GOVERNMENT OF ORISSA
WORKS DEPARTMENT

ORISSA STATE ROAD PROJECT

PHASE I : YEAR 1

CHANDBALI - ANANDAPUR – 95 Kms
OSRP – CW – Y1 – P02

ENVIRONMENTAL MANAGEMENT PLAN

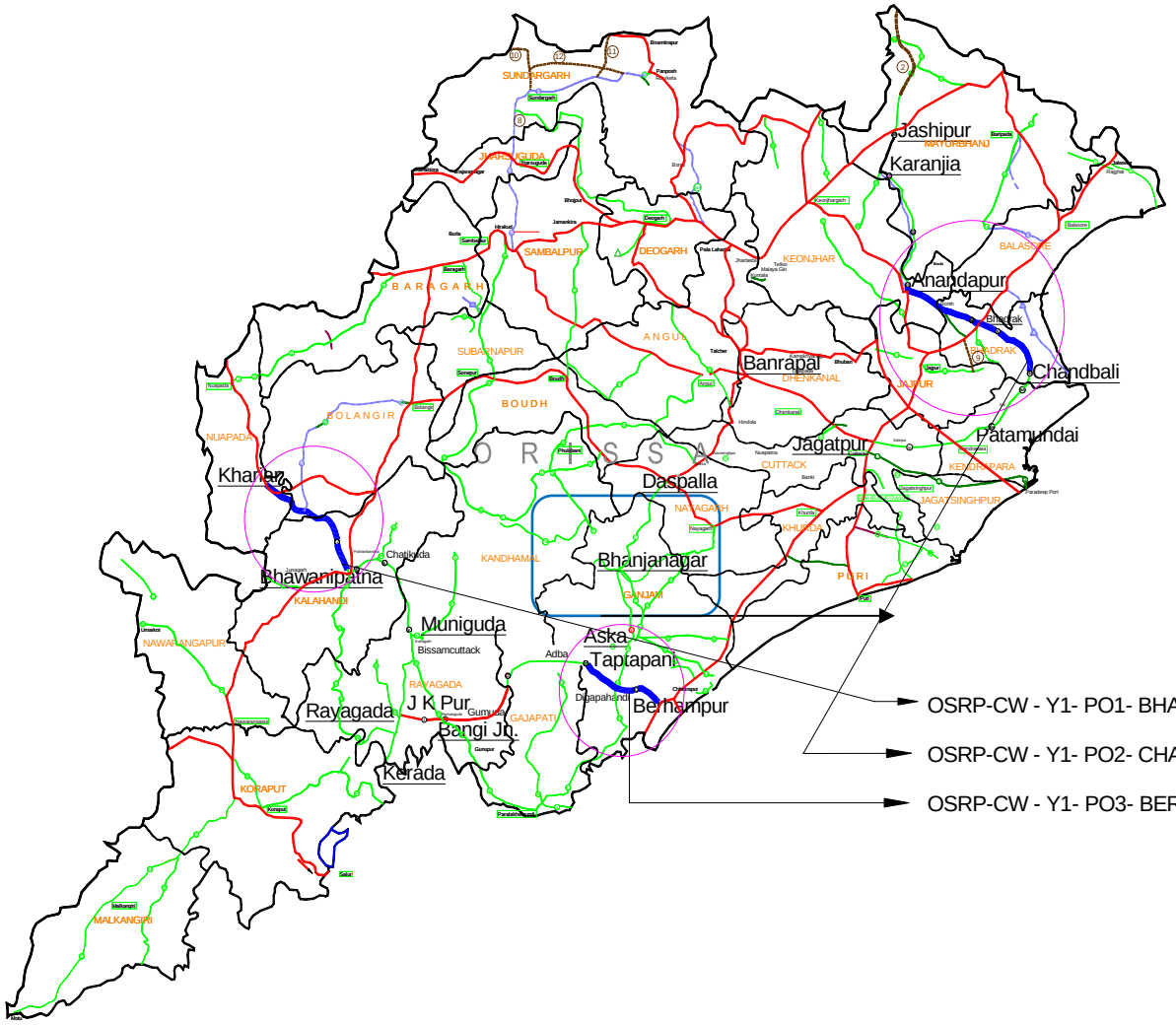
APRIL 2007

CONSULTING ENGINEERS GROUP LTD.

JAIPUR

OSRP

PROJECT ROADS OF PHASE-I, YEAR-1.



LEGEND

YEAR-1 ROADS

OSRP-CW - Y1- PO1- BHAWANIPATNA - KHARIAR

OSRP-CW - Y1- PO2- CHANDBALI- BHADRAK -ANANDPUR

OSRP-CW - Y1- PO3- BERHAMPUR -TAPTAPANI

ABBREVIATIONS

ADB	Asian Development Bank
ASI	Archaeological Survey of India
ADVs	Animal Drawn Vehicles
BP	Bank Practices
CAMPA	Compensatory Afforestation, 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
CT	Census Town
DFO	Divisional Forest Officer
DOE	Department of Environment
DPR	Detailed Project Report
EA	Environment Assessment
EAC	Expert Appraisal Committee
EIA	Environment Impact Assessment
EMAP	Environment Management Action Plan
EMP	Environment Management Plan
FACOR	Ferro Alloys Corporation of Orissa
FGD	Focus Group Discussion
GoI	Government of India
GoO	Government of Orissa
GP	Good Practices, Gram Panchayat
HAL	Hindustan Aeronautics Limited
HDVs	Human Drawn Vehicles
IBs	Inspection Bungalows
IER	Independent Environmental Review
IMD	Indian Meteorological Department
IMFA	Indian Metals & Ferro Alloys Corporation
IRC	Indian Road Congress
ISAP	Institutional Strengthening Action Plan
KBK	Koraput-Bolangir-Kalahandi
LCV	Light Commercial Vehicles
MDR	Major District Road
MoEF	Ministry of Environment & Forests
MoST	Ministry of Surface Transport
MOU	Memorandum of Understanding

NAC	Notified Area Council
NALCO	National Aluminium Company
NGO	Non Government Organization
NH	National Highway
NOC	No Objection Certificate
NTPC	National Thermal Power Corporation
O&M	Operation & Maintenance
OBCC	Orissa Bridge Construction Corporation
ODR	Other District Road
OFC	Optical Fibre Cable
OP	Operational Policies
OSPCB	Orissa State Pollution Control Board
OSRP	Orissa State Roads Project
OUAT	Orissa University of Agriculture & Technology
OWD	Orissa Works Department
PA	Protected Areas
PAPs	Project Affected Persons
PIA	Project Influence Area
PIU	Project Implementation Unit
PRI	Panchayati Raj Institutions
RCC	Reinforced Concrete Cement
R&R	Rehabilitation & Resettlement
RD	Rural Development
ROB	Road Over Bridge
RoW	Right of Way
SC	Schedule Caste
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
WB	World Bank

Executive Summary

This is one of the oldest roads from Bhadrak to the earst while Chandbali river port connecting NH-5 with the costal tracts of Orissa. Total distance from Bhadrak to the Baitarani river bridge at Chandbali covers km 51. This is one of the 9 road corridors. OSRP of Orissa Works Department has decided to develop in Phase-I project activity under Year-1 projects. This will be connected to SH-53 i.e. Bhadrak – Anandapur – Karanjia out of which the 1st package will cover 49.225kms from km0 to km49 up to district border of Keonjhar and Mayurbhanj near Godabhanga. Thus the 1st package may be called ABC package i.e. Anandapur – Bhadrak – Chandbali covering 49kms of SH-53 and 45.910kms of SH-9. The balance will be taken up in phase-I, year-2, and project activity.

The environment and Biodiversity studies for pre construction, construction and post - construction period have been evaluated and summarized in the draft final Environmental Assessment Report vividly.

This report further concentrates on site specific and corridor specific management action plan to meet the standards set forth in the reports earlier, so as to avoid, mitigate & minimize the various threats from environment and Biodiversity point of view, through out the project period of 3 years and post construction monitoring there after as would be required from time to time.

Corridor connectivity is the link between NH-5,5 A, SH -9 and 9A, proposed Dhamra port and existing Paradeep port, proposed POSCO steel plant, as well as some local development that will come up in between in the coastal belt. The mining activity in Keonjhar & Mayurbhanj district, the industries being developed in Sukinda valley shall get connected to the sea ports via SH-53 and NH-5 as well as SH-9 & 9A, when the entire corridor gets upgraded and improved.

The land acquisition proposal has been submitted to the district Collector Bhadrak containing the land ownership details of 34 revenue villages, which includes non-forestlands over 33.25 acres comprising of govt. and private land of agricultural and non-agricultural origin for SH-9. Similarly in case of Bhadrak to Anandapur the area proposed to be acquired for SH-53 portion up to 49km before Godabhanga ,will be 11.27 acres of private lands, 1.99acres of govt. land relating to Bhadrak district and 14.90acres of private land, 2.62acres of govt. land in Keonjhar district. Out of the govt. land indicated for Bhadrak and Keonjhar district portion of SH-53, there are 0.08acres of forest land pertaining to Anandapur village of Keonjhar district comprising of Gramya Jungle plot no.5130, 5148, 4944, 4308, 3389 and 3368 as per ROR details made available by the Tahasildar of Bhadrak, Bantho and Anandapur Tahasils of both the districts.

In case of SH-9 many such lands going to be acquired, are either ponds or wetlands owned by private and community. The road passes through thick habitations and the flood plains of river Baitarani besides the inter tidal flow of river mouth close to Chandbali up to Arjunabindha in case of SH-53 portion i.e. Bhadrak and Keonjhar district, the net land area going to be acquired is 13.26 and 17.52acres respectively most of which comprises of agricultural land and few government land. Few irrigation channels are running parallel / adjacent to Bhadrak – Anandapur road. The "blind" curves and "S" curves have been corrected and straightened requiring

additional agricultural and non agricultural land at three locations. It has been proposed to develop these sites as utility zones for the commuters besides avenue planting and compensatory aforestation for the forest area and avenue plants those are proposed to be felled.

In case of SH-9, the area relates to the location of Bhitar Kanika Wild life sanctuary and National Park within the impact limit of 10kms from Chandbali which is not covered due to development of a separateproject for connecting the Baitarani bridge with Arjunabindha either avoiding the Chandbali township and narrow banks of the river on the left or shoring up the deep river bank and acquiring land from the river to widen the road. The inter connectivity of road development related water pollution and soil erosion may influence the eco system of the National park down stream, which is famous for the salt water crocodile, mangroves, water birds, several kinds of fish and crustacean and mollusks besides the water monitor lizard and land monitor lizard. Therefore the proposed package has been designed up to 45^{th}.Km. only ,leaving the balance length to be taken up with the package for SH-9 A after a thorough study. The flood plains together with the inter-tidal flat beds of Agricultural land act as the best breeding ground for the above-mentioned life forms and the ever-changing soil and water salinity and fertility of the area.

Similarly for the road portion of SH-53 from km0 to km 49, the corridor passes within 3kms from Hadagada wildlife sanctuary(BAULA R.F.), near Boncho and directly intersects a zone of elephant & bear movement between 51km to 54km i.e. from Toradia nala up to Gohirabani village limits. More specifically elephant herds are damaging the agricultural crops and houses of Bankhedi and Colony sahi villages on their migratory routes from Hadagada sanctuary towards Keonjhar across river Baitarani. A provision for bear and elephant pass has been suggested at 52.800kms, which is likely to require additional land acquisition to develop a corridor of movement for wildlife up to river Baitarani. An alternate suggestion is proposed to develop small water harvesting check dams on the beds of Toradia nala to prevent the wildlife coming across this nala for water and agricultural crops. The impounded water in the reservoir in Toradia nala check dams will help in conservation of wildlife, less acquisition of agricultural land of Tribals and agricultural crops besides vegetables grown along the flood plains of river Baitarani.

Considering the cost that will be involved in providing an elephant underpass and barricading the corridor, (from the forest up to Baitarani) together with cost of land acquisition (which may come around Rs.1 crore) the development of check dams project in and around in Bankhedi before the Toradia bridge is an alternative to provide better opportunities for agriculture as well as wildlife conservation at less expenditure .It is also proposed to avoid the Elephant underpass by easing the embankment slopes at desired locations around Bankhedi on either side of the road and posting warning signposts for road users.

Adverse Impact on Environment

The road development activity, which affect the environment in 3 stages i.e. pre construction, construction and post construction period shall affect the avenue plantations where trees more than 100 years old will be required to be removed. The green tunnels, the food sources and nesting areas for many creatures will be lost. The low drainage system will get silted, the rich and fertile agricultural lands will be brought under non agricultural use, the ponds and wet lands, which are a cheap source of protein for the residents along the corridor, the houses, the drinking water sources,

schools, colleges, market places and the open causeway allowing the flood water flow un obstructed shall come under stress and some of them may altogether get lost.

There is no scope of bringing in road construction materials from nearby locality in this corridor due to the absence of sand, Morrum, granular sub grade materials, bricks, hard stones, granites or fly ash along with soil of required quality from any quarry within 15 to 20kms from the road corridor. The construction materials will be colleted from quarries located 43km away at Bagudi quarry and sand from Baitarani river between Ambagadia to Anandapur at different places as would be allowed by the Tahasildar Anandapur or from Sathipur on NH-5 .The Hot mix and Batch mix plant are proposed near Bhadrak.

Considering the above factors the effect of pre construction, construction and post construction activities, effects and assessment and monitoring mechanism precautionary measures, emergency action plan, soil and water conservation, development of habitat, avenue plantation, various cost components, conditions to be incorporated in the contract document, various stages of supervision and maintenance schedule all have been discussed after indicating the affected structures, locations, drainage systems along the corridor in the tables below. In all projects after completion of the project work much of the debris and ugly scars of development are a normal feature under Indian conditions to avoid which carefull action plan to record, monitor and improve the activities have been duly conceived and put into this report.

Table showing Land to be Acquired from Chandbali to Bhadrak (SH-9 Part) & Bhadrak to Anandapur (SH-53 Part)

SH No.	Total no. of villages covered	No. of Tahasils	Name of the Revenue district	Land area to be Acquired in Acres			Name of the Forest division	Total Land to be acquired in Acres
				Govt.	Private	Forest		
SH-9 (Part)	23	3	Bhadrak	8.92	24.37	0.00	Bhadrak Wildlife division	33.29
SH-53 (Part)	12	2	Bhadrak	1.99	11.27	0.00-		13.26
SH-53 (Part)	14	1	Keonjhar	2.54	14.90	0.08	Keonjhar forest division	17.52
Total	49	6		13.45	50.54	0.08	1 Forest division	64.07

Table showing the CPRs and Trees Likely to be Affected along with Location of Hot mix /Batch mix plants and Quarry sites of SH-9

Sl. No.	Distance	Type of Structures	Numbers		No. of Trees		Location of Hot mix & Batch mix plant	Location of Quarry		Length & quality of Haul road
			Left	Right	Left	Right		Material	Location	
1	0-46	-	-	-	3488	1915	Right 0 to 5km either side	Sand	River Baitarani at Sathipur on NH-5	37 km from Bhadrak (0km) on way to Cuttack
								Morrum	Kupari on Bhadrak – Bontho Kupari road on SH-53 and MDR	32 km from Bhadrak (0km)
								GSB & Morrum Quarry, Stone Quarry	At Baghudi hill on NH-5 9km	From Bhadrak (0km) .34 km on NH-5 and 9km on feeder road from NH-5 to quarry site
2	0-46	Religious structures partially affected	8	18	-	-	-	-	-	-
3	0-46	Hospital partially affected	3	-	-	-	-	-	-	-
4	0-46	Schools Partially affected	8	5	-	-	-	-	-	-
5	0-46	Office building Partially affected	5	0	-	-	-	-	-	-
6	0-46	Banks partially affected	1	-	-	-	-	-	-	-

7	0-45	Passenger shed at bus stop fully affected.	3	2	-	-	-	-	-	-
		Partially affected	4	5	-	-	-	-	-	-
8	0-45	Spur junction	52	74	-	-	-	-	-	-
9	0-45	New bus bay provided	20	19	-	-	-	-	-	-
10	0-45	New Toll plaza	1	1	-	-	-	-	-	-
11	0-45	Ponds & water bodies	41	42	-	-	-	-	-	-
12	0-45	Hand pumps	27	13	-	-	-	-	-	-
13	0-45	Taps	8	8	-	-	-	-	-	-
14	0-45	Well partially affected	-	1	-	-	-	-	-	-

Table showing the CPRs and Trees Likely to be Affected along with Location of Hot mix /Batch mix plants and Quarry sites of SH-53 (Part)

Sl. No.	Distance in km	Type of Structures	Numbers		No. of Trees		Location of Hot mix & Batch mix plant	Location of Quarry		Length & quality of Haul road
			Left	Right	Left	Right		Material	Location	
1	0-49.225	-	-	-	1482	1495	Left km21 /22	Sand	River Baitarani at Sathipur on NH-5	42 km from Bhadrak (0km) on way to Cuttack
							Left 45km		River Baitarani at Anandapur	1km unpaved Kuchha road
								Morrum	Kupari on Bhadrak _ Bontho Kupari road on SH-53 and MDR	32 km from Bhadrak (0km) Black top & WBM road

								GSB & Morrum Quarry, Stone Quarry	At Bhagudi hill on NH-5 -9km	From Bhadrak (0km) .34 km on NH-5 and 9km on feeder road from NH-5 to quarry site
									Gohire on NH-215 towards Jajpur road	10km from Anandapur at km45 – 1.5km from NH-215 towards right
									Chhenapadi on SH-53	4km to the right on Hadagada WBM road approval to be taken
2	0-49.225	Religious structures partially affected	7	6	-	-	-	-	-	-
3	0-49.225	Hospital partially affected	2	1	-	-	-	-	-	-
4	0-49.225	Schools partially affected	9	4	-	-	-	-	-	-
5	0-49.225	Colleges partially affected	1	1	-	-	-	-	-	-
6	0-49.225	Office building Partially affected	1	4	-	-	-	-	-	-
9	0-49.225	Passenger shed at bus stop fully affected.	3	1	-	-	-	-	-	-
		Partially affected	3	3	-	-	-	-	-	-
10	0-49.225	Spur junction	60	55	-	-	-	-	-	-

11	0-49.225	New bus bay provided	11	10	-	-	-	-	-	-
12	0-49.225	New Toll plaza	1		-	-	-	-	-	-
13	0-49.225	Ponds & water bodies	11	6	-	-	-	-	-	-
There are 2 Ponds coming within the Centre on the RoW as per the proposed alignment at km2.448 and km17.100										
14	0-49.225	Hand pumps	25	15	-	-	-	-	-	-
15	0-49.225	Taps	6	5	-	-	-	-	-	-

As per the above table the fully affected structures are to be relocated in consultation with public and the concerned departments such as, Urban development, CD & Panchayat Raj, Public Health department, Rural Water Supply & Sanitation Organization, Urban development department etc. or compensated.

FOREST and PROTECTED AREAS:

The presence of **2** protected areas i.e. Sanctuary and National park,Sanctuary at Bhitarkanika and Hadagada wildlife sanctuary in Baula R.F. along with **1** Biosphere Reserve buffer area within 10kms radius of the project brings this projects under **category A** (as per the latest guidelines issued by government of India, Ministry of Environment and forest notification No.1433 dated 14/09/2006). There is proposal to limit the development activity under Phase-I, Year-1 projects up to a distance beyond which, there is requirement for major decision on structural designs, wildlife underpasses and long diversion of the road involving fresh acquisition of land. In this case to negotiate the congested approaches up to Baitarani river bridge beyond Chandbali bazaar, the requirement of one diversion from 5km up to the bridge approach is necessary. Similarly to avoid provision of a passage for movement of elephants, bears and other wildlife across SH-53 near Bankhidi, at chainage km52.800, there is additional requirement of land acquisition for the road embankment and corridor development. The situation being volatile, a hard decision has to be taken for developing minor irrigation structure or small check dams on Toradia nala in place of the road embankment and corridor development, so that the problem of tribal discontentment can be avoided together with benefits for the wildlife and agriculture. This requires avoiding elephant underpass with combined departmental action of Forest, Irrigation, Revenue and OWD for development of check dams as source of water for wildlife. This has limited the Phase-I, Year-1 project route of Bhadrak – Chandbali and Bhadrak – Anandapur from 0km to 45km and 0km to 49km from Bhadrak, which reduces additional acquisition of tribal land and tribal resistance in Keonjhar district as well as local resistance around Chandbali. Since negligible forest land is involved within 49km of SH-53 except in Anandapur revenue village limits that too without involving reserved or protected forest, the proposal comes up with minimum acquisition of tribal and non tribal land and minimum non forest use of forest land.

Major Environmental Structures

The zone is prone to cyclone and flooding depending upon the weather condition over Bay of Bengal. Care has been taken to retain as many numbers of giant trees and green tunnels or at least in a single row of avenue plants, so that the force of cyclone and resultant destruction will be limited and nesting, perching, and feeding continues un interrupted on SH-9 & SH-53.

Sufficient number of bridges and culverts with adequate and additional span and vantage are provided with improvement of black spots on the corridor by additional geometric correction of road alignment at sharp bends and "S" curves.

Submergible zones as per the HFL data on Bhadrak – Chandbali and Bhadrak – Anandapur corridor during last rains (2006) has been considered for designing the road embankment and drainage. Pedestrian and cattle movement zones are being provided on the bridges and culverts going to be constructed afresh.

Several structures are suggested with technical details and cost for avoidance, mitigation and minimization of the impact on road users, wildlife, drainage, avenue planting, soil erosion and pollution.

Action Plan for Environment Impact Mitigation

The impact mitigation as discussed above are required to be taken up in holistic manner with a sequence of operation so that adverse effects are not magnified, rather reduced to negligible level.

Sequence of Construction to Minimize Adverse Impact

The portions of the road which were previously getting submerged prier to this project are to be taken up first of all with adequate provision of diversion facilitating movement of traffic on a firm but stable temporary road with adequate vantage above the HFL, where the entire road surface is now proposed to be cut off for constructing the bridges and culverts in place of cause way and old culverts between km 5.5-5.9, km 15-16, km 25.200 – 26, km 27.500 – 28.500, km 29.500 – 30.500, 31.600-32.700, km 33.700 – 36.500 and km 46.5 – 46.9 for Bhadrak – Chandbali portion. The non submergible zones can be developed latter on through similar sequencing keeping in view the working season and traffic load, so that over crowding is avoided. This is because such locations are inside or adjacent to markets, thick residential areas and major road junctions at km 0-1, km 2.5-4, km 13-15, km 31-33, km 43-45.

Similarly in case SH-53, the submergible portion between 4km to 17km, 34km to 36km, 39km to 43km, 45km to 48km, intermittently requires raising of embankments with additional and improved vantage. The sequencing is furnished in the table below.

Table showing sequencing of Bridge and Culvert Construction Activities on SH-9

Sl. No.	Chainage wise Sequence pattern							
	5.5-5.9	15-16	25.200 – 26	27.500 – 28.500	29.500 – 30.500	31.600-32.700	33.700 – 36.500	46.5 – 46.9
1	√	-	√	-	√	-	√	-

2	-	√	-	√	-	√	-	√
3	√	-	√	-	-	√	-	√

Table showing sequencing of Bridge & Culvert Construction Activities on SH-53

Sl. No.	Chainage wise Sequence pattern						
	4 – 6	6 – 10	10 – 15	15 - 17	34 –36	39 – 43	45 – 48
1	-	√	-	√	-	√	-
2	√	-	√	-	√	-	√
3	-	√	-	√	√	√	-
4	√	-	√	-	-	√	√

The above sequence of operations are marked according to the specific locations where submergence may dislocate the connectivity during rains and therefore proper diversion with adequate openings and adequate height has to be provided by the contractor before dismantling the existing surface and old structures.

The table showing the common property resources and sensitive receptors as indicated above relating to Schools, hostels, colleges, hospitals, Anganbadi and ANM centre, drinking water sources, temples, shrines are to be carefully treated at the time of pre construction activity for allowing them the required compensation to relocate the structures away from the RoW at identified new locations before the actual construction activity starts, which will be on the basis of the progress made in settling the compensation issue and the effective mobilization of machineries, equipments to shift the utilities and come up with construction work.

Detail design specifications have been provided in this report for implementation of various structural designs and precautionary measures in the form of guidelines and additional contract document for environment and biodiversity activity.

The use of ground water resources as drinking water source is liable to be affected during dismantling of bore wells and taps to minimize which, provision for sealing up of tube wells and taps after extracting the usable materials and fittings has been suggested. Additional provision of better sanitation facility in this poor drainage basin has been suggested by going for a raised platform around the bore wells or stand posts with connectivity to a soak pit for preventing spillage and pollution in an around such water sources together with provision of tree planting as site enhancement.

There are 7 wildlife underpasses at wetlands, creeks, drainage channels, submergible areas, such as at km 26.43, 28.83, 30.15, 31.7, 35.8, 40.9, 43.2 on SH-9 and at Km.11.867,13.507,17.002,21.024,40.242 on SH-53, (where amphibians, reptiles and rodents crossings are located) in shape of trap drains with hume pipe viaduct connectivity for preventing death of wildlife under the wheels of first moving vehicles. This is an agrarian economy where lots of carts, domestic cattle and pedestrian movement with head loads of agricultural products are on the move.

Therefore, some of the existing old bridges and culverts and all the new construction shall have additional provision for a footpath facilitate pedestrian and domestic cattle movement.

The proximity of the protected area and the movement of tidal water within 25km to 40km on SH-9 and presence of water bodies causing submergence from 0km to km17, km25 to km40, km45 to km49 on SH-53, through drains, creeks and canals has encouraged existence of numerous ponds, wet lands, which provide employment and food to local people for traditional fishing and Pisci culture. Therefore all efforts have been made to locate the labour camps, machinery and equipments, stores as well as POL in non-flood prone areas i.e. in between km 21 to km 22 besides temporary camps of men, machineries and equipments.

The abstract cost of the project for environment and biodiversity action plan with management and monitoring devices comes to Rs. 59918098.00 for SH-9 & SH-53 Phase-I, Year-1 package. This has been furnished with drawings, locations and estimation of cost for each of the items of activity, which is liable to vary in case of appreciation or depreciation of the units of activity.

Avenue plantations to replenish the lost vegetation along the corridor shall be taken up by contractor using 1½-year-old Polly pot plants not below 0.7mtrs in height planted on mounds of earth in case of wet lands and on level ground above HFL in pits of 45X45X45cm size.

The carpeting of the slopes on embankments shall be taken up through showing of Cassia tora, Tephrosia villosa, Vertiver species etc. spaced at 30cm interval from row to row.

Last but not the list almost the entire quarry material shall be transported from far of places beyond Bhadrak on the NH-5 and SH-53 as a result of which lot of stock pilling has to be carried out to make an inventory of materials which shall be located on high land with slope protection measures and water spray where necessary. Besides anti erosion mulch covering of grass carpets / coir carpets /silt fencing as the case may be that will be decided by the Supervision consultant and environment export depending upon the location and weather condition of the zone during construction activity.

The hazards that may arise out of equipments, machineries, POL, chemicals, highly inflammable materials and poisonous substances with residual effect has to be addressed as per emergency procedure for countering and neutralizing the effect on the eco system.

The following quantities of natural occurring minor minerals are estimated to be required for the road development process in a nut shell.

Approximate Quantity of Construction Materials Required

Sl. No.	Item	Quantity	Tonnage
1	Earth work	202103cum	281893
2	Sub grade	744131cum	1364215
3	GSB & Murrom	193565cum	354862
4	WMM	205385cum	311630
5	PCC	49880cum	84197

6	DBM	50810cum	77078
7	BC	30984cum	47002
8	Lime	10000cum	-
9	RCC	38524cum	-
10	Geo-synthetic Material	10000sqm	-
11	PC	775598sqm	1714071
12	Tac-coat	775598sqm	542918
13	Bitumen	-	518.7
14	Rough Stone & Boulders	13602cum	-

The above quantity of material will be procured from natural sources relating to filling, bitumen course (BC), dense bitumen (DBM), wet mix macadam (WMM), granular sub base (GSB) and sub grade as detailed below taking into account the material that will be used in RCC, PCC, stone pitching, filter medium, gabion walls, retaining and breast walls boundary walls, guard walls, toe walls, cascades, slope drains etc.

The bitumen, cement, geo-synthetic, lime, HYSD bars for reinforcement shall be procured from original manufacturer.

Natural Resources to be Mobilized for the Project

Sl. No.	Item	Quantity	Tonnage
1	Earth work from borrow pits	262431cum	366038
2	Sand/Crusher Dust	20997cum	33322
3	GSB & Murrom	193565cum	354862
4	Course Aggregate	394509cum	510810
5	Bitumen	-	518.7
6	Filter Material	82248cum	106494
7	Cement	15200cum	-
8	Water	597500LT	-
9	Potable Water	1533000LT	-
10	Diesel	-	47500
11	Rough Stones	20936cum	29630
12	Demolition Wastes obtained from dismantling of structures like Bridges, Culverts, Walls etc. other than road way excavation to be used at different construction sites	405796cum	-
13	Surplus Demolition Waste from Road way excavation to be used at different sites after using 60% excavated material in construction of road way embankment	321133cum	-

Most of these materials shall be procured from quarries except bitumen, PC and TAC, cement, HYSD bars, POL etc. from manufacturers.

All disposable debris and utilizable waste products, shall be properly recycled at appropriate channel through public auction sale of the material at site by the contractor at pre construction, construction and post construction period depending upon the agencies involved as would be decided by the site engineer, the supervision consultant and the environment of the PIU in consultation and prier approval of the State Pollution control board and the local administrative authority. No garbage, sewerage and drain water shall be allowed to a free flow that may contaminate the surrounding and therefore has to be impounded effectively through pounding as per the approved plan of action agreed upon by the local authorities of SPCB, Panchayat Raj institutions, District administration and the Supervision consultant.

CHAPTER I

INTRODUCTION

1.1 PROJECT BACKGROUND

Orissa State Roads Project (OSRP) is a road upgrading and rehabilitation initiative by Govt. of Orissa with financial assistance from the World Bank. The Project will be implemented in phases. Under Phase I of the Project, 825kms of State Highways has been selected for up gradation and rehabilitation on priority basis. These 825kms of State Highways has been short listed based on technical and economic evaluation studies conducted by Orissa Works Department (OWD) of Government of Orissa. Preparation of Detailed Project Report for these 825kms of State Highways under Phase I have been initiated through on site data collection on traffic volumes, existing pavement condition in terms of roughness and design, assets and resources within and outside RoW etc. Also cost estimates, bid documents are being prepared along with measures to address social and environment issues in the light of World Bank guidelines, statutory requirements of Government of India and State Government. In addition, network analysis of remaining 3700km State Highways is being done under Phase I of the Project, to arrive at a selection of 1600km of State Highways for rehabilitation in subsequent Phases.

Out of the 825kms of road corridors under Phase I of **OSRP, 364.781kms** are to be covered in 1st Year of the Phase I programme (Table 1). The present Environment Assessment exercise relates only to these corridors (Phase I: Year I) under OSRP. How ever this has been changed for various design constraints **to 204km only** at the time of finalization of bid documents and detail designs etc. corresponding to following chainage.

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 Orissa at a total estimated project cost of US$ 315 million. The International Bank for Reconstruction and Development shall fund US$ 250 million and remaining shall be through the Orissa State funding. The Orissa Works Department (OWD) will be the executing agency for the Project.

The project has been split into two phase for implementation purpose, Phase-I to be implemented in two years construction period and shall include up-gradation and rehabilitation of 825kms of state road network and the total distance to 812Km only.

Table – 1.1

Details of Road Corridors under Phase I: Year 1 of OSRP

Sl. No.	Corridor	SH No	Originally proposed	Length	Actual proposal for Year-1 Package
1	Berhampur – Taptapani – Raipanka – Bangi Jn. – JKPur – Rayagada	SH–17 and SH-4	151km 52km	203kms	0km - 41km SH-17
2	**Anandapur - Bhadrak Bhadrak – Chandbali**	**SH 53 SH 9**	**0km - 57.6km 0km -53km**	**57.6km 53km**	**0km to 50km 0km to 45km**
3	Khariar - Bhawanipatna	SH 16	0km to 70km	68km	0km – 68km
Total				**381.6km**	**204km**

The Environment Impact Assessment study has been completed and three corridor-specific Environmental Management Plans have been prepared for year-one works, which includes the following road sections:

1	OSRP-CW-Y1-P01	Bhawanipatna - Khariar – 68km	Year 1- Package 1
2	**OSRP-CW-Y1-P02**	**Chandbali – Anandapur – 95km**	**Year 1- Package 2**
3	OSRP-CW-Y1-P03	Berhampur – Taptapani – 41km	Year 1- Package 3

1st Package from Chandbali – Bhadrak - Anandapur starts from **0/0km to 45/0km of SH-9 (Part) and 0/0km to 50/0km of SH-53(Part),** the 0km being from Bhadrak to the East and West respectively, the NH-5 being the dividing line between both the link roads of this corridors. This package connects NH-5 with SH-9A beyond Chandbali and connects SH-5A at Duhuria on SH-9A. Similarly the SH-53 from Bhadrak towards Anandapur connects NH-215, at Anandapur bypass after the **Baitarani** bridge at 45km of SH-53. Thus the mineral and industrial areas of Keonjhar, Jajpur, Dhenkanal and Angul districts along with Sundergarh and Sambalpur districts will be connected with proposed Dhamra port and existing Paradeep port for export and import of products and the adjacent areas of respective corridors will have economic and subsidiary infrastructure development when the NH and SH develop into full fledged communication medium. The package on SH-53 covering the balance 72km up to Karanjia and 106km up to Jagatpur will also connect Karanjia, Chandbali, Aul, Pattamundai, Kendrapada and Salepur with the western Orissa through a shortest possible linkage that will lead to prosperity and increase in commercial activities of agricultural, fisheries, bettle vine and shrimp products, coconut and its derivative, Jute and other sea based products in the years to come. This is **a category "A" project** as per **environmental grading by MoEF, in their notification No. 1433 dated 14/09/2006.** There is 1 protected area named Hadagarh wildlife sanctuary within Baula RF of Keonjhar wildlife division, 3kms to the right side of SH-53 at Bancho. Similarly on SH-9 the Bhitarkanika National Park, and wildlife sanctuary and salt water crocodile habitat comes within 10km zone of influence of this package at 45km stone. These are ecologically sensitive areas, because the zone influence of SH-53 (Part) and SH-9 (Part) entirely runs through the flood plains of river Baitarani and Salandi on either side. In addition to this the inter tidal swamps and creeks are located on SH-9 part between 26km to 45km and beyond which are unique eco systems because of the marginal difference in the gradient and proximity to Bhitarkanika mangrove forests.

1.2 SALIENT FEATURES OF THE PROJECT

The broad objective of the project is rehabilitation of existing road network involving raising of formation levels, strengthening of pavements and where necessary widening and realignment of roads to meet the design standards and accident prone sites ,submergible areas , green tunnels ,wild life movement areas.

The detailed design process for these road corridors was initiated in early 2006 and is in progress. The expected contract period for construction work is 24 months, which has been referred in the discussions of the report as the construction phase. After construction work, the project will enter into operational period. The design life (or operation period) of the project is 20 years from the start of operation.

1.3 PROJECT INTERVENTIONS

Since the corridor extends directly through the flood plains of river Baitarani and the irrigation systems of Hadagarh irrigation project over river Salandi as well as the most fertile but least drained agricultural land between Bhadrak to Chandbali, it is one of the major interventions in the drainage system and flood control mechanism of the area that may get adversely favorably /influenced on account of the road development that will involve raising and widening of the embankments and construction of several culvert and bridges that is likely to cause blockade of the drainage system during construction period. Similarly there is every likely hood of soil, water and air pollution during construction and after on account of increase in vehicular traffic intense commercial activity and ribbon development associated with high ways through out the country. The destruction of avenue plants which are serving as the wind breaks and shelter belts in the costal eco system, along with loss of more than 12 decades old tall ever green Arjun and Fasi trees shall be another major intervention in the area. The sub base of the road being susceptible to low bearing capacity shall require excavation and relaying with modified texture to improve its bearing capacity shall require dumping of the excavated materials and reformation of new GSB and murrom carried over long distances at times more than 60km away, which may result in snap soil erosion, blockade streams and flood water flow, inter tidal flow and that may lead to loss of agricultural products and adverse influence over intertidal breeding zones.

1.3.1 Proposed Design Modifications

Table – 1.2

Sl. No.	Applicable Chainage (km)	Type of Cross section	Reference	Remarks
1	**SH-9-** 1.200-3.600, 4.100-5.400, 5.850-6.300, 6.650-9600, 10.250-11.500, 12.900-14.000, 14.300-16.100, 18.500-19.000, 19.200-20.100, 20.200-21.200, 21.600-24.450, 24.800-25.400, 27.100-30.300, 30.500-32.900, 33.200-37.100, 37.400-39.100, 40.300-41.725, 42.000-44.600 **SH-53-** 4.230-7.600, 8.850-11.100, 11.400-13.320, 13.850-16.680, 20.700-24.000, 24.330-24.450, 26.100-27.100, 30.500-30.920, 32.400-32.750, 33.100-33.650, 34.100-35.050, 35.500-39.900, 40.100-40.400, 45.550-46.300, 47.100-48.100, 48.450-49.000	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 **SH-9-** 12.300-12.600, 41.100-41.225	To maintain traffic speed as per IRC Guideline outside built	Horizontal plan of the road design	

	SH-53- 11.100-11.600, 17.100-17.550, 42.300-44.600, 46.300-46.600	up area.		
3	**SH-9-** 0.000-1.200, 3.600-4.100, 5.400-5.850, 6.300-6.650, 9.600-10.250, 11.500-12.900, 14.000-14.300, 16.100-18.500, 19.000-19.200, 20.100-20.200, 21.200-21.600, 24.450-24.800, 25.800-27.100, 30.300-30.500, 32.900-33.200, 37.100-37.400, 39.100-40.300, 41.725-42.000,44.600-4500. **SH-53-**	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.	Horizontal plan of the road design	Conforming to the R&R policy 2006 of Govt. of Orissa and general principles of mitigation avoidance and minimisation of impact
4	**SH-9-** 26.430, 28.837, 30.154, 31.700, 35.825, 40.974 **SH-53-** 11.867, 13.507, 17.002, 21.024, 23.500, 34.000, 40.242	To facilitate movement of wildlife across the road by providing traffic calming measures	No under pass provided	Cautionary and advisory signage to be posted
5	Nil	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
6	**S.H.-9**-32.885. **S.H.-53**-33.900.	Forest check gate with naka shed and cross barriers together with parking bay either side	As would be fixed by forest department	To facilitate checking of illicit removal of forest and wildlife products
7	**SH-9-** 3.950, 6.500, 12.235, 16.417, 17.668, 18.425, 19.3700, 21.420, 21.990, 23.252, 24.600, 33.126, 36.195, 37.255, 40.000 **SH-53-** 1.356, 1.795, 3.359, 3.595, 4.427, 5.984, 8.469, 8.576, 8.737, 10.024, 11.798, 13.463, 14.528, 17.018, 18.866, 19.402, 19.453, 24.252, 29.851, 30.339, 31.478, 31.588, 33.952, 35.809, 36.571, 38.543, 39.977, 40.048, 40.567, 44.031, 47.013, 48.340.	Major and minor (cross, Y & T) junctions on spur roads and major roads intersecting the SH.	Horizontal plan and detail design for junctions	To facilitate movement of traffic and meet future developmental needs
8	**SH-9-** 0.100, 0.070, 3.600, 3.595, 5.400, 6.400, 6.545, 9.800, 10.095, 11.400, 12.295, 13.800, 14.195, 16.500, 17.895, 20.200, 21.395, 24.250, 24.545, 25.700, 26.245, 26.600, 27.095, 30.500, 31.195, 32.750, 33.095, 36.295, 37.195, 39.500, 40.195, 41.900, 42.595, 43.100, 43.295, 44.500. **Truck lay Bye**-1.500 **SH-53-** 8.000, 8.255, 11.470, 11.950, 13.300, 13.555, 14.375,	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

	14.630, 17.400, 17.720, 18.445, 19.400, 20.020, 24.095, 24.345, 24.345, 26.095, 27.045, 27.545, 29.270, 30.020, 30.845, 31.825, 33.695, 34.045, 34.970, 40.020, 40.945, 41.175, 42.345, 44.245, 45.100, 45.595, 46.845, 47.025 **Truck Lay Bye-** 4.700			passengers

1.3.2 Proposed CD / Bridge Improvement Works

Table – 1.3 (A)

Culverts (Bhadrak - Chandbali) (SH-9)

S. No.	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Type of Existing Culvert	Proposed Span Arrangement	Type of Proposed Culvert	Remarks
1	-	**0/0**	-	-	**1/23/0**	**RCC Box**	**Additional structure**
2	2/500	2/507	1 x 3.0	Slab	-	-	To be widened
3	2/800	2/865	1 x 3.0	Slab	-	-	To be widened
4	4/300	4/350	2 x 1.0	Pipe	1/23/0	RCC Box	Replaced due to poor condition
5	4/900	4/935	1 x 2.0	Arch	1/23/0	RCC Box	Replaced due to poor condition
6	-	**5/705**	-	-	**1/43/0**	**RCC Box**	**Additional structure**
7	-	**5/740**	-	-	**1/44/0**	**RCC Box**	**Additional structure**
8	6/990	7/001	1 x 0.9	Pipe	1/22/0	RCC Box	Replaced due to poor condition
9	7/900	7/927	1 x 0.9	Pipe	1/22/0	RCC Box	Replaced due to poor condition
10	8/900	8/939	1 x 4.5	Slab	1/64/0	RCC Box	Replaced due to poor condition
11	9/500	9/602	1 x 2.0	Slab	1/23/0	RCC Box	Replaced due to poor condition
12	9/900	9/902	1 x 4.5	Slab	1/63/0	RCC Box	Replaced due to poor condition
13	10/250	10/260	1 x 1.4	Slab	1/22/0	RCC Box	Replaced due to poor condition
14	11/100	11/142	1 x 1.4	Slab	1/23/0	RCC Box	Replaced due to poor condition
15	11/650	11/535	2 x 0.3	Pipe	1/22/0	RCC Box	Replaced due to poor condition
16	12/600	12/397	1 x 0.3	Pipe	1/22/0	RCC Box	Replaced due to poor condition
17	12/900	12/923	1 x 0.9	Pipe	1/22/0	RCC Box	Replaced due to poor condition
18	13/150	13/132	1 x 1.4	Slab	1/23/0	RCC Box	Replaced due to poor condition
19	14/800	14/791	1 x 0.3	Pipe	1/22/0	RCC Box	Replaced due to poor condition
20	-	**15/125**	-	-	**1/43/0**	**RCC Box**	**Additional structure**
21	15/600	15/360	1 x 0.3	Pipe	1/22/0	RCC Box	Replaced due to poor condition
22	-	**15/425**			**1/43/0**	**RCC Box**	**Additional structure**

S. No.	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Type of Existing Culvert	Proposed Span Arrangement	Type of Proposed Culvert	Remarks
23	15/700	15/714	1 x 3.2	Slab	1/43/0	RCC Box	Replaced due to poor condition
24	**-**	**15/750**	-	-	**1/43/0**	**RCC Box**	**Additional structure**
25	**-**	**15/850**	-	-	**1/43/0**	**RCC Box**	**Additional structure**
26	16/500	16/509	1 x 0.6	Pipe	1/23/0	RCC Box	Replaced due to poor condition
27	16/700	16/733	1 x 0.6	Pipe	1/22/0	RCC Box	Replaced due to poor condition
28	17/100	17/078	1 x 1.5	Slab	1/22/0	RCC Box	Replaced due to poor condition
29	17/700	17/666	1 x 0.9	Pipe	1/22/0	RCC Box	Replaced due to poor condition
30	17/900	17/928	1 x 1.0	Pipe	1/22/0	RCC Box	Replaced due to poor condition
31	18/200	18/195	1 x 1.0	Pipe	1/22/0	RCC Box	Replaced due to poor condition
32	18/600	18/627	1 x 1.0	Pipe	1/22/0	RCC Box	Replaced due to poor condition
33	19/100	19/096	1 x 1.0	Pipe	1/22/0	RCC Box	Replaced due to poor condition
34	19/400	19/367	2 x 1.5	Slab	1/33/0	RCC Box	Replaced due to poor condition
35	19/900	19/888	2 x 2.3	Slab	-	-	To be widened
36	20/100	20/144	1 x 1.4	Slab	1/22/0	RCC Box	Replaced due to poor condition
37	20/200	20/365	1 x 0.6	Pipe	1/22/0	RCC Box	Replaced due to poor condition
38	20/700	20/691	1 x 0.6	Pipe	1/22/0	RCC Box	Replaced due to poor condition
39	21/050	21/074	1 x 0.45	Pipe	1/22/0	RCC Box	Replaced due to poor condition
40	21/150	21/235	1 x 0.45	Pipe	1/22/0	RCC Box	Replaced due to poor condition
41	21/400	21/490	1 x 0.6	Pipe	1/22/0	RCC Box	Replaced due to poor condition
42	21/700	21/829	1 x 1.5	Slab	1/22/0	RCC Box	Replaced due to poor condition
43	22/700	22/570	1 x 0.9	Pipe	1/22/0	RCC Box	Replaced due to poor condition
44	23/150	23/240	1 x 3.2	Slab	1/43/0	RCC Box	Replaced due to poor condition
45	24/050	24/096	1 x 0.9	Arch	1/22/0	RCC Box	Replaced due to poor condition
46	24/350	24/478	1 x 0.8	Pipe	1/22/0	RCC Box	Replaced due to poor condition
47	24/500	24/770	1 x 1.2	Slab	1/22/0	RCC Box	Replaced due to poor condition
48	25/200	25/249	1 x 1.0	Pipe	1/22/0	RCC Box	Replaced due to poor condition
49	26/400	26/430	-	Choked	1/22/0	RCC Box	**Replaced due to insufficient vent, to be used for Environmental purpose**
50	**-**	**28/225**	-	-	**1/43/0**	**RCC Box**	**Additional structure**

S. No.	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Type of Existing Culvert	Proposed Span Arrangement	Type of Proposed Culvert	Remarks
51	**-**	**30/075**	**-**	**-**	**1/44/0**	**RCC Box**	**Additional structure**
52	30/600	30/821	1 x 0.5	Arch	1/22/0	RCC Box	Replaced due to poor condition
53	**-**	**31/400**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
54	**-**	**31/700**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure, to be used for Environmental purpose**
55	**-**	**36/775**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
56	**-**	**36/850**	**-**	**-**	**1/44/0**	**RCC Box**	**Additional structure**
57	**-**	**37/850**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
58	39/300	39/387	2 x 0.45	Pipe	1/22/0	RCC Box	Replaced due to poor condition
59	39/800	39/837	1 x 0.8	Pipe	1/22/0	RCC Box	Replaced due to poor condition
60	40/350	40/310	1 x 0.6	Pipe	1/22/0	RCC Box	Replaced due to poor condition
61	40/950	40/974	1 x 0.9	Pipe	1/23/0	RCC Box	**Replaced due to insufficient vent, to be used for Environmental purpose**
62	**-**	**41/125**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
63	**-**	**41/275**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
64	**-**	**41/375**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
65	**-**	**41/550**	**-**	**-**	**1/43/0**	**RCC Box**	**Additional structure**
66	41/990	41/996	2 x 1.5	Slab	1/34/0	RCC Box	Replaced due to poor condition
67	**-**	**42/225**	**-**	**-**	**1/44/0**	**RCC Box**	**Additional structure**
68	**-**	**42/400**	**-**	**-**	**1/44/0**	**RCC Box**	**Additional structure**
69	43/050	43/061	1 x 0.6	Arch	1/22/0	RCC Box	Replaced due to poor condition
70	43/600	43/771	1 x 4.8	Slab	1/43/0	RCC Box	Replaced due to poor condition
71	44/400	44/315	1 x 1.8	Slab	1/23/0	RCC Box	Replaced due to raising of road level

Table – 1.3 (B)

Culverts (Bhadrak- Anandapur) SH-53

Sl. No.	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Type of Existing Culvert	Proposed Span Arrangement	Type of Proposed Culvert	Remarks
1	1/010	1165	1 x 0.9	Pipe	1/23/0	Box Cell	Replaced due to poor condition
2	1/275	1328	-	Choked	1/23/0	Box Cell	Replaced due to insufficient vent
3	1/900	2010	1 x 0.9	Pipe	1/34/0	Box Cell	Replaced due to insufficient vent
4	2/150	2201	3 x 1.5	Slab	1/44/0	Box Cell	Replaced due to poor condition
5	2/400	2354	3 x 0.9	Pipe	1/23/0	Box Cell	Replaced due to poor condition
6	2/600	2668	1 x 1.8	Slab	1/34/0	Box Cell	Replaced due to poor condition
7	3/700	3604	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to poor condition
8	3/900	3979	-	Choked	1/22/0	Box Cell	Replaced due to insufficient vent
9	4/500	4411	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to poor condition
10	5/010	5122	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to raise in road level
11	6/800	6675	1 x 1.5	Slab	2 x 1.0	Pipe	Replaced due to poor condition
12	7/880	7785	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to less carriage way width
13	8/300	8498	1 x 2.7	Slab	2 x 1.0	Pipe	Replaced due to poor condition
14	8/750	8958	1 x 0.6	Pipe	1/23/0	Box Cell	Replaced due to poor condition
15	8/850	9027	2 x 0.9	Pipe	2 x 0.9	-	To be extended
16	10/600	10699	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to less carriage way width
17	11/150	10975	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to poor condition
18	-	11249	-	-	1/22/0	Box Cell	Additional structure
19	-	11500	-	-	1/23/0	Box Cell	Additional structure
20	12/200	11869	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition, to be used for Environmental purpose
21	13/110	12809	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to insufficient vent
22	13/800	13507	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition, to be used for Environmental purpose
23	14/200	13909	1 x 0.9	Pipe	1 x 0.9	-	To be extended
24	14/400	14166	1 x 1.8	Slab	1/22/0	Box Cell	Replaced due to poor condition
25	14/600	14300	1 x 2.4	Slab	1/33/0	Box Cell	Replaced due to raise in road level
26	15/500	15110	2 x 0.9	Pipe	2 x 0.9	-	To be extended
27	17/200	17002	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to poor condition, to be used for Environmental purpose
28	17/300	17123	2 x 0.9	Pipe	1/22/0	Box Cell	Replaced due to poor condition
29	-	17500	-	-	1/34/0	Box Cell	Additional structure

30	18/500	17954	2 x 0.9	Pipe	2 x 0.9	-	To be extended
31	18/700	18261	-	Choked	2 x 1.0	Pipe	Replaced due to insufficient vent
32	18/800	18444	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
33	18/850	18486	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
34	19/250	18902	1 x 0.3	Pipe	2 x 1.0	Pipe	Replaced due to poor condition
35	20/100	19695	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
36	20/800	20426	4 x 0.45	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
37	20/825	20450	1 x 1.3	Slab	1/22/0	Box Cell	Replaced due to poor condition
38	21/050	20648	1 x 4.6	Slab	1/43/0	Box Cell	Replaced due to poor condition
39	21/750	21024	1 x 0.8	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent, to be used for Environmental purpose
40	22/800	22225	2 x 0.6	Pipe	1/34/0	Box Cell	Replaced due to insufficient vent
41	23/600	22794	1 x 0.6	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
42	24/150	23700	1 x 0.3	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
43	24/700	24205	1 x 0.6	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
44	24/750	24375	1 x 0.6	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
45	25/700	25253	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to raise in road level
46	25/710	25265	1 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to insufficient vent
47	25/990	25571	-	Choked	2 x 1.0	Pipe	Replaced due to insufficient vent
48	26/450	26025	-	Choked	2 x 1.0	Pipe	Replaced due to insufficient vent
49	26/700	26351	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
50	27/050	26645	1 x 0.45	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
51	27/100	26699	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to poor condition
52	27/800	27440	2 x 0.9	Pipe	2 x 0.9	-	To be extended
53	28/200	27733	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
54	28/950	28531	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to poor condition
55	29/100	28684	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to poor condition
56	29/650	29159	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
57	29/700	29250	1 x 0.45	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
58	29/800	29374	2 x 0.9	Pipe	2 x 0.9	-	To be extended
59	30/150	29601	2 x 0.9	Pipe	2 x 0.9	-	To be extended
60	30/500	29984	2 x 0.9	Pipe	2 x 0.9	-	To be extended
61	30/900	30501	2 x 0.9	Pipe	2 x 0.9	-	To be extended
62	31/100	30684	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to poor condition

63	31/500	31097	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to raise in road level
64	31/800	31353	-	Choked	2 x 1.0	Pipe	Replaced due to insufficient vent
65	31/900	31484	2 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to poor condition
66	32/200	31776	4 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to change in alignment
67	32/400	32108	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to change in alignment
68	33/050	32528	2 x 0.9	Pipe	2 x 1.0	Pipe	Replaced due to change in alignment
69	33/450	32964	1 x 3.0	Slab	2 x 1.0	Pipe	Replaced due to poor condition
70	33/500	33013	2 x 0.9	Pipe	1/22/0	Box Cell	Replaced due to change in alignment
71	34/400	33760	1 x 0.9	Pipe	1 x 0.9	-	To be extended
72	34/750	34204	2 x 1.0	Pipe	2 x 1.0	-	To be extended
73	35/300	34662	2 x 1.1	Pipe	2 x 1.0	-	To be extended
74	35/700	34935	1 x 0.6	Pipe	1 x 1.0	Pipe	Replaced due to insufficient vent
75	35/900	35281	1 x 1.0	Slab	1/63/0	Box Cell	Replaced due to insufficient vent
76	36/100	35444	1 x 1.0	Slab	1/23/0	Box Cell	Replaced due to poor condition
77	36/250	35595	1 x 1.0	Slab	1/34/0	Box Cell	Replaced due to poor condition
78	36/600	35998	2 x 1.0	Slab	1/34/0	Box Cell	Replaced due to poor condition
79	37/150	36430	1 x 0.6	Pipe	1/23/0	Box Cell	Replaced due to poor condition
80	37/200	36510	1 x 0.6	Pipe	1/34/0	Box Cell	Replaced due to poor condition
81	37/300	36624	1 x 3.15	Slab	1/44/0	Box Cell	Replaced due to raise in road level
82	-	38300	-	-	1/34/0	Box Cell	Additional structure
83	38/900	38088	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to change in alignment
84	39/450	38665	2 x 2.5	Arch	1/43/0	Box Cell	Replaced due to poor condition
85	40/500	39657	1 x 0.9	Arch	1/22/0	Box Cell	Replaced due to poor condition
86	40/850	40017	1 x 0.9	Arch	1/22/0	Box Cell	Replaced due to poor condition
87	41/100	40242	2 x 1.8	Arch	1/43/0	Box Cell	Replaced due to poor condition, to be used for Environmental purpose
88	41/700	40808	2 x 1.2	Slab	1/33/0	Box Cell	Replaced due to poor condition
89	-	42425	-	-	1/23/0	Box Cell	Additional structure
90	43/200	42191	1 x 0.9	Pipe	1/33/0	Box Cell	Replaced due to change in alignment
91	-	43500	-	-	1/34/0	Box Cell	Additional structure
92	-	44400	-	-	1/23/0	Box Cell	Additional structure
93	45/500	44680	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to poor condition
94	45/700	45094	1 x 1.5	Slab	1/23/0	Box Cell	Replaced due to raise in road level
95	45/900	45275	1 x 1.6	Slab	1/22/0	Box Cell	Replaced due to raise in road level

96	45/990	45395	1 x 1.5	Slab	1/22/0	Box Cell	Replaced due to raise in road level
97	46/600	45720	1 x 1.5	Slab	1/23/0	Box Cell	Replaced due to raise in road level
98	46/900	46032	1 x 1.6	Slab	1/23/0	Box Cell	Replaced due to raise in road level
99	47/300	46311	1 x 1.6	Slab	1/23/0	Box Cell	Replaced due to change in alignment
100	47/800	47246	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to raise in road level
101	48/550	47931	1 x 1.5	Slab	1/34/0	Box Cell	Replaced due to raise in road level
102	49/100	48530	1 x 3.0	Slab	1/33/0	Box Cell	Replaced due to raise in road level

Table – 1.4 (A)

Bridge (Bhadrak - Chandbali) SH-9

Sl. No	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Proposed Span Arrangement	Carriageway Width (m)	Overall Width of Bridge (m)	Remarks
1	**0/00**	**0/00**	**2 x 6.5**	**-**	**-**	**-**	**One Major junction has been proposed**
2	1/005	1/015	2 x 3.45	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to poor condition
3	1/800	1/755	2 x 3.4	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to poor condition
4	3/200	3/241	5 x 3.7	2 x 8.0 m	11.0	12.0	Reconstruction due to poor condition
5	3/900	3/862	3 x 7.6	2 x 8.0 m	11.0	12.0	Reconstruction due to poor condition
6	6/050	6/096	4 x 6.7	3 x 8.0 m	11.0	12.0	Reconstruction due to poor condition
7	9/200	9/159	5 x 2.7	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to poor condition
8	9/300	9/245	3 x 7.0	-	-	-	Good, Rehabilitation required
9	13/600	13/646	2 x 4.5	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to poor condition
10	**-**	**25/425**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
11	**-**	**25/550**	**-**	**10 x 1.0 m dia pipe**	**11.0**	**12.0**	**Additional Bridge**
12	**-**	**27/800**	**-**	**10 x 1.0 m dia pipe**	**11.0**	**12.0**	**Additional Bridge**
13	**-**	**27/925**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
14	28/100	28/168	3 x 4.35	2 x 6.0 Double Cell Box	11.0	12.0	Reconstruction due to poor condition
15	**-**	**28/500**	**-**	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
16	28/800	28/837	6 x 2.5	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to submergence

Sl. No	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Proposed Span Arrangement	Carriageway Width (m)	Overall Width of Bridge (m)	Remarks
							and poor condition
17	**-**	**28/900**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
18	**-**	**29/850**	**-**	**10 x 1.0 m dia pipe**	**11.0**	**12.0**	**Additional Bridge**
19	**-**	**29/950**	**-**	**10 x 1.0 m dia pipe**	**11.0**	**12.0**	**Additional Bridge**
20	30/050	30/154	10 x 2.0	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to submergence and poor condition
21	30/200	30/335	2 x 6.7	-	-	-	Good, Rehabilitation required
22	**-**	**31/050**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
23	**-**	**31/150**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
24	**-**	**31/900**	**-**	**10 x 1.0 m dia pipe**	**11.0**	**12.0**	**Additional Bridge**
25	32/100	32/100	4 x 1.75	1 x 6.0 Single Cell Box	11.0	12.0	Reconstruction due to submergence and poor condition
26	**-**	**32/380**	**-**	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
27	33/500	33/543	5 x 2.0	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to submergence and poor condition
28	33/900	33/907	5 x 1.9	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to submergence and poor condition
29	**-**	**34/025**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
30	**-**	**34/375**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
31	34/700	34/803	1 x 10.3	**-**	-	-	Good, Rehabilitation required
32	-	**35/000**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
33	-	**35/090**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
34	-	**35/280**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
35	-	**35/340**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
36	-	**35/425**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
37	-	**35/510**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**

Sl. No	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Proposed Span Arrangement	Carriageway Width (m)	Overall Width of Bridge (m)	Remarks
38	**-**	**35/600**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
39	**-**	**35/680**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
40	36/005	35/825	10 x 2.1	3 x 3 Triple Cell Box	11.0	12.0	Reconstruction due to submergence and poor condition
41	**-**	**35/900**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
42	**-**	**35/975**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
43	**-**	**36/040**	-	**3 x 8.0 Box**	**11.0**	**12.0**	**Additional Bridge**
44	**-**	**37/000**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
45	**-**	**37/075**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
46	38/100	38/005	5 x 10.45	-	-	-	Good, Rehabilitation required
47	**-**	**41/750**	-	**3 x 3 Triple Cell Box**	**11.0**	**12.0**	**Additional Bridge**
48	42/400	42/487	2 x 3.65	1 x 6.0 Single Cell Box	11.0	12.0	Reconstruction due to poor condition
49	43/500	43/558	2 x 3.2	1 x 6.0 Single Cell Box	11.0	12.0	Reconstruction due to poor condition

Table – 1.4 (B)

Bridge (Bhadrak - Anandapur) SH-53

Sl. No.	Existing Chainage	Proposed Chainage	Existing Span Arrangement	Proposed Span Arrangement	Carriageway Width (m)	Overall Width of Bridge (m)	Remarks
1	9/800	10/016	(1 x 3.55) / (1 x 3.95)	1 x 8.0 RCC Box	11.0	12.0	Reconstruction due to poor condition
2	11/600	11/407	2 x 7.0	2 x 8.0 RCC Box	11.0	12.0	Reconstruction due to Realignment
3	17/700	17/275	2 x 7.0	3 x 9.0 RCC Box	11.0	12.0	Reconstruction due to Realignment
4	18/400	17/830	1 x 6.9	3 x 3 m Double cell	11.0	12.0	Reconstruction due to submerged and poor condition
5	19/300	18/879	2 x 6.3	-	-	-	Rehabilitation required
6	30/950	30/638	1 x 5.5	-	-	-	Good, Rehabilitation required
7	37/600	36/892	1 x 8.6	-	-	-	Rehabilitation required

8	37/700	36/989	1 x 8.6	-	-	-	Rehabilitation required
9	37/850	37/120	1 x 8.6	-	-	-	Rehabilitation required
10	38/010	37/276	1 x 8.3	-	-	-	Rehabilitation required
11	38/200	37/573	2 x 5.1	1 x 10.8 Solid slab	11.0	12.0	Reconstruction due to poor condition

Table -1.5 (A)

Summary of proposed Culverts (Bhadrak - Chandbali) (SH-9)

Type of Culvert	**Nos.**
Culverts Widened	
Slab widening	3
Culverts Replaced	
New Single Box of 1/22/0	33
New Single Box of 1/23/0	8
New Single Box of 1/33/0	1
New Single Box of 1/34/0	1
New Single Box of 1/43/0	3
New Single Box of 1/63/0	1
New Single Box of 1/64/0	1
Additional Culverts proposed	
Single Cell Box of 1/23/0	1
New Single Box of 1/43/0	14
New Single Box of 1/44/0	5
Total	**71**

Table -1.5 (B)
Summary of Proposed Culverts (Bhadrak – Anandapur) SH-53

Type of Culvert	**Nos.**
Culverts Widened	
Pipe extension	12
Culverts Replaced	
New Single Pipe	13
New Double Pipe	22
New Single Box of 1/22/0	15
New Single Box of 1/23/0	10
New Single Box of 1/33/0	10
New Single Box of 1/34/0	7
New Single Box of 1/43/0	3
New Single Box of 1/44/0	2
New Single Box of 1/63/0	1
Additional Culverts Proposed	
Single Cell Box of 1/22/0	1
Single Cell Box of 1/23/0	3
Single Cell Box of 1/34/0	3
Total	**102**

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 and as per revised guidelines notified by **Govt. of India, Ministry of Environment and Forest in their notification no. 1433, dated 14/09/2006.** 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.

