सत्यमेव जयते

Roads and Buildings Department

Government of Gujarat

Second Gujarat State Highway Project

Mehsana-Palanpur SH 41

DRAFT DETAILED PROJECT REPORT

Volume IV

(Environmental Management Plan)

December, 2018

LEA Associates South Asia Pvt. Ltd., India

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List of Abbreviations

AE	Authority's Engineer
BOQ	Bill of Quantity
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESMF	Environmental and Social Management Framework
CoI	Corridor of Impact
CO	Carbon monoxide
CPR's	Common Property Resources
GPCB	Gujarat Pollution Control Board
GSHP II	Second Gujarat State Highways Project
GoG	Government of Gujarat
GoI	Government of India
LASA	LEA Associates South Asia Pvt. Ltd.
CSC	Construction Supervision Consultant
SC	Supervision Consultant
IE	Independent Engineer
LHS	Left Hand Side
MoEF & CC	Ministry of Environment and Forest and Climate Change, Govt. of India
MoRTH	Ministry of Road Transport and Highways, Govt. of India
NOC	No Objection Certificate
NO_X	Nitrates of Oxygen
NH_3	Ammonia
NGO	Non-Government Organization
PIU	Project Implementation Unit
Pb	Lead
O_3	Ozone
R&BD	Roads and Buildings Department
RPF	Resettlement Policy Framework
RoW	Right of Way
RAP	Resettlement Action Plan,
RPM	Respiratory Particle Matter, $PM_{2.5}$
RHS	Right Hand Side
SO_2	Sulfur dioxide
SPM	Suspended Particle Matter , PM_{10}

1 INTRODUCTION

1.1 BACKGROUND

1. With the demonstrated excellence through Gujarat State Highway Project[1], Government of Gujarat (GoG) Roads and Buildings Department (R&BD) and the World Bank (WB) had continued with their successful partnership. This was another teaming up and effort towards empowering the communities with enhanced road infrastructure and building the capacities of stakeholders participating in Second Gujarat State Highway Project (GSHP II). Continuing the development process under GSHP II, R&BD Government of Gujarat has selected four additional corridors, aggregating to 153 km length for preparation of developmental intervention and implementation of existing State Highways. The corridors are proposed for Rehabilitation / Strengthening and Widening; as necessary.

2. List of four additional corridors to be implemented under GSHP II are presented as Table 1-1.

Table 1-1: Additional Corridors under GSHP II

Sr. No	List of Roads	Length (Km)	SH No	RoW	Present Lane Configuration	Proposed Improvement	Districts Covered	Specific regions
1	Mehsana - Unjha - Siddhpur - Palanpur	60.92	41	60	4LPS	4 LPS to 6L + Paved Side Shoulder and Hard Shoulders+ Multipurpose Pathway on LHS	Mehsana, Patan Banaskantha	North Gujarat
2	Four laning of Mehsana bypass including RoB	5.05	41	60 & 100	2LPS	2 LPS to 4 L + Paved Side Shoulder	Mehsana	
3	Chanasma-Harij-Sami-Radhanpur	60.42	55	30	2LPS	Rehabilitation / Strengthening	Patan	
4	Vallabhipur-Ranghola (Via Dhola&Parvala)	26.57	39	24/30	2LPS	Rehabilitation / Strengthening	Bhavnagar	Saurashtra Region
	Total	**152.96**						

Source: R&BD, Govt. Of Gujarat

3. Out of four, three corridors are situated in northern part of the state having 126.39 km length, while remaining one is located in Saurashtra region of Gujarat 26.57 km length.

1.2 CONTEXT FOR THE EMP

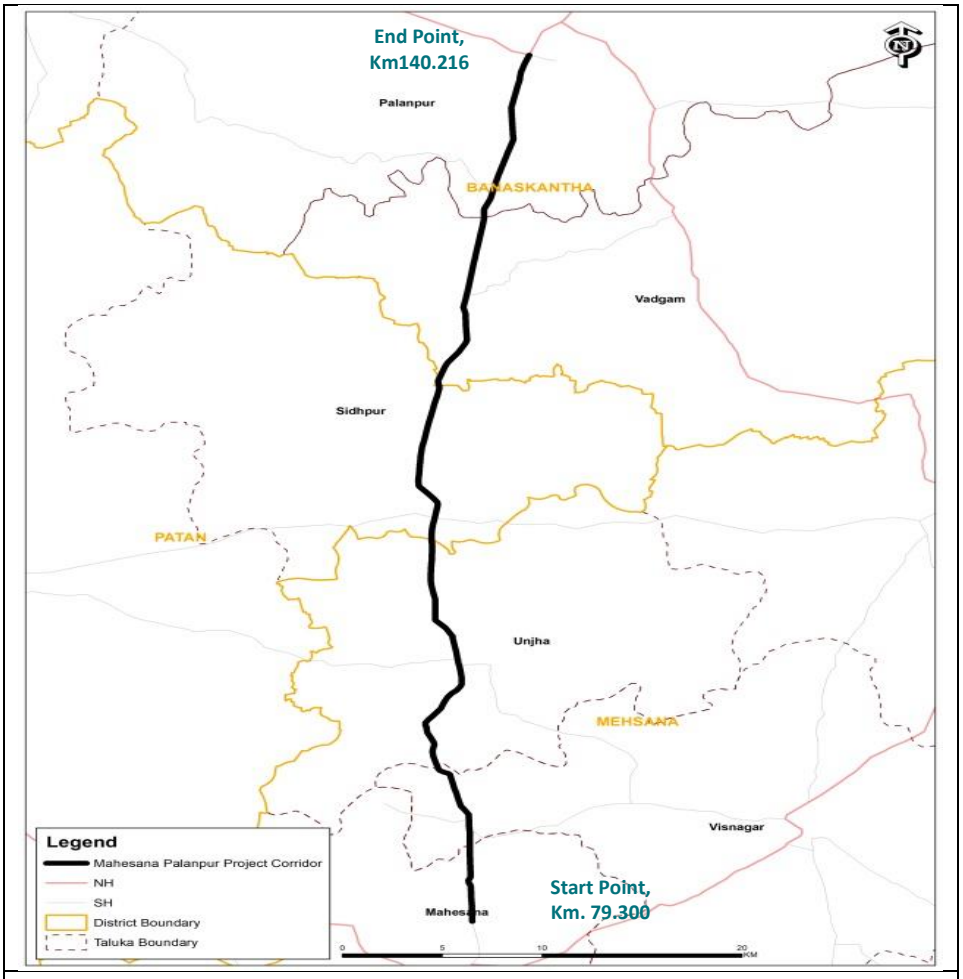
4. As part of the project preparation, an Environmental Impact Assessment (EIA) has been undertaken for the proposed roads. This EMP for the Mehsana to Palanpur (SH 41) corridor is based on the findings of EIA. It also details the effective implementation of the environmental management measures required for addressing the potential environmental impacts in the project. This Environmental Management Plan assists the Project Proponent, Authority's Engineer and the Contractor (Civil Works Construction Agency) to implement the environmental management measures suggested as

[1] GSHP, 2001-2007 one of the most successful WB assisted state highway project, set many benchmarks for others to follow.

an outcome of the Environmental Impact Assessment (EIA). This document places the Environmental Management Plan for the Mehsana-Palanpur corridor under GSHP II.

1.3 BRIEF DESCRIPTION OF THE PROJECT ROAD

5. The project corridor Mehsana to Palanpur section of State Highway 41 falls in North region of the state, starts at km 79+300 near Mehsana town and ends at km 140+216 at Palanpur town, with a length of 60.92 km (SH-41). This corridor was earlier developed under Gujarat State Highway Project (GSHP) during the period 2000 to 2006 (4L) under World Bank Loan Assistance.



Map 1-1: Mehsana-Palanpur Corridor Key Map (SH 41)

6. This road section (Mehsana to Palanpur) is a part of a corridor connecting two National Highways, at Ahmedabad and at Palanpur having four lane (Ahmedabad-Mehsana-Palanpur). This also acts as an important link for interstate traffic as well as to regions of Northern and Central regions of Gujarat State. For the commercial traffic plying from Gujarat to Rajasthan and up north it acts as strategic connector and one of the important roads for boosting industrialization in Northern Gujarat.

7. The project corridor passes through Mehsana, Visnagar and Unjha talukas of Mehsana district, Siddhpur taluka of Patan district and Vadgam, Palanpur taluka of Banaskantha district, and thus comprises of 28 villages and three major towns (Unjha, Sidhpur and Planapur). Major Settlements along the corridor are Bhandu, Unava, Unjha, Sidhpur, Chappi, Kanodar and Palanpur.

8. The corridor is having four Lane Carriageway of 24 m width including median. The available RoW is 60 m

9. Considering above aspects and importance of the the corridor, R&BD-GoG and the World Bank again have teamed up to develop this road considering widening of existing 4 lane paved shoulder to 6 lane with paved shoulder and Multipurpose Path on LHS.

1.4 STRUCTURE OF THE REPORT

10. This report is structured to be a standalone document suitable for handing over to the Contractor for enabling him to implement the suggested environmental management measures which has resulted due to EIA.

Chapter 1-Introduction: This chapter contains background of the project, scope pertaining to the additional corridors and description of the project road. Further to the introduction of the project road, this chapter also provides a summary of the applicable laws and regulations and information on various clearances (Environmental) required.

Chapter 2-Improvement Proposal: This chapter provides overview of various improvement proposals finalized and adopted while upgrading existing four lanes to six lane plus configuration of the project corridor.

Chapter 3-Environmental Issues and Design Measures: This chapter highlights the possible environmental issues due to proposed developmental activities, summary of environmental impacts and corresponding design measures, specific measures pertaining to environmental and social impacts.

Chapter 4-Climate Resilient Interventions: Selected Climate Resilient Intervention including other interventions for societal benefits which can be proposed for this project corridor is discussed in this chapter.

Chapter 5-Environmental Enhancement Measures: Chapter describes selected locations, where environmental enhancement measures are proposed.

Chapter 6-Environmental Management Plan (EMP): Environmental Management Plan (EMP) is presented in Chapter 6. This will form the part of the contract bid document.

Chapter 7-Implementation Arrangements: Implementation arrangements for implementing the Environmental Management Plant (EMP) including reporting system are presented in the Chapter 6. The chapter also includes environmental protection clause i.e. Non Conformity to the EMP as a part of the effective EMP implementation practices, which will also form a part of the contract bid document.

Chapter 8-Implementation Budget: This Chapter provides the necessary budget for implementing the Environmental Management Plan (EMP).

2 PROPOSED PROJECT IMPROVEMENT

2.1 IMPROVEMENT OF PROJECT CORRIDOR

11. The proposed improvement of existing corridor is to widen from four lane with paved shoulder to six lane with paved shoulders and hard shoulders along with Multipurpose Path on LHS, with Side Drain, Landscape, Bus Stops with Bus Bays and Utility Zones.

12. Possible interventions have been adopted as climate resilient measures, under "Climate Resilient Corridor approach". The "Climate Resilient Corridor Approach" chosen to be adopted includes measures against abnormal heat/temperature conditions draught and flood situations and earthquake resilient measures particularly at structures (Bridges and flyovers etc.) are proposed. The adopted interventions are further detailed in **CHAPTER 4** of this report.

13. To demonstrate the best engineering and environmental management implementation practices, beyond road to corridor approach has been adopted, in which besides engineering intervention, interventions like Landscaping along the corridor and median have been considered, Landscaping at selected Bus bays, Truck Lay Byes, with all amenities, integration of drain, Rainwater Harvesting Structures and oil / silt traps structures before the out fall to nearby water resources have been proposed. Details of these interventions have been discussed in the **Chapter 5**.

2.2 MAXIMUM UTILISATION OF ROW

14. The existing RoW of the corridor is 60 m. The project road Mehsana- Palanpur (State Highway-41), is one of the important highways catering for considerable traffic in and out of the Gujarat state. As this State highway was developed under GSHP- I, it has many unique features and is having sufficient land width and high potential for development of corridor and not as just road. In this context corridor development approach has been started with the understanding of the characteristics and various types of needs. As the capacity of present 4L corridor has exhausted (As discussed in Chapter 3 of Volume-I) it necessitates higher order intervention. Capacity of the highway is being improved as a corridor by accommodating all road users, amenities, aesthetics, and utilities alongside the highway.

15. Major portion of highway stretch also serves as an important pathway to the pilgrims of famous Ambaji (Gujarat) and Ramdevra temple (Rajasthan) for a fortnight twice a year. These devotees use the highway, travelling barefoot from all over the Gujarat and carry vehicles, carts and religious things with them.

16. Apart from people and vehicles, presence of rural areas witnesses the grazing paths of cattle and livestock. The animals accompanied by steward cross the highway at many locations. These other users of the road such as pilgrims and animals get affected by the moving traffic raising safety concerns and also affect traffic speed.

17. In order to design the corridor, all users facilities have been taken into account, and an analysis showing their basic needs as road users is comprehended in the below Table 2-1.

Table 2-1: Identified Road Users and Their needs

Sr.No.	Road Users	Basic Need
1	Regular pedestrians	Segregated Space from moving vehicles Comfortable walkway

Sr.No.	Road Users	Basic Need
		Rest Areas and public convenience places
2	Pilgrims	Safety and Space for carts and religious belongings Smooth Surface of pavement Rest Areas and public convenience places
3	Slow Moving vehicles (Cycles, carts, Auto)	Lane segregation from fast moving vehicles Rest Areas and public convenience places
4	Two wheelers	Adequate Lane space Rest Areas and public convenience places
5	Four wheelers	Mobility and Safety Reduced conflict and side friction Adequate Lane space Rest Areas and public convenience places
6	HCVs and LCVs	Mobility and Safety Reduced conflict and side friction Truck Lay-byes Adequate Lane space and lane markings Rest Areas and public convenience places
7	Cattle	Cattle crossings/safe passage at higher movement spots

18. This section details out the aforementioned key concern's integration into the project design. The approach has taken to provide adequate space and infrastructure to make Mehsana-Palanpur State Highway as a Corridor by assessing different alternatives.

19. The road space is taken care of with respect to different users as carriageway widening and segregation of motorized and non-motorized traffic with infrastructure provisions for safety and other services. Also similar provisions are made along the length to have the corridor having road as main space utilizing major portion of the RoW integrating with sections for rural space, urban space and stakeholder's space in terms of utilities.

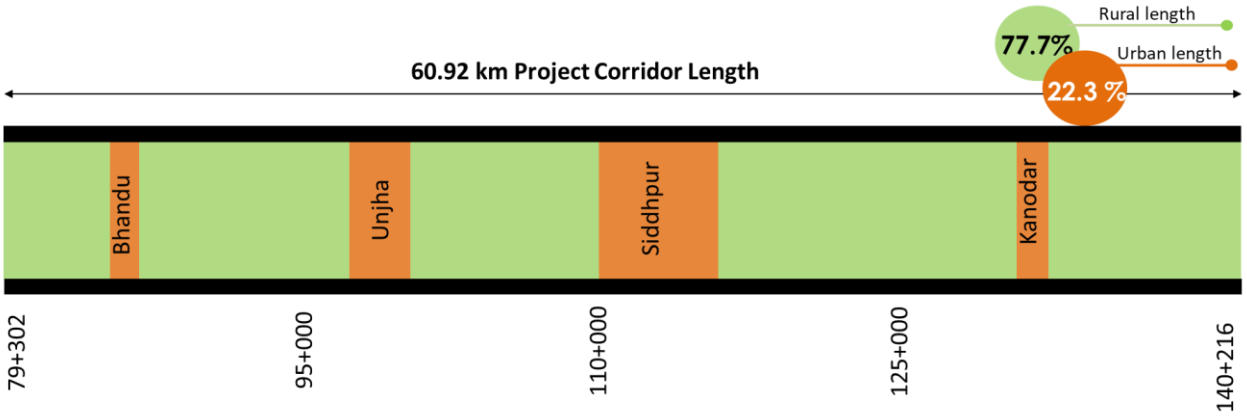


Figure 2.1: Urban and Rural Schematic diagram

20. The project road is 60.92 km long and it follows eccentricity of centerline of about 6 m to certain sections of length at left and right side of 60 m RoW (Figure 2.2).

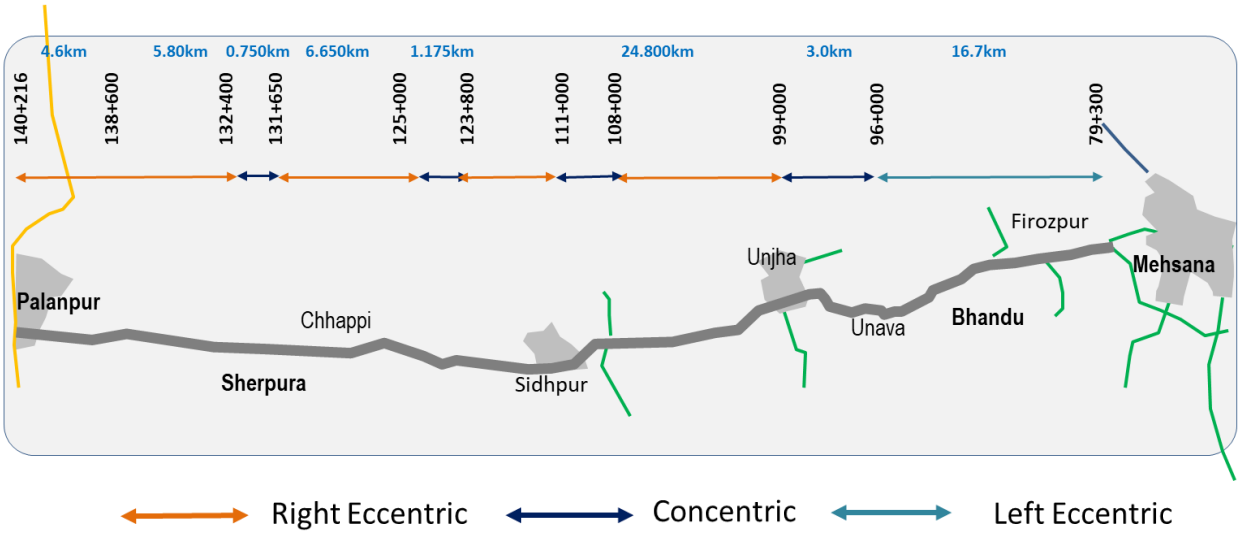


Figure 2.2: Location of Eccentricity along Road

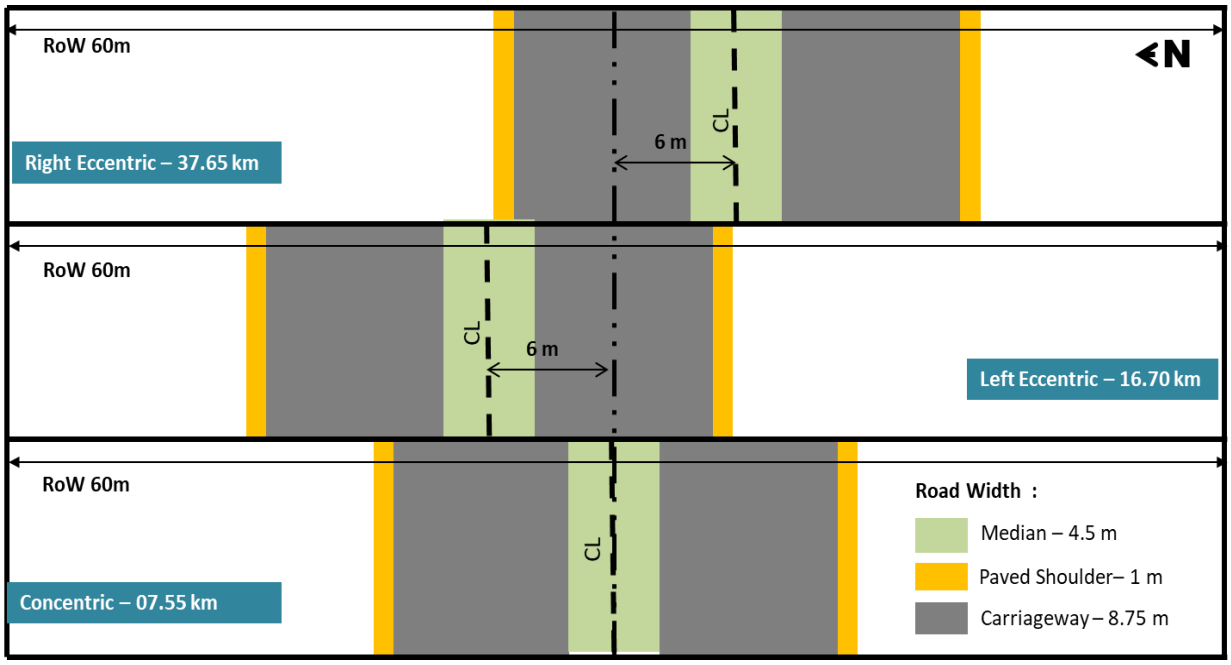
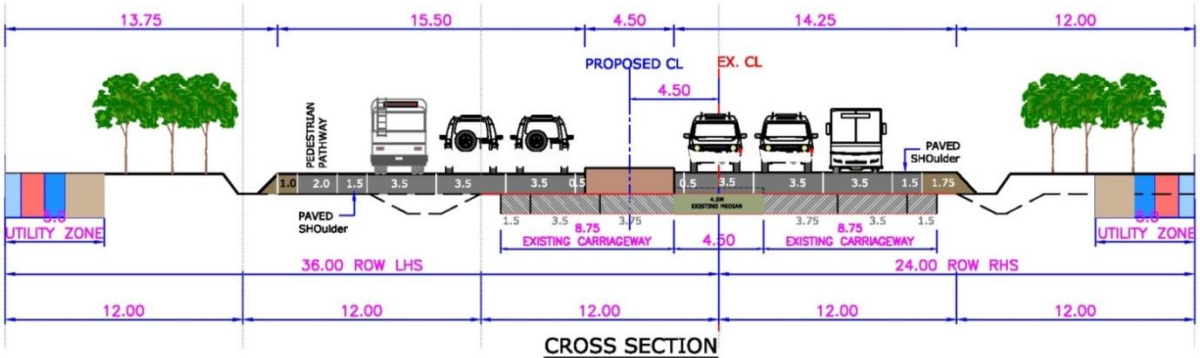


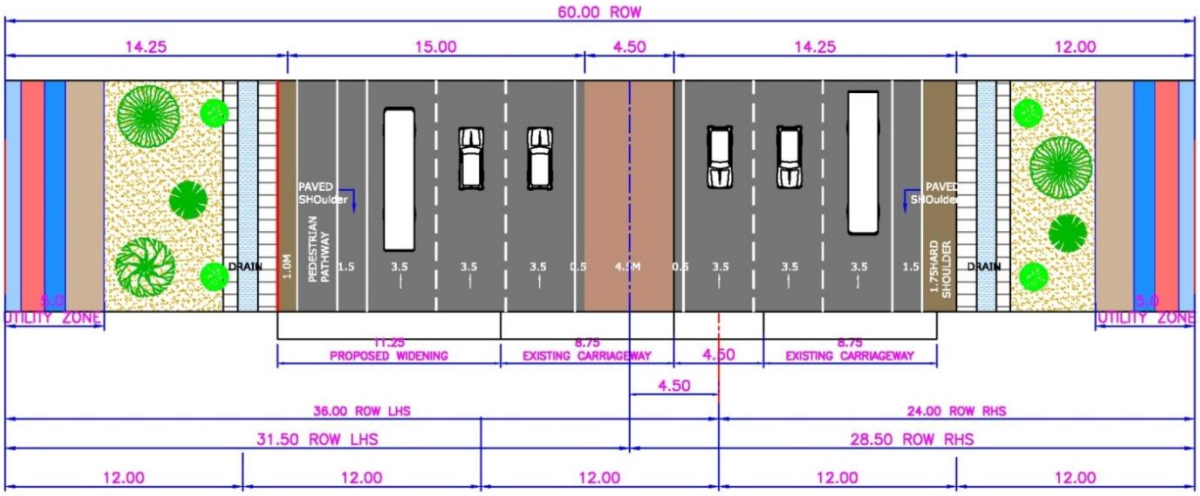
Figure 2.3: Eccentricity of Existing Carriageway

21. With due concern to all kinds of users alternatives were analyzed so as to take care of Motorized Traffic in terms of lanes in carriageway, bus bays shelters, and Non-Motorized Traffic through footpath, slow moving vehicle zone / multipurpose path across the width.

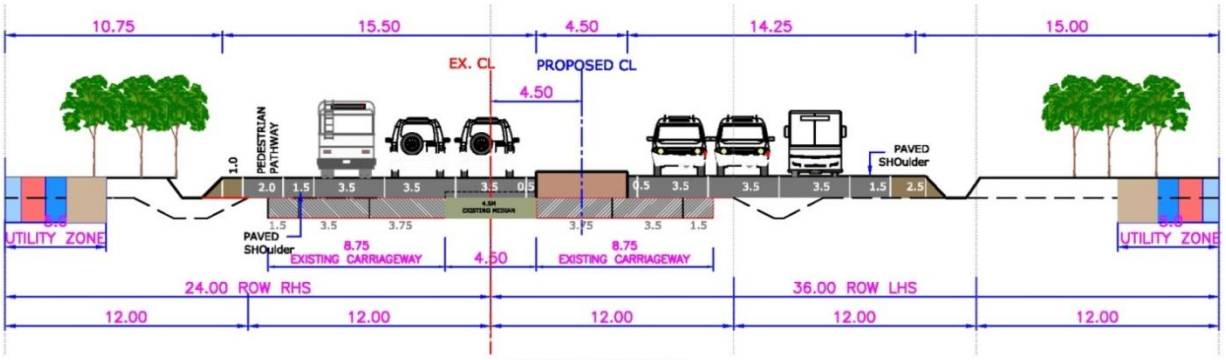
22. Cross sections for the proposed treatment is considered as follows:



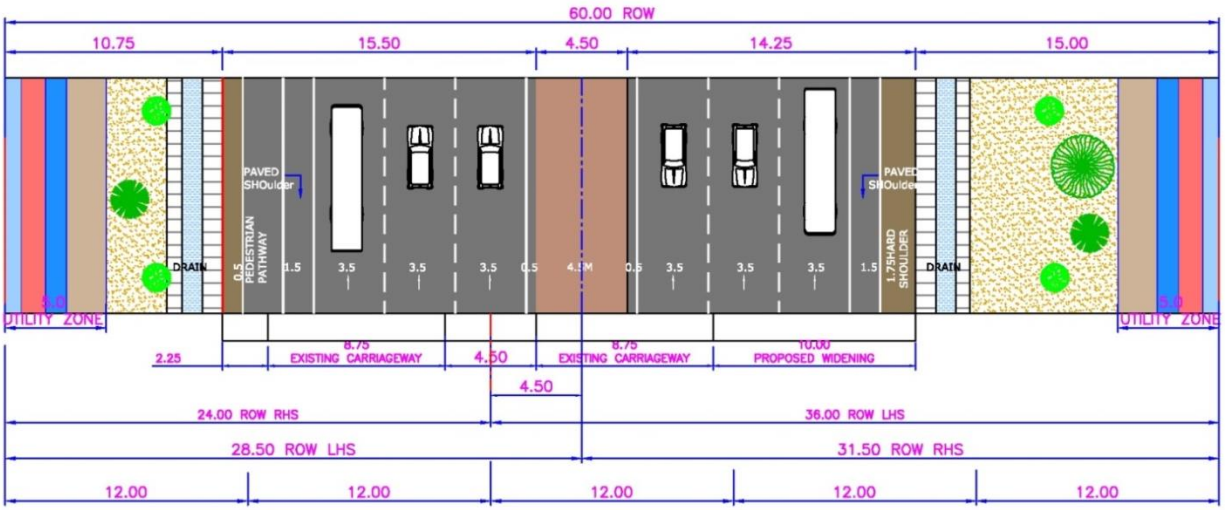
CROSS SECTION



PLAN
79+300 96+000



CROSS SECTION



Plan

96+000 to 140+000

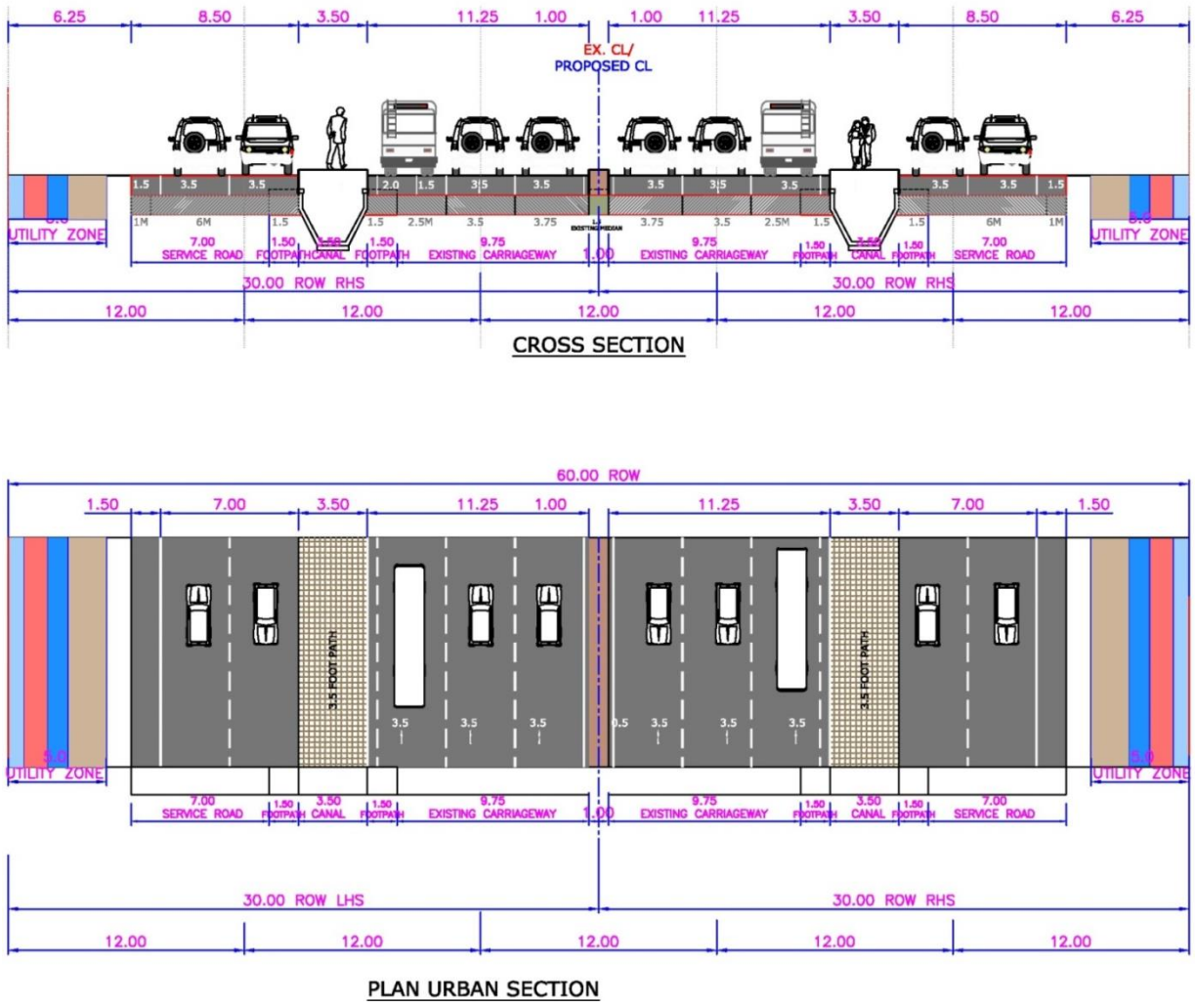


Figure 2.4: Typical Cross Sections for Proposed Treatment and CoI

3 ENVIRONMENTAL ISSUES AND DESIGN MEASURES

3.1 INTRODUCTION

23. Based on EIA study, the impacts have been identified pertaining to environmental sensitivity. Study area considered as 10 km on either side of the road (Buffer zone), and 30 m on either side of the project corridor in the immediate vicinity. Subsequent sections highlight the summary of the impacts as identified in the impact assessment study and suggested mitigation measures to those impacts.

