 5 to 8 cms, above to the ground weeds must be removed and regular cutting with the scythe and rolling must begun. A top – dressing of farmyard manure or vermi compost, which is properly pulverized sieved is spread @250gm per 1sqm. When the grass is sufficiently secure in the ground to bear the moving machine, the blades must be raised an inch above the normal level for the first two or three cuttings. That is to say, the grass should be cut so that it is 4 to 5 cm in length, instead of the 3cm, necessary for mature grass.

Failure of the rain continuously for more than two days requires watering through manual or mechanical device except during late winter and summer month up to mid June by regular daily watering.

Damage due to fungus, ants, termites, cater pillars, weevils, aphids and bugs, which are the causes of dying back besides lack of watering has to be controlled by application of insecticides, fungicides mixed with sand or fine silt and spread thinly over the turf and watered.

Rolling

A light roller shall be used periodically, taking care that the area is not too wet and sodden.

Maintenance

Normal maintenance procedure like pruning of the sides and edges, application of fertilizer mixed with water, weeding of the turf to free it from other grasses and herbs has to be carried out regularly before rolling, so that the area remains healthy and green. Repairs to damaged portions has to be done by replacing the entire affected area together with soil and then relaying and replanting with new stock of grass or grass sods of same variety fixed in position over newly laid earth and watered regularly.

Nursery Stack

Planting should be carried out as soon as possible after nursery stacks reach the site. Where planting must be necessarily delayed, care should be taken to protect the plants from pilferage or damage by people and animals.

Plants with bare-roots should be heeled-in as soon as received or otherwise protected from drying out and others set closely together and protected from wind. If planting is delayed for more than a week, packaged plants should be unpacked, the bundles opened up and each group of plants heeled in separately and clearly labeled. If for any reason, the surface of the roots becomes dry the roots should be thoroughly soaked before planting

General Requirements of Earth, Manure and Fertilizers

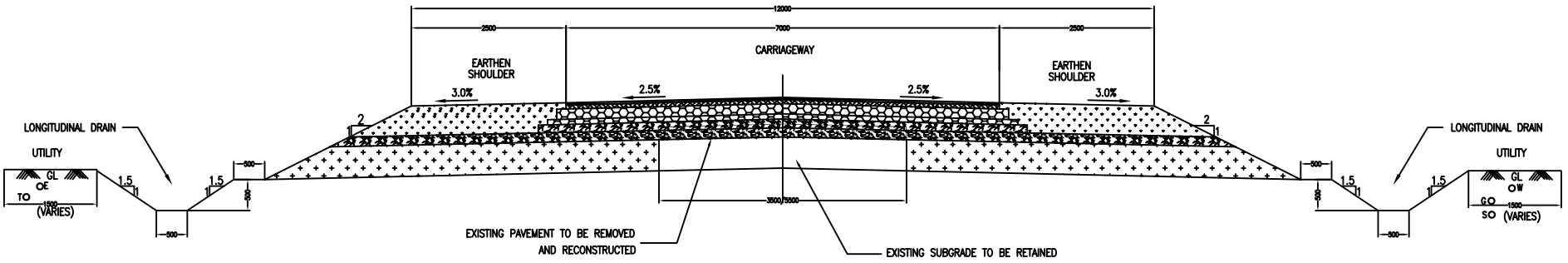
Earth: Good earth shall be agricultural soil of loamy texture, free from kankar, morrum, shingles, rocks, stones, building rubbish and any other foreign matter. The earth shall be free from clods or lumps of sizes bigger than 50mm in any direction. It shall have pH ranging between 6.5 to 7.5.

Manure: Well-decayed organic matter obtained in dry state from the municipal dump or other similar source shall be approved as manure by the Project Engineer. The manure shall be free from earth, stone or other extraneous matter. Well screened manure shall be supplied at site.

Fertilizers: If the soil tests indicate pH value not as per the above specification namely between '6.5 to 7.5', following measures need to be taken.

- If pH exceeds 7.5, aluminium sulphate or equivalent fertilizer should be added at the rate of 1 kg per cubic meter to lower the pH by one full point.
- If pH is below 6.5, add ground limestone or equivalent fertilizer at the rate of 1 kg per cubic metre to raise pH by one full point.

TCS–02



TYPICAL CROSS SECTION IN OPEN AREA (WITHOUT PAVED SHOULDER) FOR RECONSTRUCTION / WIDENING

LEGENDS

1) BC
2) DBM
3) WMM
4) GSB
5) SUBGRADE
6) DLC
7) PCC
8) EARTH FILL
9) E – Electricity Cable
10) T – Telecom Cable
11) W – Water Supply Line
12) G – Gas Line
13) S – Sewer

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO.OSRP/CEG/RIGID 02.
5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/OD
6. PCC–PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYNG LAYER ABOVE IT.
7. INCASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
8. FOR DETAILS OF RETAINING WALL REFERE DRW. NO. OSRP/CEG/RW.

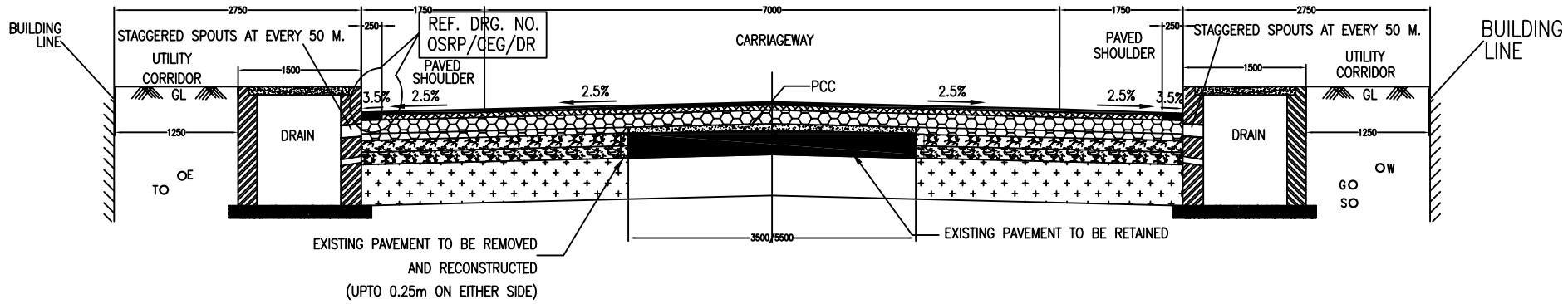
CONSULTING ENGINEERS GROUP LTD.
E–12,Moji Colony,Malviya Nagar Jaipur–17
Tel: +91–141–2520899,2521899,2520556
Fax: 2521348, e–mail: ceg@cegindia.com

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

TYPICAL CROSS-SECTION
TCS- 02

DRG NO.	OSRP/CEG/TCS–02					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–04



TYPICAL CROSS SECTION IN BUILT–UP AREA FOR OVERLAY \ WIDENING

LEGENDS

1) BC	6) DLC	11) W – Water Supply Line
2) DBM	7) PCC	12) G – Gas Line
3) WMM	8) EARTH FILL	13) S – Sewer
4) GSB	9) E – Electricity Cable	
5) SUBGRADE	10) T – Telecom Cable	

NOTES:

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4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO.OSRP/CEG/RIGID 02.
5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/OD
6. PCC–PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYNG LAYER ABOVE IT.
7. INCASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
8. FOR DETAILS OF RETAINING WALL REFERE DRW. NO. OSRP/CEG/RW.

CEG
CONSULTING ENGINEERS GROUP LTD.
E–12,Moji Colony,Malviya Nagar Jaipur–17
Tel: +91–141–2520899,2521899,2520556
Fax: 2521348, e–mail: ceg@cegindia.com

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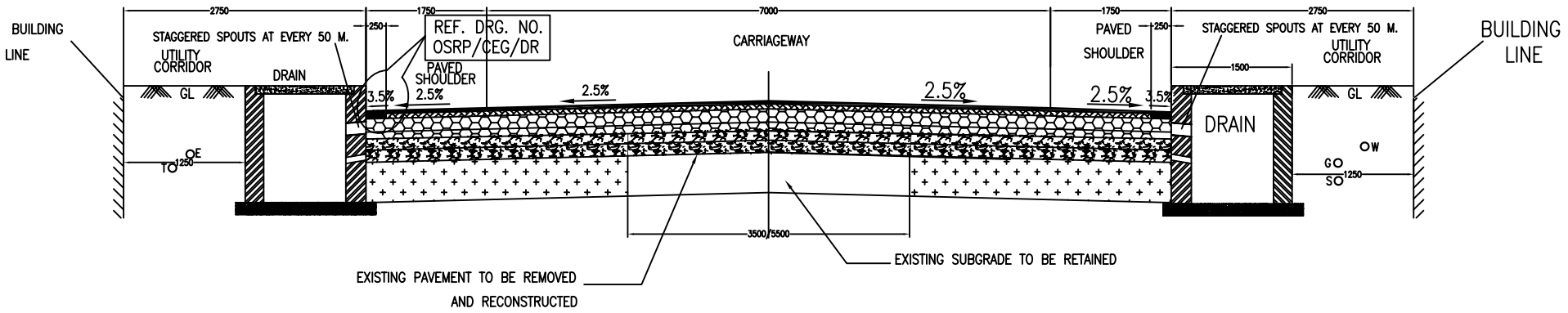
TYPICAL CROSS-SECTION
TCS- 04

DRG NO.	OSRP/CEG/TCS–04					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–05



TYPICAL CROSS SECTION IN BUILT–UP AREA FOR RECONSTRUCTION \ WIDENING

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO.OSRP/CEG/RIGID 02.
5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/OD
6. PCC–PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYNG LAYER ABOVE IT.
7. INCASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
8. FOR DETAILS OF RETAINING WALL REFERE DRW. NO. OSRP/CEG/RW.

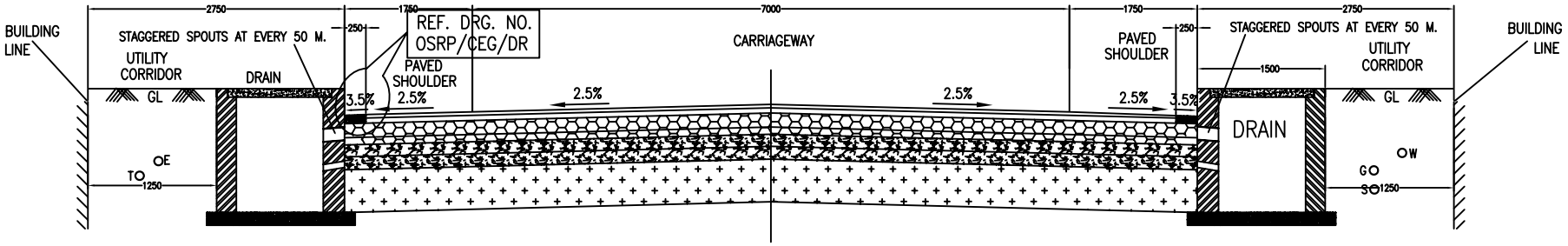
CONSULTING ENGINEERS GROUP LTD.
E–12,Moji Colony,Malviya Nagar Jaipur–17
Tel: +91–141–2520899,2521899,2520556
Fax: 2521348, e–mail: ceg@cegindia.com

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

TYPICAL CROSS-SECTION
TCS- 05

DRG NO.	OSRP/CEG/TCS–05					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–06



TYPICAL CROSS SECTION IN BUILT–UP AREA FOR NEW CONSTRUCTION

LEGENDS

1) BC	6) DLC	11) W – Water Supply Line
2) DBM	7) PCC	12) G – Gas Line
3) WMM	8) EARTH FILL	13) S – Sewer
4) GSB	9) E – Electricity Cable	
5) SUBGRADE	10) T – Telecom Cable	

NOTES:

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4. THE CROSS SECTIONS SHALL BE READ WITH DETAILS OF TRANSITION BETWEEN RIGID AND FLEXIBLE REFER DRAWING NO.OSRP/CEG/RIGID 02.
5. FOR PAVEMENT EDGE DETAILS REFER DRAWING NO. OSRP/CEG/OD
6. PCC–PROFILE CORRECTIVE COURSE WITH THE MATERIAL SAME AS THAT OF OVERLAYNG LAYER ABOVE IT.
7. INCASE THE UTILITIES/TREES OBSTRUCTING THE LONGITUDINAL DRAINS, THE DRAINS MAY BE DIVERTED AS PER ENGINEERS DIRECTIONS
8. FOR DETAILS OF RETAINING WALL REFERE DRW. NO. OSRP/CEG/RW.

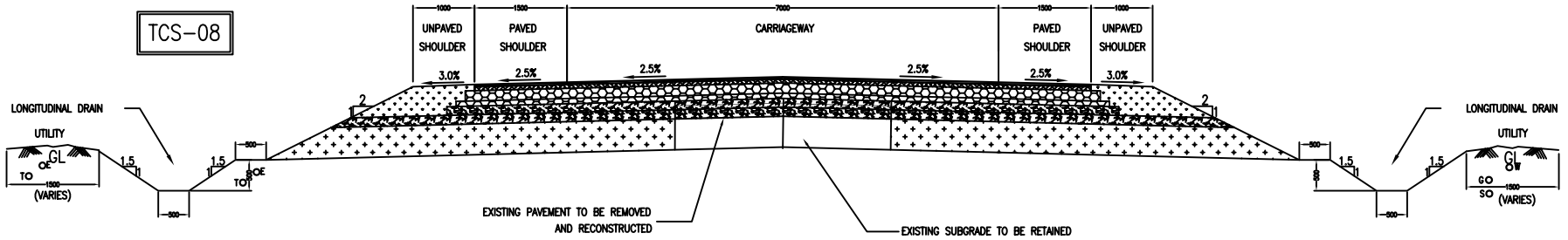
CONSULTING ENGINEERS GROUP LTD.
E–12,Moji Colony,Malviya Nagar Jaipur–17
Tel: +91–141–2520899,2521899,2520556
Fax: 2521348, e–mail: ceg@cegindia.com

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

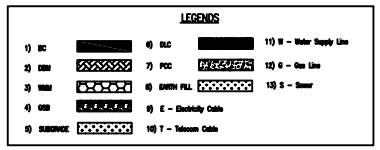
TYPICAL CROSS-SECTION
TCS - 06

DRG NO.	OSRP/CEG/TCS–06				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV RO	B.M	R.J	R.R.D.K	S.G
SCALE	NTS							

TCS-08



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR RECONSTRUCTION / WIDENING



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
3. FOR LAYER THICKNESS DETAILS REFER 'SCHEDULE OF WIDENING AND LAYER THICKNESS DETAILS'
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PROJECT:-
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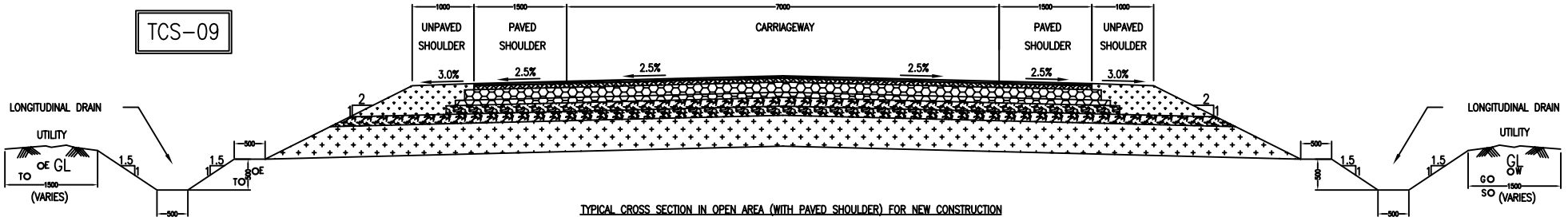
TYPICAL CROSS-SECTION
TCS - 08

DRG NO.	OSRP/CEG/TCS–08					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–09



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR NEW CONSTRUCTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
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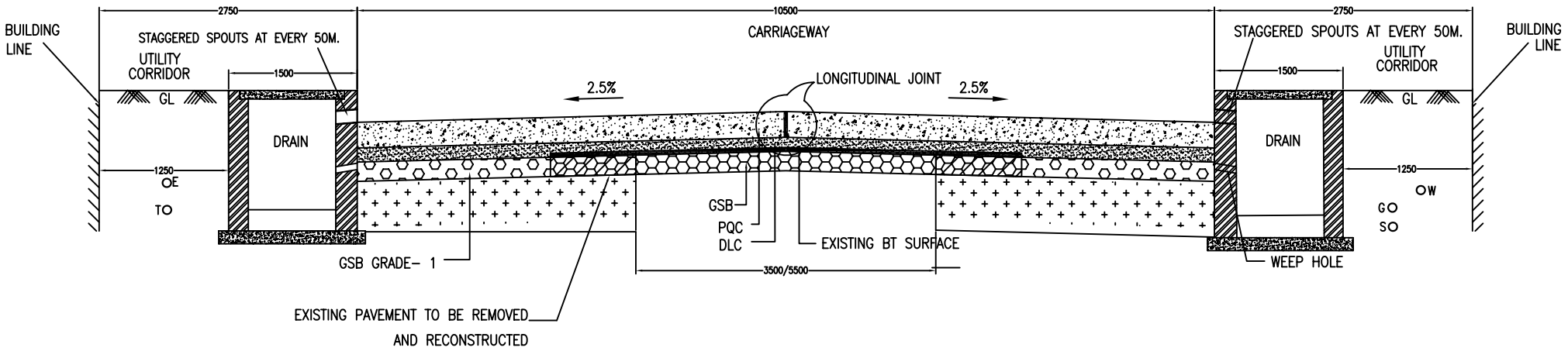
TYPICAL CROSS-SECTION
TCS - 09

DRG NO.	OSRP/CEG/TCS–09					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–16



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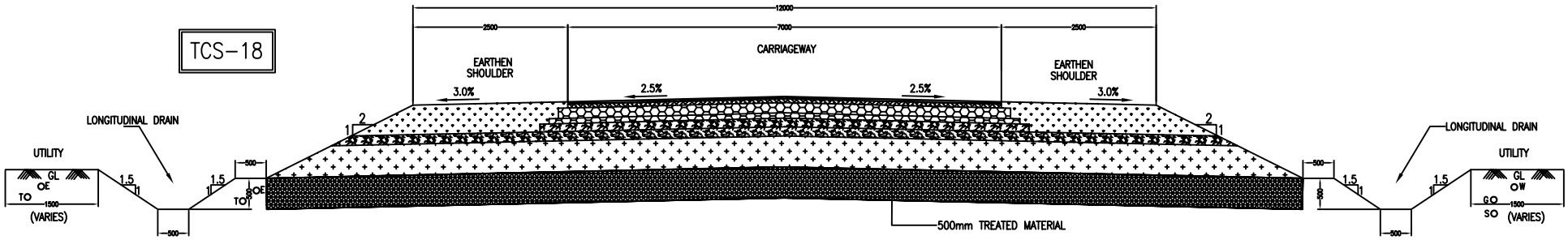
TYPICAL CROSS-SECTION
TCS- 16

DRG NO.	OSRP/CEG/TCS–16					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–18



TYPICAL CROSS SECTION IN OPEN AREA (WITHOUT PAVED SHOULDER) FOR NEW CONSTRUCTION IN EXPANSIVE CLAYS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
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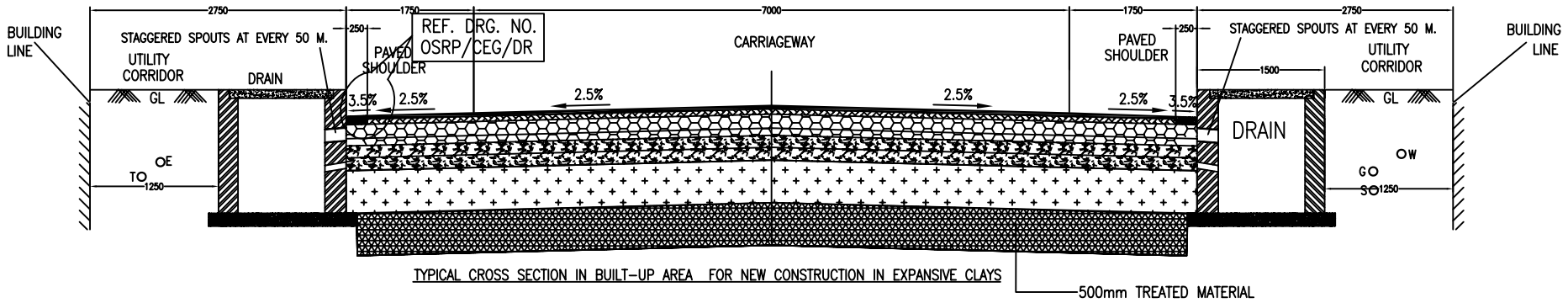
TYPICAL CROSS-SECTION
TCS- 18

DRG NO.	OSRP/CEG/TCS–18					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–19



TYPICAL CROSS SECTION IN BUILT–UP AREA FOR NEW CONSTRUCTION IN EXPANSIVE CLAYS

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. FOR DRAIN DETAILS REFER DRAWING NO.OSRP/CEG/DR
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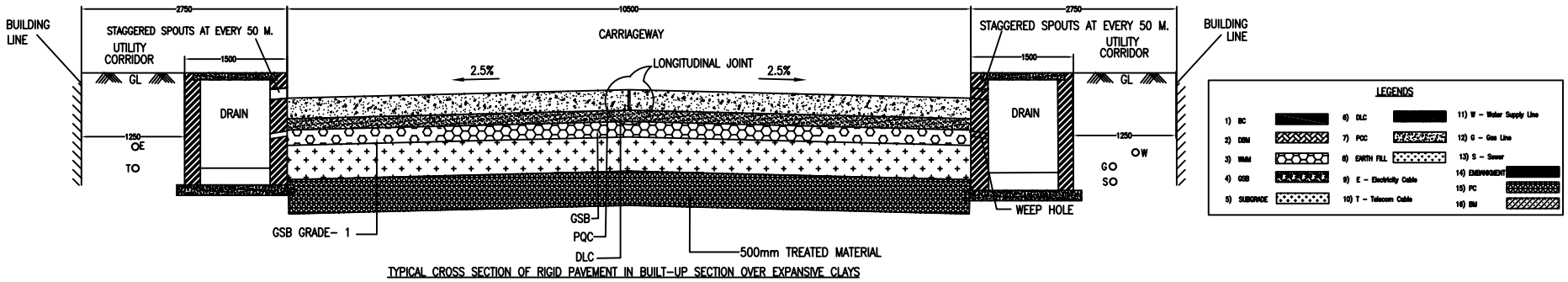
TYPICAL CROSS-SECTION
TCS- 19

DRG NO.	OSRP/CEG/TCS–19					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–21



TYPICAL CROSS SECTION OF RIGID PAVEMENT IN BUILT–UP SECTION OVER EXPANSIVE CLAYS

NOTES:

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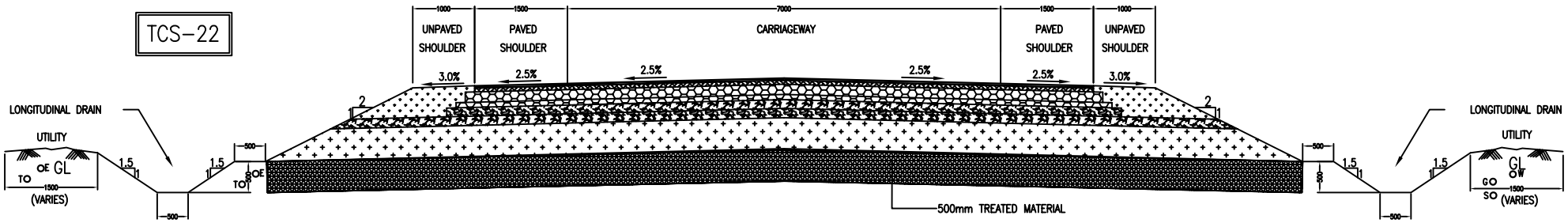
TYPICAL CROSS-SECTION
TCS- 21

DRG NO.	OSRP/CEG/TCS–21					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

TCS–22



TYPICAL CROSS SECTION IN OPEN AREA (WITH PAVED SHOULDER) FOR NEW CONSTRUCTION OVER EXPANSIVE CLAYS

NOTES:

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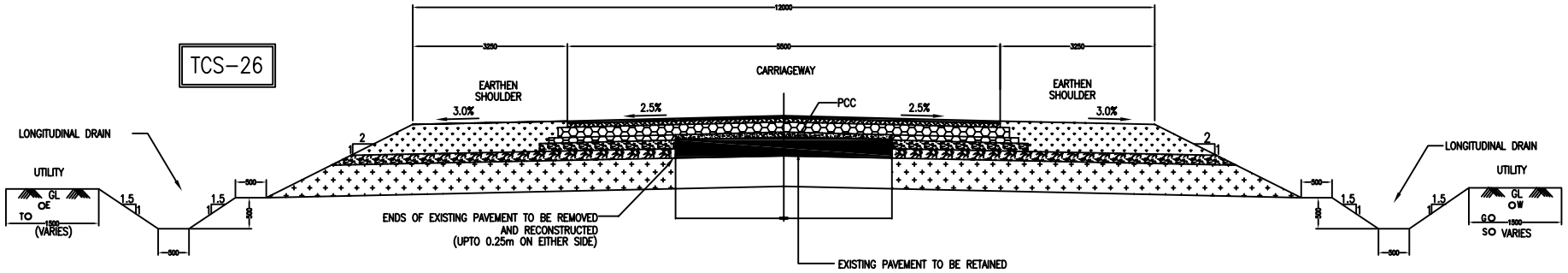
TYPICAL CROSS-SECTION
TCS- 22

DRG NO.	OSRP/CEG/TCS–22					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								