1.5 ENVIRONMENTAL MANAGEMENT PLAN

1.5.1 Scope

Based on the environmental impacts predicted, specific EMP for each construction 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 4.01given below.

The World Bank Approach

As environmental considerations have more and more become a fixed part of Bank operations, these guidelines and criteria now cover many different kinds of project possibilities and settings and are used in the evaluation of environmental impacts of virtually all projects. Experience in environmental evaluations within the Bank has given rise to a series of operations which are now being followed. In brief, these include:

1. In-house study of the proposed project, utilizing the Bank's technical staff.

2. On-site 'environmental reconnaissance' to determine likely impact of the project; the problems, if any, likely to result; recommendations for preventing or mitigating such problems; or recommendations for in depth studies of particular environmental responses.

3. In-depth studies are the subject of multidisciplinary investigations conducted under terms of reference carefully tailored to the conditions and requirements surrounding the particular project, or component thereof.

4. Projects of such a nature that their environmental impacts are of unique importance to a regional or global audience, and wherein singularly unique and important environmental values are involved, must, of necessity , be the object of comprehensive and detailed studies to determine how or else the project can proceed.

5. Projects for which environmental safeguards or controls are to be included are examined during the construction and preoperational stages to determine their adequacy and sufficiency in light of any changes which may have occurred subsequent to final appraisal.

6. Projects in operation are examined periodically to determine the continuing adequacy of environmental safeguards and the need, if any, for new or improved controls.

7. Projects involving 'important ecological systems' are subjected to 'environmental post-audits' at appropriate points in their implementation to determine the accuracy of the project.

8. Impact assessment and the actual consequences for such systems. In each and every project subjected to one or more of the steps cited above, the environmental safeguards which may be indicated are the object of cost/benefit analysis. Efforts are continuing to develop a more suitable methodology for identifying the diseconomies, social and opportunity costs, and benefits to be anticipated. The difficulties experienced in this regard are many, and are the subject of increased.

Research

The environmental studies seen as being requisite to financing a project are, in most instances, financed by the borrowing entity, in much the same manner as other aspects of project preparation, such as engineering, geology, marketing, etc. In some cases involving poor countries, the Bank may finance the required studies. Increasingly, the borrowing entity is encouraged to make the necessary studies, while the Bank reserves the right to approve the terms of reference and the qualifications of those employed in their conduct. The Bank does assist, where appropriate, in preparing the terms of reference and in defining the disciplines to be used in the studies. In some instances, the Bank will conduct the required studies being financed by the borrower. In any event, findings of environmental studies are shared jointly with the borrower, member country government, and the Bank. Thus, while no format 'impact statement' on the environmental consequences of a development project is strictly required, the Bank does require that major adverse effects be avoided or mitigated and, as indicated, has established systematic procedures for accomplishing this. To date, all projects requiring safeguard measures have been successfully negotiated with the borrower and member country.

9 Industrial projects are of especial concern to the Bank-in FY 1976 the Bank and IFC loaned over $800 million in that sector. Like projects in the other sectors, industrial projects are examined for their environmental, occupational health, and worker safety aspects. In addition to the extensive guidelines provided in the Bank's handbook, more specific and detailed effluent and emission guidelines have been prepared for the many types of industries financed by the Bank (World Bank, 1977). There are close working relationships with the WHO, UNIDO, ILO, ECE, and others active in the industrial field.

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, spur 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 PIU, 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 as applicable to this particular corridor are indicated below in the form of **Table – 1.6.**

Table – 1.6

Regulatory and Clearance

Sl. No.	Clearance	Department	Responsibility
1.	Clearance under Forest (Conservation) Act. 1980 and Forest (C) Rules rules,2003	MoEF, GoI, and State Forest Department, Govt. of Orissa	OWD, OSRP, PIU, GoO.
2.	Clearance under Environment Protection Act. 1986, Environment Protection Rules 1986 and Notifications issued there under Environment Impact Notification No. 1433 dated 14/09/2006	SPCB, SEIAA, SEIC, CPCB, EIAA	OWD,OSRP, PIU
3.	Consent for establishment and consent for operation of construction plants	SPCB	Contractor

4.	Permission for withdrawal of ground water from the regulatory zones as per Water (prevention and control of pollution) Act. 1974 The Water (prevention and control of pollution) Cess Act. 1977	Central Ground Water Board /Authority	Contractor
5.	Permission for taking surface water. The Water (prevention and control of pollution) Cess Act. 1977	Irrigation Department, Govt. of Orissa	Contractor
6.	Permission for Employing Labour	State Department of Labour	Contractor
7.	License for setting up of Diesel pumps	Department of Explosives and Supplying Company	Contractor
8.	Registration of Workers	Executing Agency of Building and other Construction Workers Act, 1996	Contractor
9.	Permission for opening of new quarries for aggregates, if any The mines Act. 1952 & Orissa Minor minerals concession rules-2004.	Department of Mines and Geology& Revenue ,Govt of Orissa	Contractor
10.	PUC Certificate for Vehicles and Machinery a. The Air (prevention & control of pollution) Act. 1981 b. The Noise pollution (regulation & control) Act. 1990 c. The Central motor vehicle Act.1998	Road Transport Authority of concerned District and State Department of Commerce and Transport	Contractor
11.	Permission for setting up of labour camps	Local Health Departments and Local Body	Contractor
12.	No Objection Certificate for the overall activities	SPCB	PIU, OSRP (Project Preparation Stage)
13.	Felling and Removal of trees from Avenue, Acquired land and Forest Land (Orissa Timber & other Forest produce Transit Rules 1980 and Orissa Forest Act. 1972	State Forest Department – Concerned divisional Forest Officer	OWD, PIU ,OSRP, OFDC Ltd, Local Divisional Forest Officer
14.	Explosives for mining, ghat cutting and demolition of Structures	Explosive license from Central Excise, GoI,,the State Police and Fire services Departments	Contractor
15.	Shifting of utilities like Power supply, Audio visual cables, Water supply, sewerage and drainage. Environment Protection Act. 1986	Local Panchayat Raj Institutions /NAC Municipal Corporation and OWD regulations for laying /Drawings the new connections	Respective agencies responsible for the utilities and continuity of providing services, OWD, SPCB, RWSS, PHD, Electric supply company, BSNL etc.
16.	Affected Religious structures & shrines including relocation	State endowment /Wakf Board /Local Trustee or	OWD, OSRP, PIU, District compensation

		Management	officer, NGO, Endowment /Managing committee, Contractor
17.	Affected bore wells, ponds, taps, wells, site enhancement, educational institutions and health services, Govt. buildings	RWSS, PHD, Gram Panchayat, Gram Sava, Education Department, Health and other affected Department	Contractor, OWD, OSRP, PIU, Panchayat Raj Institutions and Respective Controlling Departments assigned with the work..
18.	Ancient monuments and Archeological sites and remains Act. 1958	ISI & State Archeological survey department.	Contractor, OWD, PIU
19	Wildlife protection Act. 1972	PCCF wildlife, Orissa and State advisory board or National Advisory Board	Contractor, OWD, PIU, State Forest Department

THE PROJECT ROAD:

The corridor originates from NH- 5 at Bhadrak and runs east and west directions towards Chandbali and Anandapur respectively up to river Baitarani at either end ie, at 52km and 45km of SH-9 and SH-53. SH-9 pertaining to this package will be covered up to 45km and SH-53 up to 50km there by avoiding the major and sensitive ecological and biodiversity regions beyond this chainage which warrants a deep and effective study of the eco system, the biodiversity, the biosphere reserve as well as the impact categorization for efficient and effective mitigation measures to minimize the adverse impacts within the zone of influence that is 10km radial distance from the project corridor.

As reiterated earlier, the project will cover no RF or PRF or any forest of any kind except few forest kissam lands which have been avoided through engineering design by limiting the width of ROW through toe walls to reduce the width of ROW.

The forest check gates at the boundaries of Keonjhar and Bhadrak, Bhadrak and Kendrapada and the CPRs on SH-53 and SH-9 requires specific consideration on account of their necessity within the package for better and efficient management of the life support systems. The irrigation and drainage channels on either side of the existing road requires recreation after necessary widening that is going to fill up the existing system there by raising the apprehensions of water logging. The loss of flora and fauna unique to the area deserves special treatments for its protection and preservation besides sustained development through adequate mitigation measures.

PHYSIOGRAPHIC CHARACTERISTICS:

The project covers the flood plains of Baitarani river with coastal fertile alluvial and colluviums plain land chiefly used for agriculture and expose to seasonal inundation during rains and early winter months due to bad drainage system and non release of flood waters to the sea on account of tidal surge during 10 to 15 of lunar fort nights. The water level is most unpredictable especially in this zone from Bancho to Chandbali and beyond, because of the cyclonic storms and incessant rain fall that is very common in Bay of Bengal during monsoon and retarding monsoon months. The water logging and high water table with part of the road coming under inter tidal zone will loose its fertile characteristics once the flow system of flood waters diminishes due to embankments and roads. The other physical characteristic is the ground water

system for potable purposes is not available very near the surface due to saline ingress as a result very deep tube wells are to be sunk in the coastal tracts to get potable water for human consumption free from Arsenic, Salt ingress and fluoride. No stone, GSB, Murrom or under lying rock system comes across the entire stretch from Fakirpur up to Chandbali and therefore the entire corridor requires up gradation of bearing capacity to avoid crust failure by carrying murrom, GSB, rough stones, hard granite metal etc. from out of the district. Even sand is not available nearby for construction activity either from river Salandi or Baitarani within the entire stretch of 45km of SH-9 and 30km of SH-53. It is proposed to carry sand from Sathipur on NH-5 by truck transport for part of SH-9 and SH-53 and collect sand from Anandapur and Ambagadia, where river Baitarani is approachable by road for collection of sand.

PROPOSED PROJECT INTERVENTIONS:

- **Proposed template cross section details:**

The details drawings are enclosed separately showing the design for village sections, open areas, wildlife movement, ghat sections and RF locations, as the case may be dealing with cut and fill areas, curves, box cutting ,bus bay, truck lay bye etc. This has been provided exclusively in the detail Engineering Drawings and schedules which may be referred to. As has been mentioned earlier, the road has to be re-laid after excavation with improved sub base having higher bearing capacity.

Table – 1.7

Proposed Project Interventions

Sl. No	Clearances	Acts	Approving Agency	Applicability to the Project	Time Required	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	Orissa Pollution Control Board	Applicable	3 months	OWD	CE, WB Projects, Project in charge PMU/SC
2	Environment Clearance	Environment Protection Act 1986 Notification dated,14 September 2006	Ministry of Environment and Forest, Govt. of India	Applicable	6 months	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 /MoEF	Applicable	3 months	OWD	CE, WB Projects, Project in charge 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	Applicable	2 months	OWD	CE, WB Projects, Project in charge PMU/SC
5	Permission for removal of tree growth within the	Orissa Forest Act. 1972 Orissa timber and other forest produce transit rules 1980	Local Divisional Forest Officer	Applicable	1 month for each workout area	OWD	CE, WB Projects, Project in charge PMU/SC

Sl. No	Clearances	Acts	Approving Agency	Applicability to the Project	Time Required	Responsibility	
						Execution	Supervision
	PROW Felling conversion and removal from stump site						
PROJECT IMPLEMENTATION STAGE							
6	Permission for Withdrawal of Ground Water	Environment Protection Act 1986	Central Ground Water Board		2 months	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	2 months	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 Orissa /Archaeological Survey of India (ASI)	Applicable	2 months	Contractor	CE, WB Projects, Project in charge PMU/SC
9	Permission for Sand Mining from river bed	Orissa Minor Minerals Concession Rules 2004	District Collector /Tahasildar /Irrigation department	Applicable	1 month	Contractor	CE, WB Projects, Project in charge PMU /SC
10	Permission for Opening of New Quarry	Orissa Minor Minerals Act.	Department of Mines Govt. of Orissa / Orissa State Pollution Control Board /District Administration	Applicable	1 month	Contractor	CE, WB Projects, Project in charge PMU/SC
11	Hot mix plant, Crushers, Cement Batching	Air (Prevention and Control of Pollution) Act. 1981	Orissa State Pollution Control Board	Applicable	3 months	Contractor	CE, WB Projects, Project in charge PMU/SC

Sl. No	Clearances	Acts	Approving Agency	Applicability to the Project	Time Required	Responsibility	
						Execution	Supervision
	Plant						
12	Storage of Hazardous Chemicals	Hazardous Waste (Management and Handling) Rules 1989 and Manufacturing Storage and Import of Hazardous Chemicals Rules 1989	Orissa State Pollution Control Board	Applicable	3 months	Contractor	CE, WB Projects, Project in charge PMU/SC
13	Disposal of Hazardous Waste	Hazardous Waste (Management and Handling) Rules 1989	Orissa State Pollution Control Board, with consent and approval from Local Administration and community	Applicable	2 months	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	Orissa State Pollution Control Board with consent from the Local Administration and Local community	Applicable	2 months	Contractor	CE, WB Projects, Project in charge PMU/SC
15	Pollution Under Control Certificate	Central Motor Vehicles Act 1988	Department of Transport, Govt. of Orissa	Applicable	1 Month	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	1 Week	Contractor	CE, WB Projects, Project in charge PMU/SC
17	Registration of Workers	Labour welfare Acts.	District Labour Commissioner	Applicable	1 Month	Contractor	CE, WB Projects, Project in charge PMU/SC

CHAPTER 2
BASELINE ENVIRONMENTAL SETTING AND IMPACT SUMMARY

2. BASELINE ENVIRONMENTAL FEATURES IMPACTED AND PROPOSED MITIGATION MEASURES

The details are given below:

Table – 2.1

Water Bodies

Impacted Ponds	Impacted man-made water harvesting structures	Hand pumps	Sump	Wells	Water Taps / Stand post
91	Nil	67	Nil	Nil	17

Table – 2.2

Impacted Trees

Trees Impacted LHS	Trees Impacted RHS	Green Tunnels	Name of the Forest Division
3581	2873	Nil	Bhadrak and Keonjhar Forest Division

Table – 2.3

Composition of Plants along the Corridor going to be adversely affected

Sl. No.	Local Name	Scientific Name
1	Banyan	Ficus bengalensis
2	Aswath	Ficus religiosa
3	Udumbara	Ficus glumerata
4	Jari	Ficus infectoria
5	Tentuli	Tamarindus indica
6	Karanja	Pongamea pinnata
7	Dharunja	Holoptelia integrifolia
8	Bada Chakunda	Samania saman
9	Chakundi	Cassia siamea
10	Sirisa	Albizia lebeck
11	Simul	Ceiba patendra
12	Fasi	Annogeissus acuminata
13	Amba	Mangifera indica
14	Limba	Azadirachta indica
15	Mahala	Ailanthus exelcessa
16	Mahula	Madhuca latifolia
17	Kochila	Strychnos nuxvomica
18	Ritha	Sapindus emarginatus

19	Akash malli	Melingtonea hortensis
20	Jamun	Cizygium cumini
21	Kendu	Diospirous melanoxylon
22	Suama	Soyimida fabrifuga
23	Sala	Shorea robusta
24	Piasala	Pterocerpus marsupium
25	Kuruma	Adina cordifolia
26	Sisoo	Dalbergia sisoo /D.latifolia
27	Khaira	Acacia catechu
28	Chhatiana	Alstonea scholaris
29	Arjuna	Terminalia arjuna
30	Asana	T.alata
31	Harida	T.chebula
32	Bahada	T.bellerica
33	Ainala	Phyllanthus emblica/ Emblica officinalis
34	Harasingar	Nyctanthes arbortristis
35	Karada	Cleistanthus collinus
36	Sahada	Strebulus asper
37	Bheru	Chloroxylon switenea
38	Ankula	Alangium hexapetalum
39	Baula	Mymosops elengi
40	Champa	Michelia champaca
41	Katha champa	Plumeria alba /P.rubra
42	Giringa	Stereospermum acerifolium
43	Sunari	Cassia fistula
44	Atundi	Combretum decandrum
45	Bigaba	Jatropha curcas /J.gossypifolia
46	Palasa	Beutia frondosa
47	Gambhari	Gmelina arborea
48	Gohira	Acacia leocophloea
49	Babul	Acacia nilotica
50	Bela	Aegle marmelus
51	Puruni (Ghodapuruni)	*Boerhovia diffusa*
52	Apamarga	*Achyranthes aspera*
53	Bhui neem	*Andrographis paniculata*
54	Ayyapan	*Aristolochea indica*
55	Tihudi	*Operculina turpethum*
56	Muturi	*Smilax macrophylla*
57	Sugandhi	*Hemidesmus indicus*
58	Arka	*Calatropis gigantia*
59	Gunja / Kaincha	*Abrus precatorius*
60	Chitaparu (Rakta chitapru)	*Plumbago rosea (Red Flower)*
61	(Sweta) Chitaparu	*P.zeylanica (White flower)*
62	Pasaruni	*Pederia foetida*
63	Mersunga	*Muraya koengii*
64	Banatulasi	*Ocimum gratissimum*
65	Kateri/Chakadabheji	*Solanum xanthocarpum*
66	Bala	*Sida cordifolia*
67	Dengabheji	*Soalanum torvum*

68	Bahada	*Terminalia belerica*
69	Harida	*Terminalia chebula*
70	Arjun	*Terminalia arjuna*
71	Kamalagundi	*Malotus philippinensis*
72	Fanafana	*Oroxylon indicum*
73	Bidanga	*Embelia ribes*
74	Baibidanga	*Embelia tsjeriam*
75	Guduchi	*Tinospora cordifolia*
76	Salaparni	*Desmodium ganjeticum*
77	Bankulthi	*Tephrosia purpuria*
78	Talamuli	*Curculigo orchoides*
79	Arrow root	*Curcuma aungostifolia*
80	Karpura haldi	*Curcuma aromatica*
81	Daskerenta	*Barleria cristata*
82	Dahidahika	*Cocculus hirsutus*
83	Sunari	*Cassia fistula*
84	Satabari	*Asparagus racemosus*
85	Baidanka	*Muccuna Pruriens*
86	Bridhadaraka	*Argyreia nervosa*
87	Gokshura (Bada)	*Pedalium murex*
88	Sangokshura	*Tribulus terrestris*
89	Gangasiuli (Harsingar)	*Nyctanthes arbortristis*
90	Patalgaruda	*Rauvolfia serpentina*
91	Dhataki	*Wood forida fruticosa*
92	Pitakeruan	*Wrightia tinctoria*
93	Keruan	*Holarhena antidysenterica*
94	Baruna	*Creteva religiosa /C . nurvula*
95	Puruni/Atikapudi	*Trianthema portulacastrum*
96	Karanja	*Derris indica /Pongamea pinnata*
97	Bana Govi	*Elephanatapus scabber*
98	Bel	*Aegle marmelus*
99	Narguni	*Atlantia manophylla*
100	Nagarmatha	*Cyperus rotundus*
101	Kochila	*Strychnus nuxvomica*
102	Krushnaparni	*Uraria picta*
103	Sankarjata	*`Urenia lagopoides*
104	Bana Piaz	*Urgenia indica*
105	Mendi or Anantamula	*Tylophora indica*
106	Keu	*Costus speciosus*
107	Gaigobra / Langalangalia	*Gloriosa superba*
108	Sankhapuspi	*Clitorea ternatia*
109	Gugul	*Comiphera caudata*
110	Bhuini amla	*Phyllanthus fraternus*
111	Atibala	*Abutilon indicum*
112	Bala	*Sida cordifolia*
113	Chiller	*Caesal pinea sappan*
114	Gillo	*Caesalpinea cristata*
115	Bajradanti	*Barbaria crista*
116	Bakuchi	*Psoralia corrylifolia*

117	Sweta sorisha	*Cleome gynandra*
118	Sweta tila	*Digitalis purpurea*
119	Gohira	*Acacia leucophloea*
120	Babul	*Acacia nilotica*
121	Pasanabhedi (Paunsa paunsia)	*Erva lanata*
122	Keshdura or Bhringaraj	*Eclipta prostrata /E.erecta*
123	Keshranjani	*Wadellia chinensis*
124	Bana alu	*Dioscorea digitalis*
125	Mundi	*Speranthus indicus*
126	Pokasunga	*Baliospermum montanum*
127	Pasanabhedi	*Collius frescohli*
128	Bidarikand	*Pruraria tuberosa*
129	Gudmari	*Gymnema silvestre*
130	Bada Pokasunga	*Cineraria versicolour / Cineraria maritime*
131	Indramarisha	*Acalypha indica*
132	Indrayan	*Citrallus colocynthis*
133	Uturudi	*Pergularia damea*
134	Sivalingi	*Diplocyclos palmatus*
135	Asadhua	*Caparis horrida*
136	Guduchi	*Tinospora cordifolia*
137	Baigoba	*Jatropha curcas*
138	Nalibaigoba	*Jatropha gossypifolia*
139	Gandhana	*Premna tomentosa*
140	Modafal	*Helectris isora*
141	Tundapoda	*Todalia asiatica*
142	Sunsunia	*Oxalis Corniculata*
143	Pita saga	*Malugo pentahyla*
144	Lahanga	*Cellosia arjenta*
145	Monsa rohini	*Soymida febrifuga*
146	Basanga	*Justacia adhatoda / Adhatoda vasica*
147	Bramhi	*Bacopa monieri*
148	Thalkudi	*Centella asiatica*
149	Kani khanda	*Ipomea haderacia / Ipomea nil*

Tube wells and Stand posts

All total **26 stand posts** with connecting underground water supply lines and mains supply systems within the Urban areas of Rayagada, JKPur, Bisam cuttack and Therubali are affected fully. So also **80 Bore wells** /Hand pumps are getting fully affected requiring relocation or replacement away from the PROW on high ground and healthy locality, so as not to locate any such unit near any polluting source of effluence from factories, sewerage systems, urban areas drainage systems, garbage dumping yards, submergible areas and nearer to railway tracks, latrines, stables, cowsheds, effluent and garbage release areas of hospitals, nursing homes, slaughter houses, poultry firms etc. Bore wells shall be located with

provision for a soak pit minimum 10mtr away from the stand post of bore wells to prevent spread of waste water and surplus water, which is a common site around such facilities. The bore wells or hand pumps and water taps shall be connected to the line drain that is being provided at Urban areas to facilitate easy disposal of the waste water at a far of place away from the bore well, so as to prevent in grace of harmful, foul smelling, waste water affecting the quality of ground water through direct slippage through a underground water source. The tube wells and bore wells or stand posts on account of accumulation of water and puddle become virtual breeding ground for house fly, bacteria and mosquitoes, which are responsible for contamination and spread of diseases. Therefore, additional cost of soak pits has been provided to ensure safety and security of users. Thus around **80 bore wells** and **26 water taps** have to be set up at high ground away from the ROW with raised cemented platform connected to a soak pit as per design or connected to lined drains /cover drain in built up areas as per the design details of stand posts and tube wells /bore wells /hand pumps corresponding to **Drawing number OSRP /CEG /SH /ENV/07**. Site enhancement like planting of one Ashok (Saraca asoka) /Anthocephalous cadamba/ Aegle marmelus /Pungamea pinnata plant shall be taken up with one Tabernamontana coronaria plant so that, the area around the Tap or Tube well /Bore well remains cool and shady with additional beauty of scented flowers or non-timer medicinal flowers or fruits. Such plants may be within 5mtr from the Tap or bore well platform if there is space near by. All such solitary plants shall have tree guards as per **Drawing No OSRP /CEG /SH /ENV/07**.

No bath rooms of any short to be erected for privacy or other wise as bore wells are for supply of scarce potable drinking water which is a precious resource and should not be misused.

The bathrooms never maintain privacy when erected on a road side with top open due to clear visibility from Bus, Truck or such other moving contrivance on the adjacent road.

All bore well if near the ROW should have a drainage channel up to the side drain of the road, where pucca drains are provided in residential locality or to a soak pit 20mtr away for ground water recharge. Bore wells to have a single tree and one flowering bush /Tulsi plant as a sight enhancer as discussed under stand posts.

Bore wells out side the ROW

The bore wells which are not affected, but causing accumulation of water and pollution within the construction zone away from ROW, shall be provided with site enhancement and hygienic platforms, where essentially required or where there is a popular demand to restore the structures if requested by the local public, however this facility will be only extended for a repair and restoration of the platform and disposal sources.

All bore wells, stand posts, and all pipe supply lines which are to be decommissioned on account of being fully affected shall be mandatorily relocated first of all after the sites are selected and connected to main supply lines in the case of stand posts, while the abandoned or decommissioned shall be removed, shorted out and sealed and made pollution free by preventing contamination through proper dismantling and sealing of openings with sand and fine aggregate with cement concrete, there by plugging up to 4mtr such bore holes and under ground pipes, where removal is not possible from the top down wards.

No new bore holes dug up for sinking of hand pumps shall be kept open and un guarded till it is fitted with the required pipes and covered with the hand pumps fittings to prevent accidental fall and death of human, domestic cattle and wildlife. In case of any such incident, the contractor and the organization assigned with the job of relocation and replacement shall be held responsible for the damages that may accrue on account of such mishaps and careless handling of activities.

Water bodies and Ponds

Specific provisions relating to activities in an around water bodies such as, minor irrigation structures, water harvesting units, irrigation canals, natural drainage systems, nalas, streams and rivers getting filled up by road widening have been dealt with under Chapter -3, but a few salient features those need specific attention by the contractor and environmental specialist are :

- To prevent or minimize acquisition and silting up of the structures, that may lead to a chain of environmental damages like, flooding, breach of embankments, less water holding capacity and distress of the local users.
- Prevent water pollution and ponding of drains, sewerage and wash outs from garages, factories, hospitals, slaughter houses, entering into such natural /artificial sources of water used by the community and the live stock or wildlife that may suffer heavily.

There shall be tree planting on the embankments of all water bodies shown on the **Table – 2.4** at a spacing of 5mtrX5mtr or 2.5X2.5mtr interval on the outer edge of the bunds, embankments, so as to prevent fall of leaves into the water body, which may pollute the water (while enhancing the aesthetic value) in 45cm^3 pits, which shall be dug up during April – May. This shall be in 1mtr.cube pits, where young plants up to 30cm.girth at BH, will be relocated by uprooting such plants mechanically with ball of earth remaining intact and planting the same after trimming the roots and shoots as would be necessary.

Table – 2.4

Tree planting on the Embankments of all Water Bodies

Location of ponds & water bodies	Site enhancement planting proposed for embankments	Number of trees to be planted
SH-9- 1.017, 2.485, 2.822, 8.190, 9.280, 6.900, 12.302, 12.580, 12.900, 13.112, 11.780, 19.555, 20.400, 20.470, 20.600, 20.670, 20.725, 20.758, 20.900, 21.900, 22.200, 22.348, 22.542, 22.900, 24.900, 25.050, 27.700, 27.705, 27.790, 28.000, 28.062, 28.800, 29.147, 29.250, 29.300, 29.400, 29.500, 29.555, 29.715, 29.700, 30.013, 30.565, 30.683, 30.970, 31.300, 31.417, 31.823, 31.960, 32.100, 32.450, 32.490, 33.200, 33.600, 33.870, 34.000, 36.100, 36.104, 36.428, 39.100, 39.263, 39.640, 40.266, 40.360, 41.500,	Trees consisting of Banyan, Aswath, Mango, Kadamba, Arjuna, Simul, Tamarind, Siris, Champa, Harida, Bahada, Anla, Sunari, Pulanga, Karanja and Jamun etc. with Gulmohar, Spathodia, Bengal almond	100

41.760, 42.336, 42.440, 43.240, 43.865, 44.000 **(Ponds)** 4.424, 4.470, 5.830 – **(Canal)** **SH-53-** 2.448, 2.800, 6.600, 8.915, 13.713, 13.737, 17.100, 17.700, 17.740, 19.614, 19.665, 20.270, 20.868, 22.290, 26.590, 31.484, 36.723, 37.350, 48.640- **(Ponds)**		

Table – 2.5

Area affected for Common Property

Sl. No	Parameters	Property Type of Government /community	Number /Area in acres	Remarks
1	Religious Structures	Community	34	New construction by the contractor as per negotiation by the NGO, with the community, subject to limitation within compensation amount and some additional cost towards aesthetic improvement of the surrounding exteriors and interiors as would be necessary at the relocated site, in addition to the approach road. In case of boundary wall and gate being affected or requiring removal the new boundary walls with site enhancement provisions and gate shall be constructed by the contractor as per design **Drawing No. OSRP /CEG /SH /ENV/ 04-A.**
2	Burial Grounds	Community	Nil	Minimum intervention in land acquisition and replacement by equal area through conversion and acquisition land if necessary. Site enhancement through boundary wall, benches, maintenance of existing crematorium or rest area, planting of shed bearing and flowering trees as per the decision by specific community or Gram Sava.
3	Schools and college	Community /Govt.	10	New construction of the acquired building away from ROW, out of the compensation amount before demolition, erection of new boundary wall with provision of noise, dust and toxic fumes, filter or suppression through masonry and vegetative method, planting climbers and trees as a screen as per the design **Drawing No. OSRP/ CEG/ SH/ ENV/ 04-B, Drawing No. OSRP/ CEG/ SH/ ENV/ 04 B & C, Drawing No.**

Sl. No	Parameters	Property Type of Government /community	Number /Area in acres	Remarks
				OSRP/ CEG/ SH/ ENV/ 04B & D. Provision of pedestrian tubular metal barricade as a interception barrier or shifting of the gates 2mtr inside to prevent direct accesses to the highway. Signage and rumble strips, zebra crossings for traffic calming.
4	Passenger sheds	Govt.	73	Replacement and relocation with bus bay, passenger shed and site enhancement planting refer **Drawing No. OSRP/CEG/SH/ENV/02,**
5	Land acquisition (Private /Community /Government /Forest)	**Private Other Govt. land**	50.54Acres 13.41Acres	

To provide input under environmental impact and mitigation measures including impact on *Biodiversity,* the following actions are proposed.

The Biodiversity Assessment and Management Plan will provide in depth analysis of the individual problems on the package with recommended parameters to address the problems for preserving and protecting the wild flora and fauna by suitable change in the design structure that will be blended at the project formulation and implementation stage and effective monitoring to be continued there after. Similar exercise for assessment of environmental safeguards and mitigation /minimization /avoidance measures against specific threats are discussed below along with detail design and guidelines etc., so as to prepare a model document for follow up action by the responsible agencies during pre-construction, construction and post construction stage with detail formats of reporting, seeking permission of statutory authority as the case may be.

FOREST and PROTECTED AREAS:

The corridor covers protected area Hadagarh wildlife sanctuary within the zone of influence that is 10km radial distance on either side of carriage way near Bancho to the right at a distance of 3km only, which will be influenced by the road development. There are 6 VF lands adjacent to the corridor proposed to be develop pertaining to revenue village Anandapur, which have been avoided by **erection of toe walls** to reduce the width of the road, so that no forest land gets acquired for non forest use. The package covers GT Sheets No.74A/9 & 74A/10.

Potential Impact of the Project on Environment and Biodiversity

There are 49 villages in 6 Tahasils and 2 districts covering 20.33ha of private land and 5.39ha of govt. land total into 25.72ha to be acquired for development of the corridor. As a result there will be change in the land use pattern of around 26ha in the entire stretch of 95km of project road. There are exclusive green tunnels in between Bhadrak to Anandapur and Bhadrak to Chandbali, which have been saved partially on account of there close proximity in the old and narrow alignment,

which is now being develop. During the pre-construction phase many of the huge and aged (more than 120 year old) trees standing there as towers to prevent wind damage 10 times the height of the tree in its leeward side will be lost along with the very shelter belt character of these trees, after the avenues are cut and removed for the widening. The perching and nesting ground for birds, predatory and friends of agriculture will be lost altogether in the process which has to be replaced by suitable plantation of similar species along the new corridor for quick establishment of a shelter belt in this zone. The disposal of excavated materials from the road surface along with top soil from the portion of land going to be acquired is one of the major issues to be tackled due to non availability of dumping and stock pilling area for such surplus materials, those will be replaced by improved sub base and sub grade.

The aforesaid activities will also cater to additional requirement of land for stock pilling excavated materials and transported sub base and sub grade materials till its potential use at specific locations. The heavily built up areas serving as commercial and residential centers right from Bhadrak to Chandbali and Bhadrak to Anandapur such as Ichhapur, Berhampur, Alinagar, Ranipur, Tihidi, Dolasahi, Mirjapur, Pirahata bazaar, Kanpur, Samantaraypur, Gadibazar, Digachhia, Khenranga, Matto, Mahulia, Choragadia, Randia, Barapada, Ganijanga, Chhayalasingh, Hatadiha, Tilo, Bonto, Mareygaon, Ambagadia, Fakirpur and Anandapur, require specific consideration for less widening and service lane /line drains, so that the acquisition is not adversely effective the public. The list of CPRs affected and the type of mitigation have been dealt with separately below according to its location and design feasibility as per ground condition. However some houses used for residential purposes, some squatter colonies used for residence cum commercial activities shall be removed fully or partly as per the design to improve communication and vehicular movement. This will affect adversely the buildings, temples, landmarks, commercial establishments, squatters, small business kiosks, essential supply systems like electronic communication through fiber optic cables, power supply, cable TV and internet, sewerage and drainage, potable drinking water etc. This will also fragment the corridor of wildlife movement, degrade the vegetative cover on account of tree felling on either side of the road in a frequently cyclone susceptible area, water logging on account of embankment. The quarries, borrow areas, road diversions, demolition of buildings, culverts, bridges, wells, excavation of road surface, dust smoke and poisonous gases from vehicle and road construction materials, release of garbage, sewerage and waste water into water bodies and open country will lead to soil, water and air poisoning high noise levels deteriorating the ambient quality standards beyond tolerable limits.

The nesting, hunting, breeding and grazing grounds of fauna in the close vicinity of the corridor will be adversely affected or destroyed completely on account of road improvement, which are difficult to be clearly assessed and evaluated immediately. All these will require specific attention for evaluating the probable levels of damage and come up with avoidance, minimization, mitigation and improvement of existing system in a manner that is befitting for flora and fauna the stake holder along the corridor like the PAPs, socio religious structural equilibrium in the most acceptable manner.

Adverse Impact on Environment

The adverse impacts are soil erosion, loss of agricultural productivity, loss of biodiversity, loss of drainage channels, water logging, flooding and destruction of shelter belt and fertile land leading to pollution of water sources ambient air and water quality etc. The noise pollution and loss of carbon utilization due to cutting down of huge avenue trees shall have to be attended in a more realistic approach for avoiding any ecological damage on the area.

The impact will be felt in 3 stages.

(i) Pre-construction,

(ii) Construction and

(iii) Post-construction.

(i) **Pre-Construction** – Details of utilities such as power supply, water supply, sewerage, drainage, fiber optic cable systems, audio visual cables Telephone lines, bus stops, passenger shades, community latrines, ponds, tube wells, religious places, burial ground, markets, water bodies, irrigation canals and drainage systems shall be impacted due to their shifting /demolition /diversion, which will affect the day to day living conditions of human beings, wildlife and domestic cattle. The felling of trees, shrubs, bushes, green tunnels, avenues will increase the susceptibility of rise in local temperature and damage due to cyclone, loss of livelihood and occupations, nesting, perching and food source of many wildlife.

(ii) **Construction** – Construction activity will generate lots of garbage, debris, soil erosion, emission of noise dust fumes and toxic gases, which will deteriorate the ambient quality of air, water and noise and pollute the soil. The road cuttings will cause traffic and drainage problem for the area. The movement of heavy machinery, digging of foundation, operation of crushers, spillage from various stockpiled materials, road formation, grading, black topping, culvert and bridge construction will generate materials, which may cause pollution of water, air and loss of vegetation due to lack of photo synthesis. The use of explosives, the use of natural water sources will add towards pollution and competitive use..

Action Plan for Environment Impact Mitigation

There are only 10 ponds and water bodies on either side of the road coming under impact within 20mtrs from proposed RoW centre line. At all such locations as detailed below treatment such as erecting PCC (M-20) Toe walls as per design specification vide **Drawing No OSRP /CEG /SH /ENV/03** of Environment Management Plan) and provision of bathing ghat, sluice gate /spill way for drainage of excess water from the area. Additional site improvement measures are detailed in specific tables against specific CPRs.

Table – 2.6

Affected Ponds and Water bodies with details of mitigation Measures to be taken on SH-9

Sl No.	Items	Chainage at km	Location left /right	Distance in m from centerline	Affected in m	Length of toe wall in Mtrs.	Cost @5197/- per Rmtr	Cost of Spillway @58808.00	Bathing ghat @92330.00 each	Site Enhancement Plantation @351950.00 for 400 plants	Total cost
1	Pond	1.017	R	10	15	15	77955	0	0	0	77955
2	Pond	2.485	L	12.9	22	25	129925	0	0	0	129925
3	Pond	2.822	R	12.9	55	55	285835	0	0	0	285835
4	**Canal**	4.424	R	12.8	1176	1180	6132460	0	0	0	6132460
5	**Canal**	4.47	L	13	430	430	2234710	0	0	0	2234710
6	**Canal**	5.83	R	13	251	255	1325235	0	0	0	1325235
7	Pond	8.19	R	13	18	20	103940	0	0	0	103940
8	Pond	9.28	L	13	96	100	519700	0	0	0	519700
9	Pond	6.9	L	8.15	37	40	207880	0	0	0	207880
10	Pond	12.302	R	8.4	19	20	103940	0	0	0	103940
11	Pond	12.58	R	8.3	24	24	124728	0	0	0	124728
12	Pond	12.9	L	12.8	34	34	176698	0	0	0	176698
13	Pond	13.112	R	13.3	19	20	103940	0	0	0	103940
14	Pond	11.78	L	13	11	15	77955	0	0	0	77955
15	Pond	19.555	L	12.9	26	30	155910	0	0	0	155910
16	Pond	20.4	R	13	53	55	285835	0	0	0	285835
17	Pond	20.47	L	13	22	25	129925	0	0	0	129925
18	Pond	20.6	L	12.9	17	20	103940	0	0	0	103940
19	Pond	20.67	L	13	14	15	77955	0	0	0	77955
20	Pond	20.725	R	13	10	10	51970	0	0	0	51970
21	Pond	20.758	R	13	5	5	25985	0	0	0	25985
22	Pond	20.9	L	13	24	25	129925	0	0	0	129925
23	Pond	21.9	R	13	24	25	129925	0	0	0	129925
24	Pond	22.2	R	13	67	70	363790	0	0	0	363790
25	Pond	22.348	L	12.9	30	30	155910	0	0	0	155910
26	Pond	22.542	R	13	41	45	233865	0	0	0	233865
27	Pond	22.9	R	12.9	18	20	103940	0	0	0	103940
28	Pond	24.9	R	12.8	21	25	129925	0	0	0	129925
29	Pond	25.05	L	12.9	27	30	155910	0	0	0	155910
30	Pond	27.7	R	12.9	17	20	103940	0	0	0	103940
31	Pond	27.705	L	12.9	63	65	337805	0	0	0	337805
32	Pond	27.79	R	12.8	28	30	155910	0	0	0	155910
33	Pond	28	L	12.9	268	270	1403190	0	0	0	1403190
34	Pond	28.062	R	13	114	115	597655	0	0	0	597655
35	Pond	28.8	L	12.8	79	80	415760	0	0	0	415760
36	Pond	29.147	R	12.6	315	315	1637055	0	0	0	1637055
37	Pond	29.25	L	13	54	55	285835	0	0	0	285835
38	Pond	29.3	L	13	70	70	363790	0	0	0	363790
39	Pond	29.4	L	13	26	30	155910	0	0	0	155910

40	Pond	29.5	R	13	15	15	77955	0	0	0	77955
41	Pond	29.555	L	13	75	75	389775	0	0	0	389775
42	Pond	29.715	L	13	46	50	259850	0	0	0	259850
43	Pond	29.7	R	13	43	45	233865	0	0	0	233865
44	Pond	30.013	L	12.9	28	30	155910	0	0	0	155910
45	Pond	30.565	R	13	27	30	155910	0	0	0	155910
46	Pond	30.683	L	12.9	14	15	77955	0	0	0	77955
47	Pond	30.97	L	13	43	45	233865	0	0	0	233865
48	Pond	31.3	L	13	40	40	207880	0	0	0	207880
49	Pond	31.417	R	13.2	26	30	155910	0	0	0	155910
50	Pond	31.823	R	13	33	35	181895	0	0	0	181895
51	Pond	31.96	R	13	440	440	2286680	0	0	0	2286680
52	Pond	32.1	L	13	27	30	155910	0	0	0	155910
53	Pond	32.45	R	12.8	21	25	129925	0	0	0	129925
54	Pond	32.49	L	13	210	210	1091370	0	0	0	1091370
55	Pond	33.2	L	13.2	21	25	129925	0	0	0	129925
56	Pond	33.6	L	13	53	55	285835	0	0	0	285835
57	Pond	33.87	L	12.8	134	135	701595	0	0	0	701595
58	Pond	34	R	12.9	42	45	233865	0	0	0	233865
59	Pond	36.1	L	12.9	39	40	207880	0	0	0	207880
60	Pond	36.104	R	13	70	70	363790	0	0	0	363790
61	Pond	36.428	L	13	13	15	77955	0	0	0	77955
62	Pond	39.1	R	12.9	53	55	285835	0	0	0	285835
63	Pond	39.263	L	12.9	20	20	103940	0	0	0	103940
64	Pond	39.64	R	13	20	20	103940	0	0	0	103940
65	Pond	40.266	R	13	23	25	129925	0	0	0	129925
66	Pond*	40.36	L	13	30	30	155910	60790.00	97736	17597.5	332034
67	Pond	41.5	L	13	23	25	129925	0	0	0	129925
68	Pond	41.76	L	13	14	15	77955	0	0	0	77955
69	Pond	42.436	R	13	58	60	311820	0	0	0	311820
70	Pond	42.44	L	13	53	55	285835	0	0	0	285835
71	Pond	43.24	R	13	48	50	259850	0	0	0	259850
72	Pond	43.865	L	13	80	80	415760	0	0	0	415760
73	Pond	44	L	13	170	170	883490	0	0	0	883490
Total						**5818**	**30236146**	**60790**	**97736**	**17598**	**30412269.50**

Bhadrak – Anandapur (SH-53)

Sl No.	**Items**	**Chainage at km**	**Location left /right**	**Distance in m from centerline**	**Affected in m**	**Length of toe wall in Mtrs.**	**Cost @5197/- per Rmtr**	**Cost of Spillway @58808.00**	**Bathing ghat @92330.00 each**	**Site Enhancement Plantation @351950.00 for 400 plants**	**Total cost**
1	Pond	2.448	C	-	75	75	389775	0	0	0	389775
2	Pond	2.8	R	13	31	35	181895	0	0	0	181895
3	Pond	6.6	L	13	10	10	51970	0	0	0	51970
4	Pond	8.915	R	13	25	25	129925	0	0	0	129925
5	Pond	13.713	L	8	18	20	103940	0	0	0	103940

6	Pond	13.737	L	8	13	15	77955	0	0	0	77955
7	Pond	17.1	C	-	14.9	15	77955	0	0	0	77955
8	Pond	17.7	L	8	12	15	77955	0	0	0	77955
9	Pond	17.74	R	11	3	5	25985	0	0	0	25985
10	Pond	19.614	R	8	134	135	701595	0	0	0	701595
11	Pond	19.665	L	8	45	45	233865	0	0	0	233865
12	Pond*	20.27	L	8	81	85	441745	60790.00	97736.00	43993.75	644264.75
13	Pond*	20.868	L	13	23.5	25	129925	60790.00	97736.00	43993.75	332444.75
14	Pond	22.29	L	13	9	10	51970	0	0	0	51970
15	Pond	26.59	R	13	18	20	103940	0	0	0	103940
16	Pond	31.484	L	8	24	25	129925	0	0	0	129925
17	Pond	36.723	L	13	40	40	207880	0	0	0	207880
18	Pond	37.35	L	13	265	265	1377205	0	0	0	1377205
Total						**865**	**4495405**	**121580**	**195472**	**87987.5**	**4900444.5**

2.1 ACTIVITY SEQUENCING FOR EFFECTIVE IMPLEMENTATION

Prior to commencement of construction, the Contractor(s) will be required to submit an EMP Implementation Plan to the PIU based on the Contractor's actual construction methodologies, work program, type and number of construction plants to be used.

Sequence of Construction to Avoid Water pollution

- In all these cases the barricading with G.I. sheets and wrought iron bars has to be initially erected at the desired location up to which the pond /water bodies proposed to be acquired as temporary silt fencing. Then the space in between is to be excavated for slush and need to be refilled with sand and G.S.B. compacted layer by layer. Then the foundation trench for the Toe wall has to be excavated mechanically as per design. PCC /RRS masonry Toe wall is then built up for the desired length 2001mtrs as per the site condition and design **Drawing No. OSRP/CEG/SH/ENV/3, 9 & 10.** The top of the Toe wall is to be given a steep slope towards the road side so as to avoid the use of such structures as a platform for resting or defecating which is a common practice in this zone. The silt fencing and digging of foundation trench of un affected water bodies shall not be taken up for improvement of the embankment until and unless the community agrees for such works on such property ,where surplus disposal is a necessity and these sites are ideal for dumping of surplus excavated materials from foundations ,road sub base and cuttings.
- After erection of the Toe wall, the G.I. barricade is to be taken out with the surplus material if any on the pond side to prevent the silting and pollution of the water body.
- Some of the ponds and water bodies on govt. land shall have a Bathing ghat away from the road side on any of the side embankment, made up of R.C.C. / RRS masonry structure as per design. The design layout of such bathing ghat is at **Drawing No. OSRP /CEG /SH /ENV/09** for Environment Management plan.

- **No such ghat is to be erected on any private property or institutional property duly compensated for acquisition of land and water body**. Accordingly the **site engineer and supervision consultant** will take on the spot decision whether to provide for additional site enhancement measures on such private property with the consent of the land owner so as to reduce the impact of accumulated water and barren embankments *provided further there is public demand and the owner/owners sign a memo of undertaking to allow the property used by public with the Gram sava or GramPanchayat.* Out of the ponds and water bodies denoted here as pond**, some shall have a sluice gate or spill way to drain excess water** accumulation and avoid impact on the road. The spill way design and location shall be as per the field condition as per **Drawing No. OSRP/CEG/SH/ENV/10.** Where culverts on the road connect the water body, no spill way shall be provided unless it is a dead end reservoir. Spill way should not be adjacent to the road for avoiding soil erosion and flooding of the road during rainy season.
- The embankment of each pond coming within 20mtrs from proposed centre line of the road shall be planted up with trees, shrubs and bushes as site enhancement measure and the plants shall be eco-friendly catering to the need of birds, rodents, amphibians and providing some non timber forest products.
- The species, which spoil the water quality, are not to be planted at these sites. Suitable species are Ficus bengalensis, F.religiosa, F.infectoria, Strebulus asper, S.toxides, Cizygium cuminii, Aegle marmelus, Mango, Zizyphus zozoba, Z.numelarai, Palmyra palm, Madhuca latifolia, Bambax ceiba, Helecteris isora, Spathodia companulata, Pithecolabium dulcis, Terminalia arjuna, T.alata, T.belerica, T.chebulla, Diospiros montana, Embelia ribes, Azadirachta indica, Anthocephalus cadamba, Messua farrea etc. placed at 5mtr X 5mtr spacing. Some bagunvilla plants of different colour may be introduced in between the trees to add color to the environment.

Planting is to be taken up by relocating the young under 30cm girth trees shifted from the road side, which were due to be felled for the RoW and carried up to the site with a ball of earth as described separately. This plant will be planted in the pre-dug up $1mtr^3$ pit after mixing the bottom half of the soil with manure and pesticides, fungicides and filling the top soil first of all in the pit in such a manner that no void is allowed inside the pit while the ball of earth remains attached to the plant. Then the bottom soil mixtures will be filled in and compacted by pressing all around manually with the foot. This should be done during rainy season when regular rains have started to prevent loss of these relocated transplants. Where plants for relocation are not available near by, such planting shall be carried out with available one-year-old nursery seedlings in similar manner, those have been raised out of the old avenue plants as a gene bank to recreate the corridor specific plants at these sites for the benefit of human beings and wildlife.

In addition, the shrubs and small flowering bushes shall be planted in between two trees at 2.5mtr interval as an aesthetic measure.

Table – 2.7

Other common Property Resources

Sl. No	Impacted property	Mitigation measures	Additional Enhancement measures
1	School 10 numbers	Noise cum dust suppression RCC boundary walls with/without grill gate	Tree planting, approach roads, shifting of entry gate inside ,Metal tubular interception barricade
2	Religious Structure 34 numbers	Noise cum dust suppression RCC boundary wall with flower vase atop	Aesthetic planting of flowering and religious trees, shrubs inside and out side
3	Burial Grounds Nil	Noise cum dust suppression RCC boundary with/without gate ,repair/restoration of sheds, pandals inside	Planting of flowering and shade bearing trees, shrubs, bushes inside and out side
4	Passenger Sheds 73 numbers	73 New passenger shades with bus bay facility and zebra crossings	Site enhancement planting of few flowering shrubs

The boundary walls of 10 schools with portions of existing building at few locations are impacted. Here noise, dust mitigation measures, improvement of approach road and gate along with site enhancement aesthetic planting shall be carried out. The length of boundary wall shall be minimum 20 mtrs with provision for approach wall at exit point and, fixing up of MS Grill Gates, embedded in R.C.C. pillars and the top of the R.C.C. boundary wall having G.I. wire mesh mounted on embedded G.I. angle iron posts for flowering evergreen creepers to crawl over and serve as a vegetative screen to effectively reduce dust, fumes and muffle noise affecting the institutional environment. The RCC masonry boundary wall shall be provided with plastering and groove cuttings as per design to absorb and reduce noise on the high way from affecting the area within.

Similar boundary walls for affected religious sites with embedded flower vases over the masonry/RCC boundary wall having grooves cut on the outer wall plastered surface and approach road with or without gates are designed for construction together with aesthetic planting of scented ,religious and flowering shrubs, herbs and small to medium trees

For burial grounds subject to availability of space in addition to the noise cum dust suppression boundary wall facing the highway, there shall be **new ms grill gate** and renovation of the crematoriums or pall bearers rest sheds for mitigation.

Aesthetic tree planting within and out side the campus where ever open space is available, shall be taken up with non poisonous, aromatic, flowering and edible fruit bearing plants of medicinal and air purifying variety ,subject to approval by the governing body of such schools or the administrative authority of the institutions. In case of units under the control and management of local gram panchayat /CD Blocks/community, the consent and approval of the activities proposed to be undertaken in each case has to be communicated and prior written

approval is obtained during pre construction activity before the construction activity is taken up.

The plants are: -

Creepers -	Quiscalis indica, Bignonea spp., Hiptage, Tecoma, Ipomea haderecia, Argeriya nurvula, Morning glory (Ipomea nill) **cuttings of which can be rooted in the nursery and transplanted in the field.**
Shrubs -	Tabernamontana coronaria, Jasminum humile, Nictanthes arbortristis, Muraya exotica, Muraya koinegi, Karabira (Red, white and cream)**cuttings and seedlings can be raised in the nursery** and planted in the field'
Trees -	Amla, Bahada, Harida, Neem, Sal, Barun, Bakul, Nageswar, Delonix,wild & Grafted Mango, Litchi, Chandan, Rakta chandan, Putranjiba, Jack fruit, Karanj, Jayanti, Agasti ,Bengal almond ,Alstonea, Bara, Aswath,Udumbar,Jari etc.(No Bara,Aswath,Jari,Udumber.Wild mango will be planted within).

1. The total length of each structure is taken as required facing the road and extending the other two sides only.
2. The number of plants shall be climbers at 45cm interval or 80 plants in two rows within the perimeter adjacent to boundary wall.

   Further planting may be taken up by the students and volunteers to cover up any surplus land within the campus, if they demand for which the PIU /contractor may supply the planting materials free of cost. Plants shall be placed at 2.5mtrs apart in single or multiple rows.

   - **All tube wells /hand pumps** inside the schools and colleges, hospitals etc. which are relocated shall be provided with a soak pit away from the boundary wall or foundation of any building and on the down hill slope taking care to ensure that no such soak pit get sub merged /flooded during rains or located in a natural submergible zone.
   - No soak pit over or near any sheet rock with dip direction towards the bore well.

KEY ENVIRONMENTAL FEATURES:

The **Chandbali - Bhadrak - Anandapur** route is one of the commercially important areas, which has the potential to develop rapidly because of its strategic location providing connectivity to Dhamra port, Paradeep port, Bhitarkanika wildlife sanctuary, Hadagarh wildlife sanctuary. The proposal to stock pile, the surplus excavated materials at 5km interval with proper layering and grass turfing will require allotment of site by the Govt. for such activity, which shall be later on under taken as medicinal and aromatic plantation with religious trees and recreation center to develop as such sites. The placement of natural drainage system and reconstruction of impacted canals and irrigation channels will go hand in hand for assuring provision of potable water supply to every PAP. The breeding grounds and hatcheries for marine and fresh water aquatic creatures shall be protected by provision of clearing the drainage system much before the project activity starts in full swing.

The major water sources will be from numerous ponds and natural streams in the locality from where water can be collected through lift pump and used in the road construction as well as masonry works besides use in dust suppression and sub base consolidation.

The details of Key Environmental features getting affected within this package are furnished in the Table below.

Table – 2.8

Key Environmental Features

Forests	Protected area	Water body /Pond /Reservoir /Water harvesting structures	River /Nala /Canal	Wildlife movement	Green tunnel
Nil	1 Hadagarh wildlife sanctuary	88 Ponds	60 Nalas /Creeks /Causeway 3 Canals	13	10.00km

The total enumerations of trees available on the avenue either side of the proposed package that may require removal have been listed above, out of which the trees to be removed and those to be retained are separately indicated for each km are shown in **Annexure - I**. All trees to be removed and retained shall be jointly enumerated by the Divisional Forest Officer, Bhadrak and DFO, Keonjhar wildlife division from Chandbali to Hatadihi and Anandapur to Hatadihi respectively as per there jurisdiction over the area. Executive Engineer and his field units together with the Tahasildar and his field units according their respective jurisdiction shall be associated in this verification for avoiding any claims and counter claims regarding ownership over the trees to be removed, which shall be blazed and blazed surface **colored black** with tree serial no. in white paint. The trees to be retained shall have the blaze **colored red** with serial number in white paint and their girth and other details as specified in the tree enumeration format duly filled in separately for joint signature by all the participants, their superiors for reference, record and future action, according to the plan of action detailed in this regard.

2.2 POTENTIAL IMPACTS OF THE PROJECT

In the EIA study, a detailed discussion has been made on potential impacts of the project on the existing environment along the road corridor. A brief summary of these impacts is presented below.

2.2.1 Land Acquisition Requirements

It is estimated that about **25.72ha** of Govt. and private land (5.39 +20.33) will be acquired for widening of ROW, together with additional areas for toll plaza, truck lay bye, forest check gate, bus stops and passenger shed, development of spur road connectivity and formation of embankments. The acquisition forest land in SH-53 only pertaining to Anandapur revenue village have been avoided along 6 VF locations by suitable engineering intervention in shape of toe wall. In rest of the length and breadth between 0/0km to 45/0km of SH-9 and 0/0km to 50/0km of SH-53, no other forest land is affected. The above land requirement pertains to

permanent land diversions in addition to these additional land shall be required for setting up of camp sites, storage facilities etc by the contractor for the project construction period temporarily with out affecting any forest land. The same shall be approximately within **5ha** at the maximum taking into account, the diversions, haulage roads, quarries and burrow sites as well as approach to bypass roads on temporary alignments along side the proposed bypass. This shall be arranged by the contractor during the initial arrangement for execution of the work as per the prevailing legal requirements and guidelines here in before and here in after prescribed in this EMP. This shall be prior approval of the PIU/OWD as per the specifications/guidelines detailed in EMP document, ensuring permission from the land owners through execution of valid legal agreements for such use or valid written permission for subject to approval and acceptance by the SC, EEp of the SC, the EMU of OWD and the site engineer conforming to the standards of activity and quarry materials.

2.2.2 Common Property Resources Impacted

The project corridor is dotted with numerous common property resources likely to be either partially or fully impacted as has been mentioned above in the foregoing tables with reference to Hand pumps, Water taps, Wells, Passenger sheds, Spur road junctions, schools, colleges, hostels, burial grounds, crematoriums, religious statues, temples, shrines, mandaps, irrigation canals, rain and flood water, drainage systems, ponds, bathing ghats, feeder channels, water harvesting structures, reservoir and irrigation tanks, avenue plants, giant trees as land marks, archeological sites and monuments etc. The mitigation measures provided for them have been separately indicated with cost of various activities proposed towards mitigation, avoidance, minimization of impacts together with enhancement facilities.

Table – 2.9

Impact Summary (SH-9 & SH-53)

Sl. No	Parameter	Quantity
Negative Impacts		
1	Hand Pumps	80
	Water tap	15
	Wells & sumps	Nil
2	Ponds/water body	88+ 3 Canal
3	Relocation/partial acquisition of Religious properties	34
4	Transfer of Agricultural land (ha.)	20ha.
5	Borrow Earth (Cum)@1000m3/km	79463cum
6	Quarry Material (Cum)Crushed stone @4000cum/km	566510cum
7	Sub base @2500cum/km	744131cum
8	Water (KL)Average @2500litres/day or 10000litres/4km	237500LT
9	Water for dust suppression@4 liters / meter	360000LT

10	Nos. of Trees to be felled from avenue & from private property government forests	6346+400
Positive Impacts		
1	Enhancement sites	157
2	Cultural/Religious Properties	34
3	Surface water body	102
4	Educational Institute	11
5	Safe Access to educational institution	11
6	Enhancement as Bus bays	73
7	Junctions	32+17
8	Vegetative / Wall Noise Barrier	53
9	Tree Saving (Nos.)	1002
10	Waste Reuse (cum)	1368427cum
11	Proposed Plantation	10 ha.
12	Major junction improvement (nos.)	03
13	Proposal for Rotary Junctions (nos.)	03
14	Intersections / Access improvement (nos.)	162
15	Bus Bays (nos.)	79
16	Pedestrian Crossing (locations)	182
17	Signage boards (nos.)	309
18	Traffic calming measures (locations)	188 locations
19	Lined Drain (length in Km)	33111mtrs
20	Four lane sections (length in Km)	Nil
21	Crash Barriers / Guard rail(locations)	Furnished in a separate **Table - 2.10**

Table – 2.10

Schedule of Guard Posts (Bhadrak - Chandbali) SH-9

Chainage		Length	Side	Remarks
From	To			
4213	4233	20	Both	Bridge Approach
4243	4263	20	Both	..do..
3834	3854	20	Both	..do..
3864	3884	20	Both	..do..
6064	6084	20	Both	..do..
6094	6114	20	Both	..do..
28812	28832	20	Both	..do..
28842	28862	20	Both	..do..
34975	34995	20	Both	..do..
35005	35025	20	Both	..do..
35025	35085	60	Both	High Embankment
35095	35275	180	Both	..do..
35285	35328	43	Both	..do..