3.2 CONSIDERATION TO ASSESS IMPACTS

24. As detailed out in Appendix 1, section of State Highway 41 from Mehsana to Palanpur has been declared as Notified Protected Forest (NPF). Hence, balance available width of land beyond the existing road is notified protected forest land. Any widening activity beyond existing road on this available width of land triggers forest clearance. Hence, centerline shifting requires forest diversion. By considering and adopting corridor development approach, it has been decided to occupy full 60 m width i.e. from 24 m of existing road to up to edge of the RoW i.e. 60 m. Accordingly impacts were assessed and discussed with the design team for further integration for EMP / minimizing impacts. Details have been discussed in EIA report while summary of the report is provided in sections ahead.

3.3 SUMMARY OF IMPACTS

25. Environmental Impact Assessment has been carried out for the project corridor and the impacts that are likely to arise from the implementation of the projects are detailed along with suitable design measures in Table 3-1 below.

Table 3-1: Summary of Environmental Impacts and Design Measures

Sl. No	Environmental and Social Impact	Design Measures
1.	A total of **18,720 trees**[2] (encompassing all the three districts along the corridor) are being impacted.	By adopting the CoI[3] approach and prevention of felling of trees along the natural drains in rural sections and landscaping sections have resulted in conservation of nearly **7708 trees**.
2.	Forest land diversion: 211.27 ha of protected forest land need to be diverted for widening and strengthening activity by adopting standard cross section.	To compensate the same as a part of environmental mitigation measures and compensatory afforestation scheme, the conditions for the diversion of forest land laid by the forest department shall be carried out.
3.	Impact on water bodies (surface and ground water) • Ponds on LHS at: Km. 86.2, 93.7, 101.275,101+700, 120.600 • Ponds on RHS at: Km. 99.650, 100.150, 101.700, 102+100, 103.350, 111.800 River / Canal crossings : • Major: Ch. Km. 81+920 (Rupen), 89+870 (Pushpawati), 109+710 (Sarswati), 122+035 (Adhuria), 129+580 (Umerdeshi) • Sujalam Suphalam Canal at Ch. Km. 87+145 • Dharoi Canal @ km. 104+150 and 105+990	At the river and canal crossings, the impact on the water quality is inevitable during construction. Hence, mitigation measures like provision of Silt traps and Oil interceptors are suggested at the locations where surface water (rivers/canals/drains) bodies are prevalent.
4.	Road accident to the livestock while crossing the	Cautionary signs provided at 120 m prior to the cattle crossing location as per IRC

[2]Estimated through primary survey by LASA, 2018.
3 The CoI is the width required for the actual construction of road, including carriageway, shoulder and embankments and pilgrim pathway on left side of the road.

Sl. No	Environmental and Social Impact	Design Measures
	project corridor. Major cattle crossing locations are identified at:	norms. The irregular movement of the cattle along the project corridor shall be restricted by creating awareness / capacity building among the villagers, guiding them to use the dedicated cattle crossings. These activities shall be initiated by a Contractor that needs to be carried out while implementing the EMP for this project corridor.
5.	Impact on Cultural and Community Properties (32): Community Properties (18) including 02 Educational Institutions (Boundary Wall or Gate), 06 Water tanks/kundies and 03 Wells, 3 public toilets and 3 police check posts and 1 seating arrangement around tree falls within RoW are impacted. Impacts on Cultural Assets (14) including There are 14 cultural assets (07 Shrines, 07 Temples,) getting impacted either fully or partially.	By adopting design modifications (CoI approach), the impact on community properties have been reduced to 6 and cultural properties to 3 (02 temples 1 shrine) on both sides. **Total Affected CPRs are 23:** • Temples : 05 • Shrines : 06 • Institutions (School Colleges): 01 (Boundary Wall or Gate only) • Water tanks : 03 • Wells : 02 • Public toilets : 02 • Police Check posts : 03 • Seating arrangement around tree: 1
6.	Safety issues need to be addressed in the proposed design	• Road safety audit had been performed for the corridor and the outcome of the report and the public consultation has been taken as a base to provide road safety measures in the design. The safety measures includes provision of safety measures near settlements, Junction improvements, street lights etc. Due care has been taken at the socially sensitive locations like schools and temples. • Local communities have been taken into confidence while finalizing the road designs.
7.	Pedestrian Safety	• To reduce the speed and subsequently to increase the pedestrian safety, rumble strips are provided at number of locations. • Similarly, raised pedestrian crossings have also been proposed. • The locations and chainage of Rumble strips; raised pedestrian are available in **Volume II of DPR**

3.4 CLEARANCE REQUIREMENTS

26. **Environmental Clearance**: As per the amendment dated 22nd August, 2013 to the EIA notification September 14th, 2006, environmental clearance (EC) has been made mandatory only for new state highways (refer **Appendix 1**). Hence, the widening / strengthening and improvement works on existing State Highways are not covered under the ambit of the notification and are not categorized either as Category A or Category B. However, the project shall require obtaining consent from competent authorities such as the Gujarat Pollution Control Board (GPCB), for the purpose of '*Consent to Establish'* by submitting an online Common Application (as per Schedule-I), under Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981 and authorization under Hazardous Wastes (Management and Handling) Rules, 1989, as amended.

27. **Forest Clearance**: As per the Gujarat Government Gazette dated 5th July, 1973 and 3rd July 1975, Mehsana – Unjha – Siddapur – Dharewada - Palanpuar (SH 41) corridor is declared as 'Notified Protected Forest (NPF)' under Forest (conservation) Act 1980. As per the directions of the forest department, the corridors which had been declared as State Highways before 1980 will have 9.75 m width (Black top and shoulder) as road way width and corridors that are declared after 1980 as State Highways will have the actual (existing) width of the black top and shoulder as road way width. Adopting this criterion, the project corridor (SH41) has been designated as State Highways (SH 41) before the year 1980, hence a width of 9.75m is considered for applying forest clearance based on the forest department directions. However, during development of two laning with PS (the year 2000- 2003) and during four laning (during the year 2003-2006) under Gujarat State Highway Project (GSHP) forest clearance has already been obtained up to existing four lane corridor (Please refer attached **Appendix 1**). Any requirement beyond this necessitates the submission of forest land diversion proposal.

28. Since, land beyond existing corridor of SH 41 within available RoW is declared notified protected forest land under Social Forestry Division of the State Government, the forest clearance procedure as stipulated in the Forest Act, 1980 has been adopted. The project corridor traverses through three districts namely Mehsana (Ch 79+300 to 106+740, Patan (Ch 106+740 to 117+608) and Banskantha (Ch 117+608 to 140+216). As per guidelines prescribed by the MoEF & CC , GoI, Forest Clearance Proposal (Form-A) has been prepared and submitted along with the necessary enclosures to the District Conservator of Forest (DCFs), Social Forestry (SF) Divisions of State Forest Department, through Project Implementation Unit (PIU), Roads and Building Department, Govt. of Gujarat.

29. The details of the forest land diversion for the project corridor are shown in the following Table 3-2**.**

Table 3-2: Details of Forest Land Diversion (NPF)

Sl. No.	Project corridor - sections	District / Divisions	Length (km)	Existing road way width (m)	Average additional width taken (m)	District – Division wise Area to be diverted (ha.)
1	Km 79+302 to 106+740	Mehsana	27.44	24	36	97.29
2	Km 106+740 to 117+608	Patan	10.868	24	36	31.93
3	Km 117+608 to 140+216	Banaskantha	22.608	24	36	82.05
Total			**61.92**			**211.27**

30. **Other Project Clearances**: Implementation of the project works would require clearances from the Gujarat Pollution Control Board (GPCB) as well as several other line agencies. These would have to be obtained by the Contractor before commencement of civil works in the project area. The clearances to be obtained are presented in Table 3-3**.**

Table 3-3: Applicable Laws and Regulations

Sl. No.	Clearances	Acts	Approving Agency	Applicability to the Project	[4]Indicative Time Frame	Responsibility	
						Execution	Supervision
PROJECT PREPARATION STAGE							
1	No Objection Certificate (NOC)	Water (Prevention and Control of Pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board	Applicable	3-6 months	PIU	-
2	Diversion of forest land for Non-forest use	Forest Conservation Act (1980), Forest Conservation Rules (2003) and Guidelines issued to date	Regional Office Western Zone, MoEF & CC, Bhopal / MoEF & CC, New Delhi, Govt. of India	Applicable	9-12 months	PIU	-
3	Permission for removal of avenue tree within the PROW	Forest Conservation Act (1980) Forest Conservation Rules (2003) and Guidelines issued to date	Forest Department, GoG	Applicable	3 -6 month for each workout area	PIU	-
PROJECT IMPLEMENTATION STAGE							
4	Permission for Withdrawal of Surface Water from Rivers, Nala, Water harvesting structure/ Reservoirs/ Ponds/ Irrigation canals	Gujarat Water Supply and Sewerage Board Act, 1978	Gujarat Water Supply and Sewerage Board	Applicable (If the Contractor is extracting surface water)	3 months	Contractor	Authority's Engineer
5	Permission for Sand Mining from river bed	Mines and Minerals (Development and	Commissioner of geology and mining,	Applicable	2 month	Contractor	Authority's Engineer

[4] The right of permission vests with the Competent Authority

Sl. No.	Clearances	Acts	Approving Agency	Applicability to the Project	[4]Indicative Time Frame	Responsibility	
						Execution	Supervision
		Regulation) Act, 1957	GoG				
6	Permission for Opening of New Quarry	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of geology and mining, GoG	Applicable	2 month	Contractor	Authority's Engineer
7	Hot mix plant, Crushers, Cement Batching Plant	Air (Prevention and Control of Pollution) Act. 1981	Gujarat Pollution Control Board	Applicable	3 months	Contractor	Authority's Engineer
8	Storage of Hazardous Chemicals	Hazardous Waste (Management and Handling) Rules 1989 and Manufacturing Storage and Import of Hazardous Chemicals Rules 1989	Gujarat Pollution Control Board	Applicable	3 months	Contractor	Authority's Engineer
9	Disposal of Hazardous Waste	Hazardous Waste (Management and Handling) Rules 1989	Gujarat Pollution Control Board	Applicable	2 months	Contractor	Authority's Engineer
10	Disposal of Construction Waste & liquid effluent from Labour camps	Water (Prevention and Control of Pollution) Act 1974	Gujarat Pollution Control Board	Applicable	2 months	Contractor	Authority's Engineer
11	Pollution Under Control Certificate	Central Motor Vehicles Act 1988	Transport Department (GoG)	Applicable	1 Month	Contractor	Authority's Engineer
12	Employing Labour	Executing Agency of Building and other construction act, 1996	Labour& Employment Department, GoG	Applicable	1 Week	Contractor	Authority's Engineer
13	Registration of Workers	Labour welfare Acts.	Labour& Employment Department, GoG	Applicable	1 Month	Contractor	Authority's Engineer

Source: Acts, Rules and Regulatios from Central and State Gouvernement

3.5 SPECIFIC MEASURES

31. Some of the project related impact cannot be resolved through design modifications / alterations, for those impacts specific mitigation measures are suggested as discussed in the Table 3-4**.** Some of the suggested measures are also taken as an input based on the public consultation held along the corridor.

Table 3-4: Environmental and Social Specific Measures

Sl. No	Impact	Mitigation Measures
1	Impact on residential/ commercial structures and land acquisition Issues	(i) 36 m CoI approach has been adopted for minimizing the social impacts associated with the residential/ commercial and land acquisition issues. (ii) Instance where unavoidable impact on land and structures are anticipated, compensation and assistance will be provided in line with the Resettlement Policy Framework (RPF) adopted for the project.
2	Upgradation of the existing drains (bridges and culverts)	All the bridges, culverts and structures across irrigation canals that are existing are proposed to be widened as this corridor is widened to 6L plus (except major bridges located across Sarasvati and Umardeshi). Where ever necessary the flood data collected from the meteorological department is used as a source for designing the drain along the corridor.
3	Solid waste management on the project highways stretch	Solid waste management is planned to implement through a local panchayat or municipality by a Contractor under Swachch Bharat Abhiyan by conducting capacity building / awareness to the public, provision of dust bins at locations Ch km. 79.800, between km. 98 to 100, between km. 107.5 to km. 112.5, km. 119, km. 120.5, km. 139 identified as potential area for proper SWM practices.
4	Impact on local land use (topography/ Soil) due to the disposal of the construction waste generated during the project construction	The excavated material and scarified bitumen those are likely to be generated from the project corridor. Disposal of the debris will have impact on the local topography, hence as a resource recovery approach, the excavated waste shall be tested for the CBR values and if found suitable will be used as a subgrade material, for strengthening the embankment (or) as a

Sl. No	Impact	Mitigation Measures
		strengthening layer for village and approach roads.
5	Reuse and Recycle the scarified material	Adopting the green concept of 3 R's (Recovery, Recycle and Reuse), the Contractor shall be encouraged to recycle the dismantled/excavated/ pavement milling (recycled asphalt product) materials as much as possible at appropriate level without compromising with the standards and specifications.
6	Surface and ground water quality	(i) ***Surface water***: With exemption to suspended solids (TDS), Fluorides and Total Hardness and Cl, Fe & Ca (Only from Pond at Bhandu), and all other key parameters are well within the permissible limits prescribed for drinking water standards (IS 10500) and it is found suitable for construction., Prior water treatment with removal of suspended solids would make the surface water suitable for domestic purpose as well. The water quality locations which are carried out for quality monitoring tests are at Start point of the corridor, Fatehpura Jn (km. 16.750 end of Mehsana bypass (i.e. near km. 79.300), Village pond near Bhandu (km. 85), village pond of Unjha (near km 112) and village pond near Brahamanwada (near km. 105). (ii) ***Groundwater***: Key groundwater quality parameters like Suspended Solids(TDS), Alkanility ($CaCO_3$), Total Hardness and Calcium(Ca) were observed to have high concentration, with exemption of the mentioned parameters other key parameters are well within the stipulated drinking water standards (IS 10500) and hence prior water treatment would make the groundwater suitable for domestic purposes. (Ground water quality locations were tested at nearby underground water source at Fatehpura Jn. near start point of the corridor, Farmer's pipeline near Sujlam Suflam Canal, Shubh Psyllium Industries Bore well, and an Indian Pump Bore well) (iii) Extraction of groundwater in the project area for construction purpose shall be prohibited within Mehsana due to fact that the project district is declared as 'Over Exploited Zone' by Ground Water Resource Development Centre (GWRDC) and hence the Contractor shall seek for surface water as an alternate to the groundwater source. Further exploring groundwater shall lead to groundwater resource depletion.
7	Air quality impact at the habitations/ settlements **Settlements :** • Mehsana (km. 79+300) • Unjha (between km. 98 - 100) • Bhandu (km. 85.900) • Siddhapur (between km. 107.5 to 112.5) • Brhamanwada (105.070) • Chaapi (between 119.5 to 121.5) • Palanpur (between km. 138.5 to 141.1) **Sensitive Receptors:** • Hot Mix , WMM and Batch Mix Plant To be established by the Contractor • Bliss Water Park, 82.300 (LHS) • GETOCO / UGVCL Campus (Siddhapur), km.110.400 (LHS)	Analysis of samples from air quality monitoring locations revealed that quality of PM_{10} and $PM_{2.5e}$ were crossing the permissible limits at all four locations from where samples were obtained. Rest of the parameters was found within permissible limits. This is mainly attributed due to higher volume of traffic and ongoing construction of DFCC bridge structures at Unjha. Air pollution due to construction yard will be particularly ground-based with localized effect during the construction period. It is required that the construction yard shall be located away from the settlement, all construction machineries (Crushers, Hot-mix Plants & Batching Plants) should be kept / stationed at least 1000 m away from the settlements.
8	Noise pollution at settlements and sensitive receptors **Settlements :** • Mehsana (km. 79+300) • Unjha (between km. 98 - 100) • Bhandu (km.85.9) • Siddhapur (between km. 107.5 to 112.5) • Brhamanwada (105.070) • Chaapi(between 119.5 to 121.5) • Palanpur (between km. 138.5 to 141.1) **Sensitive Receptors:** • Eklavya English Med. School, 79.7 (RHS) • Utkarsh Vidayala, km 83.400 (LHS) • Hopital, km. 111.230 (LHS) • GOKUL Technical Campus, km. 115.350 (RHS) • Govt. Eng. College, km. 135.5 (RHS)	Noise level sample was collected at Fatehpura Jn. (start point of the point corridor km. 79.302), Unjha, Chaapi and Palanpur (near end point of the project corridor). Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 150 m of the nearest habitation/ educational institutes/ health centers (silence zones) shall be restricted during the night time between 10.00 pm to 6.00 am. Contractor shall provide temporary noise barriers at the identified locations viz., Educational Institutions including schools and colleges, Health centers (PHC / CHC / Clinics, Hospitals), Cultural Properties (Shrines / Temples etc.) which are quite noticeable along the project corridor section of SH 41, prior to commencement of work.

4 CLIMATE RESILIENT INTERVENTIONS FOR MEHSANA-PALANPUR CORRIDOR

4.1 INTRODUCTION

32. Climate change and global warming is the major environmental challenge of the twenty-first century in India as well as globally. This leads to major global threats such as poverty, hunger, population growth, armed conflict, air and water pollution, displacement, soil degradation, deforestation and desertification. It is necessary to find a solution of climate change concern and there are several approaches to slowing of this critical situation in India. Climate-resilient integrity with the climatic condition is one of the best tools to fight these challenges.

4.2 CLIMATE VARIABILITY IN GUJARAT

33. Gujarat State is located in extreme west of India and due to its geo climatic, geological and geophysical features, the State is vulnerable to all major natural hazards such as Drought, Flood, Cyclone, Earthquake and Tsunami[5]. The climatology of Gujarat is influenced by the Arabian Sea in the West and three hill ranges along its Eastern border. A long coastline makes parts of arid Saurashtra and Kutch occasionally experience very high rainfall. These occasional heavy rainstorms are responsible for most of the floods in the State. While the Northern part of the State is mostly arid and semi-arid, the Southern part is humid to sub-humid.

34. Extremes of rainfall or temperatures are quite common in this region. Whole of Gujarat region has earthquake hazard of different levels from moderate to high as zones III to V are assigned to it in the seismic zoning map of India. Over the decade, Gujarat has been experiencing early impacts of climate change that has caused unprecedented heavy rain and massive floods followed by long spells of drought. The heavy rains followed by flood in recent years 2016, 2017 have caused a substantial damage to the road assets including major bridges in various parts of the State.

4.3 CLIMATE VARIABILITY AT PROJECT CORRIDOR

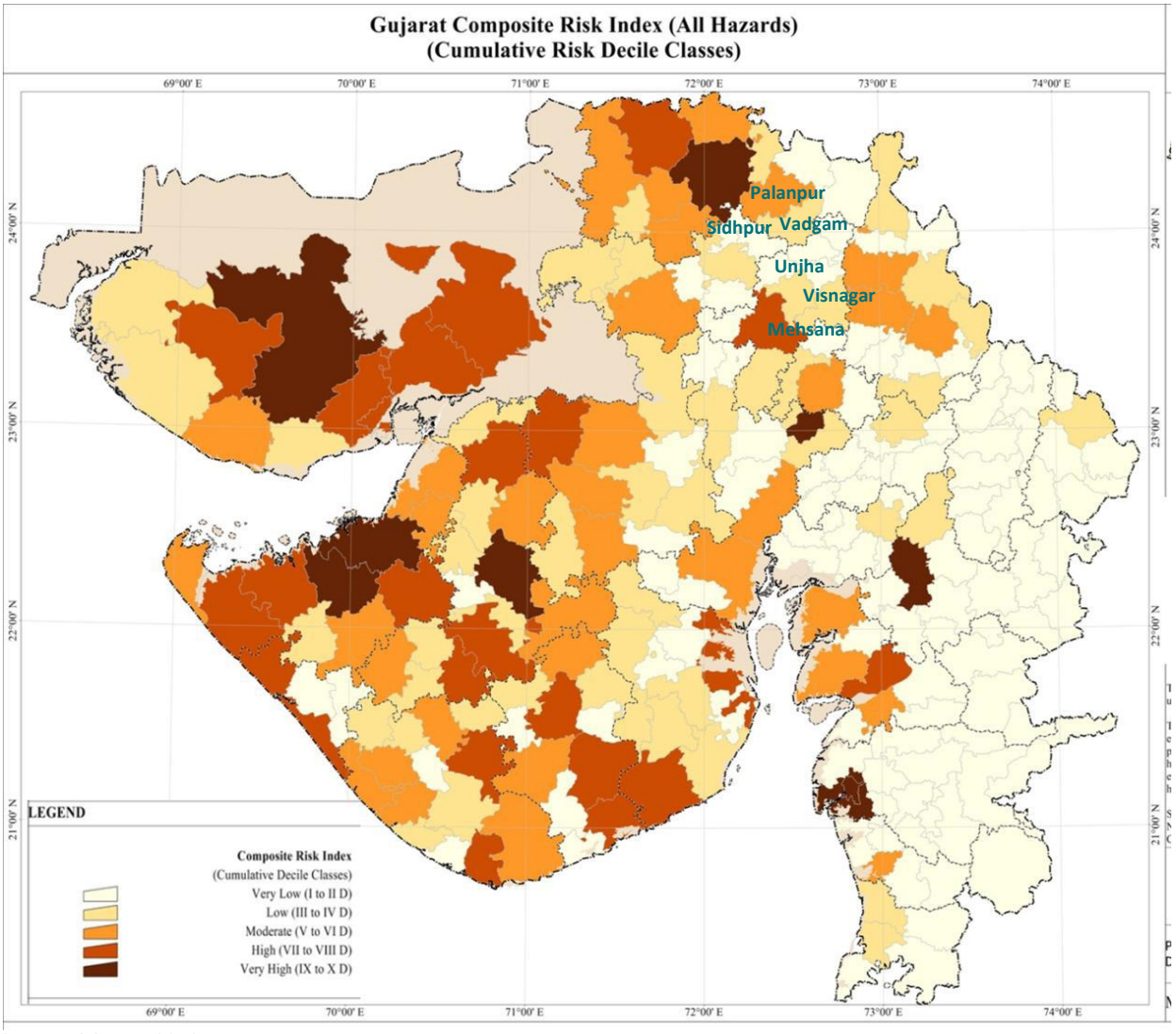
35. Project corridor passes through three districts of Mehsana, Patan and Banaskantha in northern Gujarat. The Banaskantha project district received a rainfall of 150 mm (24 hours) which was proximity to the heaviest rainfall area of 219 mm (24 hours) in Sabarkantha district during 2016-17. The history of climate variability in project districts is as follows:

- During the year 2013-14: The project districts experienced extremely heavy rainfall and the districts were worst effected with receiving unprecedented rainfall.
- During 2015-16: Worst effected with heavy rainfall districts include Banaskantha, Patan, Kutch and Mehsana.
- During 2016-17: The districts are affected with moderate occurrence of rain fall and close to the region of high occurrence of rainfall in Sabarkantha District.
- 1115 villages of 6 Districts (including Project District-Banaskantha) declared as Drought affected villages during the year 2016.

[5] Report on Gujarat State Disaster Management Plan, 2016-17.

- During the summer, the maximum temperature often peaks to 45 degrees Celsius in northern districts of Gujarat, which is leading to severe heat wave conditions.

36. According to the Composite Index Map (including all Hazards) developed by the State Disaster Management Authority (GSDMA), index levels of Gujarat composite risk zone for the year 2016-17, the project talukas of respective districts are under very low to high risk zones in terms of the overall composite index of hazard zonation map **(Figure 4.1).**



Source: GSDMA-2016-17

Figure 4-1: Gujarat Composite Index Map (Taluka level)

37. Transportation sector is one of the most affected sector with the above said variability condition in India, hence a proactive way of designing and implementing in transport infrastructure is required if long-term sustainability of the road network is to be considered. Initiatives in design measures will help in addressing and cope up the with as part of resilient measures due to climate change. These measure are often limited to implement however, those are value addition to adapt for the future perspectives in transport infrastructure development.

4.4 CLIMATE RESILIENT INTERVENTIONS

38. The possible design interventions to address the climate change and other green interventions to safeguarding the environmental and social impacts are discussed in subsequent paragraphs for this corridor. The design interventions have been identified and developed based on primary findings by site visits, consultations and review of relevant literature on possible impacts and mitigation measures suggested in various documents prepared by the World Bank[6] and Gujarat State Disaster Management plans. Also reviewed past experiences in various design interventions followed under GSHP I and II and other State Road Projects.