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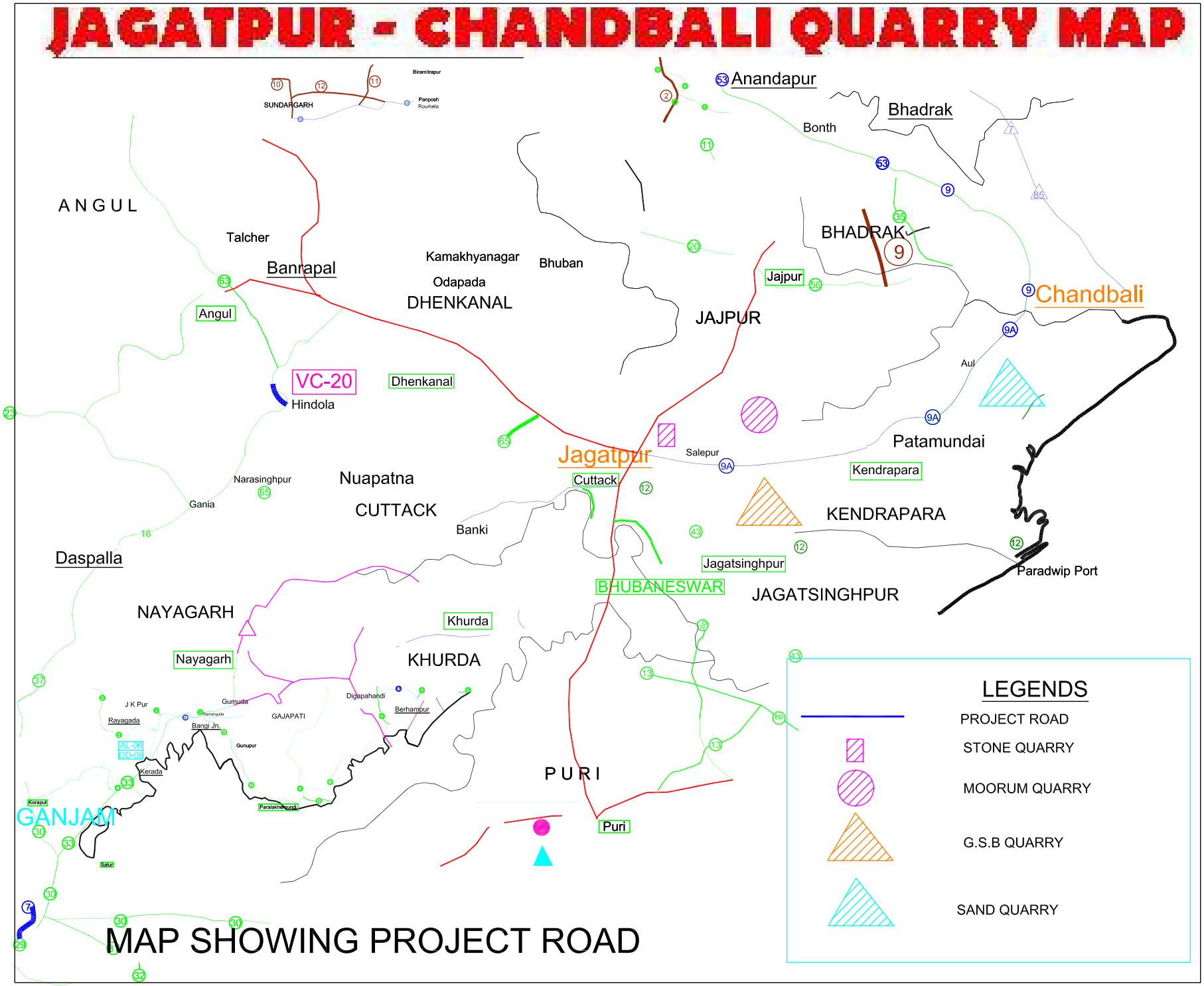
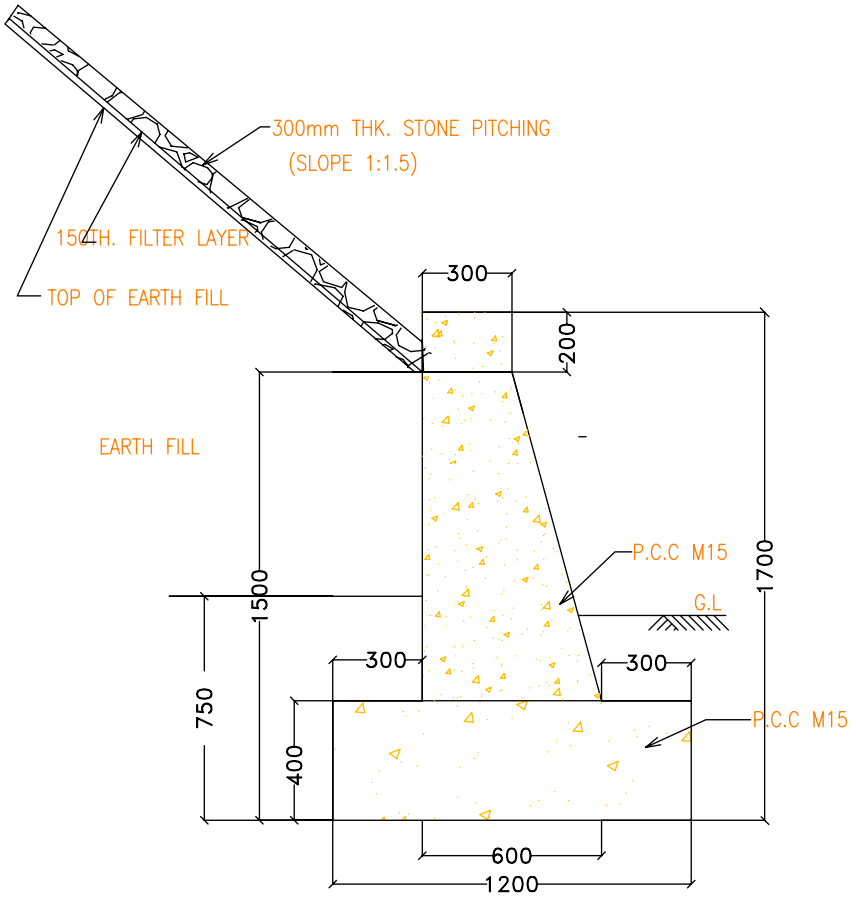
TYPICAL CROSS-SECTION
TCS- 26

DRG NO.	OSRP/CEG/TCS-26					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	B.M	R.J	R.R.D.K	S.G
SCALE	NTS								

JAGATPUR - CHANDBALI QUARRY MAP

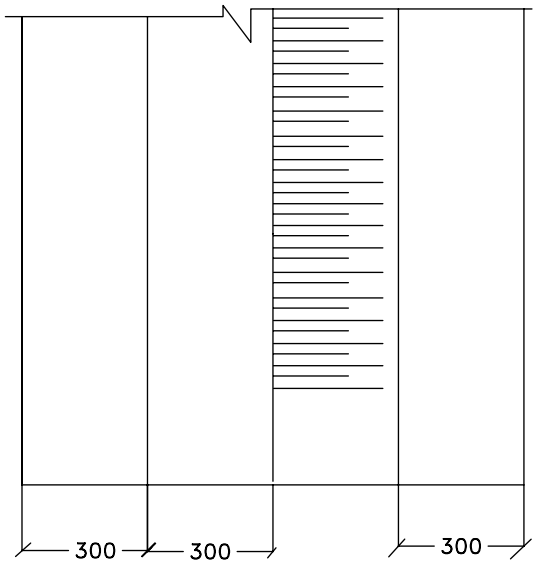


MAP SHOWING PROJECT ROAD



TOE WALL FOR POND

(CROSS SECTION)



PLAN OF TOE WALL FOR WATER BODY

Sl No.	Items	Chainage at km	Location left /right	Mtrs.
1	Pond	4.477	R	30
2	Pond	5.305	R	25
3	Pond	7.411	L	15
4	Pond	7.459	R	35
5	Pond	11.585	R	95
6	Pond	34.424	L	25
7	Pond	38.56	L	30
8	Pond	45.928	R	20
9	Pond	53.374	R	15
10	Pond	54.724	L	25
11	Pond	57.162	L	30
12	Pond	57.8	R	15
13	Pond	57.83	L	15
14	Pond	63.221	R	20
15	Pond	63.381	R	50
16	Pond	63.927	L	20
17	Pond	64.944	L	35
18	Pond	65.932	L	20
19	Pond	66.763	L	25
20	Pond	67.362	R	20
21	Pond	69.57	L	70
22	Pond	72.5	L	30
23	Pond	76.305	R	50
24	Pond	76.4	L	35
25	Pond	77.239	L	25
26	Pond	79.682	L	35
27	Pond	81.879	L	20
28	Pond	82.012	R	15
29	Pond	82.821	R	20
30	Pond	91.351	L	30
31	Pond	91.532	L	50
32	Pond	93.3	L	25
33	Pond	96.113	L	80
34	Pond	97.712	R	280
35	Pond	102.4	L	30
36	Pond	102.65	R	19
37	Pond	102.926	L	45
38	Pond	104.033	L	65
39	Pond	104.485	L	25
40	Pond	104.575	L	80
41	Pond	104.670	L	35
42	Pond	104.668	R	45
43	Pond	104.776	L	180
44	Pond	105.120	L	40

Length of toe wall in

TO MINIMISE IMPACT ON STORAGE CAPACITY & WATER SPREAD OF PONDS, WATER BODY, NALA BED, TOE WALLS TO BE ERECTED SUCH THAT IT PREVENTS ACCIDENTAL FALL INTO THE DEPRESSION AND WASHING OF VEHICLES/BATHING/ WASHING ON THE ROAD SIDE

CEG
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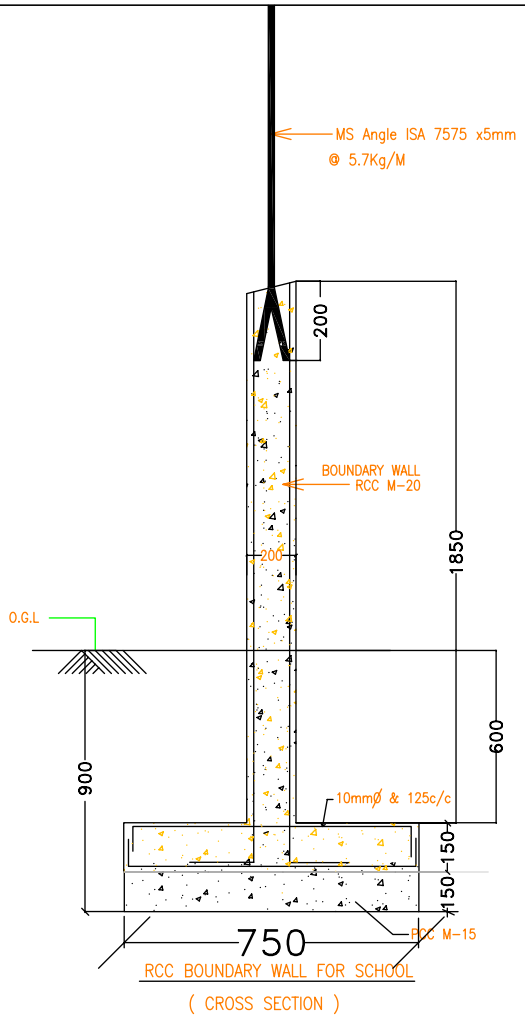
PROJECT:-

CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

TYPICAL PCC TOE WALL WITH STONE PITCHING FOR WATER BODIES AS ENVIRONMENTAL MITIGATION.

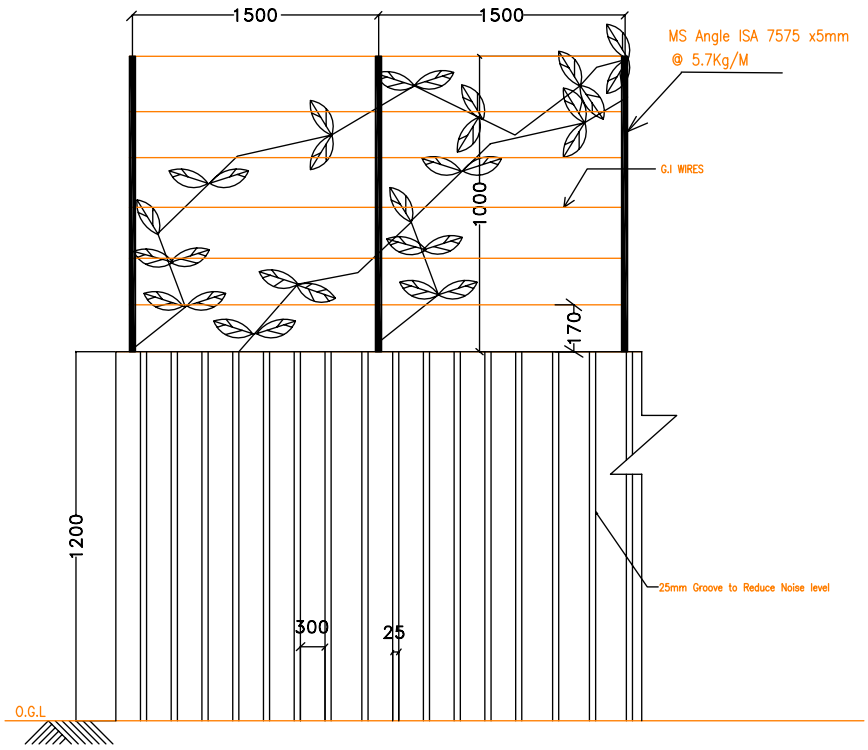
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/03					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS								



RCC BOUNDARY WALL FOR SCHOOL

(CROSS SECTION)



FRONT ELEVATION

RCC M-20 BOUNDARY WALL FOR SENSITIVE RECEPTORS
WITH NOISE & DUST REDUCTION ARRANGEMENT

Sl No	Item	Chainage	Location L/R	Affected Length in mtrs
1	Madrasa	3.5	Left	40
2	School, Gujarpur	4.33	Left	40
3	School	5.382	Left	58
4	School	5.7	Left	34
5	School	10.275	Right	20
6	School	19.565	Left	41
7	School	50.36	Right	10
8	School, Kendrapara	51.736	Right	90
9	School	58.407	Left	29
10	School	62.987	Right	40
11	School	102.7	Left	36
12	School	102.745	Left	58
13	Hospital	26.695	Left	78
14	Police Station, Jagatpur	0.443	Left	23
15	Electrical Sub Station	9.58	Right	25
16	Sub Resister Office, Salipur	19.634	Left	30
17	Inspection Bungalow	33.914	Right	53
18	Govt. Building	100.50	Right	60
19	Office of Tahasildar Chandabali	100.64	Left	5

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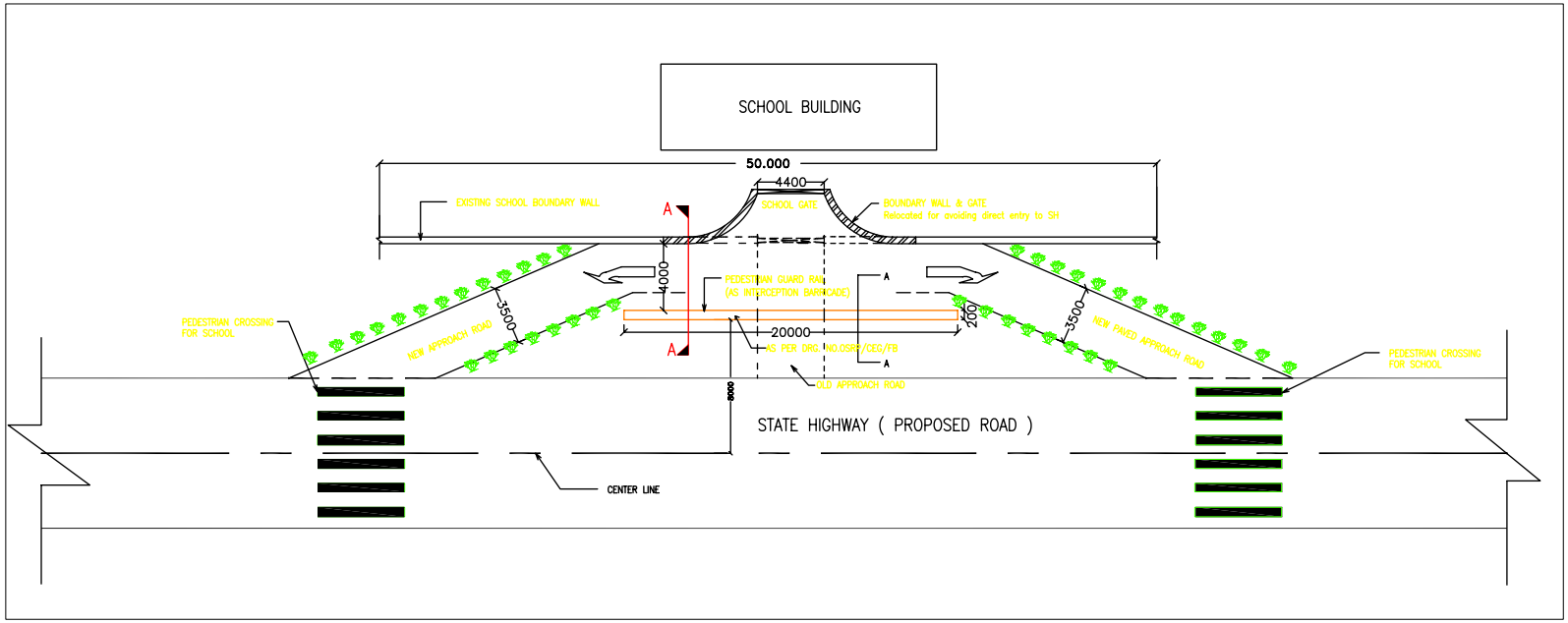
TYPICAL NOISES & DUST BARRIER FOR ENVIRONMENTAL MITIGATION.
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/04-B				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	RO	M	JYOTI	G.P.M	S.G
SCALE	NTS							

Sl No	Item	Chainage	Location L/R	Affected Length in mtrs
1	School, Gujarpur	4.33	Left	40
2	School	5.382	Left	58
3	School	5.7	Left	34
4	School	10.275	Right	20
5	School	19.565	Left	41
6	School	50.36	Right	10
7	School, Kendrapara	51.736	Right	90
8	School	58.407	Left	29
9	School	62.987	Right	40
10	School	102.7	Left	36
11	School	102.745	Left	58
12	Hospital	2.3	Left	
13	Hospital	26.695	Left	78
14	Temple	6.120	Left	15
15	Temple	50.076	Left	31
16	Temple	104.061	Right	19



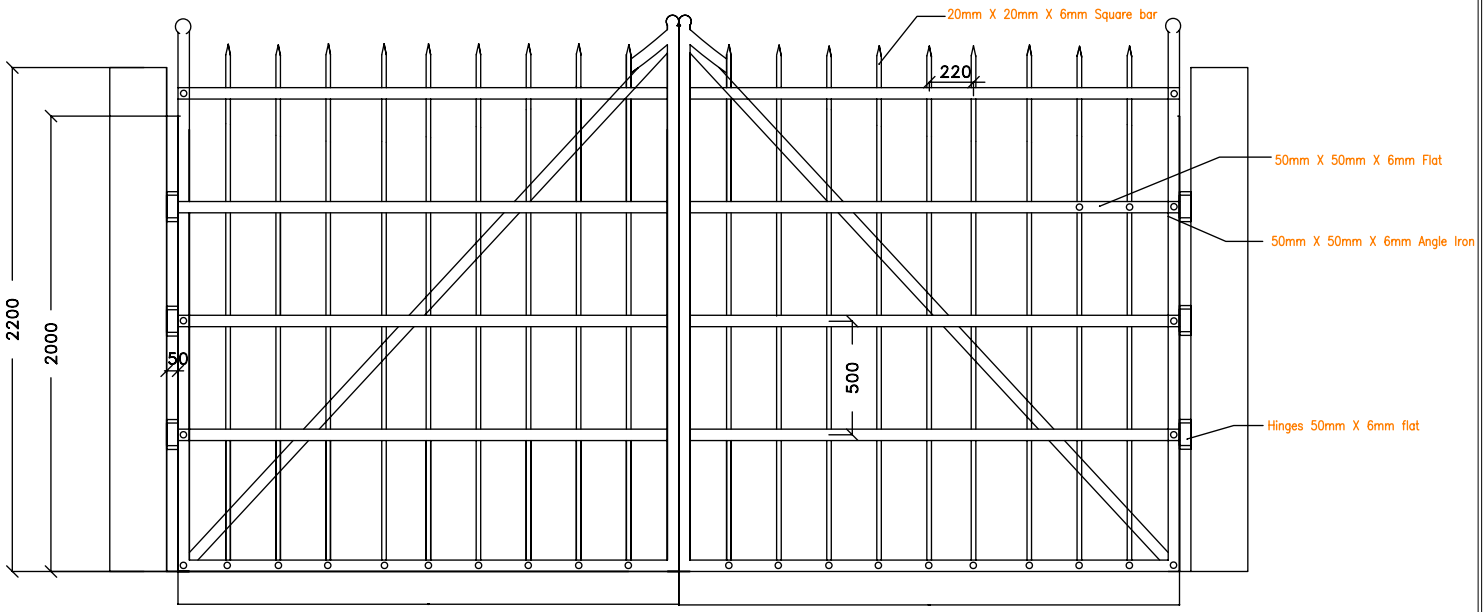
- THERE SHALL BE RUMBLER STRIPS & SPEED BREAKERS 150m & 10m AWAY FROM PEDESTRIAN CROSSINGS NEAR SCHOOLS, COLLEGES, HOSTELS, TEMPLES, HOSPITALS, DISPENSARIES AND OLD AGE HOMES, WEEKLY MARKET AREA, G.P MARKET COMPLEX ADJACENT TO THE ROAD WITHIN 25m TO 50m DISTANCE FROM CENTRE LINE. THE BOUNDARY WALL SHOULD HAVE G.I ANGLE POSTS WITH G.I WIRE MESH GRILL/ STRINGS FOR GROWING CREEPERS TO MUFFLE NOISE AND DUST.
- CREEPERS WITH SCENTED/COLOURFUL FLOWERS TO BE PLANTED WHICH HAVE TOMENTOSE LEAVES TO ABSORB MORE DUST AND NOISE.
- THE BOUNDARY WALL PLASTERING TO HAVE VERTICAL GROOVES TO DEFELECT NOISE TOWARDS THE ROAD WHICH WILL ACT AS A COUNTER NOISE SOURCE TO DAMPEN THE HIGH WAY NOISE LEVEL.
- VEGETATIVE SHRUBS AND BUSHES WHICH ARE NON BROWSABLE AND HAVING SCENTED FLOWERS TO BE PLANTED ON THE PERIPHERY OR EDGE OF THE APPROACH ROAD TO SUCH PLACES. THE BOUNDARY ENTRY POINT TO BE SHIFTED IN WORDS IN CASE OF CLOSE WITH NAME OF THE INSTITUTION ENGRAVED.
- PROXIMITY AND DIRECT ENTRY TO THE ROAD WITH AND A BARRICADE WALL SHALL BE ERECTED 4m AWAY FROM THE ENTRY POINT INFRONT OF THE GATE

CEG
CONSULTING ENGINEERS GROUP LTD.
E-12,Moji Colony,Malviya Nagar Jaipur-17
Tel: +91-141-2520899,2521899,2520556
Fax: 2521348, e-mail: ceg@cegindia.com

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

METAL BARRICADES FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

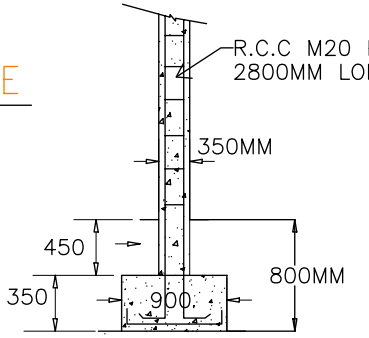
DRG NO.	OSRP/CEG/SH/ENV/05				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



ORNAMENTAL GATE

Suitable locking arrangements to be made during fabrication.

Sl No	Item	Chainage	Location L/R
1	Madrasa	3.50	Left
2	School, Gujarpur	4.33	Left
3	School	5.382	Left
4	School	5.7	Left
5	School	10.275	Right
6	School	19.565	Left
7	School	50.36	Right
8	School, Kendrapara	51.736	Right
9	School	57.332	Right
10	School	58.407	Left
11	School	62.987	Right
12	School, Gopalpur	74.9	Right
13	School	102.7	Left
14	School	102.745	Left
15	Hospital	2.3	Left
16	Hospital	26.695	Left
17	Sub Register Salipur	19.634	Left
18	Inspection Bangalow	33.914	Right
19	Inland Water Transport	100.50	Right
20	Tahasildar Chandbali	9.362	Left
21	Temple	10.828	Left



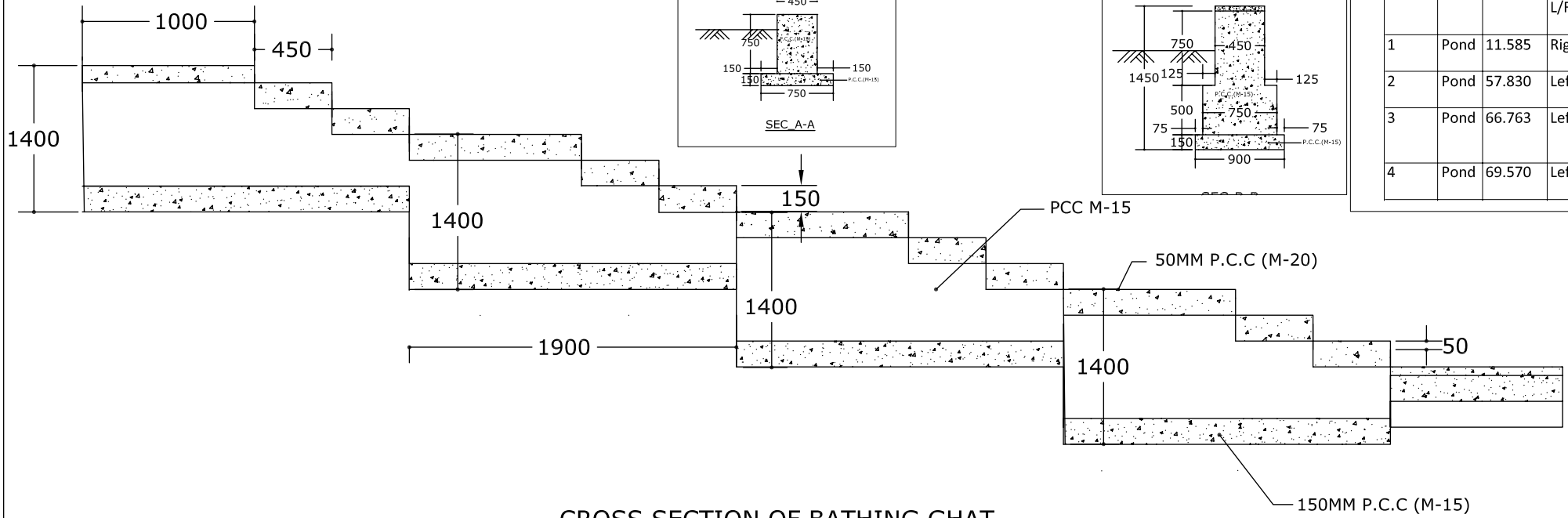
foundation detail
(For R.C.C Pillar)

CONSULTING ENGINEERS GROUP LTD.
E-12,Moji Colony,Malviya Nagar Jaipur-17
Tel: +91-141-2520899,2521899,2520556
Fax: 2521348, e-mail: ceg@cegindia.com

PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

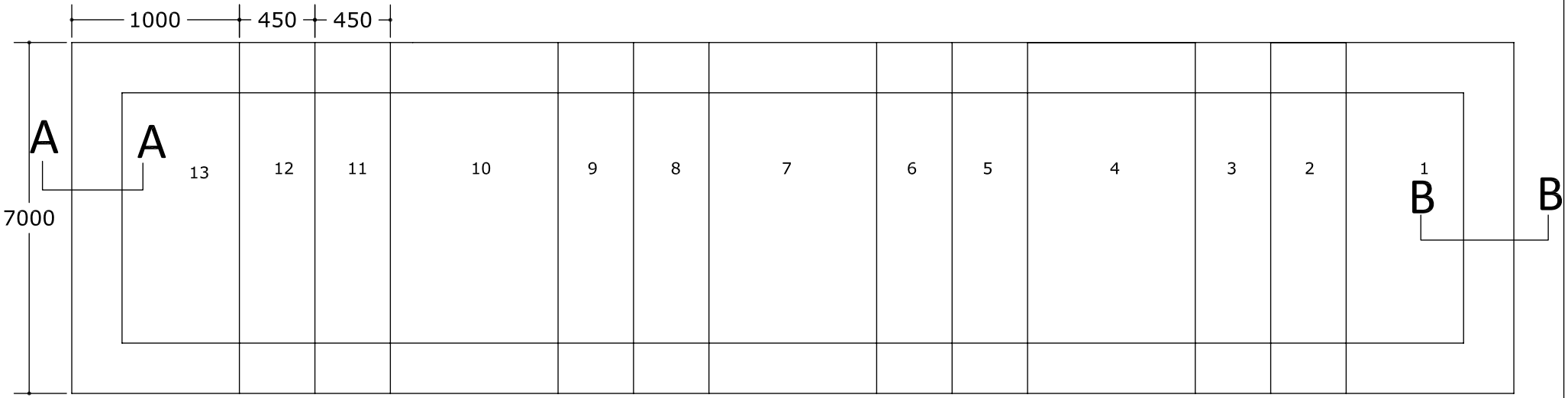
TYPICAL M.S GRILL GATE FOR SENSITIVE RECEPTORS LIKE SCHOOLS,COLLEGES, HOSPITALS,OLD AGE HOMES ETC. WITH NOISE & DUST BARRIERS
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/05-A				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



Sl No.	Item	Chainage	Location L/R
1	Pond	11.585	Right
2	Pond	57.830	Left
3	Pond	66.763	Left
4	Pond	69.570	Left