35352	35413	61	Both	..do..
35437	35498	61	Both	..do..
35522	35588	66	Both	..do..
35612	35668	56	Both	..do..
35692	35820	128	Both	..do..
35830	35888	58	Both	..do..
37959	37979	20	Both	Bridge Approach
38021	38041	20	Both	Bridge Approach

Schedule of Guard Posts (Bhadrak – Anandapur) SH-53

Sl.No.	Chainage		Length	Side
	From	To		
1	17806	17826	20	Both
2	18853	18873	20	Both
3	30615	30635	20	Both
4	36868	36888	20	Both
5	36965	36985	20	Both
6	37096	37116	20	Both
7	17839	17859	20	Both
8	18883	18903	20	Both
9	30645	30665	20	Both
10	36898	36918	20	Both
11	36995	37015	20	Both
12	37126	37146	20	Both

While relocating the wells it has been decided to go for sinking of bore wells as local shallow well water will not be safe for drinking after the corridor development brings in economic development and associated pollution of the ground water. The stand posts will also be relocated like wise and all these shall be carried out after due consideration of drainage, convenience, safety and position of soak pit to recharge the ground water with the surplus flow from these water sources during use. This again will be basing on the exercise made with the public for selection of sites to relocate them.

The ponds and water harvesting structures are important sources of ground water recharge and irrigation facility for the agricultural land along these water sources. These are also used as a source of water for bath, washing clothes, bathing cattle as well as for cooking purposes, because in this region the bore wells yield a type of water which either discolors cooked food or being hard water, consumes lot of fuel during cooking and spoils the taste of food.

Compensation shall be provided for loss/damage to the common property resources identified. In addition to that, protection measures (like toe walls, boundary walls, gates, interception walls etc) wherein likely damage may occur during construction phase will be erected particularly near educational institutions, health facilities, water bodies and religious sites.

The common site of people openly defecating on the road side day and night and polluting the environment, especially in this corridor either side of residential areas in Bisamcuttack, Elengalupada, Amlabhata, JKPur, Rayagada, Metakarbeda vattada, Jemadeipentha, Kotavalsa, etc. is a pernicious practice, which can only be removed by way of a social movement to provide a septic tank latrine in each house hold free of cost by government, because the subsidized Barapalli latrines

provided through CD blocks has not been able to stop this unhealthy practice of people spoiling the bunds of water bodies and foot path of roads, which leads to several air and water borne diseases and worm infection.

Where ever Burial grounds, cremation area and Kabrasthan comes along the road provision of a boundary wall has been made to separate out all such locations from further encroachment by road users with facility for site enhancement like planting, Peppal, Neem, Bara, Kadamba, Arjun trees within subject to availability of space and approval by the community using the ground. On this road such CPRs are not affected and therefore no provisions has been made.

Public utilities like Optical Fiber Cable lines, telephone boxes, poles, power lines, transformers, lamp posts, water pipe lines, stand posts, open well, bore well, which are coming within the ROW now proposed shall have to be removed and relocated much before the actual road improvement activity starts in full swing .The utilities are to be so located one side of the corridor keeping the water supply lines away from drains and sewerage lines so as not to hamper future road expansion and avenue planting at least on one side of the corridor.

All tube wells and stand posts shall have a platform with drainage channel and a pipe connecting the waste water up to a soak pit 10mtr away for ground water recharge and non pollution of the area around the portable water source. No bath rooms or any enclosure for taking bath or washing platform to be erected near any bore well or stand post, so that the adjoining area remains dry. A provision to shore up the point of installation of a tube well to prevent water logging and seepage around the borehole, (which is common cause of water pollution) has been recommended to minimize water pollution and depletion of ground water.

All religious structures, whose boundaries are affected and which are opening to the RoW directly become a potential spot for occurrence of accidents during morning and evening hours as well as on certain specific ceremonial occasions. To prevent this, on either side of the main gate of the temple, traffic calming measures as provided in the list of such signage’s on the direct access point of the road where the access will diverted on both side of the interception wall and thereby the rush and in advertent collusion with moving traffic on the road shall be nullified.

All gram panchayat market places for farmers, all weekly market places and religious structures coming within 20mtr from the proposed center line on either side, but not within the ROW shall be provided with designer boundary walls according to the necessity with sound and dust reduction arrangement and site enhancement plantations so that the esthetic quality and approach to such sites become user friendly preventing direct impact on the road as per the designs provided.

The water front along ponds, miner irrigation projects, water harvesting structures and river sites shall be provided with RCC retaining walls and RCC ghats in such a manner that vehicles will not be entering into water bodies to pollute the entire water source and the field bunds along all such water bodies within 50mtr distance from the proposed center line shall be planted of with young trees shrubs and bushes which are coming within the ROW and proposed to be relocated as environmental safety and improvement measures to esthetically enhance the corridor.

There shall be no borrow area or quarry within 1 km from the center line of the road and all such borrow areas /quarries shall be developed into water harvesting structures /fishing ponds and or reclaimed with over burden and top soil for plantation.

The **batch mix** and **hot mix** plants shall be installed at **2km** from Bhadrak on SH-53, as there are thickly populated residential and urban areas else where prone to flooding which will be resulting in environmental damage.

The sand shall be collected from **Baitarani** river beds on the up stream location at Sathipur on NH-5 and between **Ambagadia to Anandapur** on the left of SH-53, keeping the facts under consideration not to locate the sand collection pits close to the embankments, bathing ghats, bridge and culvert locations as well as turnings on the river bed, so as not to adversely influence the river flow.

The haulage roads on this package to approach the quarries, borrow areas and water sources are mostly on existing kacha roads 2km, which will require frequent maintenance and repair to keep it under pliable condition by using coarse aggregate and scraped bitumen materials available from demolition wastes and surplus GSB available from hill cuttings and excavations of foundation. A detail tabular statement indicating the location of quarries, borrow areas and length of haulage roads is provided as **Annexure – XXXXI,** showing the cost component for maintenance of such roads during operation period. If at all any haulage road is temporarily laid over any private property, the same should be done after removing and stock pilling the top soil to a depth of minimum 20cm to 25cm and after decommissioning the road should be scrapped out from the field for reuse as reclamation of borrow pits, while the compacted soil underneath the haulage road shall be loosened by the contractor and then the stock piled top soil shall be spread over such portion of the land in question.

There are several high lands on either side of the corridor containing good soil for embankment purposes, which can be made use of by the Contractor through negotiation with land owners after entering into a valid agreement with them to compensate the loss and to restore the top soil after excavation of the borrow material to the desired depth as would be mutually agreed upon by both the parties. The mitigation measures for the quarries and borrow areas may not be required as all the stone quarries are going to continue for a pretty longer period on account of its enormous deposit of stones and GSB fit for removal in the coming years. Sprinkling of water on haulage roads at intervals as would be required to keep down the dust shall be under taken for preventing air pollution in and around such locality. However the abandoned borrow areas in these locations or else where that will be used by the contractor, shall have to be reclaimed and filled up with over burden, demolition wastes, bitumen scraps, excavated soil from foundation and road surface with a cover of top soil for plantation of shrubs, bushes and trees at 2.5mtr interval over such reclaimed area at the cost of contractor.

The wildlife movement along the corridor has been indicated under Item No.4 of **Table 1.2** and the detail location with movement pattern and presence or absence of forest cover has been shown in a corridor strip map enclosed.

2.2.3 Locations of Trees

The tentative number of trees to be cut has been calculated but shall vary on actual field surveys. These estimates do not include the private trees and trees along realignment sections likely to be cut.

Table – 2.11

Avenue Trees Proposed to be Removed and Retained (SH-9)

Sl No	Chainage		Trees to be Removed			Trees to be Retained		
	From	To	Left	Right	Total	Left	Right	Total
1	0.000	1.000	11	14	25	0	0	0
2	1.000	2.000	43	14	57	21	0	21
3	2.000	3.000	64	80	144	7	0	7
4	3.000	4.000	49	32	81	30	2	32
5	4.000	5.000	16	26	42	8	4	12
6	5.000	6.000	52	38	90	22	0	22
7	6.000	7.000	71	51	122	1	16	17
8	7.000	8.000	32	41	73	1	2	3
9	8.000	9.000	31	42	73	25	9	34
10	9.000	10.000	46	51	97	8	0	8
11	10.000	11.000	113	132	245	2	2	4
12	11.000	12.000	110	83	193	4	2	6
13	12.000	13.000	28	31	59	2	0	2
14	13.000	14.000	75	64	139	9	4	13
15	14.000	15.000	3	1	4	0	1	1
16	15.000	16.000	1	5	6	2	0	2
17	16.000	17.000	8	6	14	2	1	3
18	17.000	18.000	20	22	42	0	0	0
19	18.000	19.000	57	65	122	1	4	5
20	19.000	20.000	44	34	78	1	1	2
21	20.000	21.000	98	61	159	2	3	5
22	21.000	22.000	91	62	153	8	4	12
23	22.000	23.000	115	63	178	18	9	27
24	23.000	24.000	118	93	211	19	7	26
25	24.000	25.000	63	46	109	4	5	9
26	25.000	26.000	7	10	17	2	1	3
27	26.000	27.000	25	7	32	2	0	2
28	27.000	28.000	43	23	66	3	4	7
29	28.000	29.000	4	5	9	0	3	3
30	29.000	30.000	33	12	45	8	8	16
31	30.000	31.000	49	7	56	8	4	12
32	31.000	32.000	19	5	24	1	5	6
33	32.000	33.000	5	2	7	6	0	6
34	33.000	34.000	6	12	18	3	1	4
35	34.000	35.000	1	2	3	0	0	0
36	35.000	36.000	1	1	2	0	0	0
37	36.000	37.000	31	10	41	2	1	3

38	37.000	38.000	4	5	9	0	0	0
39	38.000	39.000	56	10	66	38	2	40
40	39.000	40.000	25	30	55	2	0	2
41	40.000	41.100	61	125	186	13	6	19
42	41.000	42.200	48	30	78	14	4	18
43	42.000	43.300	67	48	115	7	15	22
44	43.000	44.400	31	47	78	21	10	31
45	44.000	45.500	92	66	158	10	3	13
Total			**1967**	**1614**	**3581**	**337**	**143**	**480**

Avenue Trees Proposed to be Removed and Retained (SH-53)

Sl No	**Chainage**		**Trees to be Removed**			**Trees to be Retained**		
	From	**To**	**Left**	**Right**	**Total**	**Left**	**Right**	**Total**
1	0.000	1.000	101	35	136	72	2	74
2	1.000	2.000	15	64	79	86	0	86
3	2.000	3.000	14	2	16	1	0	1
4	3.000	4.000	13	19	32	1	0	1
5	4.000	5.000	53	26	79	17	1	18
6	5.000	6.000	53	11	64	30	1	31
7	6.000	7.000	10	33	43	1	17	18
8	7.000	8.000	20	20	40	0	8	8
9	8.000	9.000	29	15	44	0	5	5
10	9.000	10.000	13	22	35	17	14	31
11	10.000	11.000	111	95	206	18	15	33
12	11.000	12.000	10	20	30	4	6	10
13	12.000	13.000	78	90	168	9	0	9
14	13.000	14.000	21	17	38	0	0	0
15	14.000	15.000	48	57	105	0	0	0
16	15.000	16.000	13	25	38	0	0	0
17	16.000	17.000	24	36	60	0	1	1
18	17.000	18.000	16	16	32	0	1	1
19	18.000	19.000	20	41	61	0	0	0
20	19.000	20.000	12	20	32	0	1	1
21	20.000	21.000	21	14	35	10	0	10
22	21.000	22.000	52	73	125	0	5	5
23	22.000	23.000	12	16	28	15	3	18
24	23.000	24.000	3	7	10	16	0	16
25	24.000	25.000	11	25	36	0	0	0
26	25.000	26.000	7	3	10	1	1	2
27	26.000	27.000	9	22	31	0	10	10
28	27.000	28.000	27	40	67	0	0	0
29	28.000	29.000	24	20	44	0	2	2

30	29.000	30.000	23	22	45	0	2	2
31	30.000	31.000	27	13	40	1	0	1
32	31.000	32.000	38	34	72	0	1	1
33	32.000	33.000	9	30	39	0	15	15
34	33.000	34.000	50	70	120	0	3	3
35	34.000	35.000	57	45	102	0	1	1
36	35.000	36.000	34	18	52	1	3	4
37	36.000	37.000	18	16	34	3	5	8
38	37.000	38.000	19	16	35	12	3	15
39	38.000	39.000	42	11	53	36	0	36
40	39.000	40.000	27	25	52	0	0	0
41	40.000	41.100	37	33	70	0	0	0
42	41.000	42.200	12	13	25	0	0	0
43	42.000	43.300	7	0	7	0	3	3
44	43.000	44.400	1	1	2	0	7	7
45	44.000	45.500	1	3	4	0	2	2
46	45.000	46.600	9	10	19	0	1	1
47	46.000	47.700	17	32	49	0	9	9
48	47.000	48.800	43	57	100	1	1	2
49	48.000	49.900	97	54	151	5	8	13
50	49.000	50.000	71	27	98	4	4	8
Total			**1479**	**1414**	**2893**	**361**	**161**	**522**

The trees to be felled and or retained as per the enumeration list which is 6474nos.

Since no forest land is required for acquisition, the cost of compensatory aforestation together with NPV shall be treated as nil.

The cost of such plantation shall be as per the cost norm furnished in accordance to **Annexure – XXIV** together with cost of fencing (painted wire mesh gabions or barbed wire fencing) @768/- per gabion as per design details in **Drawing no. OSRP /CEG /SH /ENV /08**. However to keep down the cost of avenue planting, only the non browsable species and few browsable flowering species are selected for this corridor for which only flowering and browsable species shall be intermittently introduced near habitations and long stretches of the corridor to break monotony. The non browsable species and their growth parameters are furnished in a tabular format for implementation in the field as below;

Table – 2.12

Selected Trees for Avenue Planting other than Flowering & Browsable species and their Growth Characteristic

Sl. No	Species		Growth Rate				
	Local Name	Botanical Name	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Karanja	Derris indica	1.8	2.25	3	3.5	4
2	Patuli	Lugorstroemia	1.8	2	2.5	3	3.5
3	Baula	Mimosups elengi	0.75	1	1.25	2.5	3

4	Pulanga	Callophylum innophylum	1.5	2	2.5	2.8	3
5	Chhatian	Alstonea scholaris	1.5	2	3	3.05	3.8
6	Kendu (Mankada)	Diospirus peregrina	0.45	0.75	1.25	1.5	2
7	Neem	Azadirachta indica	0.75	0.25	1.5	1.75	2
8	Mahula	Madhuca latifolia	0.5	1	1.25	1.5	2
9	Pani Jamu	Salix tetrasperma	0.75	1	1.5	1.75	2
10	Baruna	Crateva religeasa	1	1.5	1.75	2.5	3
11	Gandhana	Premna integripolia	0.75	1	1.05	2	3
12	Bhrusanga	Muraya koingi	0.5	1.2	1.5	1.8	2
13	Begunia	Vitex negundo	0.5	1	1.5	2.5	3
14	Bai Dimiri	Ficus hispida	0.25	0.5	1.25	2.5	3
15	Kamini	Muraya exotica	0.25	0.25	0.4	0.4	0.5
16	Tala/Palmyra Palm	Borassus flabelifer	0.25	0.5	0.75	0.8	1.5
17	Dadmari	Cassia auriculeta	0.20	0.5	0.75	1.0	1.5

Total space available for planting on either side of corridor between **Chandbali - Anandapur comes** to **38.57km** on the left and **36.28km** on the right, out of which only one side planting shall be resorted to in built up area and both side planting will be carried out in open areas and forest area, preference shall be given to local species of shrubs and medium height trees and some flowering plants, medicinal plants and plants with aesthetic value spaced at 5mtr in single row. Wherever high lands and hilly terrain or clay soil is encountered suitable species which can survive on such sites shall be planted, such as Neem, Karanja, Hinjala, Babool, Siris, Palash, Kusum, Tamarind, Mahula, on clay and black cotton, Anla, Harida, Bahada, Harasingar, Karada, Bidanga, Kendu, Suama on hilly and stony soil. Thus an average length of avenue plantation over **38km** shall be taken up in suitable high lands and low land with mounds by way of depositing excavated earth and top soil to have a raised platform for tree planting in submergible areas. In addition to this wherever surplus land beyond 2.5mtr is available within the ROW, the same be initiated for erecting RCC structure to ensure stability and sustained drainage across the road. The cost norm shall be **@82,950 per 400plants per km.**

Detailed discussion about tree species, flora and green tunnels has been made in the Biodiversity Assessment and Management plan prepared separately as a stand alone report, but the corridor specific data is furnished in shape of **Annexure – XVI & XXIX** to facilitate reference and costing for the project.

2.2.4 MATERIALS TO BE USED

As per the estimation of materials to be used for improvement of the road considering the engineering design and drawings, the table given below show the approximate quantity of materials required for the project.

Table – 2.13 (A)

Approximate Quantity of Construction Materials Required

Sl. No.	Item	Quantity	Tonnage
1	Earth work	202103cum	281893
2	Sub grade	744131cum	1364215
3	GSB & Murrom	193565cum	354862
4	WMM	205385cum	311630
5	PCC	49880cum	84197
6	DBM	50810cum	77078
7	BC	30984cum	47002
8	Lime	10000cum	-
9	RCC	38524cum	-
10	Geo-synthetic Material	10000sqm	-
11	PC	775598sqm	1714071
12	Tac-coat	775598sqm	542918
13	Bitumen	-	518.7
14	Rough Stone & Boulders	13602cum	-

The above quantity of material will be procured from natural sources relating to filling, bitumen course (BC), dense bitumen (DBM), wet mix macadam (WMM), granular sub base (GSB) and sub grade as detailed below taking into account the material that will be used in RCC, PCC, stone pitching, filter medium, gabion walls, retaining and breast walls boundary walls, guard walls, toe walls, cascades, slope drains etc.

The bitumen, cement, geo-synthetic, lime, HYSD bars for reinforcement shall be procured from original manufacturer.

Table – 2.13 (B)

Natural Resources to be Mobilized for the Project

Sl. No.	Item	Quantity	Tonnage
1	Earth work from borrow pits	262431cum	366038
2	Sand/Crusher Dust	20997cum	33322
3	GSB & Murrom	193565cum	354862
4	Course Aggregate	394509cum	510810
5	Bitumen	-	518.7
6	Filter Material	82248cum	106494
7	Cement	15200cum	-
8	Water	597500LT	-
9	Potable Water	1533000LT	-
10	Diesel	-	47500
11	Rough Stones	20936cum	29630
12	Demolition Wastes obtained from dismantling of structures like Bridges, Culverts, Walls etc.	405796cum	-

	other than road way excavation to be used at different construction sites		
13	Surplus Demolition Waste from Road way excavation to be used at different sites after using 60% excavated material in construction of road way embankment	321133cum	-

60% of the excavated material from carriage way and demolition wastes from bridges, culverts etc. shall be re-used exclusively on the embankments and the balance shall be used in filter media, back fill, earth fill, stone pitching, rubble stones, construction an pot hole repair of haulage road, diversions and its maintenance, raising of embankment of streams and spur road, on either side of the bridges and culverts, on back fills of guard walls, gabion walls, toe walls and development of sites on abandoned roads to take up plantation, besides providing scarce water sources for the wildlife and development of earthen mounds to act as flood shelters, site enhancement plantations, religious and socio culture gathering to raise medicinal plant for community use. Some of the materials shall be used as fillers to depressions and low laying areas. Detail break up of the disposal depends upon the manner in which the demolition waste is dumped at the time of excavation and demolition within the initial lead and lift provided in the estimated cost. In case of eroded patches this demolition wastes shall be a boon to develop check dams, spurs and filling up of borrow areas after decommissioning of the borrowing activity to restore natural balance. In case of flood prone areas additional increase in the height of river banks shall be under taken, especially in the banks of Baitarani as a safe guard and 2nd line of defense for the SH. Some of the excavated materials shall be used in developing the spur road connectivity, where junctions have not been provided to have a better approach to the main road.

There are 1 stone quarry, 1 GSB & Murrom quarry besides 1 sand quarry sites from Baitarani at Sathipurn on NH-5, 35km from Bhadrak, from Baitarani at Anandapur 2km at Fakirpur 3.5km, at Ambagadia 1.5km. The entire package from **Chandbali - Anandapur** and these shall be under use by the contractor for different stretches of the road as per the location statement furnished in the layout plan and lead chart enclosed above. Out of this the GSB and murrom quarries shall be operated only when the available quantity of GSB, murrom, earth, hard rock & soft rock, cut and excavated materials available from the hill cuttings, ghats and new alignment are fully utilized within the nearest stretches of road formation to ensure utilization of the excavated materials from cutting and excavation zones. The maintenance of haulage road for the purpose of stone quarries and the nearest GSB quarries have been indicated in the tabular statement separately in shape of **Annexure - XXXXI,** which may be referred. No separate haulage charge has been provided for transportation of the excavated and hill cutting quantities of GSB and murrom within initial lead and lift of 1km from the available sites. Extra charges of carriage of these materials from available sites on the road up to its disposal shall be provided extra in the manner befitting for the economy and safe disposal of the quantities that will be removed from the cut areas.

Since quarrying, crushing, grading, loading, transportation and unloading besides use of these materials will generate adverse environmental hazard like dust, noise,

noxious gas, effluents, which may impact the local environment, major shall be under taken to use minimum blasting charges in the quarry, sprinklers to spray water for dousing the dust generation, noise suppressers and rubberized mounting to reduce noise and vibration, mist spray units at crusher points for settling the generation of dust at the time of crushing, grading, loading, tarpaulins or covers over transport vehicles carrying, cement, sand, coarse and fine aggregate, in order to reduce the impact on environment. The storage and stock pilling of dust generating materials, inflammable and hazardous substances shall be regulated under prevail ant legal requirements besides underground sumps and sealed container, waterproof go downs with fire prevention measures details of which are given in tabular statement captioned as Guidelines.

Table – 2.14

Mitigation measures suggested for ponds, tanks & water bodies

Mitigation measures	Locations	Quantity
Toe wall	88	6683mtr
Bathing ghat	3	3nos.
Spillway /sluice gate	3	3nos.
Embankment planting for site enhancement	44	44Nons

Table – 2.15

Mitigation measures suggested for drinking water sources (Tube well, Open Well & Water taps)

Mitigation measures	Numbers
Replacement	85
Site Enhancement	3 Locations or 120 plants
Compensation	-

Detail design for site enhancement with provision of tree planting cemented platform, drainage channel with soak pit as per drawing no. OSRP /CEG /SH /ENV /07.

Table – 2.16

Mitigation measures suggested for waiting rooms at bus stops

Mitigation measures	Numbers
Replacement	71
Repairing & Renovation	-
New Addition	-

Replacement to be as per Drawing No. OSRP /CEG /SH /ENV /02

Table – 2.17

Mitigation measures suggested for School, Colleges, Hostels & Hospitals (Sensitive Receptors of Noise and Air pollution)

Mitigation measures	Numbers
Noise and dust suppression barrier filter screen	4
Construction of Alternate approach	10
Construction of Interception metal tubular barricade to prevent direct entry to highway	10
Site Enhancement with Tree planting for secondary Dust & Noise Barrier	4

NB: Figures are not additive as in each CPR more than one mitigation measure has been suggested

There may be further requirement of additional boundary wall with dust & noise filter barriers at locations depending on the new construction of fully /partially affected sensitive receptors in the close proximity of the developed corridor for which the site engineer, the supervision consultant, environment expert and the Contractor will ensure adequate provision.

Table – 2.18

Mitigation measures suggested for Religious structures & Shrines

Mitigation measures	Number
Compensation for construction of new temple & shifting of puja pandals	18
Construction of boundary wall of partially affected, temple building and boundary walls other than the main temple	6
Change of approach to entry points at places of worship	-
Site Enhancement Measures for aesthetic appeal	-
Protection of Religious Trees	-

NB: Figures are not additive as in each CPR more than one mitigation measure has been suggested.

Table – 2.19

Mitigation measures suggested for Burial Grounds / Kabristhan/ Crematoriums

Mitigation measures	Number
Construction of Boundary wall	-
Replacement /additional area by land alienations*	-
No Mitigation measure	-

2.3 KEY ACTION POINTS

Early and sound planning is the key to deal with multifarious activities in a time bound manner. Key action points for developing operational plan/s for the pre-construction stage have been listed in this sub-section. This checklist intends to provide a ready-to-use reference guide for the various agencies, which also specifies the men responsible or supervising authority for each activity.

Prior to the start of construction work, the following pre-construction activities need to be taken up by PIU/OWD, other State Govt. departments (such as Revenue and Forest department, SPCB), RWSS, PHD, Rural Roads Organisation,

Community development, Irrigation, DPR consultant; utilities companies/agencies, concerned contractor etc. The key action points in this regard are presented in **Table – 2.20** below.

Table – 2.20

Key Action Points for Pre-construction Period

Sl. No.	Task	Action to be taken	Main Agencies Involved
1	Obtaining Environmental Clearance	Initiate and complete the process for obtaining regulatory clearances such as forest clearance under F(C) Act. and Environmental Clearance under Environment Protection Act.	DPR Consultant; PIU/OWD; Forest Dept., GoO; Wildlife Wing, GoO; Orissa State Pollution Control Board/ SEIAA Orissa, /EIAA MoEF, GoI
2	Preparation of Land Plan Schedules, Land & Asset Acquisition	Initiate and complete the process for land acquisition (Refer RAP for details)	DPR Consultant; PIU/OWD; OWD Divisions; Revenue Department, GoO.
3	Identification of Forest Land and Existing Growth	Preparation of Application in Form-A under Forest Conservation Act, 1980 and allied activity including forest land schedule, assessment of growing stock and wildlife, movement corridor of wildlife, identification and suitability of non forest land in leu of forest land to be released, demarcation and pillar posting, preparation of field survey and field map data, identification and alienation of suitable non forest land adjacent to forest area, depositing NPV and cost of aforestation	DPR Consultant; PIU/OWD; OWD Divisions; Revenue Department; Forest Dept., GoO, Concerned Divisional Forest Officer to Assess the growing stocks and NPV of proposed forest land, cost of compensatory aforestation over selected non forest land along with its suitability for taking up plantation
4	Joint field Measurement Surveys for Forest Land Diversion	Joint Survey and Verification of Forest Land by PIU/OWD, Revenue Dept. and Forest Department, Govt. of Orissa.; District Collectors to identify equivalent non-forest land within the district for Compensatory Aforestation.	CCF Nodal Cell, Forest Dept., GoO; Concerned District Collectors; Department of Forest and wildlife , GoO; MoEF, GoI.
5	Joint Enumeration Surveys for tree cutting	Joint enumeration of trees coming within the RoW and in diversions within Reserved /Protected Forest Areas /Protected Areas /heritage sites etc.	Local Range Staff of Forest Department, GoO; PIU/OWD; Revenue Dept. (Tehsildar); DPR Consultant; OWD Division Staff.
6	Obtaining Forest Clearance and Road-side Tree Cutting Permissions	Complete the process for obtaining Forest Clearance and tree cutting permission for avenue plantation within Corridor of Impact	DPR Consultant; PIU/OWD; OWD Divisions; Revenue Dept., GoO; Forest Dept.; Wildlife Wing of GoO, MoEF, GoI OFDC ltd.

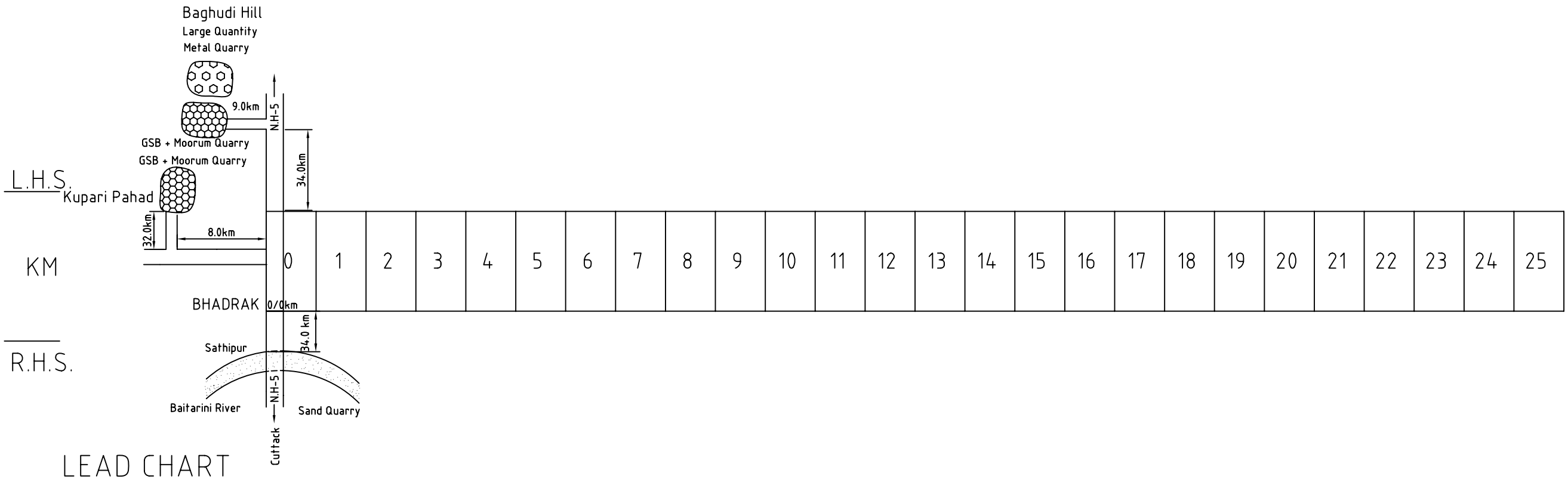
7	Tree Cutting Plan	Prepare Action Plan for tree felling (after Stage II clearance is received from MoEF under FC Act, 1980)	Tree Cutting Contractor; PIU /OWD; Local representative of OFDC Ltd.; Forest Dept. / DFO
8	Tree Protection/ Preservation Plan	Tree Preservation on the Site and Documentation as stipulated in this EMP for the sub-project including list of trees to be retained (green tunnels, giant trees, religious & landmark trees).	Tree Cutting Contractor; PIU/OWD; Local representative of OFDC Ltd.; Forest Dept.; OWD Divisions
10	Preparation and Implementation of Aforestation Scheme	Preparation of aforestation scheme by Concerned Forest Divisions having jurisdiction over the identified area.	Forest Dept., GoO;, MoEF, GoI; Concerned DFO having jurisdiction over the selected site, PIU of OWD.
11	R&R of affected people and properties	Implementation and co-ordination for R&R operations as per OSRP policy provisions and RAP	PIU/OWD; Revenue Dept., GoO; OWD Divisions; Other Concerned Agencies/ Communities/Local Bodies; NGOs
12	Relocation of Public Utilities	Public utilities need to be shifted as per the Utility Shifting Plan	Concerned Departments /PIU of OWD
13	Relocation of CPRs	Prepare action plan for re-location /site enhancement in co-ordination with concerned agencies/communities	PIU/OWD; DPR Consultant; OWD Division Staff; Concerned Agencies/ Communities; NGOs.
14	Land-use Planning	Prepare and administer land use control measures to prevent unwarranted ribbon development	OWD, Local Bodies and Planning Depart., Revenue department GoO
15	Borrow pits and Quarry Sites	Selection of Borrow Areas and Quarry Sites and Approval of such sites.	Contractor; Supervision Consultant; PIU/OWD; Revenue Administration of the District; SPCB; Directorate of Mines, GoO.
16	Identification of site for Construction Camp/s and Stack Yards for Material Storage	Select, finalize and seek approval for construction camp/s sites including lay-out plan showing storage facility, workers camp, office areas, mess, sanitation and garbage disposal facilities, drainage, fire safety arrangements etc.	Contractor; Local Bodies/Land Owner; Labour Department; SC; PIU/OWD; OWD Divisions; District level representative of OSPCB.
17	Identification of Site for Hot-mix, Batching Plants, Crusher Units	Select and finalize the sites for plant sites including lay-out plan showing storage facility, waste collection and disposal facilities, drainage, fire safety arrangements etc.	Contractor; Local Bodies/Land Owner; Labour Department; SC; PIU/OWD; OWD Divisions; District level representative of OSPCB.
18	Traffic Safety Management Plan	Prepare a Detailed Working Plan for Traffic Safety and Management	Contractor; Local Bodies/Land Owners; SC; PIU/OWD; OWD Divisions; Local Police Administration.

FIG. 1.2 BORROW AREA CHART, LEAD CHART FOR BHADRAK TO CHANDBALI

KM 0/0 TO KM 50/000 (SH-9)

TO BHADRAK

TO CHANDBALI



LEAD CHART

COARSE AGGREGATE	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
STONE	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
G.S.B. MATERIAL	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
FINE AGGREAGTE SAND	34	35	36	37	38	39	40	41	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
SOIL	50.5	49.5	48.5	47.5	46.5	45.5	44.5	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5	33.5	32.5	31.5	30.5	29.5	28.5	27.5	26.5

METAL QUARRY FOR STONE AGGREGATE

SAND QUARRY

GSB+ MOORUM MATERIAL

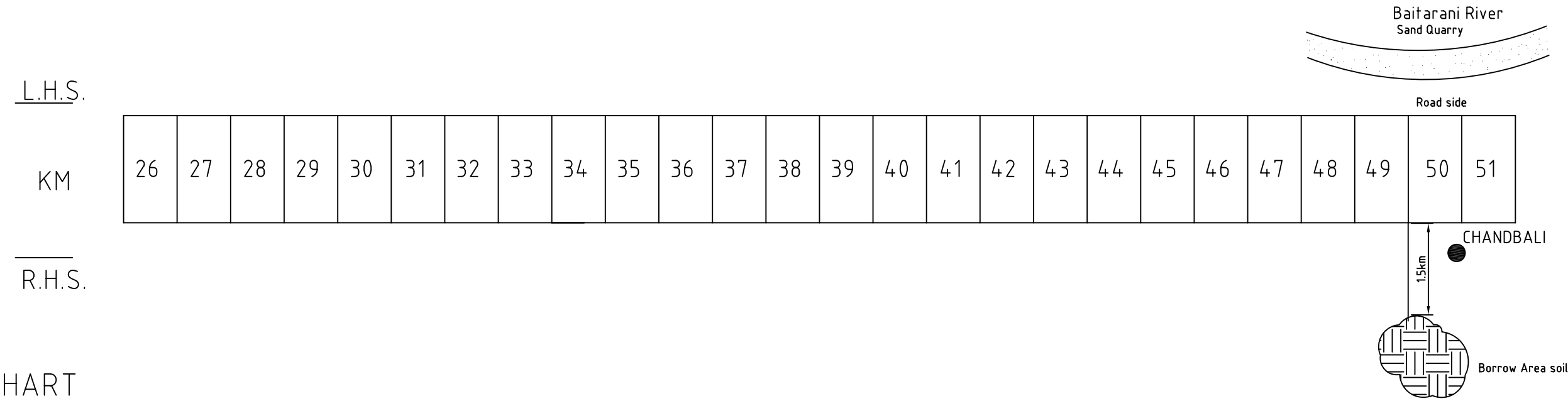
SOIL

FIG. 1.2 BORROW AREA CHART, LEAD CHART FOR BHADRAK TO CHANDBALI

KM 0/0 TO KM 50/000 (SH-9)

TO BHADRAK

TO CHANDBALI



LEAD CHART

COARSE AGGREGATE	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
STONE	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
G.S.B. MATERIAL	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
FINE AGGREAGTE MATERIAL	24	24	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	2	3
SOIL	25.5	24.5	23.5	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	9.5	8.5	7.5	6.5	5.5	4.5	3.5	2.5	1.5	2.5

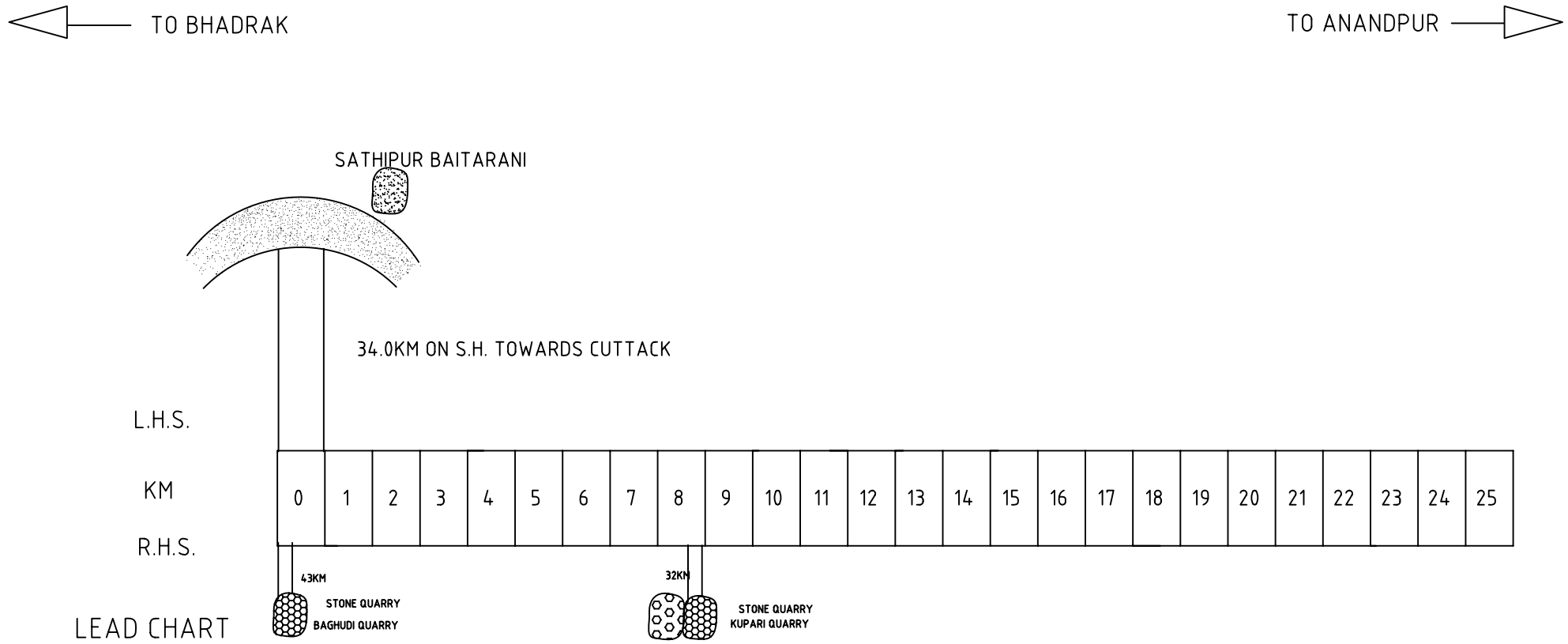
METAL QUARRY FOR STONE AGGREGATE

GSB+ MOORUM MATERIAL

SAND QUARRY

SOIL

FIG.1.2 BORROW AREA CHART, LEAD CHART FOR BHADRAK TO ANANDPUR
KM 0/0 TO KM 57/400(SH-53)



LEAD CHART

COARSE AGGREGATE	40	39	38	37	36	35	34	33	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
STONE	40	39	38	37	36	35	34	33	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
G.S.B. MATERIAL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FINE AGGREAGTE SAND	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59

METAL QUARRY FOR STONE AGGREGATE

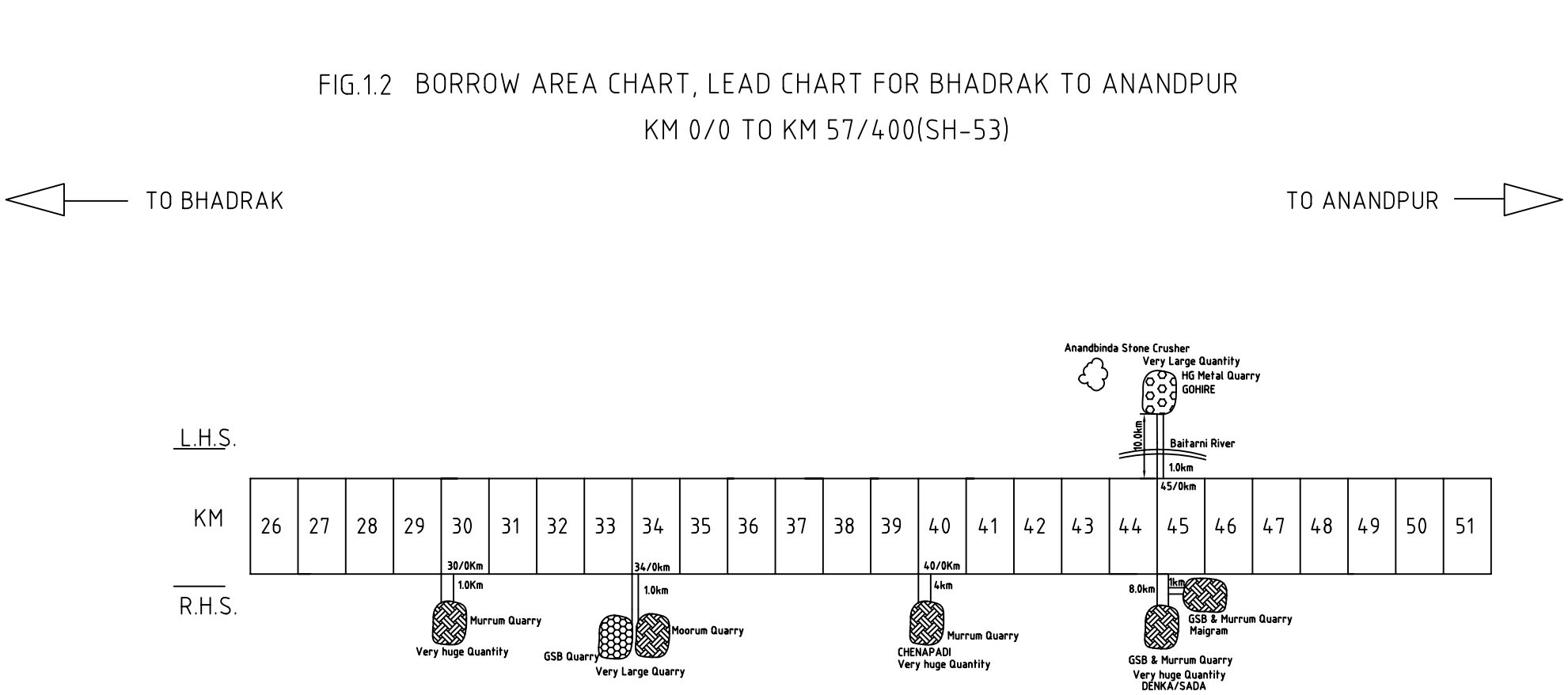
SAND QUARRY

Moorum Quarry

STONE & GSB Quarry

CENTRAL MIX PLANT (PROPOSED LOCATION)

FIG.1.2 BORROW AREA CHART, LEAD CHART FOR BHADRAK TO ANANDPUR
KM 0/0 TO KM 57/400(SH-53)



LEAD CHART

COARSE AGGREGATE	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	11	12	13	14	15	16
STONE	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	11	12	13	14	15	16
G.S.B. MATERIAL	5	4	3	2	1	2	3	2	1	2	3	4	5	5	4	1	2	1	2	3	2	1	2	3	4	5
FINE AGGREAGTE SAND	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7

METAL QUARRY FOR STONE AGGREGATE

SAND QUARRY

Moorum Quarry

STONE & GSB, MOORUM MATERIAL

CENTRAL MIX PLANT (PROPOSED LOCATION)

FIG - 1.2 BORROW AREA CHART, LEAD CHART FOR BHADRAK TO ANANDPUR

KM 0/0 TO KM 57/400(SH-53)

TO BHADRAK

TO ANANDPUR

L.H.S.

KM	52	53	54	55	56	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

R.H.S.

LEAD CHART

COARSE AGGREGATE	17	18	19	20	21	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STONE	17	18	19	20	21	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G.S.B. MATERIAL	6	7	8	9	10	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FINE AGGREAGTE SAND	8	9	10	11	12	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

METAL QUARRY FOR STONE AGGREGATE

SAND QUARRY

Moorum Quarry

STONE & GSB, MOORUM MATERIAL

CENTRAL MIX PLANT (PROPOSED LOCATION)

CHAPTER 3
ENVIRONMENTAL MANAGEMENT PLAN

3.1 Environmental 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 **Chandbali - Anandapur** 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

Pre-Construction Stage

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
Pre-construction activities by Project Implementation Unit, Orissa Works Department					
P.1	Land Acquisition	The acquisition of land and properties (govt./private) will be carried out in accordance with the Rehabilitation Action Plan and the entitlement framework for the project. The PIU has to ascertain that any environmental impacts resulting from additional acquisition of land shall be addressed and integrated into the EMP and other relevant contract documents.	Land Acquisition Act 1984 and its Amendments; R&R Policy and RAP of OSRP.	PIU, Revenue Dept., NGOs, Collaborating Agencies	PIU /OWD /District Collectors
P.2	EMP Preparation of Resettlement Sites	All R & R activities will be undertaken in accordance with the RAP document. It will be ensured that all R&R activities including preparation and implementation of environmental management plan for such site/s are completed before the construction activity starts on any section of ROW of existing/proposed road including bypasses. EMPs for such a Resettlement Site will be prepared in consultation with the concerned community. Plans will include specific actions in relation to basic services, health,	R&R Policy and RAP of OSRP.	PIU, Revenue Dept., NGOs, Collaborating Agencies	PIU /OWD /District Collectors

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		hygiene and plantation.			
P.3	Tree Cutting	Tree cutting is to proceed only after all the legal requirements including attaining of in-principle and formal clearances from the Forest Dept. /MoEF are obtained by OWD. In case of plantation outside forest areas, a joint enumeration of the trees to be cut shall be conducted by the PIU/OWD in association with Orissa Forest Development Corporation (OFDC) and the Forest Department, GoO. 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. The tree felling operations will to be carried out by OFDC. No construction activity and tree felling can be taken up in any location of the contract package, which has not been cleared by the Regional C.C.F., Eastern Region, Bhubaneswar or the MoEF, Govt. of India. In all around, **6746** trees have been identified for cutting after design finalization. Details can be referred in **Annexure 1**. This doesn't include trees on forest land or those on private properties, which are proposed to be acquired for the project. **The records shall be updated by the PIU as these figures are available upon completion of joint enumeration exercises for such sites.** Activities pertaining to tree felling, logging, stacking of fire wood and passing of timber and removal are to be synchronized and removal of the converted materials shall	Orissa Forest Act, 1972; Orissa Timber and Other Forest Produce Transit Rules, 1980; MoRTH 201.2; Framework on Arrangements with the Forest Department for OSRP	EMU of PIU /OWD, Forest Dept., OFDC /Tree Felling Contractor	EMU of PIU /OWD, Site Engineer /Supervision Consultant

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		be taken up by the responsible agencies as per tree cutting and removal rules as prescribed separately together with the prevailing of Orissa Timber and Other Forest produce Transit Rule 1980. or as specified by the Competent Authority. Trees will be removed from the Corridor of Impact before the actual commencement of the construction work to prevent traffic problems and accidents. Tree cutting should not be carried out simultaneously all along the corridor as this will adversely impact the traffic movement and road safety. It should be carried out on priority basis at locations of diversions, bridge and culvert construction, and such other places where the construction work is scheduled to be started early i.e. is under priority one stretch as identified in the Contract Package. All workers involved in the cutting and removal of trees and demolition of structures shall wear safety helmets, gloves, and protective shoes and shall provided 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 and this information shall be with the Site Supervisor. 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 of the Forest			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		Department, OWD/PIU and SC. No sooner the trees are felled, the same has to be kept under watch and ward by the felling agency and steps taken for its authentication by 'passing' carried out at stump site. The 'passing' by any Forest Officer not below the rank of an ACF of the Forest Department irrespective of the location of the tree (either with in RoW or the acquired private land and govt. forest land) should be considered for quick removal of such trees. Uprooting of the stumps should start immediately after the logs and firewood are removed from the stump site to speed-up road construction. To the extent possible, felling of trees which are located beyond the hard shoulder - that is on the slopes of the embankment can be retained for reducing the loss of vegetative cover by careful selection of young and sound trees within 30cm girth and up to 1mtr girth.			
P.4	Relocation of Community Utilities and Common Property Resources	All community utilities and common property resources such as stand posts, bore wells, wells, ponds, water supply lines, toilets, sewage lines, drainage systems, optical fiber cables, electric power supply lines, transformers, irrigation pump houses, telephone and television cables shall have to be relocated and restored before the commencement of the road improvement activity. Details can be referred in **Annexure 2**. **The fittings/pipes that can be re-utilized shall be salvaged and reused.** While relocating these utilities and facilities, all concerned	EMP Annexure 2 and RAP document of OSRP.	OWD/PIU; Concerned Agencies/Departments; Contractor	PIU/OWD, Site Engineer/Supervision Consultant

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		agencies including PIU shall take necessary pre-cautions and provide for barricading/delineation of such sites to prevent accidents including accidental fall into bore holes, pits, drains both during demolition and construction/ relocation of such facilities. Standard safety practices shall be adopted for all such works. Early completion of works for schools, colleges and health centres including shifting of gates and construction of boundary walls will be planned during holidays so that the risk of accidents and disturbance to day-to-day activity of such institutions is minimized. The schools and health centers will be constructed as per the relevant state norms. In case of govt. buildings, staff quarters, weekly and kisan markets, proper planning and extra care has to be taken to prevent unusual hardship to public on account of demolition/discontinuance of functioning of such facilities along with provision of appropriate safety measures during the construction /relocation process. Relocation sites for all CPRs shall be selected in consultation with concerned communities, local administrative authorities/departments and the gram sava. Environmental considerations with suitable/required actions including health and hygiene aspects will be kept in mind while relocating all community utilities and resources. The PIU/OWD will relocate these properties in consultation and written agreement with the agency/ owner/community			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		prior to initiation of any type of construction work/activity in such stretches. This includes construction of noise barrier walls, boundary walls, shifting of entrance gates and other protection works, specifically at school, college and health centre sites. Proper placement (as per codes) of passenger shelters/bus stops will be ensured to prevent distress to the commuters and passengers. The dismantled bore holes, wells and tap points shall be properly packed and sealed so that no external water or pollutants can enter such openings.			
P.5	Relocation of affected Cultural and Religious Properties	All religious structures, statues (idols), mandaps and boundaries coming within the corridor of impact will be relocated after alternative sites are selected for relocation of these structures in consultation with the concerned communities, management committee/trust/endowment authority and after disbursement of the due payments are made or construction is taken up and completed by the PIU /Contractor as per the design and specification approved by the community /endowment. No cultural properties or religious structures shall be removed or relocated without the knowledge and written consent of the concerned parties or communities and local administration as the case may be. Sites for the relocation of these religious structures will be identified in accordance with the choice of the community.	EMP Annexure 2; RAP document of OSRP	EMU of PIU /OWD; NGOs; Contractor; Concerned Community	EMU of PIU /OWD, Site Engineer /Supervision Consultant

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		The NGO and PIU in consultation with local people will finalize design of these temples. As far as possible, the architectural elements of the structure should be conserved/reflected/translated into the design of new structures in accordance with wishes of the community. **The relocation of such properties must be completed before commencement of any physical road improvement activity.** Proper drainage and garbage disposal at such sites will be ensured to prevent unhygienic conditions, blocking of drains etc. at/near relocated structures. Garbage collection bins, soaks pits or other appropriate measures will be provided apart from simple enhancement of such sites.			
P.6	Orientation of Implementing Agencies	The OWD/PIU shall organize orientation sessions during all stages of the project. This shall include on-site training (general as well as specific to the context of this sub-project) as well. These sessions shall involve concerned division-level staff of the OWD involved in this sub-project, Staff of the Site Engineer/ Supervision Consultant and the implementing agencies. Refer details in **Chapter 4.**	Training Plan (EMP) – Chapter 4	EMU OF PIU/OWD, Site Engineer/Supervision Consultant	EMU OF PIU/OWD
Pre-construction activities by the Contractor/Environmental Officer of the Site Engineer/Supervision Consultant (SC)					

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.7	**Field Verification and Modification of the Contract Documents**				
P.7.1	Joint Field Verification	The Environmental Officer of Supervision Consultant and the Contractor will carry out joint field verification to ascertain the possibility to saving trees, environmental and community resources wherever such representations or suggestions in writing have been received and forwarded by the project authority or by the site engineer in accordance with the local situations. In all such cases the interested organization/representatives, authority, expert (as required for a specific situation), executing and supervising agencies together with the local administrative set-up has to under take a joint field verification for assessing 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 measures including the efficacy of enhancement measures suggested in the EMP shall be summarized in a written document containing all the details with date, time, place and signature of the individuals involved and this shall be sent to the EMU OF PIU/OWD for approval. The PIU shall maintain proper documentation and		Contractor; Environmental Officer of SC	PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		justifications/reasons in all such cases where deviation from the original EMP is proposed.			
P.7.2	Assessment of Impacts due to Changes/ Revisions in the Project Work	The Environmental Officer of SC will assess impacts and revise/modify the EMP in consultation with the PIU/OWD in accordance to the recommendation made by the field survey party in the event of changes /revisions (including addition or deletion) in the project's scope of work.	EA; Biodiversity Management Plan; EMP Document of OSRP	Contractor; Environmental Officer of SC	PIU/OWD
P.8	Crushers, Hot-mix Plants and Batching Plants Location	Hot-mix and batching plants will be located 1000 mts. away from settlements, forests, wildlife movement areas and commercial establishments, preferably in the downwind direction. No plants can be set-up within 1000mts. from the following locations : • 5.95km Ichhapur • 6.60km Berhampur • 8.19km Balibili • 8.21km Mirjapur • 2.8km Nathasahi • 5.00km Karamil • 11.00km Alinagar • 11.4km Ranipur • 9.65km Dolasahi • 12.65km Paliabindha • 16.5km Tihidi • 12.75km Nandapur • 20.20km Kolha	MoRTH 111.1; Air Pollution Control Act; Noise Rules; EMP document of OSRP	Contractor	Environmental Officer of SC ; PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		• 22.7km Maa Kali Temple • 24.5km Bindha • 26.00km Pirahat • 27.57km Kanpur • 29.100km Samantaraipur • 29.5km Gadibazar • 39.25km Digochhia • 46.35km Gohulia • Bagudi • Randia • Barapada • Banta • Hatadihi • Banchoo • Fakirpur • Ambagadia • **SH-9-** 26.430, 28.837, 30.154, 31.700, 35.825, 40.974 **SH-53-** 11.867, 13.507, 17.002, 21.024, 23.500, 34.000, 40.242 to facilitate movement of wildlife across the road by providing traffic calming measures. The Contractor shall submit a detailed layout plan for all such sites and seek prior approval of Environmental Officer of SC before entering into formal agreement with a land owner for setting-up such sites. Actions by SC and PIU/OWD against any non-compliance shall be borne by the Contractor at his own cost. Arrangements to minimize dust pollution through provision			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		of windscreens, mist spray units, and dust encapsulation will have to be provided at all such sites. Specifications of crushers, hot mix plants and batching plants should have to comply with the requirements of the relevant current emission control legislations and Consent / NOC for all such plants shall be submitted to the SC and PIU/OWD. No such installation by the Contractor shall be allowed till all the required legal clearances are obtained from the competent authority and the same is submitted to the PIU/OWD and the SC.			
P.9	Other Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery to be procured for construction will confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under Environment Protection Act, 1986 will be strictly adhered to. Efficient and environment friendly equipment confirming to the latest noise and effluent emission control measures available in the market should be used in the project. The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period, which shall be produced to the PIU/OWD and the Supervision Consultant for verification whenever required.	Air Pollution Control Act, 1981; Noise Rules; Motor Vehicle Act, 1988; EMP document of OSRP	Contractor	Environmental Officer of SC ; EMU of PIU /OWD
P.10	**Identification and Selection of Material Sources**				

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
P.10.1	Borrow Areas	Finalizing borrows areas for borrowing earth and all logistic arrangements as well as compliance to environmental requirements, as applicable, will be the sole responsibility of the Contractor. Locations finalized by the Contractor shall be reported to the Environmental Officer of SC and who will in turn report to PIU/OWD. **SH-9- 26.430, 28.837, 30.154, 31.700, 35.825, 40.974** **SH-53- 11.867, 13.507, 17.002, 21.024, 23.500, 34.000, 40.242 to facilitate movement of wildlife across the road by providing traffic calming measures.** Format for reporting will be as per the Reporting Format for Borrow Area and will include a reference map and proposed rehabilitation plan. The Environmental Officer of the SC will be required to inspect every borrow area location and evaluate such proposals in accordance to environmental requirements prior to issuing approval for use of such sites. No borrow areas shall be opened within 500mts. from wildlife movement zones and forest areas. The borrow areas shall be at least 300mts. from schools and village access roads. The Contractor will not start borrowing earth from the selected borrow area until a formal agreement is signed between land owner and Contractor and a copy of this agreement is submitted to the Environmental Officer of the SC. The Supervision Consultant shall report these facts to	IRC Guidelines; Borrow Area Management Framework given in the EMP of OSRP	Contractor	Supervision Consultant; EMU of PIU /OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		the PIU/OWD along with remarks in the prescribed format along with documentary proofs. Planning of haul roads for accessing borrow materials will be undertaken by the Contractor and these details will be provided in the format given in the EMP. The haul roads shall be routed to avoid agricultural areas as far as possible and will use the existing village roads wherever available. In case such agricultural land is disturbed, the Contractor will rehabilitate it as per Borrow Area Rehabilitation Framework given in this EMP or as approved by the Environmental Officer of SC. Haul roads shall be maintained throughout the operation period of the borrow areas by undertaking the required maintenance and repair works, which may include strengthening, pot hole repairing and diversions. Improvements shall be done to reduce inconvenience to users of these roads, residents living along the haul roads and minimize air and water pollution. Such measures will include, but not limited to, frequent sprinkling of water, repairing of the road, road safety provisions (warning and informatory signage, flagmen etc.), and ensuring covering of loaded vehicles by waterproof tarpaulin and consultation with public and special precautions required near schools, health centers and settlement areas. All borrow areas whether in private, community or govt. land shall be restored either to the original condition or as			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		per the approved rehabilitation plan immediately upon 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. Action against non-compliance in this regard shall be the sole responsibility of the Contractor and shall be made good at his own cost. Substantial completion or completion certificates for the civil work shall not be issued unless restoration and rehabilitation works are completed and the same has been approved by the SC and the PIU/OWD in writing.			
P.10.2	Quarry	Contractor will finalize the quarry for procurement of construction materials after assessment of the availability of sufficient materials and other logistical arrangements. The Contractor will procure necessary legal permission for quarry opening and operation from Directorate of Mines, GoO; District Administration; SPCB and will obtain written approval from the local Tahasildar. A copy of such approval along with the rehabilitation plan shall be submitted to the PIU/OWD and Environmental Officer of Supervision Consultant. Format on quarry/ crushers along with the required maps showing site details and haul road network shall be submitted to PIU/OWD through the Environmental Officer of SC prior to initiating and operation of quarry sites for the project. No quarry and/or crusher units shall be selected or used,	MoRTH 111.3; Quarry Area Management Framework given in the EMP of OSRP	Contractor	Supervision Consultant; PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		which is within 1000mtrs. from a forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. No quarries or crusher units for this contract package shall be established within 1000mtrs. from the following locations: **SH-9** • 5.95km Ichhapur • 6.60km Berhampur • 8.19km Balibili • 8.21km Mirjapur • 2.8km Nathasahi • 5.00km Karamil • 11.00km Alinagar • 11.4km Ranipur • 9.65km Dolasahi • 12.65km Paliabindha • 16.5km Tihidi • 12.75km Nandapur • 20.20km Kolha • 22.7km Maa Kali Temple • 24.5km Bindha • 26.00km Pirahat • 27.57km Kanpur • 29.100km Samantaraipur • 29.5km Gadibazar • 39.25km Digachhia • 46.35km Mahulia			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		SH-53 • 2.0km Bagudi • 3.1km Randia • 7.0km Barapada • 19.4km Banta • 18.0km Tillo • 30.0km Hatadihi • 32.8km Banchoo • 41.5km Fakirpur • 34.0km Ambagadia • **SH-9-** 26.430, 28.837, 30.154, 31.700, 35.825, 40.974 • **SH-53-** 11.867, 13.507, 17.002, 21.024, 23.500, 34.000, 40.242 to facilitate movement of wildlife across the road by providing traffic calming measures. • Contractor will also work out haulage road network and report to Environmental Officer of Supervision Consultant who shall inspect and in turn report **to PIU/OWD on the suitability of such haul roads from safety of residents, biodiversity and other environment point of views. All precautions for preventing accidents, spillage of materials and pollution, as mentioned in P.11.1 shall be adhered to by the Contractor.**			
P.10.3	Sand (all river and stream beds used directly or indirectly for	Quality sand can be procured from riverbeds adjacent to the corridors i.e. from River Baitarani free from silt and other impurities as per the locations indicated above. This procurement shall be made only after declaration of sand quarry sites by the local Tahasildar Anandpur, and Jajpur, K	MoRTH 111.3; Miner Mineral Concession Rules, 2004	Contractor	Supervision Consultant; EMU of PIU /OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
	the project)	with the concurrence of the concerned District Collector with due regard to Orissa Miner Mineral Concession Rules, 2004 and regulation regarding protection of river basins by Irrigation department. In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority and the Environment Officer of the SC keeping in view the objections and convenience of the local population, who may restrain such activities for their own security and safety. Where the supplier of sand is another party, the authentic copy of lease agreement that has been executed between the local Tahasildar and the supplier has to be submitted to SC and PIU/OWD Executive Engineer of the project before any procurement is made from such a site. To avoid accidents and caving in of sand banks at 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 away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic cattle, wildlife and human beings. The flood embankment on either side of the river shall not be used for movement of tippers and loaders, which are likely to be damage and destroy such structures. Instead alternative haul roads will be constructed, avoiding the embankment for safety and security of the vehicles, road			