39. Enhancing the resilience of development plans to climate risk is thoroughly a strategic and proactive move and it requires anticipated climate threats which are to be assessed before the design measures and implementation plans, so that the proposed measures will reduce the impacts on extreme events due to climate change. The following table presents (Table 4-1) possible design considerations for incorporating into the design measures.

Table 4-1: Impacts of Climate Change and Potential Design Considerations Proposed for the Project Corridor

Climatic Condition	Impacts	Design considerations (Climate Resilient Measures)
High Temperature	**Rising of heat/temperature** • Optimal removal of avenue trees increases the local heat/temperature (special/temporal impact) • Loss of soil moisture due to clearing & grubbing activity. • Temperature breaks soil cohesion and increase dust volume which causes health and traffic accidents • Susceptibility of wildfires that threaten the transportation infrastructure directly	• Provision of landscaping on both sides of the corridor to control the heat and local temperature • Turfing on side slopes to maintain temperature and dust control • Regular maintenance of side drains • Provisions included for dust suppression methods
	Pavement: • Increased fatigue bituminous pavement needing additional maintenance cost • Deterioration of gravel surface due to excessive moisture loss leading to additional cycle of resurfacing • Increased VOC with additional consumption of fuel and increase the GHG emissions. • Possibility of increase in road accidents.	• Use of pavement with stiff bitumen and soft bitumen with solvent in water (emulsion), • Control the soil moisture • Adaptation of gravel sealing (Otta seal/grav-seal) • Additional road safety provisions
	Bridges: • Thermal expansion of bridges • Higher corrosion activity at locations with high humidity.	• Careful attention to material used for joints • Extensive use of corrosion protection material
Water Scarcity (Drought condition)	**Along the Road** • Unavailability of water for compaction work • Drought increases mortality of plants along road alignment • Increase aridity and lower water table affecting the road base stability	• Rain Water Harvesting Structures and connecting to natural streams (silt fencing and mini treatment plants connecting to ground water recharge pits) • Protection and conservation of water bodies alongside the corridor
Extreme Rainfall	**Road pavement and Drainage structures** • Overtopping and washing away of the pavement • Increase of seepage and infiltration • Increase of hydrodynamic pressure of roads • Traffic hindrance and safety concerns • Washing of CD Structures and roads act like a dams	• Adequate drainage provisions according to the projected/expected rain fall events. • Regular maintenance by cleaning and clearing the natural side drains and culverts • Adopting the erosion protection with slope stability measures

[6] World Bank's document on Enhancing the Climate Resilience of Africa's Infrastructure-Conference Edition
Public Disclosure Document Moving Towards Climate-resilient Transport

Earthquake	**<u>Road Embankment & Drainage Structures:</u>** • Failure of embankment and drainage structures. • Failure of Pavement • Collapse of bridges • Damage to bridge, bearing and column • Traffic disruption • Damage to utilities (urban stretches)	• Design considerations followed for roads and bridge structures falling under specified earthquake zone.

40. Climate Resilient interventions are proposed for Mehsana-Palanpur corridor as mentioned above are to be integrated into the design as part of the proposed widening option from the existing 4 lane to 6 lane facility of the corridor. Most of the climate resilient measures are as part of road construction activity which are already in practice and included as EMP /clauses in bid document to be followed by the contractor during road construction.

41. The following table presents the proposed climate resilient interventions and other conventional measures for social benefits are discussed as:

Climatic Condition	Proposed Design considerations (Climate Resilient Measures)	Measures to be followed by the Contractor/Implementation of Climate Resilient Measures
High Temperature / Heat	• Provision of landscaping on both sides of the road to control local temperature • Turfing on side slopes to maintain temperature and dust control • Regular maintenance of side drains • Provisions include for dust suppression methods. Use of pavement with stiff bitumen and soft bitumen with solvent in water (emulsion), • Control the soil moisture • Adaptation of gravel sealing (Otta seal / grav-seal) • Additional road safety provisions	Avenue tree plantations all along the length of the corridor and landscape with Turfing have been proposed at the locations as mentioned in Volume II, Part 1. The proposed landscaping measure shall be followed by the Contractor with prior approval from Authority's Engineer.
Drought / water scarcity	• Rain Water harvesting structures and connecting to natural streams (silt fencing and mini treatment plants connecting to ground water recharge pits or nearby water bodies). • Protection and conservation of water bodies alongside the corridor	Provision of Rain water harvesting structures at low lying water stagnant areas along the length of the corridor on both sides. Besides that, ditches of RWS will be connected to the natural drain along the corridor and again connected to the major water bodies located in the vicinity of the corridor with the provision of oil interceptors.
Extreme Rainfall / Floods	• Adequate drainage provisions according the projected/expected rain fall events. • Regular maintenance of cleaning and clearing the natural side drains and culverts • Adopting the erosion protection with slope stability measures	Regular maintenance by cleaning and clearing the natural side drains and culverts shall be carried out by the Contractor. Slope stability measures wherever required shall be followed by the Contractor.
Earthquake	• Design consideration for roads and bridge structures falling under specified earthquake zone.	Proper designs for Bridge structures so as to the earthquake resilient.

4.5 LANDSCAPING

42. Landscaping concept has been adopted on both sides of Mehsana - Palanpur road. The concept of landscaping has been evolved after due consideration and views of local public, specific opportunities looking to the importance of major urban towns / places along the corridor, in addition to that inclusion of multipurpose path has an advantage of landscaping and aesthetic view while walking by pilgrims along the corridor.

43. For the stretch between Mehsana to Palanpur section (**Ch 79+300 to Ch 140+216**), Architectural elements, rest areas, rural landscape and urban approaches have also been chosen as landscaping measure to provide an aesthetic appearance.

44. Landscaping of Highway is proposed at following locations.

- Median
- Grade Separated Intersections
- Entry and Exit Ramps
- At-Grade islands of the intersection locations
- Rest Areas
- Bus shelter / Bus bay / truck laybys,
- Urban approaches
- Selected Rural sections

45. The landscaping shall include provision of turf, shrubs, avenue trees, lawn and seating arrangement for public with aesthetic appearance to the Project Highway as per Manual. Additionally plantation on Medians, avenue plantation on either side of highway shall be all through the length of the Project Highway in accordance with **IRC: SP: 87-2013, IRC: SP: 21-2009.** The plantation of trees and shrubs should be done so as to ensure the following characteristics.

46. The shrubs should be / have-

- All seasoned
- Climate Adaptive
- Low maintenance
- Aesthetic appearance

47. The avenue trees should be / have-

- Fast growing
- Shady
- All seasoned
- Climate Adaptive
- Low maintenance

48. The local creeper species are recommended for landscaping, which include Ailanthus Excelsa (Ardusa), Azadirichta Indica (Neem), Callistemon (citrinus bottlebrush), Cassia Javanica (Pinkecia), Cassia Siamea, Delonix Regia (Gulmohar), Cassia-Fistula Garmalo), Manilkandra Hexandra (Palu), Emblica Officlanis (Amla), Moringa Oleifera (Drumstick), Morus-Alba (Setur), Pithecellobium Dulce (Goras Amli), Pongomia Pinnata (Karanj), Punica Granatum (Dadam), Prosopis Cineraria, Salvadora oleodes (Piloo), Syzigium Cumini (Jamun), Ziziphus spinosa (Bordi), Terminalia-catappa (Badam), Dalbergia sissoo (Sheesham), Pterospermum acerifolium (kanak champa) etc.

49. The cost for implementation and maintenance has been worked out and is included in the EMP Budget.

50. The indicative / conceptual designs are given in Figure 4-2 to Figure 4-3 below. Rest of the images of Conceptual designs pertaining to Landscaping in Rural Section, Landscaping in Urban section, Landscaping in the Median etc. have been provided vide **Appendix 2**.

Figure 4-2: Conceptual image for Bus bay Location

Figure 4-3: Conceptual image for Rest Area Location

51. Further details and concept plan and design for rest area landscaping concept, images of urban rural sections, etc. provided vide **Appendix 2** along with this report.

52. The proposed locations for landscaping are given in Table 4-2 below.

Table 4-2: Proposed Locations for Landscaping

Sr. No	Chainage From (km)	Chainage To (km)	Type of Element / Section	Side	Length (in km)
1	79.575	79.725	Architectural Element, Rural	LHS	0.150
2	80.750	80.950	Rest area	Both	0.200
3	82.800	83.000	Rural landscape	Both	0.200
4	87.950	88.150	Rural landscape	Both	0.200
5	90.350	90.550	Rural landscape	Both	0.200

Sr. No	Chainage From (km)	Chainage To (km)	Type of Element / Section	Side	Length (in km)
6	92.575	92.620	Architectural Element	LHS	0.045
7	92.950	93.150	Rest area	Both	0.200
8	100.025	100.250	Urban approach	Both	0.225
9	102.000	102.200	Rural landscape	Both	0.200
10	114.850	115.050	Rest area	Both	0.200
11	116.725	116.925	Urban approach	Both	0.200
12	118.650	118.850	Rural landscape	Both	0.200
13	122.650	122.850	Urban approach	Both	0.200
14	129.600	129.800	Rural landscape	Both	0.200
15	133.300	133.500	Rural landscape	Both	0.200
16	134.675	134.875	Pilgrim gateway plus rest area	Both	0.200

53. The selected bus bay / bus shelters are to be provided with landscaping. The locations of them are given in below Figure 4-3**.**

Table 4-3: Selected Bus bay / Bus shelters location with landscaping

Sr. No.	Chainage (km)	RHS	Village	length (m)
1	83.160	LHS	Near Buttapaldi	100
2	83.110	RHS		100
3	92.940	LHS	Unava	100
4	92.890	RHS		100
5	101.310	LHS	Maktupur	100
6	101.340	RHS		100

54. **Rest Areas'** landscaping must include the minimum but not limited to, the elements listed below-

- Shelters with seating arrangement
- Sanitation facilities (preferably bio-toilets)
- Drinking water facility
- Dustbins
- A photograph spot (depicting character of the locality)
- Aesthetic green landscaping through plantation.

4.6 DRIP IRRIGATION

55. Drip irrigation system with independent water source shall be installed for watering of shrubs/plants/trees in median islands, roundabouts, truck layby, bus shelters, parking areas and other locations as required; use of water tanker for watering the plants/shrubs shall not be permitted in general as it causes hazard to traffic. Proper system for watering of plants, shrubs, trees, etc. in select landscaping areas shall also be made.

4.7 SILT TRAP, RAINWATER HARVESTING STRUCTURES AND OIL INTERCEPTORS

56. Silt Traps, Rainwater Harvesting Structures and Oil Interceptors shall be provided all along the Project Highway at identified locations. The locations shall conform to the site requirements in consultation with Authority's Engineer during the implementation. The Typical Drawings of Silt Traps, Rainwater Harvesting structures and Oil Interceptors are given in **Volume VI Drawings.**

4.7.1 Silt Traps

57. The Contractor shall provide silt trap to prevent sediments from the construction site entering into the nearby watercourses and also silt from surface water from carriageway entering into nearby water courses through drains. Silt trap shall be provided at the locations given in the Table 4-4 below.

Table 4-4: Locations of Silt Traps

Sl. No.	Type of water body	Chainage	Remarks
1	Rivers	81+920	Rupen
2		89+870	Pushpavati
3		109+710	Saraswati
4		122+035	Adhuriyo
5		129+580	Umerdeshi
6	Ponds	93+600	LHS
7		111+800	RHS
8		120+600	LHS

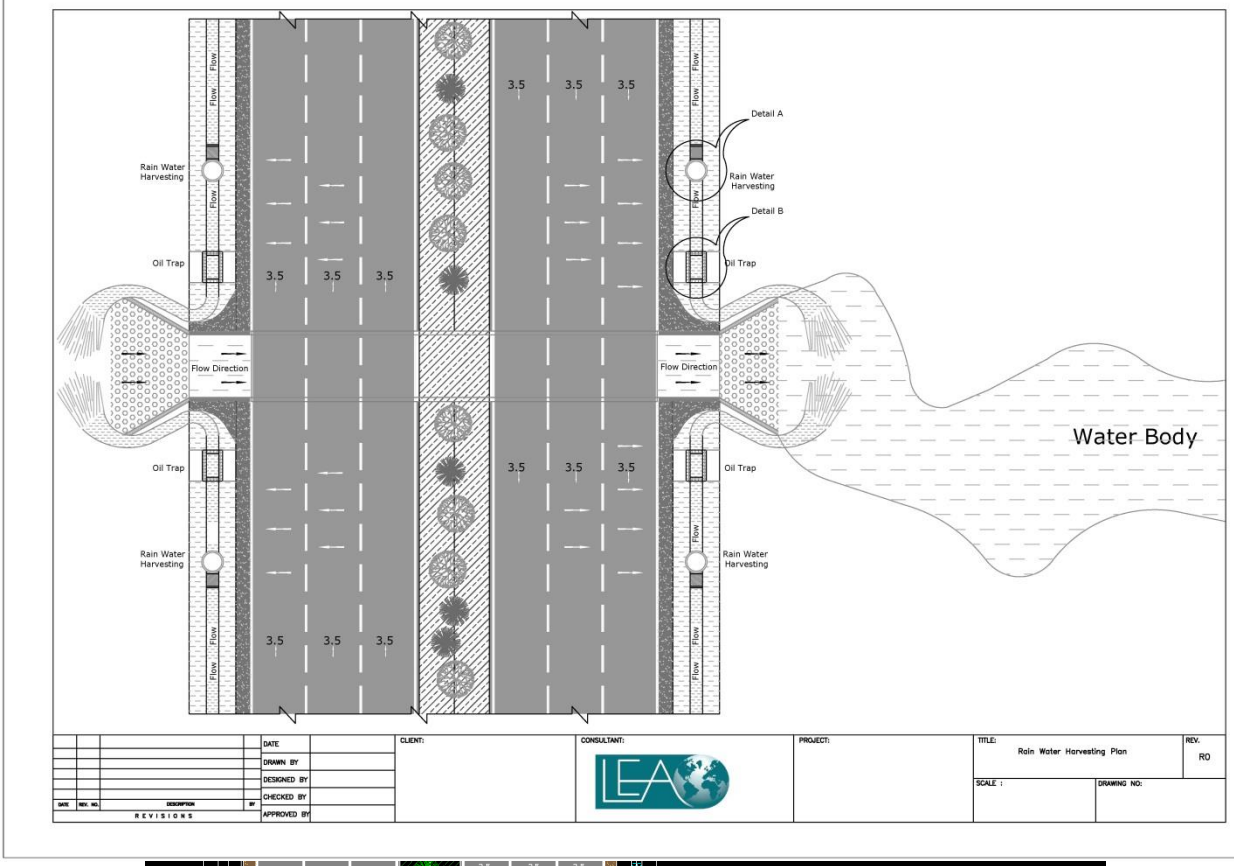
4.7.2 Oil interceptors

58. The Contractor shall provide oil interceptors at vehicle parking area, vehicle repair area, workshops, refueling area and nearby water bodies to the construction camps. The Contractor shall also provide oil interceptors at drain outlet to the water bodies. Slope of the prepared and paved site (1:40) shall be such that all the wastewater flows into the interceptor before discharge. Periodic cleaning (once in a week) will be done from outside by skimming off film of oil over the surface. The typical drawing given in Part 3 Drawings provides the details of the arrangements that need to be made for the oil interceptor for the removal of oil and grease from 'point' sources.

4.7.3 Rain water Harvesting Structures

59. Runoff from highways contains pollutant deposits from vehicles which find a way into surface drainage channels. In addition to provision of dry swales along the road longitudinal drains, water filtering and recharge structures are suggested. Contractor shall accordingly examine the project corridor for providing rainwater harvesting structures along the corridor. The Contractor shall provide rainwater harvesting pits at locations where there is stagnation of rain water, at bridge and culverts, at low lying water stagnant areas along the length of the corridor on both sides besides at water bodies locations. Locations shall be finalized in consultation with the Authority's Engineer. The locations for these structures shall be selected such that there is no requirement for additional tree felling.

60. A typical RWH structure and flow diagram which is connecting to the natural stream are depicted in Figure 4-4 to Figure 4-6 below.



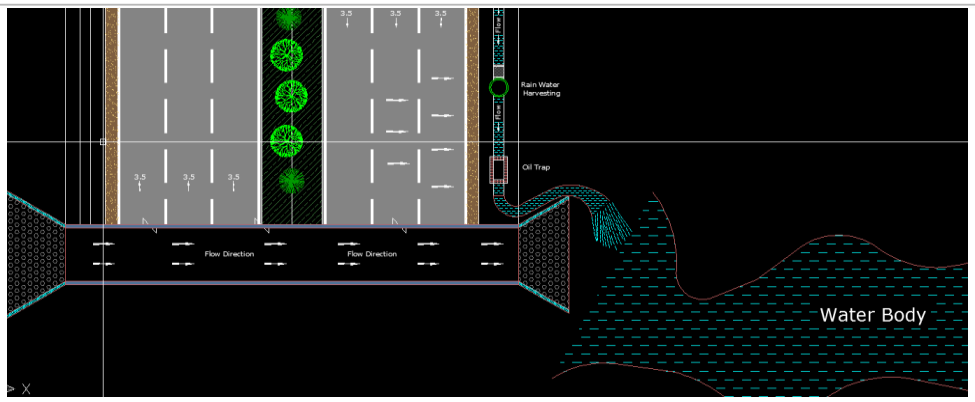
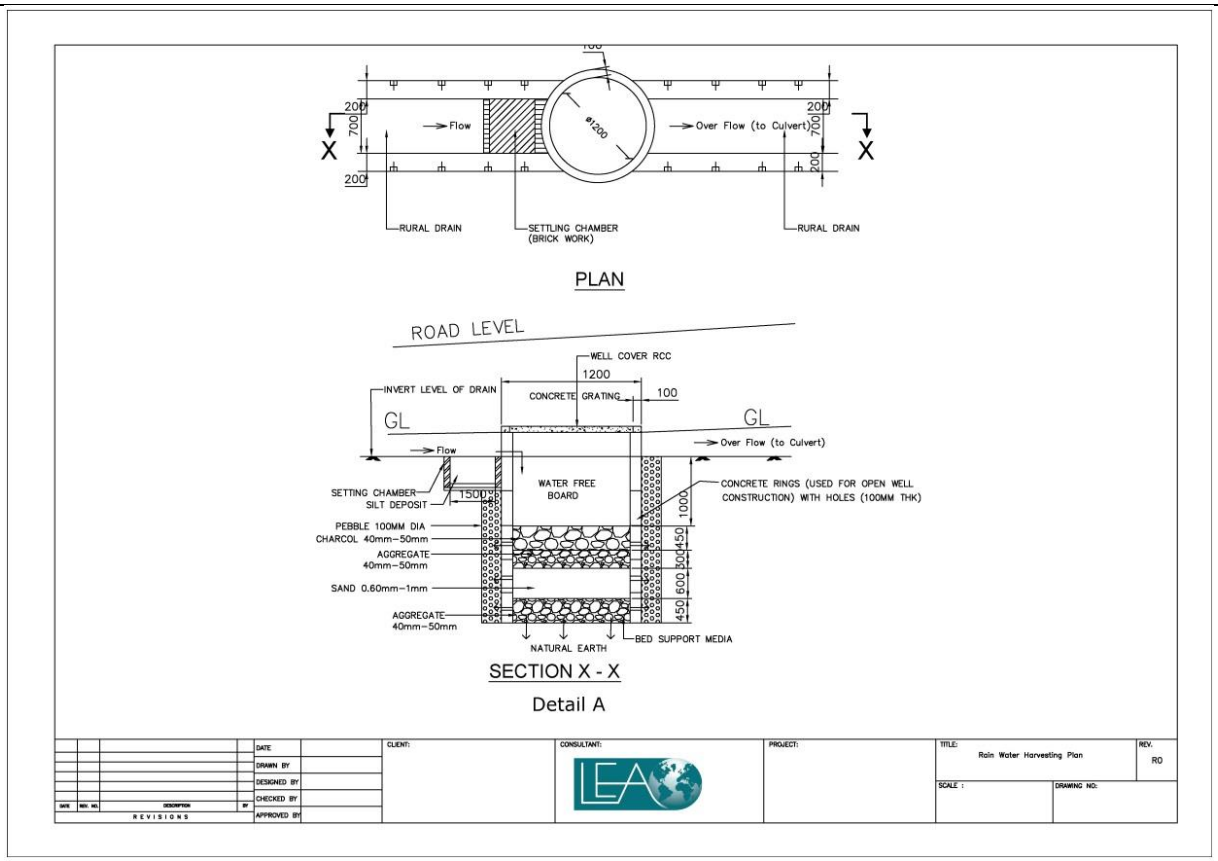
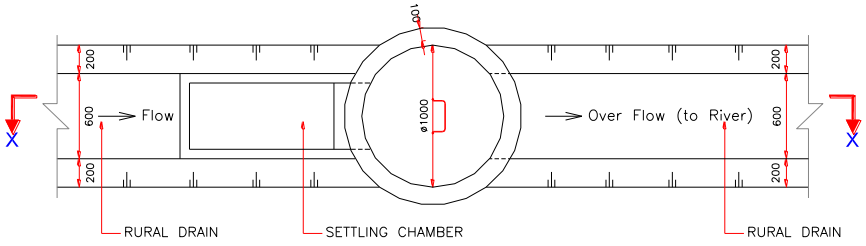
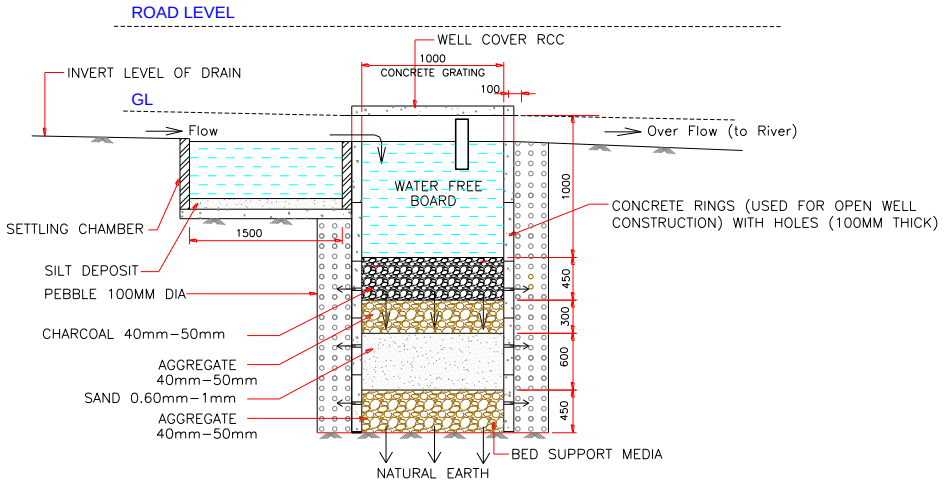


Figure 4-4: Sketch - Drain connecting to natural stream





PLAN



SECTION X - X

Figure 4-5: Dual media water harvesting structure

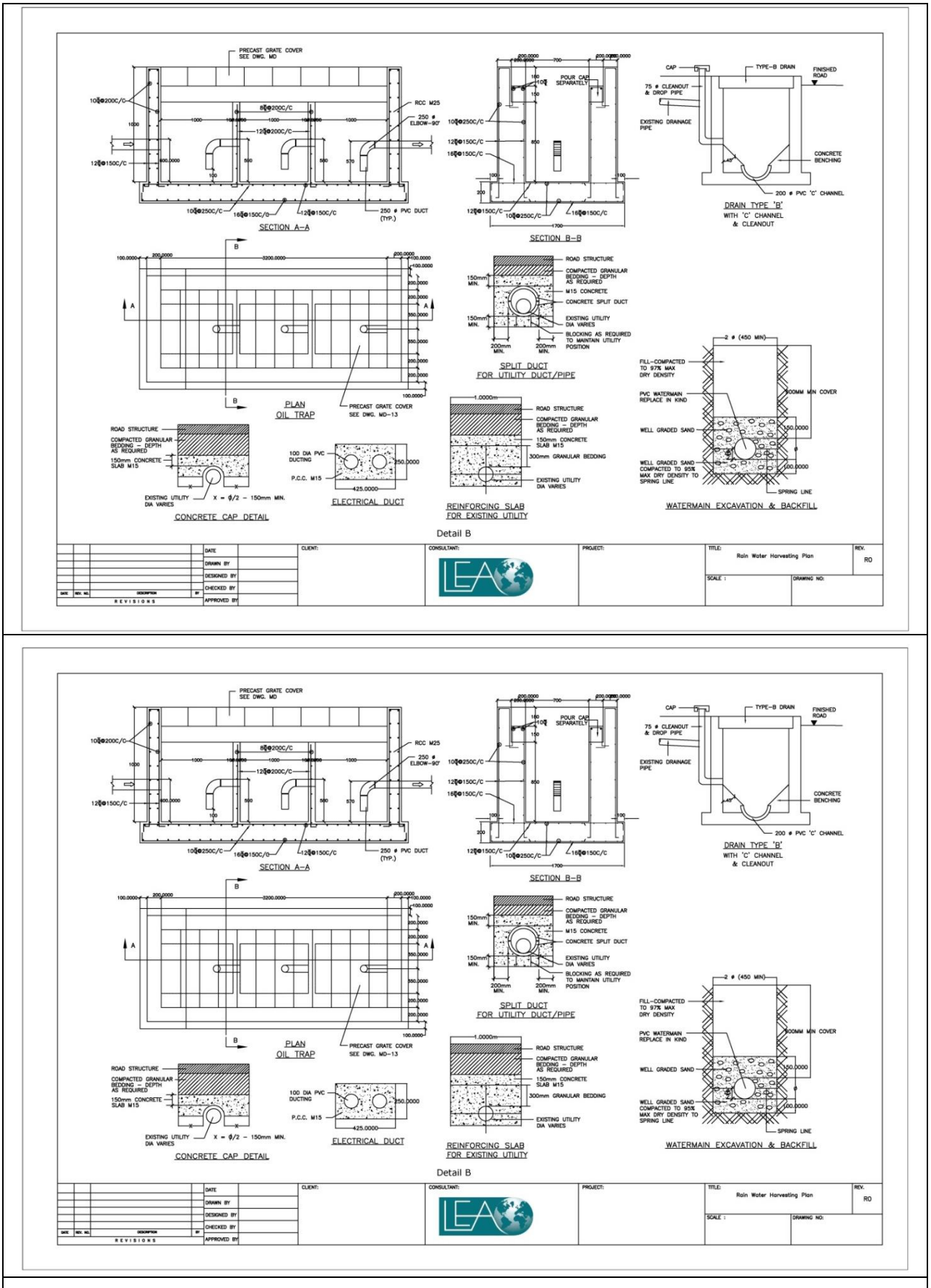


Figure 4-6: Typical Details Of The Other Required Structures Along The Corridor

61. Ditches collect the surface run-off from the road and carry it to nearest natural drainage. A standard highway design includes ditches on both sides. Generally runoff collected in ditches enters natural drain with considerable velocity, as there is a fall between the end of a ditch and the river/stream which is at the lowest elevation in the area.

62. Run-off will carry all the particulate matter from the road to the natural drain or sink and thus possess potential threat of adding TS, TSS and turbidity to it. The greater velocity may contribute scouring of edges or base of the drain or sink and which may further increase the turbidity. Therefore, an arrangement, which can diffuse the force of water and provide sufficient space for sediments to settle down, is required. This can be achieved by providing some kind of an obstruction in the path of water flow.

4.8 OTHER CONVENTIONAL/ SOCIETAL BENEFITS

4.8.1 Mitigation Measures for Air & Noise Pollution

63. Vegetative barriers on both sides of the road and the median of roadways help to loft roadway pollutants through chimney effect. Accordingly, all along the length of the corridor, avenue trees of local species have been proposed.

64. Highway noise has maximum impact on noise sensitive uses such as educational and medical institutions located along the road corridors. Reduction of noise levels within the premises of such institutions shall be made through vegetative barriers. Vegetative barrier are proposed at all along the project corridors. Noise barrier shall be provided in situations wherever the school / colleges/ hospitals/ residential areas / old age homes are abutting to the project highway in order to avoid noise pollution.

65. The Contractor shall provide noise barriers at the suggested locations of identified “school/ colleges/ hospitals/ residential areas/ old age homes” prior to commencement of work at such locations in consultation with Authority’s Engineer and local Authorities at locations given in Table 4-5 below.