CROSS SECTION OF BATHING GHAT

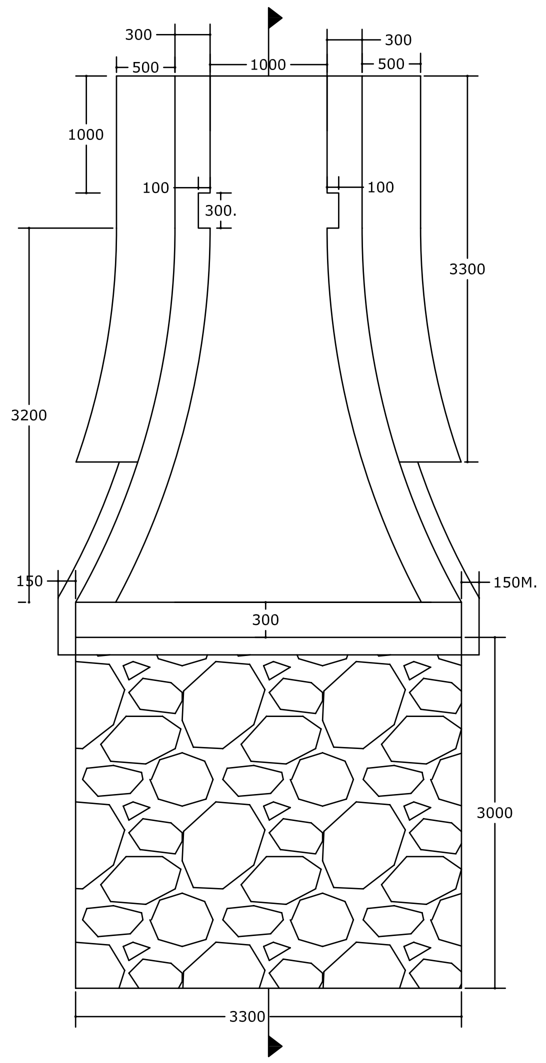


CEG CONSULTING ENGINEERS GROUP LTD.
E-12,Malf. Colony,Malviya Nagar Jaipur-17
Tel: +91-141-2520899,2521899,2520556
Fax: 2521348, e-mail: ceg@cegindia.com

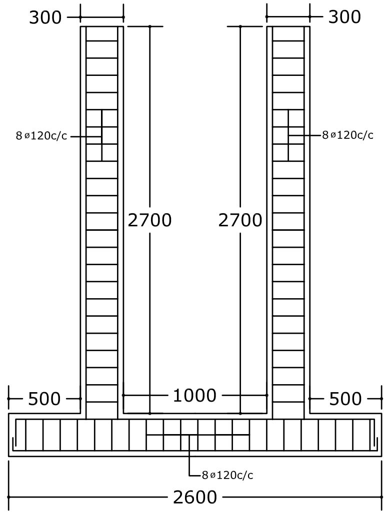
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

DESIGN FOR BATHING GHAT
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/9					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	PRABINA	G.P.M	S.G
SCALE	NTS								

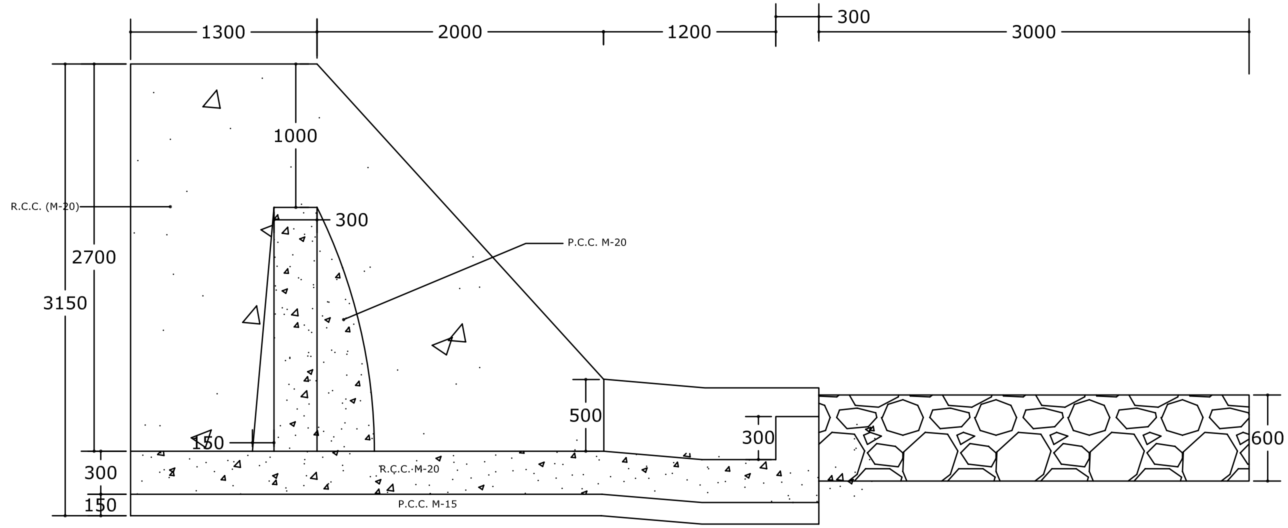


PLAN



CROSS-SECTION AT B-B

Sl No.	Item	Chainage	Location L/R
1	Pond	11.585	Right
2	Pond	57.830	Left
3	Pond	66.763	Left
4	Pond	69.570	Left



CROSS-SECTION AT A-A

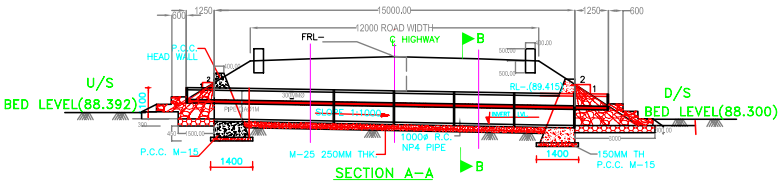
CONSULTING ENGINEERS GROUP LTD.

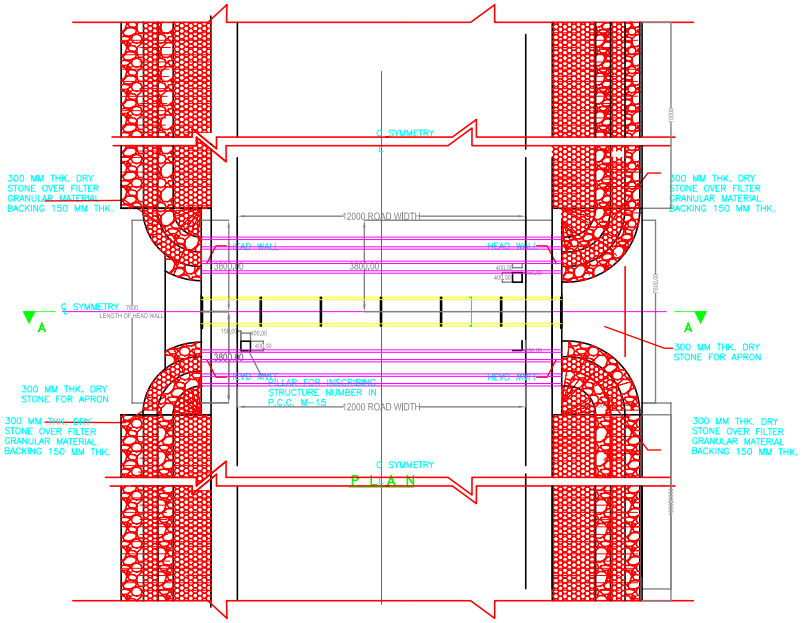
PROJECT:- CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

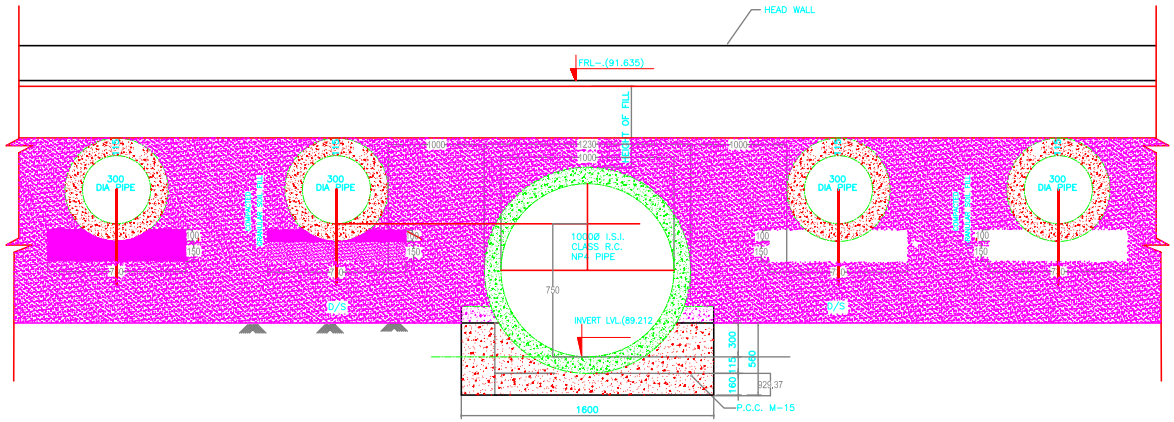
CONCEPTUAL DESIGN FOR SPILLWAY GATE
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/10			DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.	DATE	REV	R0	M	PRABINA	G.P.M	S.G
SCALE	NTS						

REPTILE UNDER PASS







NEW SINGLE PIPE 1.2 m HPC

Sl. No	Proposed Chainage	Proposed Formation Level	Camber/Super Elevation		Bed level		Height of Fill		LW1	RW1	Direction of flow	Total Length	No.of Pipes
1	12+326	21.830	-2.5%	-0.19%	18.403	18.701	2.477	2.318	4.953	4.635	R to L	21.59	9
2	31+100	14.763	-2.5%	-2.5%	12.426	11.760	1.387	2.053	2.774	4.106	L to R	18.88	8
3	70+040	11.377	-2.5%	-2.5%	6.702	7.015	3.725	3.412	7.450	6.824	R to L	26.27	11
4	76+600	9.500	-2.5%	-2.5%	5.624	6.582	2.926	1.968	5.852	3.936	R to L	21.79	9
5	78+300	10.270	-2.5%	-2.5%	5.881	6.444	3.439	2.876	6.878	5.752	R to L	24.63	10
6	80+880	9.500	-2.5%	-2.5%	7.197	7.235	1.353	1.315	2.706	2.630	R to L	17.34	7
7	83+240	10.754	-2.5%	-2.5%	7.130	7.608	2.674	2.196	5.348	4.392	R to L	21.74	9
8	86+640	8.894	-2.5%	-2.5%	5.995	6.239	1.949	1.705	3.898	3.410	R to L	19.31	8
9	92+400	9.152	-2.5%	-2.5%	5.416	5.352	2.786	2.850	5.572	5.700	L to R	23.27	10
10	96+120	9.891	-2.5%	-2.5%	6.202	7.884	2.739	1.057	5.478	2.114	R to L	19.59	8

NEW SINGLE PIPE

Sl. No	Proposed Chainage	Proposed Formation Level	Camber/Super Elevation		Bed level		Height of Fill		LW1	RW1	Direction of flow	Total Length	No.of Pipes
			Left	Right	Left	Right	Left (H1)	Right (H2)					
1	9+030	23.982	-2.5%	-2.5%	22.261	22.223	0.8	0.81	1.54	1.6	L to R	15.16	7
2	16+423	19.024	-2.5%	-2.5%	18.574	17.861	0	0.21	0	0.4	L to R	12.42	5
3	43+780	10.798	-2.5%	-2.5%	9.755	8.861	0.1	0.99	0.19	2	L to R	14.16	6
4	51+240	10.573	-2.5%	-2.5%	9.575	9.012	0	0.61	0.1	1.2	L to R	13.32	6
5	97+778	10.203	-2.50%	-0.10%	7.116	5.718	2.1	3.68	4.28	7.4	L to R	23.63	10
6	102+940	8.735	-2.5%	2.5%	5.720	8.488	2.1	0	4.13	0	R to L	16.13	7

NEW SINGLE PIPE 1.2 m HPC

Sl. No	Proposed Chainage	Proposed Formation Level	Camber/Super Elevation		Bed level		Height of Fill		LW1	RW1	Direction of flow	Total Length	No.of Pipes
			Left	Right	Left	Right	Left (H1)	Right (H2)					
1	25+000	17.252	-2.5%	-2.5%	14.859	14.664	1.4	1.64	2.89	3.3	L to R	18.16	8
2	33+950	14.966	-2.5%	-2.5%	12.305	12.680	1.7	1.34	3.42	2.7	R to L	18.1	8
3	40+174	11.597	-2.5%	-2.5%	9.528	9.433	1.1	1.21	2.24	2.4	L to R	16.66	7
4	60+820	8.621	-2.5%	-2.5%	5.768	6.110	1.9	1.56	3.81	3.1	R to L	18.93	8
5	63+358	8.457	-2.5%	-2.5%	6.363	6.390	1.1	1.12	2.29	2.2	R to L	16.52	7
6	64+783	9.403	-2.5%	-2.5%	7.184	7.382	1.3	1.07	2.54	2.1	R to L	16.68	7
7	67+680	9.015	-2.5%	-2.5%	6.427	6.026	1.6	2.04	3.28	4.1	L to R	19.35	8
8	71+243	10.670	-2.5%	-2.5%	7.984	7.767	1.7	1.95	3.47	3.9	L to R	19.38	8
9	74+720	9.500	-2.5%	-2.5%	6.810	6.676	1.7	1.87	3.48	3.7	L to R	19.23	8
10	94+140	9.245	-2.5%	-2.5%	7.633	7.485	0.7	0.81	1.32	1.6	L to R	14.94	6

SIZE	Prop. Chainage	Prop. FRL	Camber		Bed Level		Direction of flow	Span	Clr. Ht.	Thk.	Thk.	Thk.	Thk.	Width of Appron (U/S)	
			Left	Right	Left	Right		a	b	c	d	e	f	@ start	@ end
3/33/0	73+540	10.670	-2.50%	-2.50%	7.559	7.804	R to L	3	2.9	0.5	0.45	0.5	0.47	3.94	8.6

Engineer

Project Management Unit, World Bank Projects,
Office of the Engineers-in-Chief (Civil)
Mezzanine Floor, Nirman Soudha, Keshari Nagar,
Unit-V, Bhubaneswar - 751001
Tel/Fax: +91674 2396781, 2396784
E-Mail: osrp@smecindia.com

ORISSA STATE ROADS PROJECT
Works Department, Govt. of Orisssa

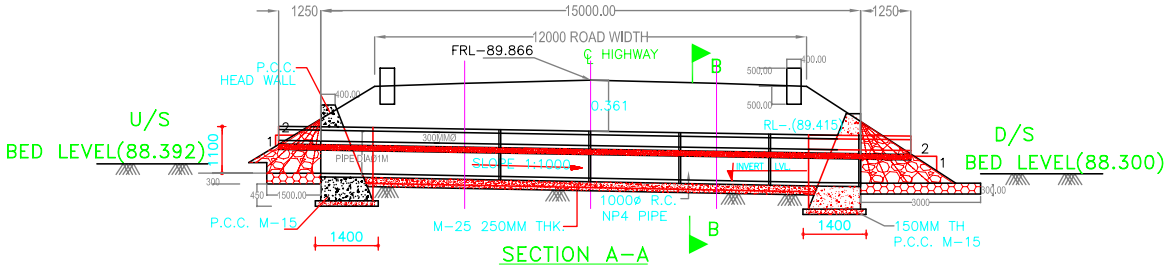
REPTILE UNDERPASS+PIPE CULVERT (GEN.)

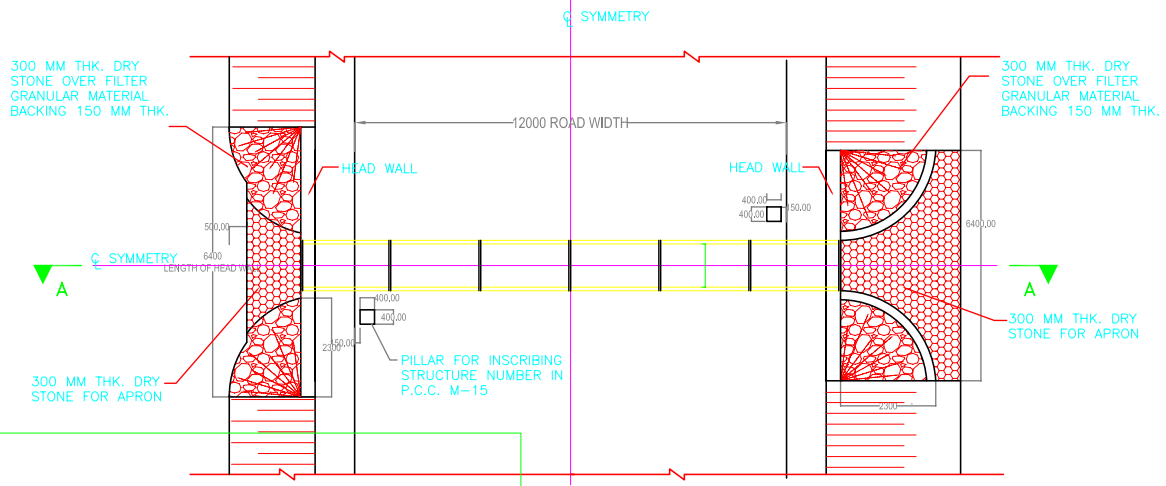
Rev No.: DATE : 8:01:12

DRG.NO. : OSRP/ENV-14

PREPARED BY | CHECKED BY | ISSUED BY

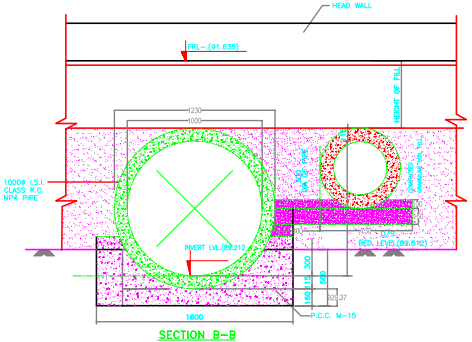
SCALE:- NTS

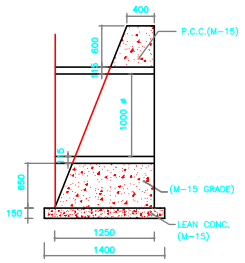




UTILITY DUCT

P L A N





DETAIL OF HEAD WALL

NOTES:

1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER.
2. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED, DO NOT SCALE THE DIMENSIONS.
3. LOOSE / UNSUITABLE SOIL BELOW CULVERTS IS REPLACED WITH SUITABLE GRANULAR MATERIAL.
4. CHAINAGE / FORMATION LEVEL IS PROVIDED AS PER APPROVED PLAN & PROFILE.
5. FOR CULVERTS SKEW TO THE TRAFFIC DIRECTION LENGTH OF CULVERT SHALL BE ADJUSTED AS PER SITE CONDITION.
6. LONGITUDINAL SLOPE OF PIPE SHALL BE MIN. 1 IN 1000.
7. FIRST CLASS BEDDING CAN BE USED FOR MAXIMUM HEIGHT OF FILL OF 4.0 M.
8. THE FINISHED ROAD LEVEL SHALL BE VERIFIED WITH ALIGNMENT DRAWING & GROUND LEVEL WITH SITE CONDITIONS BEFORE EXECUTION.

Table 6.3: Proposed Culverts with Utility Duct

Sl. No.	Existing Chainage	Design Chainage	Now Proposed	Type of Structure	Remarks in New Proposal	Utility Duct
1	-	5650	1x1.0	Pipe		Utility Duct
2	0/190	0/190	1x1.0	Pipe	Additional Structure	Utility Duct
3	2/010	1921	2x1.0	Pipe		Utility Duct
4		2400	1x1.0	Pipe	Additional Structure	Utility Duct
5	-	2800	1x1.0	Pipe		Utility Duct
6		3/850	1x1.0	Pipe	Additional Structure	Utility Duct
7		4/300	1x1.0	Pipe	Additional Structure	Utility Duct
8	-	7473	1x1.0	Pipe		Utility Duct
9	8/250	8200	1x1.0	Pipe		Utility Duct
10		9265	1x1.0	Pipe	Additional Structure	Utility Duct
11	10/140	10100	1x1.0	Pipe	Additional Structure	Utility Duct
12	10/925	10885	1/33/0	RCC Skew Box		Utility Duct
13	-	13820	1x1.0	Pipe		Utility Duct
14	16/640	16608	2x1.0	Pipe		Utility Duct
15	-	17315	1x1.0	Pipe		Utility Duct
16	17/550	17500	2x1.0	Pipe		Utility Duct
17	18/310	18381	1x1.0	Pipe		Utility Duct
18	-	21060	1x1.0	Pipe		Utility Duct
19		22050	1x1.0	Pipe		Utility Duct
20	22/600	22648	2x1.2	Pipe		Utility Duct
21	23/900	23853	2x1.2	Pipe		Utility Duct
22	24/450	24470	2x1.0	Pipe		Utility Duct
23	26/150	26173	2x1.2	Pipe		Utility Duct
24		26/550	1x1.0	Pipe	Additional Structure	Utility Duct
25	-	27220	1x1.0	Pipe		Utility Duct
26		28/500	1x1.0	Pipe	Additional Structure	Utility Duct
27	32/650	32600	1x1.0	Pipe		Utility Duct
28	-	33390	1x1.2	Pipe		Utility Duct
29	35/100	35042	1x1.2	Pipe		Utility Duct
30	36/150	36000	1x1.0	Pipe		Utility Duct
31	37/700	37580	1x1.2	Pipe		Utility Duct
32	38/350	38363	1x1.0	Pipe		Utility Duct
33	-	39740	1x1.2	Pipe		Utility Duct
34	-	40940	1x1.2	Pipe		Utility Duct
35		41/680	1x1.0	Pipe	Additional Structure	Utility Duct
36	-	43180	1/22/0	RCC Box		Utility Duct
37	43/650	43673	Slab Widening	Widening of extg. str		Utility Duct
38		43/780	1x1.0	Pipe	Additional Structure	Utility Duct
39		44/480	1x1.0	Pipe	Additional Structure	Utility Duct
40		45/200	1x1.2	Pipe	Additional Structure	Utility Duct
41		48/150	1x1.0	Pipe	Additional Structure	Utility Duct
42		48/870	1x1.0	Pipe	Additional Structure	Utility Duct
43	-	49400	1x1.2	Pipe		Utility Duct
44	-	49800	1x1.2	Pipe		Utility Duct
45		50085	1x1.0	Pipe		Utility Duct
46		50850	1x1.0	Pipe		Utility Duct
47		51950	1x1.2	Pipe		Utility Duct
48	52/900	52950	1x1.2	Pipe		Utility Duct
49	-	55080	1x1.0	Pipe		Utility Duct
50	-	55920	1x1.0	Pipe		Utility Duct
51		56860	1x1.0	Pipe		Utility Duct
52		57850	1x1.0	Pipe		Utility Duct
53	62/950	62983	2x1.0	Pipe		Utility Duct
54		65280	1x1.2	Pipe		Utility Duct
55		65900	1x1.0	Pipe		Utility Duct
56	69/310	69385	1x1.2	Pipe		Utility Duct
57	72/850	72456	2x1.0	Pipe		Utility Duct
58		77940	2x1.2	Pipe		Utility Duct
59		84915	1x1.0	Pipe		Utility Duct
60	86/150	85826	1x1.0	Pipe		Utility Duct
61		94600	1x1.0	Pipe	Additional Structure	Utility Duct
62	-	95460	1x1.0	Pipe		Utility Duct
63	45/200	105375	2x1.0	Pipe		Utility Duct
64	-	104300	1x1.0	Pipe		Utility Duct
65	48/010	102500	2x1.0	Pipe		Utility Duct
66		6/450	1x1.0	Pipe	Additional Structure	Utility Duct

Engineer

Project Management Unit, World Bank Projects,
Office of the Engineers-in-Chief (Civil)
Mezzanine Floor, Nirman Soudha, Keshari Nagar,
Unit-V, Bhubaneswar - 751001
Tel/Fax: +91674 2396781, 2396784
E-Mail: osrp@smecindia.com

ORISSA STATE ROADS PROJECT
Works Department, Govt. of Orisssa

Rev No.: DATE : 8:01:12

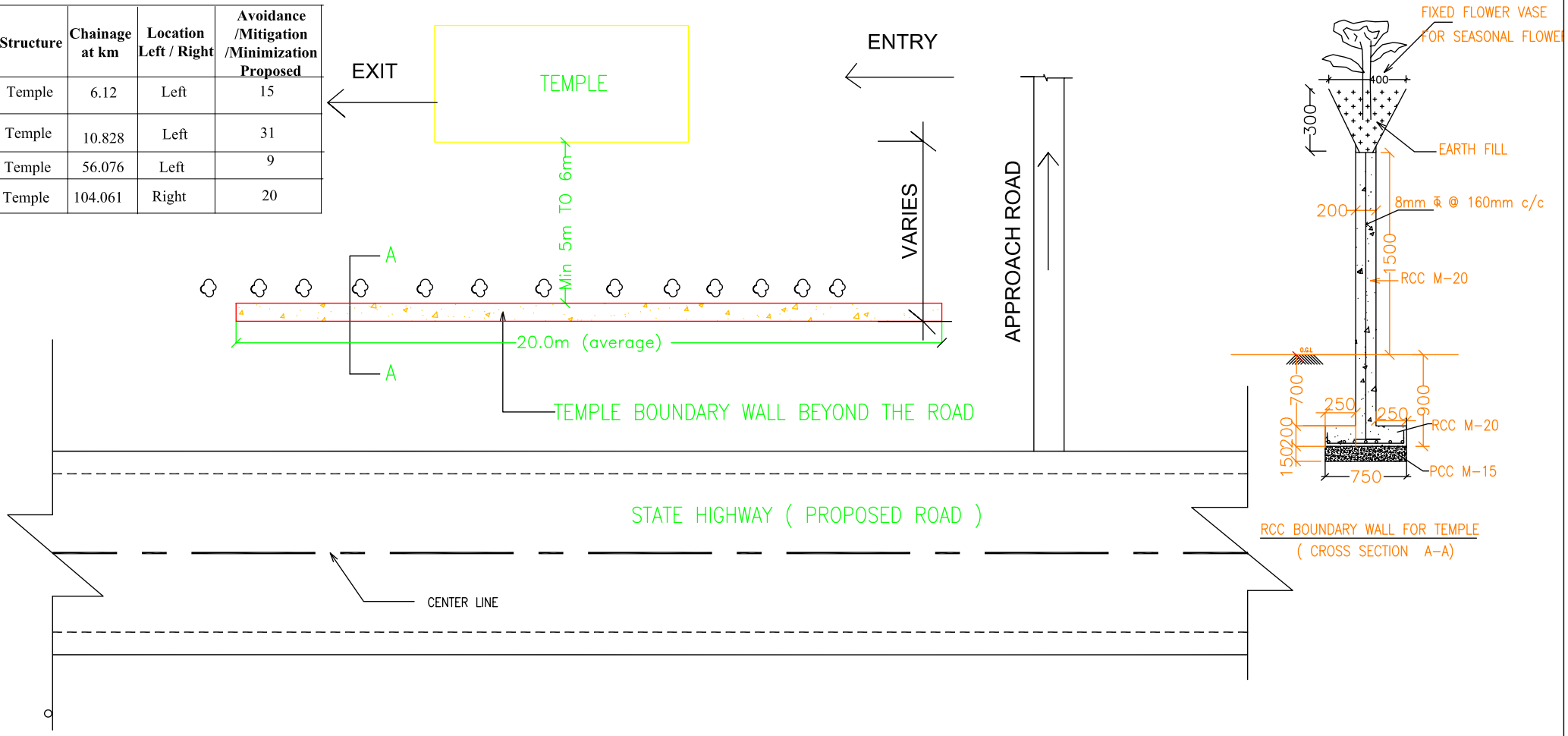
PREPARED BY | CHECKED BY | ISSUED BY

UTILITY DUCT+PIPE CULVERT (GEN.)