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		users and the habitations along the banks of the river.			
P.10.4	Arrangement for Construction Water	To avoid disruption/disturbance to other water users, the Contractor will extract water from fixed locations and consult the Environmental Officer of SC before finalizing the locations. The Contractor will provide a list of locations and type of sources from where water for construction will be used to the SC and the PIU/OWD. All efforts shall be made to ensure avoidance of competitive use of a single water source, which may be depleted on account of the stress caused by drawing of water for road construction activity by the Contractor. 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. In case of nalas and water scarcity areas, 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, these structures when abandoned will serve as a ground water recharge after suitable modification. 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 as declared by the State Govt. The Contractor	State Norms and Water Policy	Contractor	Environmental Officer of SC ; PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		shall pay the royalty for use of such water as decided by the State Govt. under relevant norms. A copy of the permission obtained from the Competent Authority shall be submitted to Supervision Consultant and OWD prior to initiation of construction activity. Use of any other water source such as irrigation canals, ponds, 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 and submit this to the SC.			
P.11	Labor Requirements	The Contractor preferably will use unskilled labor drawn from local areas to provide maximum benefit to the local community especially to the SC and ST population along the corridor.	General Conditions of the Contract Document	Contractor	Supervision Consultant; PIU/OWD
P.12	Construction Camp Locations – Selection, Design and Lay-out	Construction camps will not be proposed within 500mtrs. from the nearest settlement and 1000mtrs. from the nearest reserved or protected forest to avoid conflicts and stress on the local infrastructure facilities resources. Stock pilling of construction materials and go downs shall be at least 500mtrs. from the nearest water source. These are to be located on higher ground to avoid impact during floods due to pollution or due to any accidental spillage of stored /stockpiled materials.	Framework for Construction Camps; General Conditions of Contract Document	Contractor	Supervision Consultant; PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		All location and lay-out plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Environmental Officer of SC and OWD/PIU. Other conditions laid out in the Framework for Construction Camps (part of this EMP) shall apply. The waste disposal and sewage treatment shall be such that the environment is not polluted with the waste material and foul order including the effluents and wastewater generated at the campsite. The designing and setting up of these structures should be as per the approved site plan. This should include soak pits, septic tanks and arrangements for carriage of extra sewage by sealed mechanized containers for disposal at designated sites, as available in the locality, with due written permission from the Competent Local Authority. In case of non-receipt of any such permission from the competent authority as stated above, the provision of wider safety tanks and storage facility for garbage has to be made at the camp site as additional measures.			
P.13	Arrangements for Temporary Land Requirement	The Contractor will carry out negotiations with the landowners for obtaining their consent for temporary use of their lands for haulage roads, approach roads, temporary diversions; stockpiling of bulk construction materials; establishment of camps, hot-mix plants, batching plants and crusher units with proper agreement, detailing the terms and conditions agreed between both the parties. This needs to include conditions governing activities to be ensured during	Contract Document	Contractor	Supervision Consultant; PIU/OWD

S. No.	Environmental Issue	Management Measures	Reference	Responsibility	
				Planning and Execution	Supervision and Monitoring
		the construction stage and at the time of decommissioning of the project. The agreement must contain the details of the land involved with relevant records of ownership. A copy of such agreement/s (use and clean-up operations) shall have to be submitted to the Supervision Consultant and PIU/OWD.			
P.14	Orientation of Implementing Agencies	The OWD/PIU shall organize orientation sessions during all stages of the Project. This shall include on-site training (general as well as specific to the context of this sub-project) as well. These sessions shall involve staff of the Site Engineer/ Supervision Consultant and the contractor/s. Refer details in **Chapter 4.**	Training Plan (EMP) – Chapter 4	PIU/OWD, Site Engineer/Supervision Consultant	PIU/OWD

Table 3.2

ENVIRONMENTAL MANAGEMENT PLAN

Construction Stage

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
Activities to be Carried Out by the Contractor					
C.1	**Site Clearance**				
C.1.1	Clearing and Grubbing	Site clearance including clearance of marked trees for felling and removal has to be carried out much before the actual road construction takes place. Structures and utilities (cabins, commercial properties, hoardings, overhead power transmission lines, cable connections, telephone lines, bore wells, stand posts, wells, statues, temples etc.) should have been compensated/relocated as per RAP and EMP provisions before tree felling work and clearing or grubbing activities are undertaken since such activities may damage structures (private and govt.) and essential facilities/utilities of public use. All works shall be carried out in a manner such that the damage or disruption to flora is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from Environmental Officer of SC.	MoRTH 201.2	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		Any tree up to 30cm girth at breast height shall be uprooted mechanically with ball of earth intact for relocation and transplantation at various degraded sites, embankment of water body, ponds, temples, market places, schools and along road corridors for preventing complete loss of such vegetative cover. The Contractor, under any circumstances will not cut or damage trees. Vegetation above 30 cm girth will be considered as trees and can be compensated, in the event of OWD/PIU's written instruction to undertake tree cutting.			
C.1.2	Generation of Debris from dismantling structures and road surface	Debris generated due to the dismantling of the existing road will be suitably reused in the proposed construction as follows: ➢ Eighty percent (60%) 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 balance shall be used to raise the diversions and haulage roads to desired level, raise the embankments of drainage systems those are to reconstructed on account of expansion of the road, repair of pot holes, filling up of ditches and depressions along the corridor to prevent water	Framework for Waste Management (EMP); Guidelines of Orissa State Pollution Control Board.	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		logging, raising the earthen mounds at each 5th km nearer to habitations to serve as flood and cyclone shelters as well as recreations areas through plantations of medicinal and religious trees and development of utility centers on abandoned roads to make it more pliable and wide. ➢ 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 Environmental Officer of SC. ➢ 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 Environmental Officer of SC. ➢ 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 surface water bodies or form puddles in the area.			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		The pre-designated disposal locations will be a part of Comprehensive Solid Waste Management Plan to be prepared by Contractor in consultation and with approval of Environmental Officer of SC and approval local competent authority. All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, considered incidental to the work, will be planned and implemented by the Contractor as approved and directed by the Environmental Officer of SC and OWD/PIU. All disposal sites 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 in the approved format. These shall be verified and approved by the Environment Officer of SC in consultation with the Local Competent Authority after joint site visits, prior to disposal of any debris or waste materials. The Contractor shall then enter into an agreement with the concerned land owner/s and a copy of this document shall be submitted to OWD/PIU through Environment Officer of SC.			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.1.3	Other Construction Wastes Disposal including Fly Ash	The pre-identified disposal locations will be a part of Comprehensive Waste Disposal & Solid Waste Management Plan to be prepared by the Contractor, which needs to be approved by the Environmental Officer of SC (as per the process described in C.1.2). Disposal sites will be finalized prior to initiation of any work on a particular section of the road. Contractor will ensure that any spoils/materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests etc.; pastures; eroded slopes; and in ditches, which may pollute the surrounding including water sources. Such spoils from excavation can be used to reclaim borrow pits and filling-up of depressions which are not connected to any water source in the locality nor under use by the local people. Surplus fly ash, bottom ash and lime, if any transported for use on this corridor shall not be left open and dumped at any disposal site. Contractor shall take care of such residual materials for use at any other location/s of new embankment construction wok with proper protection measures. The re-use and disposal of debris from diversions shall be the responsibility of the Contractor, which includes	Framework for Waste Management (EMP); Guidelines of Orissa State Pollution Control Board.	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		rehabilitation and restoration of such sites. These quantities also need to be reflected in the Solid Waste Disposal Plan. Non-bituminous wastes other than fly ash 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 will 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, Zyziphus, Bel, Pepal, Banyan, Babool, Arjuna, Karanja, Samania, Siris, Neem, Maha Neem, Tamrind, Fasi, etc. No disposal site shall be created as part of the project, without prior approval of the Environmental Officer of SC, OWD/PIU and Local Competent Authority. SC will keep strict vigil on this aspect and ensure that work is not permitted without appropriate Solid Waste Disposal Plan in place. 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.			
C.1.4	Stripping, stacking and	The top soil from all sites including road side widening	MoRTH: 301.3.2;	Contractor	Supervision

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
	preservation of top soil	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 reuse. A portion of the temporarily acquired area and/or RoW edges will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of Environmental Officer of SC. 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 fencing. (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 (not those in barren	MoRTH: 301.7; MoRTH: 301.3.3; MoRTH: 305.3; Framework for Borrow Areas		Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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 carefully inspected, closely supervised and properly recorded by the SC.			
C.1.5	Accessibility	The Contractor will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road by providing temporary connecting road, as necessary. Construction activities that shall affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provision approved by the SC. The Contractor will take care that the cross roads are	MoRTH specifications and IRC guidelines	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		constructed in such a sequence that construction work over the adjacent cross roads are taken up in a manner that traffic movement in any given area does not get affected.			
C.1.6	Planning for Traffic Diversions and Detours	Detailed traffic control plans will be prepared and submitted to the Resident Engineer of SC for approval, minimum seven days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, traffic safety arrangements 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. The Contractor will provide specific measures for safety of pedestrians and workers as a part of traffic control plans. Temporary diversions will be constructed with the approval of the Resident Engineer and Environmental Officer of Supervision Consultant. The temporary traffic detours will be kept free of dust by sprinkling of water three times a day or as required under specific conditions and directed by the SC (depending on weather conditions, construction in the settlement areas and volume of traffic). The Contractor will ensure that	MoRTH: 112; IRC SP:55	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Contractor will also inform local community of changes in traffic routes and pedestrian access arrangements with assistance from SC and OWD.			
C.2	**Construction Material**				
C.2.1	Earth from Borrow Areas for Construction	No borrow area will be opened without permission of the Environmental Expert of Supervision Consultant. The location, shape and size of the designated borrow areas will be as approved by the Environmental Expert of Supervision Consultant and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10: 1961). The borrowing operations will be carried out as specified in the guidelines for setting and operation of borrow areas. The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; will be maintained dust free by the Contractor. Sprinkling of water will be carried out thrice a day to control dust along such roads during their period of use. During dry seasons (winter and summer) frequency of water sprinkling will have to be increased according to	MoRTH: 305.2; Framework for Borrow Area Management	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		the site and climatic conditions in the settlement areas and Environmental Officer of SC will decide the numbers of sprinkling depending on the local requirements. Contractor will rehabilitate the borrow areas as soon as borrowing is over from a particular borrow area in accordance with the Framework for Borrow Area Management **(refer Framework – 4)** or as suggested by Environmental Expert of Supervision Consultant.			
C.2.2	Quarry Operations	The Contractor shall obtain materials for quarries only after the approval of Department of Mines, Govt. of Orissa and the District Administration. A copy of this consent must be submitted to OWD/PIU through Environment Expert of SC. The Contractor will develop a Comprehensive Quarry Redevelopment Plan, as per the Mining Rules of the State and submit a copy to OWD and SC prior to opening of the quarry site. The quarry operations will be undertaken within the rules and regulations in vogue.	MoRTH:111.3	Contractor	Supervision Consultant; PIU/OWD
C.2.3	Transporting Construction Materials and Haul Road Management	Contractor shall maintain properly (as directed by SC) all roads (existing or constructed for the project), which are used for transporting construction materials, equipment and machineries. All vehicles delivering goods to the site shall be	MoRTH specifications	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		covered to avoid spillage of materials and air pollution. It shall be the responsibility of the Contractor to ensure that highways and other roads used for transportation of construction materials are clear from any dust, sand, soil, aggregates etc., fallen from the transporting vehicles used for the project. Contractor will arrange for regular water sprinkling for dust suppression of all such roads and surfaces, as directed by Environmental Officer of SC. 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 like geo-synthetic fabrics 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.			
C.2.4	Construction Water	Contractor will arrange adequate supply and storage of water for the whole construction period at his own cost. The Contractor will take all precaution to minimize the wastage of water in the construction process and related operations.	State Water Policy; Water Act and Rules	Contractor	Supervision Consultant; PIU/OWD
C.3	**Construction Work**				
C.3.1	Disruption to Other Users of Water	While working across or close to any perennial water bodies, Contractor will not obstruct/ prevent the flow of	MoRTH:304.3.2; Water Rules and	Contractor	Supervision Consultant;

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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 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. In all such cases specific provision of lessening the impact of construction has been elaborated in the design plan of retaining walls, spillways and ghats in **Drawing No. OSRP/CEG/SH /ENV/03** 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 to H). Proper slope protection measures have to be taken as approved by the Environmental Officer of SC and OWD/PIU. The Contractor will take prior approval of the River Authority or Irrigation Department and SC for any such	Policy of the State		PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		activity. The 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 down stream population subject to the condition that under no circumstances the down stream 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.			
C.3.2	Drainage and Flood Control	Contractor will ensure that no construction materials like earth, stone, ash or appendage disposed off so as not to block the flow of water of any water course and cross drainage channels. Where necessary adequate mechanical devices to bail out accumulated water from construction sites, camp sites, storage yard, excavation areas are to be pre-settled and arranged well in advance of the rainy season besides providing temporary cross drainage systems. The contractor will take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or run-off of sediments is controlled. Silt fencing shall be installed prior to the onset of the monsoon at all the required locations, as directed by Environmental	MoRTH:305.3.7; MoRTH:306	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		Officer of SC and OWD/PIU. The contractor will also ensure that no material blocks the natural flow of water in any water course or cross drainage channel. Prior to monsoon, the contractor will provide either permanent or temporary drains to prevent water accumulation in surrounding residential, commercial and agricultural areas. Additionally, al structure construction sites shall be cleared/cleaned-up. A pre-monsoon joint inspection (in May first week) by SC and/or PIU/OWD will be conducted to identify all such areas which need to be cleared and restored before the onset of rains.			
C.3.3	Siltation of Water Bodies and Degradation of Water Quality	Contractor will construct silt fencing at the base of the embankment construction near all water bodies (including wells) and around the stockpiles at the construction sites. Silt fencing will be provided prior to the commencement of earthwork and continue till the stabilization of the embankment slopes is complete on the particular sub-section of the road. The contractor will also put up sedimentation cum grease traps at the outer mouth of the drains located in truck lay byes and bus bays which are ultimately	MoRTH: 306; Silt Fencing Details in Annexure 4	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		entering into any surface water bodies / water channels with a fall exceeding 1.5 m. Contractor will ensure that construction materials containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby water bodies.			
C.3.4	Slope Protection and Control of Soil Erosion	➢ The contractor will construct slope protection works as per design, or as directed by the Environmental Officer of SC 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. Contractor will ensure the following: ➢ 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. ➢ Terfing works will be taken up as soon as possible provided the season is favorable for the	MoRTH: 305.2.2.2; MoRTH: 306.2; Framework for Soil Erosion and Sedimentation Control	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		establishment of grass sods. ➢ Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks with sowing of seeds of grass, shrub and bushes 30cm interval from line to line across the slope and sprinkling of water on such slopes after completion of the earth work. ➢ Regular watering shall be provided at such locations as required. In all these cases, seeds of Banachakunda (Cassia tora), Banakolthi (Tephorosia), Bala (Sida species), Vetiver grass, Pamarosa grass, Croton bonplandianus (Gandha tulasi), Jatropha gossypifolia etc. will be used. ➢ In borrow pits, the depth shall be regulated so that the sides of the excavation should not be stepper than 1 vertical to 2 horizontal, from the edge of the final section of the bank. ➢ Along sections abutting water bodies, stone pitching as per design specification will be provided to protect slopes. All such stone pitching should have a filter layer to prevent scouring and settlement of the pitched surface when the water label recedes. ➢ Stabilization of the embankment with appropriate technique/s shall commence soon after the			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		embankment formation. ➢ Any existing drainage channel or body shall not be obstructed during filling operations. ➢ The embankment slope shall be maintained as per IRC specifications.			
C.4	**Pollution**				
C.4.1	**Water Pollution**				
C.4.1.1	Water Pollution from Construction Wastes	The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system by providing safe wastewater soak pits away from any aquifers or water body. 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 collection pits. Construction materials containing fine particles like lime stone, lime, cement, fine aggregates etc. shall be stored in enclosures away from water bodies on high land to ensure that any run off from such locations does	MoRTH: 111.4; MoRTH: 111.1; Water Act, 1974	Contractor	Supervision Consultant; PIU/OWD, SPCB

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		not drain into nearby water courses. No garbage, sludge, lubricants, fuel, sewerage or contaminated waste water is to be released in the settlement areas, water bodies, forests and wildlife habitats or grazing areas. All waste arising from the project is to be disposed off in the manner that is acceptable to the State Pollution Control Board or as directed by Environmental Expert of Supervision Consultant. The Environmental Expert of SC will specify in the progress reports on whether the all liquid wastes disposed off from the various sites meets the discharge standards as specified by the CPCB Govt. of India. If case of non-compliance actions taken by SC shall also be specified. This shall be done on the basis of pollution monitoring results received from the Contractor and that from the Independent Agency hired by OWD/PIU.			
C.4.1.2	Water Pollution from Fuel, Lubricants and Chemicals	The Contractor will ensure that location of parking lots; garage; fuel/lubricants storage sites; POL waste collection sites; vehicle, machinery and equipment maintenance and refueling sites (other than those located inside construction camps, for which the relevant clause is applicable); are located on high ground at least 500 m from rivers, streams, canals, ponds, wildlife movement areas, forests and ground	MoRTH: 111.4; MoRTH: 111.1; Petroleum Act and Rules; MoEF/CPCB Notifications;	Contractor	Supervision Consultant; PIU/OWD, SPCB

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		water sources. If such areas are located on agricultural land, top soil will be stripped, stockpiled and returned after cessation of such use. Garage, service stations, refueling stations and equipment maintenance yards shall be so located at least 100mts. away from kitchen, mess and drinking water facilities within the camp site. The Contractor will ensure that all vehicle/machinery and equipments operation, maintenance and refueling will be carried out in such a fashion that any 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 (as per the design provided) in such areas to prevent liquid wastes from entering into any aquifer, local water source, abandoned well, 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) 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	Framework for Construction Camps		

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		vehicle parking areas. The contractor will arrange for collection, storage, reuse/disposal of spent oil, lubricants, grease, sludge, slurry, bitumen, chemicals, paints etc. Covered bins/drums (marked specifically regarding the contents) shall be kept separately at maintenance and refueling areas. Disposal shall be at pre-identified sites (list to be submitted to SC and OWD/PIU) as approved by the Environmental Officer of SC. All spills and collected petroleum products will be disposed off in accordance with the prevailing MoEF and SPCB guidelines issued for such purpose. Environmental Officer of SC will certify that all arrangements comply with the guidelines of SPCB/ MoEF or any other relevant laws such as the Central Excise and Explosive Substances Act.			
C.4.2	**Air Pollution**				
C.4.2.1	Dust Pollution	The contractor will take every precaution to reduce the level of dust (SPM and RSPM) from crushers, material storage yards, haul roads and construction sites (including earthwork, dismantling, scarification and material mixing sites) by sprinkling of water, mist spray, encapsulation of dust source and erection of screen /barriers. Hot mix plant and batch mix plant will be fitted with dust extraction units and mist spray to keep down the	MoRTH:111.1; MoRTH:111.5; MoRTH:111.9; MoRTH:111.10; Air Act; SPCB Rules and Guidelines	Contractor	Supervision Consultant; PIU/OWD, SPCB

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		dust emission levels. The suspended particulate matter value at a distance of 40m from a unit located in such a cluster should be less than 500 µg/m^3. Dust screening vegetation such as Dwarf bamboo, Justiacea, Vitex negundo, Lawsonia inermis will be planted around the crusher sites besides provision of dust screens. The contractor will provide necessary certificates to confirm that all crushers used in the project conform to relevant dust emission control legislation. Air pollution monitoring will be conducted as per the Pollution Monitoring Plan and results shall be used to strengthen/rectify problematic areas. If other existing crushers are used, such units need to have valid license from the SPCB. Copies of the required certificates and consents of the operator owner shall be procured by the Contractor and submitted to OWD/PIU through Environment Officer of SC prior to the procurement of material from such units. The Resident Engineer will ensure that the necessary documents have been submitted by the contractor before material procurement permission is issued by the Materials Engineer of SC.			
C.4.2.2	Emission from Construction Vehicles, Equipment and	Contractor will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm to the emission standards	Motor Vehicles Act	Contractor	Supervision Consultant; PIU/OWD,

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
	Machineries	specified by the CPCB. Certification issued for such contrivances obtained from designated/approved authority shall be submitted along with the specified reporting format. The contractor will maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results will also be submitted to SC and OWD/PIU as per the Pollution Monitoring Plan in the specified format.			SPCB
C.4.3	**Noise Pollution**				
C.4.3.1	Noise Pollution: Noise from Vehicles, Plants and Equipment	The Contractor will ensure the following: ➢ 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. ➢ All vehicles and equipment used in construction will be fitted with exhaust silencers. ➢ 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. ➢ Limits for construction equipment used in the	Noise Rules, 2002	Contractor	Supervision Consultant; PIU/OWD; SPCB, Affected Communities; PRIs; NGOs; Staff at Schools and Health Centres

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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. ➢ Maintenance of equipment, machinery and vehicles (including proper lubrication, tuning, checks for muffler effectiveness) shall be regular and up to the satisfaction of the Environmental Officer of SC to keep noise levels under control . ➢ Construction activity at sites within 100m habitations and hospitals shall not be carried out during night (10:00 pm to 06:00 am). ➢ 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. ➢ 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. ➢ Contractor will provide noise barriers at all sensitive receptors mentioned in Tabular statement under Chapter -2 of EMP, which includes masonry walls and vegetative screens (creepers) as per the			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		design **drawing no. OSRP/CEG/SH/ENV/04B.** These locations include 34 temples (**SH-9-** 0.915,11.362,11.928,11.932,13.167,13.280,14.583, 18.413,19.376,21.975,23.640,24.584,26.023,27.500,27.746,29.400,33.010,30.960,31.347,39.810,40.000,42.577,42.927,43.317 **SH-53** 3.480, 3.790,3.837,20.000,24.250,25.870,29.710,40.580,41.640,42.300) **Chandbali to Bhadrak and Bhadrak to Anandpur on SH-9 and SH 53 respectively**, 8 schools and 1 college (SH-9- 21.000,27.780,36.200,40.720,31.300 SH-53- 5.750,8.320,17.590,20.250,33.960,35.150,44.600) on the above roads, 2 Hospitals at (13.300km on SH-9 and 29.250kms on SH-53), 8 govt. buildings (SH-9- 4.525,16.355,17.100,39.662,32.885,31.300 and SH-53- 0.980, 20.050,20. 220,31.710,41.300km, 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 at the construction sites as per the noise monitoring plan and results will be submitted to SC and OWD/PIU. Environmental Officer of SC will be required to regularly inspect all above mentioned sites to ensure proper compliance of the said measures.			
C.5	**Safety**				

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.5.1	Personal Safety Measures for Labour	Contractor shall provide (including enforcement with zero tolerance): ➢ Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, mortars, concrete, welding sites, blasting, crusher and stockpiling locations etc. as per the Factory Act, 1948. ➢ Welder's protective eye-shields to workers engaged in welding works. ➢ Earplugs to workers exposed to high noise levels (above 65db) at quarries, crushers, compaction sites, concrete mixing, batch mixing, drilling and hot mixing plants, fabricating and heavy machinery operations. ➢ Hard hat or helmets to all workers, supervising staff and inspecting officials entering a construction site, plant area, quarry, loading and unloading site. ➢ Protective goggles and clothing to workers engaged in stone breaking activities. ➢ Earplugs to workers exposed to noise in crushing, compaction, blasting, dismantling or concrete mixing operations. ➢ Adequate safety measures for workers during	Factories Act, 1948; Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		handling of materials at site. ➢ Nettings and platforms below and on the sides of overhead construction and excavation work to prevent mishaps due to accidental fall of workmen and debris. The Contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. 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 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. Contractor will provide facemasks to the workers			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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. 'No smoking' and other 'high risk' areas are to be provided with warning signage besides strict enforcement of PPE with zero tolerance limits. These arrangements need to be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization, which shall be approved by SC and OWD/PIU after proper scrutiny.			
C.5.2	Traffic Safety	The Contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signage, markings, flags, lights, reflectors and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Environmental Officer of SC for the information and protection of road users approaching or passing through the section of any construction site of activity or diversion. The Contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRTH/ IRC specifications. Before taking up construction on any section of the	MoRTH specifications and IRC guidelines	Contractor	Resident Engineer; Bridge Engineers PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		existing lanes of the highway, a Traffic Control Plan will be devised and implemented to the satisfaction of the Environmental Officer of SC and local administrative authorities including traffic police.			
C.5.3	Risk from Electrical Equipment(s)	All power transmission lines whether clawed or sufficiently covered are potential hazards at construction sites. The Contractor will take all required precautions to prevent danger from electrical cables, wires and equipment and ensure that – ➢ 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. ➢ All such electrical installations and wirings shall be barricaded in manner that ensures safety of the road users, wildlife and operating vehicles/equipment such as cranes, excavators, loaders, fabricating units etc. ➢ Necessary fencing, illumination and proper insulation of the electrical lines shall be ensured by the contractor for safety and security of the public, road users, workers and the wildlife. ➢ The contractor shall ensure proper maintenance of electrical supply lines/points. ➢ All such electrical operating units shall be	-	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		switched off before operations are closed every day or night as the case may be. ➢ All electrical equipment/cables/wires to be used in the construction shall have to conform to the relevant BIS specifications/codes. ➢ The contractor will ensure that such equipment/cables/wires are free from patent defect, and under good working conditions 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.			
C.5.4	Risk Force Measure	The contractor will 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	-	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		chemicals on account of accidents or spillage are to be kept ready at camping sites or major construction sites to attend to such eventualities. Construction Safety Plan to be prepared by the contractor 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 approved by the Supervision Consultant and the Environmental Officer of the OWD/PIU as per the standard practice adopted under labour welfare activities and Factories Act.			
C.5.5	First Aid	The Contractor shall arrange for - ➢ A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone with life saving first aid kits. ➢ 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	Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Supervision Consultant; PIU/OWD
C.6	**Cultural Property**				

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
C.6	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 will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or property. He will, immediately upon discovery thereof intimate the Environmental Officer of SC, local police and administration of such discovery and carry out the given instructions for dealing with the same. The SC will seek direction from the State Archaeological Department before instructing the contractor to recommence the work in the site. Till such time, the site and the findings shall be under strict watch and ward of the contractor, SC and local administration to prevent any pilferage, alteration of the findings by the workmen or locals as the case may be.	Central and State Laws	Contractor	Supervision Consultant; PIU/OWD, State Archeological Department
C.7	**Labor Camp Management**				
C.7.1	Accommodation	Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The location, layout and basic provision of facilities at	Building and the other Construction Workers (Regulation of	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		each labour camp site will be submitted to SC. The construction or hiring of such facilities shall commence only after the written approval from the SC. The Contractor will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labour) in functional and hygienic manner. Any non-compliance or damage shall be made good by the contractor at his own cost.	Employment and Conditions of Service) Act, 1996		
C.7.2	Potable Water	The contractor will also provide availability of potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The contractor will ensure the fulfillment of the following conditions at all work places for the benefit of workers: a) Supply of sufficient quantity of potable water (as per IS) in every workplace/labor 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	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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. Environmental Officer of SC will be required to inspect			

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		the labour camp once in a week to ensure compliance to these health and hygienic standards prescribed in the EMP. The camp-in-charge will be responsible for day-to-day monitoring.			
C.7.3	Sanitation and Sewage System	The contractor will ensure that - ➢ The sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses takes place. ➢ Separate toilets and bathrooms for women workers wherever required, screened from those of men, are provided with markings in vernacular language. ➢ All such facilities must have adequate water supply with proper drainage and disposal facility. ➢ All toilets in workplaces are with dry earth systems which are to be maintained, cleaned and disinfected daily using proper disinfectants. The location of such provisions should not affect the air, surface water and ground water of the locality or the agricultural fields located near-by. ➢ 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. ➢ In the main camp, no night soil or sewerage shall	Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		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 to check the hygiene standards.			
C.7.4	Waste Disposal	The Contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Officer of SC. 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, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold / given out for recycling.	Environment Protection Act, 1986 and Rules	Contractor	Supervision Consultant; PIU/OWD, SPCB, Local Authorities
C.8	**Contractor's Demobilization and Decommissioning of Established Setup**				
C.8.1	Clean-up Operations,	Contractor will prepare site restoration plan, which will	-	Contractor;	OWD/PIU

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
	Restoration and Rehabilitation	be submitted for approval to the Resident Engineer of SC. The Resident Engineer and the Environmental Officer of SC will be jointly responsible for approving and monitoring these plans. The contractor needs to submit his plan at least 60 days prior to 'substantial handing over of the site.' All clean-up and restoration operations shall be completed by the contractor prior to demobilization. The contractor will clear all temporary structures; dispose all garbage, night soils and POL waste as per the approved Comprehensive 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 that has been impacted on account of accidental spillage. 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 left clean and tidy, at the Contractor's expense, to the entire satisfaction of Environmental Officer of SC and OWD/PIU. The Resident Engineer shall ensure that all clean-up and restoration operations are completed satisfactorily		Resident Engineer of SC; Environment Officer of SC	

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference	Responsibility	
				Execution / Civil Work	Supervision/ Monitoring
		and written approval is given to the contractor before the 'works completion' is issued/recommended. The OWD/PIU shall ensure through site inspection that the Contractor and SC have complied with all these provisions.			

Table 3.3

ENVIRONMENTAL MANAGEMENT PLAN

Operation Stage

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
OPERATION STAGE					
Activities to be Carried Out by the OWD					
O.1	Monitoring and Evaluation of Operational Performance of Environmental Mitigation Measures provided in the Project	The OWD/PIU will monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project. Monitoring and performance indicators have been indicated in Chapter 4. These include – ➢ Tree preservation and plantation ➢ Biodiversity Works ➢ Construction Camp Management ➢ Top Soil Preservation ➢ Borrow and Quarry Area Management ➢ Traffic Safety and Management ➢ Pollution Control and Waste Management ➢ Site enhancements etc. Also, the rehabilitation works at degraded sites along nalas, streams and gullies after soil and water conservation measures has to be inspected, recorded and damages timely repaired for effective functioning and maintenance of such efforts in the field.	-	OWD Field Divisions; OWD/PIU	OWD/PIU; Concerned Departments/Agencies

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		All observations and data shall be added /updated in the Database/Information Management System developed for the project. This also covers other points given in this table.			
O.2	Maintenance of Drainage	OWD/ PIU will ensure that all drains (side drains and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding without damaging the spurs and check dams erected to stabilize the course and flow of all such drainage channels. OWD/PIU will ensure that all the sediment/oil and grease traps set up at the truck and bus lay bye are cleared once in every three months.	MoRTH specifications; IRC guidelines	OWD Field Divisions	OWD/PIU
O.3	Pollution Monitoring	The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination are to be continued at pre-designated locations as identified in the Pollution Monitoring Plan and if necessary, at additional locations for comparative study of pre and post operation data in order to ensure further improvement/modification in similar future works. OWD/PIU will appoint specific pollution monitoring agency for this purpose.	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency; OWD/PIU	OWD/PIU
O.3.1	Atmospheric Pollution	Ambient air concentrations of various pollutants shall be monitored as envisaged in the pollution-monitoring plan at pre designated locations to	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency;	OWD/PIU

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		compare the levels with the pre construction data. Additional data at other location may be collected as per any site specific requirement.		OWD/PIU	
O.3.2	Noise Pollution	Noise pollution will be monitored as per monitoring plan at sensitive locations where pre-construction noise data was collected. The survival rate and functioning of the noise control plantations and noise control walls has to be specifically supervised and monitored for further improvement/replication at other affected points if necessary. The survival rate of dwarf bamboo plantation at such locations along the road avenue in this cyclone ravaged corridor needs to be specifically monitored. Signage indicating 'no horn zones' near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation barriers will be taken up thrice in the operation period.	Pollution Monitoring Plan (EMP)	Pollution Monitoring Agency; OWD/PIU	OWD/PIU
O.4.	Soil Erosion and Monitoring of Borrow Areas	Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, will be carried out before monsoon, during monsoon and after winter rains to record and monitor the effectiveness of such structures for five years after the completion of project, so as to evaluate the	Frameworks on Prevention of Soil Erosion and Borrow Area Management (EMP)	OWD Field Divisions; OWD/PIU	OWD/PIU

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		beneficial effects of each type of activity together with the cost involved.			
O.5	Changes in Land Use Pattern	OWD shall take initiative and act as a facilitator in preparing an action plan to encourage balanced, congestion free, safe, hygienic, environment friendly activity on either side of the developed highway during and after completion of the project. This to avoid irregular, ugly, unhygienic and destructive ribbon development, close to the road corridor which adversely affects agricultural and water harvesting capabilities and drainage system of the area. The OWD may consider effective promulgation through some legislation and guidelines controlling such unbridled activity, which are self destructive and distressful for the poor farmers and a drain on the state's economic resources. A state-wide anti-encroachment policy to ensure safety (of the residents and the road users), highway aesthetics and future possibilities for expansion of highway facilities should be considered by OWD. This could include notification and legal recourse against local authorities, which supply power, water, sanitary connections and register commercial activities to encroachers, squatters and illegal settlers on the OWD land. This policy should also cover religious structures, mandaps and puja pandals etc. A land use-zoning map may be developed, under	Legal Provisions under Prevention and Control of Ribbon Development Act	OWD/PIU, Local Authorities, Revenue Department and Local Civic Bodies, District Administration	OWD/PIU; Govt. of Orissa

Sl. No.	Environmental Aspect/Issue	Management Measures	Reference Document	Responsibility	
				Execution/Civil Work	Supervision /Monitoring
		which up to a particular distance from the RoW of the alignment especially in new bypass stretches, no development will be allowed. Necessary hoardings along the corridor will be provided to warn encroachers against any such activity (including punitive action such as forfeiture of the structures and belongings without prior notice, legal action in the court of law barring any stay over such action by the state from any court of law). Budgetary provisions may be made to control the ribbon development along project road.			
O.6	Road Safety and Maintenance of Assets	No advertisement/hoardings shall be allowed within the Right of Way limits of the project road. Regular maintenance and cleaning of assets such as sign boards, bus stops, drains etc. shall be undertaken.	-	OWD Divisions (and its contractors, if any), District Administration/ Local Authorities, Local Police	. OWD/PIU; Govt. of Orissa

Table 3.4
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 and those in the strips of land to be diverted from the forest area for road widening and strengthening, construction of bridges/culverts and for creating temporary diversions is required for the project. A total of **(3581 on SH-9 and 2893 on SH-53) 6474** trees will be cut along **Chandbali – Bhadrak 0 to 45 km of SH-9** and 0 to 50 km of **SH-53** respectively for the project road 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 1002 trees shall be preserved in this contract package(480nos on SH-9 and 522nos on SH-53). 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. The details of above trees km wise may be referred under **Table 2.11 of Chapter 2.** 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	PIU/OWD; DPR consultants; Tree Felling Contractor; Supervision Consultant	Project Director, PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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 PIU/OWD and the SC. Documentation of such exercises shall be maintained by the EMU of PIU /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. 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/PIU. As necessary, separate proposals for felling of such trees will be submitted to the concerned Divisional Forest Officer Bhadrak wild life Division and Keonjhar wild life Division after joint enumeration exercises are completed. Systematic corridor level documentation for the trees to be cut and those retained shall be maintained by PIU. A separate list will be maintained by the PIU/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,	PIU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	Project Director, PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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 up rooting and relocation.		
B.3	Tree Cutting	Trees with bird nestings shall not be felled between August to mid-April to facilitate the young birds/new generations to fly out. Additionally, all provisions stated under **clause P.3 of Table 3.1** shall be adhered to.	PIU/OWD; Forest Dept., GoO; OFDC; Tree Felling Contractor	PIU/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 shall be raised to meet the plantation targets in a time bound manner.	PIU/OWD; Forest Dept., GoO	PIU/OWD; Forest Dept., GoO Supervision Consultant
B.5	Compensatory Afforestation	No forest land involved in acquisition.	District Administration, DFO, Executive Engineer, Forest Department Govt. of Orissa, MoEF, PIU of OWD	PIU/OWD, Forest Department, GoO
B.6	Drainage	Adequate number of drainage structures as per the list of culverts and bridges indicated with treatment to be carried out against each location in **Chapter – 1 - Table 1.3, 1.4 and 1.5.** Sufficient vantage to enable smooth flow of	PIU/OWD; Supervision Consultant	PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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 up stream and down stream. 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.		
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 **Salandi** areas on either side of the package beside the irrigation canals and intertuidal zones and ponds, which are the perennial sources of water for the wildlife and domesticated live stock . 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 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.	PIU/OWD; Forest Dept., GoO	PIU/OWD; Forest Dept., GoO
CONSTRUCTION STAGE				
Activities to be Carried Out by the OWD/Forest Department, GoO/Contractor				
B.8	Construction management and	The contractor shall adhere to all clauses /specifications covered under the contract including EMP requirements mentioned in **Tables 3.1 and 3.2 (and**	Contractor	PIU/OWD;

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
	related aspects	**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.		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	PIU/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 PIU for implementation by Forest department. • **SH-9-26.430,28.837,30.154,31.700,35.825,40.974kms.** • **SH-53-11.867,13.507,17.002,21.024,23.500,34.000,40.242kms.**	Contractor	PIU/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 Bhawanipatna - Khariar road: **SH-9** • 5.95km Ichhapur • 6.60km Berhampur • 8.19km Balibili • 8.21km Mirjapur • 2.8km Nathasahi • 5.00km Karamil • 11.00km Alinagar • 11.4km Ranipur • 9.65km Dolasahi • 12.65km Paliabindha • 16.5km Tihidi • 12.75km Nandapur • 20.20km Kolha • 22.7km Maa Kali Temple • 24.5km Bindha	Contractor	PIU/OWD; Forest Dept., GoO ; Supervision Consultant

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		• 26.00km Pirahat • 27.57km Kanpur • 29.100km Samantaraipur • 29.5km Gadibazar • 39.25km Digachhia • 46.35km Mahulia **SH-53** • 2.0km Bagudi • 3.1km Randia • 7.0km Barapada • 19.4km Banta • 18.0km Tillo • 30.0km Hatadihi • 32.8km Banchoo • 41.5km Fakirpur • 34.0km Ambagadia • **SH-9-** 26.430, 28.837, 30.154, 31.700, 35.825, 40.974 • **SH-53-** 11.867, 13.507, 17.002, 21.024, 23.500, 34.000, 40.242 to facilitate movement of wildlife across the road by providing traffic calming measures. Debris shall be directly loaded into dumpers/tractors and disposed at the pre-identified 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		

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		such activity, where accumulation of water is likely to induce slip circle and land slides. 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	PIU/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	PIU/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	PIU/OWD; Forest Dept.; Supervision Consultant
B. 15	Strengthening Forest Check Gates	The two existing forest check gates at the under-mentioned locations will be reconstructed along with provision of lay bye to enable proper checking of vehicles and prevent congestion on the highway : ➢ 32.885km (SH-9) ➢ 33.900km (SH-53)	Plantation near underpasses and/or crossing sites	
B. 16	Informatory and Warning Signage	Signage (229nos.) regarding speed limits and protecting wildlife/environment shall be put-up along the road. This may include information/warnings about for preventing forest fires, hunting, snaring, encroaching, smuggling,	Contractor	PIU/OWD; Forest Dept.; Supervision

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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.		Consultant
B.17	Avenue or 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 the Contractor 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. A total **of 6474 trees** are going to be removed from the avenue to be replaced by 3 times the number **19422 plants.** Planting along the avenue over **20km,** will cover **14000 plants** only as per the **Table -2.12** using poly pot seedling (1.5 year old) **including 674 plants** to be up rooted and re-planted. 10% additional planting stock shall be raised in the nursery for casualty replacement along the Right of Way. The balance **5422** plants shall be planted as site enhancement activity along the **abandoned roads, ponds and other water** bodies, camouflage corridor, toll plaza, bus stops, spur junctions and for the purpose of beautification and environmental up gradation along the corridor as per details in the CPR s enhancement budget under **Chapter - 5.** A minimum of 75 percent survival rate of the saplings shall be required for the	Contractor	Supervision Consultant; PIU/OWD

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		clearance of payments at the end of the 3rd year of maintenance. Any damage beyond this threshold shall be made good by the contractor at his own cost. The contractor will maintain the plantation for a minimum of three years beyond which it shall be handed over to the OWD for maintenance. The plantation shall be taken up in areas beyond the ROW inside degraded forest land by Forest Department, through a memo of understanding (MoU) between OWD and Forest Department as site enhancement for wildlife and environment. In case of Govt. waste land this will be taken up by local SHG, after signing MoU with OSRP of OWD. 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/PIU(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.		
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 -9 and	Contractor; PRIs; Local Communities/SHGs/ Individuals	PIU/OWD; Supervision Consultant

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		SH-53 to function as cyclone cum flood escape centers over Govt. land as has been discussed with the district Collectors Bhadrak and Keonjhar during public disclosure of the EMP document as a safe guard to prevent soil erosion and silting up of drainage systems.		
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 near by DFO, Bhadrak wild life Division and Keonjhar wild life Division respectively of all such activities, along with the local Forest Range Officer or Wildlife Warden and as per their advice will take appropriate steps/measures, if required in consultation with the Forest Officials – this could include rescue, first-aid or	Contractor; Supervision Consultant	PIU/OWD; Supervision Consultant; Forest Dept., GoO

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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	PIU/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.	PIU/OWD; Supervision Consultant	PIU/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 wildlife shall be monitored for five years.	PIU/OWD; Forest Department, GoO	EMU of PIU/OWD; Forest Department, GoO

Sl. No.	Environmental Aspect/Issue	Management Measures	Responsibility	
			Execution/Civil Work	Supervision /Monitoring
		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 Orissa'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 Orissa.
- 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 PIU 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 EMAP 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	Environment Officer	1	In charge of EMU of OSRP	MSc. in Environment Science and 5 years experience
2	Research Assistants	5	Supervise the Environment Monitoring programme suggested in EMAP and supervise the Contractors activities from Environment aspect	BSc. in environment science /Botany /Zoology /Forestry and 2 years field experience
3	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 Action Plan (EMAP) and will allow corrective actions to be undertaken when needed. EMAP 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 EMAP

4.3.1 Monitoring of the Components of Environment

As suggested in the EMAP, 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 parameter	Five locations where baseline monitoring was carried out and additional locations like foundation excavation areas for 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	Sampling	Once in a season or thrice in a year

	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 EMAP Contractor's Self Audit

The Contractor will be responsible for conducting its activities in accordance with the contract documents and the EMAP, 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 waters 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 EMAP.

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 EMAP.

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 EMAP 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 EMAP, 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 EMAP, 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 EMAP
- **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 5.2) Hot mix / batching plant	Contractor, SC, OWD (EMU),
	Operation				Two seasons in a year for three years		Along the road (refer table no 5.2)	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 5.2)	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 5.2) 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 5.2)	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 5.2) Hot mix / batching plant	Contractor, SC, OWD (EMU),
	Operation				four seasons for three years		Along the road (refer table no 5.2)	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	Contractor, SC, OWD (EMU),

Format No.	Item	Stage	Contractor	SC Consultant		PIU, OSRP		Reporting from OWD to World Bank)
			Implementation and Reporting to TA Consultant	Supervision	Reporting to PIU,	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 PIU/SC								
PIU1	Form for keeping records of Consent obtained by contractor (To be filled by SC Consultant)	Construction	Quarterly		Quarterly	Quarterly	Half Yearly	-
PIU2	Checklist for Environment Inspection	-	-	-	-	On each visit	On each visit	-
PIU3	Summary Sheet (To be filled by PIU)	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 **Chandbali- Bhadrak- Anandpur** 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 clearance requirements
4. Environment notification No-1433 dated 14th Sept 2006 by MoEF, Govt. of India.
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 –

- **241** spur roads out of which **44** will be provided with site enhancement for junctions which are being developed.
- **91** ponds (water bodies) for construction of Toe wall with stone pitching as silt fencing
- **3** spillways for drainage of water above HFL
- **3** bathing ghats for community use.
- **4** site enhancement plantation on the embankment of water bodies,
- **68** new Hand Pumps replacing **68** fully affected tube wells with additional provision of drains and soak pit,
- **17** water taps replaced as against **17** fully affected stand posts with additional provision of drain and soak pit.
- **9** schools and **1** college where approach road and gate has been shifted 2mtr inside including 1 where approach road and gate has been shifted to another location 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 3 schools with site improvement through providing noise and dust suppression cum new boundary wall. All the schools provided with new MS grill gates.
- **18** fully and **16** partially affected temples, out of which **18** 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 16 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.

- 132 cross drains and 32 major drains or rivulets 5 irrigation canals, 20 flooding zones/ Cause ways, along the proposed corridor will be requiring mitigation besides additional drainage structures for flood prone areas and wild life via duct locations on either side of intertidal zone of the corridor from Tihidi to Chandbali and in the agricultural fields of SH-53 between Barapada to Fakirpur which will be tackled by slope protection, utilization of excavated materials in raising plantation mounds, improvement of water logged areas in habitations near by for environmental up gradation and suitable disposal of demolition and excavation materials. In addition to this the buried existing Nayan Jori between the entire stretch of the corridor from Chandbali to Anandapur serving as irrigation and drainage line on either side which will be blocked due to road expansion and improvement as well as tree felling and development of diversions shall be reconstructed along the toe line in shape of line drain with embankment made out of excavated earth and demolition materials to prevent erosion, degradation of agricultural land, drainage systems and breeding of aquatic life, so important for the ecological balance and continuance of the down stream stake holders and inmates Bhitarkanika national park. Bamboo and Pandanous odoratisimus, plantations shall be provided along these new embankments for preventing soil erosion and creating an effective shelter belt within next three years for the cyclone prone habitat.
- Slope protection measures through bioengineering method have been provided to check erosion and stabilize ghats as well as embankment slopes, besides retention of avenue plants coming beyond 6mtr carriage way and pavement on either side of the proposed centre line except at curves and inner faces of curves to facilitate clear visibility, while avoiding the possibility of accidents at these potential sites.
- Wildlife movement at **6** location on SH-9 and **7** locations on SH-53 shall be provided with wild life under pass viaduct on either side of the located CDR system as per the design and locations enclosed in shape of **Annexure XXXXIV** to this report where easing of the embankment slope to facilitate wildlife movement with corridor camouflage planting either side and use of boulders, up rooted stumps, rejected logs along side the camouflage plantation to provide protective cover and shelter to wild animals has been suggested. Trap drains to guide reptiles, amphibians, rodents and other small creatures cross the road through viaduct under passes provided to prevent mass death of this wildlife under the wheels of speeding vehicles.
- Location of sites for setting up batching and mixing as well as bitumen hot mix units, top soil dumps near the NH-5 to facilities capacity utilization of the coarse aggregates and GSB to be properly mixed, graded and carried to the side of utilizations has been suggested to reduced 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

Detail Abstract of cost for Environment and Biodiversity Management Plan and Mitigation Measures

Sl No.	Structure	Nos.	Cost per Unit	Total Cost
1	Site enhancement proposed at Spur road Junctions (Y & T junction) **14+30**	44	50496.00	2221824
2	School boundary wall with noise & dust mitigation and gate for 21mtr	41	123961.00	3447074.63
	Boundary wall with gate and noise & dust mitigation measure approach road and shrub plantating		85789.00	
	Boundary wall without gate and noise & dust mitigation measure		80137.00	
	Boundary wall with noise & dust mitigation grill gate and metal interception barricade with approach road and shrub planting		167736.00	
3	Improved boundary wall with gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	2	85789.00	171578
	Improved boundary wall without gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	1	80137.00	80137
4	Temple Boundary wall	36	77058.00	2774088
5	Religious shrine	1	5197.00	5197
6	**Hospital /PHC**			
	Boundary wall with dust cum noise filter and site enhancement plantation with gate	4	85789.00	343156
	Boundary wall with dust cum noise filter and site enhancement plantation without gate	1	80137.00	80137
	Entry to be shifted left side approach road with new gate, boundary wall, noise & dust barrier	1	123961.00	123961
7	Oil & Grease filter with soak pit	2	129059.00	258118
8	**Potable Water sources**			

	(a) **Hand Pumps (Bore well)** with raised cement concrete platform connected to soak pit for ground water recharge and site enhancement planting	68	72122.00	4904296
	(b) **Stand post** (Water taps) with raised cement concrete platform connected to soak pit for ground water recharge and site enhancement planting (7+10)	17	53147.00	903499
9	**Water bodies and Ponds** provided with **Toe walls** (5818+865)	6683	5197.00	34731551
10	Water bodies and Ponds provided with **Bathing ghat (1+2)**	3	97736.00	293208
11	Water bodies and Ponds provided with **Spillway (1+2)**	3	60790.00	182370
12	Water bodies and Ponds provided with **Site Enhancement planting (1+2) locations @351950/- per 400 plants with tree guard**	120	351950	105585
13	Avenue Planting with Tree guards	38	351950	13374100
14	Reptile underpass connected to Trap drains including cost of Pipe culvert and Trap drains (6+5)	11	48456.00	533016
15	Enumeration of Trees to be Felled	6747	2.40	16192.8
16	Maintenance of Haulage road	-	-	492800.00
17	Use of Demolition wastes, Flood and cyclone shelters 19nos.	/200000cum	3.00	600000.00
Total				**65641888.43**

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. 65669188**/-, which excludes the cost of passenger shed, traffic calming measures, 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.

Table – 5.2

Project Cost on Monitoring Activities

Sl. No.	Component	Stage	Item	Unit	Unit Cost (Rs.)	Quantity	Total Cost
(A) FOREST CLEARANCE							
1	Forest Clearance	Pre-Construction	Net present value (NPV)	Ha.	-	-	0
			Compensatory aforestation	Ha	-	-	0
			Joint survey and enumeration & marking of tree growth over forest and non forest land required to be removed from PROW	Nos.	-	-	0
			Joint enumeration and marking of trees to be retained within the PROW and abandoned road	Nos.	-	-	0
(A) Forest Clearance Cost							
(B) MITIGATION							
2	Water	Pre-Construction	Relocation of Hand Pumps	No.	72122	68	4904296
			Relocation of stand posts	No	53147	17	903499
			Compensation	No.	-	-	0
			Combined oil & Sedimentation chambers	No.	109059	2	258118
			Oil Interceptors at Vehicle parking areas	No.	-	-	0
		Construction	Silt fencing in shape of Toe wall (PCC M-15) at ponds with back fill	Meter	5197	6683	34731551
			Bathing ghat (RRS Masonry)	Each	97736	3	293208
			Spillway in PCC	Each	60790	3	182370

			Silt fencing in shape of **Toe wall** with back fill &stone pitching	Meter	-	-	0
			Silt fencing in shape of **Guard walls** with back fill &stone pitching	Meter	-	-	0
			Silt fencing in shape of **Hill drains** with back fill &stone pitching	Meter	-	-	0
			Cascade with Riprap	Meter	-	-	0
			Recycling of surplus demolition and excavation materials at abandoned road surfaces, formation of embankments for the road to the extent it fits into the quality standards, the backfill of canal, stream and river embankments provided with guard wall and toe walls, raising of embankment levels at bridge and culvert approaches and exit point of streams and rivers within the zone of lead and lift where such materials are generated	MT	-	-	0
3	School	Construction	School boundary wall with noise & dust mitigation and gate for 21mtr	-	123961.00	41	3447074.63
			Boundary wall with gate and noise & dust mitigation measure approach road and shrub planting	-	85789.00		
			Boundary wall without gate and noise & dust mitigation measure	-	80137.00		
			Boundary wall with noise & dust mitigation grill gate and metal interception barricade with approach road and shrub planting	-	167736.00		
4	Govt. Building		Improved boundary wall with gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	-	85789.00	2	171578

			Improved boundary wall without gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	-	80137.00	1	80137
5	Temple		Boundary wall	-	77058.00	36	2774088
			Religious shrine	-	5197.00	1	5197
6	Wildlife crossings	Construction	Reptile underpass with trap drains and via duct	Each	48456	11	533016
7	Spur Road & Junctions	Construction	Matching carriage way connectivity with SH	-	-	Refer detail cost estimate	0
(B) Mitigation cost							**48284132.63**
(C) MONITORING							
8	Air Quality	Construction	Monitoring along the road	No. of Samples	A part of the contract amount for package	At 3 locations, three(3) seasons in a year for a period of 2 years (Total 3x2x3 = 18 Samples)	0
			Monitoring at Hot mix plant and batch plant	No. of Samples		At 2 locations, three seasons in a year for 2 years (Total 2x3x2 =12 Sample)	0
		Operation	Monitoring along the road at locations where monitoring was done during constructions	Samples		At 3 locations,3 seasons in a year for a period of three years Total3x3x3=27samples	0
9	Water Quality	Construction	Drinking water quality monitoring at labour camps/ works site	Samples		At 3 location, four seasons in a year for 2 years Total 3x4x2 =24samples	0
			Monitoring along the road	Samples		At 3 locations, four seasons in a year for 2yearsTotal 3x4x2=24 Samples)	0
		Operation	Monitoring along the road at locations where monitoring was done during constructions	samples		At 3 locations four seasons in a year for two years (Total 3x4x2 = 24 samples)	0
10	Noise	Construction	Monitoring along the road	Samples		At 5 locations, three seasons in a year for 2. years (Total 5x3x2=30Samples)	0

			Monitoring at construction yard	Samples		At 3 location, three seasons in a year for 2 years (Total 3x3x2=18 Samples)	0
		Operation	Monitoring along the road at locations where monitoring was done during constructions	Samples		At 3 locations, three seasons in a year for 2 years (Total 3x3x2 =18 Samples)	0
11	Soil	Construction	Monitoring along the road	No of Samples		At 3 location, four seasons in a year for 2 years (Total 3x4x2=24 Samples)	0
			Monitoring along hot mix plant and batch plant	No of Samples		At 2 location, four seasons in a year for 2 years (Total 2x2x4=16 samples)	0
		Operation	Monitoring along the Road	No. of Samples		At 1 location four seasons in a year for 3 years (Total 1x4x3 = 12 samples)	0
12	WILD LIFE	Operation	Monitoring at underpass and trap drains	Sightings of different species		3 seasons in a year for three years 4times at 4 locations(3x3x4x4=144)	0
(C)- Monitoring Costs							Costing should be prepared by Contractor
(D) ENHANCEMENT							
13	Enhancement Sites (1)	Construction	Enhancement of spur road junctions	No.		44nos. @50496 each	2221824
14	Enhancement Sites (2)	Construction	Enhancement of Ponds/water body	No.		120nos. plants @879.88 each	105585.6
15	Enhancement Sites (3)	Construction	Access to Educational Institutes	No.		Included in the Item No.3 above	0
16	Enhancement Sites (4)	Construction	Bus Bays (Included in Engineering design)	No.		Refer Detail Cost estimate for the package	0
17	Enhancement Sites (5)	Construction	Hand pumps/stand posts	No.		136 plants, cost included in Item no.2 above.	0
18	Enhancement Sites (6)	Construction	Corridor camouflage	No.		-	0

19	Enhancement Sites (7)	Construction	Stone Quarry	No.		Not located along the corridor	0
20	Enhancement Sites (8)	Construction	Borrow area for GSB & Murrom and Top soil cum over burden dumps	Ha.		Not located along the corridor except the portions between Fakirpur to Anandapur	0
21	Enhancement Sites (9)	Construction	Abandoned road	No.		-	0
(D)- Enhancement							**2327409.6**

Table – 5.3

Environmental Budget

Sl. No.	Description of Item	Stage	Unit	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)	Budget allocation
1.	**Environmental Enhancement:** 1. Bund Protection by silt fencing and toe wall with stone pitching	Construction	Mtr	6683	5197	34731551	Contractor
	2. Spillway for water bodies		Nos.	3	60790	182370	
	3. Bathing Ghat for community		Nos.	3	97736	293208	
	4. Water bodies and Ponds provided with Plantation of Tree		Nos.	120nos. trees	879.87	105585	
	5. Avenue Planting with brush wood fencing around browsable plants		KM	38	351950	13374100	OWD through SHG /NGO
	6. Use of Demolition wastes a) Disposal of surplus excavated materials and demolition wastes for embankments, back fills, filter material, filling of ditches, embankment of drainage systems along the road and site enhancement plantation and Haulage road		Cum	526929	-	0	Contractor
	b) Flood and cyclone shelters 19nos.		Cum	200000	3.00	600000	OWD through SHG /NGO
	7. Provision of new a) Hand pumps		Nos.	72122	68	4904296	OWD through RWSS & PHD
	b) Water taps		Nos.	53147	17	903499	
	c) Sumps (compensation)		Nos.	-	-	0	OWD through Revenue Deptt.
	d) Well with sump (compensation)		Nos.	-	-	0	
	8. Restoration of degraded sites, degraded forest and abandoned quarries & borrow areas		Area	-	-	0	Forest Department /SHG
	9. Repair and restoration of crematoriums. Tube well platforms, temples and mandaps, schools on the edge of ROW and piece meal basis		Nos.	-	-	0	Local Gram panchayat administration
	10. Cost of Plantation on either side of wildlife movement as corridor camouflage cover		Nos.	-	-	0	OWD through SHG /NGO

	11. Signage for wildlife movement		Nos.	-	-	0	Contractor
	12. Reptile underpass connected to Trap drains including cost of Pipe culvert and Trap drains		Nos.	48456	11	533016	
	13. Cost for Garbage collection bins centers at commercial locations and small towns		Nos.	-	-	0	
	14. Haulage Road and its maintenance		-	-	-	492800	
	15. Site enhancement proposed at Spur road Junctions (Y & T junction)		Nos.	50496	44	2221824	
	16. Mitigation measures for Schools, colleges & Hostels		Nos.	-	41	3447074.63	
	17. Compensation for Schools		Nos.	-	-	0	OWD through Revenue Deptt.
	18. Mitigation measures for Temples		Nos.	77058	36	2774088	Contractor
	19. Compensation for Temple		Nos.	-	-	0	OWD through NGO & Revenue Deptt.
	20. Religious Shrine		Nos.	5197	1	5197	Contractor
	21. Mitigation measure for Hospital		Nos.	-	6	547254	
	22. Mitigation measures for Burial ground		Nos.	-	-	0	
	23. Mitigation measures for Govt. buildings		Nos.	-	3	251715	
	24. Compensation for Govt. buildings		Nos.	-	-	0	OWD through Revenue Deptt.
	25. Oil & Grease separator with soak pit at Toll Plaza and Truck lay bye		Nos.	129059	2	258118	Contractor
	26. Secondary slope protection in embankments \cut & fill location at the base of retaining walls		Nos.	-	-	0	OWD through SHG /NGO
	27. Gene bank nursery for developing rooted cuttings /seedlings /root coppices /off sets of existing vegetation for relocation on abandoned road and site enhancement locations		Nos.	-	-	0	OWD (EMU)
	28. Additional Provision for survey demarcation, pillar posting, preparation of map and enumeration of growing stock, blazing and marking on forest land		Area	-	-	0	PIU of OWD

	proposed to be acquired						
	29. Drainage at streams, rivers and affected natural water courses	Construction	Mtr	To be developed along the corridor either side as a replacement, where existing channel is getting buried by using surplus excavated and demolition wastes within initial lead and lift.		0	Contractor
	30. Cost of entry level intervention measures to prevent man animal conflict including cost of seeds, plants, graft, fertilizer and pesticides	Pre-construction	-	-	-	0	
	31. Net Approximate value of forest land to be diverted		Area	-	-	0	CAMPA
	32. Compensatory aforestation to be carried out over equivalent non forest land, free from encumbrances and adjacent to existing forest boundary earmarked for declaration as DPF by Govt. of Orissa.		Area	-	-	0	
	33. Joint enumeration of Avenue trees and trees on private land		Nos.	2.40	6747	16192.8	PIU of OWD
	34. Bioengineering slope protection measures on embankment, hill cutting and filling areas – a) Agro net mulch with planting	Construction	Sqm	-	-	0	Contractor
	b) Overhead garland drain on hill cutting		Mtr	-	-	0	
	c) Slope drain across & along the contour		Mtr	-	-	0	
	d) Gabion cascade		Nos.	-	-	0	
2.	Silt Fencing and Encapsulation	Construction	Covered in the contract			0	Contractor
3.	Noise Barrier (Raising of existing brick wall/ with foundation)		Cum	-	-	0	Contractor
4.	Diversion of water courses	Construction	Covered in contract rates			0	Contractor
5.	Dust Suppression	Construction	Covered in contract rates			0	Contractor
	Sub Total					**65641888.43**	
6.	Pollution Monitoring					0	

6.1.	Air Quality Monitoring for SPM, RPM, SO2, Nox and CO for summer, winter and post monsoon (1 sample per season for 2 years)	Construction	Number	6		0	Contractor, SC and over seen by EMU
6.2.	Air Quality Monitoring for SPM,RPM, SO2, Nox and CO for summer, and winter 1 sample per season for 3 seasons per year at 2 locations for 2 years at hot mix and batch mix plant sites (2x3x2)	Construction	Number	12		0	Contractor, SC and over seen by EMU
6.3	Air Quality Monitoring for SPM, RPM, SO2, Nox and CO for summer, winter and post monsoon @1 sample per season for 3 seasons per year for 3 years at 3 locations 3x3x3	Operation	Number	27	300	8100	* EMU of OSRP
6.4.	Water Quality Drinking water quality monitoring at labour camps/ works site, at 3 location, four seasons in a year for 2 years Total 3x4x2 =24samples	Construction	Number	24		0	Contractor, SC and over seen by EMU
	Water Monitoring along the road for use in construction at all construction sites for 2 years as an when necessary to ensure the quality of water used in construction as frequently as required		Number	As would be required in the field of activity	A part of contract package	0	Contractor and SC and over seen by EMU
6.5.	Water Monitoring along the road at locations where monitoring was done during Pre –constructions at 3 locations four seasons in a year for two years (Total 3x4x2 = 24 samples)	Operation	Number	24	300	7200	* EMU,OSRP
6.6.	Soil Monitoring along the road At 3 location, four seasons in a year for 2 years (Total 3x4x2=24 Samples)	Construction	Number	24		0	Contractor and SC and over seen by EMU
	Monitoring along hot mix plant and batch plant At 2 location, four seasons in a year for 2 years (Total 2x2x4=16 samples)			16		0	
6.7.	Soil Monitoring along the Road At 1 location four seasons in a year for 3 years (Total 1x4x3 = 12 samples)	Operation	Number	12	1000	12000	*EMU,OSRP
6.8.	Monitoring of Noise Levels	Construction and operation	Monitored by Department using the Instrument Purchased under the Project				
Sub Total						**27300**	
Total Budget						**65669188.43 or 6.56crore**	

* Note – The funds to be spent during post operation monitoring activities by the OWD (EMU Unit of OWD) shall be met out of contingent expenses of the project.