Table 4-5: Indicative locations and sensitive receptors

Sl. No.	Chainage (Km)	Structure / Features (Sensitive Receptors)	Side	Remarks
1.	80+100	Shree Swami Narayan Vishwamangal Gurukul	RHS	Institution
2.	83+400	Utkarsh Vidyalaya	LHS	Institution
3.	98+650	Maa Uma Multi-speciality Hospital	RHS	Institution
4.	100+600	TEF School BW+Gate	LHS	Institution
5.	101+200	Nilkanth Vidhyalaya	LHS	Institution
6.	111+180	Avatar Hospital	RHS	Institution
7.	111+230	Bhani Hospital	LHS	Institution
8.	111+300	Narsingh College	RHS	Institution
9.	113+130	Sehat Hospital	RHS	Institution
10.	115+350	Gokul Technical Campus gate & BW	LHS	Institution
11.	129+840	Rangoli Pre School Kanodar	LHS	Institution
12.	131+670	SKM High School Kanodar	LHS	Institution
13.	135+500	Government Engineering College Palanpur	RHS	Institution
14.	138+200	Convent of Jesus and Mary	LHS	Institution

4.8.2 Use of Renewable Energy

66. In line with the GoG initiatives to foster initiatives towards exploration and adoption of non-conventional energy sources, the street lights along the corridors, including lighting at the junctions, bus stops, truck lay bay etc., are proposed solar powered to grid system (Table 4-6).

- Free from the disturbance arising due to the avenue tree canopy
- Prevents vandalism
- Reflects a symbolic representation of green highways to the road users/public

67. The Solar Street Light units has been so designed to provide average of 40 lux illumination all through on top of carriageway and footpath wherever provided during the operating hours from dusk to dawn at locations as per Manual and in rest areas bus shelters and in landscape area. The Solar Street light units shall include all foundation works, erection of pole, installation of solar PV panel and providing and fixing LED bulbs including other ancillary works satisfying Ministry of New and Renewable Energy (MNRE) standards. The solar lights shall be provided using appropriate system by feeding solar energy generated directly to the power grid without making use of batteries (storage cell).

Table 4-6: Solar Street Light Sections

(Provision of Solar lights locations as per IRC:SP:87:2013)

Location	Total Length (m)
Near Bus stop locations	230
Near Truck lay-bye locations	240
Rupen bridge	385
Sujalam sufalam bridge	335
Pushpavati bridge	385
Saraswati bridge	643
Adhuria bridge	386
Umardeshi bridge	467
Total Length	**3071**

4.8.3 Recycling of Pavement

68. Adopting the green concept of 3 R's (Recovery, Recycle and Reuse), the recycling of the existing pavement has been suggested. Based on the quality of the sub grade materials, it is proposed to recycle them for the purpose of pavement, strengthening embankment etc. In case if it does not meet the requirements in terms of quality, it shall be recycled as pavement for the approach road/ village roads. The concept is included as a condition in the contract document, stating that "***the Contractor shall be encouraged to recycle the dismantled / excavated / pavement milling (recycled asphalt product) materials as much as possible at appropriate level without compromising with the standards and specifications.***"

4.8.4 Cattle Crossings

69. Based on the survey, the number of cattle's crossing the corridor is insignificant and hence having a dedicated underpass for cattle crossing may not be necessary. Moreover the high costs involved in the construction and maintenance rules out the feasibility to have an underpass. Hence, it has been proposed to have cautionary sings at 120m prior to the cattle crossing locations (Table 4-7) as per IRC norms. The irregular movement of the cattle along the project corridor shall be restricted by creating awareness/capacity building among the villagers, guiding them to use the dedicated cattle crossings.

Table 4-7: Details of Cattle Crossing Locations along the Project Corridor

Sl. No.	Villages	Cattle crossing locations (Chainage)	Provisions of Cautionary sign boards
1	Nanidau	81.500 to 82.000	Provision of Safety signage as per IRC standards and special signage for cattle, rumble strips at start and end point of each cattle crossing locations and provision of median openings at the cattle crossing locations.
2	Motidau	83.200 to 83.800	
3	Bhandupura	88.150 to 89.000	
4	Brahmanwada	104.000 to 105.200	

Source: Detailed Assessment by LASA, 2018

4.8.5 Solid Waste Management

70. The reconnaissance survey conducted reveals that the solid waste management practice adopted along the green stretch from Mehsana to Palanpur is not organized and systematic. The settlements near Mehsana, Unjha, Siddhapur and Chaapi and the small / medium industries located near Chhaapi / Palanpur are identified as key waste generators present along this corridor. The consultation reveals the reasons for the road side dumping and they are as follows :

- Lack of bins within the settlement and the irregularity in collection and
- Open disposal of industrial wastes into the RoW. The absence of efficient collection mechanisms results in the industries to dump their wastes on government lands outside their settlement limits (Ch 141+200).

71. As one of the green Initiative measures, options for dedicated solid waste management practice along the green highways are explored. Dust bins and large size community bins shall be provided at the below mentioned locations: chainage km. 79.800, km. 95, between km. 98 to 100 (Unjha), between km. 107.5 to km. 112.5 (Sidhpur), between km. 119.5 to km. 121.5 (Chaapi), and between km. 138.5 to 140.0 (Palanpur) to improve the solid waste management in the project area. The responsibility of collection and disposal of waste from these bins shall remain with the concerned municipalities/panchayat.

- Start point of the project corridor, km. 79.302
- Bhandu at km 85 - 86
- Unava, Km. 95 - 96
- Unjha Town km 98 - 100
- Maktapur km 101+000
- Brahmanwada km 105+000
- Khali village km 107+500
- Siddhapur, between km. 110 to km. 112.5
- Chaapi, between km. 119.5 to km. 121.5
- Palanpur between km. 138.5 to 140.000

72. The responsibility of collection and disposal of waste from these bins shall remain with the concerned municipalities/ panchayat.

5 ENVIRONMENTAL ENHANCEMENT MEASURES

5.1 ENHANCEMENT MEASURES FOR COMMUNITY AND INSTITUTIONAL ASSETS

73. Enhancement measures to the selected community and institutional assets have been included. These have been identified based on consultations with the communities / stakeholders, through an objective evaluation of the use, importance, values to the communities. Enhancement measures like provision of Smart bins, community bins & dustbins, paver blocks, foot path, plantation - tree plantations, tree seating, covering well with iron gril, raising ht. of existing well, protection against noise levels in the form of vegetative barriers, fencing, boundary wall, gate, road safety measures including crash barriers at identified properties are suggested.

74. Adoption of location specific avoidance measures through localized design interventions and protection measures has ensured that only 11 cultural assets are being impacted, which includes 06 temples (having major impact / minor impact), 05 shrines (are having major impact / minor impact). The details of the impacted structures are given in the Resettlement Action Plan (RAP). For the affected structures the compensation and assistance will be provided in line with the Resettlement Policy Framework (RPF) adopted for the project. However, no enhancement of any of the cultural properties is proposed.

5.2 ENHANCEMENT OF ROAD SIDE AMENITIES AND FEATURES

75. The Contractor shall enhance the road side amenities and features at locations given below in table 5.1. The enhancement measures include but not limited to provision of Smart bins, community bins & dustbins, paver blocks, plantation (and maintenance) of saplings tree seating arrangement, raising ht. of an existing well and covering it with the iron grill, protection against noise levels in the form of vegetative barriers, enhancement at existing Toilet and Drinking Water Facilities etc.

76. These enhancement measures shall be taken with concurrence of local authority / community. The identified locations hereunder are tentative and shall be confirmed in consideration of the site requirements in consultation with local authority, Authority's Engineer and the Authority.

77. Below Table 5-1 contains list of selected enhancement measures along the SH 41 from Mehsana to Palanpur. Necessary specifications pertaining to these enhancements have been provided beneath the Table 5-1, while **Appendix 3** contains drawings on the same. **Cost provisions of the enhancement measures have been included in the EMP budget.**

Table 5-1: Environmental Enhancement Measures at Identified Locations along: Mehsana-Palanpur SH 41 Project Corridor

Sl. No.	Name of Amenity/Feature	Type / Objective	Minimum Enhancement measures require at
1.	Rainwater harvesting	To increase ground water level	The Contractor shall provide rainwater harvesting pits all along the corridor at 1 km intervals staggered on both sides of the project highway. It shall not be provided near water bodies like ponds and rivers and may be located adjoining the side drain so that surface runoff from roadway finally falls into these pits through side drains and thereby helps in recharging the ground. Locations shall however be finalized in consultation with the Authority's Engineer taking into consideration the site constraints and such that it does not involve any additional land acquisition or additional tree felling.

Sl. No.	Name of Amenity/Feature	Type / Objective	Minimum Enhancement measures require at
2.	Solid Waste Management	Collection & Disposal of municipal / panchayat	The Contractor shall implement SWM on the project highway. **Smart waste collecting bins - Community Bins and Large Size Dust bins** shall be provided at identified littering location and maintained on both sides at start and end of the following locations or as directed by the Authority's Engineer. **a)** Bhandu at km 85+000 **b)** Unjha Town km 98+000 **c)** Maktapur km 101+000 **d)** Brahmanwada km 105+000 **e)** Khali village km 107+500 **f)** Sidhpur, between km. 110+000 to km. 112+500 **g)** Tendiwada / Chaapi, between km. 119+500 to km. 121+500 **h)** Palanpur between km. 138+5000 to 140+000 The responsibility of collection and disposal of waste from these bins shall remain with the concerned municipalities/ panchayat.
3.	Oil interceptor	Filtration of surface water	The Contractor shall provide oil interceptors at vehicle parking area, vehicle repair area, workshops, refuelling area and nearby water bodies to the construction camps. The Contractor shall also provide oil interceptors at drain outlet to the water bodies.
4.	Silt Trap	To prevent sediments	• River (81+920) • River (89+870) • Pond (93+600) • Ponds - 111+800 (RHS) • Pond - 120+600 (LHS) • Saraswati River (109+710) • Adhuriyo River (122+035) • Umerdeshi River (129+580)
5.	Landscaping	Aesthetic view, increase green cover	Locations as mentioned in **Schedule - C of Section-VII** (conditions of contract & schedules).
6.	Drip Irrigation	Optimise use of water for sprinkling and landscaping	Drip irrigation system with independent water source shall be installed for watering of shrubs/plants/trees in median islands, roundabouts, truck layby, bus shelters, parking areas and other locations as required; use of water tanker for watering the plants/shrubs shall not be permitted in general as it causes hazard to traffic. Proper system for watering of plants, shrubs, trees, etc. in select landscaping areas shall also be made.
7.	Well	Ground Water Asset	Well at 80+700 (LHS, 16.2 m); and another well at km. 121.9 (RHS) • Providing rainwater collection pit so that rain water without debris collected in to the well; • To raise height of a Well (at-least 1.5 m from GL); • Well shall be covered with iron grill (safety); • Plantation (native species) around well; • Tree seating including preservation of existing tress around Well.
8.	Water Kundi	Asset – Water Resources	Water Facility ("*Kundi*") at km. 85+600 (LHS); 7 m offset from edge of the existing pavement) • To be Preserve and Enhanced
9.	Toilet (Public)	Public Convenience	Public Toilets on RHS at km. : a) 85+600 (11 m) b)110+500 (3 m), c)111+500 (15 m), d) 113+000 (7 m) • To be Preserve and Enhanced
10.	Drinking Water Tank	Public Convenience	Drinking Water Facilities (Water Tank) at km. • Km. 121+900 (RHS), • Km. 125 (LHS, 10 m) To enhance the locations by providing paver blocks, plantation and seating area - providing benches, repairing / restoring for drinking water facility.

General Guidelines for Enhancement

78. Specifications for Plantation and Brick Fencing, Concrete Benches (Whichever is applicable) etc.:

1. **Plantation:** Planting of trees and their maintenance for two years (Planting of ornamental trees, native species) in 0.60 m dia. holes, 1 m deep dug in the ground, mixing the soil with decayed farm yard / sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintenance of the same. It shall be protected with fencing.
2. **Brick Fencing:** Half brick circular tree guard in 2nd class brick, internal diameter 0.9 m., height 1.6 m., above ground and 0.20 m. below ground. (bottom 2 courses laid dry and top three courses in cement mortar 1:6 (1 cement and 6 sand) and the intermediate courses being dry honey comb masonry)
3. **Metal Fencing:** Diameter 0.6 m, height 2 m., above ground and 0.30 m. below ground.
4. **Concrete Benches:** Concrete Seating Benches, 1.5 m (length) by 0.6 m (width); RCC M 15 Grade, Unit in Nos., It shall be fit in a way that at least 4 adult persons may be accommodated at desired height.
5. **Solid Waste Management :** Provision of Bins at identified locations 1) Small Size Waste Bin – Litter Bin, Wheel Based and /or Pedal Based, 240 Litre size, 2) Big size Community Bin – Waste Bin of 1100 Litre in Size
6. **Paver Block:** Providing and laying interlocking paver blocks of high density 80 mm thick M-50 grade in bus-bays, truck layby and other locations as shown in the drawing, close jointed over bed of 50mm thick river sand to a tight pattern, laid to proper line and level including bedding down the completed surface with a plate vibrator or by firmly topping level with mallet and a large flat piece of timber, finishing by brushing clean dry sand over the surface to fill all the joints thoroughly and as per Additional Technical Specification A 15 or as directed by the Authority's Engineer.
7. **Dismantle all existing R.C.C. Bus stands**
8. **Compound Wall** around temple up to 0.90 m height with intermediate brick pillars up to 1.5 M height at 2 M c/c with Steel Grill Work to specification above 0.9 M height**.**
9. **Iron Gate:** Supplying, fitting and fixing double leaf heavy duty iron gate (4m Wide), frame made from 50mm x 6mm M.S. flat iron with another horizontal flat at the middle, 20mm dia. M.S. bars at 200mm apart from bottom flat to top flat and 20 mm dia. M.S. bars at 200mm apart from bottom flat to middle flat including drilling, welding etc. complete. All vertical bars are to be protruded at least 100mm above the middle and top flat is to be flattened and pointed as directed. Necessary locking arrangement on both faces, arrangement for temporary closing the gate and 2 nos.(minimum) strong iron hinges of M.S. bars and flat of same sizes on each leaf to be embedded in C.C brick pillars as necessary including a red oxide painting to all iron works as directed and specified.

79. Drawings pertaining to above mentioned specification are provided vide **Appendix 3** along with this report.

6 ENVIRONMENTAL MANAGEMENT PLAN

80. The Contractor shall implement the Environmental Management Plan and attachment to the Environmental Management Plan specified hereunder as part of Work.

81. A description of the various management measures during various stages of the project are provided in below sections which forms the Environmental Management Plan (EMP) and part of the Contract Bid Document.

6.1 PRE-CONSTRUCTION STAGE

6.1.1 Pre-Construction Activities by PIU

82. Prior to the Contractor mobilization, the PIU will ensure that an encumbrance free CoI / RoW is handed over to enable the start of construction. The RoW clearance involves the following activities:

- Clearance of the RoW includes diverted stretch of forest land of road side notified protected forest for the proposed width that can accommodate proposed CoI and removal of trees on the same, and
- Relocation of common property resources (CPRs) impacted, including cultural properties as temples and community assets as wells, tube wells, hand pumps and other such utilities.

6.1.2 By Contractor/ Authority's Engineer

83. The pre-construction stage involves mobilization of the Contractor, the activities undertaken by the Contractor pertaining to the planning of logistics and site preparation necessary for commencing construction activities. The activities include but not limited to are:

- Procurement of construction equipment / machinery such as crushers, hot mix plants, batching plants and other construction equipment and machinery
- Identification and selection of material sources (quarry and borrow material, water, sand etc.)
- Selection, design and layout of construction areas, hot mix and batching plants, labour camps etc.
- Planning traffic diversions and detours, including arrangements for temporary land acquisition.

6.2 CONSTRUCTION STAGE

6.2.1 Construction stage activities by the Contractor

84. Construction stage activities require careful management to avoid environmental impacts. Activities that trigger the need for environmental measures to be followed include but not limited to are:

- Imbibing environmental principles at all stages of construction as good engineering practices
- Implementation of site-specific mitigation / suggested management measures
- Monitoring the quality of environment along the construction sites (as air, noise, water and soil)

85. There are several other environmental issues that are required to be addressed as part of good engineering practices. These include improvement of roadside drainage, provision of additional cross drainage structures or raising the road height in low-lying stretches, reconstruction and improvement of bunds of the affected water bodies.

6.3 OPERATION STAGE

86. Monitoring the environmental attributes during the entire contract period including that of Defect Liability and Maintenance Period shall be carried out by the Contractor as laid down in the monitoring plan. The compliance to the environmental monitoring by the Contractor shall be confirmed by the Authority's Engineer.

PROTECTION OF THE ENVIRONMENT CLAUSE

6.4 NONCONFORMITY TO ENVIRONMENTAL MANAGEMENT PLAN (EMP)

- The Environmental Management Plan (EMP) forms part of the Bid Document. The aspects given in EMP are mandatory in nature and thus, the Contractor is contractually bound to abide by the same.

87. It is deemed that the costs associated with carrying out the requirements of the EMP are, unless separate items are included in the quoted bid price, as incidental to the works therefore, no excuses towards non-compliance during construction shall be entertained. All these clauses are applicable to sub-contractors as well. However, the main Contractor will be held responsible in the case of any non-compliance on part his sub-contractors. The Authority's Engineer and Authority shall regularly monitor the compliance of EMP by the Contractor. The Contractor shall regularly monitor the compliance of EMP by their Sub-contractors. **The Contractor shall submit monthly environmental reports in the format prescribed by Authority. (Additional reports shall be submitted upon request from Authority / Authority's Engineer).**

88. The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP. Any lapse in implementing the same will attract the penalties.

- The Contractor shall take all reasonable steps to protect the environment on and off the site; and to avoid damage or nuisance to persons or to property of the public or others including any living entity resulting from pollution, noise or any other causes arising as a consequence of his methods of execution.

89. The Contractor shall follow the Environmental Management Plan as specified. The Authority's Engineer shall maintain record of compliance or non-compliance of Environmental Management Plan. On observing any non-compliance, the Authority's Engineer shall issue a notice to the Contractor, to rectify the same. **In case of any failure to rectify the non-compliance within the specified / stipulated timeframe in implementing the EMP, the Contractor is liable for the penalties as mentioned below:**

1) All lapses in obtaining clearances / permissions under statutory regulations and violations of any regulations including eco-sensitive areas shall be treated as a **major lapse**.
2) Any complaints of public, within the scope of the Contractor, formally registered with the Authority's Engineer, Authority or with the GoG and communicated to the Contractor, which is not properly addressed within the time period intimated by the Authority's Engineer / Authority shall be treated as a **major lapse**.
3) Non-conformity to any of the mitigation measures stipulated in the EMP (other than stated above) shall be considered as a **minor lapse**.
4) On observing any lapses (i.e. major & minor), the Authority's Engineer shall issue a notice to the Contractor, to rectify the same.
5) Any minor lapse, which is not rectified and/or complied within fifteen days from the notice issued by the Authority's Engineer, shall be treated as a **major lapse**.
6) If a major lapse is not rectified upon receiving the notice the Authority's Engineer shall invoke deduction, in the subsequent Interim Payment Certificate.

7) **For major lapses**, 0.15% of the Contract Price will be withheld for each notified lapse.
8) If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited**. Aggregate forfeited amount shall not exceed 3% of the Contract Price.

The Contractor achieving the compliance to EMP will be appreciated through:

a. Certificate of appreciation from Authority / R&BD-GoG with regard to compliance to EMP provisions;
b. The Contractors' environmental performance will be disclosed in the GSHP-II website for their compliance in achieving the EMP.

6.5 COMPLIANCE WITH LABOUR REGULATIONS

- During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to construction industry are given below. The Contractor shall keep the Authority indemnified in case any action is taken against the Authority by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Authority is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Authority's Engineer/Authority shall have the right to deduct any money due to the Contractor including his amount of performance security. The Authority/Authority's Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Authority.
- The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Authority at any point of time.

90. Salient Features of Some Major Labour Laws Applicable to Establishments Engaged in Building and other Construction Work: (The latest Act / law shall apply)

a) Workmen Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

c) Employees P.F. and Miscellaneous Provision Act 1952 *(since amended)*: The Act Provides for monthly contributions by the Authority plus workers @ 10% or 8.33%. The benefits payable under the Act are :

i. Pension or family pension on retirement or death, as the case may be.
ii. Deposit linked insurance on the death in harness of the worker.
iii. Payment of P.F. accumulation on retirement/death etc.

d) Maternity Benefit Act 1961: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013: This Act defines sexual harassment in the workplace, provides for an enquiry procedure in case of complaints and mandates the setting up of an Internal Complaints Committee.

f) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Authority by Law. The Principal Authority is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Authority if they employ 20 or more contract labour.

g) Minimum Wages Act 1948: The Authority is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, and Runways are scheduled employments.

h) Payment of Wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

i) Equal Remuneration Act 1976: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

j) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs.3500/-per month or less. The bonus to be paid to employees getting Rs. 2500/- per month or above up to Rs.3500/- per month shall be worked out by taking wages as Rs. 2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

k) Industrial Disputes Act 1947: The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

l) Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Authority on matters provided in the Act and gets the same certified by the designated Authority.

m) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and Authority. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

n) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

o) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.

p) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Authority of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Authority to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

q) Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

r) Weekly Holidays Act -1942

s) Bonded Labour System (Abolition) Act, 1976: The Act provides for the abolition of bonded labour system with a view to preventing the economic and physical exploitation of weaker sections of society. Bonded labour covers labour arising out of a loan, debt or advance. The Act prohibits forced labour and lays down rules preventing work for under minimum wage, stopping persons from leaving the worksite etc.

t) Authority's Liability Act, 1938: This Act protects workmen who bring suits for damages against Authority in case of injuries endured in the course of employment. Such injuries could be on account of negligence on the part of the Authority or persons employed by them in maintenance of all machinery, equipment etc. in healthy and sound condition.

u) The Personal Injuries (Compensation Insurance) Act, 1963: This Act provides for the Authority's liability and responsibility to pay compensation to employees where workmen sustain personal injuries in the course of employment.

6.6 ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY (ESHS) CODE OF CONDUCT

91. The Contractor shall submit the following additional documents:

92. **Code of Conduct (ESHS)** - The Contractor shall submit its Code of Conduct that will apply to its employees and subcontractors, to ensure compliance with Environmental, Social, Health and Safety (ESHS) obligations under the contract. It should cover comprehensively all required details, complete in

all respects and include the risks to be addressed by the Code in accordance with Section VII, e.g. Risks associated with: labour influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behaviour and crime, and maintaining a safe environment etc.

93. In addition, the Contractor shall detail how this Code of Conduct shall be implemented. This shall include: how it will be introduced in the conditions of employment/engagement, what type and kind of training will be provided, how it will be monitored and how the Contractor proposes to deal with any breaches. The Contractor shall be required to implement the agreed Code of Conduct till end of contract period.

94. **Management Strategies and Implementation Plans (MSIP)** - The Contractor shall submit Management Strategies and Implementation Plans (MSIP) to manage the following key Environmental, Social, Health and Safety (ESHS) risks.

- Traffic Management Plan to ensure safety of local communities from construction traffic.
- Water Resource Protection Plan to prevent contamination of drinking water;
- HIV Prevention Plan;
- Boundary Marking and Protection Strategy for mobilization and construction to prevent offsite adverse impacts;
- Strategy for obtaining Consents/Permits prior to start of relevant works such as opening a quarry or borrow pit.
- Gender based violence and sexual exploitation and abuse (GBV/SEA) prevention and response action plan (RAP).

95. The Contractor shall be required to submit for the Authority's Engineer approval and subsequently implement the Contractor's Environment and Social Management Plan (C-ESMP) in accordance with Section VII that includes the agreed Management Strategies and Implementation Plans described herein under.

96. The extent and scope of these requirements should reflect the significant ESHS risks or requirements set out in Section VII as advised by the Environmental / Social Specialist(s). The key risks to be addressed by the Contractor should be identified by Environmental / Social Specialist(s), for example, from the Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP), Resettlement Action Plan (RAP), and/or Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project), up to a maximum of four. The risks may arise during mobilization, construction, or maintenance services and may include construction traffic impacts on the community, pollution of drinking water, depositing on private land and impacts on rare species etc. The management strategies and/or implementation plans to address these could include, as appropriate: mobilization strategy, strategy for obtaining consents / permits, traffic management plan, water resource protection plan, bio-diversity protection plan and a strategy for marking and respecting work site boundaries etc.

6.7 ENHANCEMENT MEASURES

97. There are several **community properties** and locations **warrants for enhancement that** are identified along the project corridor. Details of these identified properties are provided vide Table 6-1 of previous **chapter (Ch. 5),** covering the project highway. The selection is based on the consultation held with the communities.

98. Measures to be adopted by the Contractor as a part of comprehensive Environmental Management Plan (EMP) Implementation at Mehsana Palanpur SH 41 Project Corridor (Description of the Environmental Management Measures during various stages of the project for Mehsana Palanpur SH 41 Project Corridor)

Table 6-1: Environmental Management Plan (EMP)

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
1	**PRE-CONSTRUCTION STAGE**						
	1.1	Pre-construction activities by Authority					
		1.1.1	Utility Relocation and Common Property Resources (CPRs)	Clause 110 of MoRTH	• Authority, concerned line departments and Contractor shall take necessary precautions, and shall provide barricades/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.	Corridor of Impact.	Contractor under the supervision of the Authority's Engineer / Authority
	1.2	Pre-construction activities by the Contractor/Authority's Engineer					
		1.2.1	Joint Field Verification		• The Authority's Engineer and Contractor shall ascertain the feasibility of implementing the Environmental Management Plan (EMP) through Joint field verification. • Any observations / modification required in updating EMP shall be done by the Authority's Engineer and a copy of the modified EMP shall be submitted to the Authority for review and approval.	Along the project corridor	Contractor under the supervision of the Authority's Engineer
		1.2.2	Procurement of Machinery				
		1.2.2.1	Crushers, Hot-mix Plants & Batching Plants	(i) Emission control legislations of CPCB/ GPCB for air, noise etc. (ii) Clause 111.5 of MoRTH (Pollution from Plants and Batching Plants)	• The Contractor shall follow all stipulated conditions for pollution control as suggested by the GPCB in the consent/ NoC for establishing and operating the Hot-mix and Batching Plant. • 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 Authority. • The location of the Crusher, hot-mix and batching plant shall be at least (i) 1000 m away from any of the settlements (that exists along and / or in the vicinity of the project corridor) and shall be placed in the downwind direction and (ii) 10 km aerial distance away from the protected areas (sanctuary, national parks etc.). • Locations for settlements referred to herein EMP are indicative only. The Contractor shall submit the detailed layout plan for approval to the Authority's Engineer before getting into formal agreement with landowners for setting up of such site.	All construction machineries (Crushers, Hot-mix Plants & Batching Plants) should be kept / stationed 1000 m away from any of the settlements : Some of the major settlements / town along the project corridors; but not limited to as mentioned below are : Mehsana, Bhandu, Brahamanvada, Unjha, Sidhpur, Kanodar, Chaapi and Palanpur.	Contractor under the supervision of the Authority's Engineer
		1.2.2.2.	Other	Discharge standards	• Equipment's conforming to the latest noise and emission control measures	Along the project corridor	Contractor under

[7] All locations are referred to design chainages.