DRG.NO. : OSRP/ENV-14

SCALE:- NTS

Sl. No.	Structure	Chainage at km	Location Left / Right	Avoidance /Mitigation /Minimization Proposed
1	Temple	6.12	Left	15
2	Temple	10.828	Left	31
3	Temple	56.076	Left	9
4	Temple	104.061	Right	20



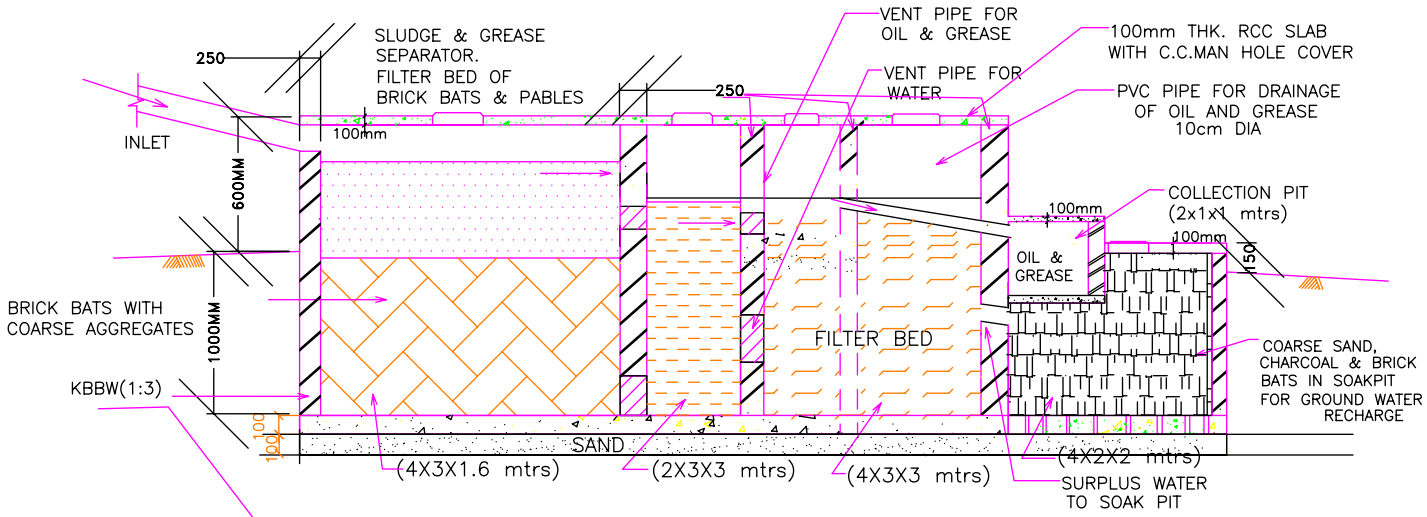
- FIXED FLOWER VASE ON THE BOUNDARY WALL FOR SEASONAL FLOWER & TULSI.

CONSULTING ENGINEERS GROUP LTD.
E-12,Moji Colony,Malviya Nagar Jaipur-17
Tel: +91-141-2520899,2521899,2520556
Fax: 2521348, e-mail: ceg@cegindia.com

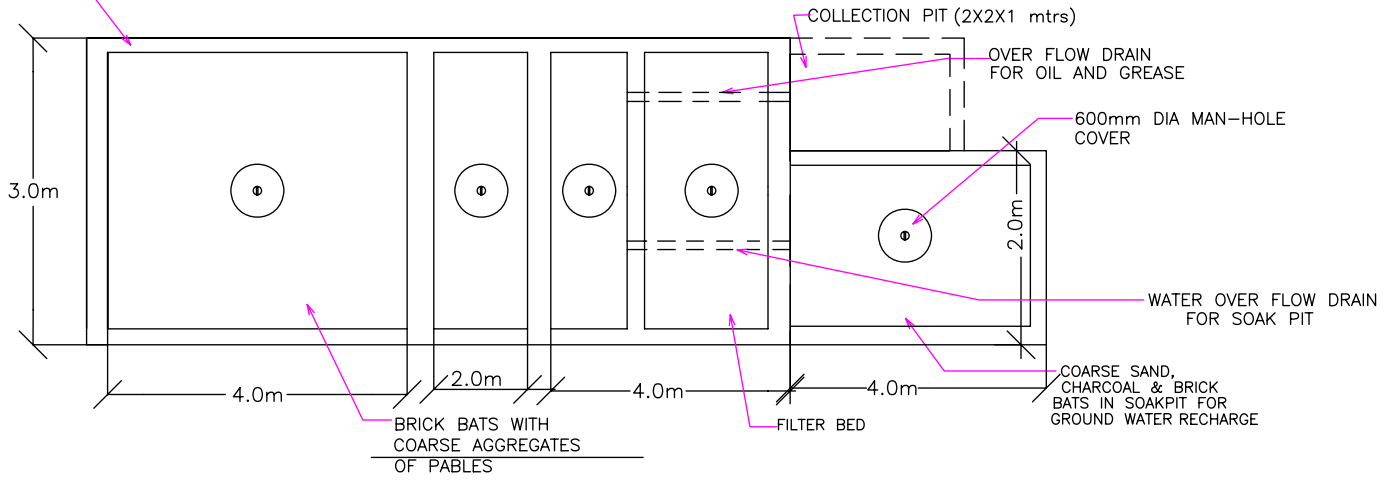
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL RCC BOUNDARY WALL OF TEMPLES, STATUES RELIGIOUS TREES AS SITE ENHANCEMENT UNDER ENVIRONMENT MITIGATION PLAN.
SH-9(Km.0/0 TO Km.99/0) & SH-9A(Km.45/0 TO Km.52/0)
(JAGATPUR - CHANDBALI)

DRG NO.	OSRP/CEG/SH/ENV/04-A				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



SECTION OF SOAK PIT



PLAN OF SOAK PIT

NOTE: PROVIDE AT CONTRACTOR'S PLANT SITE.

CONSULTING ENGINEERS GROUP LTD.
E-12,Moji Colony,Malviya Nagar Jaipur-17
Tel: +91-141-2520899,2521899,2520556
Fax: 2521348, e-mail: ceg@cegindia.com

PROJECT:-

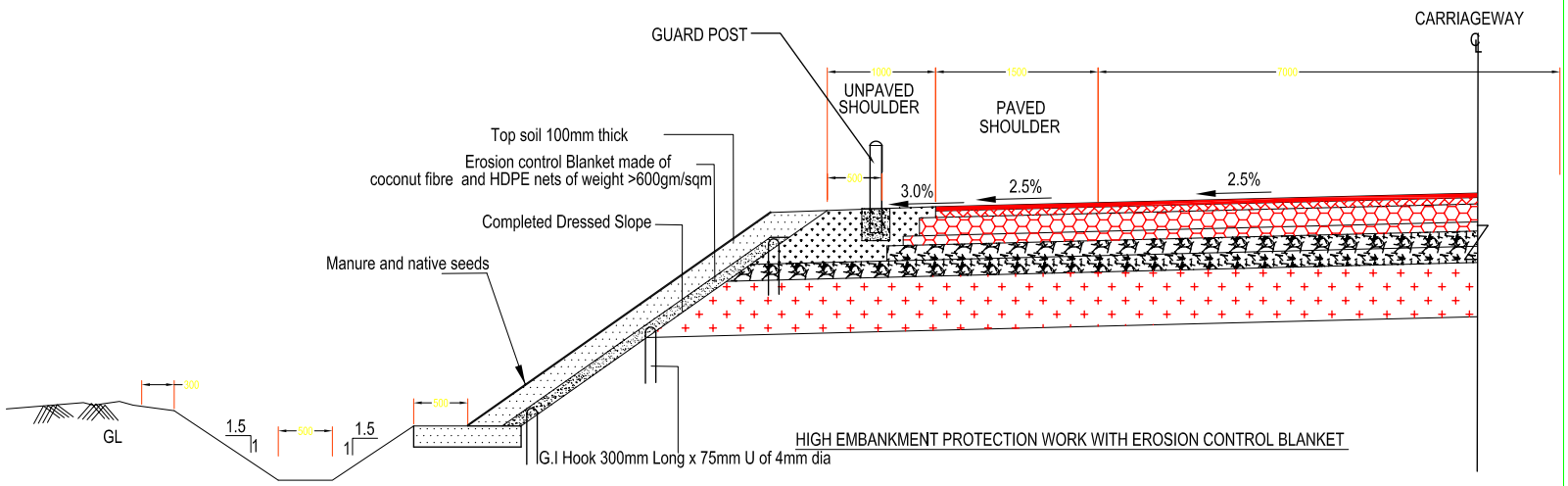
ODISHA STATE ROAD PROJECT

UNDER WORLD BANK ASSISTANCE

OIL & GREASE TRAP FOR PLANT SITE

(JAGATPUR-DUHURIA)

DRG NO.	OSRP/CEG/ENV/06					DESIGNED BY	DRAWN BY	REV.R1	APPROVED
SH. NO.		DATE	DEC,12	REV	R-1	CEG	CEG	EE(PMU)	CE,WBP
SCALE	NTS								



SCHEDULE OF ERROSION BLANKET

Sl. No.	Chainage		Length	Sides
	From	To		
1	69800	71000	1200	BOTH
2	75200	77000	1800	BOTH

OSISHA STATE ROADS PROJECT
Works Department, Govt. of Orisssa

Rev No.: | DATE : DEC, 2012

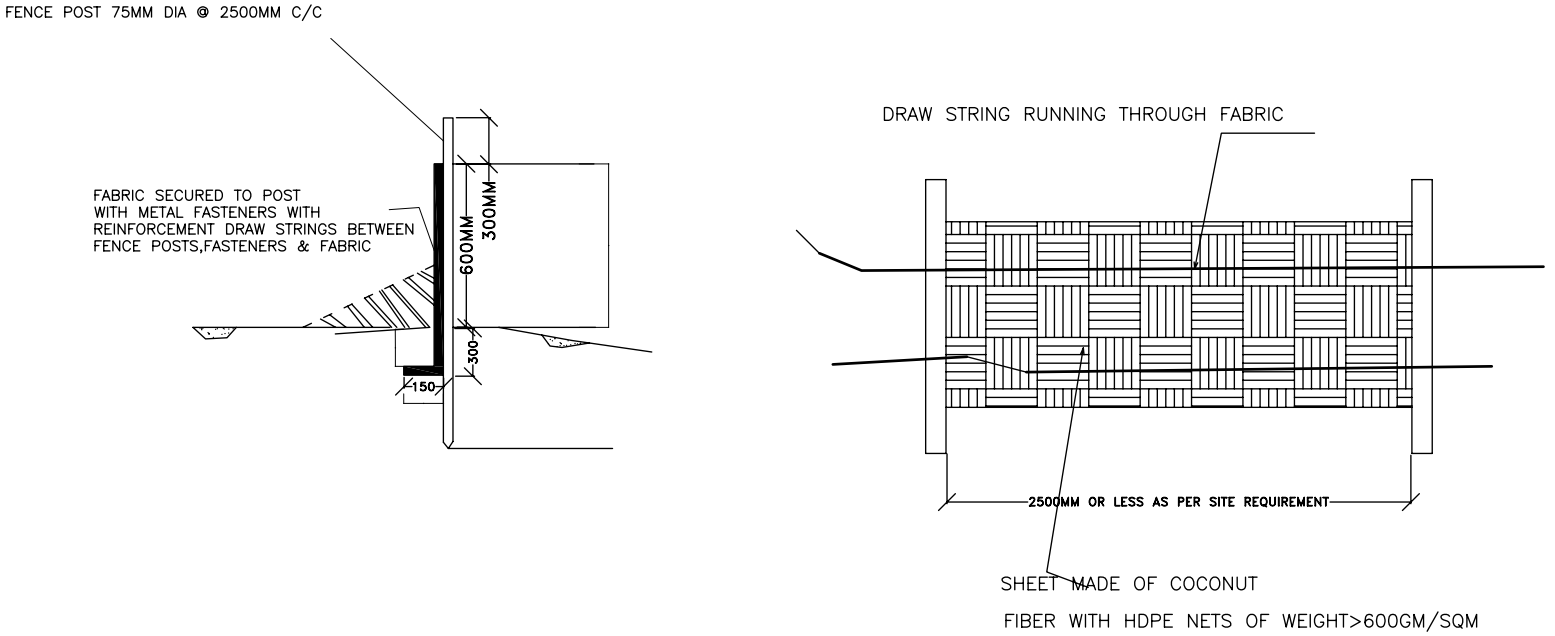
EROSION CONTROL BLANKET AT EMBANKMENT

DRG.NO. : OSRP/ENV-04

SCALE:- NTS

PREPARED BY: EE,PMU

APPROVED: CE,WBP



SILT FENCE SEDIMENT BARIER

NO SCALE

PROJECT:-

ODISHA STATE ROAD PROJECT

UNDER WORLD BANK ASSISTANCE

TYPICAL DRAWING FOR SILT FENCE

(JAGATPUR - DUHURIA)

DRG NO.	OSRP/PMU/JD-49KM/ENV/01				DESIGNED BY	APPROVED
SH. NO.		DATE	DEC,12	REV R-1	EE(PMU)	CE,WBP
SCALE	NTS					

P1: IDENTIFICATION OF DISPOSAL SITE LOCATIONS
(To be filled by the Contractor)

Name of Corridor_____
Link No._____
(Give chain ages and nearest settlements from both ends)

Sl. No.	Criteria on which in formation for each site is to be collected	Site 1	Site 2	Site 3	Site 4
1	Existing Land Use				
2	Area covered (m^2)				
3	Total Material that can be dumped within the site (m^2)				
4	Depth to which dumping is feasible (m)				
5	Distance of nearest watercourse (m)				
6	Nearest Settlement (m)				
7	Date/s of Community Consultation/s				
8	Whether the community is agreeable to sitting of dumping site (Y/N)				
9	Date of Permission from Villager/local community				
10	Proposed future use of the Site				
11	Selected Site (tick any one column only)				

Enclosures (Tick as appropriate)

1. Map of each location
2. Photographs
    a. Each disposal location
    b. Each community consultation
3. Photo copy of Agreement

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer PWD

P2: SETTING-UP CONSTRUCTION CAMP AND STORAGE AREA
(To be filled by the Contractor)

Name of Corridor_____
Link No._____
Construction Stage Report: Date_____Month_____Year_____
(Site Layout of Construction camp and working drawings of dwelling units with allied facilities to be attached with format)
Format to be submitted before target date of establishing camps
Location of Camp

Sl. No.	Item	Unit	Details	Remarks by CMU if any
1.	Detail of item camp			
a.	Size of Camp	m x m		
b.	Area of Camp	Sq.m		
c.	Distance from Nearest Settlement			
d.	Distance from Nearest Water Source	Type/Size/Capacity/present Use/Ownership		
	Date of camp being operational dd/mm/yy			
	Present land use			
	No of trees with girth > 0.3m.			
e.	Details of Storage area (Availability of impervious surface)	Mxm		
f.	Availability of separate waste disposal from storage area	Cum		
2.	Details of topsoil stacking			
a.	Quantity of top soil removed	Sq.m		
b.	Detail of storage of topsoil	Describe stacking arrangement		
3.	Details of workforce			
a.	Total No of Laborers	Nos		
b.	Total no of Male Workers	Nos		
c.	No of Male Workers below 18 years of ago	Nos		
d.	Total No of Female Workers	Nos		
e.	No of Female workers below 18 years of ago	Nos		
f.	No of children	Nos		
4.	Details of dwelling units			
a.	No of dwellings/huts			
b.	Minimum Size of Dwelling	Mxm		
c.	No. of openings per dwelling	Nos		

d.	Minimum size of opening	Mxm		
e.	Walls	Specifications		
f.	Roofing	Specifications		
g.	Flooring	Specifications		
h.	Drinking Water Tank	Specifications		
i.	Capacity of Drinking Water Tank	Cum		
j.	Size of Drinking Water Tank	Mxm		
k.	Total no of WC	Nos		
l.	No of Wcs for female workers	Nos		
m.	Minimum Size of WC	Mxm		
n.	Total No of Bathrooms for female workers	Nos		
o.	Size of septic tank for WC/Baths	Mxm		
p.	Capacity of Water Tank for WCs /Bathrooms and general purpose			
q.	Fencing around camp	Y/N		
5.	Details of facilities			
a.	Availability of security guard 24 hrs a day	Yes/No		
b.	Details of First Aid Facility	Yes/No		
c.	Availability of Dav Care Centre	Yes/No		
d.	Availability of dust bins (capacity 60 Itr)	Nos		

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer CMU

P3: ESTABLISHMENT OF BORROW AREAS

(To be submitted by Contractor for taking consent for opening of Borrow area)

Name of Corridor_____
Link No._____

Sl. No.	Location				Area (m^2)	Quantity of Available Material	Type of Material	Distance from nearest Water Course (m)	Distance from nearest Settlement	Land Use		No. of Trees to be Affected	Approved by EO (Y/N)	Remark
	Name of Village	Chainage (km)	Side (LHS /RHS)	Haul road length (m)						Before	After			

Attach Photograph of Proposed Site, Location Map, Agreement

Rehabilitation Plan Measures

Location 1:

Location2:

Remark

Submitted	**Checked**	**Approved**
Signature……	Signature……	Signature……
Name……..	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer CMU

P4: ESTABLISHMENT OF HOT MIX PLANT /BATCH MIX PLANT

(To be submitted by Contractor for taking permission from CMU)

Name of Corridor_____
Link No._____

Sl. No.	Location				Area (m^2)	Distance from nearest Water Course (m)	Distance from nearest Settlement	Existing Land Use	Prevalent Wind Direction	Weather in Down Wind Direction (Y/N)	Approved by EO (Y/N)	Remark
	Name of Village	Chainage (km)	Side (LHS /RHS)	Haul road length (m)								

1. Attach Photograph of Proposed Site

Remark

Submitted

Signature……
Name……..
Designation……..
Contractor

Checked

Signature……
Name……..
Environmental Engineer. Construction Supervision Consultant

Approved

Signature……
Name……..
Executive Engineer CMU

P5: ROAD SAFETY REPORTING FORMATS

Name of Corridor_____
Link No._____
One time reporting before commencement of construction I the Construction Zone
Sketch of construction zone showing all sub zones and location of signs, etc. to be attached with format
(Reporting by Contractor to CMU)
Format on Acquisition of Temporary diversions to be attached with format
Construction stage: Monthly Report-Date……Month…….Year…….
DIVERSION NO._____location (km_____)

Sl. No.	Item	Unit	Compliance	Remarks
	Details of Construction Zone			
1.	Length of Construction Zone	km		
2.	Distance between this and next construction zone	km		
3.	Length of transition sub zone (should be min 50 for a sped of 50 km/ hr)			
4.	Length of work sub zone in urban stretch (should be <2 km)	km		
5.	Length of work sub zone in rural stretch (5-10 km)	km		
6.	Distance between two work sub zones			
	Signage's in Construction Zones			
1.	Sign saying 'Men at Work' 1 km ahead of transition sub zone	Y/N		
2.	Supplementary sign saying diversion 1 km provided	Y/N		
3.	Sign saying 'Road Closed ahead' provided	Y/N		
4.	Compulsory Right Turn /Left sign provided	Y/N		
5.	Detour sign placed			
6.	Sharp deviation sign placed at end of advance warning sub zone	Y/N		
	Signage in Transition Sub Work Zone			
1.	Signage saying 'Keep Right /Left' provided	Y/N		
2.	Delineators placed along length of transition	Y/N		
	Signage in work sub zone			
1.	Hazard Marker placed where railing for CD structure on diversion starts	Y/N		
2.	Barricade on either side of work sub zone	Y/N		
	Signage in Termination sub zone			
1.	Sign for indication of end of work zone 120 m from end of termination sub zone	Y/N		
	Road Delineator			
1.	Roadway indicators provided			
2.	Hazard Makers provided			
3.	Object Makers Provided			

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature……
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer CMU

P6: ARRANGEMENT FOR TEMPORARY LAND

Reporting by Contractor to CMU (PRBDB)

Name of Corridor_____
Link No._____
Construction stage: quarterly Report – Date:_____Month_____Year_____
(Site Layout of all locations to be attached with format)

Sl. No.	Item	Target date for Establishment	Date of Establishment	Location					Present Land use	Size (m x m)	Existing Trees >30 cm girth	Dist. From nearest settlement	Dist. From nearest water source	Site approved or not (Y/N)	Remarks by CMU (PRBDB) if any
				Name of Village	Chainage (km)	Side (LHS /RHS)	Area (m^2)	Haul road length (m)							
1	Borrow Areas														
	BA 1														
2	Workers Camps														
	WC 1														
3	Site for Batching Plant														
	BP 1														
4	Site for Hot Mix Plant														
	HMP 1														
5	Stock Yard														
	SY 1														

Remark

Submitted	**Checked**		**Approved**
Signature……..	Signature……..		Signature……
Name……...	Name……...		Name……...
Designation……...			
Contractor	Environmental Engineer.	Construction Supervision Consultant	Executive Engineer CMU

P7: POLLUTION MONITORING

Name of Corridor_____
Link No._____
Construction Stage: Report – Date:_____Month_____Year_____
Mitigation measures suggested in last report complied or Not……..
If not reasons thereof……..
(Location at which monitoring to be conducted as per EMP)

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Completion	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial / Commercial)	Remarks
1. Air Monitoring											
						SPM RSPM HC SO_X NO_X	SPM RSPM HC SO_X NO_X				
2. Water Monitoring											
						pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease	pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease				

3. Soil Monitoring											
						pH Organic Matter Alkalinity Conductivity Water holding capacity Pb	pH Organic Matter Alkalinity Conductivity Water holding capacity Pb				
4. Noise Monitoring											
						$L_{day\ equivalent}$ $L_{night\ equivalent}$ $L_{equivalent}$	$L_{day\ equivalent}$ $L_{night\ equivalent}$ $L_{equivalent}$				

Remark

Submitted	**Checked**	**Approved**
Signature……	Signature……	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

P8: Tree cutting/Stump Removal

Name of the Road:

Date:_____Month_____Year_____

Sl. No.	Section (km)	Distance from edge of existing road	Identification Number Marked in Field	Species		Girth (cm)	Dry / Green	Average Height (m)	Remarks
				Local	Botanical Name				

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

P9: IDENTIFICATION OF SOURCE OF WATER FOR CONSTRUCTION

Name of Corridor_____

Link No._____

Construction Stage: Monthly Report – Date: Month_____Year_____

Sl. No.	Source (Name)	Location /Ch.	Distance from Road	Permission Required	Remarks

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C1: DETAILS OF EARTHWORK
(To be filled by the Contractor)

Name of Corridor_____
Link No._____
Monthly Report for Each Borrow Area under use

Month……

Reporting

Date of Submission……..

Location of Borrow Area under use

	Name of Village	Chainage (km)	Side (LHS / RHS)	Haul road length (m)
I				
II				

2. Details of Borrow Areas

2.1	Capacity of the Borrow Area	
2.2	Percentage of the capacity exhausted	
2.3	Total quality of the Earth Excavated (in cum)	
2.4	Quantity of Top Soil removed from the Borrow Areas	
2.5	Location of Top Soil stored removed	
2.6	Quantity of Top Soil stored at the beginning of the month	
2.7	Quantity of Top Soil utilized at the end of the month	
2.8	Location (s) where Top Soil has been utilized (Specify on a location plan)	
2.9	Quantity of earthwork excavation from existing road	
2.10	Total quantity of earthwork reused in cum. (5%)	
2.11	Location disposal (if other than sites) (Specify clearly on a location plan)	
2.12	Quantity of earthwork re-used in fill operation	
2.13	Location of borrow areas in disuse / exhausted	
2.14	Outline a rehabilitation plan for each of the exhausted borrow areas with special reference to Erosion Protection Measures. Also, submit at separate detailed rehabilitation plan for exhausted borrow areas for approval supported adequately with layouts, plans and drawings.	

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C2: DETAILS OF HOT MIX PLANT

(To be filled by the Contractor)

Name of Corridor_____

Link No._____

Monthly Report for Each Hot Mix Plant

Reporting Month……

Date of Submission……

1. Environment Features of the surrounding area

1.1	Name and location of Hot Mix Plant (w.r.t. PWD km ch.)	
1.2	Wind direction	
1.3	Name (s), distance population and type of settlements in a 1.5 km radius of site.	

2. Draw Sketch Plan of HMP clearly indicating distance and approach roads.

3. Details of HMP and Mitigation Measures taken

3.1	Installed Capacity	
3.2	Average Utilization	
3.3	Make	
3.4	Model	
3.5	Last Serviced	

4. Explain Air Pollution Control Measures taken at the HMP site

5. Explain Noise Pollution Control Measures taken at the HMP site

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C3: DETAILS OF LAND FILL OPERATIONS

(To be filled by the Contractor)

Name of Corridor_____

Link No._____

Monthly Report for Each Contract Package

Reporting Month……

Date of Submission……

1. Environment Features of the surrounding area

1.1	Location of each land fill site (Provide sketch Map below)	Name of Village	Chainage (km)	Side (LHS/RHS)	Haul road length (m)
	I				
	II				
1.2	Capacity of each land fill site				
1.3	Safety measure taken at land fill site (s)				
1. 2. 3. 4. 5.					