FRAMEWORK 1

Forest Land Diversion, Compensatory Afforestation and Avenue Plantation

Forest Land Diversion for Executing Works under the Project

The PIU/OWD under the provisions of the Forest (Conservation) Act, 1980 will submit a forest land diversion proposal in the prescribed format through the State Forest Department to the Regional Office of the Ministry of Environment and Forests, Govt. of India. The Regional Office of MoEF is the competent authority to dispose of such proposals irrespective of the area involved. All other stipulations provided in the EMP under the pre-construction stage shall be adhered to.

While issuing such approvals, the Regional Office may stipulate several conditions, which are to be implemented under the Project. The PIU/OWD will implement, co-ordinate and supervise (as the need be) all actions that fulfill the conditions laid down by MoEF within a time bound programme. Periodic reporting (quarterly) and documentation as agreed under the project shall be the responsibility of PIU/OWD.

Compensatory Afforestation

Compensatory afforestation sites shall be decided in consultation with the District Collector and a suitable map of the area containing the north, south, east and west boundary features, plot numbers along with the plot number of the proposed non-forest land identified for compensatory aforestation on a 1:4000 scale sketch shall be prepared. The Department of Forests, GoO will thereafter prepare afforestation scheme providing therein details of work schedule, the cost structure for implementing 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.

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. Spacing for planting shall be in accordance to the details in **Annexure – XXXVII.**

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 Browsable	1.8	2	2.5	3	3
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
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 along 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 should 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 violence 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 (GI barbed wire fencing with RCC fence posts and 6 strands of barbed wire) to prevent damage by herbivores animals. Wherever possible live-hedges may be provided, particularly in stretches near sensitive receptors such as schools, colleges, hospitals etc to act as dust filters.

During pre-construction phase, 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 would be encouraged for protection and maintenance of such plantation carried out under the project.

FRAMEWORK 2

Site Clearance - 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 PIU, Local Range Staff of Forest Dept., local divisional field staffs of Orissa Forest Development Corporation Ltd.. 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 BH 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 - hollow, sound /unsound (H/S/D).
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 cutaway 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.	D
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.	D
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.	D
7.	If the trunk is split, half burnt or half cut and removed.	D

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 that required for diversion for traffic at the selected/identified locations. Other than these trees, other natural growth to be cleared within hilly and forested track shall be recorded in the same format with specific chainage details.

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., PIU 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 PIU 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 PIU/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 PIU/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 PIU/OWD after taking stock of trees to be felled. The same will be examined by the PIU/OWD prior to approval/sanction and release of funds. Where such funds are not released by PIU/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 PIU/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 PIU/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 PIU/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/PIU, 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 PIU/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 PIU/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 PIU/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 PIU/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 PIU/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 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/PIU 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/PIU. 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/PIU 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/PIU 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 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 Soil	Actions required for Rehabilitation
(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/PIU.

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, PIU/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 PIU/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 PIU/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 PIU/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 PIU/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 PIU/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/PIU.

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

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

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.

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**

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**

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.)**

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**

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.

FRAMEWORK 7

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.

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 PIU, 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/PIU, 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/PIU 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.

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											
						$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$	$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$				

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	**Checked**	**Approved**
Signature…….	Signature…….	Signature…….
Name……...	Name……...	Name……...
Designation……..		
Contractor	Environmental Engineer. Construction Supervision Consultant	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											
						$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$	$L_{\text{day equivalent}}$ $L_{\text{night equivalent}}$ $L_{\text{equivalent}}$				

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

Summary of Trees Affected (to be cut) within the Corridor of Impact (SH-9)

Sl No	Chainage		Trees to be Removed			Trees to be Retained		
	From	To	Left	Right	Total	Left	Right	Total
1	0.000	1.000	11	14	25	0	0	0
2	1.000	2.000	43	14	57	21	0	21
3	2.000	3.000	64	80	144	7	0	7
4	3.000	4.000	49	32	81	30	2	32
5	4.000	5.000	16	26	42	8	4	12
6	5.000	6.000	52	38	90	22	0	22
7	6.000	7.000	71	51	122	1	16	17
8	7.000	8.000	32	41	73	1	2	3
9	8.000	9.000	31	42	73	25	9	34
10	9.000	10.000	46	51	97	8	0	8
11	10.000	11.000	113	132	245	2	2	4
12	11.000	12.000	110	83	193	4	2	6
13	12.000	13.000	28	31	59	2	0	2
14	13.000	14.000	75	64	139	9	4	13
15	14.000	15.000	3	1	4	0	1	1
16	15.000	16.000	1	5	6	2	0	2
17	16.000	17.000	8	6	14	2	1	3
18	17.000	18.000	20	22	42	0	0	0
19	18.000	19.000	57	65	122	1	4	5
20	19.000	20.000	44	34	78	1	1	2
21	20.000	21.000	98	61	159	2	3	5
22	21.000	22.000	91	62	153	8	4	12
23	22.000	23.000	115	63	178	18	9	27
24	23.000	24.000	118	93	211	19	7	26
25	24.000	25.000	63	46	109	4	5	9
26	25.000	26.000	7	10	17	2	1	3
27	26.000	27.000	25	7	32	2	0	2
28	27.000	28.000	43	23	66	3	4	7
29	28.000	29.000	4	5	9	0	3	3
30	29.000	30.000	33	12	45	8	8	16
31	30.000	31.000	49	7	56	8	4	12
32	31.000	32.000	19	5	24	1	5	6
33	32.000	33.000	5	2	7	6	0	6
34	33.000	34.000	6	12	18	3	1	4
35	34.000	35.000	1	2	3	0	0	0
36	35.000	36.000	1	1	2	0	0	0
37	36.000	37.000	31	10	41	2	1	3
38	37.000	38.000	4	5	9	0	0	0

39	38.000	39.000	56	10	66	38	2	40
40	39.000	40.000	25	30	55	2	0	2
41	40.000	41.100	61	125	186	13	6	19
42	41.000	42.200	48	30	78	14	4	18
43	42.000	43.300	67	48	115	7	15	22
44	43.000	44.400	31	47	78	21	10	31
45	44.000	45.500	92	66	158	10	3	13
Total			**1967**	**1614**	**3581**	**337**	**143**	**480**
SH-53								
1	0.000	1.000	101	35	136	72	2	74
2	1.000	2.000	15	64	79	86	0	86
3	2.000	3.000	14	2	16	1	0	1
4	3.000	4.000	13	19	32	1	0	1
5	4.000	5.000	53	26	79	17	1	18
6	5.000	6.000	53	11	64	30	1	31
7	6.000	7.000	10	33	43	1	17	18
8	7.000	8.000	20	20	40	0	8	8
9	8.000	9.000	29	15	44	0	5	5
10	9.000	10.000	13	22	35	17	14	31
11	10.000	11.000	111	95	206	18	15	33
12	11.000	12.000	10	20	30	4	6	10
13	12.000	13.000	78	90	168	9	0	9
14	13.000	14.000	21	17	38	0	0	0
15	14.000	15.000	48	57	105	0	0	0
16	15.000	16.000	13	25	38	0	0	0
17	16.000	17.000	24	36	60	0	1	1
18	17.000	18.000	16	16	32	0	1	1
19	18.000	19.000	20	41	61	0	0	0
20	19.000	20.000	12	20	32	0	1	1
21	20.000	21.000	21	14	35	10	0	10
22	21.000	22.000	52	73	125	0	5	5
23	22.000	23.000	12	16	28	15	3	18
24	23.000	24.000	3	7	10	16	0	16
25	24.000	25.000	11	25	36	0	0	0
26	25.000	26.000	7	3	10	1	1	2
27	26.000	27.000	9	22	31	0	10	10
28	27.000	28.000	27	40	67	0	0	0
29	28.000	29.000	24	20	44	0	2	2
30	29.000	30.000	23	22	45	0	2	2
31	30.000	31.000	27	13	40	1	0	1

32	31.000	32.000	38	34	72	0	1	1
33	32.000	33.000	9	30	39	0	15	15
34	33.000	34.000	50	70	120	0	3	3
35	34.000	35.000	57	45	102	0	1	1
36	35.000	36.000	34	18	52	1	3	4
37	36.000	37.000	18	16	34	3	5	8
38	37.000	38.000	19	16	35	12	3	15
39	38.000	39.000	42	11	53	36	0	36
40	39.000	40.000	27	25	52	0	0	0
41	40.000	41.100	37	33	70	0	0	0
42	41.000	42.200	12	13	25	0	0	0
43	42.000	43.300	7	0	7	0	3	3
44	43.000	44.400	1	1	2	0	7	7
45	44.000	45.500	1	3	4	0	2	2
46	45.000	46.600	9	10	19	0	1	1
47	46.000	47.700	17	32	49	0	9	9
48	47.000	48.800	43	57	100	1	1	2
49	48.000	49.900	97	54	151	5	8	13
50	49.000	50.000	71	27	98	4	4	8
Total			**1479**	**1414**	**2893**	**361**	**161**	**522**

Annexure – II

Space Available for Avenue Plantation (Bhadrak- Chandbali) SH-9

Sl. No.	From Chainage	To Chainage	Location Left / Right	Total length available for plantation in km
1	0.580	0.940	Left	0.360
2	1.000	3.000	Left	2.000
3	3.320	3.700	Left	0.380
4	4.400	4.800	Left	0.400
5	4.840	5.100	Left	0.260
6	5.850	6.000	Left	0.150
7	6.100	6.300	Left	0.200
8	6.650	8.600	Left	1.950
9	9.000	9.200	Left	0.200
10	9.450	9.600	Left	0.150
11	10.250	11.400	Left	1.150
12	13.400	13.820	Left	0.420
13	14.300	15.800	Left	1.500
14	18.500	19.000	Left	0.500
15	19.200	20.100	Left	0.900
16	21.500	21.600	Left	0.100
17	22.000	22.300	Left	0.300
18	22.370	23.300	Left	0.930
19	23.400	23.600	Left	0.200
20	24.000	24.100	Left	0.100
21	25.100	25.750	Left	0.650
22	27.150	27.500	Left	0.350
23	30.870	31.300	Left	0.430
24	32.200	32.500	Left	0.300
25	33.250	33.600	Left	0.350
26	37.400	37.400	Left	0.000
27	41.600	41.750	Left	0.150
28	41.830	42.000	Left	0.170
29	42.900	43.120	Left	0.220
30	43.300	43.860	Left	0.560
31	45.900	46.200	Left	0.300
32	47.400	48.600	Left	1.200
33	48.800	49.200	Left	0.400
34	50.500	51.200	Left	0.700
Total				**17.930**
35	0.530	0.600	Right	0.070
36	1.420	1.900	Right	0.480
37	5.300	5.400	Right	0.100
38	6.100	6.300	Right	0.200
39	6.650	9.000	Right	2.350
40	10.250	11.200	Right	0.950

41	12.900	13.900	Right	1.000
42	14.300	14.940	Right	0.640
43	15.000	16.100	Right	1.100
44	18.500	19.000	Right	0.500
45	19.200	20.100	Right	0.900
46	21.500	21.600	Right	0.100
47	22.280	22.700	Right	0.420
48	23.000	23.600	Right	0.600
49	25.100	25.800	Right	0.700
50	27.200	28.000	Right	0.800
51	30.800	31.200	Right	0.400
52	31.500	32.200	Right	0.700
53	38.300	38.800	Right	0.500
54	38.950	39.100	Right	0.150
55	40.600	41.300	Right	0.700
56	42.900	43.200	Right	0.300
57	44.000	44.600	Right	0.600
58	45.400	45.900	Right	0.500
59	46.550	47.550	Right	1.000
Total				**15.760**

Space Available for Avenue Plantation (Bhadrak- Anandapur) SH-53

Sl No.	From Chainage	To Chainage	Location Left / Right	Total length available for plantation in km
1	0.900	1.800	Left	0.900
2	4.230	7.600	Left	3.370
3	8.850	10.000	Left	1.150
4	10.100	10.900	Left	0.800
5	11.100	11.300	Left	0.200
6	11.900	12.400	Left	0.500
7	12.700	13.300	Left	0.600
8	13.850	14.400	Left	0.550
9	14.800	16.670	Left	1.870
10	20.800	23.100	Left	2.300
11	23.600	24.000	Left	0.400
12	24.330	25.330	Left	1.000
13	26.100	27.100	Left	1.000
14	32.400	32.750	Left	0.350
15	33.100	33.650	Left	0.550
16	34.100	35.000	Left	0.900
17	35.500	35.600	Left	0.100
18	36.000	36.500	Left	0.500
19	37.100	37.400	Left	0.300
20	38.100	39.750	Left	1.650
21	40.100	40.400	Left	0.300

22	43.950	44.300	Left	0.350
23	45.850	46.100	Left	0.250
24	46.250	46.400	Left	0.150
25	47.100	47.300	Left	0.200
26	49.000	49.400	Left	0.400
Total				**20.64**
26	0.200	0.450	Right	0.250
27	0.820	1.800	Right	0.980
28	4.230	7.600	Right	3.370
29	8.850	9.900	Right	1.050
30	10.100	11.300	Right	1.200
31	12.000	12.800	Right	0.800
32	12.900	13.300	Right	0.400
33	13.850	15.300	Right	1.450
34	16.000	16.670	Right	0.670
35	20.700	23.000	Right	2.300
36	23.400	24.000	Right	0.600
37	24.700	25.450	Right	0.750
38	26.600	27.100	Right	0.500
39	32.400	32.750	Right	0.350
40	33.100	33.650	Right	0.550
41	34.100	35.050	Right	0.950
42	35.500	35.800	Right	0.300
43	36.200	37.100	Right	0.900
44	37.600	38.100	Right	0.500
45	38.600	39.900	Right	1.300
46	40.100	40.400	Right	0.300
47	45.750	46.100	Right	0.350
48	47.100	47.800	Right	0.700
Total				**20.52**

Annexure – III

Chainage wise Abandoned Road (SH-9)

Sl No	Iten	Chainage		Location	Length in Mtrs	Mitigation Measures
		From	To			
1	Abononed Road	5.690	5.800	Left	0.110	Residential Area
2	Abononed Road	6.440	6.555	Right	0.115	Residential Area
3	Abononed Road	11.900	12.100	Left	0.200	Residential Area
4	Abononed Road	12.200	12.300	Left	0.100	Residential Area
5	Abononed Road	12.320	12.600	Right	0.280	Residential Area
6	Abononed Road	41.000	41.200	Left	0.200	Residential Area

Chainage wise Abandoned Road (SH-53)

Sl No	Iten	Chainage		Location	Length in Mtrs	Mitigation Measures
		From	To			
1	Abononed Road	11.100	11.600	Right	0.500	
2	Abononed Road	17.050	17.550	Right	0.500	Tillo Bazaar Area
3	Abononed Road	42.300	44.600	Right	2.300	Anandpur Town Area

Annexure – IV

Location of the Affected Common Property Resources (Chainage-wise) (SH-9)

Sl. No.	Structure	Chainage at km	Location Left / Right	Partially affected/fully affected
1	Temple	0.03	Left	Partially
2	Temple	0.06	Right	Partially
3	Temple	0.8	Left	Partially
4	Temple	11.362	Right	Partially
5	Temple	11.928	Right	Partially
6	Temple	11.932	Right	Partially
7	Temple	13.167	Right	Partially
8	Temple	13.28	Left	Partially
9	Temple	14.583	Right	Partially
10	Religious shrine	16.245	Left	Partially
11	Temple	18.413	Right	Partially
12	Temple	19.376	Right	Partially
13	Temple	21.975	Right	Partially
14	Temple	23.64	Right	Partially
15	Temple	24.584	Right	Partially
16	Temple	26.023	Right	Partially
17	Temple	27.5	Left	Partially
18	Temple	27.746	Right	Partially
19	Temple	30.45	Left	Partially
20	Temple	31.347	Left	Partially
21	Temple	33.01	Left	Partially
22	Temple	39.81	Right	Partially
23	Temple	40	Right	Partially
24	Temple	42.577	Right	Partially
25	Temple	42.927	Right	Partially
26	Temple	43.317	Right	Partially
Hospital /Health Center				
1	Govt. Hospital	13.3	Left	Partially
2	PHC	17.13	Left	Partially
3	PHC	39.6	Left	Partially
Govt. Building				
1	Post Office	4.525	Right	Partially
2	Office Bldg.	16.355	Left	Partially
3	Police Station	17.1	Left	Partially
4	Co-Operative Bank	31.3	Left	Partially
5	Forest check gate	32.885	Left	Partially
6	Police Check Post	39.662	Right	Partially

Schools				
1	Dibyabhumi Ashram School	21	Left	Partially
2	School	22.76	Left	Partially
3	School	22.76	Right	Partially
4	School	25.2	Right	Partially
5	School	27.56	Left	Partially
6	School	29.95	Left	Partially
7	School	36.85	Left	Partially
8	School	39.3	Right	Partially
9	School	40.72	Left	Partially
10	School	41.5	Left	Partially
11	School	41.56	Left	Partially
12	School	41.8	Right	Partially
13	School	43.7	Right	Partially

(SH-53)

Sl. No.	Structure	Chainage at km	Location Left / Right	Partially affected/fully affected
1	Satsanga Bihar	0.1	Left	Partially
2	Temple	3.48	Right	Partially
3	Temple	3.75	Right	Partially
4	Temple	3.79	Left	Partially
5	Temple	3.837	Left	Partially
6	Temple	19.3	Right	Partially
7	Temple	20	Right	Partially
8	Temple	24.25	Right	Partially
9	Temple	25.87	Left	Partially
10	Temple	29.71	Left	Partially
11	Temple	40.58	Right	Partially
12	Temple	41.64	Left	Partially
13	Temple	42.3	Left	Partially

Govt. Buildings				
1	Irrigation Office	0.98	Right	Partially
2	Govt. Building	20.05	Right	Partially
3	Tahasil Office	20.22	Right	Partially
4	Govt. Building	31.71	Left	Partially
5	Govt. Building	41.3	Right	Partially
Health Center /Hospital				
1	Primary Health center	19.68	Right	Partially

2	Hatadihi Dispensary	29.25	Left	Partially
3	Primary Health center	45.8	Left	Partially
Schools				
1	ITI School	5.75	Left	Partially
2	Engineering College Barapada	8.32	Left	Partially
3	School	18	Left	Partially
4	School	18.08	Left	Partially
5	School	19.98	Right	Partially
6	Bantha Girl School	20	Left	Partially
7	School	30.2	Right	Partially
8	College	30.3	Right	Partially
9	School	34.9	Left	Partially
10	School	36.25	Left	Partially
11	School	43.9	Left	Partially
12	School	44.3	Left	Partially
13	School	44.7	Right	Partially
14	School	45.1	Right	Partially
15	School	46.975	Left	Partially

Annexure – V

Location of Drinking water sources (Tube well, Open Well & Water taps) (SH – 9)

Sl No.	Item	Chain age at km	Location L/R	Partially /Fully affected
1	Hand pump	0.148	Left	Fully
2	Hand pump	0.8	Left	Fully
3	Hand pump	3.843	Left	Fully
4	Hand pump	4.445	Left	Fully
5	Hand pump	4.53	Right	Fully
6	Hand pump	5.2	Left	Fully
7	Hand pump	5.68	Left	Fully
8	Hand pump	6.47	Left	Fully
9	Hand pump	6.938	Right	Fully
10	Hand pump	8.21	Left	Fully
11	Hand pump	8.326	Right	Fully
12	Hand pump	9.89	Left	Fully
13	Hand pump	10.06	Left	Fully
14	Hand pump	11.942	Right	Fully
15	Hand pump	12.138	Right	Fully
16	Hand pump	13.28	Left	Fully
17	Hand pump	14.1	Right	Fully
18	**Water Tap**	14.942	Right	Fully
19	**Water Tap**	16.4	Left	Fully
20	Hand pump	16.5	Left	Fully
21	**Water Tap**	17.1	Left	Fully
22	Hand pump	17.145	Left	Fully
23	Hand pump	17.33	Right	Fully
24	**Water Tap**	17.445	Left	Fully
25	Hand pump	17.68	Left	Fully
26	**Water Tap**	17.765	Left	Fully
27	Hand pump	18.38	Right	Fully
28	Hand pump	19.37	Right	Fully
29	Hand pump	20.094	Right	Fully
30	Hand pump	23.05	Right	Fully
31	**Water Tap**	25.9	Right	Fully
32	**Water Tap**	26.32	Left	Fully
33	Hand pump	26.93	Right	Fully
34	Hand pump	29.4	Left	Fully
35	Hand pump	30.4	Left	Fully
36	Hand pump	30.735	Left	Fully
37	Hand pump	31.173	Left	Fully
38	Hand pump	36.61	Left	Fully
39	Hand pump	37.18	Left	Fully
40	Hand pump	37.24	Left	Fully

(SH-53)

Sl No.	Item	Chain age at km	Location L/R	Partially /Fully affected
1	Hand pump	2.55	LEFT	Fully
2	Hand pump	2.741	LEFT	Fully
3	Hand pump	3.126	LEFT	Fully
4	Hand pump	3.41	LEFT	Fully
5	**Water Tap**	3.77	LEFT	Fully
6	Hand pump	3.847	LEFT	Fully
7	Hand pump	6.66	LEFT	Fully
8	Hand pump	8.454	RIGHT	Fully
9	Hand pump	8.562	RIGHT	Fully
10	Hand pump	8.879	RIGHT	Fully
11	Hand pump	11.564	LEFT	Fully
12	Hand pump	13.449	RIGHT	Fully
13	Hand pump	14.725	LEFT	Fully
14	Hand pump	16.338	LEFT	Fully
15	**Water Tap**	18.39	RIGHT	Fully
16	**Water Tap**	19.37	RIGHT	Fully
17	Hand pump	19.4	RIGHT	Fully
18	Hand pump	19.552	RIGHT	Fully
19	**Water Tap**	19.61	RIGHT	Fully
20	Hand pump	19.98	LEFT	Fully
21	Hand pump	20.2	LEFT	Fully
22	Hand pump	20.258	RIGHT	Fully
23	Hand pump	21.01	LEFT	**Partially**
24	Hand pump	22.423	LEFT	Fully
25	Hand pump	24.2	RIGHT	Fully
26	Hand pump	24.255	LEFT	Fully
27	Hand pump	26.016	RIGHT	Fully
28	Hand pump	26.49	RIGHT	Fully
29	Hand pump	27.16	LEFT	Fully
30	Hand pump	27.28	RIGHT	Fully
31	Hand pump	27.333	LEFT	**Partially**
32	Hand pump	29	RIGHT	Fully
33	**Water Tap**	29.052	RIGHT	Fully
34	Hand pump	29.68	RIGHT	Fully
35	Hand pump	29.834	LEFT	Fully
36	**Water Tap**	29.942	LEFT	Fully
37	**Water Tap**	30.34	LEFT	**Partially**
38	Hand pump	30.35	LEFT	Fully
39	Hand pump	31.422	LEFT	Fully

40	Hand pump	35.1	RIGHT	Fully
41	Hand pump	35.38	LEFT	Fully
42	Hand pump	35.82	RIGHT	Fully
43	**Water Tap**	40.9	LEFT	Fully
44	**Water Tap**	41.715	LEFT	Fully
45	**Water Tap**	44.9	RIGHT	Fully

Annexure – VI

Location of Waiting rooms /Passenger shed at Bus Stops /Bus Bay (SH-9)

Passenger Shed				
1	Passenger Shed	14.173	Left	Fully
2	Passenger Shed	17.317	Right	Fully
3	Passenger Shed	24.616	Right	Fully
4	Passenger Shed	26.01	Left	Fully
5	Passenger Shed	30.438	Right	Partially
6	Passenger Shed	40	Left	Fully
7	Passenger Shed	0.15	Right	Partially
8	Passenger Shed	2.8	Right	Partially
9	Passenger Shed	6.5	Right	Partially
10	Passenger Shed	12.8	Left	Partially
11	Passenger Shed	13.19	Left	Partially
12	Passenger Shed	16.25	Left	Partially
13	Passenger Shed	16.3	Right	Partially
14	Passenger Shed	16.59	Left	Partially

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Passenger Shade				
1	Passenger Shed	13.48	Left	Partially
2	Passenger Shed	14.5	Left	Fully
3	Passenger Shed	14.73	Right	Fully
4	Passenger Shed	17.6	Left	Fully
5	Passenger Shed	31.635	Right	Partially
6	Passenger Shed	35.1	Left	Partially
7	Passenger Shed	35.823	Right	Partially
8	Passenger Shed	39.84	Left	Partially
9	Passenger Shed	42.34	Left	Fully
10	Passenger Shed	44.23	Right	Partially

Annexure – VII

Location of ponds, tanks & water bodies

Bhadrak – Chandbali (SH-9)

Sl No.	Item	Chainage at km	Location Left/Right	Distance in m from centerline	Affected in m
1	Pond	1.017	R	10.0	15.0
2	Pond	2.485	L	12.9	22.0
3	Pond	2.822	R	12.9	55.0
4	**Canal**	4.424	R	12.8	1176.0
5	**Canal**	4.470	L	13.0	430.0
6	**Canal**	5.830	R	13.0	251.0
7	Pond	8.190	R	13.0	18.0
8	Pond	9.280	L	13.0	96.0
9	Pond	6.900	L	8.15	37.0
10	Pond	12.302	R	8.4	19.0
11	Pond	12.580	R	8.3	24.0
12	Pond	12.900	L	12.8	34.0
13	Pond	13.112	R	13.3	19.0
14	Pond	11.780	L	13.0	11.0
15	Pond	19.555	L	12.9	26.0
16	Pond	20.400	R	13.0	53.0
17	Pond	20.470	L	13.0	22.0
18	Pond	20.600	L	12.9	17.0
19	Pond	20.670	L	13.0	14.0
20	Pond	20.725	R	13.0	10.0
21	Pond	20.758	R	13.0	5.0
22	Pond	20.900	L	13.0	24.0
23	Pond	21.900	R	13.0	24.0
24	Pond	22.200	R	13.0	67.0
25	Pond	22.348	L	12.9	30.0
26	Pond	22.542	R	13.0	41.0
27	Pond	22.900	R	12.9	18.0
28	Pond	24.900	R	12.8	21.0
29	Pond	25.050	L	12.9	27.0
30	Pond	27.700	R	12.9	17.0
31	Pond	27.705	L	12.9	63.0
32	Pond	27.790	R	12.8	28.0
33	Pond	28.000	L	12.9	268.0
34	Pond	28.062	R	13.0	114.0
35	Pond	28.800	L	12.8	79.0

36	Pond	29.147	R	12.6	315.0
37	Pond	29.250	L	13.0	54.0
38	Pond	29.300	L	13.0	70.0
39	Pond	29.400	L	13.0	26.0
40	Pond	29.500	R	13.0	15.0
41	Pond	29.555	L	13.0	75.0
42	Pond	29.715	L	13.0	46.0
43	Pond	29.700	R	13.0	43.0
44	Pond	30.013	L	12.9	28.0
45	Pond	30.565	R	13.0	27.0
46	Pond	30.683	L	12.9	14.0
47	Pond	30.970	L	13.0	43.0
48	Pond	31.300	L	13.0	40.0
49	Pond	31.417	R	13.2	26.0
50	Pond	31.823	R	13.0	33.0
51	Pond	31.960	R	13.0	440.0
52	Pond	32.100	L	13.0	27.0
53	Pond	32.450	R	12.8	21.0
54	Pond	32.490	L	13.0	210.0
55	Pond	33.200	L	13.2	21.0
56	Pond	33.600	L	13.0	53.0
57	Pond	33.870	L	12.8	134.0
58	Pond	34.000	R	12.9	42.0
59	Pond	36.100	L	12.9	39.0
60	Pond	36.104	R	13.0	70.0
61	Pond	36.428	L	13.0	13.0
62	Pond	39.100	R	12.9	53.0
63	Pond	39.263	L	12.9	20.0
64	Pond	39.640	R	13.0	20.0
65	Pond	40.266	R	13.0	23.0
66	Pond	40.360	L	13.0	30.0
67	Pond	41.500	L	13.0	23.0
68	Pond	41.760	L	13.0	14.0
69	Pond	42.436	R	13.0	58.0
70	Pond	42.440	L	13.0	53.0
71	Pond	43.240	R	13.0	48.0
72	Pond	43.865	L	13	80.0
73	Pond	44.000	L	13	170.0

Bhadrak – Anandapur (SH-53)

Sl No.	Item	Chainage at km	Location Left/Right	Distance in m from centre line	Affected in m
1	Pond	2.448	CENTRE	-	75.0
2	Pond	2.800	RIGHT	13.0	31.0
3	Pond	6.600	LEFT	13.0	10.0
4	Pond	8.915	RIGHT	13.0	25
5	Pond	13.713	LEFT	8.0	18
6	Pond	13.737	LEFT	8.0	13
7	Pond	17.100	CENTRE	-	14.9
8	Pond	17.700	LEFT	8.0	12
9	Pond	17.740	RIGHT	11.0	3
10	Pond	19.614	RIGHT	8.0	134
11	Pond	19.665	LEFT	8.0	45
12	Pond	20.270	LEFT	8.0	81
13	Pond	20.868	LEFT	13.0	23.5
14	Pond	22.290	LEFT	13.0	9
15	Pond	26.590	RIGHT	13.0	18
16	Pond	31.484	LEFT	8.0	24
17	Pond	36.723	LEFT	13.0	40
18	Pond	37.350	LEFT	13.0	265

Annexure – VIII

Spur Road Junction (SH-9)

Sl. No.	Item	Chainage	Location Left/Right	Affected Partially/Fully
1	Spur Road	0.625	RIGHT	Fully
2	Spur Road	0.87	RIGHT	Fully
3	Spur Road	1.07	RIGHT	Fully
4	Spur Road	1.72	RIGHT	Fully
5	Spur Road	2.774	LEFT	Fully
6	Spur Road	3.32	LEFT	Fully
7	Spur Road	3.95	RIGHT	Fully
8	Spur Road	4.376	RIGHT	Fully
9	Spur Road	4.905	LEFT	Fully
10	Spur Road	5.663	RIGHT	Fully
11	Spur Road	5.821	RIGHT	Fully
12	Spur Road	5.826	LEFT	Fully
13	Spur Road	6.136	LEFT	Fully
14	Spur Road	6.381	LEFT	Fully
15	Spur Road	6.5	LEFT	Fully
16	Spur Road	7.065	RIGHT	Fully
17	Spur Road	7.558	RIGHT	Fully
18	Spur Road	7.69	RIGHT	Fully
19	Spur Road	8.135	RIGHT	Fully
20	Spur Road	8.2	RIGHT	Fully
21	Spur Road	8.235	RIGHT	Fully
22	Spur Road	9.125	LEFT	Fully
23	Spur Road	9.387	LEFT	Fully
24	Spur Road	9.976	RIGHT	Fully
25	Spur Road	10.32	RIGHT	Fully
26	Spur Road	10.446	RIGHT	Fully
27	Spur Road	10.635	LEFT	Fully
28	Spur Road	11.316	LEFT	Fully
29	Spur Road	11.586	RIGHT	Fully
30	Spur Road	11.646	RIGHT	Fully
31	Spur Road	11.847	LEFT	Fully
32	Spur Road	12.033	RIGHT -	Fully
33	Spur Road	12.226	LEFT	Fully
34	Spur Road	12.646	LEFT	Fully
35	Spur Road	12.68	RIGHT -	Fully
36	Spur Road	12.97	LEFT	Fully
37	Spur Road	13.08	LEFT	Fully
38	Spur Road	13.3	LEFT	Fully
39	Spur Road	13.35	LEFT	Fully
40	Spur Road	13.97	LEFT	Fully
41	Spur Road	14.147	LEFT	Fully
42	Spur Road	14.16	RIGHT -	Fully
43	Spur Road	14.224	LEFT	Fully

44	Spur Road	14.542	RIGHT	Fully
45	Spur Road	16.41	RIGHT	Fully
46	Spur Road	16.46	LEFT	Fully
47	Spur Road	16.75	RIGHT	Fully
48	Spur Road	17.176	RIGHT	Fully
49	Spur Road	17.246	LEFT	Fully
50	Spur Road	17.67	RIGHT	Fully
51	Spur Road	18.015	RIGHT	Fully
52	Spur Road	18.415	RIGHT	Fully
53	Spur Road	18.44	LEFT	Fully
54	Spur Road	18.594	RIGHT	Fully
55	Spur Road	19.044	RIGHT	Fully
56	Spur Road	19.37	RIGHT	Fully
57	Spur Road	20.155	LEFT	Fully
58	Spur Road	20.156	RIGHT	Fully
59	Spur Road	20.818	RIGHT	Fully
60	Spur Road	21.063	RIGHT	Fully
61	Spur Road	21.393	RIGHT	Fully
62	Spur Road	21.413	LEFT	Fully
63	Spur Road	21.437	RIGHT	Fully
64	Spur Road	21.83	RIGHT	Fully
65	Spur Road	21.988	RIGHT	Fully
66	Spur Road	22.454	RIGHT	Fully
67	Spur Road	22.536	RIGHT	Fully
68	Spur Road	22.75	RIGHT	Fully
69	Spur Road	22.877	LEFT	Fully
70	Spur Road	22.878	RIGHT	Fully
71	Spur Road	23.105	RIGHT	Fully
72	Spur Road	23.231	LEFT	Fully
73	Spur Road	23.246	RIGHT	Fully
74	Spur Road	23.61	RIGHT	Fully
75	Spur Road	23.68	RIGHT	Fully
76	Spur Road	23.94	RIGHT	Fully
77	Spur Road	24.383	RIGHT	Fully
78	Spur Road	24.595	LEFT	Fully
79	Spur Road	24.595	RIGHT	Fully
80	Spur Road	24.9	RIGHT	Fully
81	Spur Road	25.147	RIGHT	Fully
82	Spur Road	25.261	RIGHT	Fully
83	Spur Road	25.977	LEFT	Fully
84	Spur Road	26.13	RIGHT	Fully
85	Spur Road	26.232	LEFT	Fully
86	Spur Road	26.862	LEFT	Fully
87	Spur Road	26.867	RIGHT	Fully
88	Spur Road	27.494	LEFT	Fully
89	Spur Road	27.537	RIGHT	Fully
90	Spur Road	27.673	LEFT	Fully
91	Spur Road	27.895	LEFT	Fully

92	Spur Road	28.67	RIGHT	Fully
93	Spur Road	29.404	LEFT	Fully
94	Spur Road	29.467	LEFT	Fully
95	Spur Road	30.38	LEFT	Fully
96	Spur Road	31.794	LEFT	Fully
97	Spur Road	32.017	LEFT	Fully
98	Spur Road	32.171	LEFT	Fully
99	Spur Road	33.118	RIGHT	Fully
100	Spur Road	33.18	LEFT	Fully
101	Spur Road	33.55	RIGHT	Fully
102	Spur Road	33.99	LEFT	Fully
103	Spur Road	36.069	LEFT	Fully
104	Spur Road	36.19	RIGHT	Fully
105	Spur Road	36.2	LEFT	Fully
106	Spur Road	36.234	LEFT	Fully
107	Spur Road	37.247	LEFT	Fully
108	Spur Road	38.265	LEFT	Fully
109	Spur Road	39.1	LEFT	Fully
110	Spur Road	39.185	RIGHT	Fully
111	Spur Road	39.32	RIGHT	Fully
112	Spur Road	39.583	RIGHT	Fully
113	Spur Road	39.874	LEFT	Fully
114	Spur Road	39.995	RIGHT	Fully
115	Spur Road	40.266	RIGHT	Fully
116	Spur Road	40.462	RIGHT	Fully
117	Spur Road	40.543	RIGHT	Fully
118	Spur Road	40.88	RIGHT	Fully
119	Spur Road	41.7	LEFT	Fully
120	Spur Road	41.817	RIGHT	Fully
121	Spur Road	42.278	RIGHT	Fully
122	Spur Road	42.848	LEFT	Fully
123	Spur Road	43.169	RIGHT	Fully
124	Spur Road	43.505	RIGHT	Fully
125	Spur Road	44.125	RIGHT	Fully
126	Spur Road	44.426	RIGHT	Fully

Spur Road Junction (SH-53)

Sl. No.	Item	Chainage	Location Left/Right	Affected Partially/Fully
1	Spur Road	0.26	Right	Fully
2	Spur Road	0.365	Right	Fully
3	Spur Road	0.39	LEFT	Fully
4	Spur Road	0.568	LEFT	Fully
5	Spur Road	0.928	LEFT	Fully
6	Spur Road	1.352	Right	Fully
7	Spur Road	1.355	LEFT	Fully
8	Spur Road	1.635	Right	Fully
9	Spur Road	1.716	LEFT	Fully

10	Spur Road	1.79	Right	Fully
11	Spur Road	1.845	LEFT	Fully
12	Spur Road	2.14	LEFT	Fully
13	Spur Road	2.273	LEFT	Fully
14	Spur Road	2.428	Right	Fully
15	Spur Road	2.843	LEFT	Fully
16	Spur Road	3.327	Right	Fully
17	Spur Road	3.357	LEFT	Fully
18	Spur Road	3.585	Right	Fully
19	Spur Road	4.415	Right	Fully
20	Spur Road	4.417	LEFT	Fully
21	Spur Road	5.977	Right	Fully
22	Spur Road	6.675	LEFT	Fully
23	Spur Road	7.67	Right	Fully
24	Spur Road	7.75	LEFT	Fully
25	Spur Road	7.79	Right	Fully
26	Spur Road	8.465	Right	Fully
27	Spur Road	8.68	LEFT	Fully
28	Spur Road	8.73	LEFT	Fully
29	Spur Road	8.875	LEFT	Fully
30	Spur Road	9.6	Right	Fully
31	Spur Road	10.018	LEFT	Fully
32	Spur Road	10.02	Right	Fully
33	Spur Road	10.046	LEFT	Fully
34	Spur Road	10.78	LEFT	Fully
35	Spur Road	11.6	LEFT	Fully
36	Spur Road	11.71	LEFT	Fully
37	Spur Road	11.72	Right	Fully
38	Spur Road	11.795	LEFT	Fully
39	Spur Road	11.795	Right	Fully
40	Spur Road	12.49	Right	Fully
41	Spur Road	12.73	LEFT	Fully
42	Spur Road	13.08	LEFT	Fully
43	Spur Road	13.46	LEFT	Fully
44	Spur Road	13.73	LEFT	Fully
45	Spur Road	13.78	LEFT	Fully
46	Spur Road	14.525	LEFT	Fully
47	Spur Road	14.735	Right	Fully
48	Spur Road	16.33	LEFT	Fully
49	Spur Road	17.015	Right	Fully
50	Spur Road	17.62	LEFT	Fully
51	Spur Road	18.14	Right	Fully
52	Spur Road	18.4	Right	Fully
53	Spur Road	18.86	LEFT	Fully
54	Spur Road	18.865	Right	Fully
55	Spur Road	19.4	LEFT	Fully
56	Spur Road	19.45	LEFT	Fully

57	Spur Road	19.552	LEFT	Fully
58	Spur Road	19.552	Right	Fully
59	Spur Road	20.005	LEFT	Fully
60	Spur Road	20.445	Right	Fully
61	Spur Road	21.027	LEFT	Fully
62	Spur Road	21.885	LEFT	Fully
63	Spur Road	22.43	LEFT	Fully
64	Spur Road	22.82	Right	Fully
65	Spur Road	24.2	Right	Fully
66	Spur Road	24.25	LEFT	Fully
67	Spur Road	25.7	Right	Fully
68	Spur Road	26.58	Right	Fully
69	Spur Road	26.73	Right	Fully
70	Spur Road	26.98	Right	Fully
71	Spur Road	27.29	LEFT	Fully
72	Spur Road	27.311	Right	Fully
73	Spur Road	27.957	Right	Fully
74	Spur Road	28.44	Right	Fully
75	Spur Road	29.115	LEFT	Fully
76	Spur Road	29.585	Right	Fully
77	Spur Road	29.61	LEFT	Fully
78	Spur Road	29.85	Right	Fully
79	Spur Road	30.225	LEFT	Fully
80	Spur Road	30.245	Right	Fully
81	Spur Road	30.335	LEFT	Fully
82	Spur Road	31.085	LEFT	Fully
83	Spur Road	31.085	Right	Fully
84	Spur Road	31.476	LEFT	Fully
85	Spur Road	31.58	Right	Fully
86	Spur Road	32.036	LEFT	Fully
87	Spur Road	32.89	LEFT	Fully
88	Spur Road	32.89	Right	Fully
89	Spur Road	32.985	Right	Fully
90	Spur Road	33.895	Right	Fully
91	Spur Road	33.95	LEFT	Fully
92	Spur Road	35.1	Right	Fully
93	Spur Road	35.36	LEFT	Fully
94	Spur Road	35.45	LEFT	Fully
95	Spur Road	35.81	Right	Fully
96	Spur Road	36.57	LEFT	Fully
97	Spur Road	37.67	Right	Fully
98	Spur Road	38.54	Right	Fully
99	Spur Road	38.62	LEFT	Fully
100	Spur Road	39.87	LEFT	Fully
101	Spur Road	39.975	Right	Fully
102	Spur Road	40.045	LEFT	Fully
103	Spur Road	40.565	LEFT	Fully

104	Spur Road	40.73	LEFT	Fully
105	Spur Road	41.855	LEFT	Fully
106	Spur Road	43.97	Right	Fully
107	Spur Road	44.028	Right	Fully
108	Spur Road	44.11	Right	Fully
109	Spur Road	44.218	Right	Fully
110	Spur Road	44.63	LEFT	Fully
111	Spur Road	44.765	Right	Fully
112	Spur Road	44.907	Right	Fully
113	Spur Road	45.325	LEFT	Fully
114	Spur Road	46.4	Right	Fully
115	Spur Road	47.01	Right	Fully

Annexure – IX

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 – X

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 – XI

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 – XII

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

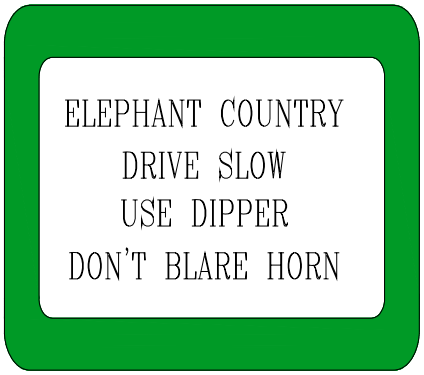
6. INFORM FOREST OFFICE
   IF ANY WILDLIFE IS IN DISTRESS

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

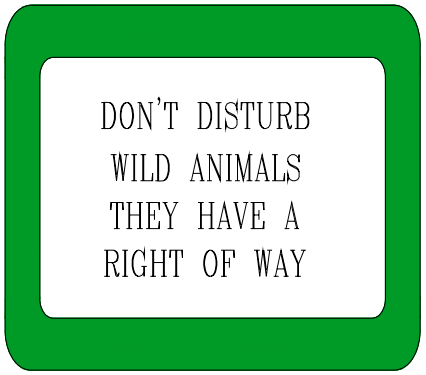
8. WILDLIFE CRIME AND ABETMENT ARE PUNISHABLE
   – AVOID IT.

SP-29

SP-30



SP-31



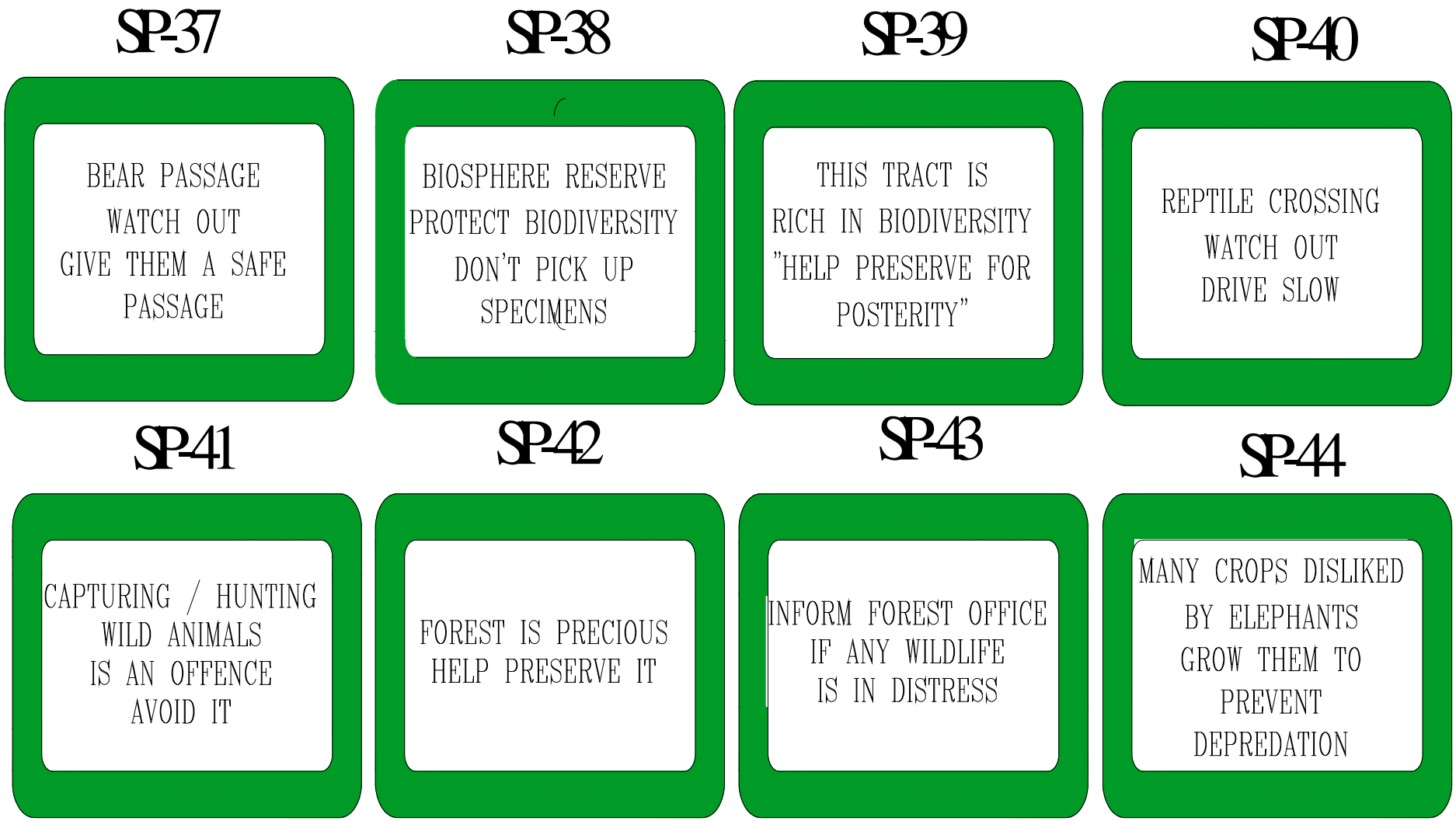
SP-32

SP-33

SP-34

SP-35

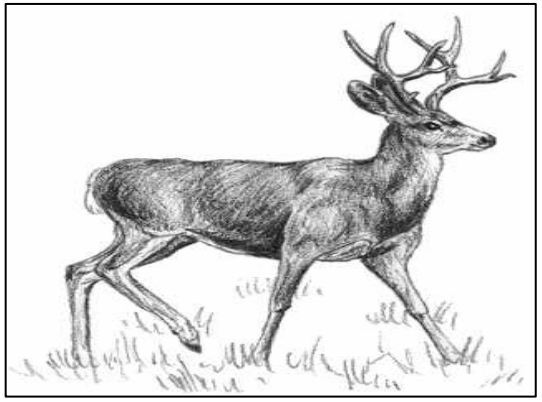
SP-36


SP-37
BEAR PASSAGE
WATCH OUT
GIVE THEM A SAFE
PASSAGE
SP-38
BIOSPHERE RESERVE
PROTECT BIODIVERSITY
DON'T PICK UP
SPECIMENS
SP-39
THIS TRACT IS
RICH IN BIODIVERSITY
"HELP PRESERVE FOR
POSTERITY"
SP-40
REPTILE CROSSING
WATCH OUT
DRIVE SLOW
SP-41
CAPTURING / HUNTING
WILD ANIMALS
IS AN OFFENCE
AVOID IT
SP-42
FOREST IS PRECIOUS
HELP PRESERVE IT
SP-43
INFORM FOREST OFFICE
IF ANY WILDLIFE
IS IN DISTRESS
SP-44
MANY CROPS DISLIKED
BY ELEPHANTS
GROW THEM TO
PREVENT
DEPREDATION

SP – 46

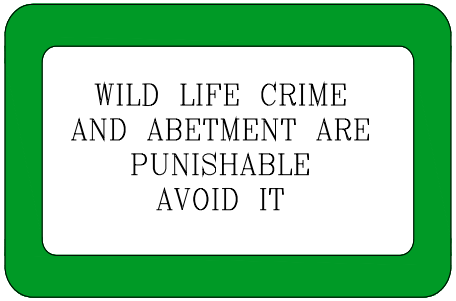
SP – 47

SP – 48



SP – 49

SP-45



1. jÉú iõelY @ k c]ýùe iZKðZûe ij ~ûZûdûZ Ke«ê ö
Zúaâ @ûùfûK I gŸ aýajûe 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\ìhY 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\ìhY \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 iÚû^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 - XXX

BIOENGINEERING METHODS FOR SLOPE PROTECTION ON EMBANKMENTS,WATER BODIES,RIVER BANKS AND HILL CUTTINGS (per 100 Rmts)

SL No.	ITEM	Unit	Quantity	Rate	Cost
1	Preparation of a planter'bar containing four pointed projections as per design to facilitate 5x 5mm size,10mm deep holes at 30cm interval on the ground including cost of material,fabrication and delivery	L S	1.00	900.00	900.00
	a) Labour				
	Mate	Day	1.40	80.00	112.00
	Mazdoor	Day	10.00	70.00	700.00
	b)Machinary				
	Water tanker 6KL capacity	hour	0.50	200.00	100.00
	c)Material				
	Cost of grass slips/seed lings rooted cuttings of vetivers,sachhrum,citranalla,sabai,bridhearak, periwinkle,tephrosilia	L S	3 months old rooted slips/cuttings**(330 nos)**	3.00	990.00
	Supply of farmyard manure	cum	2.00	50.00	100.00
	Chloropyrophos Pesticide	kg	0.05	350.00	17.50
	Fungicide	kg	0.05	350.00	17.50
	Cost of water	KL	3.00	10.00	30.00
	Total				**2967.00**
	Overhead charges 8%				**237.36**
	Contractor's profit 10%				**320.44**
	Total cost				**3524.80**
			Cost per Rmt		**35.25**
2	Maintainance including casualty replacement,application of pesticide,fungicide, and liquid manure at fortnight interval watering thrice a week upto break up off mansoon for 45 days				
	a) Labour				
	Mate	Day	3.00	80.00	240.00
	Mazdoor	Day	30.00	70.00	2100.00
	b)Machinary				
	Water tanker 6KL capacity	hour	5.00	2.00	10.00
	c) Material				
	Liquid manure	Litre	6.00	12.00	72.00
	Pesticide	Kg	0.50	350.00	175.00
	Fungicide	Kg	0.25	350.00	87.50
	Cost of water	KL	30.00	10.00	300.00
	Cost of plants(10% casualty)	Nos	4.00	3.00	12.00
	Total				**2996.50**
	Overhead charges 8%				**239.72**
	Contractor's profit 10%				**323.62**
	Total cost				**3559.84**
	Total cost				**7084.64**
			Cost per Rmt		**70.85**

3	Sowing of seeds in trenches 30cm wide 30cm deep in two rows of 10cm apart from row to row of Vetivers,Tephrosilia,Tarwar,Gokshur,Periwinkle, Palmarosa,Sida,Cordifoli, upto 100m/1m				
	a) Labour				
	Mate	Day	1.40	80.00	112.00
	Mazdoor	Day	10.00	70.00	700.00
	Mazdoor for refilling of trenches	Day	4.00	70.00	280.00
	b)Machinary				
	Water tanker 6KL capacity	hour	0.50	200.00	100.00
	c) Material				
	Cost of seeds	kg	0.25	500.00	125.00
	Farmyard manure	cum	2.50	50.00	125.00
	Pesticide	Kg	0.25	350.00	87.50
	Fungicide	Kg	0.25	350.00	87.50
	Cost of water	KL	3.00	10.00	30.00
	Total				**1647.00**
	Overhead charges 8%				**131.76**
	Contractor's profit 10%				**177.88**
	Total cost				**1956.64**
			Cost per Rmt		**19.57**
	Maintainance				
4	Repair of raincuts and filling of off eroded patches during watering	Day	0.40	80.00	32.00
5	Thinning out of seed slips after 1 month from date of sowing for planting at blank patches				
	a) Labour				
	Mate	Day	1.40	80.00	112.00
	Mazdoor	Day	10.00	70.00	700.00
	b)Material				
	Application of liquid manure	KL	2.00	12.00	24.00
	Pesticide Sud treatment	Kg	0.25	350.00	87.50
	Fungicide	Kg	0.25	350.00	87.50
	Cost of water	Litre	3.00	10.00	30.00
	Total				**1073.00**
	Overhead charges 8%				**85.84**
	Contractor's profit 10%				**115.88**
	Total cost				**1274.72**
	Total cost				**3231.36**
			Cost per Rmt		**32.31**

6	Training and protection works for nallahs,river banks streams to minimise damage during rains				
A	Boulders laid across the nallah bed in inverted saucer shape				
	a) Labour				
	Mate	Day	0.04	80.00	3.20
	Mason	Day	0.35	100.00	35.00
	Mazdoor	Day	0.75	70.00	52.50
	b)Material				
	Stone	cum	1.25	344.00	430.00
	Stone spalls	cum	0.20	344.00	68.80
	Planting of rooted offsets with digging of pits on nala bed	Nos	100.00	3.00	300.00
	Watering for 15 days	Day	0.20	70.00	14.00
	Total				**903.50**
	Overhead charges 8%				**72.28**
	Contractor's profit 10%				**97.58**
	Total cost				**1073.36**
			Cost per Rmt		**10.73**
B	Sand and soil fill and empty cement bags sealed at openings laid across the stream 2m wide, 1m height at 25m interval from one structure to other structure in stiff slopes, at 50m interval in gentle slopes placeed in a staggered profile (Cost includes nominal digging of foundation in the stream bed and edges)				
	a) Labour				
	Mate	Day	0.04	80.00	3.20
	Mason	Day	0.06	120.00	7.20
	Mazdoor	Day	1.00	70.00	70.00
	b)Material				
	Cement bags	Nos	700.00	5.00	3500.00
	Gravel/sand/earth	cum	7.00	145.00	1015.00
	Planting of rooted offsets with digging of pits on nala bed	Nos	100.00	3.00	300.00
	Watering for 15 days	Day	0.20	70.00	14.00
	Total				**4909.40**
	Overhead charges 8%				**392.75**
	Contractor's profit 10%				**530.22**
	Total cost				**5832.37**
			Cost per Rmt		**58.32**

7	**Structure for providing spur in nallah beds to control the direction of water**				
	Providing and construction of structure for nallah beds with segments of wire crates of size 1.5x0.5x0.5 m made from 4mm galvanised steel wire @32 kg per 10sqm having minimum tenstile strength of 300Mpa conforming IS:280 and galvanised coating conforming to IS:4826,woven into mesh with double twist,mesh size not exceeding 100x100mm,filled with boulders with list dimension of 200mm,all loose ends to be tied with 4mm galvanised steel wire				
	Taking output=1.5x0.5x0.5				
	a) Labour				
	Mate	Day	0.28	80.00	22.40
	Mazdoor	Day	5.00	70.00	350.00
	Mazdoor(skilled)	Day	2.00	80.00	160.00
	b)Material				
	Galvanised steel wire crates mesh size 100mmx100mm woven with 4mm dia G.I wire in rolls of required size	sqm	61.00	55.00	3355.00
	Stone boulders with least dimension of 200mm	cum	12.60	344.00	4334.40
	Stone spalls of minimum size 25mm	cum	2.52	344.00	866.88
	Total				**9088.68**
	Overhead charges 8%				**727.09**
	Contractor's profit 10%				**981.58**
	Total cost				**10797.35**
			Cost per Rmt		**107.97**
8	**Planting of trees and their maintainance for one year**				
	planting of trees by the road side(Avenue trees) in 0.60m dia holes,1m deep dug in the ground,mixing the soil with decayed farmyard/sludge manure,planting the saplings,backfilling the trench, watering,fixing the tree guard and maintaining the tree for one year				
	a) Labour				
	Mate	Day	1.70	80.00	136.00
	Mazdoor for planting	Day	2.00	70.00	140.00
	Mazdoor for maintainance for one year	Day	15.00	70.00	1050.00
	b)Machinary				
	Water tanker 6KL capacity	hour	2.00	200.00	400.00
	c) Material				
	Sapling 2m high 25mm dia	Each	10.00	500.00	5000.00
	Farmyard manure	cum	0.94	50.00	47.00
	Pesticide	Kg	0.50	350.00	175.00
	Cost of water	KL	12.00	10.00	120.00
	Total				**7068.00**
	Overhead charges 8%				**565.44**
	Contractor's profit 10%				**763.34**
	Total cost				**8396.78**
			Cost per Rmt		**83.97**
				Total Cost	**114135.80**