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
			Construction Vehicles, Equipment and Machinery	and Noise limits as per Environment Protection Act, 1986 (EPA) Emission standards as per Bureau of Indian Standard (BIS) preferably Bharat IV emission norms	shall be used. • Pollution under Control (PUC) certificates for all vehicles and machinery shall be made available to the Authority's Engineer and Authority for verification whenever required.		the supervision of the Authority's Engineer
		1.2.3	Identification & Selection of Material Sources				
		1.2.3.1.	Borrow Areas	Clause 305.2.2 of MoRTH Clause 111.2 (Borrow Pits for Embankment Construction)	• The Authority's Engineer shall inspect every borrow area location prior to issuing approval for use of such sites. • Care shall be taken to avoid agriculture areas for planning haul roads for accessing borrow materials. In case of damage, the Contractor shall be solely responsible and shall rehabilitate it, as approved by Authority's Engineer. • All borrow areas shall be restored either to the original condition or as per the approved rehabilitation plan by the Authority's Engineer, immediately upon completion of the use of such a source. • Clearance or permission of the same from the appropriate authority to be undertaken by the Contractor.		Contractor under the supervision of the Authority's Engineer
		1.2.3.2.	Quarries	Clause 111.3 of MoRTH (Quarry Operations)	• No quarry and/or crusher units shall be established, which is within 1000 m from the residential/ settlement locations, forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. • Locations for settlements referred to herein EMP are indicative only. • Contractor shall work out haul road network to be used for transport of quarry materials and report to Authority's Engineer who shall inspect and approve the same.	Potential quarries and stone crushers identified at reasonable distances from the project corridor These quarries / stone crushers are : 1) Chitrasani: 15 km from end point of the project corridor i.e. Palanpur & 45 km from Sidhpur. 2) Ambaghanta; 45 km from end point of the project corridor i.e. Palanpur 3) Khodamali: 60 km from Sidhpur 4) Antroli (Harsol): 88 km from Mehsana end 5) Vadagam: 101 km from Mehsana 6) Dhansura (Simli); 111 km from Mehsana 7) Bayad: 117 km from Mehsana 8) Sathamba: 140 km from Mehsana.	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
						For new quarry area, it is necessary that it is located 1000 m away from the settlements / following locations: Mehsana, Bhandu, Brahamanvada, Unjha, Siddhapur, Kanodar, Chaapi and Palanpur.	
		1.2.3.3.	Arrangement for Construction Water		• The Contractor shall source the requirement of water preferably from surface water bodies, rivers, canals and tanks in the project area. • To avoid disruption/disturbance to other water users, the Contractor shall extract water from fixed locations. The Contractor shall consult the local people before finalizing the locations. • Only at locations where surface water sources are not available, the Contractor can contemplate extraction of ground water, after intimation and consent from the Authority's Engineer. • The Contractor shall comply with the requirements of Gujarat Groundwater Authority and seek their approval for extraction of ground water.	All rivers / surface water bodies that can be utilized within the project area at the following locations : River Rupen 81+920, River Pushpavati 89+870, River Saraswati 109+710, Adhuriyo 122+035, Umerdeshi 129+580 Sujlam Suflam Canal at km 87+145; Dharoi Canal at km 103+975 & 105+780.	Contractor under the supervision of the Authority's Engineer
		1.2.3.4.	Sand (all river and stream beds used directly or indirectly for the project)	Clause 111.3 of MoRTH (Quarry Operations)	• In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority. • 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 (0.9 metres) shall not be allowed. Such quarry shall be barricaded 10m away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic cattle, wildlife and human beings.	Nearest sand quarries locations (Indicative). Derol Village at River Sabarmati, Lead of 60 km. from Start Point, Mehsana	Contractor under the supervision of the Authority's Engineer
		1.2.4	Setting up construction sites				
		1.2.4.1	Construction Camp Locations – Selection, Design & Layout		Construction camps shall not be proposed: (i) Within 10000 m of ecologically sensitive areas (if any) (ii) Within 1000 m from any of the nearest habitations to avoid conflicts and stress over the infrastructure facilities, with the local community Locations for habitation and settlements referred to herein EMP are indicative only. Contractor's Construction Camp Setup and Plant Site Location has to be at least 1000 m away from any of the nearest settlement and habitation.	Nearest Habitations (Indicative only) and not limited to as mentioned below: Mehsana, Bhandu, Brahamanvada, Unjha, Siddhapur, Kanodar, Chaapi and Palanpur.	Contractor under the supervision of the Authority's Engineer
		1.2.4.2.	Arrangements for Temporary Land Requirement	Clause 108.3. of MoRTH	• The Authority's Engineer shall ensure that the temporary site is cleared prior to handing over to the owner (after construction or completion of the activity) and it is included in the contract	Areas temporarily acquired for construction sites / hot mix plants / borrow areas / diversions / detours	Contractor under the supervision of the Authority's Engineer
		1.2.4.3.	Stock-yards		• The Contractor shall identify the location for stockyards for construction materials at least 1000 m from water courses.	Stockyards shall not be established within 1000 m from water course :	Contractor under the supervision of

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
					• Separate enclosures shall be planned for storing construction materials containing fine particles such that sediment-laden water does not drain into nearby storm water drains	**Nearest water body locations are but not limited to at**[8] : Ponds on LHS (86+200, 93+700, 101+275, 101+700, 120+600). Ponds on RHS (99+65, 100+150, 101+700, 102+100, 103+350, 111+800) **River / Canal crossings:** River Rupen 81+920, River Pushpavati 89+870, River Saraswati 109+710, Adhuriyo 122+035, Umerdeshi 129+580 Sujlam Suflam Canal at km 87+145; Dharoi Canal at km 103+975 & 105+780. **List of identified underground water resources but not limited to are:** Well (80+700, LHS), Bhandu Well (85+600), 121+900 (RHS)	the Authority's Engineer
		1.2.4.4.	Fuel storage and refuelling areas	Clause 2.1.1.6 of EMP hereunder (Stripping of Soil) Clause 2.1.4.1.2 of EMP (Water Pollution from Fuel, Lubricants and Chemicals)	• The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refuelling sites are located at least 500 m from rivers and irrigation canal/ponds.	Canals, water bodies and ponds locations are but not limited to as mentioned above in para of the attribute setting of construction camp - stockyards.	Contractor under the supervision of the Authority's Engineer
			Labour Camp Management				
		1.2.5.1	Location of Construction labour camps: Accommodation	Factories Act, 1948 and Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	• The Contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labourers, to standards approved by the Authority's Engineer. • Labour camps shall not be located within 1000 m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of labour camps shall be submitted to Authority's Engineer for approval prior to construction.	Along the project corridor at the location of construction labor camps	Contractor under the supervision of the Authority's Engineer

[8] Numbers in the bracket are Chainages on State Highway 41 from Mehsana to Sidhpur

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
				(construction & maintenance of labor camp)			
		1.2.5.2	Potable Water	The Contract Labour (Regulation and Abolition) Act, 1970 and Factories Act, 1948	• The Contractor shall supply portable water through municipal/ panchayat sources. In case of groundwater it shall be treated prior to supply.	Construction labor camps	Contractor under the supervision of the Authority's Engineer
		1.2.5.3	Sanitation facilities	Factories Act, 1948 for sanitation	• The sanitation facilities for the camp shall be 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 take place.	Construction labor camps	Contractor under the supervision of the Authority's Engineer
		1.2.5.4	Waste Disposal	Municipal Solid Waste (Management and Handling) Rules – 2000 for effective waste disposal	• The Contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner	Construction labor camps	Contractor under the supervision of the Authority's Engineer
		1.2.5.5	HIV/ AIDS Prevention Measures		• The Contractor shall implement the following measures towards ensuring HIV/AIDS prevention during the entire contract period (i) conduct awareness campaign including dissemination of IEC materials on HIV/AIDS for all construction personnel (including labourers, supervisors, Authority's Engineers and consultants) on HIV/AIDS/STDs within 3 months of mobilization and once a year subsequently during the contract period; (ii) carry out screening of construction personnel for HIV/ AIDS, within the 3 month of mobilisation (iii) conduct semi-annual health check-up of all construction personnel including testing for STDs; (iv) erect and maintain hoardings/ information signages on HIV/AIDS prevention at the construction sites, labour camps and truck parking locations; (v) Install condom vending machines at the labour camps, including replenishment of supplies.	Construction & labor camps	Contractor under the supervision of the Authority's Engineer
2	**CONSTRUCTION STAGE**						
	2.2.	Construction Stage Activities by Contractor					
		2.1.1	**Site Clearance**				
		2.1.1.1.	Clearing and Grubbing	Clause 201 of MoRTH (Clearing and Grubbing)	• All works shall be carried out in a manner such that the damage or disruption to flora is minimal. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from the Authority's Engineer.	Along the project corridor at construction sites	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
					• Trees shall be saved from cutting wherever it possible.		
		2.1.1.2.	Dismantling of Bridge work / Culverts	Clause 202 of MoRTH (Dismantling Culverts, Bridges and other structures / pavements)	• The Contractor shall follow all necessary measures (including safety) especially while working close to cross drainage channels to prevent earthwork, stonework, materials and appendages from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems.	At locations where Cross Drainage works are proposed.	Contractor under the supervision of the Authority's Engineer
		2.1.1.3.	Generation & disposal of Debris	Clause 202.5 of MoRTH. (Disposal of materials)	• Disposal of unutilized non-toxic debris shall be either through filling up of borrow areas or at pre-designated disposal sites, subject to the approval of the Authority's Engineer. • At locations identified for the disposal of residual bituminous wastes, the disposal shall be carried out on top of a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water. • Debris generated due to the driving of piles or other construction activities along the rivers, streams and 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. • The pre-designated disposal locations shall be part of Comprehensive Solid Waste Management Plan that has to be prepared by the Contractor in consultation and with approval of Authority's Engineer.	Throughout Project Corridor.	Contractor under the supervision of the Authority's Engineer
		2.1.1.4.	Non-bituminous construction wastes disposal	Clause 202.5 of MoRTH. (Disposal of materials)	• The Contractor shall finalise the location of disposal sites based on the following. ○ not located within designated forest area ○ does not impact natural drainage courses ○ No endangered/rare flora is impacted by such dumping. ○ Settlements are located at least 1000 m away from the site. The Authority's Engineer shall approve disposal sites after conformation.		Contractor under the supervision of the Authority's Engineer
		2.1.1.5.	Bituminous wastes disposal	Clause 202.5 of MoRTH	• The disposal of residual bituminous wastes shall be done by the Contractor at secure land fill sites, with the requisite approvals for the same from the concerned government agencies.		Contractor under the supervision of the Authority's Engineer
		2.1.1.6.	Stripping, stacking and preservation of top soil	Clause 301.3.2 of MoRTH (Stripping and storing topsoil) Clause 305.3.3 of MoRTH (Stripping and Storing Topsoil) Clause 301.7 of MoRTH (Finishing operations)	• Contractor shall strip the topsoil at all locations that has been opened up for construction, including temporarily acquired land for traffic detours, storage, materials handling or any other construction related or incidental activities.	At all construction sites	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
		2.1.1.7.	Accessibility		• The Contractor shall provide safe and convenient passage for vehicles; pedestrians and livestock to and from roadsides and property accesses 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 provisions to ensure uninterrupted access, as approved by the Authority's Engineer. • The Contractor shall take care that the cross roads are 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.	Throughout Project Corridor	Contractor under the supervision of the Authority's Engineer
		2.1.1.8.	Planning for Traffic Diversions and Detours	Clause 112 of MoRTH (Arrangement for traffic during construction)	• Detailed traffic control plans shall be prepared by the Contractor and the same shall be submitted to the Authority's Engineer. • The Contractor shall provide specific measures for safety of pedestrians and workers as a part of traffic control plans. The Contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • The Contractor shall inform local community of changes in traffic routes and pedestrian access arrangements with assistance from Authority's Engineer and Authority.	All along the project corridor. **Figure 1** to **13** of **Appendix 6** may please be followed during implementation / execution.	Contractor under the supervision of the Authority's Engineer
		2.1.2	**Construction Materials**				
		2.1.2.1.	Earth from Borrow Areas for Construction	IRC-010 (procurement of earth materials)		All along the project corridor, all access roads, temporarily acquired sites & all borrow areas.	Contractor under the supervision of the Authority's Engineer
		2.1.2.2.	Quarries	Clause 111.3 of MoRTH (Quarry Operations)		Potential quarries and stone crushers locations are : 1) Chitrasani: 15 km from Palanpur (end point of the project corridor) 2) Ambaghanta; 45 km from Palanpur (end point of the project corridor) 3) Khodamali: 60 km from Sidhpur 4) Antroli (Harsol): 88 km from Mehsana end 5) Vadagam: 101 km from Mehsana 6) Dhansura (Simli); 111 km from Mehsana 7) Bayad: 117 km from Mehsana 8) Sathamba: 140 km from Mehsana.	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
		2.1.2.3.	Blasting	Clause of 302 Of MoRTH (Blasting operations)		All blasting and Pre-splitting Sites.	Contractor under the supervision of the Authority's Engineer
		2.1.2.4.	Transporting Construction Materials	Clause 111.8.1 & Clause 111.11 of MoRTH	• All vehicles that are delivering materials to the site shall be covered to avoid spillage of materials. • The unloading of materials at construction sites close to settlements shall be restricted to daytime only.	All along the Project corridor and all haul roads	Contractor under the supervision of the Authority's Engineer
		2.1.3	**Construction work**				
		2.1.3.1.	Disruption to other users of Water	Clause 2 Water Quality of Annexure "A" to Clause 501 of MoRTH (Protection of the Environment)	• In case of diversion of water bodies, the Contractor shall take prior approval from the Irrigation Department and Authority's Engineer for any such activity. The Authority shall ensure that Contractor has served a notice to the downstream users of water, well in advance, where such diversion of the flow is likely to affect the downstream population subject to the condition that under no circumstances the downstream flow shall be stopped.		Contractor under the supervision of the Authority's Engineer
		2.1.3.2.	Drainage and Flood Control	Clause 202 of MoRTH (Dismantling Culverts, Bridges and other structures / pavements)	• Contractor shall ensure that construction materials like earth, stone, ash or appendages disposed off does not block the flow of water of any water course and cross drainage channels. • Where necessary, adequate mechanical devices to bailout accumulated water from construction sites, camp sites, storage yard, excavation areas are to be arranged well in advance before the rainy season besides providing temporary cross drainage systems. • The Contractor shall 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 Authority's Engineer and Authority. • The Contractor shall ensure that no material blocks the natural flow of water in any water course or cross drainage channel. Prior to monsoon, the Contractor shall provide either permanent or temporary drains to prevent water logging.	Silt fencing at - Surface water sources / water bodies / drains/ Nalahs/ Ponds / canals etc. - List of some of the locations, but not limited to as mentioned above in para of the attribute setting of construction camp - stockyards.	Contractor under the supervision of the Authority's Engineer
		2.1.3.3.	Siltation of Water Bodies and Degradation of Water Quality	Clause 306 of MoRTH (Soil erosion and Sedimentation control)		Silt fencing at - Surface water sources / water bodies / drains/ Nalahs/ Ponds / canals etc. - List of some of the locations, but not limited to as mentioned above in para of the attribute setting of construction camp - stockyards.	Contractor under the supervision of the Authority's Engineer
		2.1.3.4.	Slope Protection and	Clause 306 of MoRTH (Soil erosion	• The Contractor shall construct slope protection as per the design and / or as directed by the Authority's Engineer	High raise embankments and surface water bodies locations shall	Contractor under the supervision of

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
			Control of Soil Erosion	and Sedimentation control) Clause 307 of MoRTH (Turfing with sods) Clause 308 of MoRTH (Seeding and Mulching)		be carried out by adopting stone pitching method. At cross drainage works, nearby surface water bodies, ponds etc. as per decision of Authority's Engineer.	the Authority's Engineer
		2.1.4	**Pollution Control**				
		2.1.4.1.	Water Pollution				
		2.1.4.1.1.	Water Pollution from Construction Wastes	Schedule VI - General Standards for Discharge of Environmental Pollutants (Liquid Waste Disposal) - CPCB The Environment (Protection) Rules, 1986 and Water Act, 1974	• The Contractor shall take all precautionary measures to prevent the generated wastewater from entering into streams, water bodies or the irrigation channels arising due to construction activity. • Contractor shall avoid construction works close to the streams or water bodies during monsoon. • Monitoring to check water pollution shall be conducted as per the "Environmental Monitoring Plan Programme Table" and results shall be used to identify any additional pollution control measures those are required to be adopted.	Surface water sources / drains / Nalahs / Ponds/ Canal etc. - at locations, but not limited to are: **Ponds** on LHS (86+200, 93+700, 101+275, 101+700, 120+600). Ponds on RHS (99+650, 100+150, 101+700, 102+100, 103+350, 111+800) **River / Canal crossings:** River Rupen 81+920, River Pushpavati 89+870, River Saraswati 109+710, Adhuriyo 122+035, Umerdeshi 129+580 Sujlam Suflam Canal at km 87+145; Dharoi Canal at km 103+975 & 105+780.	Contractor under the supervision of the Authority's Engineer
		2.1.4.1.2.	Water Pollution from Fuel, Lubricants and Chemicals	Petroleum Act and Rules and Environment (Protection) Rules, 1986 (Standards for Emission or Discharge of Environmental Pollutants Schedule – I) for Liquid Waste Disposal	• Oil interceptors shall be provided at vehicle parking locations, wash down and refuelling areas. • When fuel storage and refuelling areas are located on agricultural land or areas supporting vegetation, the top soil shall be stripped, stockpiled and returned after cessation of such storage. • Monitoring to check water pollution shall be conducted as per the "Environmental Monitoring Plan Programme Table" and results shall be used to identify any additional pollution control measures those are required to be adopted.	Surface water sources / drains / Nalahs / Ponds/ Canal etc. - at locations, but not limited to are: **Ponds** on LHS (86+200, 93+700, 101+275, 101+700, 120+600). Ponds on RHS (99+650, 100+150, 101+700, 102+100, 103+350, 111+800) **River / Canal crossings:** River Rupen 81+920, River Pushpavati 89+870, River Saraswati 109+710,	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
				Clause 111 of MoRTH (Precaution and Safeguarding the Environment) Clause 2 Water Quality of Annexure "A" to Clause 501 of MoRTH (Protection of the Environment) Clause 301.3.2 of MoRTH (Stripping and storing topsoil) Annex-8 (Environmental Monitoring Program) of IRC-SP-108.		Adhuriyo 122+035, Umerdeshi 129+580 Sujlam Suflam Canal at km 87+145; Dharoi Canal at km 103+975 & 105+780.	
		2.1.4.2.	Air Pollution				
		2.1.4.2.1.	Dust Pollution	Clause 3 Air Quality of Annexure "A" to Clause 501 of MoRTH (Protection of the Environment) Clause 111.5 of MoRTH (Pollution from Plants and Batching Plants) Annex-8 (Environmental Monitoring Program) of IRC-SP-108.	• The conditions for pollution control given in the NoC (consent for establish and operate) by the GPCB shall strictly be followed. • Air pollution monitoring shall be conducted as per the Environmental Monitoring Plan and results shall be used to identify any additional pollution control measures that require to be adopted.	Construction area / site, Construction camps, material loading / unloading facilities. Settlements location, receptors: Below mentioned list is indicative only. Mehsana, Bhandu, Brahamanvada, Unjha, Siddhapur, Kanodar, Chaapi and Palanpur.	Contractor under the supervision of the Authority's Engineer
		2.1.4.2.2.	Emission from Construction Vehicles, Equipment and Machineries	Schedule-I: Standards for Emission suggested by CPCB/ GPCB	• Certificates issued for such contrivances that were obtained from designated/approved authority shall be submitted along with the specified reporting format to the Authority's Engineer. • The Contractor shall maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery that are being used for the project. Monitoring results shall be submitted to Authority's Engineer and Authority.	Construction camps, material loading / unloading facilities	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
		2.1.4.3.	Noise Pollution				
		2.1.4.3.1.	Noise Pollution: Noise from Vehicles, Plants and Equipments	Noise Limits for vehicles (Environment (Protection) Amendment Rules, 2000) and Part 'E', Schedule – VI of Environment (Protection) Rules, 1986. Clause 5A The Noise Pollution (Regulation and Control) Rules, 2000 (sound emitting construction equipments) Annex-8 (Environmental Monitoring Program) of IRC-SP-108.	• All plants and equipment used in construction shall strictly conform to the MoEF & CC & CC/ CPCB noise standards. • Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 150 m of the nearest habitation/ educational institutes / health centres (silence zones) shall be stopped during the night time between 9.00 pm to 6.00 am. • Contractor shall provide noise barriers to the suggested locations of identified schools / Temples / health centres prior to commencement of work. • Monitoring shall be carried out at the construction sites as per the monitoring schedule and results shall be submitted to Authority's Engineer. Based on the monitoring results, the Authority's Engineer, if required, shall recommend any additional noise mitigation measures required to be implemented by the Contractor.	Sensitive receptors : Construction site / camp and sensitive locations : Below mentioned list is indicative only. Sensitive Receptors at town and settlements - Mehsana, Bhandu, Brahamanvada, Unjha, Sidhpur, Kanodar, Chaapi, Palanpur; Further Indicative locations and sensitive receptors as given in table 4.5 of Chapter 4 of this EMP.	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.	Safety				
		2.1.4.4.1	Safety Procedures		The Contractor shall: • Comply with all applicable safety regulations, • Take care of the safety of all personnel who are entitled to be on the Site, • Use reasonable efforts to keep the site and works clear of unnecessary obstructions so as to avoid danger to personnel, • Fencing, lighting, guarding and supervision of the works shall be carried out and provided until completion and taking over. It is necessary to provide any temporary works (including roadways, footways, guards and fences) as necessary, since the execution of these works, shall not raise a concern for the purpose of use and protection of the public and of owners as well as occupiers of adjacent land • A construction safety checklist has been included (Appendix 4 Form EM-6)	All construction sites	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.2	Care and supply of Documents		• The Contractor shall prepare, submit and obtain approval from the Authority's Engineer for construction of the Safety Management Plan, and the same shall be prepared 14 days prior to commencement of construction works at site.		Contractor under the supervision of the Authority's

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
							Engineer
		2.1.4.4.3	Contractors general obligations		• All design calculations and fabrication drawings for temporary works (such as form-work, staging, centring, scaffolding, specialized construction, handling and launching equipment and the like) material lists for structural fabrication as well as detailed drawings for templates, and anchorage and temporary support details for pre stressing cables as well as bar bending and cutting schedules for reinforcement, etc. shall be prepared by the Contractor at his own cost and forwarded to the Authority's Engineer at least six weeks in advance of the actual constructional requirements. The Authority's Engineer will check the same for the Contractor's use with amendments.		Contractor under the supervision of the Authority's Engineer
		2.1.4.4.4	Personal Safety Measures for Labour, Material handling , Painting etc.	Factory Act, 1948, Factories (Amendment) Act, 1987 (Chapter -5 Safety) Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	Construction Safety Plan shall be prepared by the Contractor during mobilization and approved by Authority's Engineer and shall be adhered to by the Contractor throughout the construction period, and shall include provision of: • Protective footwear and protective goggles to all workers employed in mixing asphalt materials, cement, and lime mortars, concrete etc. • Welders protective eye-shields to the workers engaged in welding works • Protective goggles and clothing to workers engaged in stone breaking activities and workers shall be seated at sufficiently safe intervals • The Contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The Contractor shall ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. • Contractor shall provide facemasks to the workers when paint is applied in the form of spray or a surface having dry lead paint when it is rubbed and scrapped. • The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of use of PPE with zero tolerance.	All construction sites	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.5	Health and Safety		• The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the site. • The Contractor shall appoint an accident prevention officer at the site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority. • The Contractor shall send, to the Authority's Engineer, details of any accident as soon as practicable after its occurrence.	All construction sites and labour camps	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
					• The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Authority's Engineer may reasonably require.		
		2.1.4.4.6	Traffic Safety & Pedestrian Safety	Clause 112. of MoRTH (Arrangement for traffic during construction)	• Pedestrian Safety shall be ensured. Pedestrian circulation shall be demarcated prior to start & unsafe areas shall be cordoned off.	All along the project corridor	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.7	Risk from Electrical Equipment(s)	Factory Act, 1948 – Chapter -5 (Safety) and Factories (Amendment) Act, 1987	• No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. • All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Authority's Engineer	All construction equipment	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.8	Safety during Road Works	Clause 112.4 of MoRTH (Traffic safety and control) Clause 112.5 of MoRTH (Maintenance of Diversions and traffic control devices) IRC-SP-55 (Traffic Management in work zones)	• The Contractor shall provide adequate signage and markings as per the instruction of the Authority's Engineer in the construction zones as per IRC-SP-55. • Appendix 6 which contains examples of some good practice in traffic control and safety during construction, Figures 1 to 13, may please be referred and implemented.	All along the project corridor and all haul roads	Contractor under the supervision of the Authority's Engineer
		2.1.4.4.9	First Aid	Section 36 (First Aid) of Building and the other Construction Workers(Regulation of Employment and Conditions of Service) Act, 1996	• First aid measures shall be provided in the construction zones and labour camps.	All construction sites and labour camps	Contractor under the supervision of the Authority's Engineer
		2.1.4.5.	Cultural Property				
		2.1.4.5.1.	Chance Found Archaeological Property	Ancient Monuments and Archaeological Sites and Remains Rules 1959	• All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site are the property of the Government and shall be dealt as per provisions of the relevant legislation.	Along the project corridor	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
				Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act 2010	• The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing.		
		2.3.	Environmental enhancement and special issues				
		2.2.1.	Enhancement measures		• Landscaping at junctions to improve aesthetics etc. • Rehabilitation of cultural and community properties	At suitable locations along the project road:	Contractor under the supervision of the Authority's Engineer
		2.2.2.	Environmental Enhancement of Community Properties / Rehabilitation / Restoration of Cultural and Religious Properties	Physical Cultural Resources (WB OP/BP 4.11)	• The architectural elements of the structure shall be conserved/reflected/translated into the design of new structures/ enhancements in accordance with wishes of the community. • One or more of the following enhancement to be carried out at **Mehsana-Sidhpur SH 41 project corridor** as a part of mitigation measures. Details of identified locations, where environmental enhancement are require to be carried out, are provided in Table 1.3. • Providing Big Community Bins - Dustbins, Smart Bins, • Waste bin – Litter bins. • Plantation with Brick Fencing / Metal Fencing • Providing Benches / Seating Arrangement (Concrete / Wooden / Metal) at identified locations, nos. as decided by the Authority's Engineer or his representative • Providing Paver Blocks at identified locations • Fencing and iron gate • Providing Shoe Rack (Temples, Mosque, Identified Religious Properties / CPRs) • Cleaning of Pucca Drain, Cleaning, C& G of Earthen / Lined drain • Providing Rainwater Harvesting Structures, Oil Interceptors and Silt Traps at Drain outlet leading to nearby Water resources. • Nos. as decided by the Authority's Engineer or his representative **Note:** Responsibility lies with the Contractor to protect and preserve all the environmental enhancement items at the locations listed above until the end of the defect liability period / operation period. In the event of the theft / loss / damage to any of the items, Contractor to replace the same at no additional cost.	At suitable locations along the project road. **Table 5.1** of **Chapter 5**, contains identified locations and treatment for enhancement measures may please be referred.	
		2.2.3.	Flora and Chance found Fauna		• The Contractor shall 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. • If any wild animal is found near the construction site at any point of time, the	Along the project road / forest	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
					Contractor shall acquaint the Authority's Engineer and execute the Authority's Engineer's instructions for dealing with the same. • The Authority's Engineer shall report to the nearby forest office (range office) and shall take appropriate steps/ measures in consultation with the forest officials.		
		2.4.	Contractor Demobilization				
		2.3.1.	Clearing of Construction of Camps & Restoration		• Contractor to prepare site restoration plans for approval by the Authority's Engineer. The plan shall be implemented by the Contractor prior to demobilization. • On completion of the works, all temporary structures shall be cleared, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Authority's Engineer. • The topsoil removed and conserved earlier shall be spread over the restoration area as per the direction of the Authority's Engineer to facilitate the growth of vegetation. • Residual topsoil shall be distributed on adjoining/proximate barren/rocky areas as identified by the Authority's Engineer in a layer of thickness of 75mm – 150mm.	All Construction Workers Camps	Contractor under the supervision of the Authority's Engineer
		2.3.2.	Redevelopment of Borrow Areas		• Redevelopment of borrow areas shall be taken up in accordance with the plans approved by the Authority's Engineer	At all borrow area locations suggested, identified and approved for the project corridors.	Contractor under the supervision of the Authority's Engineer
3	OPERATION STAGE	(Activities to be Carried Out by the Contractor/R&BD/Authority)					
	3.1.		Monitoring and Evaluation of Operational Performance of Environmental Mitigation Measures		• The Authority shall monitor the operational performance of the various mitigation/ enhancement measures carried out as part of the project. Monitoring and performance indicators have been indicated in Environmental Monitoring Plan Table.	All along the project corridor	Contractor under the supervision of the Authority's Engineer
	3.2.		Maintenance of Drainage		• Authority shall 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. • Authority shall ensure that all the sediment / oil and grease traps set up at the water bodies are cleared once in every three months. • Rainwater harvesting structures all along the road in addition to nearby water resources and natural water sources.	At locations were bridge works and culverts are proposed. Proposed Rain water Harvesting structures and silt traps locations are: at locations were bridge works and culverts are proposed, at law lying water stagnant areas along the	Contractor under the supervision of the Authority's Engineer