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C4: DETAILS OF MACHINERY IN OPERATION

(To be filled by the Contractor)

Name of Corridor_____

Link No._____

Monthly Report for Each Contract Package

Reporting Month……

Date of Submission……
(Attach copy of PPCB emission control certificate every 3 months)

1. Details of Machinery Operation

1.1	Total machinery in operation (Nos.)	
1.2	Number of pavers	
1.3	Number of rollers	
1.4	Number of excavators	
1.5	Number of graders	Nos.
1.6	Number of dumpers	Nos.
1.7	No. of workshops with repairs facility (furnish location and type of facility provided)	Workshop on Facility Location Provided
1.8	Number of vehicles in repair at each location	
1.9	Umber of oil interceptor provided in each repair / fuelling site	
1.10	Total quantity of oil and wastes recovered in each interceptor during last month.	Oil waste Liters, Kg.
1.11	Details of waste disposal. (Whether Sold/ Disposed)	

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C5: REDVELOPMENT OF BORROW AREAS

(To be filled by the Contractor)

Name of Corridor_____

Link No._____

Construction stage: Monthly Report-Date_____Month_____Year

Drawing for Redevelopment to be attached for each Borrow Area (photographs of sites before use & after rehabilitation to be attached)

Sl. No.	Borrow Area No.	Borrow Area Location					Land use	Rehabilitation Measures	Date of approval of Rehabilitation	Date of Handing Over to Owner	Remarks
		Name of Village	Chainage (km)	Side (LHS/ RHS)	Area (M2)	Haul road length (m)					

Remark

Submitted
Signature…….
Name……...
Designation……..
Contractor

Checked
Signature……
Name……...
Environmental Engineer.
Construction Supervision Consultant

Approved
Signature…….
Name……...
Executive Engineer (CMU)

C6: SAFETY CHECK LIST
(To be filled by the Contractor)

1 Contract No. _____
2 Name of Contractor _____
3 Representation _____
4 Name of Safety Officer _____
5 Date of Inspection _____

Location 1…… Location 2…… Location 3 ……

Adequate at time of Inspection Needs Improvement Needs Immediate Attention	Location 1			Location 2			Location 3			Remarks
	A	B	C	A	B	C	A	B	C	
General										
House Keeping										
Stacking of Material										
Passageway										
Lighting										
Ventilation										
Others										
Electrical										
Switches										
Wirings										
Fixed Installation										
Portable Lighting										
Portable Tool										
Welding Machine										
Others										
Fire Prevention										
Fire Fighting Appliance										
Dangerous Goods Store										
Gas Welding Cylinders										
Others										
Others										
Dust Control										
Noise Control										
First Aid Equipment										
Washing Facility										
Latrine										
Canteen										
Provision of Personal Protective										
Helmet										
Eye Protector										
Ear Protector										
Respirator										
Safety Shoes										
Safety Belts										
Others										

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C7: ACCIDENT REPORT
(To be completed on Occurrence of Injury by the Safety Officer)

Type of Accident

D01 ( )	Fall of person from a height		D11 ( )	Explosion
D02 ( )	Slip, trip or fall on same level		D12( )	Fire
D03 ( )	Struck against fixed objects		D13 ( )	Contact with hot or corrosive substance
D04 ( )	Struck by flying or falling objects		D14 ( )	Contact with poisonous gas or toxic substances.
D05 ( )	Struck by moving objects		D15 ( )	Contact with poisonous gas or toxic substances
D06 ( )	Struck / caught by cable		D16 ( )	Hand tool accident
D07 ( )	Stepping on hail etc.		D17 ( )	Vehicle / Mobile plant accident
D08 ( )	Handling without machinery		D18 ( )	Machinery operation accident
D09 ( )	Crushing / burying		D19 ( )	Other (please specify)
D10 ( )	Drowning or asphyxiation			

Agent Involved in Accident

E01 ( )	Machinery		E11 ( )	Excavation / underground working
E02 ( )	Portable power appliance		E12 ( )	
E03 ( )	Vehicle or associated equipment / machinery		E13 ( )	Ladder
E04 ( )	Material being handled, used or stored		E14 ( )	Scaffolding /gondola
E05 ( )	Gas, vapor, dust, fume or oxygen		E15 ( )	Construction formwork, shuttering and false work.
E06 ( )	Hand tools		E16 ( )	Electricity supply cable, wiring switchboard and associated equipment
E07 ( )	Floor edge		E17 ( )	Nail, sllnter or chipping
E08 ( )	Floor opening		E18 ( )	Other (Please specify)
E09 ( )	Left shaft		E19 ( )	
E10 ( )	Stair edge			

Unsafe Action Relevant to the Accident

F01 ( )	Operating without authority		F11 ( )	Failure to use eye protector
F02 ( )	Failure to secure objects		F12 ( )	Failure to use respirator
F03 ( )	Making safety devices inoperative		F13 ( )	Failure to use proper clothing
F04 ( )	Working on moving or dangerous equipment		F14 ( )	Failure to use warn others or given proper signals
F05 ( )	Using un-safety equipment		F15 ( )	Horseplay
F06 ( )	Adopting unsafe position or posture		F16 ( )	No unsafe action
F07 ( )	Operating or working at unsafe speed		F17 ( )	Others (please specify)
F08 ( )	Unsafe loading, Placing, mixing etc.		F18 ( )	
F09 ( )	Failure to use helmet		F19 ( )	
F10 ( )	Failure to use proper footwear			

G01 ( )	No protective gear		G08 ( )	Unsafe layout of job, traffic etc.
G02 ( )	Defective protective gear		G09 ( )	Unsafe process of job methods
G03 ( )	Improper dress / footwear		G10 ( )	Poor housekeeping
G04 ( )	Improper guarding		G11 ( )	Lack of warning system
G05 ( )	Improper ventilation		G12 ( )	Defective tool, machinery or materials
G06 ( )	Improper illumination		G13 ( )	No unsafe condition
G07 ( )	Improper procedure		G14 ( )	Others (please specify)

Personal Factor Relevant to the Accident

H01 ( )	Incorrect attitude /motive		H04 ( )	Unsafe act by another person
H02 ( )			H05 ( )	No unsafe personal factor
H03 ( )			H06 ( )	Other (please specify)

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental engineer. Construction Supervision Consultant	Executive Engineer (CMU)

Part-II –To be completed Upon Finalization of Employee's compensation Claim

101 ( ) No permanent incapacity

102 ( ) Less than 5% incapacity

103 ( ) More than 5% incapacity

104 ( ) Final

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….		
Contractor	Environmental engineer. Construction Supervision Consultant	Executive Engineer (CMU)

C8: POLLUTION MONITORING

Name of Corridor_____
Link No._____
Construction Stage: Report-Date: _____Month_____Year_____
If not reasons thereof……
(Location at which monitoring to be conducted as per EMP)

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Completion	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial /Commercial)	Remarks
1. Air Monitoring											
						SPM RSPM HC Sox NOx	SPM RSPM HC Sox NOx				
2.Water Monitoring											
						pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease	pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease				

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Completion	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial /Commercial)	Remarks
3. Soil Monitoring											
						pH Organic Matter Alkalinity Conductivity Water holding Capacity Pb	pH Organic Matter Alkalinity Conductivity Water holding Capacity Pb				
4.Noise Monitoring											
						$L_{day\ equivalent}$ $L_{night\ equivalent}$ $L_{equivalent}$	$L_{day\ equivalent}$ $L_{night\ equivalent}$ $L_{equivalent}$				

Remark

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Environmental Engineer	Executive Engineer
Contractor	Technical Assistance Consultant	CMU, PRBDB

C9: ENHANCEMENT MEASURES
(To be filed up by Contractor)

Name of Corridor_____
Link No._____

Sl. No.	Corridor Name	Name of the Site	Chainage (km)	Consent taken (Y/N)	Total budget		Date of Start of work	Remarks
					Total	Utilized		

Remarks

Submitted	Checked	Approved
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….		
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

C10: RESTORATION OF CONSTRUCTION SITES
(To be filed up by Contractor)

Name of Corridor_____

Link No._____

(Reporting by Contractor to CMU)

Construction stage: Monthly Report-Date……Month…….Year.

Sl. No.	Contract Package	Labour Camp		Construction Camp		Plant Site		Borrow areas		Disposal Locations		Top Soil	
		O	R	O	R	O	R	O	R	O	R	Preserved	Restored

Remarks

Submitted	Checked	Approved
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

O1: POLLUTION MONITORING

Name of Corridor_____
Link No._____
Construction Stage: Report-Date: _____Month_____Year_____
Mitigation measures suggested in last report complied or Not……
If not reasons thereof ……..
(Location at which monitoring to be conducted as per EMP)

Sl. No.	Chainage (km)	Details of locations	Duration of monitoring	Instruments used	Standards	Results	Reasons for exceeding standards	Mitigation Measures suggested	Type of area (Residential /Industrial Commercial)	Remarks
					SPM RSPM HC SOx NOx	SPM RSPM HC SOx NOx				
					pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease	pH TSS TDS Turbidity Hardness Coliform BOD COD Oil & Grease				
					pH Organic Matter Alkalinity Conductivity Water holding capacity Pb	pH Organic Matter Alkalinity Conductivity Water holding capacity Pb				
					$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$	$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$				

Remarks

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

O2: CLEANING OF CULVERT OPENINGS AND LONGITUDINAL DRAINS
(To be filed up by CMU, PRBDB)

Name of Corridor_____

Link No._____

Construction Stage: Report-Date: _____Month_____Year

Sl. No.	Structural No.	Pre monsoon	Date	Post monsoon	Date
Name of the Corridor					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

Remarks

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

CMU 1: FORMAT FOR KEEPING RECORDS OF CONSENT OBTAINED BY CONTRACTOR

Name of Corridor_____

Link No._____

Construction Stage: Report-Date: _____Month_____Year_____

Sl. No.	Contractor's Name	Clearance	Applicable Acts	Agencies	Obtained on	Valid upto	Remarks
Name of the Corridor							
1							
2							
3							
4							
5							
6							

Remarks

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

CMU 2: CHECK LIST FOR ENVIRONMENT INSPECTION
(Points / Issues to be covered)

Name of Road_____
Date of Inspection_____

Sl. No.	ESMP Measures
1	Provision of a personnel accountable for implementation of ESMP /Safety Measures with Contractor
2	Consent of PCB to Establish HMP
3	Consent of PCB to operate HMP
4	Compliance of PCB Conditions for HMP installation and operation
5	Whether compliance reported through monthly Progress report to Divisional Office of Executive Engineer
6	PUC taken for all Construction vehicles
7	Concrete platform with trap under bitumen boiler, Fuel Tank for HMP and generator set provided or not
8	Precautions to prevent contamination of soil by emulsion, Bitumen, oil and lubricant taken while storing
9	Providing cover to fine construction material & bituminous mix during transportation
10	Borrow areas:
	a) Borrow areas approved by Department
	b) Existing land was used
	c) Nos Opened
	d) Available Quantity
	e) Utilized Quality
	f) Balance Quantity
	g) Nos of Borrow areas Rehabilitated
11	Spoil and debris disposal:
	a) Present status of land
	b) Closure and completion plan
12	Site specific traffic Safety management Plan:
	a) Contractor installed the warning /regulatory Traffic signs at the construction site
	b) The arrangement adequate
13	Safety equipment i.e. helmet, gloves, gumboot, mask, earplugs etc. provided to workers
14	Health Facility at camp and work site i.e. First Aid kit & suitable vehicle for conveyance in case of emergency / accident
15	Permit for Procuring River sand
16	License from Department of mines for quarrying
17	Consent to establish / operation of crusher
18	Provision of labour camp with sanitation & potable water
19	Fire precautions at Hot Mix Plant and site Office
20	Air and noise monitoring done in camp site
21	Whether any cultural property is being impacted
22	Status of drainage provision in camp area
23	General House Keeping

Remarks

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

CMU 3: SUMMARY SHEET
(To be filled monthly by CMU and Submitted to HO, PRBDB)

Name of the corridor_____
Link No._____
Month_____
Date_____

Sl. No.	Description	Remarks
1	**No Objection Certificate**	
A	Hot mix Plant	
	Location 1	
	Location 2	
	Location 3	
B	Cement batching Plant	
	Location 1	
	Location 2	
	Location 3	
2	**Pollution Under Certificate**	
	Vehicles	
	Machineries	
3	**No objection Certificate for Diesel Gen set**	
	Location 1	
	Location 2	
4	**Labour Camps**	
	No. of sites Identified	
	Approved	
	Opened	
	Conforms to conditions imposed at the time of opening of sites	
	Closed	
5	**Workers**	
	No of workers employed	
	No of male workers	
	No of female workers	
	No of day workers	
6	**Borrow Area**	
	No. of sites identified	
	Approved	
	Opened	
	Quantity of available material	
	Quantity of material Utilized	
	Quantity of Topsoil preserved	
	Quantity to top soil used	
	No of sites closed	
	No. of sites Rehabilitated	
7.	Quarry	
	No. of sites identified	

Sl. No.	Description	Remarks
	Approved	
	Opened	
	Material available	
	Material obtained	
	No. of sites Rehabilitated	
8	Disposal Locations	
	No. of sites identified	
	Approved	
	Opened	
	Amount of Waste disposed	
	Type of waste disposed	
	No. of sites Rehabilitated	
9	Road Safety	
	Road Safety norms followed as per guidelines, SP-55 and approved Traffic plan	
10	Cleaning of Culvert/ drains	
	No. of culverts/ drains	
	Nos. Cleaned	
11	Trees	
	No of trees marked for cutting in field	
	No of trees cut	
	No of trees to be Planted	
	Trees Planted	
12	Haul Roads	
	Adequacy of maintenance of Haul Road Network	

Remarks

Submitted	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation…….	Designation…….	Designation…….
Contractor	Environmental Engineer Construction Supervision Consultant	Executive Engineer (CMU)

Annexure-I

List of trees to be impacted by the widening and strengthening of Jagatpur-Chandbali road.

Chainages (In KM)	To be Removed			Trees to retained		
	Left	Right	Total	Left	Right	Total
0/000 to 1/000	18	10	28	3	10	13
1/000 to 2/000	30	13	43	2	2	4
2/000 to 3/000	12	10	22	4	14	18
3/000 to 4/000	35	14	49	11	18	29
4/000 to 5/000	22	30	52	5	21	26
5/000 to 6/000	26	20	46	7	21	28
6/000 to 7/000	18	32	50	13	34	47
7/000 to 8/000	19	16	35	2	7	9
8/000 to 9/000	11	17	28	0	3	3
9/000 to 10/000	21	20	41	5	1	6
10/000 to 11/000	12	13	25	2	18	20
11/000 to 12/000	8	11	19	0	3	3
12/000 to 13/000	11	15	26	0	0	0
13/000 to 14/000	10	16	26	0	1	1
14/000 to 15/000	8	15	23	1	5	6
15/000 to 16/000	14	16	30	1	6	7
16/000 to 17/000	14	12	26	0	7	7
17/000 to 18/000	9	15	24	2	9	11
18/000 to 19/000	1	8	9	0	4	4
19/000 to 20/000	5	12	17	4	2	6
20/000 to 21/000	0	21	21	0	12	12
21/000 to 22/000	10	8	18	0	3	3
22/000 to 23/000	16	16	32	0	5	5
23/000 to 24/000	29	18	47	0	4	4
24/000 to 25/000	23	2	25	0	2	2
25/000 to 26/000	8	11	19	11	3	14
26/000 to 27/000	17	24	41	0	4	4
27/000 to 28/000	18	24	42	22	3	25
28/000 to 29/000	14	34	48	43	4	47
29/000 to 30/000	45	129	174	43	4	47
30/000 to 31/000	8	6	14	8	2	10
31/000 to 32/000	2	31	33	16	3	19
32/000 to 33/000	45	8	53	30	0	30
33/000 to 34/000	0	2	2	6	8	14

34/000 to 35/000	18	44	62	1	0	1
35/000 to 36/000	12	38	50	0	0	0
36/000 to 37/000	18	24	42	2	2	4
37/000 to 38/000	23	19	42	0	0	0
38/000 to 39/000	7	17	24	0	0	0
39/000 to 40/000	15	12	27	0	0	0
40/000 to 41/000	38	18	56	0	0	0
41/000 to 42/000	23	26	49	0	0	0
42/000 to 43/000	23	13	36	0	0	0
43/000 to 44/000	26	21	47	0	0	0
44/000 to 45/000	7	8	15	2	0	2
45/000 to 46/000	16	21	37	0	0	0
46/000 to 47/000	6	8	14	0	4	4
47/000 to 48/000	32	47	79	0	0	0
48/000 to 49/000	21	23	44	0	0	0
49/000 to 50/000	18	32	50	0	0	0
50/000 to 51/000	27	48	75	0	0	0
51/000 to 52/000	12	34	46	2	0	2
52/000 to 53/000	68	40	108	0	3	3
53/000 to 54/000	35	30	65	1	0	1
54/000 to 55/000	24	46	70	1	0	1
55/000 to 56/000	78	52	130	0	0	0
56/000 to 57/000	48	49	97	0	0	0
57/000 to 58/000	59	43	102	0	0	0
58/000 to 59/000	56	46	102	0	0	0
59/000 to 60/000	118	92	210	1	0	1
60/000 to 61/000	163	192	355	0	0	0
61/000 to 62/000	155	76	231	1	0	1
62 /000to 63 /000	106	88	194	0	2	2
63/000 to 64 /000	38	87	125	0	0	0
64 /000 to 65 /000	52	73	125	1	0	1
65 /000 to 66 /000	53	29	82	0	0	0
66 /000 to 67 /000	96	190	286	2	1	3
67 /000 to 68 /000	92	210	302	0	0	0
68 /000 to 69 /000	58	232	290	1	0	1
69 /000 to 70 /000	24	11	35	1	1	2
70 /000 to 71 /000	0	0	0	0	0	0
71 /000 to 72 /000	8	6	14	1	2	3
72 /000 to 73 /000	34	30	64	1	1	2
73 /000 to 74 /000	20	10	30	0	0	0
74 /000 to 75 /000	25	14	39	0	2	2

75 /000 to 76 /000	16	5	21	0	0	0
76 /000 to 77 /000	89	68	157	0	0	0
77 /000 to 78 /000	84	33	117	1	1	2
78 /000 to 79/000	52	65	117	0	0	0
79 /000 to 80 /000	30	48	78	0	0	0
80 /000 to 81/000	45	53	98	0	0	0
81 /000 to 82 /000	66	109	175	0	0	0
82 /000 to 83 /000	42	136	178	0	0	0
83 /000 to 84 /000	0	0	0	0	0	0
84 /000 to 85/000	0	0	0	0	0	0
85 /000 to 86 /000	0	0	0	0	0	0
86 /000 to 87/000	108	94	202	7	9	16
87 /000 to 88 /000	16	6	22	1	0	1
88 /000 to 89 /000	0	0	0	0	0	0
89 /000 to 90 /000	0	0	0	0	0	0
90 /000 to 91 /000	0	0	0	0	0	0
91 /000 to 92 /000	12	10	22	0	0	0
92 /000 to 93 /000	48	20	68	0	0	0
93 /000 to 94 /000	58	79	137	0	0	0
94 /000to 95 /000	54	72	126	0	0	0
95 /000 to 96/000	104	75	179	1	2	3
96 /000 to 97 /000	148	132	280	53	92	145
97 /000 to 98 /000	18	22	40	0	0	0
98 /000 to 99 /000	8	8	16	29	23	52
99 /000100 /000	0	0	0	0	0	0
100 /000 to 101 /000	8	5	13	0	0	0
101 /000 102/000	68	27	95	0	1	1
102 /000 to 103 /000	79	24	103	1	2	3
103 /000 to 104 /000	97	19	116	2	0	2
104/000to 105 /000	58	44	102	0	2	2
105 /000 to 106 /000	37	30	67	3	4	7
Grand Total	**3636**	**3932**	**7568**	**357**	**397**	**754**

Annexure – II

Avenue Plantation Jagatpur to Chandbali

Sl No	Chainage		Location	Length in K.M	Remarks
	From	To			
1	12.800	13.000	Left	0.200	Planting of Trees
3	14.700	15.350	Left	0.650	Planting of Trees
4	25.000	25.950	Left	0.950	Planting of Trees
5	46.400	47.150	Left	0.750	Planting of Trees
8	59.000	61.150	Left	2.150	Planting of Trees
9	66.800	68.000	Left	1.200	Planting of Trees
11	75.300	76.000	Left	0.700	Planting of Trees
12	80.150	81.300	Left	1.150	Planting of Trees
13	82.900	83.600	Left	0.700	Planting of Trees
14	96.200	98.000	Left	1.800	Planting of Trees
15	98.700	99.700	Left	1.000	Planting of Trees
16	12.000	13.700	Right	1.700	Planting of Trees
17	29.800	30.300	Right	0.500	Planting of Trees
18	39.700	41.300	Right	1.600	Planting of Trees
19	44.900	45.850	Right	0.950	Planting of Trees
21	46.300	47.500	Right	1.200	Planting of Trees
22	58.650	61.150	Right	2.500	Planting of Trees
23	66.800	67.350	Right	0.550	Planting of Trees
24	80.150	81.450	Right	1.300	Planting of Trees
25	82.900	83.600	Right	0.700	Planting of Trees
27	99.100	99.700	Right	0.600	Planting of Trees
Total				**22.850**	

Annexure – III

Affected Schools, Colleges, Govt. Buildings, Hospitals, Toilets & Religious sites with Mitigation Proposed, Jagatpur to Chandbali

Sl. No	Item	Chainage	Location L/R	Affected Fully/Partially	Affected Length in mtrs	Mitigation Proposed
1	Madrasa	3.5	L	Partially	35	New boundary wall with 2 gates and 20 mtrs of pedestrian barricade
1	School, Gujarpur	4.330	Left	Partially	40	Gate to be shifted with NCDB, 20 mtrs pedestrian barricade
2	School	5.382	Left	Partially	58	New boundary wall with 2 gates, 20 mtrs pedestrian barricade
3	School	5.700	Left	Partially	34	New boundary wall
4	School	10.275	Right	Partially	20	New boundary wall with gate
5	School	19.565	Left	Partially	41	New boundary wall and gate to be shifted to left side of boundary
6	School	50.360	Right	Partially	10	New boundary wall with gate
7	School, Kendrapara	51.736	Right	Partially	90	New boundary wall with 3 gates to be provided
8	School	57.332	Right	Not Affected		Only 10 numbers of trees to be planted
9	School	58.407	Left	Partially	29	New boundary wall with 1 gate
10	School	62.987	Right	Partially	40	New boundary wall with 1 gate
11	School, Gopalpur	74.900	Right	Fully	Two School buildings with 46mtrs boundary wall and gate.	Not included as road construction budget but being separately provided by Govt. from own funding to relocate utilities and CPRS
12	School	102.700	Left	Partially	36mtrs boundary wall and building 7mtrs	New boundary wall with 1 gate

13	School	102.745	Left	Partially	58mtrs boundary wall with gate and building 9mtrs	New boundary wall with 1 gate
14	P.P. College	29.590	Right	Partially	Affected by moving vehicles noise and dust	New vegetative barrier planting of 100 trees at 2.5mtr interval inside and out side the boundary
Hospitals						
15	Hospital	2.300	Left	Not Affected		Traffic calming measures to be provided
16	Hospital	26.695	Left	Partially	78mtrs boundary wall with 1.5mtrs building	New boundary wall with 1 gate and planting of 30 Nos. of trees
Govt. Buildings						
17	Transport Corporation of India	0.428	Right	Partially	53mtrs	
18	Police Station, Jagatpur	0.443	Left	Partially	23mtrs	New boundary wall with gate
19	Bank	0.550	Right	Partially	22	
20	Govt. Building	7.147	Right	Fully	Building 9mtrs	
21	Check Posts	9.362	Left	Partially		
22	Electrical Sub Station	9.580	Right	Partially	25mtrs	New boundary wall
23	Sub Resister Office, Salipur	19.634	Left	Partially	30mtrs	New boundary wall with gate
24	Govt. Building	20.500	Left	Partially	19mtrs	
25	Stata Bank Of India	23.754	Left	Partially	22mtrs	
26	Inspection Bungalow	33.914	Right	Partially	53mtrs	Gate to be shifted 2 mtrs inside
27	Govt. Building	49.100	Left	Fully		
28	Inspector of Schools	49.426	Right	Partially	5mtrs	
29	Govt. Building	49.707	Left	Partially	12mtrs	
30	Electrical Sub Station	83.617	Left	Partially	45mtrs	
31	Forest Guest House	100.390	Left	Partially	118mtrs	New fence with gate, cost to be provided to forest dept.

32	Assistant Director Inland Water Transport	100.500	Right	Partially	60mtrs	New boundary wall with gate
33	Office of The Tahasildar, Chandbali	100.640	Left	Partially	58mtrs	New boundary wall with gate
34	Sulabha Souchalaya	100.616	Right	Fully		These activitiesc will be provisional item of work subject to entering into agreement with local PRI for management and maintenance
34	UCO Bank	101.813	Right	Partially	5.5mtrs	
Temples						
1	Temple	4.344	Right	Fully		To be relocated
2	Temple with Boundry wall	4.552	Left	Fully		To be relocated
3	Temple	5.449	Right	Fully		To be relocated
4	Temple	6.120	Left	Not Affected		Pedestrial barricade to be provided over 15mtrs with planting of 10 numbers of flower bearing plants
5	Temple	6.970	Right	Fully		To be relocated
6	Temple	7.190	Left	Fully		To be relocated
7	Temple	9.552	Right	Not Affected		Barricade over 3mtrs to be provided.
8	Temple	9.650	Right	Fully		To be relocated
9	Temple	10.209	Right	Fully		To be relocated
10	Temple	10.828	Left	Partially	31mtrs	New boundry wall with gate with planting of 10 number of flower bearing plants
11	Temple	15.623	Left	Fully		To be relocated
12	Temple	18.810	Right	Fully		To be relocated
13	Temple	18.972	Right	Fully		To be relocated
14	Temple	24.912	Left	Fully		To be relocated
15	Temple	27.464	Right	Fully		To be relocated
16	Temple	27.700	Left	Fully		To be relocated
17	Temple	28.100	Left	Fully		To be relocated
18	Temple	28.190	Left	Fully		To be relocated
19	Temple with fence	29.632	Left	Fully		To be relocated
20	Temple	30.824	Left	Fully		To be relocated
21	Temple	33.670	Right	Fully		To be relocated
22	Temple	34.383	Right	Fully		To be relocated
23	Temple	35.327	Right	Fully		To be relocated

24	Temple	36.713	Left	Fully		To be relocated
25	Temple	37.152	Right	Fully		To be relocated
26	Temple	39.432	Right	Fully		To be relocated
27	Temple	42.178	Left	Fully		To be relocated
28	Temple	43.570	Right	Fully		To be relocated
29	Temple	47.200	Right	Fully		To be relocated
30	Temple	50.977	Right	Fully		To be relocated
31	Temple	51.965	Left	Fully		To be relocated
32	Temple	52.072	Left	Fully		To be relocated
33	Temple	53.600	Right	Fully		To be relocated
34	Temple	55.548	Right	Fully		To be relocated
35	Temple	56.076	Left	Not Affected		Pedestrial barricade over 9mtrs to be provided to restirict the devotees to enter directly on the road and planting of 10 numbers of flower bearing trees.
36	Temple	58.274	Left	Fully		To be relocated
37	Temple	63.272	Right	Fully		To be relocated
38	Temple	63.669	Right	Fully		To be relocated
39	Temple	64.032	Right	Fully		To be relocated
40	Temple	64.293	Left	Fully		To be relocated
41	Temple	64.776	Right	Fully		To be relocated
42	Temple	64.942	Left	Fully		To be relocated
43	Temple	65.512	Left	Fully		To be relocated
44	Temple	71.974	Right	Fully		To be relocated
45	Temple	72.790	Right	Fully		To be relocated
46	Temple	74.874	Right	Fully		To be relocated
47	Temple	77.308	Right	Fully		To be relocated
48	Temple	77.705	Left	Fully		To be relocated
49	Temple	79.551	Right	Fully		To be relocated
50	Temple	79.877	Right	Fully		To be relocated
51	Temple	79.895	Left	Fully		To be relocated
52	Temple	81.725	Right	Fully		To be relocated
53	Temple	84.093	Left	Fully		To be relocated
54	Temple	86.424	Left	Fully		To be relocated
55	Temple	96.000	Left	Fully		To be relocated
56	Temple	100.117	Right	Fully		To be relocated
57	Temple	100.520	Left	Fully		To be relocated
58	Temple	100.529	Left	Fully		To be relocated
59	Temple	100.845	Left	Fully		To be relocated
60	Temple	101.083	Left	Fully		To be relocated
61	Temple	101.340	Left	Fully		To be relocated
62	Temple	102.745	Right	Fully		To be relocated
63	Temple	103.010	Right	Fully		To be relocated

64	Temple	104.061	Right	Not Affected		Pedestial barricade to be provided over 5mtr for restigation of direct entry of devotees on the road.
65	Temple	104.329	Left	Fully		To be relocated
66	**Cemetary**	**55.707**	**Left**	**Fully**		**Compensation to be given.**

Annexure – IV

Affected Water Taps, Tube Wells and Wells with Mitigation Proposed, Jagatpur To Chandbali

1. Tube Wells

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
1	3-4	R	Cuttack	Gujarpur	Fully	To be relocated
2	3-4	R	Cuttack	Pirabazar	Fully	To be relocated
3	6-7	R	Cuttack	Mutarifa	Fully	To be relocated
4	7-8	L	Cuttack	Mutarifa	Fully	To be relocated
5	7-8	L	Cuttack	Mutarifa	Fully	To be relocated
6	8-9	R	Cuttack	Bahadulpatna	Fully	To be relocated
7	10-11	L	Cuttack	Singhamapur	Fully	To be relocated
8	11-12	L	Cuttack	Bhatapada	Fully	To be relocated
9	15-16	R	Cuttack	Gangapur	Fully	To be relocated
10	16-17	R	Cuttack	Bahabalpur	Fully	To be relocated
11	17-18	L	Cuttack	Sapanpur	Fully	To be relocated
12	22-23	L	Cuttack	Kulia	Fully	To be relocated
13	24-25	R	Cuttack	Patapur	Fully	To be relocated
14	24-25	R	Cuttack	Patapur	Fully	To be relocated
15	27-28	R	Cuttack	Nischintakoili	Fully	To be relocated
16	27-28	R	Cuttack	Nischintakoili	Fully	To be relocated
17	28-29	R	Cuttack	Nischintakoili	Fully	To be relocated
18	31-32	R	Cuttack	Katarapada	Fully	To be relocated
19	33-34	R	Cuttack	Julikipara	Fully	To be relocated
20	33-34	R	Cuttack	Julikipara	Fully	To be relocated
21	35-36	R	Cuttack	Ramaranga	Fully	To be relocated
22	35-36	R	Cuttack	Banamali pur	Fully	To be relocated
23	37-38	R	Kendrapara	Bhanagaon	Fully	To be relocated
24	37-38	L	Kendrapara	Bhanagaon	Fully	To be relocated
25	37-38	L	Kendrapara	Bhanagaon	Fully	To be relocated
26	38-39	R	Kendrapara	Chandol	Fully	To be relocated
27	38-39	R	Kendrapara	Chandol	Fully	To be relocated
28	38-39	R	Kendrapara	Chandol	Fully	To be relocated
29	38-39	L	Kendrapara	Chandol	Fully	To be relocated
30	38-39	L	Kendrapara	Chandol	Fully	To be relocated