Say	114136.00

Annexure - XXXXII

Detail Abstract of cost for Environment and Biodiversity Management Plan and Mitigation Measures (SH-9 Part & SH-53 Part)

Sl No.	Structure	Nos.	Cost per Unit	Total Cost
1	Site enhancement proposed at Spur road Junctions (Y & T junction) **14+30**	44	50496.00	2221824
2	School boundary wall with noise & dust mitigation and gate for 21mtr	41	123961.00	3447074.63
	Boundary wall with gate and noise & dust mitigation measure approach road and shrub plantating		85789.00	
	Boundary wall without gate and noise & dust mitigation measure		80137.00	
	Boundary wall with noise & dust mitigation grill gate and metal interception barricade with approach road and shrub planting		167736.00	
3	Improved boundary wall with gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	2	85789.00	171578
	Improved boundary wall without gate, noise & dust mitigation and site enhancement planting for Govt. Buildings	1	80137.00	80137
4	Temple Boundary wall	36	77058.00	2774088
5	Religious shrine	1	5197.00	5197
6	**Hospital /PHC**			
	Boundary wall with dust cum noise filter and site enhancement plantation with gate	4	85789.00	343156
	Boundary wall with dust cum noise filter and site enhancement plantation without gate	1	80137.00	80137
	Entry to be shifted left side approach road with new gate, boundary wall, noise & dust barrier	1	123961.00	123961
7	Oil & Grease filter with soak pit	2	129059.00	258118
8	**Potable Water sources**			
	(a) **Hand Pumps (Bore well)** with raised cement concrete platform connected to soak pit for ground water recharge and site enhancement planting	68	72122.00	4904296
	(b) **Stand post** (Water taps) with raised cement concrete platform connected to soak pit for ground water recharge and site enhancement planting (7+10)	17	53147.00	903499
9	**Water bodies and Ponds** provided with **Toe walls** (5818+865)	6683	5197.00	34731551
10	Water bodies and Ponds provided with **Bathing ghat (1+2)**	3	97736.00	293208
11	Water bodies and Ponds provided with **Spillway (1+2)**	3	60790.00	182370
12	Water bodies and Ponds provided with **Site Enhancement planting (1+2) locations @351950/- per 400 plants with tree guard**	120	351950	105585
13	Avenue Planting with Tree guards	38	351950	13374100
14	Reptile underpass connected to Trap drains including cost of Pipe culvert and Trap drains (6+5)	11	48456.00	533016
15	Enumeration of Trees to be Felled	6747	2.40	16192.8
16	Maintenance of Haulage road	-	-	492800.00
17	Use of Demolition wastes, Flood and cyclone shelters 19nos.	7200000cum	3.00	600000.00
Total				**65641888.43**

Annexure - XXXI
Number of Hand Pumps & Water Taps. (SH-9)

Sl No.	Item	Chain age at km	Location L/R	Partially /Fully affected	Cost @71929.00 each for bore well and @52954.00for taps
1	Hand pump	0.148	Left	Fully	72122.00
2	Hand pump	0.8	Left	Fully	72122.00
3	Hand pump	3.843	Left	Fully	72122.00
4	Hand pump	4.445	Left	Fully	72122.00
5	Hand pump	4.53	Right	Fully	72122.00
6	Hand pump	5.2	Left	Fully	72122.00
7	Hand pump	5.68	Left	Fully	72122.00
8	Hand pump	6.47	Left	Fully	72122.00
9	Hand pump	6.938	Right	Fully	72122.00
10	Hand pump	8.21	Left	Fully	72122.00
11	Hand pump	8.326	Right	Fully	72122.00
12	Hand pump	9.89	Left	Fully	72122.00
13	Hand pump	10.06	Left	Fully	72122.00
14	Hand pump	11.942	Right	Fully	72122.00
15	Hand pump	12.138	Right	Fully	72122.00
16	Hand pump	13.28	Left	Fully	72122.00
17	Hand pump	14.1	Right	Fully	72122.00
18	**Water Tap**	14.942	Right	Fully	53147.00
19	**Water Tap**	16.4	Left	Fully	53147.00
20	Hand pump	16.5	Left	Fully	72122.00
21	**Water Tap**	17.1	Left	Fully	53147.00
22	Hand pump	17.145	Left	Fully	72122.00
23	Hand pump	17.33	Right	Fully	72122.00
24	**Water Tap**	17.445	Left	Fully	53147.00
25	Hand pump	17.68	Left	Fully	72122.00
26	**Water Tap**	17.765	Left	Fully	53147.00
27	Hand pump	18.38	Right	Fully	72122.00
28	Hand pump	19.37	Right	Fully	72122.00
29	Hand pump	20.094	Right	Fully	72122.00
30	Hand pump	23.05	Right	Fully	72122.00
31	**Water Tap**	25.9	Right	Fully	53147.00
32	**Water Tap**	26.32	Left	Fully	53147.00
33	Hand pump	26.93	Right	Fully	72122.00
34	Hand pump	29.4	Left	Fully	72122.00
35	Hand pump	30.4	Left	Fully	72122.00
36	Hand pump	30.735	Left	Fully	72122.00
37	Hand pump	31.173	Left	Fully	72122.00
38	Hand pump	36.61	Left	Fully	72122.00
39	Hand pump	37.18	Left	Fully	72122.00
40	Hand pump	37.24	Left	Fully	72122.00
Total					**2752055.00**

Annexure - XXXII
Number of Hand Pumps & Water Taps (SH-53)

Sl No.	Item	Chain age at km	Location L/R	Partially /Fully affected	Cost @71929.00 each for bore well and @52954.00for taps
1	Hand pump	2.55	LEFT	Fully	72122.00
2	Hand pump	2.741	LEFT	Fully	72122.00
3	Hand pump	3.126	LEFT	Fully	72122.00
4	Hand pump	3.41	LEFT	Fully	72122.00
5	**Water Tap**	3.77	LEFT	Fully	53147.00
6	Hand pump	3.847	LEFT	Fully	72122.00
7	Hand pump	6.66	LEFT	Fully	72122.00
8	Hand pump	8.454	RIGHT	Fully	72122.00
9	Hand pump	8.562	RIGHT	Fully	72122.00
10	Hand pump	8.879	RIGHT	Fully	72122.00
11	Hand pump	11.564	LEFT	Fully	72122.00
12	Hand pump	13.449	RIGHT	Fully	72122.00
13	Hand pump	14.725	LEFT	Fully	72122.00
14	Hand pump	16.338	LEFT	Fully	72122.00
15	**Water Tap**	18.39	RIGHT	Fully	53147.00
16	**Water Tap**	19.37	RIGHT	Fully	53147.00
17	Hand pump	19.4	RIGHT	Fully	72122.00
18	Hand pump	19.552	RIGHT	Fully	72122.00
19	**Water Tap**	19.61	RIGHT	Fully	53147.00
20	Hand pump	19.98	LEFT	Fully	72122.00
21	Hand pump	20.2	LEFT	Fully	72122.00
22	Hand pump	20.258	RIGHT	Fully	72122.00
23	Hand pump	21.01	LEFT	**Partially**	72122.00
24	Hand pump	22.423	LEFT	Fully	72122.00
25	Hand pump	24.2	RIGHT	Fully	72122.00
26	Hand pump	24.255	LEFT	Fully	72122.00
27	Hand pump	26.016	RIGHT	Fully	72122.00
28	Hand pump	26.49	RIGHT	Fully	72122.00
29	Hand pump	27.16	LEFT	Fully	72122.00
30	Hand pump	27.28	RIGHT	Fully	72122.00
31	Hand pump	27.333	LEFT	**Partially**	72122.00
32	Hand pump	29	RIGHT	Fully	72122.00
33	**Water Tap**	29.052	RIGHT	Fully	53147.00
34	Hand pump	29.68	RIGHT	Fully	72122.00
35	Hand pump	29.834	LEFT	Fully	72122.00
36	**Water Tap**	29.942	LEFT	Fully	53147.00
37	**Water Tap**	30.34	LEFT	**Partially**	53147.00
38	Hand pump	30.35	LEFT	Fully	72122.00
39	Hand pump	31.422	LEFT	Fully	72122.00
40	Hand pump	35.1	RIGHT	Fully	72122.00
41	Hand pump	35.38	LEFT	Fully	72122.00
42	Hand pump	35.82	RIGHT	Fully	72122.00
43	**Water Tap**	40.9	LEFT	Fully	53147.00
44	**Water Tap**	41.715	LEFT	Fully	53147.00
45	**Water Tap**	44.9	RIGHT	Fully	53147.00
Total					**3055740.00**

Annexure - XXXIII

Ponds and Water bodies affected between CH.0.000km TO 45.000km

SH – 9 (Part)

Sl No.	Items	Chainage at km	Location left /right	Distance in m from centerline	Affected in m	Length of toe wall in Mtrs.	Cost @5197/- per Rmtr	Cost of Spillway @58808.00	Bathing ghat @92330.00 each	Site Enhancement Plantation @351950.00 for 400 plants
1	Pond	1.017	R	10	15	15	77955	0	0	0
2	Pond	2.485	L	12.9	22	25	129925	0	0	0
3	Pond	2.822	R	12.9	55	55	285835	0	0	0
4	**Canal**	4.424	R	12.8	1176	1180	6132460	0	0	0
5	**Canal**	4.47	L	13	430	430	2234710	0	0	0
6	**Canal**	5.83	R	13	251	255	1325235	0	0	0
7	Pond	8.19	R	13	18	20	103940	0	0	0
8	Pond	9.28	L	13	96	100	519700	0	0	0
9	Pond	6.9	L	8.15	37	40	207880	0	0	0
10	Pond	12.302	R	8.4	19	20	103940	0	0	0
11	Pond	12.58	R	8.3	24	24	124728	0	0	0
12	Pond	12.9	L	12.8	34	34	176698	0	0	0
13	Pond	13.112	R	13.3	19	20	103940	0	0	0
14	Pond	11.78	L	13	11	15	77955	0	0	0
15	Pond	19.555	L	12.9	26	30	155910	0	0	0
16	Pond	20.4	R	13	53	55	285835	0	0	0
17	Pond	20.47	L	13	22	25	129925	0	0	0
18	Pond	20.6	L	12.9	17	20	103940	0	0	0
19	Pond	20.67	L	13	14	15	77955	0	0	0
20	Pond	20.725	R	13	10	10	51970	0	0	0
21	Pond	20.758	R	13	5	5	25985	0	0	0
22	Pond	20.9	L	13	24	25	129925	0	0	0
23	Pond	21.9	R	13	24	25	129925	0	0	0
24	Pond	22.2	R	13	67	70	363790	0	0	0
25	Pond	22.348	L	12.9	30	30	155910	0	0	0
26	Pond	22.542	R	13	41	45	233865	0	0	0
27	Pond	22.9	R	12.9	18	20	103940	0	0	0
28	Pond	24.9	R	12.8	21	25	129925	0	0	0
29	Pond	25.05	L	12.9	27	30	155910	0	0	0
30	Pond	27.7	R	12.9	17	20	103940	0	0	0
31	Pond	27.705	L	12.9	63	65	337805	0	0	0
32	Pond	27.79	R	12.8	28	30	155910	0	0	0
33	Pond	28	L	12.9	268	270	1403190	0	0	0
34	Pond	28.062	R	13	114	115	597655	0	0	0
35	Pond	28.8	L	12.8	79	80	415760	0	0	0
36	Pond	29.147	R	12.6	315	315	1637055	0	0	0
37	Pond	29.25	L	13	54	55	285835	0	0	0
38	Pond	29.3	L	13	70	70	363790	0	0	0
39	Pond	29.4	L	13	26	30	155910	0	0	0
40	Pond	29.5	R	13	15	15	77955	0	0	0
41	Pond	29.555	L	13	75	75	389775	0	0	0
42	Pond	29.715	L	13	46	50	259850	0	0	0
43	Pond	29.7	R	13	43	45	233865	0	0	0
44	Pond	30.013	L	12.9	28	30	155910	0	0	0
45	Pond	30.565	R	13	27	30	155910	0	0	0
46	Pond	30.683	L	12.9	14	15	77955	0	0	0

47	Pond	30.97	L	13	43	45	233865	0	0	0
48	Pond	31.3	L	13	40	40	207880	0	0	0
49	Pond	31.417	R	13.2	26	30	155910	0	0	0
50	Pond	31.823	R	13	33	35	181895	0	0	0
51	Pond	31.96	R	13	440	440	2286680	0	0	0
52	Pond	32.1	L	13	27	30	155910	0	0	0
53	Pond	32.45	R	12.8	21	25	129925	0	0	0
54	Pond	32.49	L	13	210	210	1091370	0	0	0
55	Pond	33.2	L	13.2	21	25	129925	0	0	0
56	Pond	33.6	L	13	53	55	285835	0	0	0
57	Pond	33.87	L	12.8	134	135	701595	0	0	0
58	Pond	34	R	12.9	42	45	233865	0	0	0
59	Pond	36.1	L	12.9	39	40	207880	0	0	0
60	Pond	36.104	R	13	70	70	363790	0	0	0
61	Pond	36.428	L	13	13	15	77955	0	0	0
62	Pond	39.1	R	12.9	53	55	285835	0	0	0
63	Pond	39.263	L	12.9	20	20	103940	0	0	0
64	Pond	39.64	R	13	20	20	103940	0	0	0
65	Pond	40.266	R	13	23	25	129925	0	0	0
66	Pond*	40.36	L	13	30	30	155910	60790	97736	17598
67	Pond	41.5	L	13	23	25	129925	0	0	0
68	Pond	41.76	L	13	14	15	77955	0	0	0
69	Pond	42.436	R	13	58	60	311820	0	0	0
70	Pond	42.44	L	13	53	55	285835	0	0	0
71	Pond	43.24	R	13	48	50	259850	0	0	0
72	Pond	43.865	L	13	80	80	415760	0	0	0
73	Pond	44	L	13	170	170	883490	0	0	0
Total						**5818**	**30236146**	**60790**	**97736**	**17598**

***Site enhancement cost per for 20 trees**

Annexure - XXXIV

Ponds and Water bodies affected between CH.0.000km TO 49.000km

SH – 53 (Part)

Sl No.	Items	Chainage at km	Location left /right	Distance in m from centerline	Affected in m	Length of toe wall in Mtrs.	Cost @5197/- per Rmtr	Cost of Spillway @58808.00	Bathing ghat @92330.00 each	Site Enhancement Plantation @351950.00 for 400 plants
1	Pond	2.448	C	-	75	75	389775	0	0	0
2	Pond	2.8	R	13	31	35	181895	0	0	0
3	Pond	6.6	L	13	10	10	51970	0	0	0
4	Pond	8.915	R	13	25	25	129925	0	0	0
5	Pond	13.713	L	8	18	20	103940	0	0	0
6	Pond	13.737	L	8	13	15	77955	0	0	0
7	Pond	17.1	C	-	14.9	15	77955	0	0	0
8	Pond	17.7	L	8	12	15	77955	0	0	0
9	Pond	17.74	R	11	3	5	25985	0	0	0
10	Pond	19.614	R	8	134	135	701595	0	0	0
11	Pond	19.665	L	8	45	45	233865	0	0	0
12	Pond*	20.27	L	8	81	85	441745	60790.00	97736.00	43993.75
13	Pond*	20.868	L	13	23.5	25	129925	60790.00	97736.00	43993.75
14	Pond	22.29	L	13	9	10	51970	0	0	0

15	Pond	26.59	R	13	18	20	103940	0	0	0
16	Pond	31.484	L	8	24	25	129925	0	0	0
17	Pond	36.723	L	13	40	40	207880	0	0	0
18	Pond	37.35	L	13	265	265	1377205	0	0	0
Total						**865**	**4495405**	**121580**	**195472**	**87987.5**

***Site enhancement cost per for 50 trees**

Total cost
77955
129925
285835
6132460
2234710
1325235
103940
519700
207880
103940
124728
176698
103940
77955
155910
285835
129925
103940
77955
51970
25985
129925
129925
363790
155910
233865
103940
129925
155910
103940
337805
155910
1403190
597655
415760
1637055
285835
363790
155910
77955
389775
259850
233865
155910
155910
77955

233865
207880
155910
181895
2286680
155910
129925
1091370
129925
285835
701595
233865
207880
363790
77955
285835
103940
103940
129925
332034
129925
77955
311820
285835
259850
415760
883490
30412269.50

Total cost
389775
181895
51970
129925
103940
77955
77955
77955
25985
701595
233865
644264.75
332444.75
51970

103940
129925
207880
1377205
4900444.5

Annexure - XXXV
Passenger Shed at Bus Bay
SH – 9 (Part)

Sl. No.	Structure	Chainage at km	Location left /right	Cost of Passenger shed @ 57653.00	Cost of Grease and Oil separator & Soak Pit at Truck Lay Bye
1	Passenger Shed at Bus Bay	0.1	Left	58806.00	-
2	Passenger Shed at Bus Bay	0.07	Right	58806.00	-
3	Passenger Shed at Bus Bay	3.6	Left	58806.00	-
4	Passenger Shed at Bus Bay	3.595	Right	58806.00	-
5	Passenger Shed at Bus Bay	5.4	Left	58806.00	-
6	Passenger Shed at Bus Bay	6.4	Left	58806.00	-
7	Passenger Shed at Bus Bay	6.545	Right	58806.00	-
8	Passenger Shed at Bus Bay	9.8	Left	58806.00	-
9	Passenger Shed at Bus Bay	10.095	Right	58806.00	-
10	Passenger Shed at Bus Bay	11.4	Left	58806.00	-
11	Passenger Shed at Bus Bay	12.295	Right	58806.00	-
12	Passenger Shed at Bus Bay	13.8	Left	58806.00	-
13	Passenger Shed at Bus Bay	14.195	Right	58806.00	-
14	Passenger Shed at Bus Bay	16.5	Left	58806.00	-
15	Passenger Shed at Bus Bay	17.895	Right	58806.00	-
16	Passenger Shed at Bus Bay	20.2	Left	58806.00	-
17	Passenger Shed at Bus Bay	21.395	Right	58806.00	-
18	Passenger Shed at Bus Bay	24.25	Left	58806.00	-
19	Passenger Shed at Bus Bay	24.545	Right	58806.00	-
20	Passenger Shed at Bus Bay	25.7	Left	58806.00	-
21	Passenger Shed at Bus Bay	26.245	Right	58806.00	-
22	Passenger Shed at Bus Bay	26.6	Left	58806.00	-
23	Passenger Shed at Bus Bay	27.095	Right	58806.00	-
24	Passenger Shed at Bus Bay	30.5	Left	58806.00	-
25	Passenger Shed at Bus Bay	31.195	Right	58806.00	-
26	Passenger Shed at Bus Bay	32.75	Left	58806.00	-
27	Passenger Shed at Bus Bay	33.095	Right	58806.00	-
28	Passenger Shed at Bus Bay	36.295	Right	58806.00	-
29	Passenger Shed at Bus Bay	37.195	Left	58806.00	-
30	Passenger Shed at Bus Bay	39.5	Left	58806.00	-
31	Passenger Shed at Bus Bay	40.195	Right	58806.00	-
32	Passenger Shed at Bus Bay	41.9	Left	58806.00	-
33	Passenger Shed at Bus Bay	42.595	Right	58806.00	-
34	Passenger Shed at Bus Bay	43.1	Left	58806.00	-
35	Passenger Shed at Bus Bay	43.295	Right	58806.00	-
36	Passenger Shed at Bus Bay	44.5	Left	58806.00	-
37	Passenger Shed at Bus Bay	1.500 - 1.600	Left	58806.00	129059.00
Total				**2175822.00**	**129059.00**
				2304881.00	

Annexure - XXXVI
Passenger Shed at Bus Bay
SH – 53 (Part)

Sl. No.	Structure	Chainage at km	Location left /right	Cost of Passenger shed @ 57653.00	Cost of Grease and Oil separator & Soak Pit at Truck Lay Bye
1	Passenger Shed at Bus Bay	8	Left	58806.00	-
2	Passenger Shed at Bus Bay	8.255	Right	58806.00	-
3	Passenger Shed at Bus Bay	11.47	Left	58806.00	-
4	Passenger Shed at Bus Bay	11.95	Right	58806.00	-
5	Passenger Shed at Bus Bay	13.3	Left	58806.00	-
6	Passenger Shed at Bus Bay	13.555	Right	58806.00	-
7	Passenger Shed at Bus Bay	14.375	Left	58806.00	-
8	Passenger Shed at Bus Bay	14.63	Right	58806.00	-
9	Passenger Shed at Bus Bay	17.4	Left	58806.00	-
10	Passenger Shed at Bus Bay	17.72	Right	58806.00	-
11	Passenger Shed at Bus Bay	18.445	Left	58806.00	-
12	Passenger Shed at Bus Bay	19.4	Right	58806.00	-
13	Passenger Shed at Bus Bay	20.02	Left	58806.00	-
14	Passenger Shed at Bus Bay	24.095	Left	58806.00	-
15	Passenger Shed at Bus Bay	24.345	Right	58806.00	-
16	Passenger Shed at Bus Bay	24.345	Left	58806.00	-
17	Passenger Shed at Bus Bay	26.095	Right	58806.00	-
18	Passenger Shed at Bus Bay	27.045	Left	58806.00	-
19	Passenger Shed at Bus Bay	27.545	Right	58806.00	-
20	Passenger Shed at Bus Bay	29.27	Left	58806.00	-
21	Passenger Shed at Bus Bay	30.02	Right	58806.00	-
22	Passenger Shed at Bus Bay	30.845	Left	58806.00	-
23	Passenger Shed at Bus Bay	31.825	Right	58806.00	-
24	Passenger Shed at Bus Bay	33.695	Right	58806.00	-
25	Passenger Shed at Bus Bay	34.045	Left	58806.00	-
26	Passenger Shed at Bus Bay	34.97	Left	58806.00	-
27	Passenger Shed at Bus Bay	40.02	Right	58806.00	-
28	Passenger Shed at Bus Bay	40.945	Left	58806.00	-
29	Passenger Shed at Bus Bay	41.175	Right	58806.00	-
30	Passenger Shed at Bus Bay	42.345	Left	58806.00	-
31	Passenger Shed at Bus Bay	44.245	Right	58806.00	-
32	Passenger Shed at Bus Bay	45.1	Left	58806.00	-
33	Passenger Shed at Bus Bay	45.595	Right	58806.00	-
34	Passenger Shed at Bus Bay	46.845	Left	58806.00	-
35	Passenger Shed at Bus Bay	47.025	Right	58806.00	-
36	Passenger Shed at Bus Bay	4.700-4.800	Left	58806.00	129059.00
Total				**2117016.00**	**129059.00**
				2246075.00	

Annexure - XXXVII
Cost of Site Enhancement at Spur Road Junction
SH – 9 (Part) (0.000-45.000km)

Sl. No.	Chainage	Left	Right	Junction	Cost of site Enhancement
1	0.625	-	RIGHT		
2	0.87	-	RIGHT		
3	1.07	-	RIGHT		
4	1.72	-	RIGHT		
5	2.774	LEFT	-		
6	3.32	LEFT	-		
7	3.95	-	RIGHT	JUNCTION	50496.00
8	4.376	-	RIGHT		
9	4.905	LEFT	-		
10	5.663	-	RIGHT		
11	5.821	-	RIGHT		
12	5.826	LEFT	-		
13	6.136	LEFT	-		
14	6.381	LEFT	-		
15	6.5	LEFT	-	JUNCTION	50496.00
16	7.065	-	RIGHT		
17	7.558	-	RIGHT		
18	7.69	-	RIGHT		
19	8.135	-	RIGHT		
20	8.2	-	RIGHT		
21	8.235	-	RIGHT		
22	9.125	LEFT	-		
23	9.387	LEFT	-		
24	9.976	-	RIGHT		
25	10.32	-	RIGHT		
26	10.446	-	RIGHT		
27	10.635	LEFT	-		
28	11.316	LEFT	-		
29	11.586	-	RIGHT		
30	11.646	-	RIGHT		
31	11.847	LEFT	-		
32	12.033	-	RIGHT		
33	12.226	LEFT	-	JUNCTION	50496.00
34	12.646	LEFT	-		
35	12.68	-	RIGHT		
36	12.97	LEFT	-		
37	13.08	LEFT	-		
38	13.3	LEFT	-		
39	13.35	LEFT	-		
40	13.97	LEFT	-		
41	14.147	LEFT	-		
42	14.16	-	RIGHT		
43	14.224	LEFT	-		
44	14.542	-	RIGHT		
45	16.41	-	RIGHT	JUNCTION	50496.00
46	16.46	LEFT	-		
47	16.75	-	RIGHT		
48	17.176	-	RIGHT		
49	17.246	LEFT	-		
50	17.67	-	RIGHT	JUNCTION	50496.00
51	18.015	-	RIGHT		

52	18.415	-	RIGHT	JUNCTION	50496.00
53	18.44	LEFT	-		
54	18.594	-	RIGHT		
55	19.044	-	RIGHT		
56	19.37	-	RIGHT	JUNCTION	50496.00
57	20.155	LEFT	-		
58	20.156	-	RIGHT		
59	20.818	-	RIGHT		
60	21.063	-	RIGHT		
61	21.393	-	RIGHT	JUNCTION	50496.00
62	21.413	LEFT	-		
63	21.437	-	RIGHT		
64	21.83	-	RIGHT		
65	21.988	-	RIGHT	JUNCTION	50496.00
66	22.454	-	RIGHT		
67	22.536	-	RIGHT		
68	22.75	-	RIGHT		
69	22.877	LEFT	-		
70	22.878	-	RIGHT		
71	23.105	-	RIGHT		
72	23.231	LEFT	-	JUNCTION	50496.00
73	23.246	-	RIGHT		
74	23.61	-	RIGHT		
75	23.68	-	RIGHT		
76	23.94	-	RIGHT		
77	24.383	-	RIGHT		
78	24.595	LEFT	-		
79	24.595	-	RIGHT		
80	24.9	-	RIGHT		
81	25.147	-	RIGHT		
82	25.261	-	RIGHT		
83	25.977	LEFT	-		
84	26.13	-	RIGHT		
85	26.232	LEFT	-		
86	26.862	LEFT	-		
87	26.867	-	RIGHT		
88	27.494	LEFT	-		
89	27.537	-	RIGHT		
90	27.673	LEFT	-		
91	27.895	LEFT	-		
92	28.67	-	RIGHT		
93	29.404	LEFT	-		
94	29.467	LEFT	-		
95	30.38	LEFT	-		
96	31.794	LEFT	-		
97	32.017	LEFT	-		
98	32.171	LEFT	-		
99	33.118	-	RIGHT	JUNCTION	50496.00
100	33.18	LEFT	-		
101	33.55	-	RIGHT		
102	33.99	LEFT	-		
103	36.069	LEFT	-		
104	36.19	-	RIGHT	JUNCTION	50496.00
105	36.2	LEFT	-		
106	36.234	LEFT	-		
107	37.247	LEFT	-	JUNCTION	50496.00

108	38.265	LEFT	-		
109	39.1	LEFT	-		
110	39.185	-	RIGHT		
111	39.32	-	RIGHT		
112	39.583	-	RIGHT		
113	39.874	LEFT	-		
114	39.995	-	RIGHT	JUNCTION	50496.00
115	40.266	-	RIGHT		
116	40.462	-	RIGHT		
117	40.543	-	RIGHT		
118	40.88	-	RIGHT		
119	41.7	LEFT	-		
120	41.817	-	RIGHT		
121	42.278	-	RIGHT		
122	42.848	LEFT	-		
123	43.169	-	RIGHT		
124	43.505	-	RIGHT		
125	44.125	-	RIGHT		
126	44.426	-	RIGHT		
Total 14 Junctions					**706944.00**

Annexure - XXXVIII
Cost of Site Enhancement at Spur Road Junction
SH – 53 (Part) (0.000-45.000km)

Sl. No.	Chainage	Left	Right	Junction	Cost of site Enhancement
1	0.26		Right		
2	0.365		Right		
3	0.39	LEFT			
4	0.568	LEFT			
5	0.928	LEFT			
6	1.352		Right		
7	1.355	LEFT		JUNCTION	50496.00
8	1.635		Right		
9	1.716	LEFT			
10	1.79		Right	JUNCTION	50496.00
11	1.845	LEFT			
12	2.14	LEFT			
13	2.273	LEFT			
14	2.428		Right		
15	2.843	LEFT			
16	3.327		Right		
17	3.357	LEFT		JUNCTION	50496.00
18	3.585		Right	JUNCTION	50496.00
19	4.415		Right		
20	4.417	LEFT		JUNCTION	50496.00
21	5.977		Right	JUNCTION	50496.00
22	6.675	LEFT			
23	7.67		Right		
24	7.75	LEFT			
25	7.79		Right		
26	8.465		Right	JUNCTION	50496.00
27	8.68	LEFT		JUNCTION	50496.00
28	8.73	LEFT		JUNCTION	50496.00
29	8.875	LEFT			
30	9.6		Right		
31	10.018	LEFT			
32	10.02		Right		
33	10.046	LEFT		JUNCTION	50496.00
34	10.78	LEFT			
35	11.6	LEFT			
36	11.71	LEFT			
37	11.72		Right		
38	11.795	LEFT			
39	11.795		Right	JUNCTION	50496.00
40	12.49		Right		
41	12.73	LEFT			
42	13.08	LEFT			
43	13.46	LEFT		JUNCTION	50496.00
44	13.73	LEFT			
45	13.78	LEFT			
46	14.525	LEFT		JUNCTION	50496.00
47	14.735		Right		
48	16.33	LEFT			
49	17.015		Right	JUNCTION	50496.00

50	17.62	LEFT			
51	18.14		Right		
52	18.4		Right		
53	18.86	LEFT			50496.00
54	18.865		Right	JUNCTION	
55	19.4	LEFT		JUNCTION	50496.00
56	19.45	LEFT		JUNCTION	50496.00
57	19.552	LEFT			
58	19.552		Right		
59	20.005	LEFT			
60	20.445		Right		
61	21.027	LEFT			
62	21.885	LEFT			
63	22.43	LEFT			
64	22.82		Right		
65	24.2		Right		
66	24.25	LEFT		JUNCTION	50496.00
67	25.7		Right		
68	26.58		Right		
69	26.73		Right		
70	26.98		Right		
71	27.29	LEFT			
72	27.311		Right		
73	27.957		Right		
74	28.44		Right		
75	29.115	LEFT			
76	29.585		Right		
77	29.61	LEFT			
78	29.85		Right		
79	30.225	LEFT			
80	30.245		Right		
81	30.335	LEFT		JUNCTION	50496.00
82	31.085	LEFT			
83	31.085		Right		
84	31.476	LEFT			
85	31.58		Right	JUNCTION	50496.00
86	32.036	LEFT			
87	32.89	LEFT			
88	32.89		Right		
89	32.985		Right		
90	33.895		Right		
91	33.95	LEFT		JUNCTION	50496.00
92	35.1		Right		
93	35.36	LEFT			
94	35.45	LEFT			
95	35.81		Right	JUNCTION	50496.00
96	36.57	LEFT		JUNCTION	50496.00
97	37.67		Right		
98	38.54		Right	JUNCTION	50496.00
99	38.62	LEFT			
100	39.87	LEFT			
101	39.975		Right	JUNCTION	50496.00
102	40.045	LEFT		JUNCTION	50496.00
103	40.565	LEFT		JUNCTION	50496.00
104	40.73	LEFT			

105	41.855	LEFT			
106	43.97		Right		
107	44.028		Right	JUNCTION	50496.00
108	44.11		Right		
109	44.218		Right		
110	44.63	LEFT		JUNCTION	50496.00
111	44.765		Right		
112	44.907		Right		
113	45.325	LEFT			
114	46.4		Right		
115	47.01		Right	JUNCTION	50496.00
Total 30 Junctions					**1514880.00**

Annexure - XXXIX

Chainage wise location of the CPR on left and right side of SH-9 (Part) coming under impact for Mitigation measures

Sl. No.	Structure	Chainage at km	Location Left / Right	Partially affected/fully affected	Avoidance /Mitigation /Minimization Proposed	Cost of Boundary wall and site enhancement
1	Temple	0.03	Left	Partially	Boundary wall with gate noise & dust mitigation	77058.00
2	Temple	0.06	Right	Partially	New boundary wall with noise & dust mitigation	77058.00
3	Temple	0.8	Left	Partially	New gate on approach road and noise & dust mitigation on SH side	77058.00
4	Temple	11.362	Right	Partially	New boundary wall with noise & dust mitigation and new gate on approach road away from the SH	77058.00
5	Temple	11.928	Right	Partially	Compensation for relocation of structures new boundary wall with noise & dust mitigation and flower pot	77058.00
6	Temple	11.932	Right	Partially	Compensation for relocation of structures new boundary wall with noise & dust mitigation and flower pot	77058.00
7	Temple	13.167	Right	Partially	Hanuman statue to be relocated within the temple with boundary wall having noise & dust mitigation	77058.00
8	Temple	13.28	Left	Partially	Compensation for relocation of structures and noise & dust barrier with boundary wall	77058.00
9	Temple	14.583	Right	Partially	Compensation for relocation of structures and noise & dust barrier with boundary wall	77058.00
10	Religious shrine	16.245	Left	Partially	Provision of toe wall to reduce acquisition and site enhancement planting with alternate gate away from the road	51970.00
11	Temple	18.413	Right	Partially	Compensation for relocation of structures and noise & dust barrier with boundary wall	77058.00

12	Temple	19.376	Right	Partially	Compensation for relocation of structures and noise & dust barrier with boundary wall	77058.00
13	Temple	21.975	Right	Partially	Compensation for relocation of structures. Noise & dust barrier with boundary wall	77058.00
14	Temple	23.64	Right	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
15	Temple	24.584	Right	Partially	Alternate entry away from the road with noise & dust mitigation	77058.00
16	Temple	26.023	Right	Partially	New boundary wall with noise & dust barrier and alternate entry away from the road on existing opening with gate	77058.00
17	Temple	27.5	Left	Partially	New boundary wall with noise & dust barrier and alternate entry away from the road on existing opening with gate	77058.00
18	Temple	27.746	Right	Partially	New boundary wall with noise & dust barrier and alternate entry away from the road on existing opening with gate	77058.00
19	Temple	30.45	Left	Partially	Compensation for relocation of new structure in addition to new construction of boundary wall with noise & dust mitigation and alternate entry away from road	77058.00
20	Temple	31.347	Left	Partially	Compensation for relocation of new structure in addition to new construction of boundary wall with noise & dust mitigation and alternate entry away from road	77058.00
21	Temple	33.01	Left	Partially	Compensation for relocation of new structure in addition to new construction of boundary wall with noise & dust mitigation and alternate entry away from road	77058.00

22	Temple	39.81	Right	Partially	Compensation for relocation of new structure in addition to new construction of boundary wall with noise & dust mitigation and alternate entry away from road	77058.00
23	Temple	40	Right	Partially	Noise & dust barrier with gate and flower pots	77058.00
24	Temple	42.577	Right	Partially	Compensation for relocation of structures, construction of new boundary wall with flower pots noise & dust mitigation and site enhancement planting	77058.00
25	Temple	42.927	Right	Partially	Compensation for relocation of structures, construction of new boundary wall with flower pots noise & dust mitigation and site enhancement planting	77058.00
26	Temple	43.317	Right	Partially	Compensation for relocation of structures, construction of new boundary wall with flower pots noise & dust mitigation and site enhancement planting	77058.00
Total						**1978420.00**
Hospital /Health Center						
1	Govt. Hospital	13.3	Left	Partially	Boundary wall with dust cum noise filter and site enhancement plantation without gate	80137.00
2	PHC	17.13	Left	Partially	Boundary wall with dust cum noise filter and site enhancement plantation with gate	85789.00
3	PHC	39.6	Left	Partially	Boundary wall with dust cum noise filter and site enhancement plantation with gate	85789.00
Total						**251715.00**

Govt. Building						
1	Post Office	4.525	Right	Partially	Compensation for relocation	0.00
2	Office Bldg.	16.355	Left	Partially	Compensation for relocation	0.00
3	Police Station	17.1	Left	Partially	Boundary wall with dust cum noise filter and site enhancement plantation	85789.00
4	Co-Operative Bank	31.3	Left	Partially	Compensation for the acquired structure	85789.00
5	Forest check gate	32.885	Left	Partially	Compensation for relocation	0.00
6	Police Check Post	39.662	Right	Partially	To be established by Police department	0.00
Total						**171578.00**
Passenger Shade						
1	Passenger Shade	14.173	Left	Fully	Relocated	Cost shown against new Passenger Shed
2	Passenger Shade	17.317	Right	Fully	Relocated	Cost shown against new Passenger Shed
3	Passenger Shade	24.616	Right	Fully	Relocated	Cost shown against new Passenger Shed
4	Passenger Shade	26.01	Left	Fully	Relocated	Cost shown against new Passenger Shed
5	Passenger Shade	30.438	Right	Partially	Relocated	Cost shown against new Passenger Shed
6	Passenger Shade	40	Left	Fully	Relocated	Cost shown against new Passenger Shed
7	Passenger Shade	0.15	Right	Partially	Relocated	Cost shown against new Passenger Shed
8	Passenger Shade	2.8	Right	Partially	Relocated	Cost shown against new Passenger Shed
9	Passenger Shade	6.5	Right	Partially	Relocated	Cost shown against new Passenger Shed
10	Passenger Shade	12.8	Left	Partially	Relocated	Cost shown against new Passenger Shed

11	Passenger Shade	13.19	Left	Partially	Relocated	Cost shown against new Passenger Shed
12	Passenger Shade	16.25	Left	Partially	Relocated	Cost shown against new Passenger Shed
13	Passenger Shade	16.3	Right	Partially	Relocated	Cost shown against new Passenger Shed
14	Passenger Shade	16.59	Left	Partially	Relocated	Cost shown against new Passenger Shed
Schools						
1	Dibyabhumi Ashram School	21	Left	Partially	Boundary wall, gate noise cum dust filter	123961.00
2	School	22.76	Left	Partially	New boundary wall with alternate gate with noise & dust mitigation	123961.00
3	School	22.76	Right	Partially	New boundary wall with alternate gate with noise & dust mitigation.	123961.00
4	School	25.2	Right	Partially	Noise & dust barrier, gate.	123961.00
5	School	27.56	Left	Partially	Construction of boundary wall with noise & dust barrier on SH side and new gate on new approach road away from SH	123961.00
6	School	29.95	Left	Partially	Boundary wall with interception wall and noise cum dust filter.	167736.00
7	School	36.85	Left	Partially	Alternate entry point with alternate site boundary wall, gate, Noise & dust barrier.	123961.00
8	School	39.3	Right	Partially	New boundary wall with gate noise & dust barrier on alternate entry point.	123961.00

9	School	40.72	Left	Partially	Boundary wall with interception wall and noise cum dust filter.	167736.00
10	School	41.5	Left	Partially	Boundary wall with the gate relocated on the right side approach road with noise & dust barrier	123961.00
11	School	41.56	Left	Partially	Additional structure for noise & dust mitigation.	123961.00
12	School	41.8	Right	Partially	Spur road along the boundary with dust & noise mitigation on SH side.	167736.00
13	School	43.7	Right	Partially	New boundary wall with dust & noise mitigation	123961.00
Total						**1742818.00**

Annexure - XXXX

Chainage wise location of the CPR on left and right side of SH-53 (Part) coming under impact for Mitigation measures

Sl. No.	Structure	Chainage at km	Location Left / Right	Partially affected/fully affected	Avoidance /Mitigation /Minimization Proposed	Cost of Boundary wall and site enhancement
1	Satsanga Bihar	0.1	Left	Partially	Metal barricade, at age of hard shoulder for 10mtr @27590/- to prevent direct entry to the SH	27590.00
2	Temple	3.48	Right	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
3	Temple	3.75	Right	Partially	Site enhancement plantation with shifting of gate and boundary wall away from the SH.	77058.00
4	Temple	3.79	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
5	Temple	3.837	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
6	Temple	19.3	Right	Partially	Site enhancement planting 20nos. on the road side and approach	17597.5
7	Temple	20	Right	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
8	Temple	24.25	Right	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
9	Temple	25.87	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
10	Temple	29.71	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
11	Temple	40.58	Right	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
12	Temple	41.64	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
13	Temple	42.3	Left	Partially	Boundary wall with flower pots & dust cum noise filter planting	77058.00
Total						**892825.50**

Passenger Shade						
1	Passenger Shed	13.48	Left	Partially	Relocated	Cost shown in New Passenger Shed location
2	Passenger Shed	14.5	Left	Fully	Relocated	Cost shown in New Passenger Shed location
3	Passenger Shed	14.73	Right	Fully	Relocated	Cost shown in New Passenger Shed location
4	Passenger Shed	17.6	Left	Fully	Relocated	Cost shown in New Passenger Shed location
5	Passenger Shed	31.635	Right	Partially	Relocated	Cost shown in New Passenger Shed location
6	Passenger Shed	35.1	Left	Partially	Relocated	Cost shown in New Passenger Shed location
7	Passenger Shed	35.823	Right	Partially	Relocated	Cost shown in New Passenger Shed location
8	Passenger Shed	39.84	Left	Partially	Relocated	Cost shown in New Passenger Shed location
9	Passenger Shed	42.34	Left	Fully	Relocated	Cost shown in New Passenger Shed location
10	Passenger Shed	44.23	Right	Partially	Relocated	Cost shown in New Passenger Shed location
Govt. Buildings						
1	Irrigation Office	0.98	Right	Partially	Boundary wall & dust cum noise filter planting	80137.00
2	Govt. Building	20.05	Right	Partially	Compensation for relocation of building	0
3	Tahasil Office	20.22	Right	Partially	Compensation for relocation of building	0
4	Govt. Building	31.71	Left	Partially	Compensation for relocation of building	0
5	Govt. Building	41.3	Right	Partially	Compensation for relocation of building	0
6	Toll Plaza & Joint forest check gate	23.5	Across	Fully	Compensation for relocation of building	0
7	Toll Plaza	34.69	Across	Fully	Compensation for relocation of building	0
Total						**80137.00**
Health Center /Hospital						
1	Primary Health center	19.68	Right	Partially	Entry to be shifted left side approach road with new gate, boundary wall, noise & dust barrier	123961.00

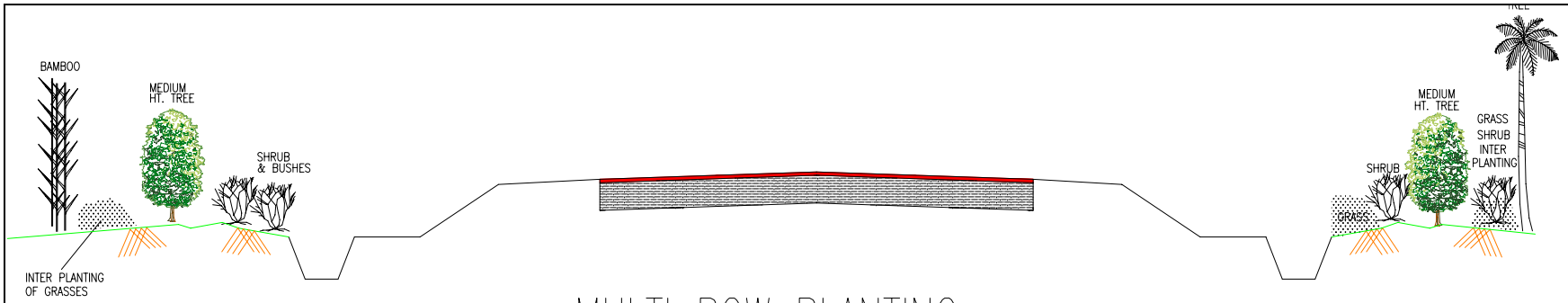
2	Hatadihi Dispensary	29.25	Left	Partially	Boundary wall with noise cum dust filter.	85789.00
3	Primary Health center	45.8	Left	Partially	Boundary wall with noise cum dust filter	85789.00
	Total					**295539.00**
Schools						
1	ITI School	5.75	Left	Partially	Boundary wall and noise cum dust filter and site enhancement Plantation 20nos.	124159.75
2	Engineering College Barapada	8.32	Left	Partially	Boundary wall and noise cum dust filter and site enhancement Plantation 30nos.	124259.125
3	School	18	Left	Partially	Boundary wall with interception wall and noise cum dust filter and site enhancement Plantation 40nos.	124358.5
4	School	18.08	Left	Partially	Site enhancement planting outside boundary wall noise & dust barrier with gate 30nos.	124259.125
5	School	19.98	Right	Partially	Site enhancement planting along the boundary wall 40nos.	397.5
6	Bantha Girl School	20	Left	Partially	Construction of new affected building and shifting of gate to pond side road with new gate boundary wall with noise & dust mitigation, metal barricade @2759/- per rmt for 7mtr on pond side to prevent accidental fall into the pond.	143274.00
7	School	30.2	Right	Partially	New boundary wall, gate, noise & dust mitigation.	123961.00
8	College	30.3	Right	Partially	Boundary wall noise & dust barrier with gate, site enhancement planting 30nos.	124259.125

9	School	34.9	Left	Partially	Boundary wall noise & dust barrier with gate, site enhancement planting 30nos.	124259.125
10	School	36.25	Left	Partially	Boundary wall noise & dust barrier with gate, site enhancement planting in side 50nos.	124457.875
11	School	43.9	Left	Partially	Shifting of gate to the side road with noise & dust barrier and enhancement planting on approach road 30nos.	124259.125
12	School	44.3	Left	Partially	Planting of 30 trees as noise & dust barricade	26396.25
13	School	44.7	Right	Partially	Site enhancement planting with noise & dust barrier interception barricade	167736.00
14	School	45.1	Right	Partially	New boundary wall with noise & dust mitigation and gate	123961.00
15	School	46.975	Left	Partially	Site enhancement planting inside, new boundary wall with noise & dust barrier 30nos.	124259.125
Total						**1704256.63**

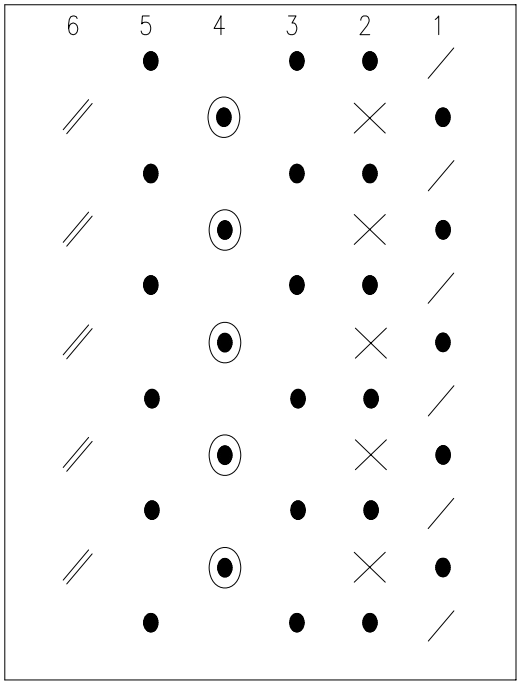
Annexure - XXXXI
Maintenance of Haulage roads

Sl. No.	Name of the Quarry	Length of haulage road in km	Type of carriageway	Qty required	Rate per cum as per technical specification clause 3002	Approximate quantity to be transported in cum	Cost of maintenance
1	Bagudi stone quarry Coarse aggregate, Fine aggregate and GSB Material	43	NH-5 - 34km, Kachha road 9km	considering 40% length to be maintained of kachha portion =9000 x 4m width x 0.2m thick for 2 occurances	55.00	5760.00	316800.00
3	Sand from river Baitarani near Sathipur	37	NH-5 34km, Kachha road 3km	considering 40% length to be maintained of kachha portion= 3000 x 4m width x 0.2m thick for 2 occurances	55.00	1920.00	105600.00
5	GSB and Murrom quarry	43	SH-53 - 30 km, Kachha road 2km	considering 40% length to be maintained of kachha portion= 2000 x 4m width x 0.2m thick for 2 occurances	55.00	1280.00	70400.00
Total							**492800.00**

ANNEXURE – XXXXIII (A)



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 – XXXXIII (B)

WILD LIFE UNDER PASS ON DRY LAND/FOREST TRACK

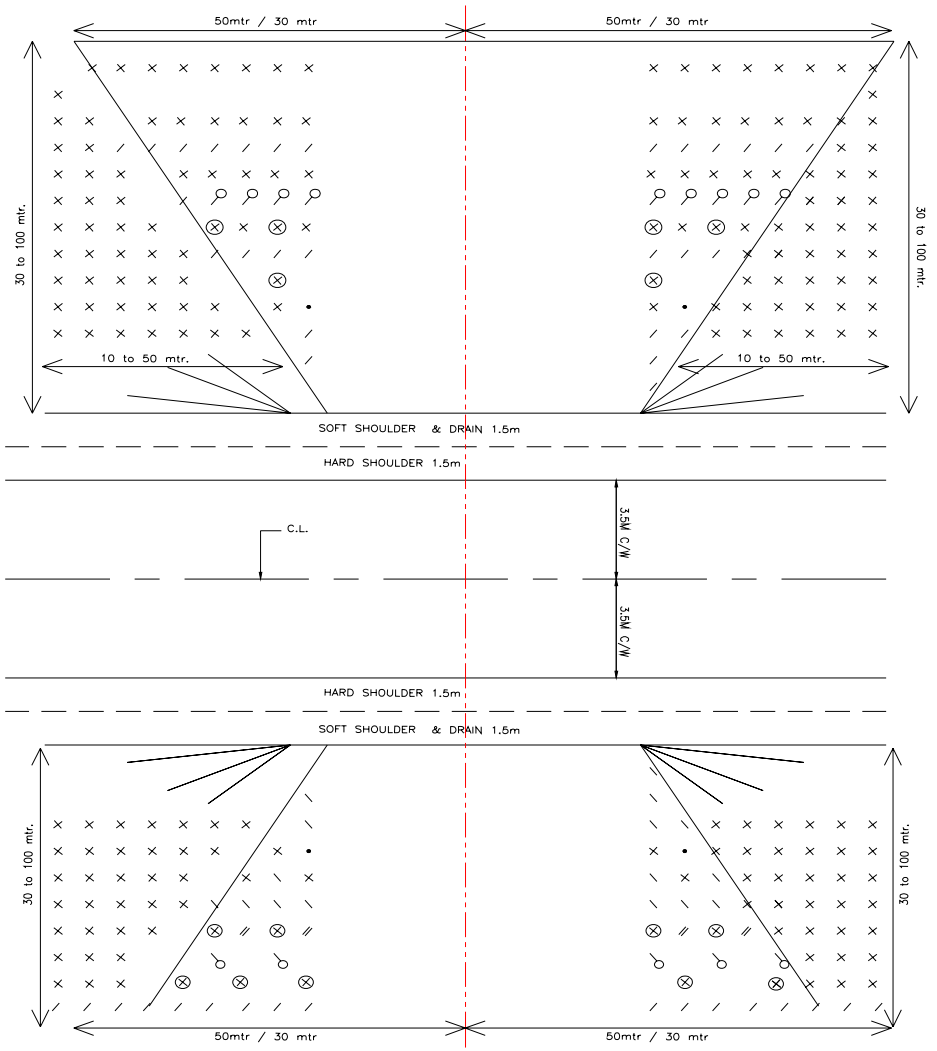
FOR BEAR / ELEPHANTS UNGULATES

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

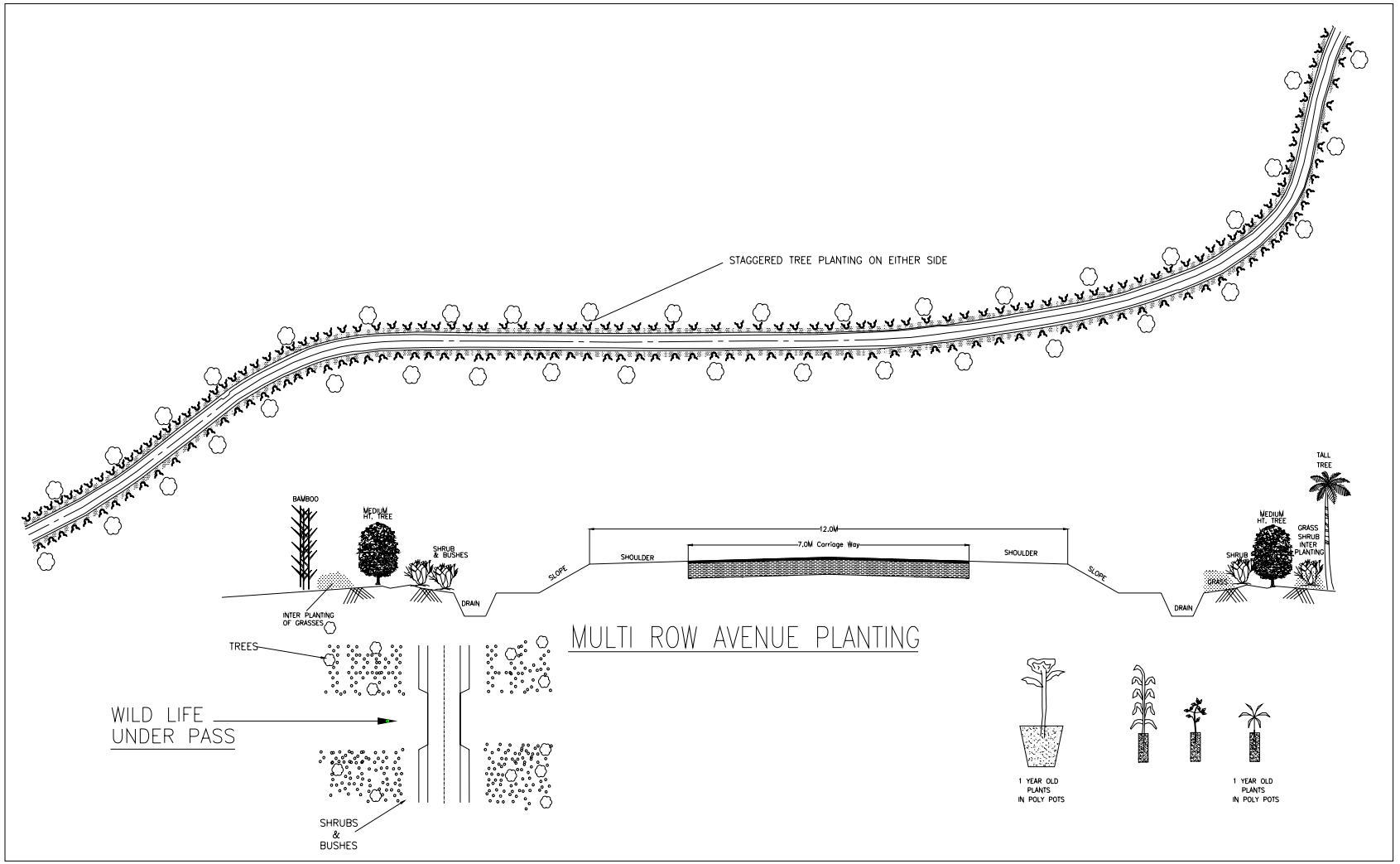
FOR OTHERS — 30Mtr. on Either side of the Opening & & Both Side of the Road

LEGEND

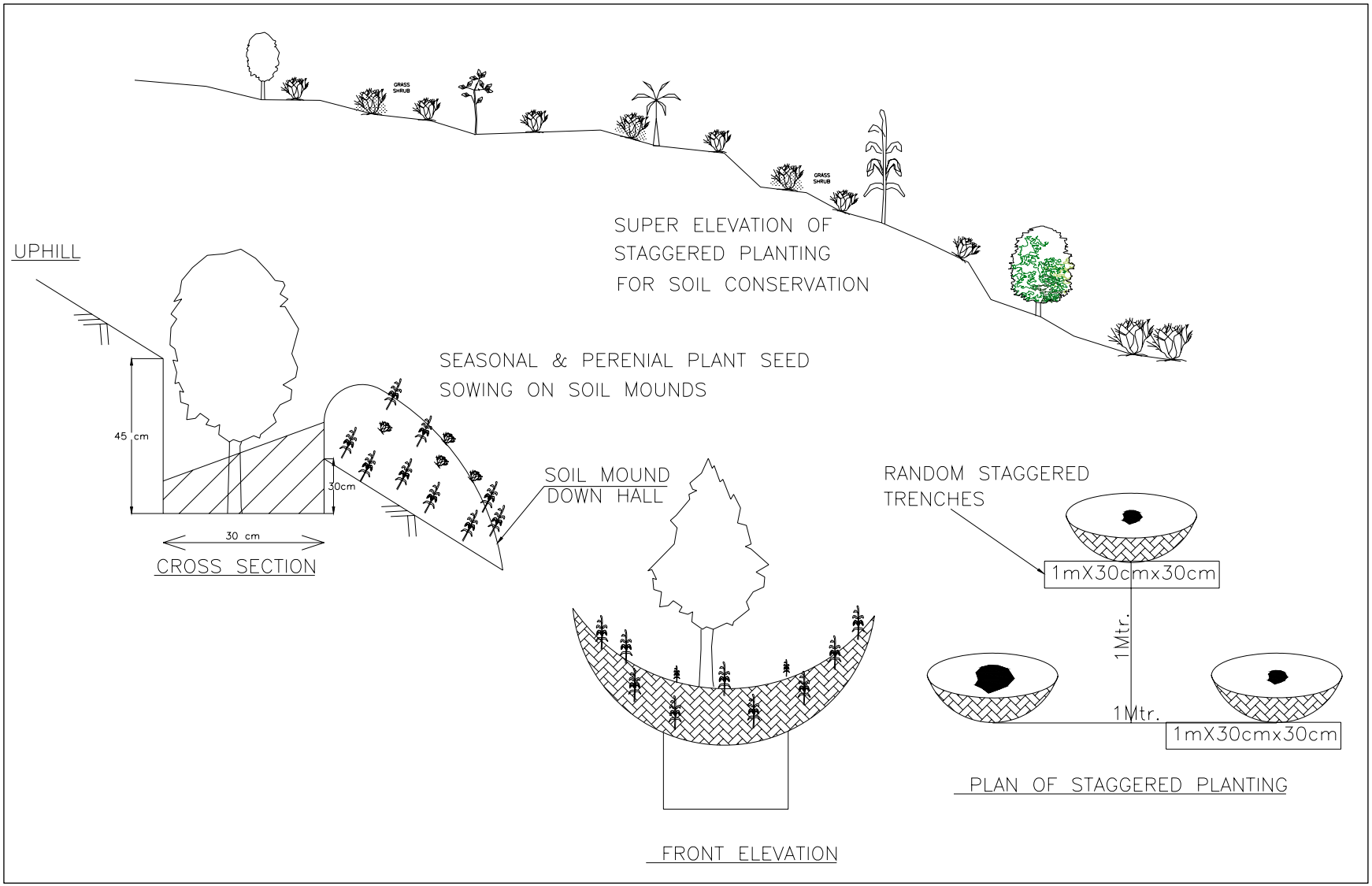
1. × GRASS SLIPS 30CM TO 1MTR APPART
2. • EVER GREEN SHRUBS 1 X 1Mtr.
3. // SEMI EVERGREEN AND DECIDUOUS SHRUBS 1M X 1M
4. / KHUS & SABAI GRASS PLANTING
5. ⊗ TALL TREES WITH FRUITS & FLOWER 2M X 2M STAGGERED.
6. ⚲ CLIMBERS / SHRUBBY CLIMBER CRAWLING OR 2.5 X 2.5 Mtr. ON GROUND

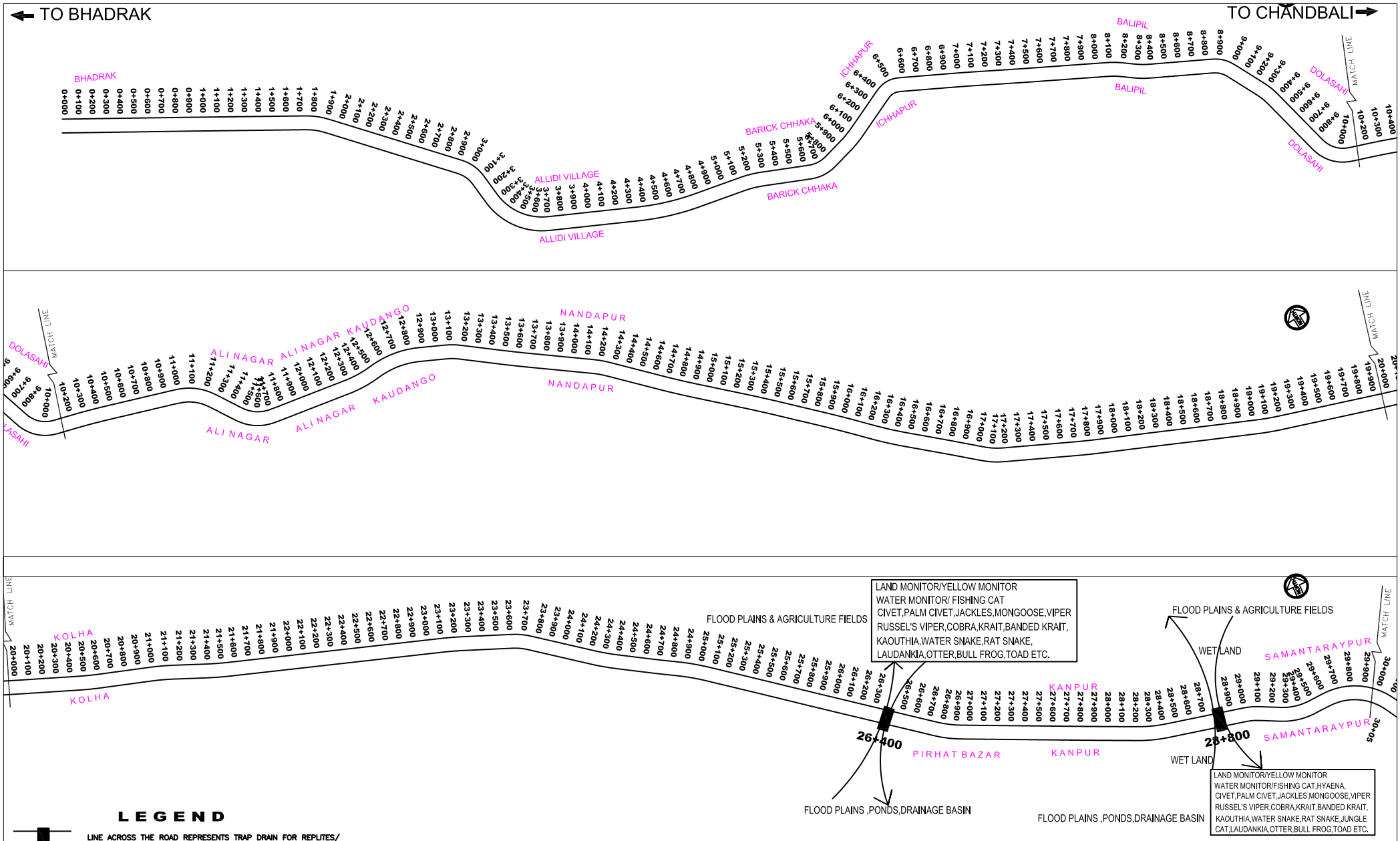


ANNEXURE – XXXXIII (C)



ANNEXURE – XXXXIII (D)



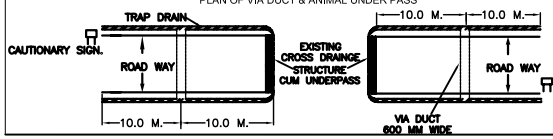


LEGEND

LINE ACROSS THE ROAD REPRESENTS TRAP DRAIN FOR REPLITES/ AMPHIBIANS/RODENTS WITH CAMOUFLAPED PLATATION ON BOTH SIDE WITH VIA DUCTS, UNDER PASS & SIGNAGE

NOTE:- REFLECTORS AND SIGNAGE SHALL BE PROVIDED ON BOTH SIDE OF ROAD BEFORE 20 M. OF ALL WILD LIFE PASS AND CROSS OVER POINTS.