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
					• Also to ensure that proposed Rain Water Harvesting structures are periodically cleared especially before monsoon.	length of the corridor on both sides and / or otherwise as directed by Authority's Engineer	
	3.3.		Pollution Monitoring	IRC-SP-108, Standards and method prescribed and set by Central Pollution Control Board (CPCB), Ministry of Environmental and Forest (MoEF & CC & CC), Govt. of India	• 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 Environmental Monitoring Plan Table 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.	All along the project corridor	Contractor under the supervision of the Authority's Engineer
	3.4.		Atmospheric Pollution	IRC-SP-108, Standards and method prescribed and set by Central Pollution Control Board (CPCB), Ministry of Environmental and Forest (MoEF & CC & CC), Govt. of India	• Ambient air concentrations of various pollutants shall be monitored as envisaged in the Environmental Monitoring Plan at pre designated locations to compare the levels with the pre-construction data. • Additional data at other location may be collected as per any site specific requirement.	All along the project corridor	Contractor under the supervision of the Authority's Engineer
	3.5.		Noise Pollution	IRC-SP-108, Standards and method prescribed and set by Central Pollution Control Board (CPCB), Ministry of Environmental and Forest (MoEF & CC & CC), Govt. of India	• Noise pollution shall be monitored as per Environmental Monitoring Plan at sensitive locations where pre-construction noise data were collected. The functioning of the noise barriers shall be supervised and monitored for further improvement/replication at other affected points if necessary. • Signage near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation measures shall be taken up as per Environmental Monitoring Plan Table.	All along the project corridor	Contractor under the supervision of the Authority's Engineer
	3.6.		Water Pollution	Indian Standards Drinking Water Specifications (IS : 10500)	• Water Quality shall be monitored as per Environmental Monitoring Plan Program at sensitive locations where pre-construction and construction stage water samples (Both, surface water and ground water samples) were collected. • Monitoring the effectiveness of the pollution attenuation measures shall be taken up as per Environmental Monitoring Plan Program Table.		
	3.7.		Soil Erosion and	IRC-SP-108,	• Visual monitoring and inspection of soil erosion at borrow areas, quarries (if	Identified and approved borrow	Contractor under

Environmental Issues				Ref: Clauses	Mitigation Measures to be Adopted by the Contractor	Location[7]	Responsibility
			Monitoring of Borrow Areas	Standards and method prescribed and set by Central Pollution Control Board (CPCB), Ministry of Environmental and Forest (MoEF & CC & CC), Govt. of India	closed and rehabilitated), embankments and other places expected to be affected, shall be carried to record and monitor the effectiveness of such structures after the completion of project, so as to evaluate the beneficial effects of each type of activity together with the cost involved.	areas	the supervision of the Authority's Engineer
	3.8.		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. • Regular maintenance of Cautionary signage.	All along the project corridor	Contractor under the supervision of the Authority's Engineer

99. Description of the Additional Environmental Management Measures during various stages of the project for Mehsana-Sidhpur Project Corridor

Table 6-2: Environmental Management Plan

Sl. No.	Environmental Issue	Activity	Mitigation Measures	Location	Implementing Agency	Supervising & Monitoring Agency
Pre-Construction Phase						
PC.1	Statutory clearance	Consent to Establish & Borrow area Clearance	• Obtain Consent from competent authorities (Gujarat Pollution Control Board (GPCB)), for 'Consent to Establish' under Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981). • Obtain the Borrow area clearance from State Department of Mines and Geology/State level EIA Authority • If any conditions are laid down by the concerned /competent authority, the same shall be integrated in the Bid Document.	Corridor of Impact	Contractor	EE, SRP; **ESMU-PIU; Roads and Building Dept., Govt. of Gujarat**
Construction Phase						
C.1	Air Pollution	Construction plants, equipment and vehicles	• All vehicles used by the Contractor shall have copies of currently valid Pollution under Control (PUC) Certificates as per the requirement of the Gujarat Motor Vehicles Department for the duration of the Contract. • The Contractor shall obtain Consent-to-Operate (CTO) under Air and Water Acts from the Gujarat Pollution Control (GPCB) and follow the conditions stipulated in the NoC (Consent to Establish and Operate) by the GPCB • Other measures to be factored in selection of location	Major Settlements locations but not limited to mentioned below are: Mehsana, Bhandu, Brahamanvada, Unjha, Sidhpur, Kanodar, Chaapi and Palanpur	Contractor	Authority's Engineer

Sl. No.	Environmental Issue	Activity	Mitigation Measures	Location	Implementing Agency	Supervising & Monitoring Agency

			• 1.0 km away from settlement, school, hospital on downwind directions
			• 300 m from any archaeological site
			• 10 km from environmental sensitive areas i.e. national park, sanctuary
			  • Minimum 500 m (preferably 1000 m) from water bodies (rivers, streams, lakes and ponds)
			  • away from agricultural land
			  • preference to barren land			

		Dust during earth works or from spoil dumps	• Maintaining adequate moisture at surface of any earthwork layer completed or non-completed to avoid dust emission.		Contractor	Authority's Engineer
		Storage of maintenance materials	• Proper stockpiling and sprinkling of water as necessary.		Contractor	Authority's Engineer
C.2	Water Pollution	Clearing of waterways of cross drainage works including bridges and clearing of longitudinal side drains	• Clearance of waterway will be undertaken before onset of monsoon. • Debris generated due to clearing of longitudinal side drains and waterways of cross drainage will be stored above high flood level and away from waterway, and reused on embankment slope or disposed at designated areas9.	Surface water sources / drains/ Nalahs/ Ponds etc. at following locations but not limited to: **Ponds** on LHS (86+200, 93+700, 101+275, 101+700, 120+600). Ponds on RHS (99+650, 100+150, 101+700, 102+100, 103+350, 111+800) **River / Canal crossings:** River Rupen 81+920, River Pushpavati 89+870, River Saraswati 109+710, Adhuriyo 122+035, Umerdeshi 129+580 Sujlam Suflam Canal at km 87+145; Dharoi Canal at km 103+975 & 105+780.	Contractor	Authority's Engineer
		Construction vehicles	• Avoiding cleaning / washing of construction vehicle in any water body		Contractor	Authority's Engineer
		Construction camp and workers' camp	• Minimum distance of 500 m (preferably 1000 m) from water bodies (river, stream, lake and ponds) • Locate facilities in areas not affected by flooding and clear of any natural or storm water courses. • The ground should have gentle slope to allow free drainage of the site. • Vehicle parking areas, warehouses and work shop locations must have impervious flooring to prevent seepage of any leaked oil & grease into the ground. The area should be covered with a roof to prevent the entry of rainwater. • Degreasing can also be carried out using mechanical spray type degreaser, with complete recycle using an enclosure with nozzles and two sieves, coarse above and fine below, may be used.		Contractor	Authority's Engineer

[9]Designated areas are to be identified and finalized by Contractor in consultation with the Authority's Engineer - EE, SRP Dn. Roads and Building Dept., Govt. of Gujarat and their representatives.

Sl. No.	Environmental Issue	Activity	Mitigation Measures	Location	Implementing Agency	Supervising & Monitoring Agency
			• All the waste oil collected, from skimming of the oil trap as well as from the drip pans, or the mechanical degreaser shall be stored in accordance with the Environment Protection (Storage and Disposal of Hazardous Wastes) Rules, 1989. For this purpose, metallic drums should be used.			
C.3	Noise Pollution and Vibration	Vehicles and Construction machinery	• All plants and equipment used in construction shall strictly conform to the CPCB noise standards • Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 1000 m of the nearest habitation/ education institutes / health centres (silence zones) shall be stopped during the night time 9.00 pm to 6.00 pm.	Construction site/camp and major Settlements locations but not limited to mentioned below are: Mehsana, Bhandu, Brahamanvada, Unjha, Sidhpur Sidhpur, Kanodar, Chaapi, Palanpur; Further Indicative locations and sensitive receptors as given in table 4.5 of Chapter 4 of this EMP.	Contractor	Authority's Engineer
C.4	Land Pollution	Spillage from plant and equipment at construction camp	• Providing impervious platform and oil & grease trap for collection of spillage from construction equipment vehicle maintenance platform • Collection of oil and lubes drips in container during repairing construction equipment vehicles • Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area • Providing impervious base at bitumen and emulsion storage area and regular clearing of any bitumen spillage for controlled disposal	Construction site / camp	Contractor	Authority's Engineer
		Soil quality monitoring	• As mentioned in the BoQ	Construction site / camp and other locations along project road as directed by Authority's Engineer	Contractor	Authority's Engineer
		Domestic solid waste and liquid waste generated at camp	• Collecting organic waste at separate bins and disposing of in a pit at designated area/s • Collecting inorganic wastes in separate bins and storing them in a secure area within the camp location, and disposal of the same in the nearest municipal solid waste site.	Construction & labour camps	Contractor	Authority's Engineer
		Temporary use of lands, including construction sites, construction camps, and borrow areas.	• Identify and finalize all lands to be temporarily used in the project in consultation with the EE SRP after entering into a written agreement with the land owners for rehabilitation of the land parcel prior to handing over. • Avoid locating borrow area close to any road (maintain at least 30 m distance from CoI and 10 m from toe of embankment,	Construction sites / camps / borrow areas	Contractor	Authority's Engineer

Sl. No.	Environmental Issue	Activity	Mitigation Measures	Location	Implementing Agency	Supervising & Monitoring Agency
			whichever is more); • Rehabilitation within agreed timeframe before handing over to the landowner			
C.5	Occupational health and safety of workers	Exposure to high noise level and inadequate facilities including supply of potable water and sanitation facilities	• Water supply, sanitation, drainage and medical health facilities at campsite • Providing and using PPEs(Personal Protective Equipments) • Using working reverse horn for all construction equipment and vehicles • Providing earth link circuit breaker (ELCB) for all electrical connections • Maintaining first aid at construction sites	Construction site / camp	Contractor	Authority's Engineer
C.6	Accidents and safety	Arrangement of traffic during construction	• Providing and maintaining traffic management comprising diversion; warning, guiding and regulatory signage; channelizes and delineators; lighting, flagmen; dust control system etc. as specified in IRC-SP-55. • Appendix 6 which contains examples of some good practice in traffic control and safety during construction, Figures 1 to 13, may please be referred and implemented.	All along the project corridor.	Contractor	Authority's Engineer
C.7	HIV/ AIDS Prevention Measures		• The Contractor shall implement the following measures towards ensuring HIV/AIDS prevention during the entire contract period • (i) conduct awareness campaign including dissemination of IEC materials on HIV/AIDS for all construction personnel (including labourers, supervisors, Authority's Engineers and consultants) on HIV/AIDS/STDs within two month of mobilization and once a year subsequently during the contract period; • (ii) conduct semi-annual health check-up of all construction personnel including testing for STDs; • (iii) erect and maintain hoardings/ information signages on HIV/AIDS prevention at the construction sites, labour camps and truck parking locations; • (iv) install condom vending machines at the labour camps, including replenishment of supplies. Note -The Condom Vending Machine, Signage's and Hoardings etc. procured under Bill No. 10 –Item 10.13 shall be the property of the Authority. The Contractor shall maintain a proper record, store them properly and hand them over to the Authority at the end of the project.	Construction & labor camps	Contractor	Contractor under the supervision of the Authority's Engineer

Sl. No.	Environmental Issue	Activity	Mitigation Measures	Location	Implementing Agency	Supervising & Monitoring Agency
C.8	Enhancement Measures	Environmental Enhancement Measures at identified locations	Following enhancement to be carried out on project corridor as a part of mitigation measures, details are provided in table 1.3. • Fencing and iron gate • Plantation with Brick Fencing • Providing Shoe Rack (Temples, Mosque, Identified Religious Properties / CPRs) • Providing Benches / Seating Arrangement (Concrete / Wooden / Metal) at identified locations, nos. as decided by the Authority's Engineer or his representative • Providing Paver Blocks at identified locations • Providing Community Bins (Waste Bins –Dustbins Big Size, 1100 Litre), as well as small 240 litre size Waste Bins (Littre Bins), Nos. as decided by the Authority's Engineer or his representative • Cleaning of Pucca Drain, Cleaning, C& G of Earthen / Lined drain • Recharge Pits-Between each on LHS and RHS (Within RoW as directed by Authority's Engineer) Note: Responsibility lies with the Contractor to protect and preserve all the environmental enhancement items at the locations listed above until the end of the defect liability period / operation period. In the event of the theft / loss / damage to any of the items, Contractor to replace the same at no additional cost.	At suitable locations along the project road: Table 1.3 for enhancement measures may please be referred.	Contractor	Contractor under the supervision of : Authority's Engineer

7 IMPLEMENTATION ARRANGEMENTS

7.1 ENVIRONMENTAL MONITORING PLAN

100. The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out. Broad objectives of the monitoring programme are:

- To evaluate the performance of mitigation measures proposed in the EMP;
- To suggest improvements in the management plans, if required;
- To satisfy the statutory and community obligations; and,
- To provide feedback on adequacy of Environmental Impact Assessment

7.1.1 Monitoring Indicators

101. The monitoring programme contains monitoring plan for all performance indicators, reporting formats and necessary budgetary provisions. Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs). The Performance Indicators shall be evaluated under three heads as:

- Environmental condition indicators to determine efficacy of environmental management measures in control of air, noise, water and soil pollution;
- Environmental management indicators to determine compliance with the suggested environmental management measures.
- Operational performance indicators have also been devised to determine efficacy and utility of the mitigation/enhancement designs proposed

Table 7-1: Environmental Monitoring Indicators

Sl. No.	Indicator	Details	Stage	Responsibility
A	**Environmental Condition Indicators and Monitoring Plan**			
1	Air Quality	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared **(**Refer Table 7.2)	Pre-Construction	PIU through DPR Consultant / Contractor under the supervision of Authority's Engineer / EE-SRP / ESMU-PIU / Authority.
			Construction	(i) Contractor (ii) Compliance to the air quality monitoring shall be confirmed by the AE
			Operation / Maintenance	
2	Noise Levels		Pre-Construction	PIU through DPR Consultants / Contractor under the supervision of Authority's Engineer / EE-SRP / ESMU-PIU / Authority.
			Construction	(i) Contractor (ii) Compliance to the noise quality monitoring shall be confirmed by the AE
			Operation /Maintenance	
3	Water Quality		Pre-Construction	PIU through DPR Consultants / Contractor under the supervision of Authority's Engineer / EE-SRP / ESMU-PIU / Authority.

Sl. No.	Indicator	Details	Stage	Responsibility
			Construction	(i) Contractor (ii) Compliance to the water quality monitoring shall be confirmed by the AE
4	Soil Quality		Pre-Construction	PIU through DPR Consultants / Contractor under the supervision of Authority's Engineer / EE-SRP / ESMU-PIU / Authority.
			Construction	(i) Contractor (ii) Compliance to the soil quality monitoring shall be confirmed by the AE
B	**Environmental Management Indicators and Monitoring Plan**			
1	Tree Cutting	Progress of tree removal marked for cutting is to be reported.	Pre-construction	Forest Department / Contractor under the supervision of Authority's Engineer / EE-SRP / ESMU-PIU / Authority.
2	Construction Camps	Location of construction camps have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction / Construction	(i) Contractor (ii) Compliance to the monitoring shall be confirmed by the AE
3	Borrow Areas	Location of borrow areas have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	(i) Contractor (ii) Compliance to the monitoring shall be confirmed by the AE
4	Rehabilitation of Borrow Areas	Authority's Engineer will undertake site visits to verify that all borrow areas have been rehabilitated in line with the landowner's request and to their full satisfaction.	Construction	(i) Contractor (ii) Compliance to the monitoring shall be confirmed by the AE

102. For each of the environmental condition indicator, the monitoring plan specifies the parameters to be monitored, location of the monitoring sites (Table 7.2), frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for environmental condition indicators of the project in construction and operation-maintenance stages is presented in Table below.

Table 7.2: Environmental Monitoring Plan (Programe)

103. The below mentioned environmental monitoring plan program shall be in confirmation with the ***IRC : SP : 108 – 2015;** Air, Water, Soil and Noise Standards by CPCB, periodic and subsequent notifications issued by MoEF & CC, GoI on parameter to measure environmental monitoring

Attribute	Project Stage	Parameter[10]	Special Guidance	Standards	Frequency	Duration	Location	Implementation (Monitoring, Supervision)
Air	Pre-Construction; Construction Post Construction (DLP) End of Maintenance period	SO_2, NO_x, PM_{10}, $PM_{2.5}$, CO	High volume sampler to be located 50 m from the road / Plant in the Downwind direction. Use method specified by CPCB for analysis	Air (prevention and Control of Pollution) Rules CPCB, NAAQS 2009 and subsequent amendments, if any thereafter; MoEF & CC, GoI Guidelines.	Three seasons per year (excluding monsoon)	24 hours Sampling	As suggested by the Authority's Engineer	**Contractor through QCI - NABL approved Agencies only,** Under the supervision of Authority's Engineer and EE-SRP / ESMU – PIU; R & BD., GoG Compliance to the Environmental monitoring parameters viz air quality monitoring, noise level monitoring, surface water and ground water quality monitoring, monitoring of soil sample quality shall be confirmed by the AE. Compliance to the borrow area rehabilitation measures shall be confirmed by the AE
Noise	Pre-Construction; Construction Post Construction (DLP) End of Maintenance	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	Noise Rules, 2000; MoEF & CC, GoI Guidelines	Three seasons per year (excluding monsoon)	Leq in dB (A) of day time and night time	As suggested by the Authority's Engineer	
Water	Pre-Construction; Construction Post Construction (DLP) End of Maintenance period	All essential [11]characteristics and some of desirable characteristics as decided by the Environmental Specialist at ESMU-PIU / Authority's Engineer	Grab sample collected from source and Analyse as per Standard Methods for Examination of Water and Wastewater. Environmental monitoring shall be conducted by NABL aggregated laboratory.	Indian Standards for Inland Surface Waters (IS: 2296, 1982; For Drinking Water (IS : 10500 - 2012) and MoEF & CC, GoI Guidelines	Three seasons per year	Grab Sampling	As suggested by the Authority's Engineer	
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	Once in a year	Grab Sampling	As suggested by the Authority' Engineer	

[10] **Parameters to be monitored for Maintenance / DLP stage is same as Construction stage**

[11] Some of the essential parameters but not limited to monitor Surface Water and Ground Water Quality are pH, BOD, COD, TDS, Pb, Oil &Grease, Detergents, Faecal Coliforms Total hardness, Sulphate, Chloride, Fe, and Pb

Attribute	Project Stage	Parameter[10]	Special Guidance	Standards	Frequency	Duration	Location	Implementation (Monitoring, Supervision)
			Environmental monitoring shall be conducted by NABL aggregated laboratory.	USEPA until national standards are promulgated				
Borrow area	Construction	As per Guidelines	Visual Observation	-	Once in a month	-	Borrow area location	
HIV/ AIDS Prevention Measures	Construction	Awareness campaign	-	-	Annual	-	Construction and Labour Camp sites in addition to the locations as suggested by AE.	Contractor under the supervision of the Authority's Engineer/ EE-SRP / ESMU – PIU; R&BD, GoG
		HIV/ AIDS Screening of 100% construction personnel's			Within one month of mobilization and every quarter during construction			
		IEC materials distribution			Quarterly			
		Condom Distribution			Once a month			

* *Annex - 8 (Environmental Monitoring Program) of IRC: SP: 108 shall be referred.*

104. Locations of Monitoring various environmental parameters, to check air, water quality and noise levels shall be as desired by the Authority's Engineers. However, to Check and Monitor Air Quality, Noise Levels, Water Quality & Soil Quality along Mehsana-Palanpur SH 41, indicative sensitive locations / receptors for Environment Monitoring are as under :

❖ **Air quality:**

Settlements:

- Mehsana (km. 79+800, start point of the project corridor)
- Unjha (between km. 98+000 to 100+000)
- Bhandu (km. 85+900)
- Brhamanwada (105+070)
- Sidhpur (between km. 110 to 112+500)
- Kanodar
- Teniwada
- Chappi
- Palanpur (towards end point of the project corridor)

Sensitive Receptors:

- Hot Mix, WMM and Batch Mix Plants (To be established by the Contractor)

❖ **Noise Level:**

Settlements:

- Mehsana (km. 79+800)
- Unjha (between km. 98 - 100)
- Bhandu (km. 85+900)
- Brhamanwada (105+070)
- Sidhpur (between km. 110 to 112+500)
- Kanodar
- Teniwada
- Chappi
- Palanpur (towards end point of the project corridor)

Sensitive Receptors:

- Hot Mix, WMM and Batch Mix Plants (To be established by the Contractor)
- Eklavya English Med. School, 79.7 (RHS)
- Utkarsh Vidayala, km 83.400 (LHS)
- Other Educational Institutions at km 111+300 RHS, 115+350 LHS, 129+840 LHS, 131+670 LHS, 135+500 RHS, 138+200 LHS
- Hospital and Health Centers at km 111+800 LHS, 111+230 LHS, 113+130 RHS; and
- Indicative locations and sensitive receptors as given in table 4.5 of Chapter 4 of this EMP.

❖ **Water Quality:**

Nearest water body locations are but not limited to at:

- Ponds on LHS (86+200, 93+700, 101+275, 101+700, 111+800).
- Ponds on RHS (99+65, 100+150, 101+700, 102+100, 103+350, 120+600)

River / Canal crossings:

- River Rupen 81+920,
- River Pushpavati 89+870,

- River Saraswati 109+710,
- River Adhuriyo River - 122+035,
- River Umerdeshi River - 129+580
- Sujlam Suflam Canal at km 87+145;
- Dharoi Canal at km 103+975 & 105+780.

List of identified underground water resources but not limited to are:

- Well (km 80+700, LHS), Bhandu Well (km 85+700), Well at km. 121+900 (RHS)

❖ **Soil Quality:**

- At start point of project i.e. 79+302;
- Brhamanwada (105+070)
- Unjha (between km. 98+000 to 100+100)
- Sidhapur between km. 110 to 112+500
- Tendiwada
- Chhapi
- Palanpur, near end point of the project corridor, km. 140
- Hot Mix, WMM and Batch Mix Plants (To be established by the Contractor)

7.2 REPORTING SYSTEM

105. Reporting system for the suggested monitoring program operates at two levels as:

- Reporting for environmental condition indicators and environmental management indicators (except tree cutting indicator)
- Reporting for operational performance indicators at the PIU level.

106. Contractor will operate the reporting system for environmental condition and environmental management indicators (except tree cutting). The Environmental Management Unit (EMU) of PIU will operate the reporting system for environmental management tree cutting indicator and operation performance indicators. The PIU will set the targets for each activity envisaged in the EMP beforehand and all reports will be against these targets.

107. Contractor will report to the Authority's Engineer on the progress of the implementation of environmental conditions and management measures as per the EMP. The Authority's Engineer will in turn report to the PIU on a quarterly basis. Reporting formats have been prepared, which will form the basis of monitoring, by the Authority's Engineer and/or the Environmental Cell as required and presented as **Appendix 4**.

Table 7-3: Summary details of Reporting

Format No.	Item	Stage	Contractor	Authority's Engineer		Project Implementation Unit (PIU)
			Implementation & Reporting to Authority's Engineer	Supervision	Reporting to PIU	Oversee / Field Compliance Monitoring
EM 1	Identification of Disposal Locations	Pre-Construction; Construction	One Time	One Time	One Time	One Time
EM 2	Setting up of Construction Camp	Pre-Construction	One Time	One Time	One Time	One Time
EM 3	Borrow Area Identification	Pre-Construction	One Time	One Time	One Time	One Time
EM 7	Tree Cutting / Felling	Pre-Construction; Construction	Monthly	Monthly	Monthly	Monthly
EM 4	Top Soil Monitoring	Construction	Quarterly	Continuous	Quarterly	Quarterly
EM 5	Status Regarding Rehabilitation of Borrow Areas	Construction	-	-	-	Half Yearly
EM 6	Construction Safety	Construction	Quarterly	Continuous	Quarterly	Quarterly
EC 1	Pollution Monitoring	Construction	As Per Monitoring Plan	Quarterly	Quarterly	Quarterly
EC 2	Pollution Monitoring	Post Construction (Maintenance/DLP)	As Per Monitoring Plan	Quarterly	Quarterly	Quarterly
OP 1	Survival Rate of Trees	Post Construction (Maintenance/DLP)	As Per Monitoring Plan	Quarterly	Quarterly	Quarterly

108. In addition to these formats, to ensure that the environmental provisions are included at every activity of the implementation by the Contractor, it is suggested that the approval of the environmental personnel of the Authority's Engineer is required in the request for application to proceed or other similar reporting formats used by the Contractor. These will not only ensure that the environmental provisions are addressed but also link the satisfactory compliance to environmental procedures prior to approval of the Payment Due by the Authority's Engineer. The activities by the Contractor that can impact the environment will be identified based on discussions between the Environmental Specialist of the PIU, Team Leader of the Authority's Engineer and the Environmental personnel of the Authority's Engineer. The decisions will be communicated to the Contractor prior to the start of the construction activities.

7.3 CLEARANCE REQUIREMENTS FOR GOVERNMENT OF GUJARAT

109. As per table 3.3 applicable laws and regulations, in Chapter 3 of this report.

7.4 INSTITUTIONAL SETUP

110. During implementation, the Contractor, Authority's Engineer and ESMU- PIU, Roads and Building Department, Govt. of Gujarat will be collectively responsible for ensuring effective implementation of the provisions of the EMP and to comply with all statutory and legal requirements and procedures applicable for the project. The institutional responsibilities for EMP implementation are presented in Table 7-4.

Table 7-4: Institutional Responsibilities

System	Designation	Responsibilities
Coordinating / Facilitating Agency	Chief Engineer (WB), R&BD	•Overview of the project implementation •Ensure timely budget for the EMP •Coordination with different state level committee, to obtain Regulatory Clearances •Participate in state level meetings •Monthly review of the progress.
	Superintending Engineer PIU	•Overall responsible for EMP implementation • Reporting to various stakeholders (World Bank, Regulatory bodies) on status of EMP implementation • Coordination with PIU Staff (Environmental officer). • Responsible for obtaining Regulatory Clearances • Review of the progress made by Contractors • Ensure that BOQ items mentioned in EMP are executed as per Contract provisions.
	Environmental and R & R Specialist (ESMU-PIU)	• Assisting SE in overall implementation of EMP • Review of periodic reports on EMP implementation and advising SE in taking corrective measure. • Conducting periodic field inspection of EMP implementation • Assisting SE to reporting various stakeholders (World Bank, Regulatory bodies) on status of EMP implementation • Preparing environmental training program and conducting the same for field officers and engineers of Contractor
Implementing / Monitoring Agency	Construction Authority's Engineer	• Shall confirm the compliance of the Environmental Management measures executed by the Contractor during the project construction and operation (concession period) • Review progress reports and periodic reporting to PIU about the status of EMP implementation • Work in close coordination with ERRS (PIU) and Contractor
	RAP implementation NGO / PMC and PIU – R & BD., GoG	• Conducting awareness campaign for all construction personnel (including labourers, supervisors, engineers and consultants) about HIV/AIDS/STDs in the construction and labour camps. • Facilitating the medical testing/ routine check-up for labours as suggested in the HPP
Contractor	Environmental Engineer of Concessionaire / Environmental and Road Safety Manager of Contractor	• Responsible for ensuring the implementation of EMP as per provision in the document. • Directly reporting to the Project Manager of the Contractor • Discussing various environmental/social issues and environmental/social mitigation, enhancement and monitoring actions with all concerned directly or indirectly • Assisting his project manager to ensure social and environmentally sound and safe construction practices • Conducting periodic environmental and safety training for Contractor's engineers, supervisors and workers along with sensitization on social issues that may be arising during the construction stage of the project • Assisting the PIU on various environmental monitoring and control activities including pollution monitoring; and • Preparing and submitting monthly reports to PIU on status of implementation safeguard measures

7.5 GOOD ENVIRONMENTAL CONSTRUCTION GUIDELINES

111. Comprehensive Environmental and Social (Construction) Guidelines for Environmental Management and Implementation Practices has been prepared and presented in the **Appendix 5**. The purpose of the guideline is to guide the Contractor and the project proponent to mitigate the environmental issues that are like to arise during the project construction and operation.