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
31	42-43	R	Kendrapara	Daliji	Fully	To be relocated
32	42-43	L	Kendrapara	Daliji	Fully	To be relocated
33	43-44	L	Kendrapara	Syamsundarpur	Fully	To be relocated
34	44-45	R	Kendrapara	Bhagabatpur	Fully	To be relocated
35	50-51	R	Kendrapara	Guhalsingh	Fully	To be relocated
36	50-51	R	Kendrapara	Guhalsingh	Fully	To be relocated
37	50-51	R	Kendrapara	Guhalsingh	Fully	To be relocated
38	51-52	L	Kendrapara	Gulnagar	Fully	To be relocated
39	53-54	R	Kendrapara	Garapur	Fully	To be relocated
40	55-56	L	Kendrapara	Jajanga	Fully	To be relocated
41	55-56	R	Kendrapara	Jajanga	Fully	To be relocated
42	55-56	R	Kendrapara	Jajanga	Fully	To be relocated
43	56-57	L	Kendrapara	Khamarkespur	Fully	To be relocated
44	58-59	R	Kendrapara	Baro	Fully	To be relocated
45	63-64	L	Kendrapara	Gangapada	Fully	To be relocated
46	63-64	L	Kendrapara	Gogua	Fully	To be relocated
47	64-65	L	Kendrapara	Gogua	Fully	To be relocated
48	64-65	L	Kendrapara	Gogua	Fully	To be relocated
49	65-66	L	Kendrapara	Badamulabasanta	Fully	To be relocated
50	65-66	R	Kendrapara	Badamulabasanta	Fully	To be relocated
51	65-66	R	Kendrapara	Badamulabasanta	Fully	To be relocated
52	66-67	L	Kendrapara	Badamulabasanta	Fully	To be relocated
53	68-69	L	Kendrapara	Belatala	Fully	To be relocated
54	68-69	L	Kendrapara	Belatala	Fully	To be relocated
55	74-75	L	Kendrapara	Gopalpur	Fully	To be relocated
56	77-78	R	Kendrapara	Mahasahani	Fully	To be relocated
57	79-80	R	Kendrapara	Chandigadi	Fully	To be relocated
58	79-80	R	Kendrapara	Chandigadi	Fully	To be relocated
59	79-80	R	Kendrapara	Chandigadi	Fully	To be relocated
60	79-80	L	Kendrapara	Chandigadi	Fully	To be relocated
61	82-83	L	Kendrapara	Sitaleswar	Fully	To be relocated
62	82-83	L	Kendrapara	Sitaleswar	Fully	To be relocated
63	86-87	R	Kendrapara	Lokapada	Fully	To be relocated
64	87-88	L	Kendrapara	Nagapada	Fully	To be relocated
65	87-88	L	Kendrapara	Nagapada	Fully	To be relocated

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
66	89-90	R	Kendrapara	Baruna Dhia	Fully	To be relocated
67	91-92	R	Kendrapara	Achhutapur	Fully	To be relocated
68	93-94	L	Kendrapara	Gokheneswar	Fully	To be relocated
69	95-96	R	Kendrapara	Kantapada	Fully	To be relocated
70	95-96	R	Kendrapara	Kantapada	Fully	To be relocated
71	97-98	R	Kendrapara	Ostia	Fully	To be relocated
72	99-100	L	Bhadrak	Simulia	Fully	To be relocated
73	100-101	L	Bhadrak	Chandabali	Fully	To be relocated

2. Wells

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
1	3-4	R	Cuttack	Pirabazar	Fully	To be relocated
2	8-9	R	Cuttack	Purbakachha	Fully	To be relocated
3	10-11	R	Cuttack	Bahugram	Fully	To be relocated
4	10-11	R	Cuttack	Bahugram	Fully	To be relocated
5	13-14	L	Cuttack	Bhatapada	Fully	To be relocated
6	22-23	L	Cuttack	Kulia	Fully	To be relocated
7	22-23	L	Cuttack	Kulia	Fully	To be relocated
8	24-25	R	Cuttack	Patapur	Fully	To be relocated
9	25-26	L	Cuttack	Mahajanpur	Fully	To be relocated
10	26-27	L	Cuttack	Mahajanpur	Fully	To be relocated
11	26-27	L	Cuttack	Mahajanpur	Fully	To be relocated
12	26-27	R	Cuttack	Mahajanpur	Fully	To be relocated
13	27-28	R	Cuttack	Nischintakoili	Fully	To be relocated
14	33-34	L	Cuttack	Julikipara	Fully	To be relocated
15	33-34	L	Cuttack	Julikipara	Fully	To be relocated
16	35-36	R	Cuttack	Banamali pur	Fully	To be relocated
17	36-37	R	Cuttack	Katikata	Fully	To be relocated
18	43-44	R	Kendrapara	Syamsundarpur	Fully	To be relocated
19	44-45	R	Kendrapara	Bhagabatpur	Fully	To be relocated
20	44-45	R	Kendrapara	Bhagabatpur	Fully	To be relocated
21	46-47	L	Kendrapara	Jantilo	Fully	To be relocated
22	78-79	R	Kendrapara	Mahasahani	Fully	To be relocated
23	79-80	L	Kendrapara	Chandigadi	Fully	To be relocated
24	80-81	L	Kendrapara	Chandigadi	Fully	To be relocated
25	82-83	R	Kendrapara	Sitaleswar	Fully	To be relocated
26	82-83	R	Kendrapara	Sitaleswar	Fully	To be relocated

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
27	82-83	L	Kendrapara	Sitaleswar	Fully	To be relocated
28	86-87	R	Kendrapara	Lokapada	Fully	To be relocated
29	93-94	L	Kendrapara	Gokheneswar	Fully	To be relocated
30	93-94	L	Kendrapara	Gokheneswar	Fully	To be relocated
31	57-58	R	Kendrapara	Trillochanpur	Fully	To be relocated
32	54-55	R	Kendrapara	Kapaleswar	Fully	To be relocated
33	72-73	R	Kendrapara	Kasananta	Fully	To be relocated
34	72-73	R	Kendrapara	Kasananta	Fully	To be relocated
35	85-86	L	Kendrapara	Demala	Fully	To be relocated
37	85-86	L	Kendrapara	Demala	Fully	To be relocated

3. Stand Post

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
1	6-7	R	Cuttack	Mutarifa	Fully	To be relocated
2	7-8	L	Cuttack	Mutarifa	Fully	To be relocated
3	19-20	L	Cuttack	Chandradeipur	Fully	To be relocated
4	37-38	L	Kendrapara	Bhanagaon	Fully	To be relocated
5	37-38	L	Kendrapara	Bhanagaon	Fully	To be relocated
6	44-45	R	Kendrapara	Bhagabatpur	Fully	To be relocated
7	44-45	R	Kendrapara	Bhagabatpur	Fully	To be relocated
8	47-48	L	Kendrapara	Jamadhara	Fully	To be relocated
9	48-49	L	Kendrapara	Kasati	Fully	To be relocated
10	51-52	L	Kendrapara	Bhamaradiapatna	Fully	To be relocated
11	63-64	L	Kendrapara	Gogua	Fully	To be relocated
12	65-66	L	Kendrapara	Badamulabasanta	Fully	To be relocated
13	65-66	L	Kendrapara	Badamulabasanta	Fully	To be relocated
14	65-66	R	Kendrapara	Badamulabasanta	Fully	To be relocated
15	65-66	R	Kendrapara	Badamulabasanta	Fully	To be relocated
16	65-66	R	Kendrapara	Badamulabasanta	Fully	To be relocated
17	66-67	L	Kendrapara	Badamulabasanta	Fully	To be relocated
18	68-69	R	Kendrapara	Belatala	Fully	To be relocated
19	68-69	R	Kendrapara	Belatala	Fully	To be relocated
20	69-70	R	Kendrapara	Belatala	Fully	To be relocated
21	69-70	R	Kendrapara	Belatala	Fully	To be relocated
22	71-72	R	Kendrapara	Balipada	Fully	To be relocated

S.No	Chainage	Side	District	Village	Affected Fully/Partially	Mitigation Measures
23	72-73	L	Kendrapara	Kasananta	Fully	To be relocated
24	72-73	L	Kendrapara	Kasananta	Fully	To be relocated
25	72-73	L	Kendrapara	Kasananta	Fully	To be relocated
26	72-73	L	Kendrapara	Kasananta	Fully	To be relocated
27	85-86	L	Kendrapara	Demala	Fully	To be relocated
28	85-86	L	Kendrapara	Demala	Fully	To be relocated
29	95-96	R	Kendrapara	Kantapada	Fully	To be relocated
30	100-101	L	Bhadrak	Chandabali	Fully	To be relocated
31	100-101	L	Bhadrak	Chandabali	Fully	To be relocated
32	100-101	L	Bhadrak	Chandabali	Fully	To be relocated
33	101-102	L	Bhadrak	Chandabali	Fully	To be relocated
34	101-102	R	Bhadrak	Chandabali	Fully	To be relocated
35	101-102	R	Bhadrak	Chandabali	Fully	To be relocated
36	101-102	R	Bhadrak	Chandabali	Fully	To be relocated

Annexure – V

Affected Passenger Shed with Mitigation Proposed, Jagatpur To Chandbali

Sl No	Item	Chainage	Location L/R	Affected Fully/Partially	Mitigation Proposed
1	Passenger Shed	3.852	Left	Fully	To be relocated
2	Passenger Shed	7.872	Right	Fully	To be relocated
3	Passenger Shed	10.851	Right	Fully	To be relocated
4	Passenger Shed	13.100	Left	Fully	To be relocated
5	Passenger Shed	26.820	Right	Fully	To be relocated
6	Passenger Shed	31.084	Right	Fully	To be relocated
7	Passenger Shed	33.680	Right	Fully	To be relocated
8	Passenger Shed	37.916	Left	Fully	To be relocated
9	Passenger Shed	38.920	Right	Fully	To be relocated
10	Passenger Shed	44.631	Right	Fully	To be relocated
11	Passenger Shed	49.110	Right	Fully	To be relocated
12	Passenger Shed	64.488	Left	Fully	To be relocated
13	Passenger Shed	77.730	Left	Fully	To be relocated
14	Passenger Shed	79.842	Right	Fully	To be relocated
15	Passenger Shed	100.117	Left	Fully	To be relocated
16	Passenger Shed	100.565	Left	Fully	To be relocated
17	Passenger Shed	101.255	Right	Fully	To be relocated
18	Passenger Shed	103.000	Left	Fully	To be relocated
19	Passenger Shed	104.324	Left	Fully	To be relocated

Annexure – VI

Affected Ponds with Mitigation Proposed, Jagatpur to Chandbali

Sl No	Item	Chainage	Location L/R	Affected Fully/Partially	Affected Length in mtrs	Mitigation Proposed
1	Pond	4.477	Right	Partially	30	
2	Pond	5.305	Right	Partially	22	
3	Pond	7.411	Left	Partially	15	
4	Pond	7.459	Right	Partially	33	
5	Pond	11.585	Right	Partially	93	bathing ghat
6	Pond	34.424	Left	Partially	25	
7	Pond	38.560	Left	Partially	29	
8	Pond	45.928	Left	Partially	16	
9	Pond	53.374	Right	Partially	15	
10	Pond	54.724	Left	Partially	25	
11	Pond	57.162	Left	Fully	28	
12	Pond	57.800	Right	Partially	11	
13	Pond	57.830	Left	Partially	50	Bathing ghat
14	Pond	63.221	Right	Partially	19	
15	Pond	63.381	Right	Partially	46	
16	Pond	63.927	Right	Partially	16	
17	Pond	64.944	Left	Partially	32	
18	Pond	65.932	Left	Partially	17	
19	Pond	66.763	Left	Partially	21	Spill way to be provided
20	Pond	67.362	Right	Partially	20	
21	Pond	69.570	Left	Partially	70	Bathing ghat
22	Pond	72.500	Left	Partially	28	
23	Pond	76.305	Right	Partially	48	
24	Pond	76.400	Right	Partially	31	
25	Pond	77.239	Left	Partially	24	
26	Pond	79.682	Left	Partially	31	
27	Pond	81.879	Left	Partially	16	
28	Pond	82.012	Right	Partially	15	
29	Pond	82.821	Right	Partially	20	
30	Pond	91.351	Left	Partially	30	
31	Pond	91.532	Left	Partially	48	
32	Pond	93.300	Left	Fully	22	

33	Pond	96.113	Left	Partially	80	
34	Pond	97.712	Right	Partially	278	
35	Pond	102.400	Left	Partially	29	
36	Pond	102.650	Right	Partially	19	
37	Pond	102.926	Left	Partially	44	Spillway to be provided
38	Pond	104.033	Left	Partially	65	Bathing ghat
39	Pond	104.485	Left	Partially	25	
40	Pond	104.575	Left	Partially	77	
41	Pond	104.670	Left	Partially	34	
42	Pond	104.668	Right	Partially	44	
43	Pond	104.776	Left	Partially	176	
44	Pond	105.120	Left	Partially	40	Spillway to be provided

Annexure – VII

Affected Spur Roads and Junctions with Mitigation Proposed, Jagatpur to Chandbali

Sl No	Item	Chainage	Location L/R	Destination	Affected Fully/Partially	Junction	Mitigation Proposed
1	Spur Road	0.176	Right	To Industrial Estate	Fully		
2	Spur Road	0.500	Left	To NH-5	Fully	Junction	
3	Spur Road	1.000	Left	To Ultra Hospital	Fully		
4	Spur Road	1.183	Left	To Ultra Hospital	Fully	Junction	
5	Spur Road	1.366	Left	To Jagatpur Village	Fully		
6	Spur Road	1.425	Right	To Industrial Estate	Fully		
7	Spur Road	1.800	Right	To Industrial Estate	Fully	Junction	
8	Spur Road	2.050	Right	Cart Track	Fully		
9	Spur Road	2.100	Both side	Cart Track	Fully		
10	Spur Road	2.185	Left	Old Road	Fully		
11	Spur Road	2.738	Left	To Imam Nagar	Fully		
12	Spur Road	2.853	Left	To Imam Nagar	Fully	Junction	
13	Spur Road	2.965	Left	Cart Track	Fully		
14	Spur Road	3.326	Left	Cart Track	Fully		
15	Spur Road	3.852	Right	Cart Track	Fully		
16	Spur Road	3.390	Left	To Gujarpur	Fully		
17	Spur Road	4.200	Right	To Gujarpur	Fully		
18	Spur Road	4.452	Left	To Gujarpur	Fully		
19	Spur Road	4.738	Left	Cart Track	Fully		
20	Spur Road	5.160	Left	To NH-5	Fully	Junction	
21	Spur Road	5.260	Left	To Field	Fully		
22	Spur Road	5.686	Left	To Field	Fully		
23	Spur Road	5.876	Left	To Field	Fully		
24	Spur Road	6.070	Right	To Field	Fully		
25	Spur Road	6.115	Left	To Field	Fully		
26	Spur Road	6.205	Both side	To Field	Fully		
27	Spur Road	6.319	Left	To Field	Fully		
28	Spur Road	6.555	Both side		Fully		
29	Spur Road	6.800	Right		Fully		
30	Spur Road	7.641	Left	To Kazibazar	Fully	Junction	
31	Spur Road	7.869	Right	To Kazibazar	Fully		
32	Spur Road	9.025	Both side	To Field	Fully		
33	Spur Road	9.440	Right	To Field	Fully		
34	Spur Road	9.487	Left	To Satyabhamapur	Fully		

35	Spur Road	10.030	Right	To Paga Village	Fully		
36	Spur Road	10.439	Left	To Biswanathpur	Fully		
37	Spur Road	10.856	Right	To Bhatpur	Fully	Junction	
38	Spur Road	10.865	Left	To Nandola	Fully		
39	Spur Road	13.113	Left	To Bhatpur	Fully		
40	Spur Road	13.530	Left	To Bhatpur	Fully		
41	Spur Road	13.900	Both side	To Bhatpur	Fully	Junction	
42	Spur Road	15.647	Left	To Zori	Fully	Junction	
43	Spur Road	16.653	Left	To Sisua	Fully		
44	Spur Road	16.686	Right	To Field	Fully		
45	Spur Road	16.900	Both side	To Sisua Village	Fully	Junction	
46	Spur Road	18.660	Left	To Salipur	Fully	Junction	
47	Spur Road	18.817	Right	To Salipur	Fully		
48	Spur Road	19.557	Left	To Salipur	Fully		
49	Spur Road	19.644	Right	To Rathpur	Fully	Junction	
50	Spur Road	19.769	Left	To Salipur	Fully		
51	Spur Road	20.027	Right	To Salipur	Fully		
52	Spur Road	20.062	Left	To Field	Fully		
53	Spur Road	20.436	Left	To Field	Fully		
54	Spur Road	21.305	Right	To Salipur	Fully		
55	Spur Road	21.350	Left		Fully		
56	Spur Road	21.890	Left	To Field	Fully		
57	Spur Road	22.850	Left	To Field	Fully		
58	Spur Road	22.925	Left	To Field	Fully		
59	Spur Road	24.120	Right	To Kendupatana	Fully	Junction	
60	Spur Road	24.430	Left	To Jugunipur	Fully	Junction	
61	Spur Road	24.873	Right	To Kendupatana	Fully		
62	Spur Road	25.680	Both side	To Field	Fully		
63	Spur Road	26.046	Left	To Field	Fully		
64	Spur Road	26.310	Right		Fully		
65	Spur Road	26.700	Right		Fully		
66	Spur Road	26.815	Left	To Nichintakoili	Fully		
67	Spur Road	27.986	Left	To Balipada	Fully		
68	Spur Road	28.095	Left	To Balipada	Fully		
69	Spur Road	28.163	Both side	To Field	Fully		
70	Spur Road	28.274	Right	To Nichintakoili	Fully		
71	Spur Road	28.952	Left	To Field	Fully		
72	Spur Road	29.674	Left	To Field	Fully		
73	Spur Road	29.700	Right	To Field	Fully		
74	Spur Road	30.660	Right	To Field	Fully		
75	Spur Road	30.845	Right	To Field	Fully		

76	Spur Road	31.695	Right	To Katarpada	Fully		
77	Spur Road	32.584	Left	Cart Track	Fully		
78	Spur Road	32.700	Both side	To Sukarpada	Fully		
79	Spur Road	32.825	Left	To Sukarpada	Fully		
80	Spur Road	33.125	Right		Fully	Junction	
81	Spur Road	33.760	Both side	To Field	Fully		
82	Spur Road	34.010	Left	To Field	Fully		
83	Spur Road	35.336	Right	To Asureswar	Fully	Junction	
84	Spur Road	35.710	Left	To Katikata	Fully		
85	Spur Road	35.770	Left	To Katikata	Fully		
86	Spur Road	35.867	Right	To Katikata	Fully		
87	Spur Road	36.258	Left	To Katikata	Fully		
88	Spur Road	36.258	Right	To Field	Fully		
89	Spur Road	36.781	Left	To Bhatpada	Fully	Junction	
90	Spur Road	37.180	Both side	To Bhatpada	Fully		
91	Spur Road	37.930	Both side	To Canal	Fully		
92	Spur Road	38.032	Left		Fully		
93	Spur Road	38.550	Left		Fully		
94	Spur Road	38.720	Left	To Bhatpada	Fully		
95	Spur Road	38.940	Both side	L to Danpur R to Chandol	Fully	Junction	
96	Spur Road	39.378	Right	To Chacdola	Fully		
97	Spur Road	40.783	Left		Fully		
98	Spur Road	41.446	Right	To Paradeep	Fully	Junction	
99	Spur Road	41.500	Right	To Paradeep	Fully		
100	Spur Road	42.095	Left		Fully		
101	Spur Road	42.190	Right	Cart Track	Fully		
102	Spur Road	42.540	Right		Fully		
103	Spur Road	43.030	Left	Cart Track	Fully		
104	Spur Road	43.380	Left		Fully		
105	Spur Road	43.660	Left	Cart Track	Fully		
106	Spur Road	44.020	Right	Cart Track	Fully		
107	Spur Road	44.480	Right	Cart Track	Fully		
108	Spur Road	44.645	Both side		Fully		
109	Spur Road	44.800	Left	Cement Road	Fully		
110	Spur Road	44.880	Right	Cart Track	Fully		
111	Spur Road	45.480	Left	Cart Track	Fully		
112	Spur Road	45.900	Right	Cart Track	Fully		
113	Spur Road	46.250	Left	Cart Track	Fully		
114	Spur Road	47.180	Right	Cement Road	Fully		
115	Spur Road	47.540	Right	Cart Track	Fully		

116	Spur Road	47.560	Left	Cart Track	Fully		
117	Spur Road	47.725	Right		Fully		
118	Spur Road	48.400	Right	To Duhuria	Fully		
119	Spur Road	48.464	Left	To Duhuria	Fully		
120	Spur Road	49.020	Right	To NH-5A	Fully		
121	Spur Road	49.128	Left	To Kendrapara	Fully		
122	Spur Road	50.010	Left	To Kendrapara	Fully		
123	Spur Road	50.850	Both side	To Kendrapara	Fully	Junction	
124	Spur Road	51.010	Right	To Kendrapara	Fully		
125	Spur Road	51.110	Right	To Kendrapara	Fully		
126	Spur Road	51.280	Right	To Kendrapara	Fully	Junction	
127	Spur Road	51.464	Left	To Kendrapara	Fully		
128	Spur Road	51.647	Left	To Kendrapara	Fully		
129	Spur Road	51.632	Right	To Kendrapara	Fully		
130	Spur Road	51.880	Left		Fully		
131	Spur Road	51.956	Both side	L to Indupur R to Kendrapara	Fully		
132	Spur Road	52.515	Right	To Kendrapara	Fully		
133	Spur Road	52.943	Right	Cart Track	Fully		
134	Spur Road	53.115	Right	To Kendrapara	Fully	Junction	
135	Spur Road	53.500	Right		Fully		
136	Spur Road	53.580	Right		Fully		
137	Spur Road	53.725	Left	Cart Track	Fully		
138	Spur Road	54.615	Right		Fully		
139	Spur Road	54.860	Left	Cart Track	Fully		
140	Spur Road	55.340	Left	Cement Road to Haladidiha	Fully		
141	Spur Road	55.480	Left	Cement Road to Haladidiha	Fully		
142	Spur Road	55.715	Left		Fully		
143	Spur Road	55.971	Right		Fully	Junction	
144	Spur Road	56.727	Right		Fully		
145	Spur Road	56.945	Right	Cart Track	Fully		
146	Spur Road	57.215	Right	To Kendrapara	Fully		
147	Spur Road	57.283	Both side		Fully		
148	Spur Road	57.731	Right		Fully		
149	Spur Road	57.876	Left	Cart Track	Fully		
150	Spur Road	57.974	Left	Cement Road	Fully		
151	Spur Road	58.244	Right	Cement Road	Fully		
152	Spur Road	58.475	Left	Cart Track	Fully		
153	Spur Road	58.495	Right	Cart Track	Fully		
154	Spur Road	58.565	Left	Cart Track	Fully		

155	Spur Road	59.628	Right		Fully		
156	Spur Road	61.237	Left		Fully		
157	Spur Road	61.280	Left	Canal Road	Fully		
158	Spur Road	61.800	Left		Fully	Junction	
159	Spur Road	62.400	Left	Cart Track	Fully		
160	Spur Road	62.767	Left	Cart Track	Fully		
161	Spur Road	62.995	Left		Fully		
162	Spur Road	63.075	Left		Fully		
163	Spur Road	63.934	Left		Fully		
164	Spur Road	64.130	Left	Cart Track	Fully		
165	Spur Road	64.415	Left	Cart Track	Fully		
166	Spur Road	64.667	Right	Cart Track	Fully		
167	Spur Road	64.782	Right	Cart Track	Fully		
168	Spur Road	64.490	Both side		Fully		
169	Spur Road	66.100	Left		Fully		
170	Spur Road	66.120	Right		Fully		
171	Spur Road	67.819	Right	Cart Track	Fully		
172	Spur Road	68.450	Right	Cart Track	Fully		
173	Spur Road	68.767	Right		Fully		
174	Spur Road	69.500	Left	To Patamundai	Fully		
175	Spur Road	69.700	Left	To Patamundai	Fully	Junction	
176	Spur Road	69.767	Left	To Patamundai	Fully		
177	Spur Road	70.400	Both side	To Patamundai and Thnapur	Fully		
178	Spur Road	71.340	Right		Fully		
179	Spur Road	71.980	Right		Fully		
180	Spur Road	72.260	Left		Fully		
181	Spur Road	72.480	Both side		Fully	Junction	
182	Spur Road	72.800	Both side		Fully		
183	Spur Road	74.225	Left		Fully		
184	Spur Road	74.558	Left	To Gopalpur	Fully		
185	Spur Road	74.875	Right	Cart Track	Fully		
186	Spur Road	75.180	Both side	R to Narendrapur L - Cart Track	Fully	Junction	
187	Spur Road	76.260	Left	Cart Track	Fully		
188	Spur Road	76.383	Right	Cement Road	Fully		
189	Spur Road	77.300	Both side	Cement Road	Fully		
190	Spur Road	77.833	Right	To Manipatana	Fully		
191	Spur Road	78.438	Right	Cart Track	Fully		
192	Spur Road	78.800	Right	Cart Track	Fully		
193	Spur Road	79.000	Left	Cart Track	Fully		
194	Spur Road	79.549	Left	Cart Track	Fully		

195	Spur Road	79.890	Both side		Fully	Junction	
196	Spur Road	80.200	Right	Cart Track	Fully		
197	Spur Road	80.650	Both side	Cart Track	Fully		
198	Spur Road	81.933	Right	Cement Road	Fully		
199	Spur Road	82.742	Right	Cart Track	Fully		
200	Spur Road	83.350	Right	To Aul	Fully		
201	Spur Road	83.640	Right	Cart Track	Fully		
202	Spur Road	84.125	Left		Fully		
203	Spur Road	84.460	Left	To Aul I.B	Fully		
204	Spur Road	85.186	Right		Fully		
205	Spur Road	85.208	Left	To Aul Bazar	Fully		
206	Spur Road	85.905	Both side	To Aul	Fully	Junction	
207	Spur Road	86.126	Right	Cart Track	Fully		
208	Spur Road	87.700	Left	Cart Track	Fully		
209	Spur Road	88.429	Both side		Fully		
210	Spur Road	89.114	Both side		Fully		
211	Spur Road	89.860	Both side	Cart Track	Fully		
212	Spur Road	91.400	Right	Cart Track	Fully		
213	Spur Road	91.480	Right		Fully		
214	Spur Road	93.300	Both side		Fully		
215	Spur Road	93.850	Both side		Fully	Junction	
216	Spur Road	94.200	Both side		Fully		
217	Spur Road	94.700	Both side		Fully	Junction	
218	Spur Road	95.150	Left		Fully		
219	Spur Road	96.481	Right		Fully		
220	Spur Road	97.464	Right		Fully		
221	Spur Road	97.600	Right	To Chandbali	Fully	Junction	
222	Spur Road	100.125	Left	To Chandbali	Fully		
223	Spur Road	100.565	Right	To Chandbali	Fully	Junction	
224	Spur Road	100.765	Right	To Chandbali	Fully		
225	Spur Road	100.832	Left	To Chandbali	Fully		
226	Spur Road	101.000	Left	To Chandbali	Fully		
227	Spur Road	101.180	Both side	To Chandbali	Fully		
228	Spur Road	101.255	Both side	To Chandbali	Fully		
229	Spur Road	101.384	Right	To Chandbali	Fully		
230	Spur Road	101.725	Left	To Chandbali	Fully		
231	Spur Road	101.800	Right	To Chandbali	Fully		
232	Spur Road	101.937	Both side		Fully		
233	Spur Road	102.470	Right		Fully		
234	Spur Road	102.743	Right		Fully		
235	Spur Road	103.000	Left	To Chandbali	Fully		