PLAN OF VIA DUCT & ANIMAL UNDER PASS



CEG
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PROJECT:-

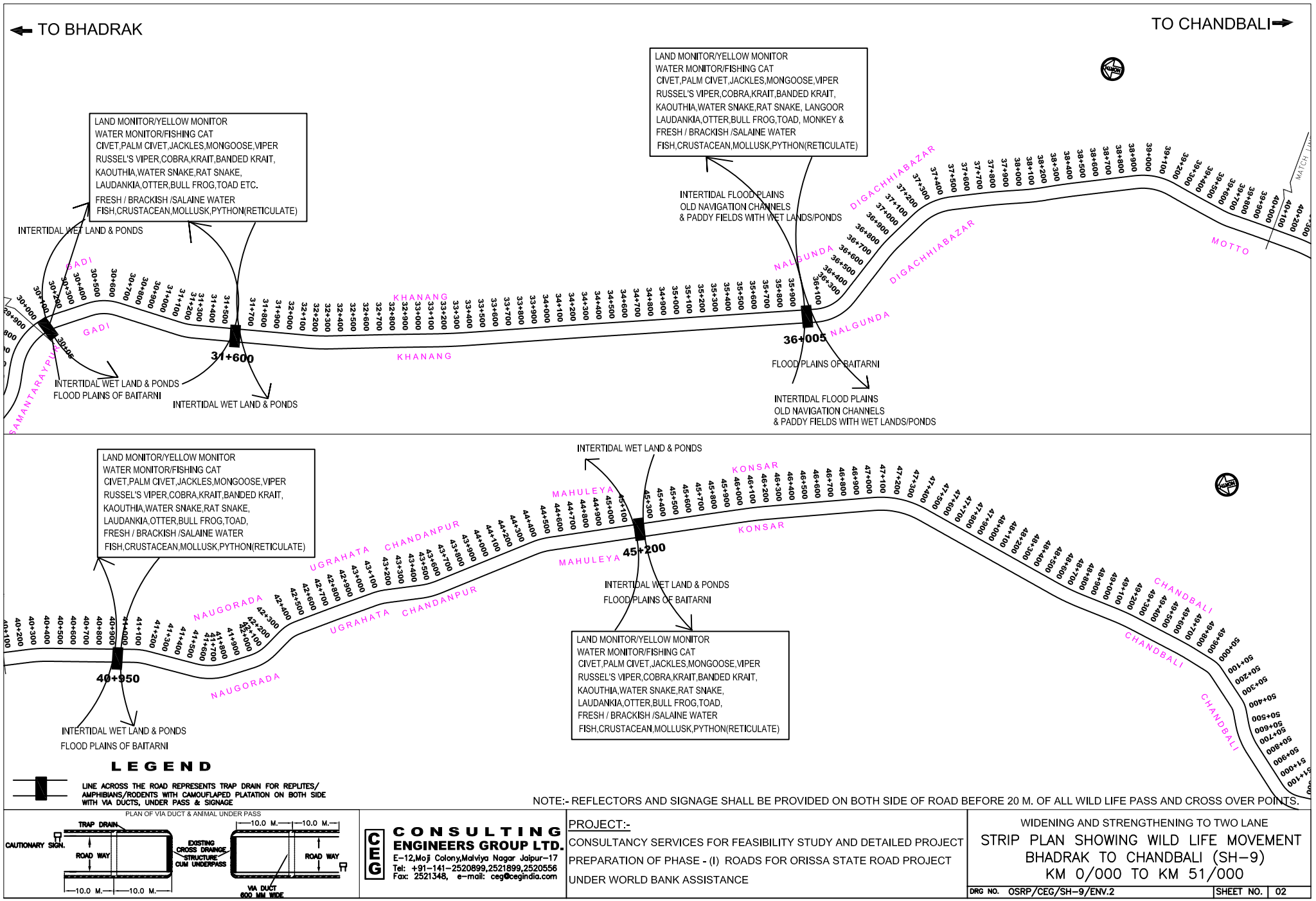
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

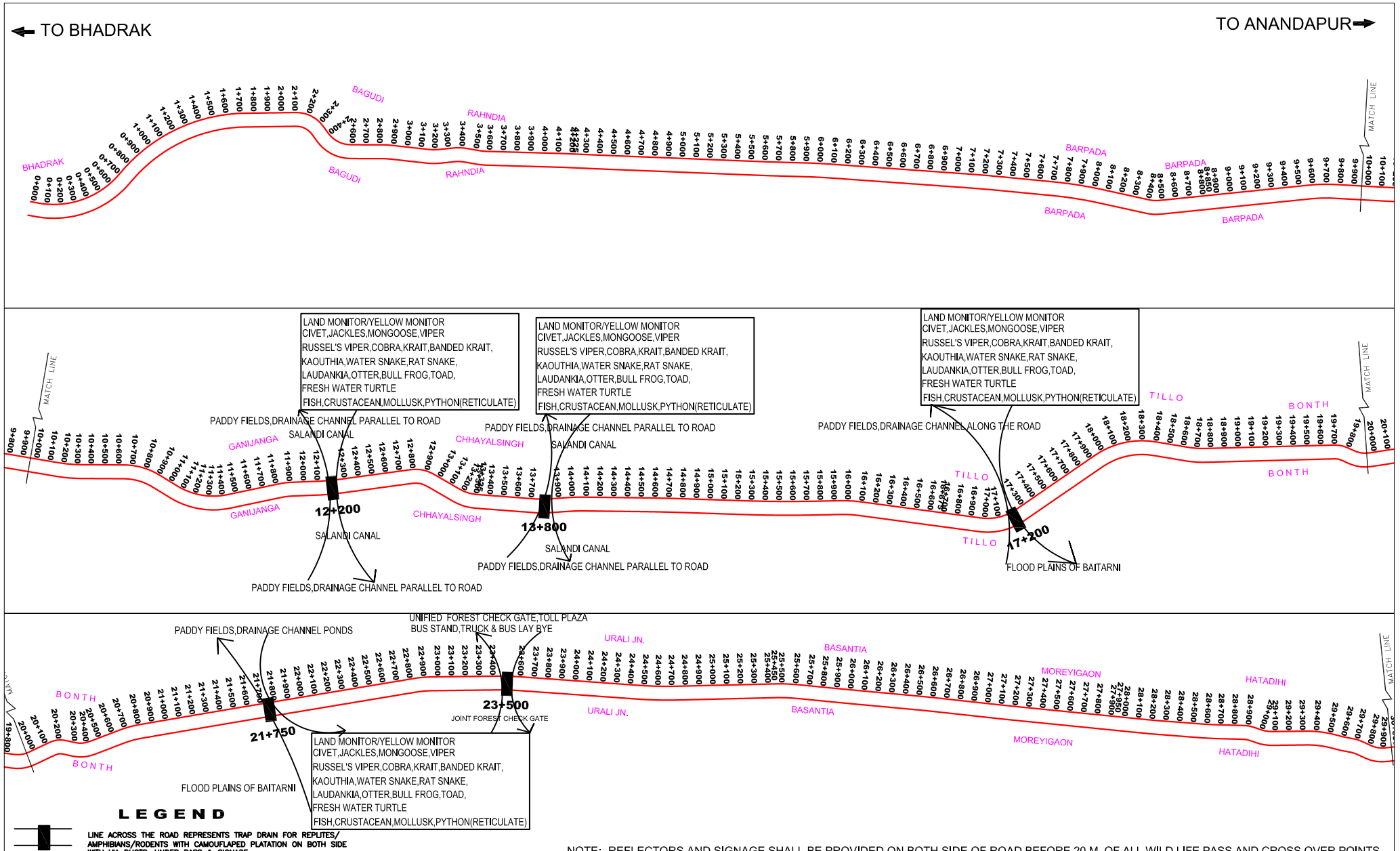
WIDENING AND STRENGTHENING TO TWO LANE

STRIP PLAN SHOWING WILD LIFE MOVEMENT BHADRAK TO CHANDBALI (SH-9) KM 0/000 TO KM 51/000

DRG NO. OSRP/CEG/SH-9/ENV.1 | SHEET NO. 01

ANNEXURE: XXXXIV-A


TO BHADRAK
TO CHANDBALI
LAND MONITOR/YELLOW MONITOR
WATER MONITOR/FISHING CAT
CIVET,PALM CIVET,JACKLES,MONGOOSE,VIPER
RUSSEL'S VIPER,COBRA,KRAIT,BANDED KRAIT,
KAOUTHIA,WATER SNAKE,RAT SNAKE,
LAUDANKIA,OTTER,BULL FROG,TOAD ETC.
FRESH / BRACKISH /SALAINE WATER
FISH,CRUSTACEAN,MOLLUSK,PYTHON(RETICULATE)
INTERTIDAL WET LAND & PONDS
LAND MONITOR/YELLOW MONITOR
WATER MONITOR/FISHING CAT
CIVET,PALM CIVET,JACKLES,MONGOOSE,VIPER
RUSSEL'S VIPER,COBRA,KRAIT,BANDED KRAIT,
KAOUTHIA,WATER SNAKE,RAT SNAKE, LANGOOR
LAUDANKIA,OTTER,BULL FROG,TOAD, MONKEY &
FRESH / BRACKISH /SALAINE WATER
FISH,CRUSTACEAN,MOLLUSK,PYTHON(RETICULATE)
INTERTIDAL FLOOD PLAINS
OLD NAVIGATION CHANNELS
& PADDY FIELDS WITH WET LANDS/PONDS
GADI
KHANANG
NALGUNDA
DIGACHHIABAZAR
MOTTO
SAMANTARAYPUR
31+600
36+005
INTERTIDAL WET LAND & PONDS
FLOOD PLAINS OF BAITARNI
INTERTIDAL WET LAND & PONDS
FLOOD PLAINS OF BAITARNI
INTERTIDAL FLOOD PLAINS
OLD NAVIGATION CHANNELS
& PADDY FIELDS WITH WET LANDS/PONDS
LAND MONITOR/YELLOW MONITOR
WATER MONITOR/FISHING CAT
CIVET,PALM CIVET,JACKLES,MONGOOSE,VIPER
RUSSEL'S VIPER,COBRA,KRAIT,BANDED KRAIT,
KAOUTHIA,WATER SNAKE,RAT SNAKE,
LAUDANKIA,OTTER,BULL FROG,TOAD,
FRESH / BRACKISH /SALAINE WATER
FISH,CRUSTACEAN,MOLLUSK,PYTHON(RETICULATE)
INTERTIDAL WET LAND & PONDS
MAHULEYA
KONSAR
UGRAHATA
CHANDANPUR
NAUGORADA
CHANDBALI
45+200
40+950
INTERTIDAL WET LAND & PONDS
FLOOD PLAINS OF BAITARNI
INTERTIDAL WET LAND & PONDS
FLOOD PLAINS OF BAITARNI
LAND MONITOR/YELLOW MONITOR
WATER MONITOR/FISHING CAT
CIVET,PALM CIVET,JACKLES,MONGOOSE,VIPER
RUSSEL'S VIPER,COBRA,KRAIT,BANDED KRAIT,
KAOUTHIA,WATER SNAKE,RAT SNAKE,
LAUDANKIA,OTTER,BULL FROG,TOAD,
FRESH / BRACKISH /SALAINE WATER
FISH,CRUSTACEAN,MOLLUSK,PYTHON(RETICULATE)
LEGEND
LINE ACROSS THE ROAD REPRESENTS TRAP DRAIN FOR REPLITES/
AMPHIBIANS/RODENTS WITH CAMOUFLAPED PLATATION ON BOTH SIDE
WITH VIA DUCTS, UNDER PASS & SIGNAGE
NOTE:- REFLECTORS AND SIGNAGE SHALL BE PROVIDED ON BOTH SIDE OF ROAD BEFORE 20 M. OF ALL WILD LIFE PASS AND CROSS OVER POINTS.
PLAN OF VIA DUCT & ANIMAL UNDER PASS
TRAP DRAIN
CAUTIONARY SIGN.
ROAD WAY
EXISTING CROSS DRAINGE STRUCTURE CUM UNDERPASS
10.0 M.
VIA DUCT 600 MM WIDE
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
WIDENING AND STRENGTHENING TO TWO LANE
STRIP PLAN SHOWING WILD LIFE MOVEMENT
BHADRAK TO CHANDBALI (SH-9)
KM 0/000 TO KM 51/000
DRG NO. OSRP/CEG/SH-9/ENV.2
SHEET NO. 02
ANNEXURE: XXXXIV-A



NOTE:- REFLECTORS AND SIGNAGE SHALL BE PROVIDED ON BOTH SIDE OF ROAD BEFORE 20 M. OF ALL WILD LIFE PASS AND CROSS OVER POINTS.

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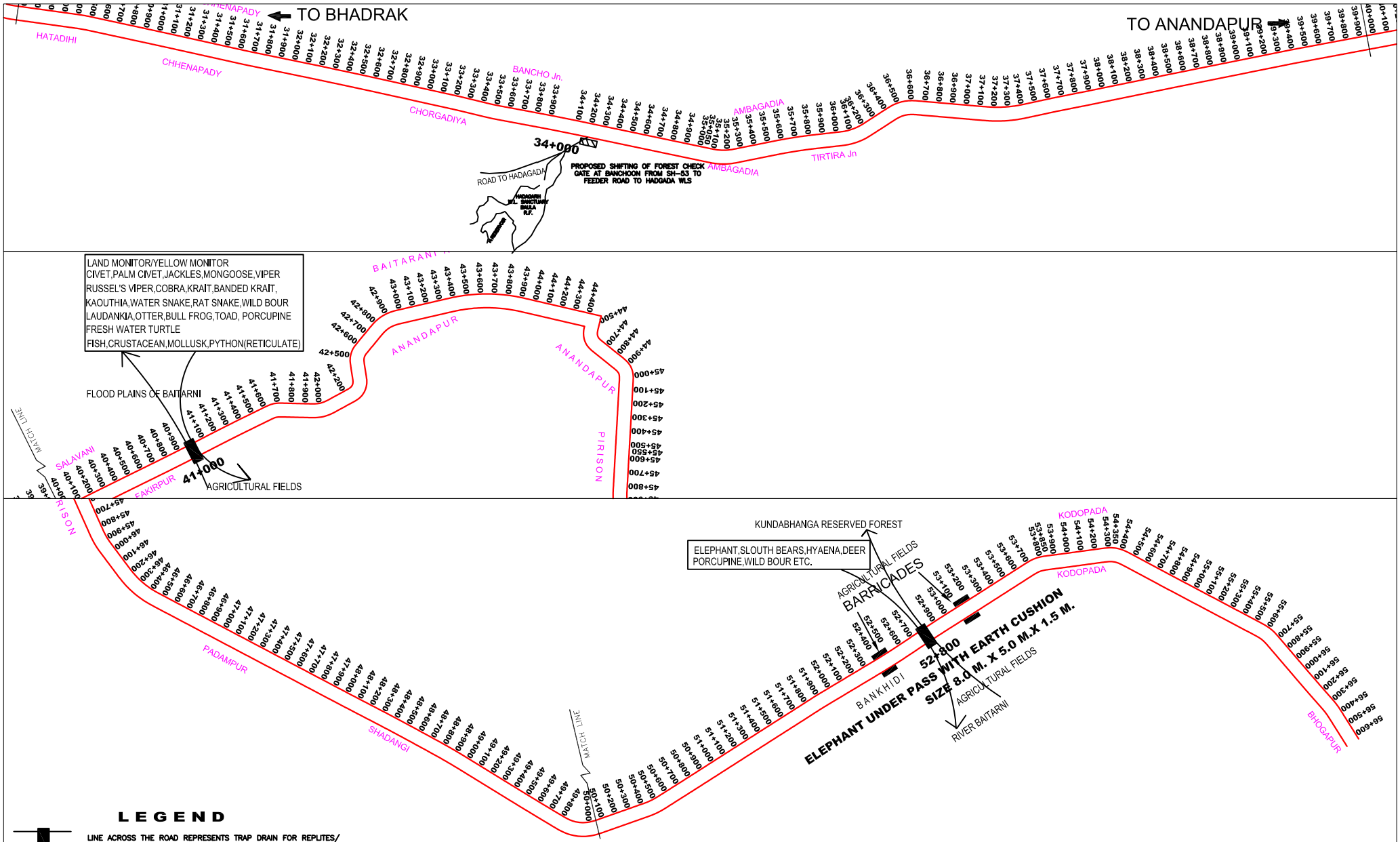
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

WIDENING AND STRENGTHENING TO TWO LANE

STRIP PLAN SHOWING WILD LIFE MOVEMENT BHADRAK TO GHODBHANGA (SH-53) PART KM 0/000 TO KM 54/000

DRG NO. OSRP/CEG/SH-53/ENV.1 | SHEET NO. 01

ANNEXURE: XXXXIV-B

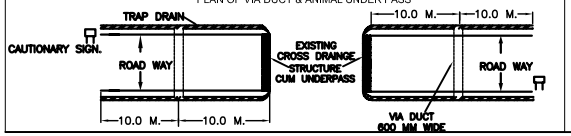


LEGEND

LINE ACROSS THE ROAD REPRESENTS TRAP DRAIN FOR REPLITES/ AMPHIBIANS/RODENTS WITH CAMOUFLAPED PLATATION ON BOTH SIDE WITH VIA DUCTS, UNDER PASS & SIGNAGE

NOTE:- REFLECTORS AND SIGNAGE SHALL BE PROVIDED ON BOTH SIDE OF ROAD BEFORE 20 M. OF ALL WILD LIFE PASS AND CROSS OVER POINTS.

PLAN OF VIA DUCT & ANIMAL UNDER PASS



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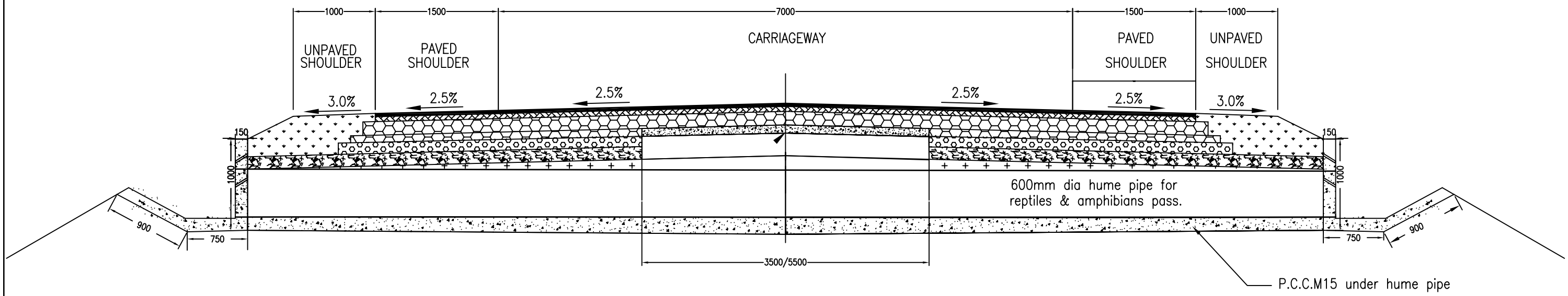
WIDENING AND STRENGTHENING TO TWO LANE

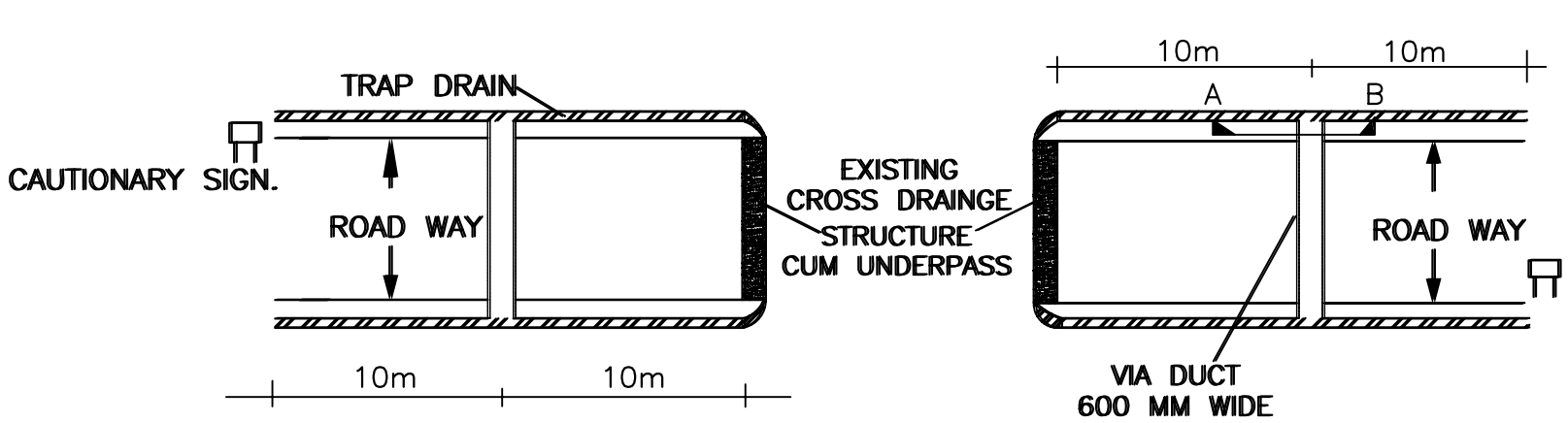
STRIP PLAN SHOWING WILD LIFE MOVEMENT BHADRAK TO GHODBHANGA (SH-53) PART KM 0/000 TO KM 54/000

DRG NO. OSRP/CEG/SH-53/ENV.2 | SHEET NO. 02

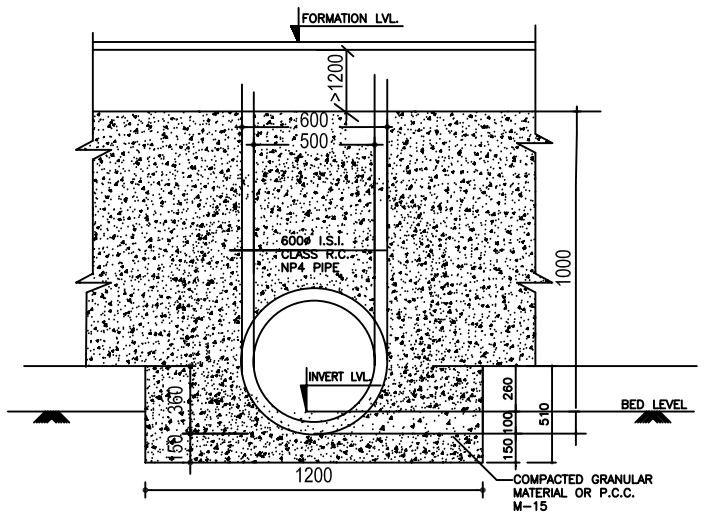
ANNEXURE: XXXXIV-B



CROSS SECTION OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS AT WET LANDS



PLAN OF REPTILES & AMPHIBIANS UNDERPASS WITH TRAP DRAINS



SECTION –A–B

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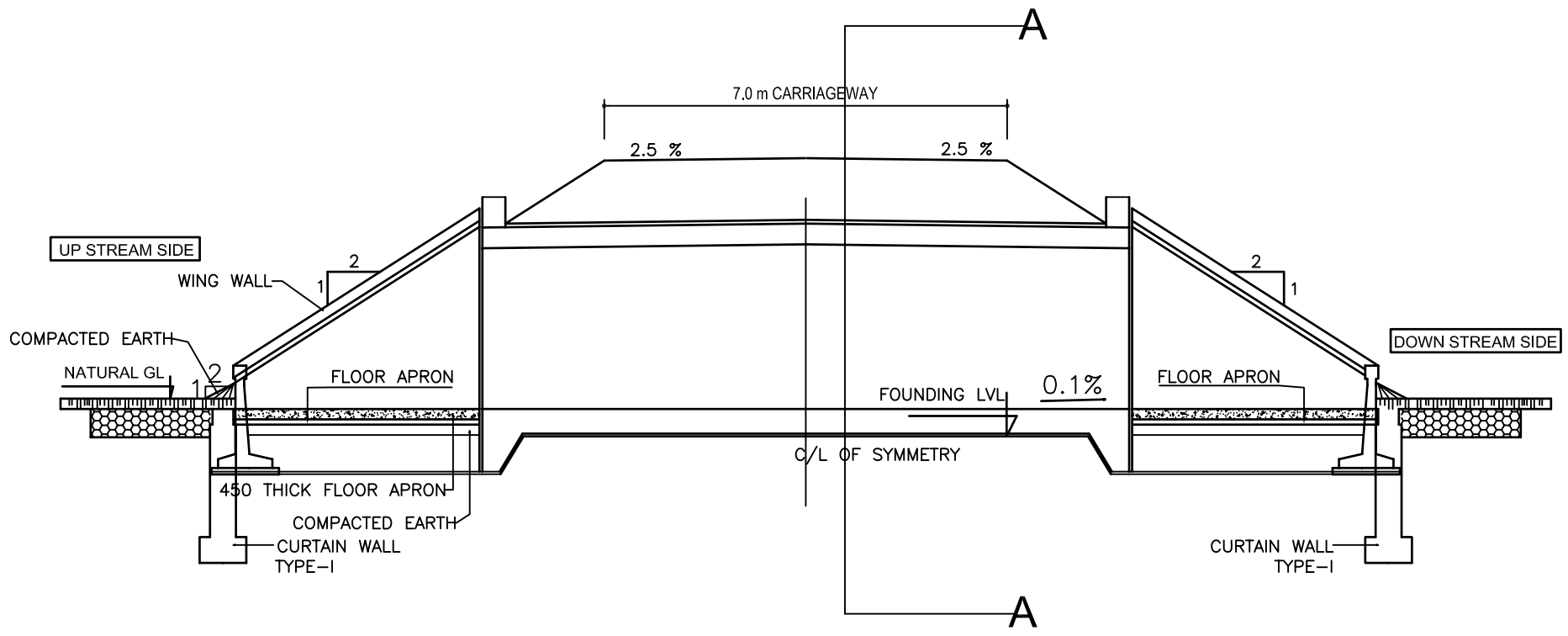
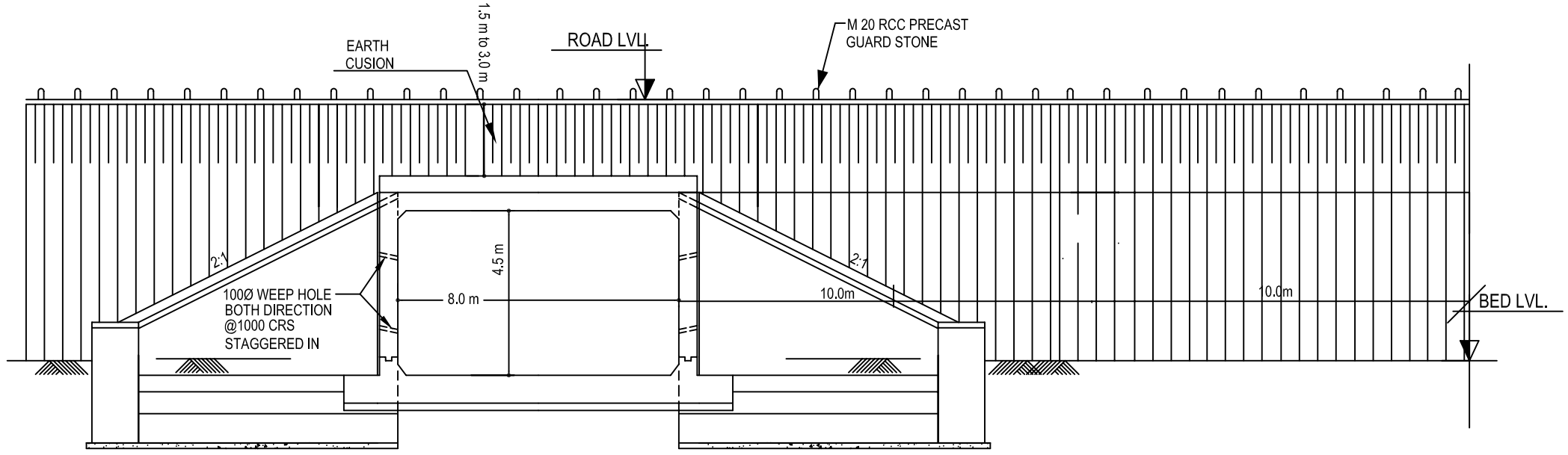
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

TRAP DRAIN WITH HUME PIPE VIA DUCT PASSAGE AT WET LAND LOCATIONS TO FACILITATE MOVEMENT ACROSS SH BY RODENTS/AMPHIBIANS/REPTILES/SMALL ANIMALS.

DRG NO.	OSRP/CEG/SH/ENV/12					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS								





SECTION A-A

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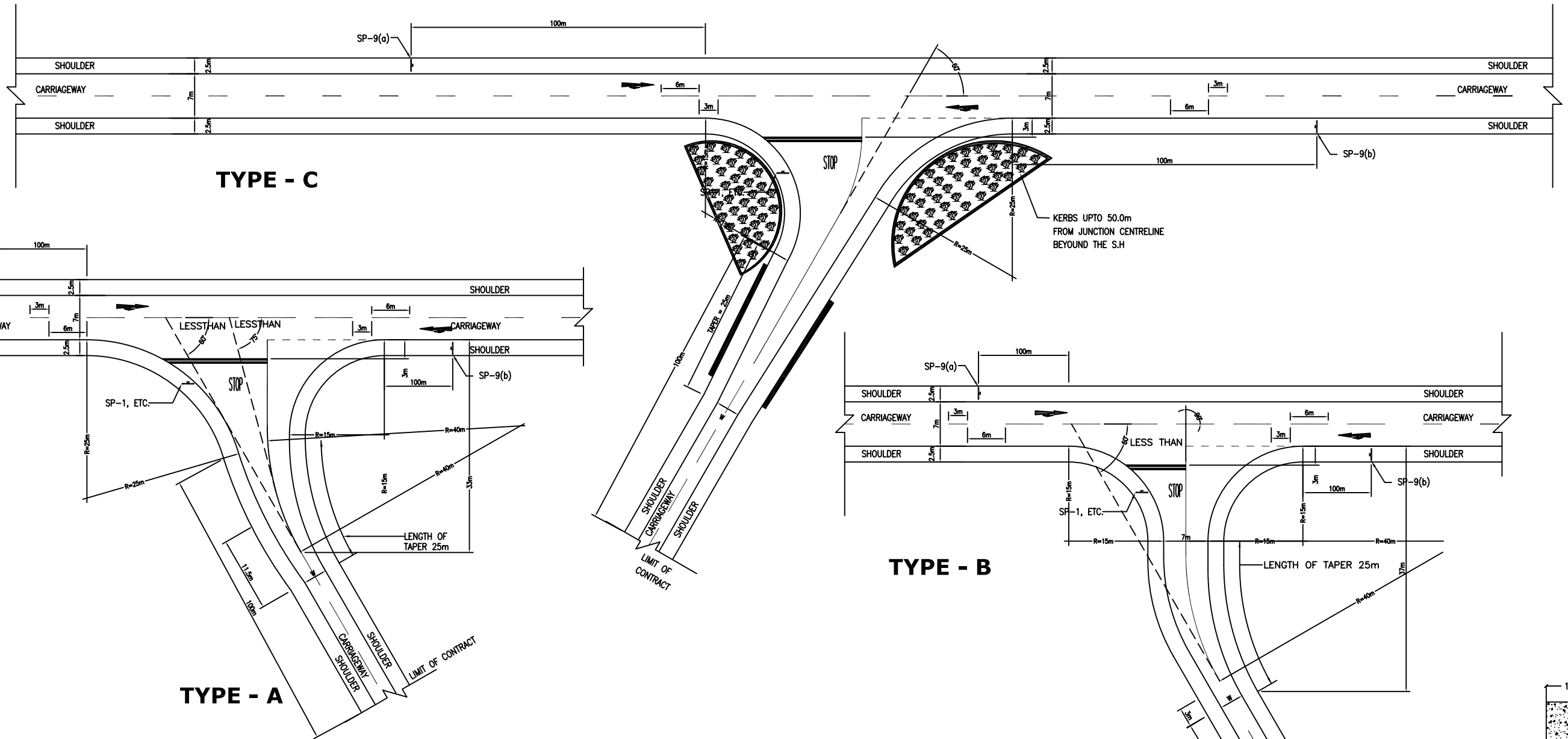
Tel: +91–141–2520899,2521899,2520556
Fax: 2521348, e–mail: ceg@cegindia.com

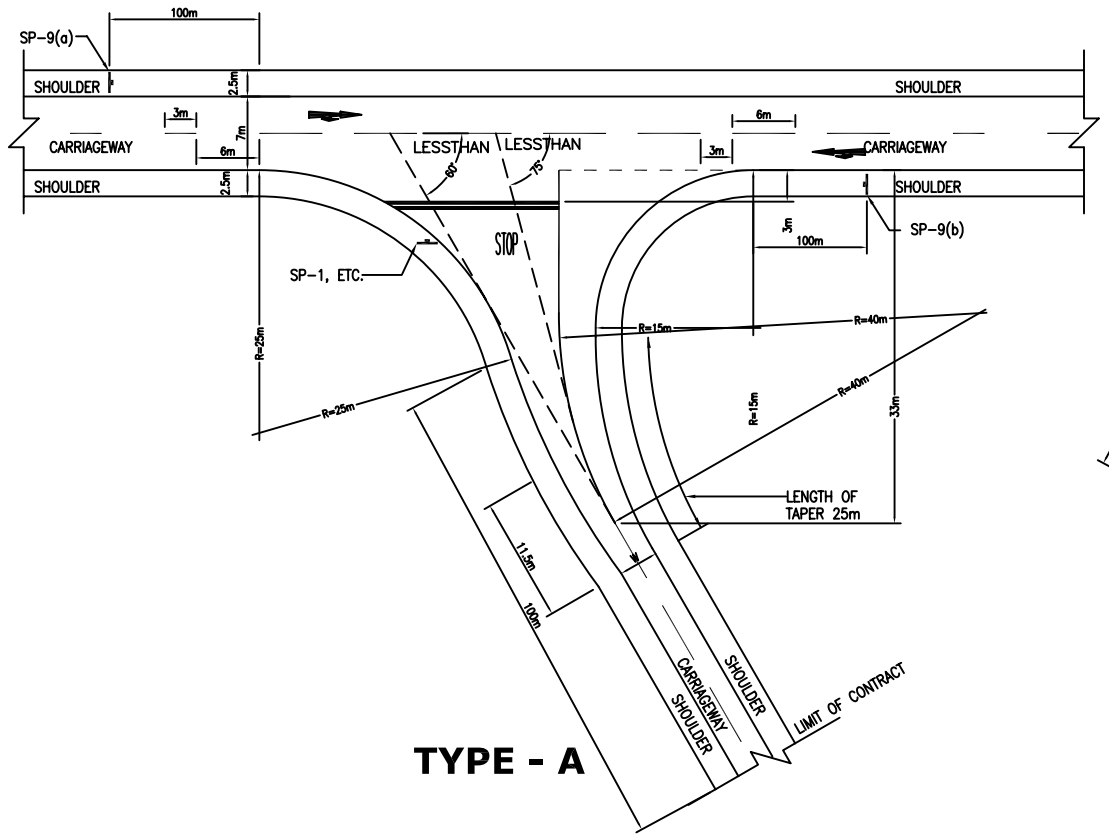
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

TRAP DRAIN WITH HUME PIPE VIA DUCT PASSAGE AT WET LAND LOCATIONS TO FACILITATE MOVEMENT ACROSS SH BY RODENTS/AMPHIBIANS/REPTILES/SMALL ANIMALS.

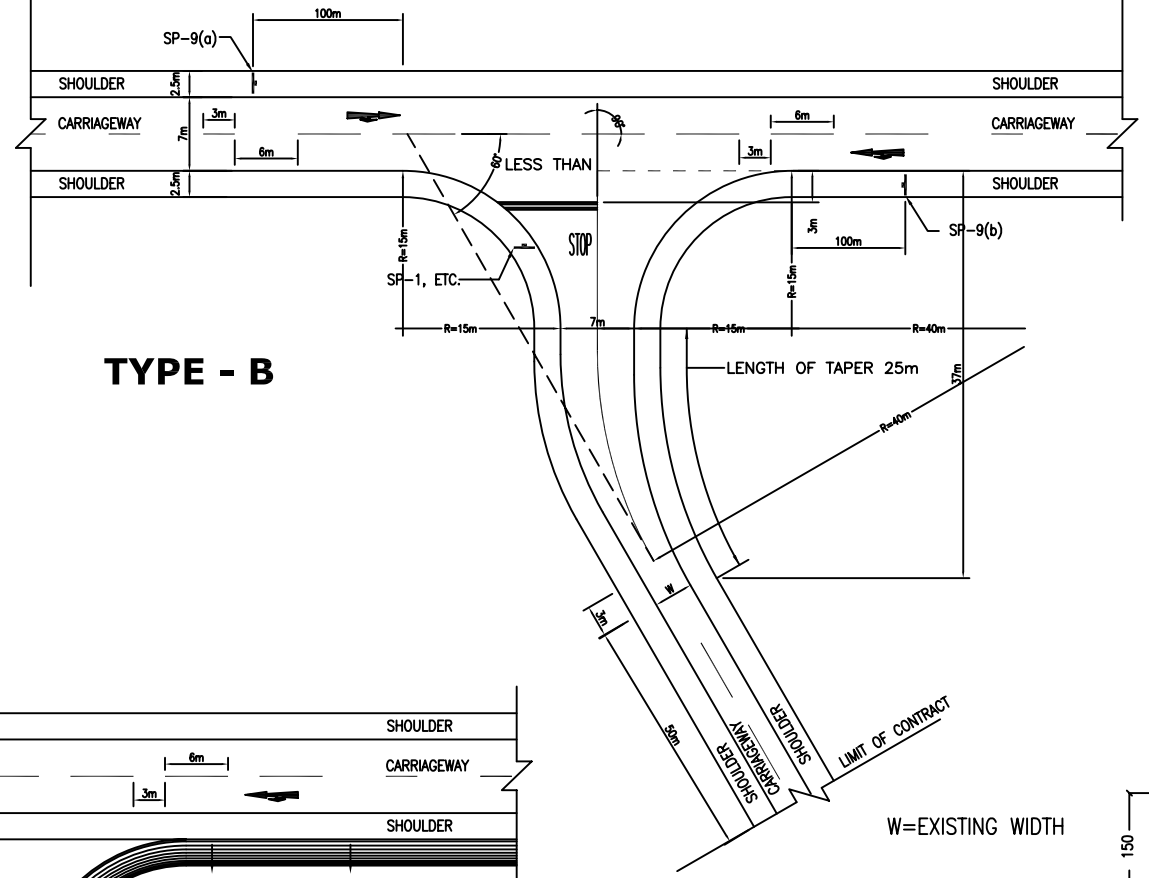
DRG NO.	OSRP/CEG/SH/ENV/11					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS								



TYPE - C



TYPE - A



TYPE - B

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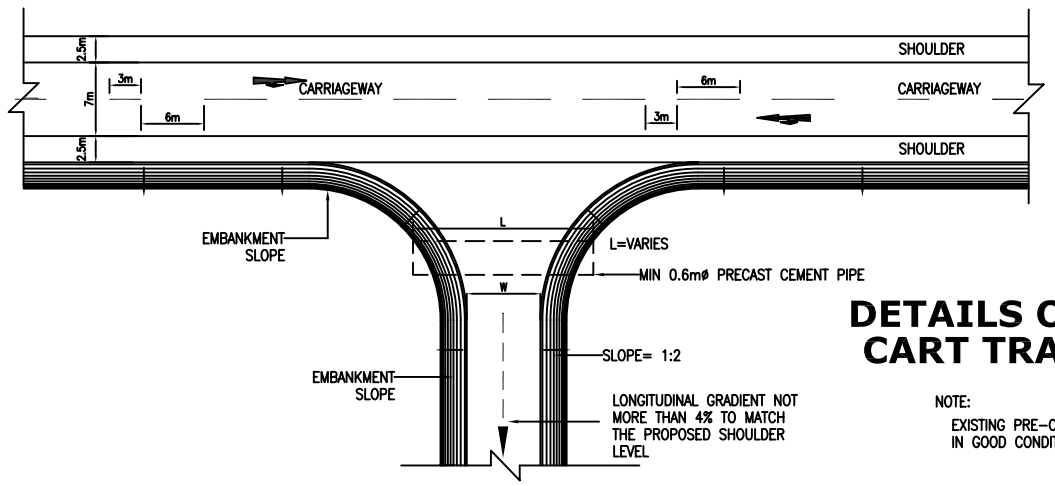
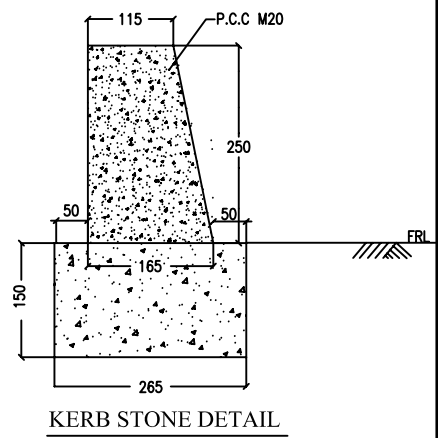


DETAILS OF CART TRACK

NOTE:
EXISTING PRE-CAST CEMENT CONCRETE PIPE IN GOOD CONDITION SHALL BE REUSED.



KERB STONE DETAIL

NOTE:
1. WHERE THE SIDE ROAD INTERSECTS THE MAIN ROAD AT ANGLES GREATER THAN 60°, THE DESIGN SHOWN AS 'C' CAN BE ADOPTED. WHERE THE ANGLES IS LESS THAN 60°. DESIGN 'A' OR 'B' CAN BE ADOPTED
2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING No. OSRP/CEG/RM/01 TO RM/02
3. FOR DETAILS REGARDING ROAD HUMP & OTHER SIGN BOARDS, MARKING REFER DRAWING No. OSRP/CEG/RH/RS/01
4. LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

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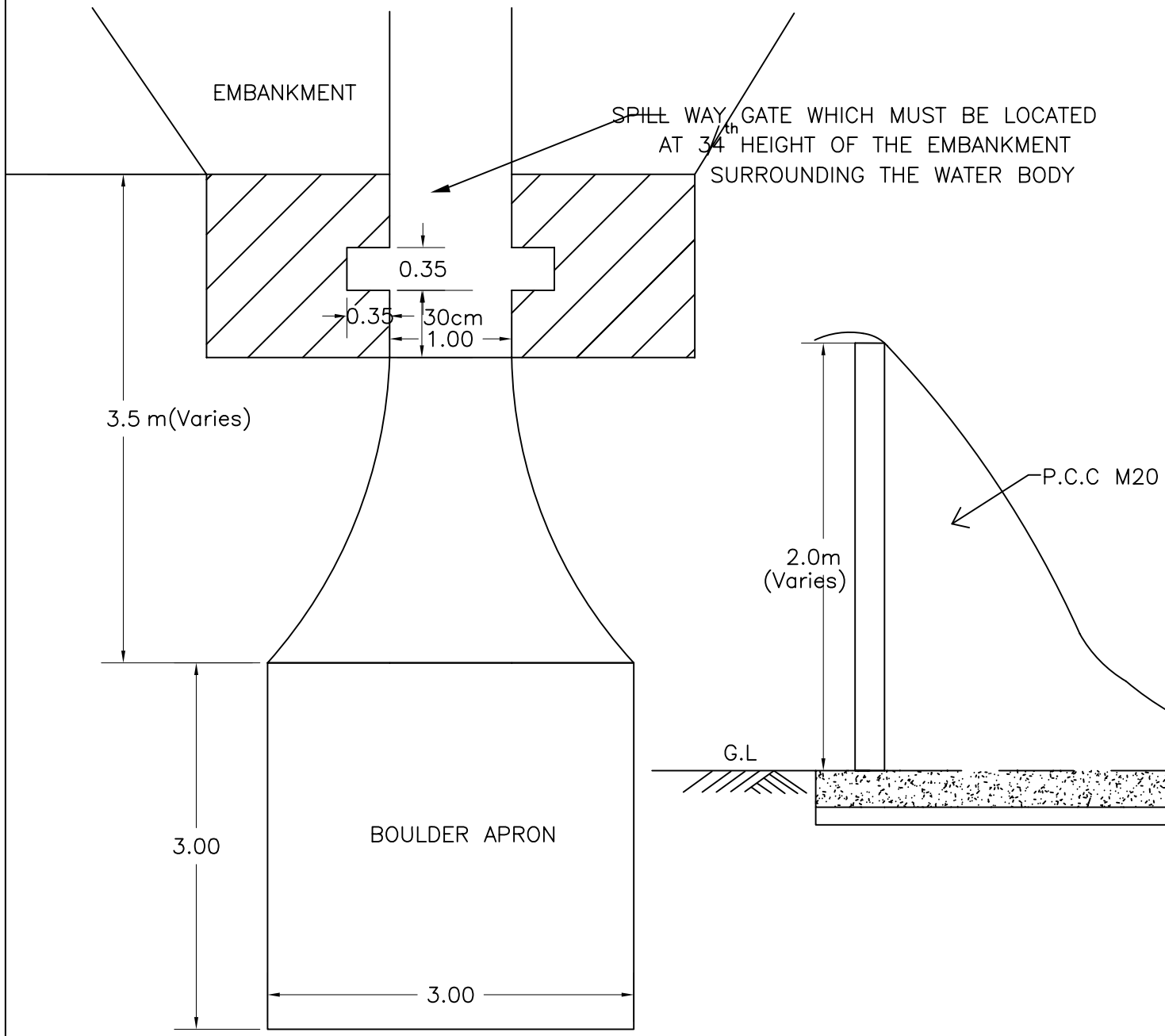
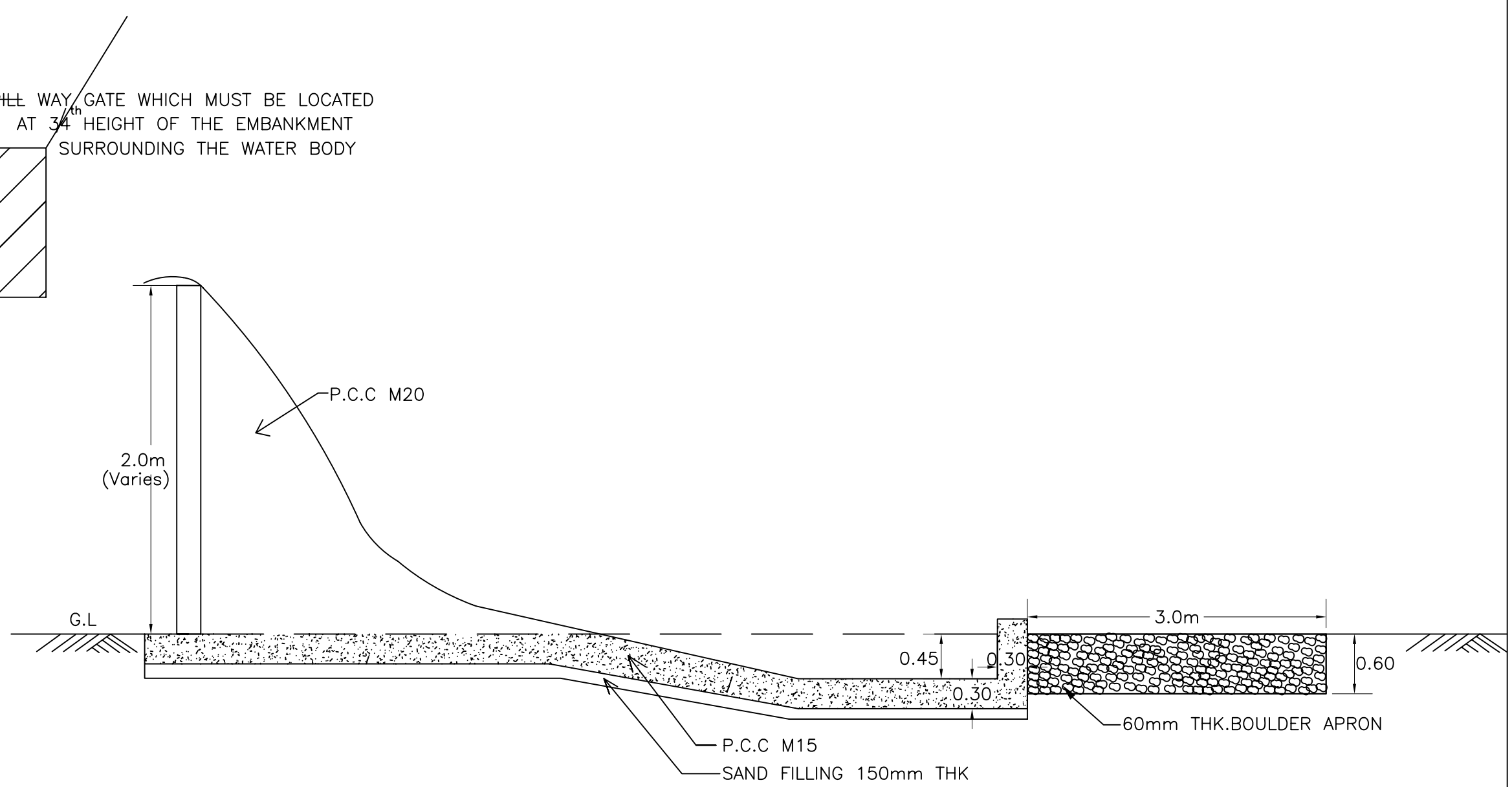
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL SITE ENHANCEMENT DESIGNS FOR ROAD JUNCTIONS AS ENVIRONMENTAL IMPACT MITIGATION.

DRG NO.	OSRP/CEG/SH/ENV/01-C					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS								



PLAN



DETAIL OF SPILL WAY GATE

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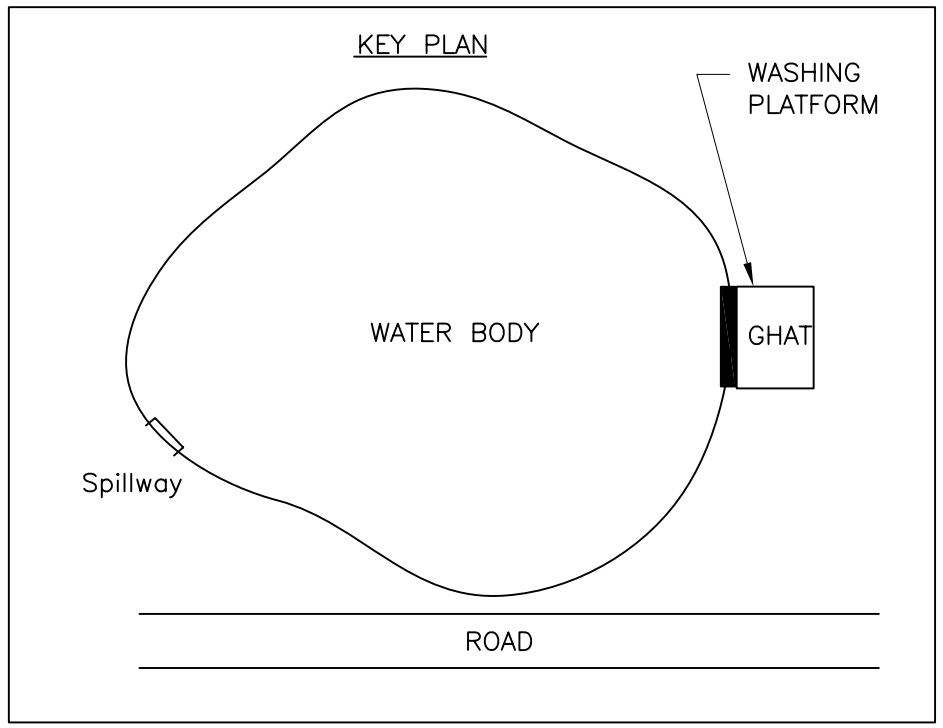
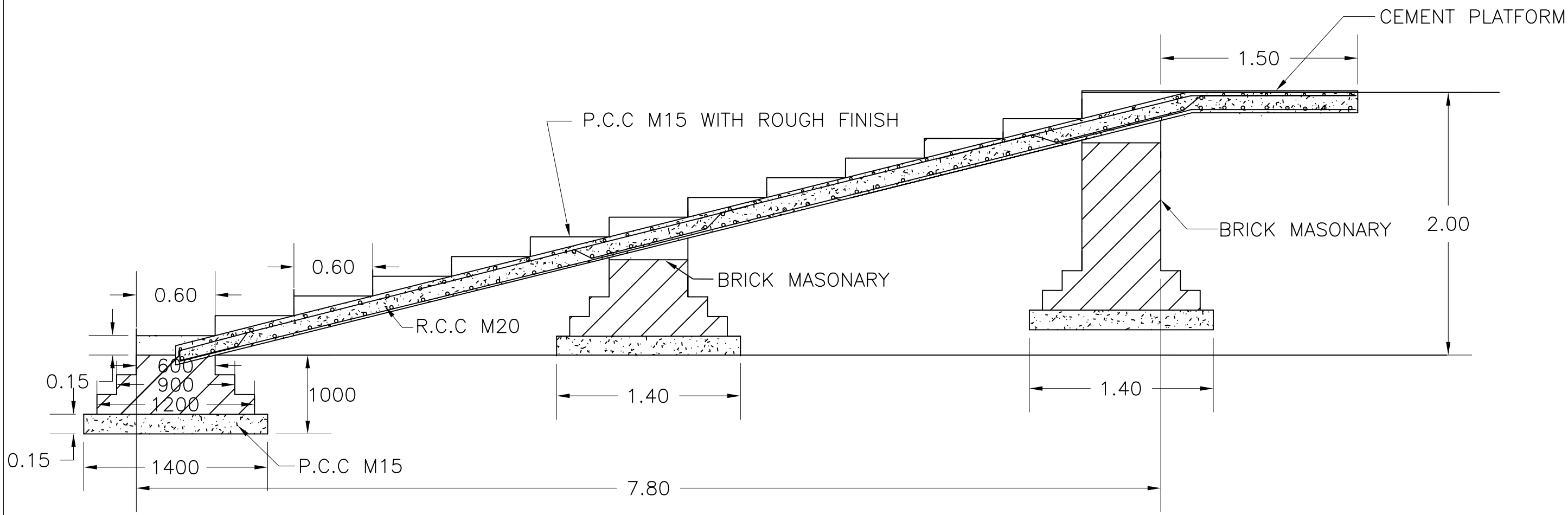
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL DESIGN FOR SPILLWAY GATE

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





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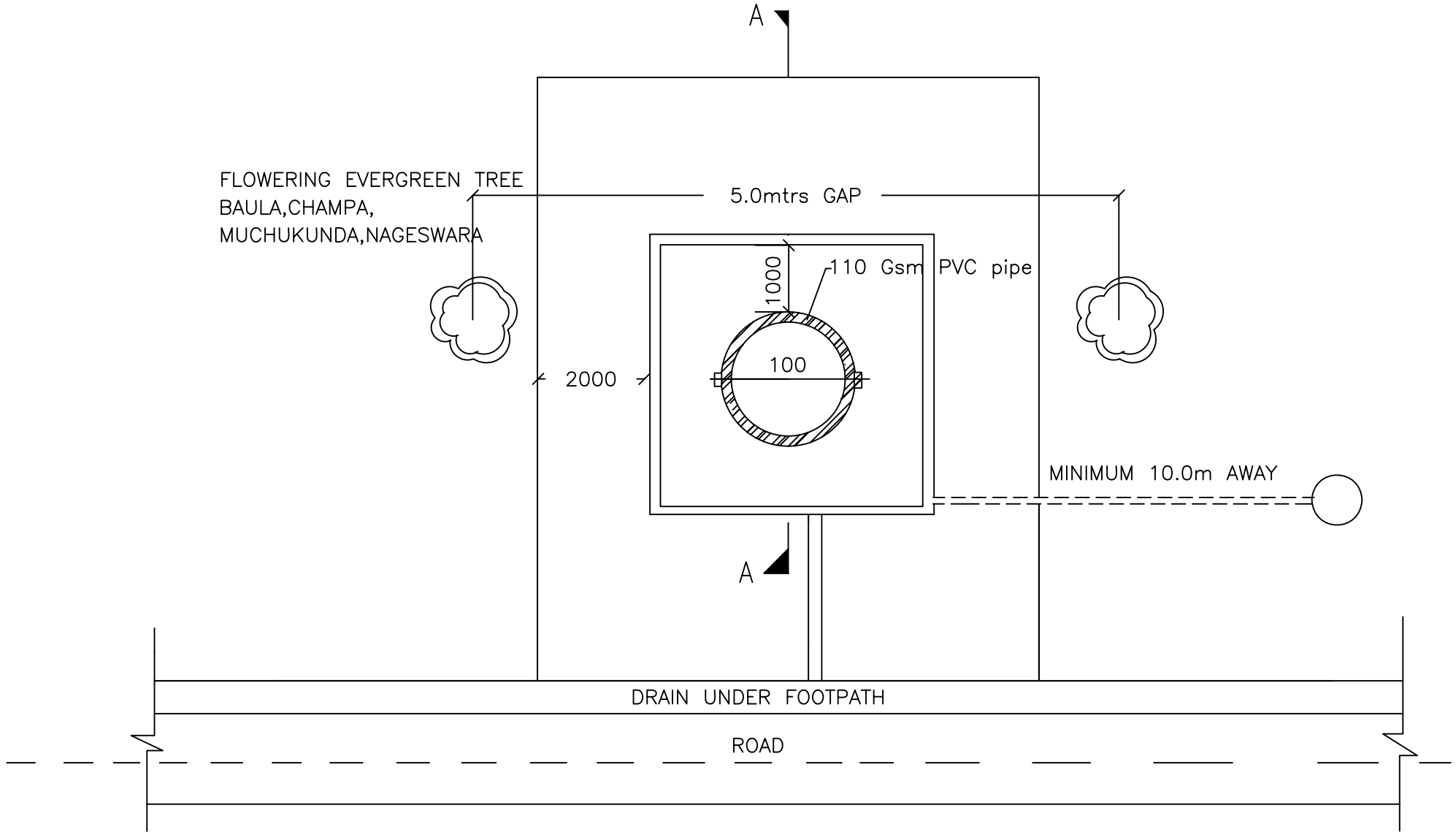
PROJECT:-

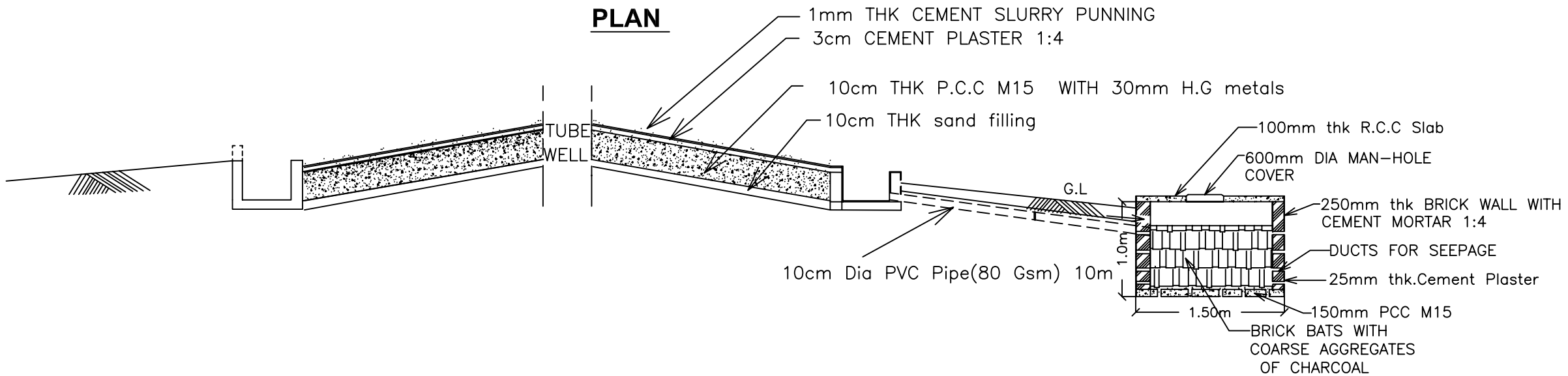
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL DESIGN FOR BATHING GHAT

DRG NO.	OSRP/CEG/SH/ENV/09				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



PLAN



SECTION OF SOAK PIT

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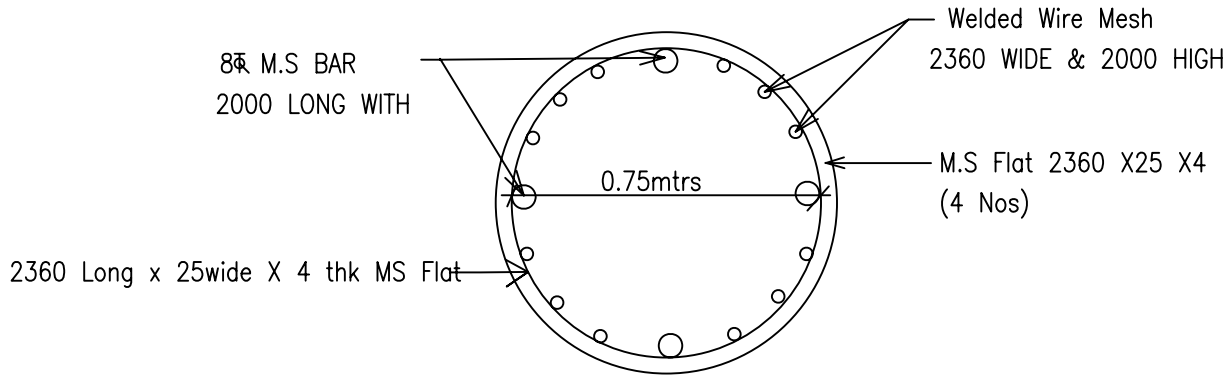
PROJECT:-

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

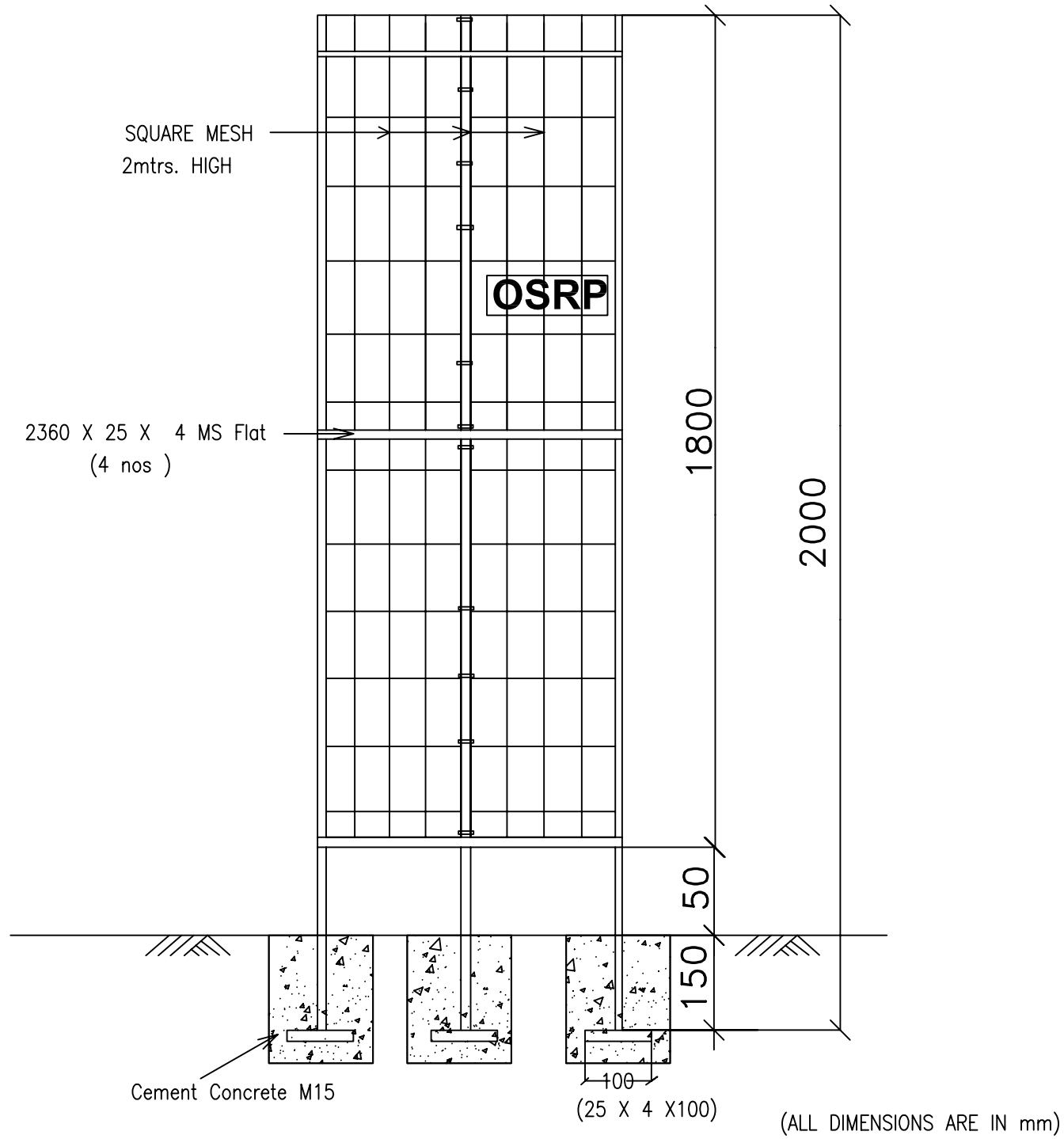
CONCEPTUAL C.C. PLATFORM AND DRAINAGE DESIGN FOR HAND PUMPS AND TAPS.