Table 7-5: Guideline for Good Environmental (and Social) Practices

ESGP No.	Environmental and Social Guidelines for Practice (ESGP)
ESGP01	Site Preparation
ESGP02	Construction and Labour Camps
ESGP03	Borrow Areas
ESGP04	Topsoil Salvage, Storage and Replacement
ESGP05	Quarry Management
ESGP06	Water For Construction
ESGP07	Slope Stability and Erosion Control
ESGP08	Waste Management and Debris Disposal
ESGP09	Water Bodies
ESGP10	Drainage
ESGP11	Construction Plants & Equipment Management
ESGP12	Labour and Worker's Health and Safety
ESGP13	Cultural Properties
ESGP14	Tree Cutting and Afforestation
ESGP15	Forests and Other Natural Habitats
ESGP16	Air and Noise Pollution
ESGP17	R&R Planning and Rap Framework
ESGP18	Local Traffic Management During Construction
ESGP19	Prior Information and Disclosure to the Public
ESGP20	General Workmanship
ESGP21	Onsite Concrete Preparation
ESGP22	Grievance management
ESGP 23	E&S Regulatory Compliance
ESGP 24	Labour Influx Management

8 ENVIRONMENTAL MANAGEMENT BUDGET

112. Budgetary estimates for environmental management in the project include all items envisaged as part of the EMP. The environment budget includes provisions for various environmental management measures (other than measures considered under good engineering practices) and the environmental monitoring costs. Budgetary provisions for the project are presented in Table 8-1.

Total Cost of Implementation of Environmental Management Plan including Landscaping

Item / Description	DESCRIPTION	Cost (INR), Rs.
EMP implementation Cost – Section 1	Mehsana - Sidhpur	3,74,06,750
EMP implementation Cost – Section 2	Sidhpur - Palanpur	1,98,03,170
Landscaping Cost – Section-1	Mehsana - Sidhpur	93,677,977.00
Landscaping Cost – Section-2	Sidhpur - Palanpur	82,128,344.00
Total Cost		**175,806,321.00**

Table 8-1: Budgetary Provisions for Environmental Management Measures

Item	DESCRIPTION	Mehsana to Siddhapur					Sidhhapur to Palanpur				
		Unit	Quantity	Unit Rate	Unit Rate	Amount (Rs.)	Quantity	Unit Rate	Unit Rate	Amount (Rs.)	Quantity
8.1	Construction of Recharge Pits / Rain Water Harvesting Structures	Nr.	31.00	**100000.00**	**107000.00**	3,317,000	Nr	31.00	**18000.00**	**19260.00**	597,060
8.2	Periodic air quality monitoring during construction stage and maintenance-operation (including DLP stage) at construction camp sites, bitumen hot mix plants, crusher plants at major settlement areas along project road.										
a)	Construction Phase	Nr.	18.00	**10000.00**	**10700.00**	192,600	Nr	18.00	**10000.00**	**10700.00**	192,600
b)	Maintenance Phase	Nr	45.00	**10000.00**	**10700.00**	481,500	Nr	45.00	**10000.00**	**10700.00**	481,500
8.3	Water quality monitoring during construction phase and maintenance-operation (including DLP stage)										
a)	Construction Phase	Nr	18.00	**6000.00**	**6420.00**	115,560	Nr	36.00	**6000.00**	**6420.00**	231,120
b)	Maintenance Phase	Nr	0.00	**6000.00**	**6420.00**	-					
8.4	Noise levels monitoring at specified silent receptors along Project Road, at construction camp sites, bitumen hot mix plants, crusher plants and at major settlement areas along project road.										
a)	Construction Phase	Nr	18.00	**4000.00**	**4280.00**	77,040	Nr	18.00	**4000.00**	**4280.00**	77,040
b)	Operation Phase including DLP	Nr	45.00	**4000.00**	**4280.00**	192,600	Nr	45.00	**4000.00**	**4280.00**	192,600
8.5	Soil quality monitoring at construction camp sites, work shop areas, oil/lubricant handling areas, bitumen hot mix plants, at all parking lay byes, vehicle servicing stations along Project Road.										
a)	Construction Phase	Nr	18.00	**10000.00**	**10700.00**	192,600	Nr	18.00	**10000.00**	**10700.00**	192,600
b)	Maintenance Phase	Nr	0.00	**10000.00**	**10700.00**	-					
8.6	Providing Oil Interceptors at the fuel / oil storage camps or Construction camps.	Nr.	20.00	**75000.00**	**80250.00**	1,605,000	Nos.	20.00	**5000.00**	**5350.00**	107,000
8.8	HIV prevention / alleviation programme (HPP Implementation)										
a)	IEC materials - printing, publishing	Nr	24.00	**5000.00**	**5350.00**	128,400	Nr.	24.00	**5000.00**	**5350.00**	128,400
b)	Healthcare clinic	Nr.	12.00	**40000.00**	**42800.00**	513,600	Nr.	12.00	**40000.00**	**42800.00**	513,600
c)	Condom vending machines	Nr.	3.00	**15000.00**	**16050.00**	48,150	Nr.	3.00	**15000.00**	**16050.00**	48,150
d)	Condom supplies	Nr.	48.00	**5000.00**	**5350.00**	256,800	Nr.	48.00	**5000.00**	**5350.00**	256,800
e)	Testing	Nr.	1200.00	**3000.00**	**3210.00**	3,852,000	Nr.	1200.00	**3000.00**	**3210.00**	3,852,000
f)	Signage's and hoardings	Nr.	16.00	**15000.00**	**16050.00**	256,800	Nr.	16.00	**15000.00**	**16050.00**	256,800
8.9	Planting of trees and their maintenance at identified enhancement locations	Nr.	500.00	**1200.00**	**1284.00**	642,000	Nr.	500.00	**1200.00**	**1284.00**	642,000
8.10 a)	Half brick circular tree guard	Nr.	250.00	**2000.00**	**2140.00**	535,000	Nr.	250.00	**2000.00**	**2140.00**	535,000
b)	Steel (metal) circular tree guard.	Nr.	250.00	**2000.00**	**2140.00**	535,000	Nr.	250.00	**2000.00**	**2140.00**	535,000
8.11	Concrete Seating Benches,	Nr.	30.00	**3000.00**	**3210.00**	96,300		30.00	**3000.00**	**3210.00**	96,300
8.12	Providing Bins for solid waste management including manufacturing, transportation, loading and unloading, overhead charges and contingencies. Etc										
a)	Big Smart Bins (Large Community Bins) - Capacity of 2200 litres,										
i)	For Collection of Organic Waste	Nr.	16.00	**35000.00**	**37450.00**	599,200	Nr.	16.00	**35000.00**	**37450.00**	599,200

Item	DESCRIPTION	Mehsana to Siddhapur					Sidhhapur to Palanpur				
		Unit	Quantity	Unit Rate	Unit Rate	Amount (Rs.)	Quantity	Unit Rate	Unit Rate	Amount (Rs.)	Quantity
ii)	For Collection of Dry Waste	Nr.	16.00	**35000.00**	**37450.00**	**2,247,000**	Nr.	16.00	**35000.00**	**37450.00**	599,200
b)	Small dustbin-Capacity of 240 litres,	Nr.	60.00	**3000.00**	**3210.00**	192,600	Nr.	60.00	**1000.00**	**1070.00**	64,200
8.13	Providing concrete shoe rack including casting, steel and all other charges Etc	Nr.	0.00	**30000.00**	**32100.00**	-	Nr.	0.00	**30000.00**	**32100.00**	-
8.14	Bio toilets	Nr.	18.00		**500000.00**	9,000,000					
8.15	Water dispenser	Nr.	18.00		**150000.00**	2,700,000					
8.16	**Silt trap**	**Nr.**	**20.00**		**75000.00**	**15,00,000**	**Nr.**	**20.00**		**75000.00**	**15,00,000**
8.17	Enhancement of existing toilets	Nr.	1.00		**25000.00**	25,000	Nr.	1.00		**25000.00**	25,000
8.19	**Rehabilitation of Borrow Areas**	**Nr.**	**15.00**		**300000.00**	**45,00,000**	**Nr.**	**15.00**		**300000.00**	**45,00,000**
8.20	**Restoration and Rehabilitation of Construction Camp and Plant Site**	**Nr.**	**2.00**		**1000000**	**20,00,000**	**Nr.**	**2.0**		**1000000**	**20,00,000**
Total cost of Implementation of Environmental Management Action Plan to be executed under Civil Works Contract						**3,74,06,750**					**1,98,03,170**
Total cost of implementation of Environmental Management (Action) Plan for Mehsana – Siddhapur – Palanpur : Rs. 5,72,09,920											

Estimate for Landscaping Works

Item No.	DESCRIPTION	Mehsana - Siddhapur				Sidhhapur - Palanpur			
		Unit	Quantity	Unit Rate	Amount	Unit	Quantity	Unit Rate	Amount
11.1	Providing and fixing of shrubs 600 mm (1ft) with bag size 13"x13" including transportation, loading and unloading etc.; and as per the requirements and directions of Engineer-In-Charge.	Km.	8.00	49897	399,176	Km	8.00	49897	399,176
11.2	Planting of trees and their maintenance for one year (planting of trees by road side, avenue trees in 0.60m holes, 1m deep dug into the ground, mixing the soil with decayed farm yard/sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for one year	Each	2167	698	1,512,566	Each	1900	698	1,326,200
11.3	Planting permanent hedges including digging of trenches, 60cm wide and 45cm deep, refilling the excavated earth mixed with farmyard manure, supplied at the rate of 4.65 cum per 100 metres and supplying and planting hedge plants 30 cm apart	Each	5300	490	2,597,000	Each	4500	490	2,205,000
11.4	Digging the trenches of size 300 mm depth and refilling the trenches with red soil. FYM at 4:1 ratio internal transport of plants & Planting the plants including the application of fertilizer and pesticides etc. complete as per the requirements and directions of Engineer-In-Charge.	Metre	29060	612	17,784,720	Metre	25340	612	15,508,080
11.5	Irrigation for landscape @ 10% of total cost	Lump sum	10% of green Landscaping Cost		2,299,744.20		lumpsum	10% of green Landscaping Cost	1,999,777.60
11.6	Grassing with 'Doob Grass' including watering and maintenance of lawn	Sq. m.	12960	13	168,480	sqm	10140	13	131,820
11.7	Formation of earth mounds as shown in the drawing, : Filling as specified in FILLING, in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil as , to minimise slumping and further internal packing down. Corners and intersections of planes shall be rounded and gradual. To grading from edgings provide horizontal shoulders, minimum width 500 mm, before any change of level. TOPSOIL COVER: For mass planted surfaces allow for 450 mm total topsoil plus mulch. For grassed surfaces allow for 150 mm total topsoil plus turf.	Cum	3570	150	535,500	Cum	2850	150	427,500

Item No.	DESCRIPTION	Mehsana - Siddhapur				Sidhhapur - Palanpur			
		Unit	Quantity	Unit Rate	Amount	Unit	Quantity	Unit Rate	Amount
11.8	Seating shelter areas (RCC Structure with wooden pergolas, poly carbonate sheet roofing and benches in masonary and stone cladding and granite flooring alongwith lighting and electrification. Painting to be done in exterior quality weather coat texture paint finish)	Sq. m.	448	20000	8,960,000	sqm	224	20000	4,480,000
11.9	Bio Toilets : Supply, transport and install 25/35 Sq. Ft biotoilet indian/western closet, Stainless steel closet and floor, Automatic self-cleaning and washing mechanism, Standard accessories like wash basin , health faucet & cloth hanger, Toilet made of structure with powder coating, Status indication for Busy/ Vacant and Automatic Exhaust fan & Ceiling light	Each	14	617000	8,638,000	Each	10	617000	6,170,000
11.11	Waste Bins (Stainless steel perforated bins-double dust bin) Supply and fixing 395mm x 250mm x 650mm high 'Blue / Green' impact-resistant, ultra-violet stabilized plastic 50 litres hanging litter bins, mounted on galvanised metal masts. All other metal parts are to protected against corrosion.	Each	18	12000	216,000	Each	12	12000	144,000
11.12	Drinking facility (Water Vending Machine-250 litres per hour) with water capacity of 2500 litres per day	Each	14	285000	3,990,000	Each	10	285000	2,850,000
11.13	Seating furniture Supply, transport and install RCC bench with back rest. Rate to include for steel treatment and application of paints as per specifications	Each	24	7500	180,000	Each	12	7500	90,000
11.14	BOLLARDS including chain	Each	15000	2100	31,500,000	Each	15000	2100	31,500,000
11.15	Architectural Elements showcasing development done by Roads and Building department, Pilgrimage aspect @ 10% of total cost	Lump-sum	Cost taken 20% of total cost		3,500,000		Lump-sum	Cost taken 20% of total cost	3,500,000
11.16	Design, supply, installation testing commissioning operation and maintenance of drip irrigation system for median plantation and new turfing by gravity / pressure sources with all necessary components / systems and emitting devising at plants etc. complete as per applicable technical specification and instruction of engineer in charge.	km	30	378000	11,340,000	km	30	378000	11,340,000
a)	Bore depth	Ft.	300	75	22,500	Ft.	300	75	22,500
b)	Pipe casing	Ft.	300	95	28,500	Ft.	300	95	28,500
c)	Labor charges / sand filling charges	LS	1	5790	5,790	LS	1	5790	5,790
	Total Cost				**93,677,977**				**82,128,344**
	Total Cost For Land-scapping for Mehsana - Siddhapur - Palanpur								

APPENDICES

Appendix 1: Requirement of Environmental Clearances

REQUIREMENT OF ENVIRONMENTAL CLEARANCE (EC)

(Amendments to EIA Notification 14th September 2006 regarding)

EIA notification of the MoEF & CC, GoI dated the 14th September 2006, categorizes all projects and activities into two categories[12] - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and manmade resources. Environmental Impact Assessment Notification, amendment in 2009, states that "all state highways and state highways undergoing expansion in hilly terrain (above 1000m AMSL) and / or ecological sensitive area" should obtain environmental clearance from State Environmental Impact Assessment Authority (SEIAA). The amendment also states that prior environmental clearance is needed for all State Highway projects, which was eventually superseded in the subsequent amendment of 2011.

Environmental Impact Assessment Notification, amendment 2011, "All new state highway projects should obtain environmental clearance from SEIAA". The new amendment excludes carrying out widening, strengthening and improvement works on the existing state highways from environmental clearances.

As per the amendment dated 4th April, 2011 to EIA notification 2006, environmental clearance has been made mandatory only for new state highways. Hence, the widening / strengthening and improvement works on existing State Highways are not covered under the ambit of the notification and are not categorized either as Category A or Category B.

CONSENT FROM GUJARAT POLLUTION CONTROL BOARD

However, the project shall require obtaining consent from competent authorities such as the Gujarat Pollution Control Board (GPCB), for '***Consent to Establish***' by submitting an online Common Application (as per Schedule-I), under Water (Prevention and Control of Pollution) Act, 1974, Air

(Prevention and Control of Pollution) Act, 1981) and authorization under Hazardous Wastes (Management and Handling) Rules, 1989, as amended.

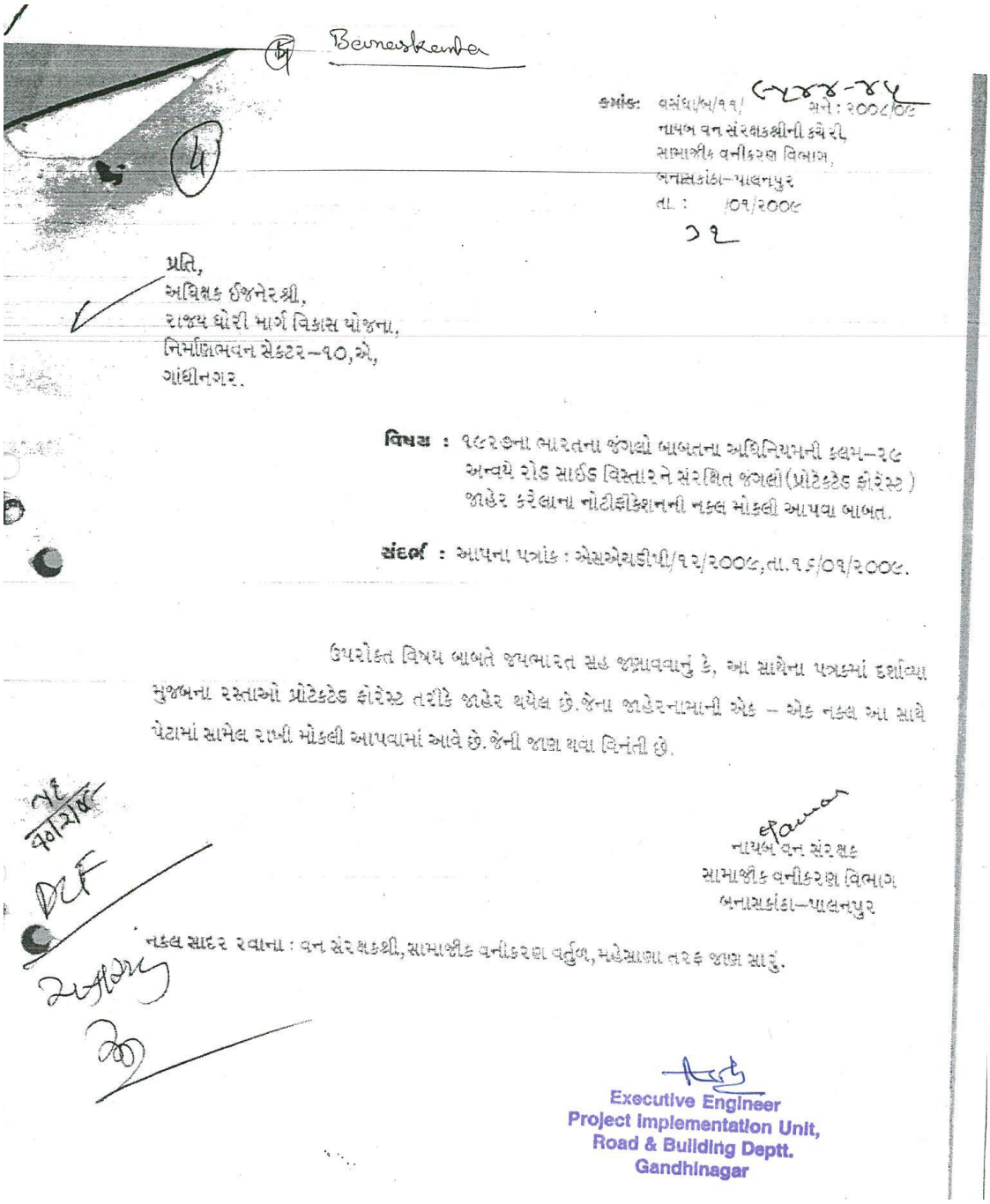
FOREST CLEAREANCE

As per the Gujarat Government Gazette dated 5th July 1973, identified State Highways (SH) and National Highways (NH) within the state of Gujarat are declared as Notified Protected Forest (NPF), under Forest (conservation) Act 1980. Hence, any infrastructure development in the identified corridors, including strengthening and widening activity would attract Forest clearance. As per the prevalent guidelines,

[12] All projects or activities included as ***Category 'A'*** in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF & CC, GoI) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification; All projects or activities included as ***Category 'B'*** in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification.

project proponent needs to apply online for forest clearance and after getting consent from Nodal Officer of state forest dept., they needs to submit duly filled Form 'A' along with the necessary enclosures to the District Forest Office, for further stages of forest clearance (*as per IRC –SP-93-2011*). The status of the forest clearance for the Mehsana Palanpur corridors is enclosed herewith**.**

Requirement of Forest Clearance for a stretch along SH 41 from Mehsana to Palanpur



Banaskantha

ક્રમાંક: વસંધા/બ/૧૧/ અને: ૨૦૦૮/૦૮
નાયબ વન સંરક્ષકશ્રીની કચેરી,
સામાજીક વનીકરણ વિભાગ,
બનાસકાંઠા–પાલનપુર
તા. : /૦૧/૨૦૦૮

પ્રતિ,
અધિક્ષક ઈજનેરશ્રી,
રાજ્ય ધોરી માર્ગ વિકાસ યોજના,
નિર્માણભવન સેક્ટર–૧૦,એ,
ગાંધીનગર.

વિષય : ૧૯૨૭ના ભારતના જંગલો બાબતના અધિનિયમની કલમ–૨૯ અન્વયે રોડ સાઈડ વિસ્તારને સંરક્ષિત જંગલો(પ્રોટેક્ટેડ ફોરેસ્ટ) જાહેર કરેલાના નોટીફીકેશનની નકલ મોકલી આપવા બાબત.

સંદર્ભ : આપના પત્રાંક : એસએચડીપી/૧૨/૨૦૦૮,તા.૧૬/૦૧/૨૦૦૮.

ઉપરોક્ત વિષય બાબતે જણાવવાનું કે, આ સાથેના પત્રકમાં દર્શાવ્યા મુજબના રસ્તાઓ પ્રોટેક્ટેડ ફોરેસ્ટ તરીકે જાહેર થયેલ છે.જેના જાહેરનામાની એક – એક નકલ આ સાથે પેટામાં સામેલ રાખી મોકલી આપવામાં આવે છે.જેની જાણ થવા વિનંતી છે.

નાયબ વન સંરક્ષક
સામાજીક વનીકરણ વિભાગ
બનાસકાંઠા–પાલનપુર

નકલ સાદર રવાના : વન સંરક્ષકશ્રી,સામાજીક વનીકરણ વર્તુળ,મહેસાણા તરફ જાણ સારૂ.

Executive Engineer
Project Implementation Unit,
Road & Building Deptt.
Gandhinagar

Sachivalaya, Gandhinagar, 28th March 1973.

...n Forest Act, 1927.

...RH-213-VHM-1073-69580-P -In exercise of the powers conferred by ...ction 29 of the Indian Forest Act, 1927 (XVI of 1927) the ...vernment of Gujarat is pleased to declare the road side area ...of Road under P.W.D./Panchayat of Palanpur Taluka of Banaskantha ...District specified in the schedule hereto annexed to be protected ...forest with effect from the date of this notification.

Schedule

District Banaskantha, Taluka Palanpur

Sr.No.	Name of Road/Canal	Length of Road/ canal in KM.	Boundaries.
1.	2.	3.	4.
1.	State Highway .Palanpur Dharewada(Ahmedabad-Kalol-Mehsana-Sidhapur-Palanpur-Aburoad)Palanpur to Boundary of Vadgam taluka.	130.00to141.00	North:-Palanpur village site. East:-Cultivation land of Laxmipura, Palanpur and Jagana villages. South:-Boundary of Vadgam taluka. West:-Cultivation land of Laxmipura, Palanpur and Jagana villages.
2.	State Highway, Palanpur-Aburoad .(Ahmedabad-Kalol, Mehsana, Sidhapur, Palanpur-Aburoad .)	141.00to182.6	North:-Sarotra Road. East:- Cultivation land of Sarotra, Amirgadh, Khapa. South:-Cultivation land of Iqbalgadh, Chitrasani and Palanpur. West:-Cultivation land of Iqbalgadh, Palanpur and Chitrasani.
3.	State Highway .Palanpur-Deesa, Palanpur to boundary of Deesa taluka.	0.0to20.0	North:-Cultivation land of Chandisar, Chadokha, Palanpur. East:-Palanpur village site. South:- Cultivation land of Chandisar, Chadokha and Palanpur. West:- Boundary of Deesa taluka.
4.	[redacted]	0.00to7.60	North:-Palanpur, Ratanpur, Merwada. East:-Boundary of Vadgam taluka. South:-Cultivation land of Palanpur, Ratanpur and Merwada villages. West:-Palanpur village site.
5.	Tourist Road, Chitrasani-Balaram.	0.00to7.60	North:-Cultivation land of Chitrasani village. East:-Boundary of Vad...

Executive Engineer
Project Implementation Unit
Road & Building Deptt.
Gandhinagar

39	MEHSANA	VIJAPUR RANASIPUR	SH	22.94	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
40	MEHSANA	VIJAPUR VISNAGAR	SH	17.71	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
41	MEHSANA	MANSA VISNAGAR	SH	17.71	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
42	MEHSANA	VAGELA RANCHHODPURA	SH	7.71	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
43	MEHSANA	AHMEDABAD KALOL MEHSANA SIDDHPUR PALANPUR ABU ROAD SH-8	SH	5.00	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
44	MEHSANA	RADHANPUR HARIJ MEHSANA VIJAPUR	SH	5.00	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
45	MEHSANA	MEHSANA VISNAGAR VADNAGAR KHERALU	SH	21.20	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
46	MEHSANA	SATLASANA DANTA AMBAJI VISNAGAR RANGPUR KHERALU	SH	7.80	AKH/187/75/VNM/1075/69684/P, DT.3/7/75
47	MEHSANA	VIJAPUR VISNAGAR			

This is to acknowledge that a proposal seeking prior approval of Central Government under the Forest (Conservation) Act 1980 as per the details given below has been successfully uploaded on the portal of the Ministry of Environment, Forests and Climate Change Government of India.

1. Proposal No. : FP/GJ/ROAD/35014/2018

2. Proposal Name : Upgradation and Widening of Mehsana to Palanpur State Highway 41 to 6 Lane plus

3. Category of the Proposal : Road

4. Date of Submission : 06/09/2018

5. Name of the Applicant with Contact Details

Name : R
Mobile No. : 9974028560
State : Gujarat
District : Gandhinagar
Pincode : 382010

6. Area Applied (ha.) : 211.27

The proposal will be examined by the Nodal Officer, Forest (Conservation) Act, 1980 to assess its completeness.