				College			
236	Spur Road	103.543	Left		Fully		
237	Spur Road	104.324	Right		Fully		
238	Spur Road	104.663	Left		Fully		
239	Spur Road	105.446	Left	To Mahulia	Fully		

Annexure-VIII

Environmental Monitoring Plan

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Number of samples per season	Implementation
Air	Construction	Co, Nox, SPM, RPM and SO2	High volume sampler to be located 50m from the plant in the downwind direction. Use method specified by CPCB for analysis	Air (prevention and Control of Pollution) Rules, CPCB, 1994	Once in every season for three seasons (except monsoons) per year for each year of construction	24 hours sampling	Construction plant sites and Work Zones	4	Contractor, SC, EMU,OSRP
	Operation				Once in summer and winter for 5 year	24 hours sampling	Road side	2	EMU,OSRP
Water	Construction	All essential characteristics and some of desirable characteristics and some of desirable characteristics as decided by the environmental specialist of the SC and OSRP	Grab sample collected from source and analyze as per standard methods for Examination of Water and Wastewater	Indian Standard for Inland surface Waters (IS:2296,1982) and for Drinking Water (IS: 10500-1991)	One in every season for all four seasons	Grab sampling	Drinking water samples from the labour camps and from hand pumps surface water from the water courses near the work sites	4	Contractor, SC, PIU, EMU, OSRP
	Operation				One in every season for all four seasons	Grab sampling	surface water sources	2	EMU,OSRP
Noise	Construction	Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 from edge of pavement	MoEF Noise Rules, 2000	One in every season during the construction	Leq in dB (A) of day time and night time	Near the construction camps, working zones, sensitive receptors and construction plant sites	As required	Contractor, SC, PIU, EMU, OSRP

	Operation	Noise levels on dB (A) scale Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 from edge of pavement	MoEF Noise Rules, 2000	One in every seasons for 5 year after completion of construction activity	Leq in dB (A) of day time and night time	Sensitive receptors	As required	EMU,OSRP
Soil	Construction	Monitoring of Pb, SAR and Oil & Grease	Sample of soil collected to acidified and analyzed using absorption spectrophotometer	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	During the pre monsoon & post monsoon season each year for the entire construction period	Grab sampling	construction camp/plant sites and productive agricultural lands abutting traffic detours and traffic diversions and major intersections	4	Contractor, SC, PIU, EMU, OSRP
						Grab sampling	surface water sources	2	
Soil	Operation	Monitoring after any major accidents/ spillage during bulk transport of hazardous material. Depending on the type of spillage /accident the parameters to be monitored will be decided by the engineer apart from those mentioned above.							EMU,OSRP

Annexure – IX

Reporting System

Item	Contractor	Supervision		OSRP		World Bank (WB)
	Implementation and Reporting to SC	Supervision	Reporting to OSRP	Oversee Compliance Monitoring	Report to WB	Desired Supervision
Construction Stage						
Monitoring of Construction site and construction camp	Before start of work	Regular	Quarterly		Quarterly	Half Yearly
Pollution Monitoring	As required	As required	Quarterly	Quarterly	After Monitoring	Half Yearly
Monitoring of Enhancements	Implementation	Regular	Quarterly	Quarterly	Half Yearly	Half Yearly
Top Soil Preservations	Weekly	Weekly	Quarterly	Quarterly	Half Yearly	Half Yearly
Borrow Area	Regular	Weekly	Quarterly	Quarterly	Half Yearly	Half Yearly
Tree Cutting	Weekly	Weekly	Quarterly	Quarterly	Half Yearly	Half Yearly
Tree Plantation	Monthly	Monthly	Monthly	Quarterly	Half Yearly	Half Yearly
Operation Stage						
Pollution Monitoring				As per Monitoring Plan	After Monitoring	Twice during operation Phase

Annexure – X

Summary Details of Reporting Formats

Item	Stage	Contractor	Forest Department	Construction Supervision Consultant (SC)	
		Implementation and Reporting to SC	Implementation & Reporting to OSRP	Supervision	Reporting to OSRP
Identification of temporary storage yards and Management Plan	Pre Construction	one Time	-	One Time	One Time
Approval of Construction Camp/ Plant site and its Management Plan	Pre Construction	one Time	-	One Time	One Time
Approval of Borrow Management Plan (General and Specific)	Pre Construction	General- One Time Specific redevelopment plan- one for each borrow area	-	Regular	Quarterly
Solid Waste Management Plan (General and Specific)	Pre Construction	General- One Time Specific plan one for each camp or plant site	-	Regular	Quarterly
Construction Camp and Plant Site Management	construction	Monthly	-	Regular	Quarterly
Top Soil Management	construction	Monthly	-	Regular	Quarterly
Pollution Control and Construction Plants	construction	Monthly	-	Regular	Quarterly
Pollution Monitoring	Construction and Operation	--	-	Regular	Quarterly
Vehicles and Pollution Control	Construction	Monthly	-	Regular	Quarterly
Details of the DG sets and pollution control	Construction	Monthly	-	Regular	Quarterly
Details of Oil Storage	Construction	Monthly	-	Regular	Quarterly
Working at water Courses and Pollution Control	Construction	Monthly	-	Regular	Quarterly
Details of Water Extraction	Construction	Monthly	-	Regular	Quarterly
Details of Personal Protective Equipment	Construction	Monthly	-	Regular	Quarterly
Status of Consent for Water Extraction	Construction	Half yearly	-	Half yearly	Half yearly
Deviation and Corrective actions	Construction	-	-	Monthly	Quarterly
Tree Plantation	Construction and Operation	-	Quarterly	-	Quarterly
Plantation of shrubs and grass	Construction and Operation	As applicable	-	As applicable	As applicable
Implementation of Enhancement	Construction	Monthly	-	Regular	Quarterly

Measures for Cultural Properties, Water Bodies and Incidental Spaces					
Status Regarding Rehabilitation of Borrow Areas	Operation	-	-	-	Half yearly
Noise Barrier construction	Operation	As applicable	-	Quarterly	Quarterly
Survival rate of plants	Operation	-	Quarterly	-	-

ANNEXURE – XI

LIST OF SIGNAGE

1. YOU ARE ENTERING ELEPHANT COUNTRY -
   WATCH OUT
   LET THEM PASS UNDISTURBED.

2. YOU ARE IN ELEPHANT COUNTRY
   DRIVE SLOW – USE DIPPER -
   DON'T BLARE HORN –

3. DON'T DISTURB WILD ANIMALS -
   THEY HAVE A RIGHT OF WAY -

4. FOREST FIRE KILLS ANIMALS AND PLANTS
   HELP TO PREVENT IT

5. WILDLIFE IS OUR PRECIOUS HERITAGE
   HELP CONSERVE IT

6. LITTER POLLUTES
   DON'T LITTER – LEAVE THE GROUND CLEAN

7. DON'T LEAVE BURNING OBJECTS -
   THIS MAY SPREAD AND DESTROY

8. BEAR PASSAGE -
   LET THEM PASS UNDISTURBED

9. BEAR PASSAGE -
   WATCH OUT -
   - GIVE THEM A SAFE PASSAGE

1. YOU ARE ENTERING BIOSPHERE RESERVE
   HELP PROTECT BIODIVERSITY
   DON'T PICK UP SPECIMENS

2. THIS TRACT IS RICH IN BIODIVERSITY
   "HELP PRESERVE FOR POSTERITY".

3. REPTILE CROSSING
   WATCH OUT
   DRIVE SLOW

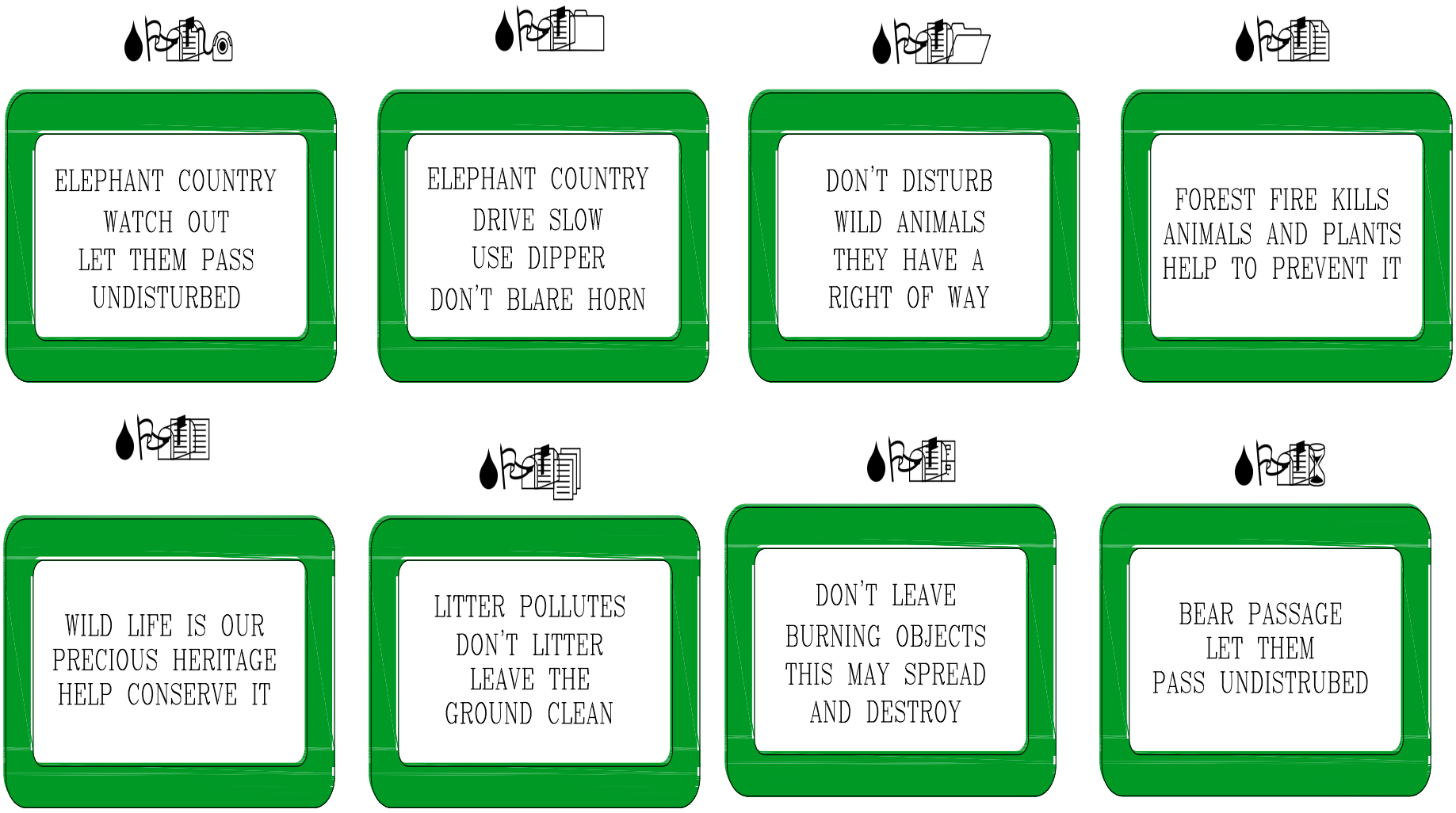
4. CAPTURING /HUNTING WILD ANIMALS IS AN
   OFFENCE
   – AVOID IT.

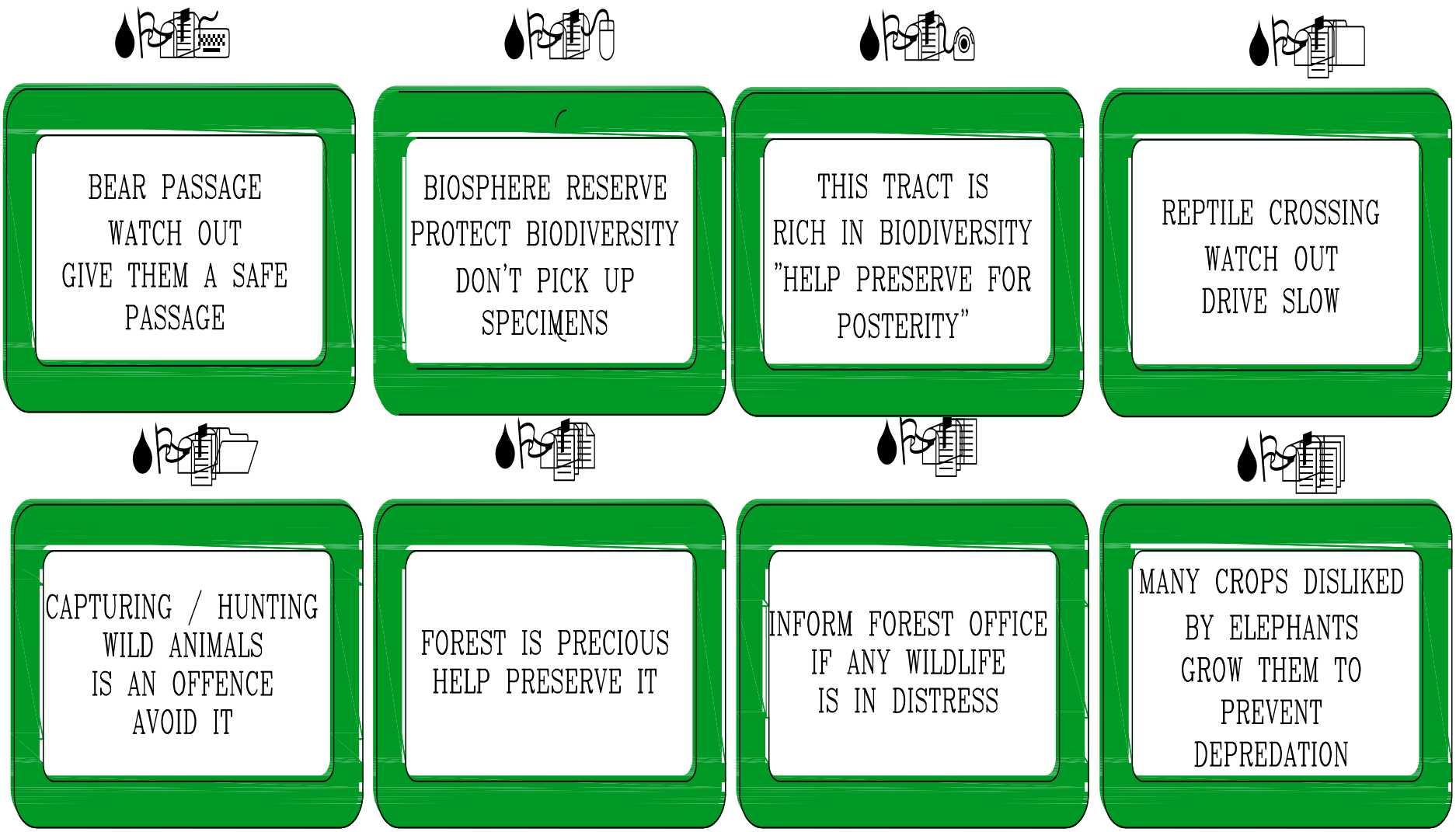
5. FOREST IS PRECIOUS
   HELP PRESERVE IT

6. INFORM FOREST OFFICE
   IF ANY WILDLIFE IS IN DISTRESS

7. MANY CROPS DISLIKED BY ELEPHANTS
   – PLANT THEM TO PREVET DEPREDATION

8. WILDLIFE CRIME AND ABETMENT ARE PUNISHABLE
   – AVOID IT.

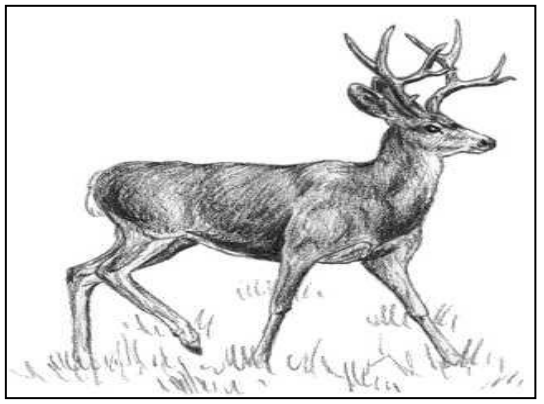

ELEPHANT COUNTRY
WATCH OUT
LET THEM PASS
UNDISTURBED
ELEPHANT COUNTRY
DRIVE SLOW
USE DIPPER
DON'T BLARE HORN
DON'T DISTURB
WILD ANIMALS
THEY HAVE A
RIGHT OF WAY
FOREST FIRE KILLS
ANIMALS AND PLANTS
HELP TO PREVENT IT
WILD LIFE IS OUR
PRECIOUS HERITAGE
HELP CONSERVE IT
LITTER POLLUTES
DON'T LITTER
LEAVE THE
GROUND CLEAN
DON'T LEAVE
BURNING OBJECTS
THIS MAY SPREAD
AND DESTROY
BEAR PASSAGE
LET THEM
PASS UNDISTRUBED


BEAR PASSAGE
WATCH OUT
GIVE THEM A SAFE
PASSAGE
BIOSPHERE RESERVE
PROTECT BIODIVERSITY
DON'T PICK UP
SPECIMENS
THIS TRACT IS
RICH IN BIODIVERSITY
"HELP PRESERVE FOR
POSTERITY"
REPTILE CROSSING
WATCH OUT
DRIVE SLOW
CAPTURING / HUNTING
WILD ANIMALS
IS AN OFFENCE
AVOID IT
FOREST IS PRECIOUS
HELP PRESERVE IT
INFORM FOREST OFFICE
IF ANY WILDLIFE
IS IN DISTRESS
MANY CROPS DISLIKED
BY ELEPHANTS
GROW THEM TO
PREVENT
DEPREDATION

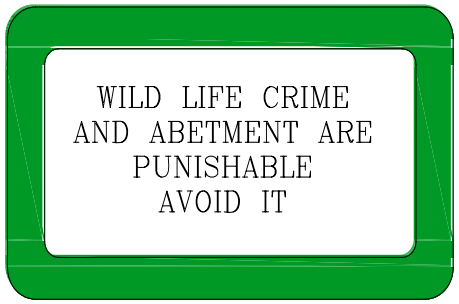
SP – 46

SP – 47

SP – 48



SP – 49



1. jÉú iõelY @• k c]ýùe iZKðZûe ij ~ûZûdûZ Ke«ê ö
Zúaâ @ûùfûK aýajûe I gŸ Ke«ê ^ûjó ö

ùicû^uê ÊQ¦ùe ~òaûKê \ò@«êö

2. jÉú iõelY @• kùe ~û^ aûj^e MZò ^òd«Y Ke«ê ö
iZKðZûe ij ~û@û«ê öCy gŸ I Zúaâ @ûùfûK aýajûe Ke«ê ^ûjóö

3. Êz¦ ~ûZûdûZ a^ý _âûYú cû^ue ÊZü iò¡ @]ôKûe ö
ùicû^u ~ûZûdûZùe aýûNûZ iéÁò Ke«ê ^ûjóö

4. Rwfeê \ê¿ûâ_ý aélfZû I _gê_lú @_iûeY Ke«ê ^ûjóö
Gjû ùicû^u aòùfû_e KûeY ùjûA_ûùeö

G[ô_ûAñ a^ý_âûYú @]ôKûeúu ij _eûcgð I @^êcZò @_eòjû~ðýö

5. Rwf I a^ý _âûYú @ûce RûZúd ic• ò I ibýZûe ^ò\gð^ö
GMêWòKe iêelû Ke«êö

a^ûMÜú iað^ûgeKûeY G[ôeê RwfKê elû Ke«ê ö

Rwfùe ^ò@ñû fMûAaû GK @_eû]ö G[ôeê ^òaéZ jê@«êö

Rk«û _\û[ð Rwfùe QûWò @ûi«ê ^ûjó ö

Gjû @ù^K Rúa R«ê I aélfZûe aò^ûge KûeY ùjûA_ûùeö

6. aRýð aÉê _â\ihY KûeKö
Gjû aòbò^Ü ùeûMe _âiûeùe iûjû~ý Kùe ö

aòlò¯ bûaùe aRýð aÉê _KûA ^eLô

GjûKê GK _ûZâùe iõMâj Ke«ê ö

~[û- @ûaRð^û KêŠùe _Kû«êö

7. bûfê cû^u ~òaû @ûiòaû eûÉû ö

iZKð eêj«ê ö ùicû^ue gû«ò bw ^ Keò ÊQ¦ùe eûÉû

_ûe ùjaûKê \ò@«êö

8. @û_Yue ^òeû_• û @ûce Kûcý ö
a^ý R«êu ~ûZûdZ _[ùe \éZ MZòùe ~û^aûj^ PfûAaû

Kò´û

gŸ â\ihY \ßûeû ùicû^uê bdbòZ KeûAaû @û_Yu

aò_\e KûeY ùjûA_ûùeö

9. Zòaâ @ûùfûK I Cy gŸ aýajûe Ke«ê ^ûjóö
]ôùe Pfû«ê ^òeaZû @af˝^ Ke«êö

10. @ûMùe a^ý _âûYú I a^ý RûZ Z^Lô `ûUK ö
bûe_âû¯ @]ôKûeúu ij ijù~ûM Ke«ê

Gaõ

Rwfe iêelûùe iûjû~ýðKe«êö

11. Rwf RûZ \âaý e ùPûeûPûfûY a¦ Ke«êö

12. a^ý _âûYú, a^fZûe @gõ aòùgh aò^û @^êcZòùe @bdûeYý
Kò´û

ùR÷a cŠkeê iõfMÜ @• keêê iõMâj Ke«ê ^ûjóö

13. Rwf I a^ý _âûYú @û_Yue iµ• ò
Gjûe ùPûeûPûfûY, gòKûe @û\ò a¦Keòaû \òMùe Z^Lô

`ûUK @]ôKûeúuê ijù~ûM Ke«ê

14. eûÉû C_ùe MûWò cUe eL«ê ^ûjó-
C¡òÁ iŰû^ùe MûWò cû^ Z^Lô _ûAñ QòWû Ke«ê ö

15. @ûMùe a^ý _âûYú I a^ý RûZ Z^Lô `ûUK ö
bûe_âû¯ @]ôKûeúu ij ijù~ûM Ke«ê

Gaõ

Rwfe iêelûùe iûjû~ýðKe«êö

16. Rwf RûZ \âaý e ùPûeûPûfûY a¦ Ke«êö

17. a^ý _âûYú, a^fZûe @gõ aòùgh aò^û @^êcZòùe @bdûeYý
Kò´û

ùR÷a cŠkeê iõfMÜ @• keêê iõMâj Ke«ê ^ûjóö

18. Rwf I a^ý _âûYú @û_Yue iµ• ò
Gjûe ùPûeûPûfûY, gòKûe @û\ò a¦Keòaû \òMùe Z^Lô

`ûUK @]ôKûeúuê ijù~ûM Ke«ê

19. eûÉû C_ùe MûWò cUe eL«ê ^ûjó-
C¡òÁ iÚû^ùe MûWò cû^ Z^Lô _ûAñ QòWû Ke«ê ö

Annexure - XII

Earthwork in excavation in all kinds of soil of foundation for structures complete as per drawing and Major Junction and technical specifications clause 304 including all leads and lifts

		Unit	Location	No	Length	Breadth	Height	Quantity by Contractor
	To be done by Contractor							
1	Toe Wall for Water Bodies	Cum	1900	1	1.00	1.20	1.00	2280.00
2	Inteception Barricade	Cum	16	1	20.00	0.75	0.83	198.00
								2478.00
	To be done by R&B Division							
1	Temple Boundary Wall	Cum	63	1	30.00	0.70	1.05	1389.15
2	School, Government Building Boundary Wall	Cum	1166	1	30.00	0.75	0.83	21634.59
3	Gate Pillars	Cum	24	2	0.75	0.75	0.75	20.25
4	Spillway Gate for Water Bodies.	Cum	3	1	1.30	2.75	3.15	33.78
	Spillway Triangular Portion	Cum	3	1	2.00	2.50	2.13	31.88
		Cum	3	1	1.50	3.60	0.95	15.39
		Cum	3	1	3.00	3.30	0.60	17.82
5	Bathing Ghat							
	Long Wall	Cum	4	2	8.60	0.90	0.70	43.34
	Cross Wall	Cum	4	1	6.10	0.90	0.70	15.37
		Cum	4	1	6.10	0.75	0.70	12.81
		Cum	4	1	6.95	6.10	0.70	118.71
								23333.09

ANNEXURE - XIII

Filling sand below foundations for structures complete and technical specifications clause 304 including all leads and lifts

		Unit	Locations	No	Length	Breadth	Height	Quantity
	To be done by Contractor							
1	Toe Wall for Water Bodies	Cum	1	1	1900.00	0.30	1.00	570.00
								570.00
	To be done by R&B Division							
1	Bathing Ghat	Cum	4	1	6.95	6.10	1.20	203.50
								203.50

ANNEXURE - XIV

Providing & laying in position **Cement Concrete M-15 grade** in foundation, levelling course etc. including centering and shuttering all complete as per drawing no. OSRP/CEG/SH/ENV/1-A,B,C,D,03,04-A,05-A,07,09,10,12 and Technical Specification Sections 1500 and 1700.

		Unit	Locations	No	Length	Breadth	Height	Quantity
	To be done by Contractor							
1	Toe Wall for Water Bodies	Cum	1900	1	1.00	1.20	0.40	912.00
			1900	1	1.00	0.45	1.10	940.50
	Parapet Wall		1900	1	1.00	0.30	0.20	114.00
2	Inteception Barricade	Cum	16	1	20.00	0.75	0.08	18.00
							TOTAL	1984.50
	To be done by R&B Division							
1	Temple Boundary Wall	Cum	1	1	63.00	0.70	0.15	6.62
2	School, Government Building Boundary Wall	Cum	1	1	1165.5	0.75	0.08	65.56
3	Spillway Gate for Water Bodies.	Cum	3	1	1.30	2.60	0.15	1.52
			3	1	3.50	2.95	0.15	4.65
4	Bathing Ghat	Cum	4	2	8.60	0.90	0.15	9.29
			4	1	6.10	0.90	0.15	3.29
			4	1	6.10	0.75	0.15	2.75
	1st Footing	Cum	4	2	8.60	0.75	0.50	25.80
	2nd Footing		4	2	8.60	0.45	0.75	23.22
	Cross Wall							
	D/S		4	1	6.25	0.75	0.50	9.38
			4	1	6.55	0.45	0.75	8.84

	U/S		4	1	6.55	0.75	0.75	14.74
							TOTAL	175.64

ANNEXURE-XV

Providing & laying in position **Cement Concrete M-20 grade** in foundation, levelling course etc. including centering and shuttering all complete as per drawing no. OSRP/CEG/SH/ENV/09,10 and Technical Specification Sections 1500 and 1700.

		Unit		No	Length	Breadth	Height	Quantity
To be done by R&B Division								
1	Spillway Gate for Water Bodies.							
	Cross Weir							
		Cum	3.00	1.00	1.00	0.08	1.70	0.38
			3.00	1.00	1.00	0.50	1.70	2.55
			3.00	1.00	1.00	0.50	1.70	2.55
2	Bathing Ghat							
	Cross Wall	Cum	4	1.00	8.60	7.00	0.15	36.12
							TOTAL	41.60

ANNEXURE-XVI

Providing & laying in position **Cement Concrete M-20 grade** in superstructure,foundation, levelling course etc. including centering and shuttering all complete as per drawing no. OSRP/CEG/SH/ENV/04-(A,B), 05, 05-A,10 and Technical Specification Sections 1500 and 1700.