DRG NO.	OSRP/CEG/SH/ENV/07				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							

TREE GUARD



PLAN



ELEVATION

TYPICAL PLAN OF TREE GUARD WITH MS BARS

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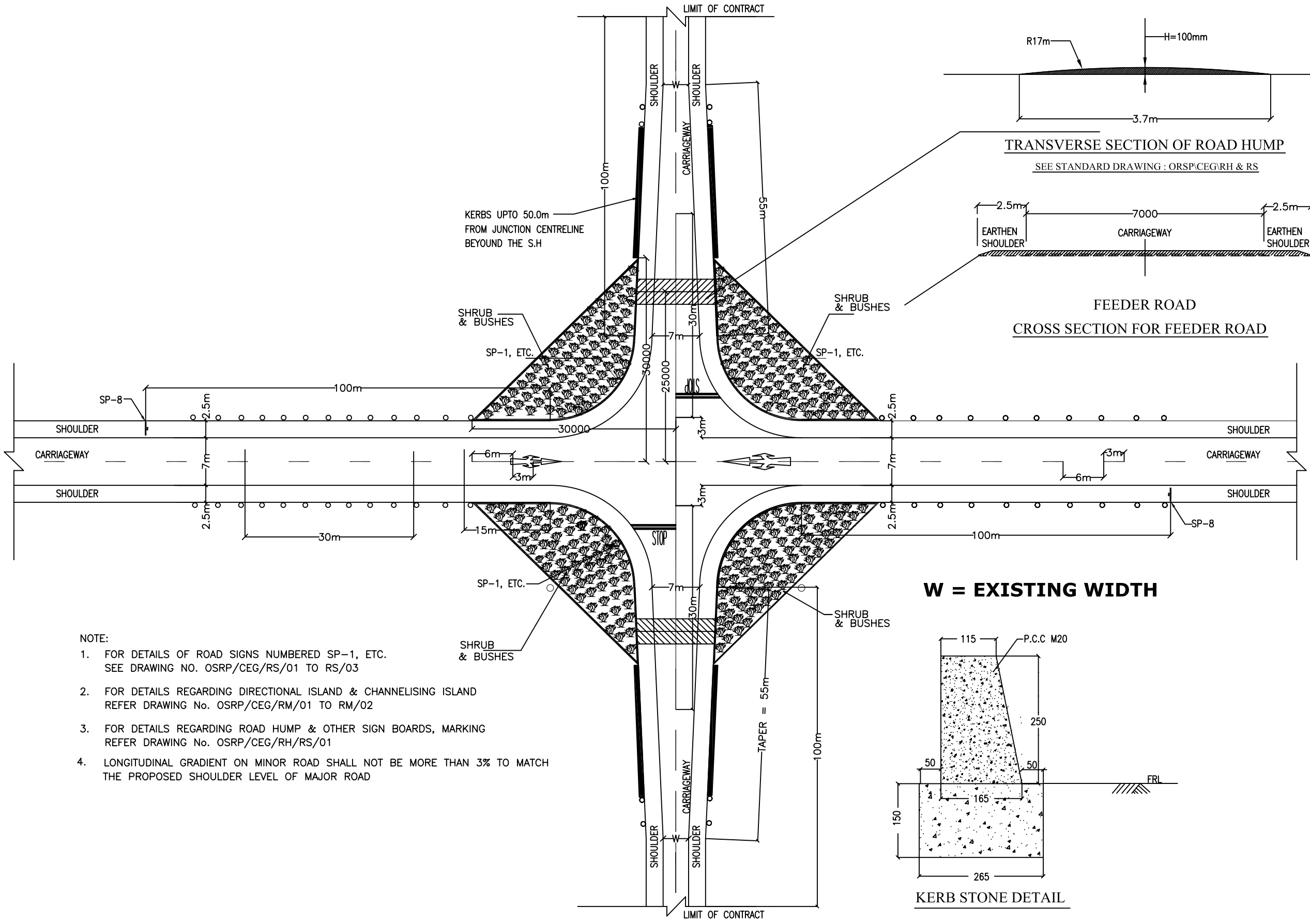
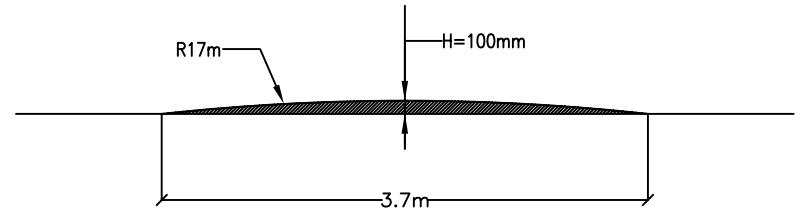
CONCEPTUAL DESIGN FOR TYPICAL TREE GUARD WITH M.S BARS.

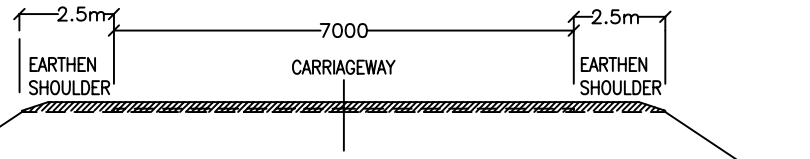
DRG NO.	OSRP/CEG/SH/ENV/08					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M.	S.G
SCALE	NTS								





TRANSVERSE SECTION OF ROAD HUMP

SEE STANDARD DRAWING : ORSP\CEG\RH & RS



FEEDER ROAD

CROSS SECTION FOR FEEDER ROAD

W = EXISTING WIDTH

NOTE:

1. FOR DETAILS OF ROAD SIGNS NUMBERED SP-1, ETC. SEE DRAWING NO. OSRP/CEG/RS/01 TO RS/03
2. FOR DETAILS REGARDING DIRECTIONAL ISLAND & CHANNELISING ISLAND REFER DRAWING No. OSRP/CEG/RM/01 TO RM/02
3. FOR DETAILS REGARDING ROAD HUMP & OTHER SIGN BOARDS, MARKING REFER DRAWING No. OSRP/CEG/RH/RS/01
4. LONGITUDINAL GRADIENT ON MINOR ROAD SHALL NOT BE MORE THAN 3% TO MATCH THE PROPOSED SHOULDER LEVEL OF MAJOR ROAD

KERB STONE DETAIL

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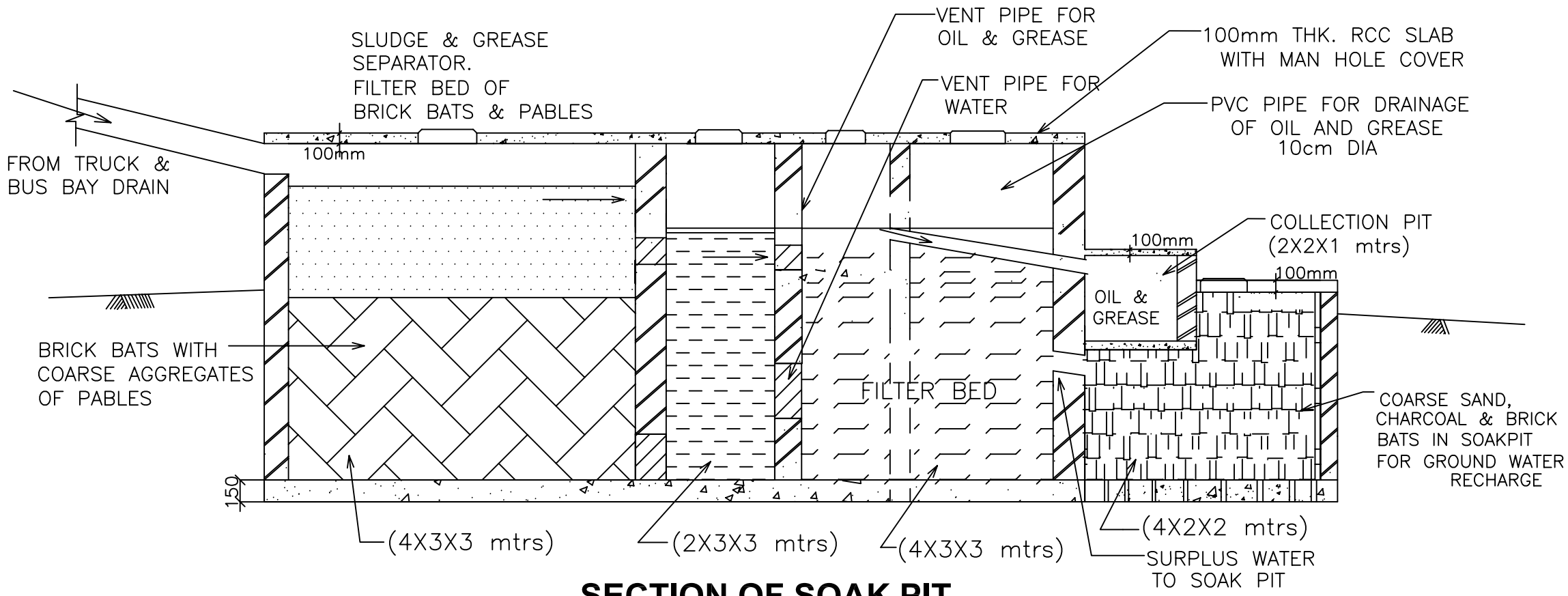
PROJECT:-

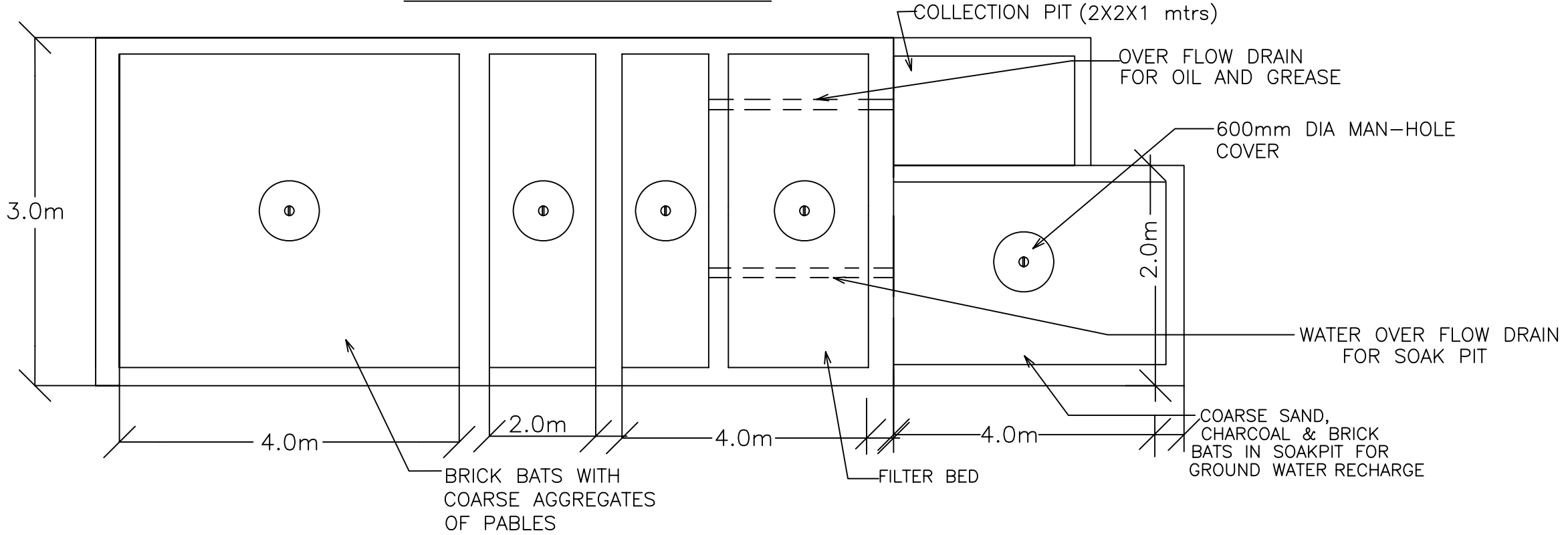
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL SITE ENHANCEMENT DESIGNS FOR ROAD JUNCTIONS AS ENVIRONMENTAL IMPACT MITIGATION.

DRG NO.	OSRP/CEG/SH/ENV/01-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

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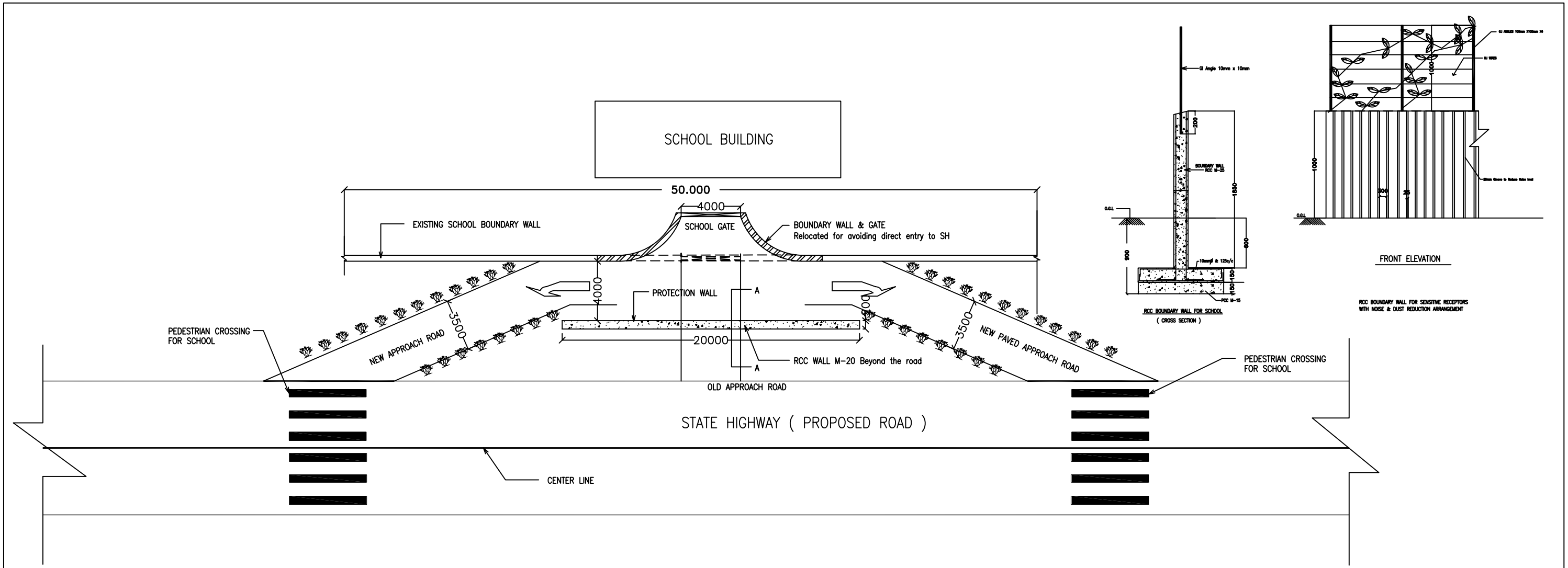
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

CONCEPTUAL DESIGN FOR SEPARATION OF OIL,GREASE AND SLUDGE OF TRUCK & BUS TERMINALS & BUS BAY

DRG NO.	OSRP/CEG/SH/ENV/06				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



- 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

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PROJECT:-
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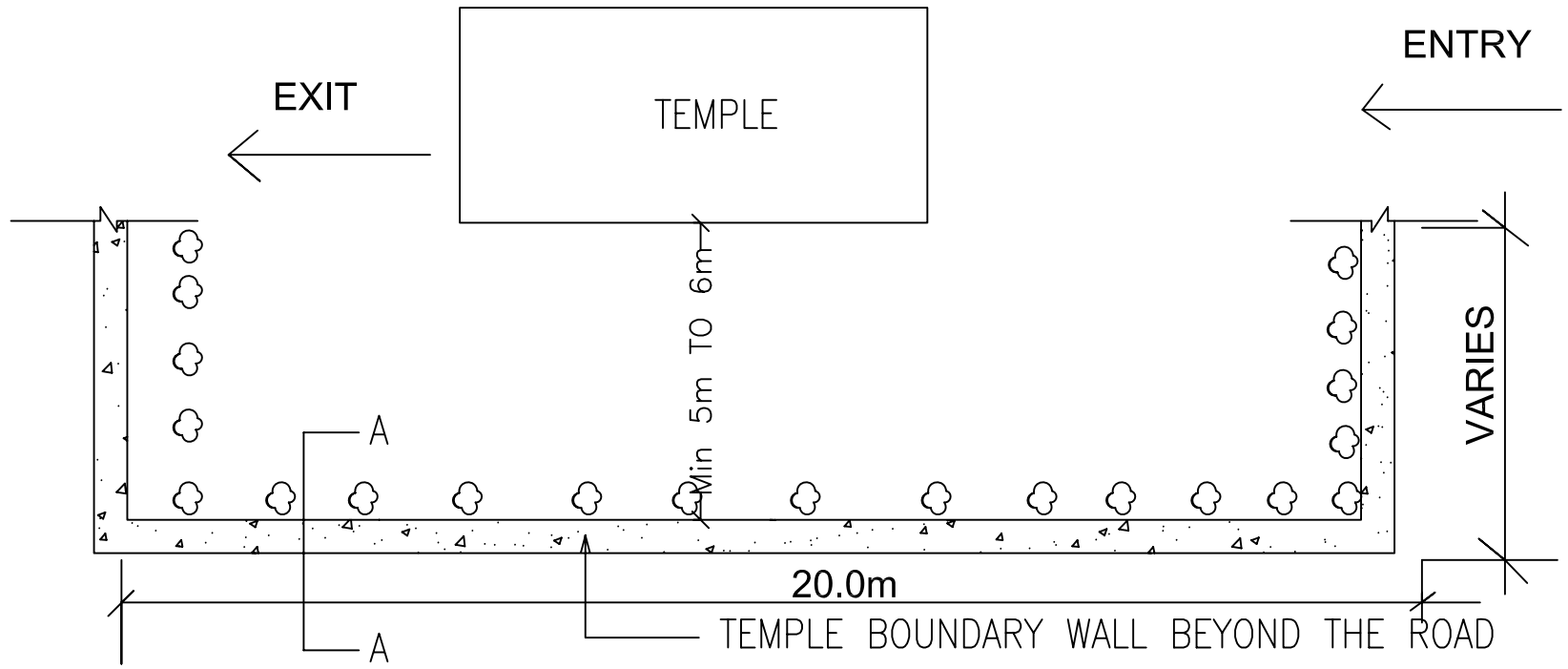
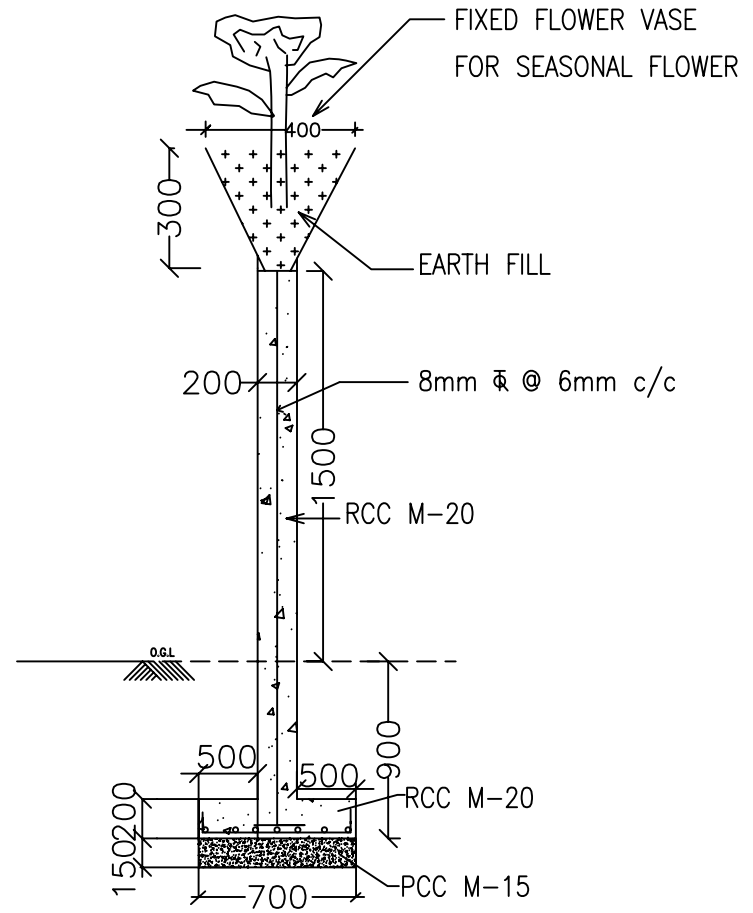
CONCEPTUAL APPROACH DESIGN FOR EDUCATIONAL AND MEDICAL INSTITUTIONAL APPROACHES AS ENVIRONMENTAL MITIGATION PLAN.

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								





RCC RETAINING WALL FOR TEMPLE
(CROSS SECTION A-A)

STATE HIGHWAY (PROPOSED ROAD)

CENTER LINE

- ALL RELOCATED TEMPLES TO HAVE ENTRY AND EXIT AWAY FROM ROAD AND ROW
- EVERGREEN SHRUBS & MEDIUM TREES LIKE TAGAR, TARAT,MANDAR,PLUMERIA NICTANTHES,MALLIKA, JASHMINE,KUNDA,KANCHAN,KARABIRA,TULSI,BELA,SHAMI,ASHOK(saraca asoka), KAMINI,NAGESWAR AND CHAMPA [PLANT TO PLANT SPACE 1.5m TO 2.0m DEPENDING ON THE SPECIES]
- FIXED FLOWER VASE ON THE BOUNDARY WALL FOR SEASONAL FLOWER & TULSI.

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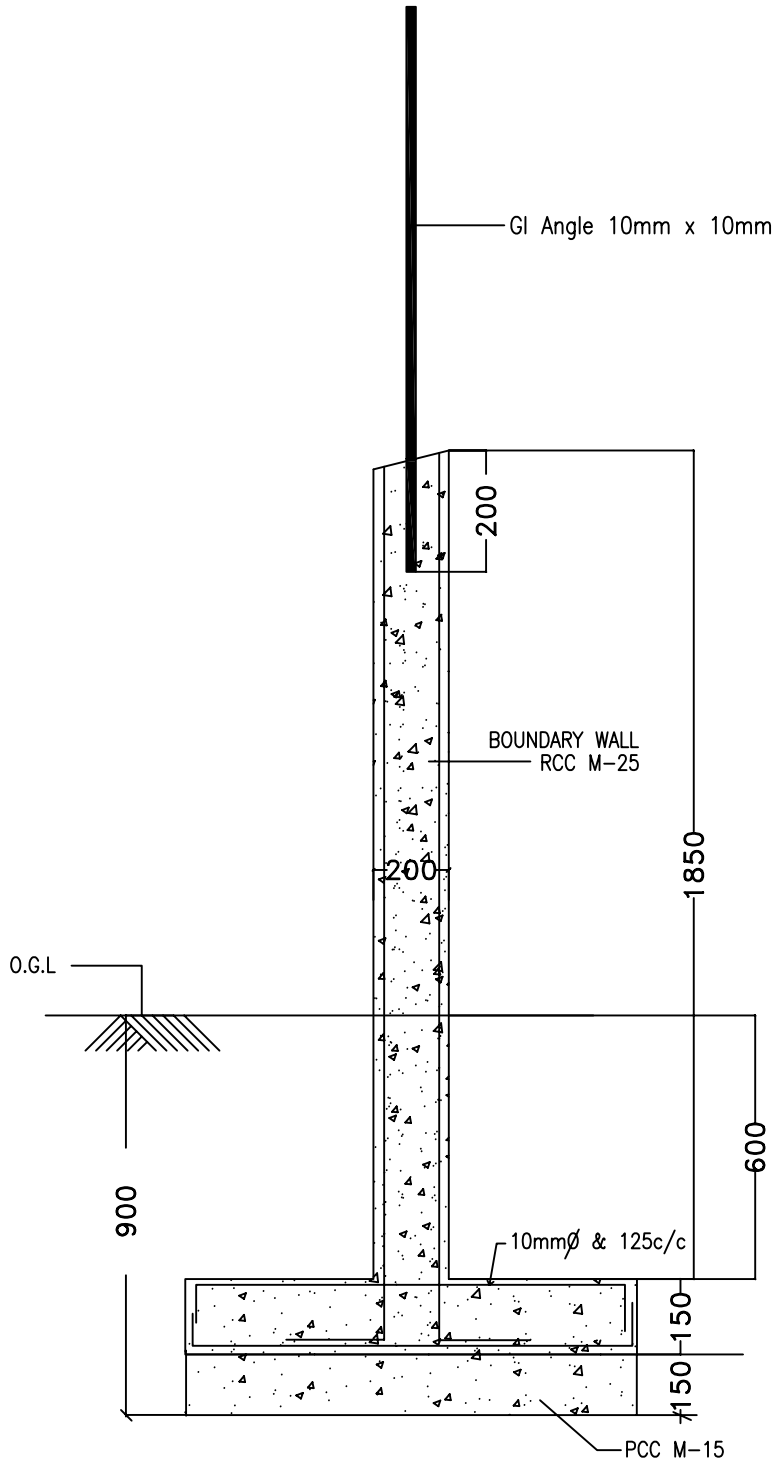
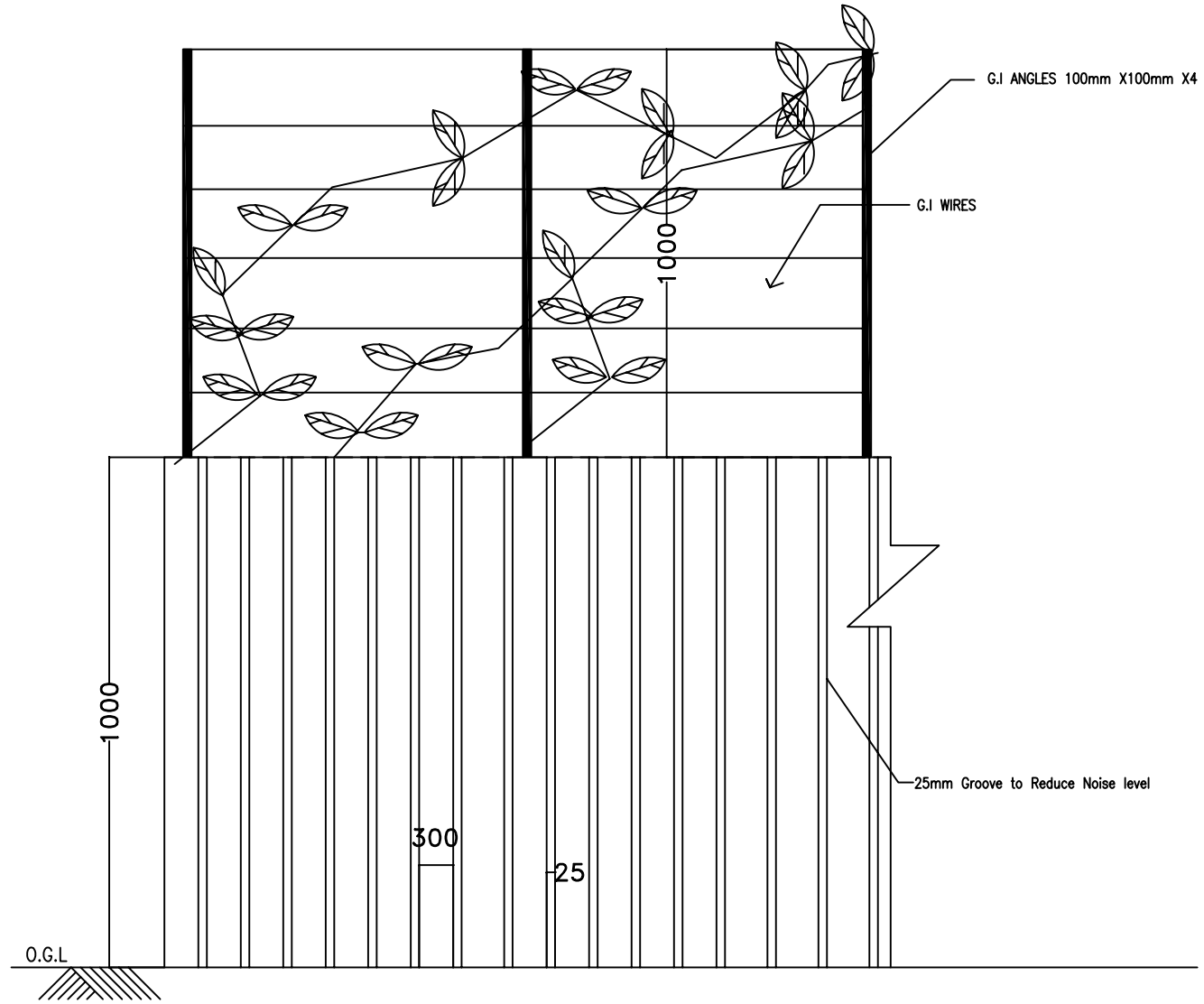
CONCEPTUAL RCC BOUNDARY WALL OF TEMPLES, STATUES RELIGIOUS TREES AS SITE ENHANCEMENT UNDER ENVIRONMENT MITIGATION PLAN.

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							



RCC BOUNDARY WALL FOR SCHOOL

(CROSS SECTION)



FRONT ELEVATION

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

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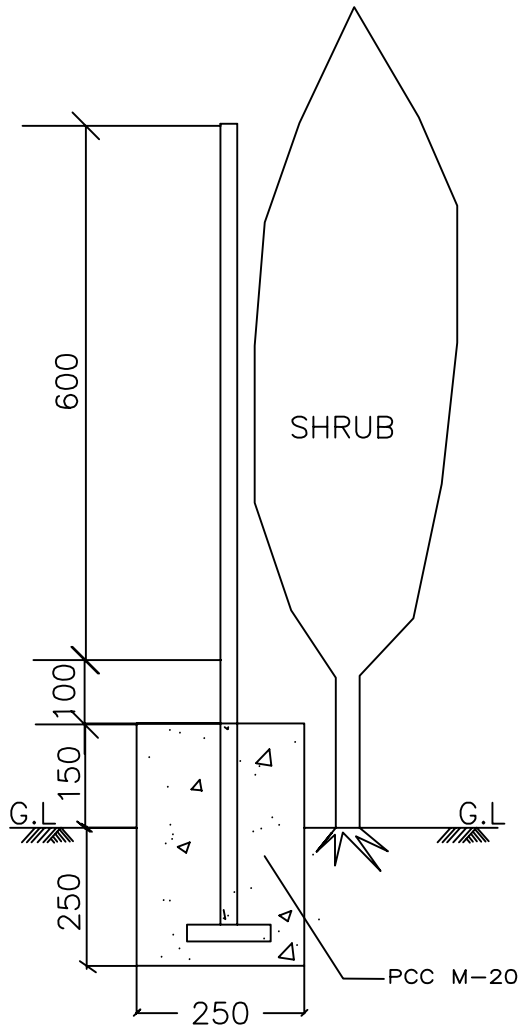
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

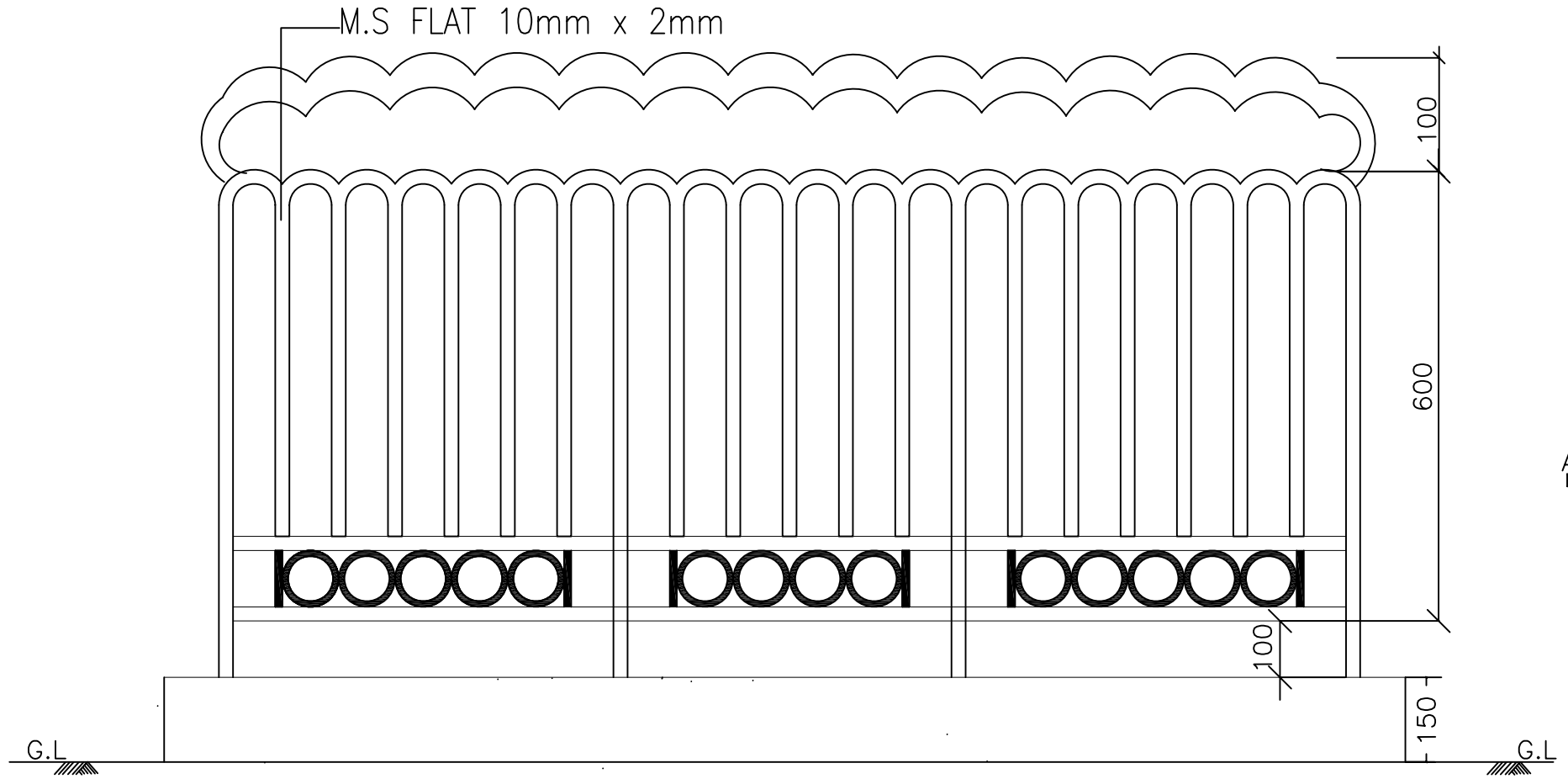
TYPICAL NOISES & DUST BARRIER FOR ENVIRONMENTAL MITIGATION.

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



SECTION A–A

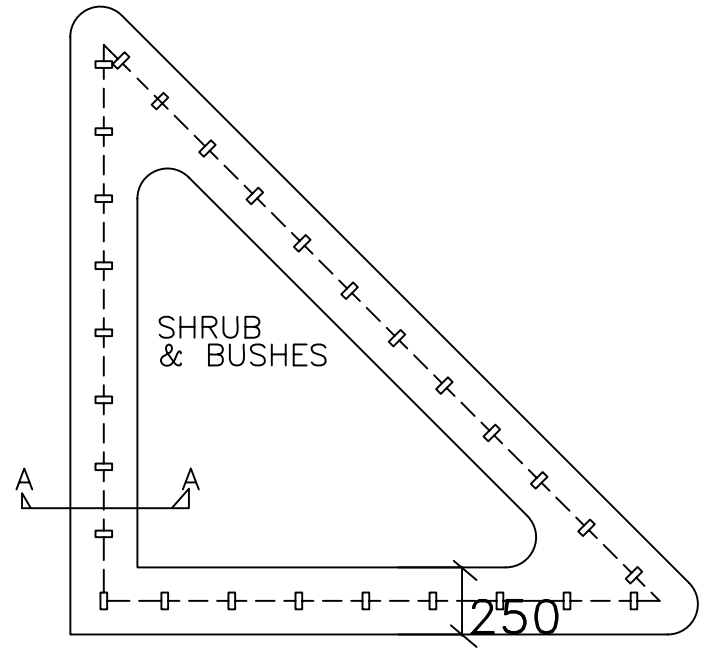
NOTE : SURFACE TO BE PAINTED WITH APPROVED ACRYLACK PAINT YELLOW & BLACK



FRONT ELEVATION

MS GRILL FOR JUNCTION

NOTE : SURFACE TO BE PAINTED WITH APPROVED ACRYLACK PAINT YELLOW & BLACK



PLAN OF TS LAND AT JUNCTION

(ALL DIMENSIONS ARE IN mm)

CORNERS AS SITE ENHANCEMENT AND PREVENTION OF ENCROCHED COMMERCIAL ACTIVITY AND KIOSKS WITHIN 20m ON EITHER SIDE OF FEEDER ROAD & SH JUNCTION.ZEBRA CROSSINGS & SPEED ARRESTER RUMBLERS TO BE 10m AND 50m AWAY FROM THE JUNCTION.

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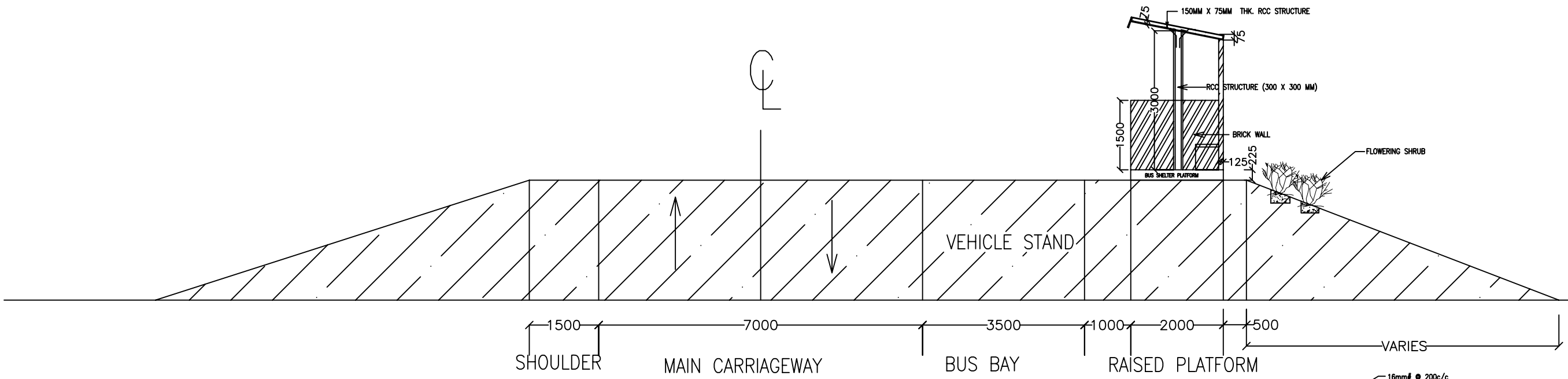
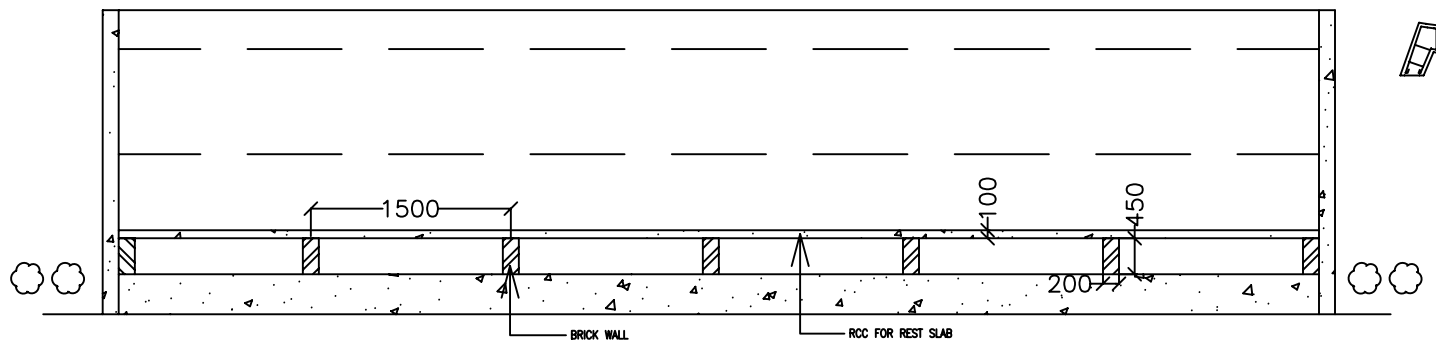
PROJECT:-
CONSULTANCY SERVICES FOR FEASIBILITY STUDY AND DETAILED PROJECT PREPARATION OF PHASE - (I) ROADS FOR ORISSA STATE ROAD PROJECT UNDER WORLD BANK ASSISTANCE

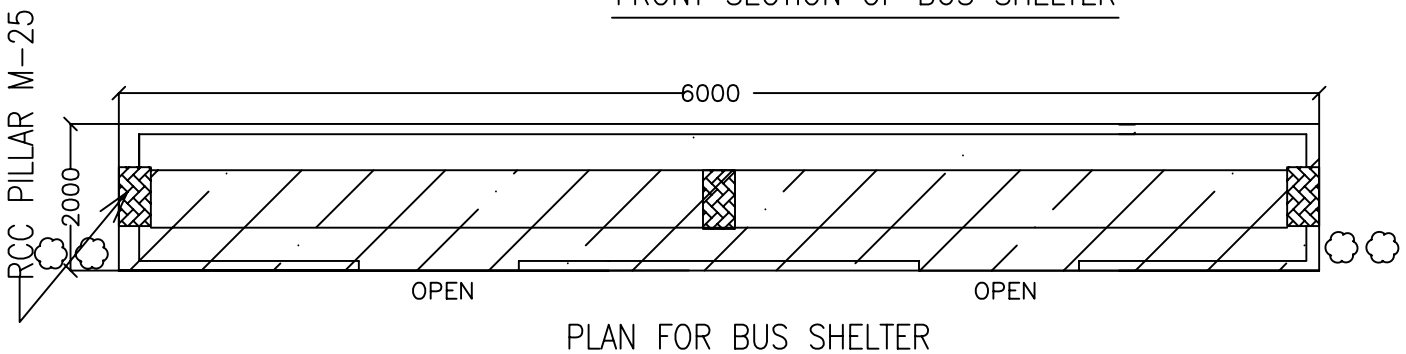
TYPICAL DESIGN OF MS GRILL FOR JUNCTION

DRG NO.	OSRP/CEG/SH/ENV/01–B					DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS								

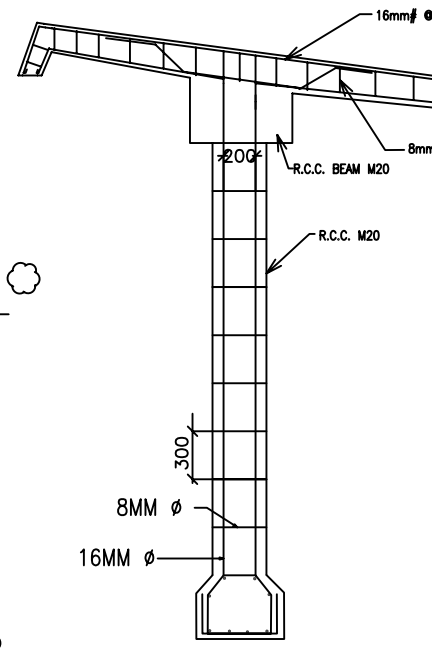




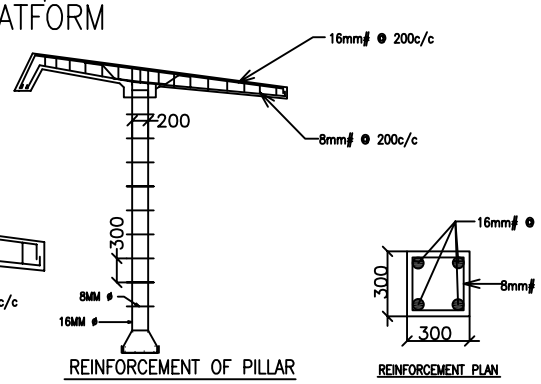
FRONT SECTION OF BUS SHELTER



PLAN FOR BUS SHELTER

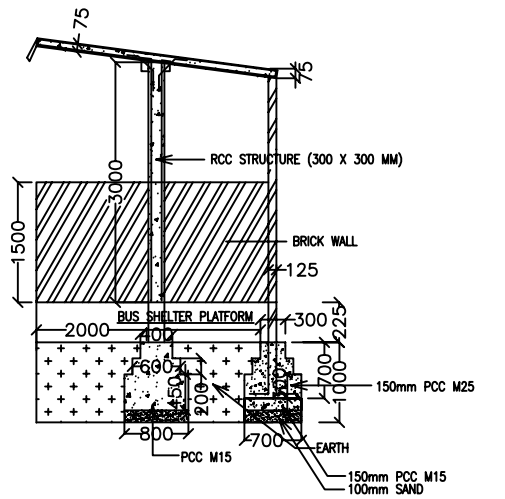


REINFORCEMENT OF PILLAR



REINFORCEMENT OF PILLAR

REINFORCEMENT PLAN



CROSS SECTION

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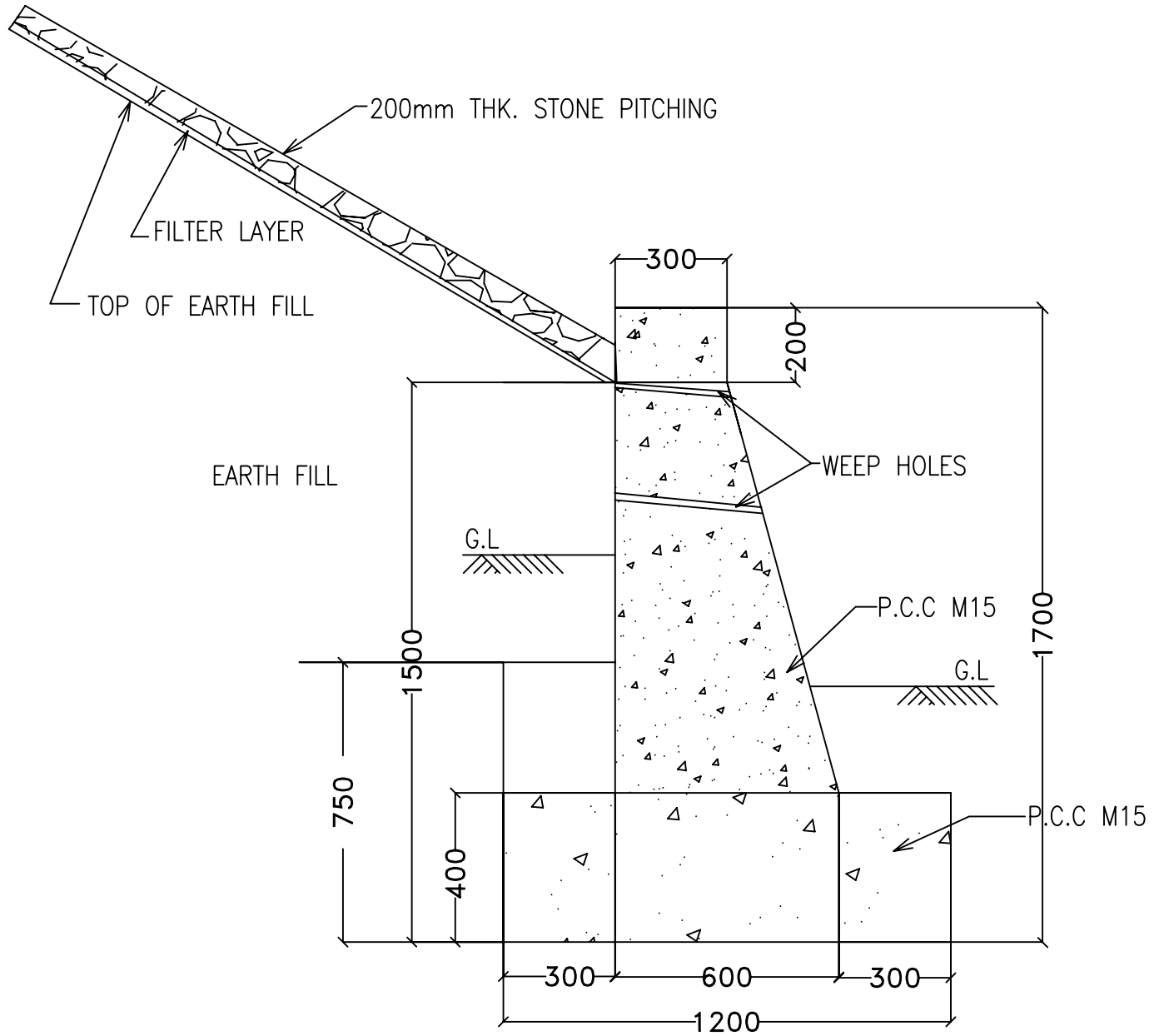
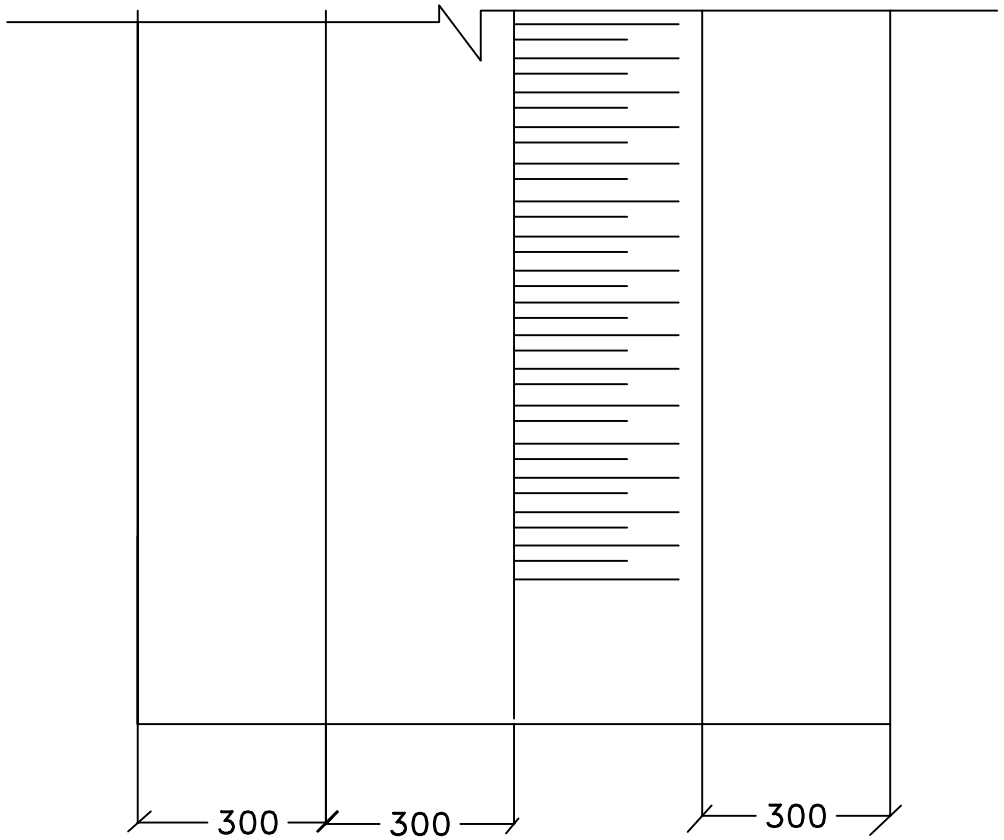
DESIGN OF PASSENGER SHED AT BUS BAY & BUS STOP

DRG NO.	OSRP/CEG/SH/ENV/02				DESIGNED (A)	DRAWN (B)	CHECKED (C)	APPROVED (D)
SH. NO.		DATE		REV	R0	M	JYOTI	G.P.M	S.G
SCALE	NTS							



TOE WALL FOR POND

(CROSS SECTION)



PLAN OF TOE WALL FOR WATER BODY

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

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TYPICAL PCC TOE WALL FOR WATER BODIES AS ENVIRONMENTAL MITIGATION.

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							

CHAPTER 1

INTRODUCTION

CHAPTER 2

BASELINE ENVIRONMENTAL SETTING AND IMPACT SUMMARY

CHAPTER 3

ENVIRONMENT MANAGEMENT PLAN

CHAPTER 4

IMPLEMENTATION MECHANISM

CHAPTER 5

BUDGETARY PROVISIONS FOR EMP IMPLEMENTATION

ANNEXURES

EMP FRAMEWORKS

REPORTING FORMATS

DRAWINGS