		Unit		No	Length	Breadth	Height	Quantity
	To be done by Contractor							
1	Inteception Barricade	Cum	16.00	1.00	20.00	0.75	0.15	36.00
			16.00	1.00	20.00	0.35	1.00	112.00
								148.00
	To be done by R&B Division							
1	Temple Boundary Wall	Cum	1.00	1.00	63.00	0.70	0.20	8.82
			1.00	1.00	63.00	0.20	2.40	30.24
2	School, Government Building Boundary Wall	Cum	1.00	1.00	1165.50	0.75	0.15	131.12
	Wall		1.00	1.00	1165.50	0.20	2.45	571.10
	IJ							
3	Gate Pillars		24.00	2.00	0.75	0.75	0.40	10.80
			24.00	2.00	0.35	0.35	2.50	14.70
								766.77
4	Spillway Gate for Water Bodies.							
	Bed		3.00	1.00	1.30	2.60	0.30	3.04
			3.00	1.00	3.50	2.95	0.30	9.29
	Curtain Wall	Cum	3.00	2.00	1.30	0.30	2.70	6.32
			3.00	2.00	3.20	0.30	1.60	9.22
			3.00	2.00	1.50	0.30	0.50	1.35
			3.00	2.00	3.60	0.30	0.30	1.94
								797.94

Junction Islands

Kerbs At Km.0/0

1.00	110.90	0.14	0.25
1.00	82.30	0.14	0.25

Kerbs At Km.24/590

1.00	37.67	0.14	0.25
1.00	23.95	0.14	0.25
1.00	38.76	0.14	0.25
1.00	25.17	0.14	0.25

For errecting MS grills

Kerbs At Km.0/0

1.00	110.90	0.25	0.40
1.00	82.30	0.25	0.40
1.00	37.67	0.25	0.40

Kerbs At Km.24/590

1.00	23.95	0.25	0.40
1.00	38.76	0.25	0.40
1.00	25.17	0.25	0.40

ANNEXURE-XVII

Cutting, bending, binding, tieing HYSD bar reinforcement with MS wires with cost conveyance, taxes etc, complete as per Drawing NO. OSRP/CEG/SH/ENV/04-A,B,5,5A,10 and Technical Specification Clause 1600 and as per the Engineer.

	Unit		No	Length	Breadth	Height	Quantity
To be done by Contractor							
Interceptive Barricade							
Quantity same as RCC M-20	MT	148.00	@	0.60	Qntl/Cum		8.88
To be done by R&B Division							
Quantity same as RCC M-20	MT	797.94	@	0.60	Qntl/Cum		47.88

ANNEXURE-XVIII

Constructing hard Laterite stone masonry in C.M 1:3 (at bathing ghat) as per technical specification cl. No. 1400, 2200 as per Drawing No. OSRP/CEG/SH/ENV/09 and as per the direction of Engineer.

	Unit	Locations	No	Length	Breadth	Height	Quantity
To be done by R&B Division							
Bathing Ghat							
1st Footing							
Long wall	Cum	4.00	2.00	10.00	0.75	0.50	30.00
Cross Wall		4.00	2.00	10.00	0.50	0.75	30.00
2nd Footing							0.00
Cross Wall		4.00	1.00	6.50	0.75	0.50	9.75
Long wall		4.00	1.00	6.50	0.75	0.75	14.63
							84.38
Providing **cement pointing** to Laterite Stone masonary 20mm thick with CM(1:3) for side wlls at bathing Ghats locations as per drawing no. OSRP/CEG/SH/ENV/9 and as per direction of Engineer-in-Charge.							
Cross Wall		4.00	1.00	6.50		0.50	13.00
Long wall		4.00	1.00	6.50		0.75	19.50
							32.50

ANNEXURE XIX

Providing and laying filter material under neath the pitching of slopes at water bodies and ponds.

	Unit	Locations	No	Length	Breadth	Height	Quantity
To be done by Contractor							
Toe Wall for Water Bodies							
Slope packing	Cum	1.00	1	1900	4.00	0.15	1140.00

ANNEXURE XX

Providing and laying of boulder approns at spilling locations

	Unit	Locations	No	Length	Breadth	Height	Quantity
To be done by R&B Division							
Spillway Gate for Water Bodies.	Cum	3.00	1.00	3.00	3.30	0.60	17.82

ANNEXURE XXI

Providing and laying of boulder approns at spilling locations

	Unit	Locations	No	Length	Breadth	Height	Quantity
To be done by Contractor							
Toe Wall for Water Bodies							
Slope packing	Cum	1.00	1	1900	4.00	0.23	1748.00

ANNEXURE XXII

Miscillaneous Items

Sl No.	Items	Unit	Locations	No	Length	Breadth	Height	Quantity
	To be done by Contractor							
1	Providing cement paint two coats to the walls as per drawing and direction of Engineer-in-Charge.							
	Toe Wall for Water bodies	Sqm	1900	1	1.00	1.00		1900.00
	Interceptive Barricade	Sqm	16	2.00	20.00	1.00		640.00
								2540.00
2	Construction of 100m long 100mm thick **approach road with GSB and moorum topping** well mixed and compacted as hard sholder as per technical spection clause 400.2 drawing no OSRP/CEG/SH/ENV/05 and as per direction of Engineer-in-Charge							
		Cum	16	2.00	50.00	3.00	0.20	960.00
3	Maintenance of haulage road for 4 occurances throughout the construction period as per technical specification clause no. 3002 asnd direction of Engineer-in-Charge.	Cum	2.00	22500.00				45000.00
4	Silt fencing of water bodies to avoid increse of turbidity of water & avoid soil errosion by filled up sand in bags of cement/jute with support of non-sal bullahs 50mm dia of 1.0m above and 0.50m depth below soil and as per drawing							
	Total nos of Ponds	Rm	L.S.					1000.00
5	Grouting stone pitching on embankments of reptile passes for making trap drain 23cm deep with Cement Concrete M15 grade using 20mm down stone aggregates as per drawing no-OSRP/CEG/ENV/14, technical specifications including cost of all materials, labour,transportation,taxes, sundries, curing, T&P etc. and as per the direction of the Engineer.							

		Sqm.	27	2.00	9.00	2.00		972.00
	To be done by R&B Division							
1	Supplying and fixing of MS Grill Gates at schools/ Government Buildings including cost of enamel painting two coats over a coat of red oxide as per drawing and as per technical spections on building items and direction of Engineer-in-Charge.	Kg.	24	4.40	2.20	@Kg/sqm	37.67	8752.64
2	Supplying and fixing of **MS ISA 7575 of 5mm thick angle posts**, split 70mm at botton end including cost of enamel painting two coats over a coat of red oxide to be fixed vertically in position in concrete and holes drilled drilled in it @ 150mm C/C as per drawing and as per technical spections on building items and direction of Engineer-in-Charge.	Kg.	819.00	1.00	1.20	@Kg/RM	5.70	5601.96
3	Providing and **GI barbed wire** twisted with 2 wires of 16BWG @ 4" barb spacing including cost of material, labour all complete as per Drawing No.OSRP/CEG/SH/ENV/04B and technical spections on building items and direction of Engineer-in-Charge.	Kg.	1228.50	6.00	1.00	@Kg/RM	0.10	737.10
4	Providing and fixing fixed flower vase of bottom(150x150), top (400x400) of depth 300mm and 40mm thick CC M-20 grade as per Drawing No.OSRP/CEG/SH/ENV/04-B and direction of Engineer-in-Charge.	Nos	63	1	@1.5m			42
5	Construction of approach road with GSB and moorum topping well mixed and compacted as hard sholder as per technical specification clause 400.2 as per direction of Engineer-in-Charge.	Rm	16	60				960.00
6	Providing **cement paint two coats to the walls** as per drawing No. OSRP/CEG/SH/ENV/04A,B,05A and direction of Engineer-in-Charge.							
	Bathing Ghats	Sqm	4	1	1.00	1.00		4.00
	Temple Boundary Wall	Sqm	63	2	1.00	1.50		189.00

School and Govt. Building Boundary Wall	Sqm	1166	2.00	1.00	1.25	2913.75
Gate Pillars	Sqm	24	2.00	1.40	2.20	147.84
						3254.59

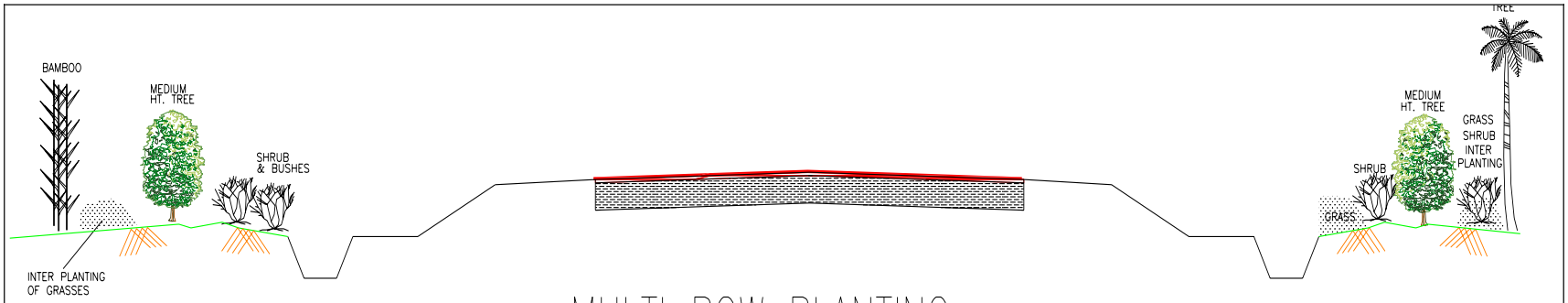
ANNEXURE XXIII

COSTING OF SOAK PIT FOR BUS TRUCK LAY BAY (DRG. NO-ENV -06)

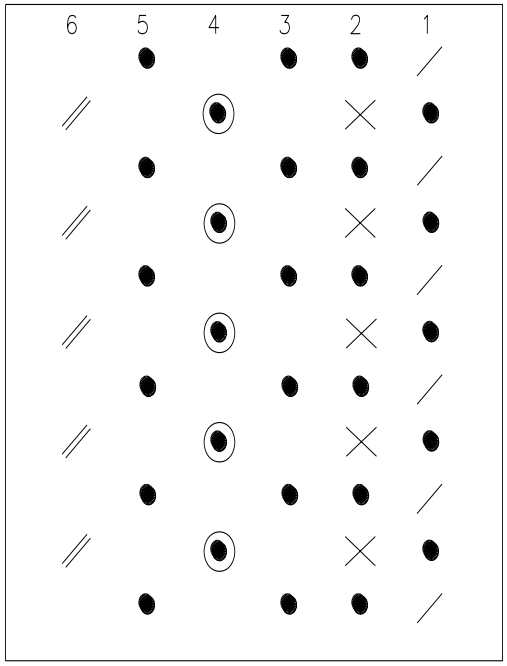
SL No.	ITEM	Unit	No	Lenth	Breadth	Height	Quantity	Rate	Cost
1	Earthwork in excavation	cum	1	15	3	1.20	54.00	34.60	1868.40
2	Sand filling for P.C.C	cum	1	15	3	0.1	4.50	398.20	1791.90
1	Foundation P.C.C M15	cum	1	15	3	0.1	4.50	4377.90	19700.55
2	R.C.C M20 for slab	cum	1	10.75	3	0.1	3.23	5047.20	16277.22
3	Supplying, fitting and placing HYSD bar for reinforcement as per specifications 1600&2200 &Sl13.6 of MORT&H	MT	**@ 80kg per cum**				0.26	64153.50	16551.60
4	a)Brickwork for Collection pit	cum	1	34	0.25	1.5	12.75		
	b)Brickwork for soak pit	cum	1	10	0.25	1.15	2.88		
	c)Brickwork for collection pit	cum	1	3	0.25	1	0.75		
		cum				Total	16.38	5135.00	84085.63
5	12mm thick Cement Plaster 1:3 as per Cl.1300 &2200&Sl13.3 of MORT&H	sqm	1	34		1.5	51.00		
	12mm thick Cement Plaster 1:3 as per Cl.1300 &2200&Sl13.3 of MORT&H	sqm	1	10		1.15	11.50		
	12mm thick Cement Plaster 1:3 as per Cl.1300 &2200&Sl13.3 of MORT&H	sqm	1	3		1	3.00		
		sqm				Total	65.50	43.00	2816.50
							Total Cost		**143091.80**
								Say	**143092.00**

ANNEXURE – XXIV (A)

BIO-ENGINEERING SLOPE PROTECTION MEASURES & AVENUE PLANTING



MULTI ROW PLANTING



LEGEND

1st & 2nd draw 1 x 1 mtr.

3rd, 4th, 5th, 6th 2 x 2 mtr

in Staggered pattern from plant to plant.

SPECIES :–

1st Row – Alternate flowering Shrubs and soil binder grasses.

2nd Row – Shrubs and bushes

3rd Row – Dwarf flowering trees or Semiever green trees.

4th & 5th row – Tall trees with long life span dee root system and fruits for birds and rodents.

5th Row – NTFP & Shade provider aesthetically appealing

6th Row – Shrubs & Bushes

ANNEXURE – XXIV (B)

WILD LIFE UNDER PASS ON DRY LAND/FOREST TRACK

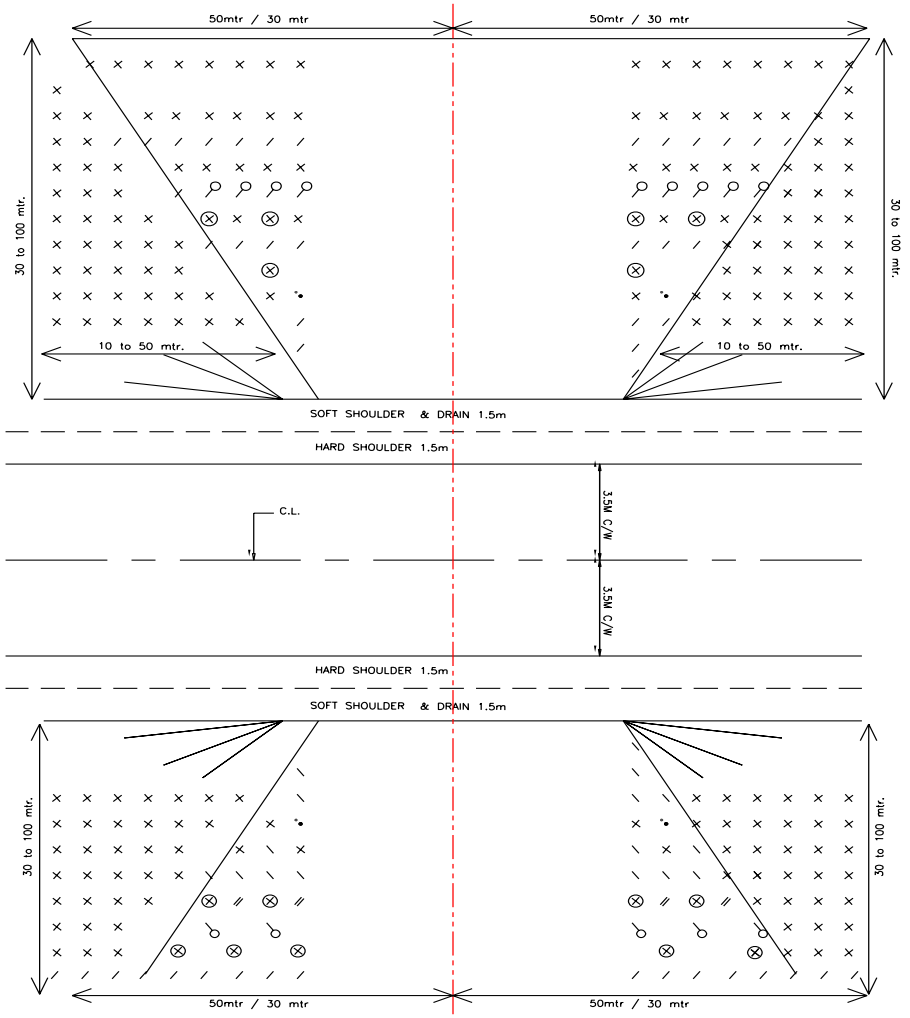
FOR BEAR / ELEPHANTS UNGULATES

FOR ELEPHANTS — 50Mtr x 100Mtr. Either Side of the Opening & Both Side of the Road

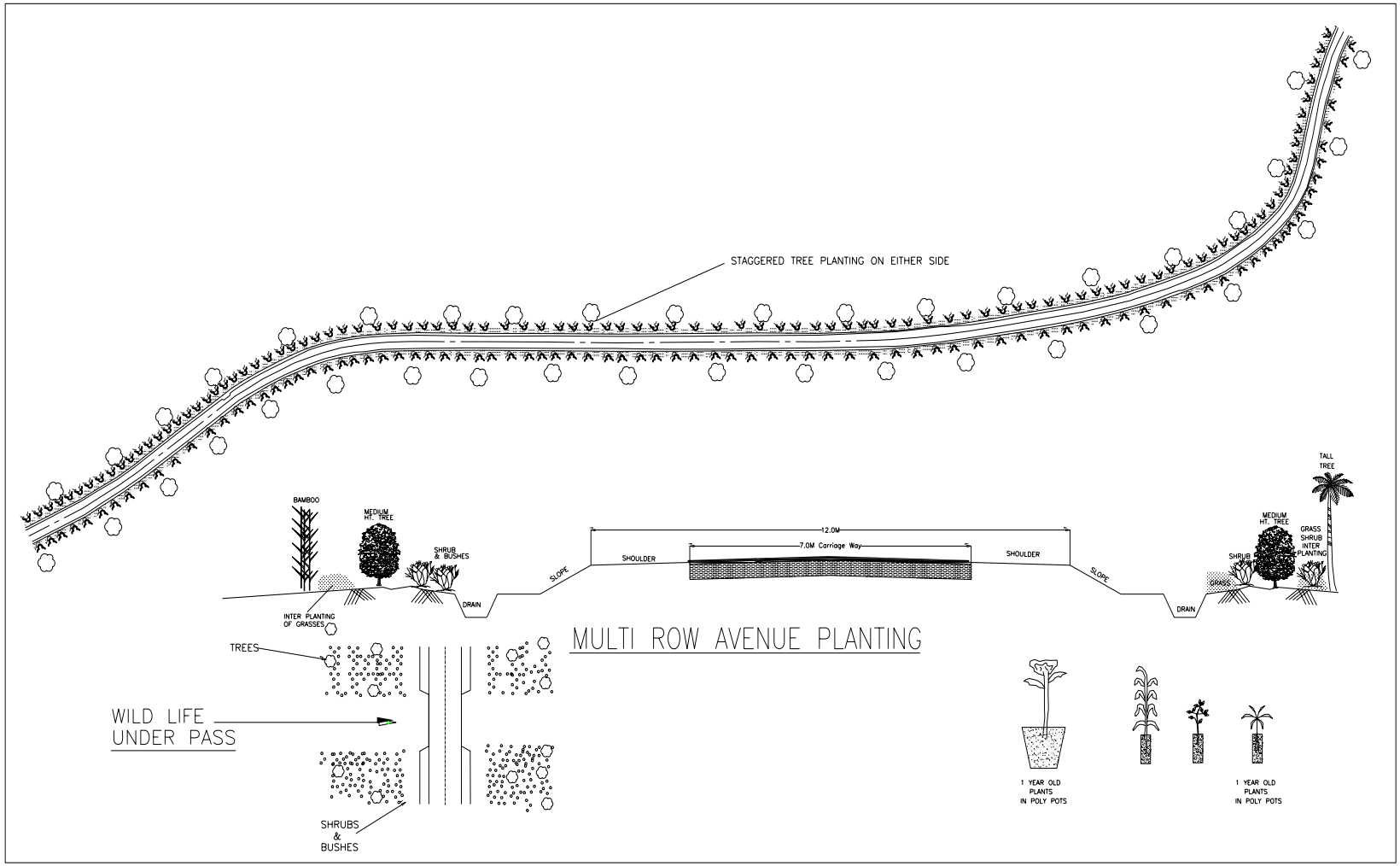
FOR OTHERS — 30Mtr. on Either side of the Opening & & Both Side of the Road

LEGEND

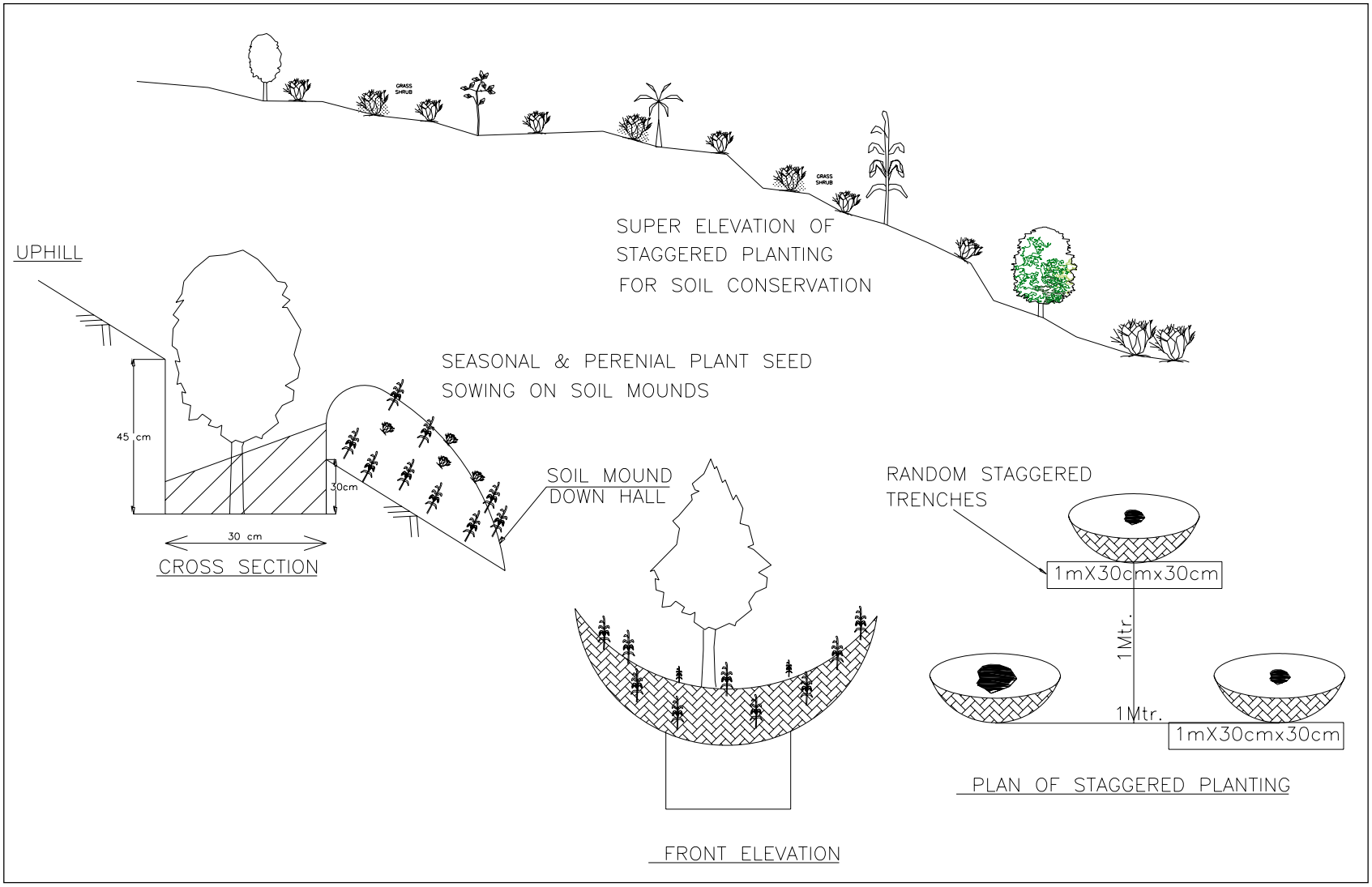
1. × GRASS SLIPS 30CM TO 1MTR APPART
2. EVER GREEN SHRUBS 1 X 1Mtr.
3. SEMI EVERGREEN AND DECIDUOUS SHRUBS 1M X 1M
4. KHUS & SABAI GRASS PLANTING
5. ⊗ TALL TREES WITH FRUITS & FLOWER 2M X 2M STAGGERED.
6. CLIMBERS / SHRUBBY CLIMBER CRAWLING OR 2.5 X 2.5 Mtr. ON GROUND



ANNEXURE – XXIV (C)



ANNEXURE – XXIV (D)



ANNEXURE XXV

Grouting stone pitching on embankments of reptile passes for making trap drain 23cm deep with Cement Concrete M15 grade using 20mm down stone aggregates as per drawing no-OSRP/CEG/ENV/14, technical specifications including cost of all materials, labour, transportation, taxes, sundries, curing, T&P etc. and as per the direction of the Engineer.

Unit = Sqm
Ref: AR-2006 Item No-10 Page-45
CC M15 using chips
Materials

CB chips 20mm size	0.90	Cum	1173.00	1055.70
Sand	0.45	Cum	304.10	136.85
Cement	3.23	Qtl	640.59	2069.11
Labour				
Mason 2nd Class	0.68	Each	190.00	129.20
Mullia	4.60	Each	150.00	690.00
Rate per 1 Cum				4080.85
(a) CC M15 as above	0.03	Cum	4080.85	122.43
(b) Extra Labour				
Mason Special	0.05	Each	205.00	10.25
Mullia	0.22	Each	150.00	33.00
c) Overhead charges @ 8% on (a+b)				13.25
d) Contractor's profit @ 0.1 on (a+b+c)				17.89
Rate per Sqm = (a+b+c+d)				196.82
			say	**196.80**

ANNEXURE XXVI

Sl. No	Description	Quantity	Unit	Rate	Amount
1	Cement Flush Pointing (1:3) to Stone Masonry works etc. comp.				
	Quantity Analysis based on Orissa Analysis of Rates-2006				
	Data for 1 Sqm				
	(a) Material				
	Sand	0.009	1 Cum	304.10	2.74
	Cement	0.043	1 Qtl	640.59	27.55
	(b) Labour				
	Mason (Second Class)	0.11	Each	190.00	20.90
	Male Mulia	0.059	Each	150.00	8.85
	Female Mulia	0.11	Each	150.00	16.50
	e) Overhead Charges@8% on (a+b)				6.12
	f) Contractor's Profit@10% on (a+b+c)				8.27
				Total	90.92
				Say	**90.90**

ANNEXURE XXVII

Providing silt fence and sediment arrestor in the construction zones and stock piles of top soil by fixing wooden posts of 100mm dia firmly to the ground at required intervals and placing closely woven fabric of coconut fibre reinforced with HDPE materials etc. complete as per drawing No OSRP/CE/PW, technical specifications including cost of all materials, labour, transportation, taxes, sundries, curing, T&P etc. and as per the direction of the Engineer.

Unit = Rmt					
Data for 75 mtr					
Materials					
100mm dia non sal bullah	30.00	Rmt	52.00	1560.00	
Coconut fibre fabric	75	Sqm	150.00	11250.00	
Metal fasteners	3	Kg	50.00	150.00	
Metal Draw String	5	Kg	50.00	250.00	
Labour fixing bullahs & nets	2	Each	150.00	300.00	
c) Overhead charges @ 8% on (a+b)				1080.80	
d) Contractor's profit @ 0.1 on (a+b+c)				108.08	
Rate 75 Mtr = (a+b+c+d)				14698.88	
Rate per 1 Mtr				195.99	
			say	**196.00**	**/ Rmt**

CHAPTER 1

INTRODUCTION

CHAPTER 2

BASELINE ENVIRONMENT SETTING AND IMPACT SUMMARY

CHAPTER 3

ENVIRONMENT MANAGEMENT PLAN

CHAPTER 4

IMPLEMENTATION MECHANISM

CHAPTER 5

BUDGETARY PROVISIONS FOR EMP IMPLEMENTATION

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REPORTING FORMATS

DRAWINGS

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