(System Administrator)

*** This is a system generated email, please do not reply. ***

Appendix 2: Concept Drawings and Images of Landscaping and Tree Plantation along Mehsana-Palanpur, SH 41

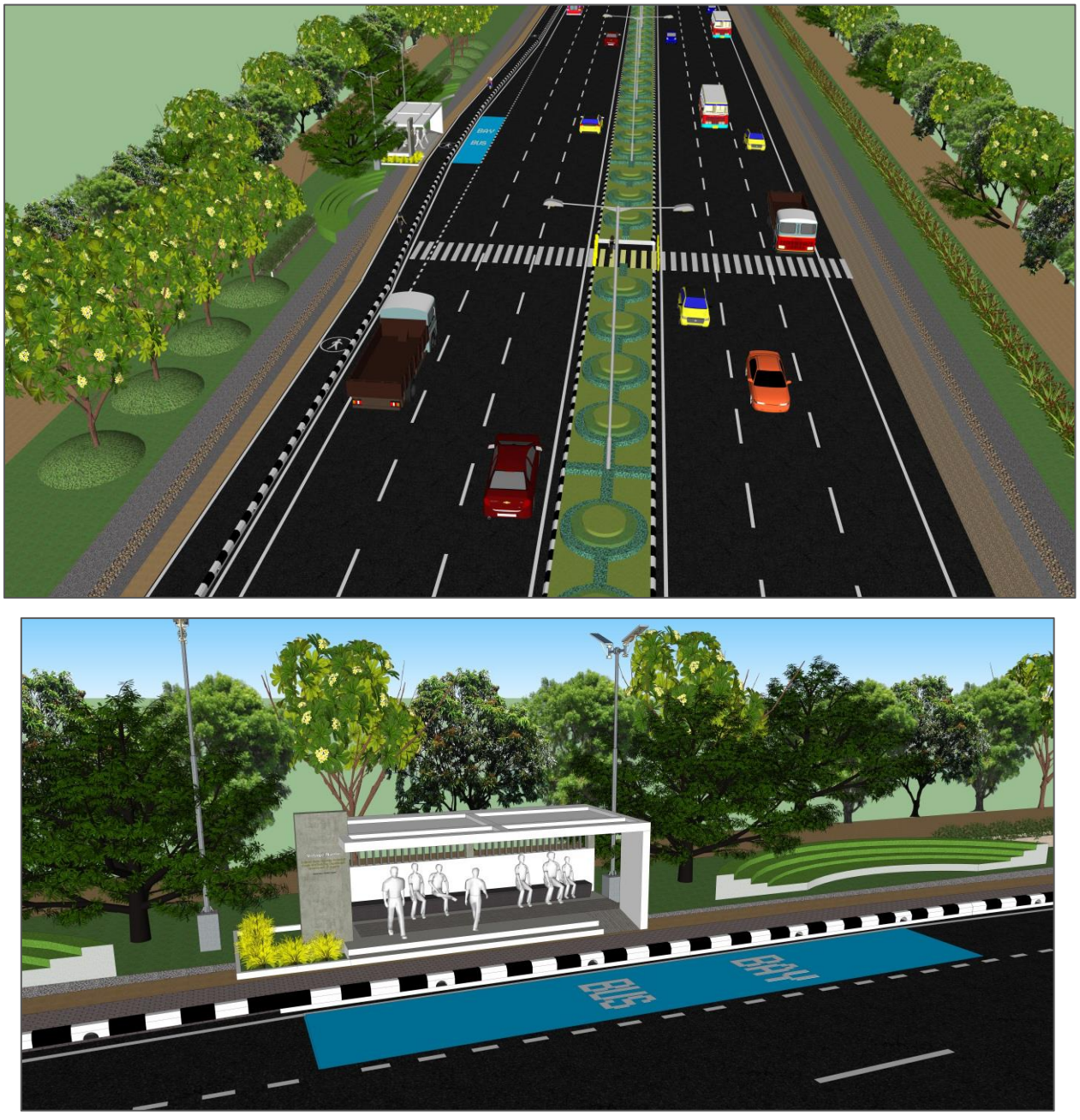


Figure 1 Concept images for Bus bay design

Figure 2 Concept images for Rest Area Design

Figure 3 Concept designs for landscape in Countryside Area (Rural Approach)

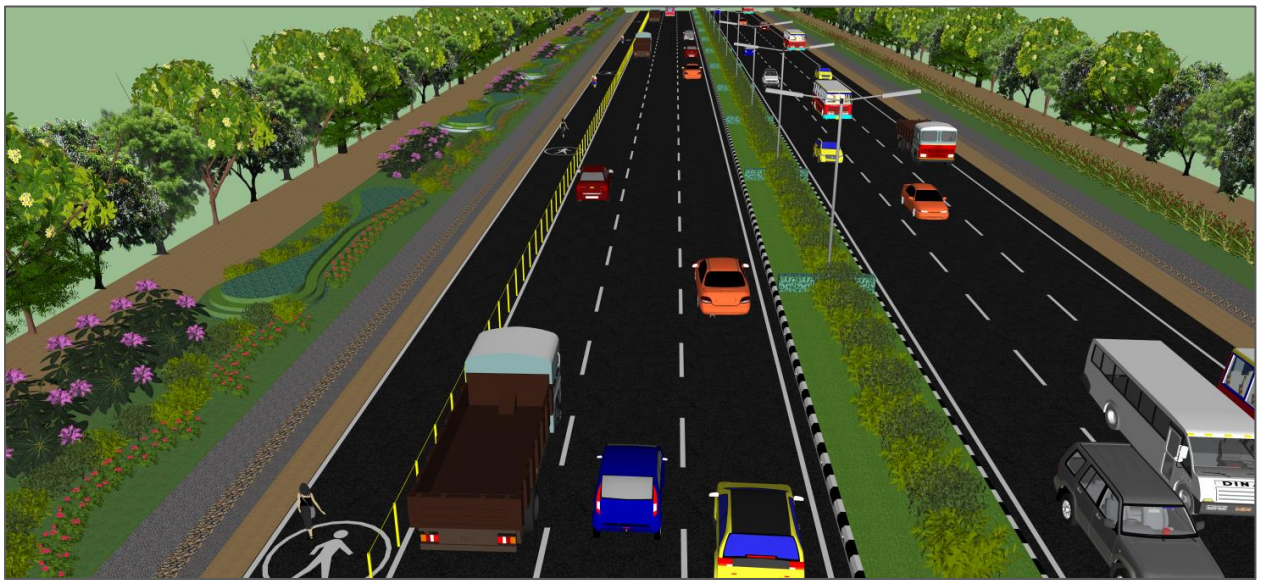


Figure 4 Concept Images for Urban approach landscaping

Figure 5 Concept images for Median landscape design

Urban approaches: To break the monotonous character of the highway and bring a rhythm to the landscaping character before reaching the urban city/region from either side, provisioning of different landscaping with certain elements are to be done and considered as urban approach sections. Urban approaches contribute to the adjacent communities' identity and to a sense of the place. Hence certain urban settings and a range of landscaping approaches are developed to provide a significant view adding to road side perspective. The specific locations of these are mentioned in the **table on landscaping in Chapter 4** of EMP.

Rural Approaches: The proposed corridor abuts the villages and hence it covers the rural space in which the integration of local needs and land use characteristics are considered and catered. The rural spaces are identified and developed through landscaping along both sides. The specific locations of these are mentioned in the **table on landscaping in Chapter 4** of EMP.

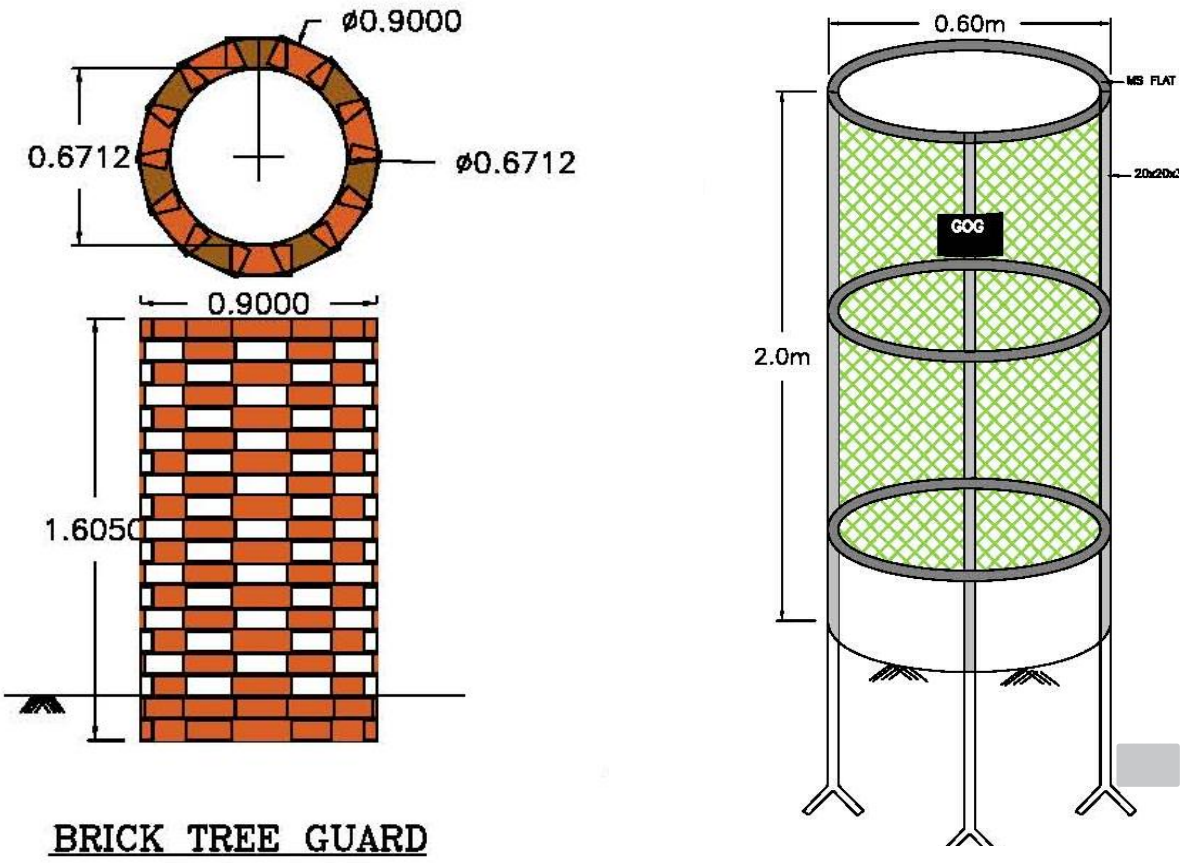
Appendix 3: "Environmental Management Plan"

Enhancement Drawings, Figures A to G

Enhancement Drawings (For details please refer detailed drawings in drawing volume)

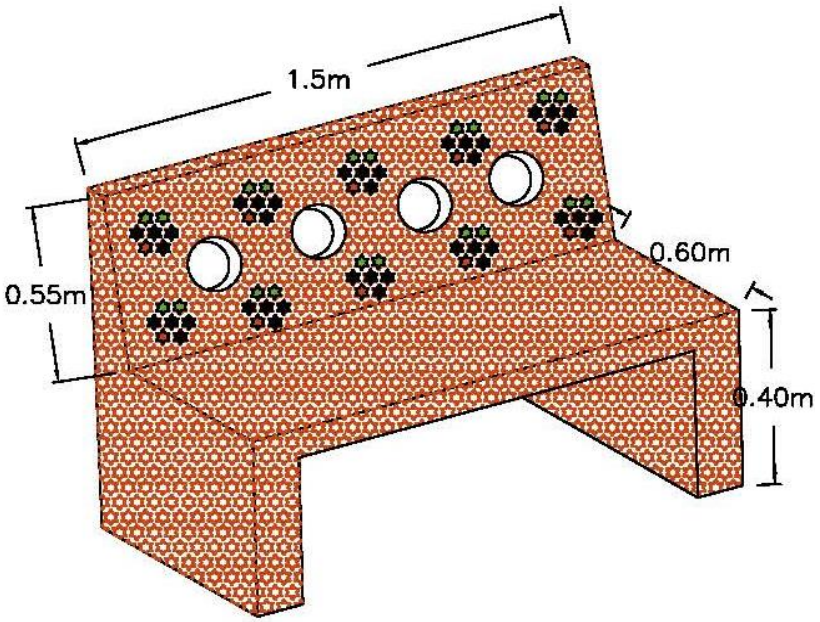
Drawings:

A. Typical Brick / Metal Fencing



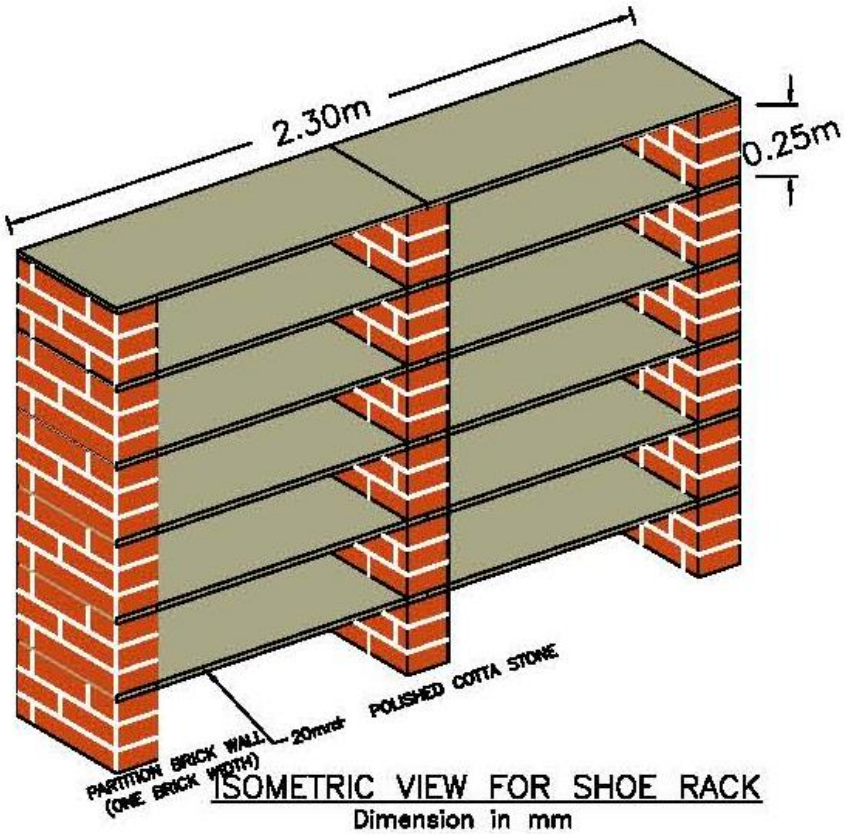
Note: Background : White Color Letters : Signal Red Color Post : Alternate Black & White Stripes

B. Typical Benches



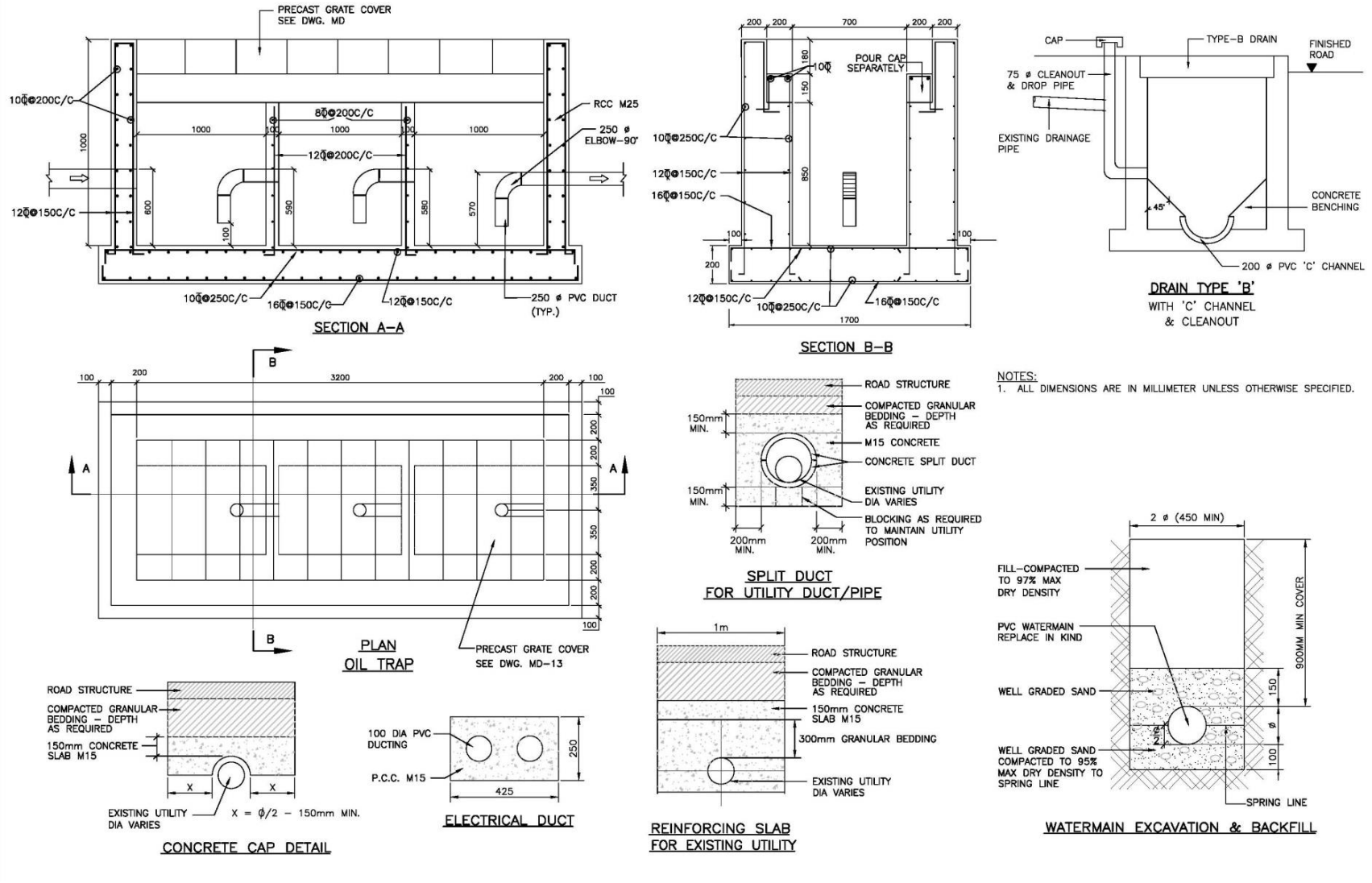
BENCHES (SEATING ARRANGEMENT) 4–SEATER

C. Shoe Rack

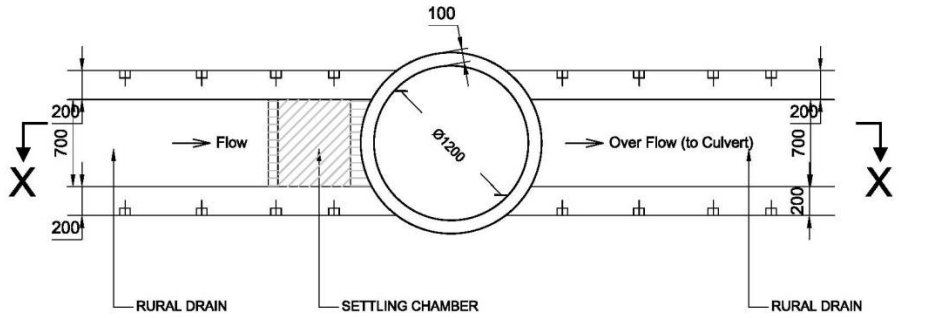


ISOMETRIC VIEW FOR SHOE RACK
Dimension in mm

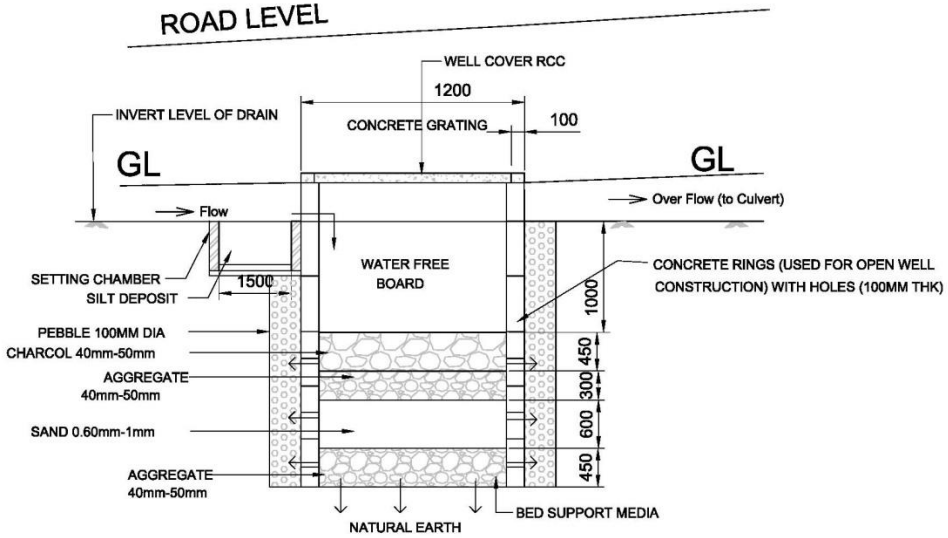
D. Oil Interceptor



E. Recharge Pit



PLAN

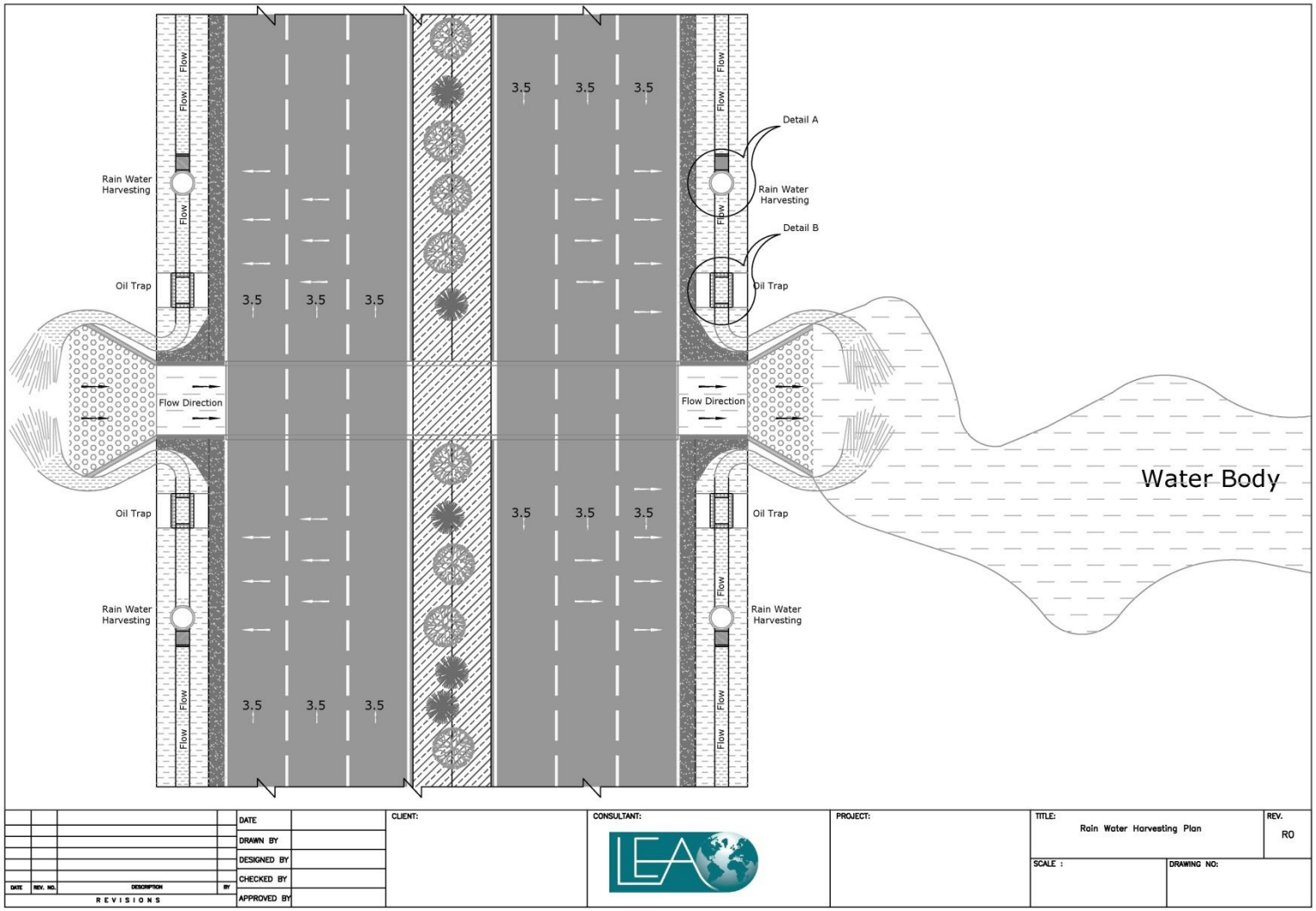


SECTION X - X

DETAIL OF DUAL MEDIA WATER HARVESTING STRUCTURE

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETER UNLESS OTHERWISE SPECIFIED.
2. DUG WELL DUAL MEDIA (WATER HARVESTING STRUCTURE) SHALL BE PROVIDED AT 500M INTERVAL AS PER SITE CONDITION AT SUITABLE PLACE ON THE SIDE DRAINS. @ 250M IN STAGGERED FASHION.

Drain outlet along with Rainwater Harvesting Structure and Oil Interceptor

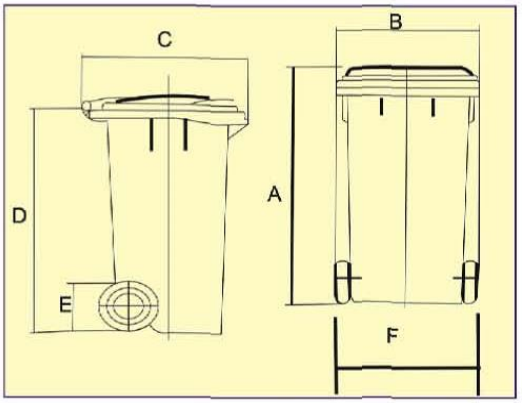


F. Waste Bin – Dustbin; Small Size 240 Litre and Smart Bin - Community Bin – Waste Bin; Big Size 1100 Litre

WHEEL WASTE BIN 240 LITRE

Model	120	240
App Volume Ltr	120	240
Article Wt. (kgs)	7.70	12.50
useful load (kgs)	60	100
A-Overall Height(mm)	980	1075
B-Overall width(mm)	490	580
C- Overall Depth(mm)	550	740
D- Upper Edge(mm)	910	1000
E-Wheel Dia (o)(mm)	200	200
F- Wheel to Wheel distance(mm)	470	570

- All the dimensions & capacity are for reference.
- ★Subject to technical Modification
- ★Container according to EN Standards



NOTES:–

1) ALL DIMENSIONS ARE IN MM
2) FOR WASTE BIN / LITTER BIN SHALL BE MADE OF 100% VIRGIN QUALITY HIGH DENSITY POLYETHYLENE MATERIAL CONFIRMING IS / EN /EURO STANDARD.
3) FOR 240 LTR. WASTE BIN,PEDAL BIN MAY BE USED INSTEAD OF WHEEL WASTE BIN AFTER ENGINEER'S CONFIRMATION
4) BRICK TYPE TREE GUARD SHALL BE USED PREFERABLY AT WITHIN PREMISES OF CULTURAL PROPERTIES.
5) ENGINEER CONFIRMATION PRIOR TO ANY ORDER BE SOUGHT.

Appendix 4: Environmental Monitoring Formats

Format EM1: Selection of disposal site locations

From _____ To _____

(Give chainage and nearest settlements from both ends)

Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3	Site 4
Area covered (m^2)				
Total Material that can be dumped within the site (m^3)				
Depth to which disposal is feasible (m)				
Distance of nearest watercourse (m)				
Nearest Settlement (m)				
Date/s of Community Consultation/s				
Whether the community is agreeable to siting of dumping site (Y/N)				
Date of Permission from Village Council President(VCP)				
Proposed future use of the Site				

Selected Site (tick any one column only)
Certified that the above information is correct to the best of my knowledge and belief.

Contractor

Signed: Date:
Name & Designation:

Recommendation on the suitability of the site

Decision Taken (tick one): Approved / Not Approved

Executive Engineer, SRP Division

Signed: Date:
Name and Designation of Deciding Authority

Enclosures
(Tick as appropriate)
1 Maps of each location
2 Photographs
a Each disposal location
b Each community consultation
3 Photocopies of permissions from VCPs

Format EM2: Construction Camp and Storage Area

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 (decided by Authority) of establishing camps
Location of Camp (km_____)

Sl. No	Item	Unit	Details	Remarks
1	**Detail of item camp**			
a	Size of Camp	mxm		
b	Area of Camp	sq.m		
c	Distance from Nearest Settlement			
d	Distance from Nearest Water Source	Type/Size/Capacity/Present Use/Ownership		
e	Date of camp being operational dd/mm/yy			
f	Present land use			
g	No other trees with girth > 0.3m.			
h	Details of Storage area(Availability of impervious surface)	mxm		
i	Availability of separate waste disposal from storage area	Cum		
2	**Details of top soil stacking**			
a	Quantity of top soil removed	Cum		
b	Detail of storage of topsoil	Describe stacking arrangement		
3	**Details of workforce**			
a	Total No of Labourers	nos		
b	Total no of Male Workers	nos		
c	No of Male Workers below 18 years of age	nos		
d	Total No of Female Workers	nos		
e	No of Female workers below 18 years of age	nos		
f	No of children	nos		
4	**Details of dwelling units**			
a	No of dwellings/huts	nos		
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	mxmxm		
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	mxmxm		
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 Day Care Centre	Yes/No		
d	Availability of dust bins (capacity 60 ltr)	nos		

Certified that the furnished information is correct the quality of work is as per god practice and all relevant information as required is attached

Contractor

Authority's Engineer

Format EM3: Reporting for Borrow Areas

Construction Stage Report: Date ____ Month_____ Year_____ Site Layout of Borrow Area and Proposed Borrow Area Redevelopment Plan to be attached with format Format to be submitted before target date as (decided by Authority) for establishing Borrow Areas Borrow Area No. BA_____
Location of Borrow Area (Km_____)

Sl. No	Item	Unit	Details	Remarks by CSC, if any
1	**Details of Borrow Area**			
a	Date of Borrow Area becoming operational dd/mm/yy			
b	Current Land use			
c	Distance from Nearest Settlement	Km		
d	No of settlements within 200m of Haul Road	No.		
e	No of settlements within 500m of Borrow Area	No.		
f	Total Capacity	cum		
g	No of Trees with girth more than 0.3 m	No.		
h	Length of Haul Road	km		
i	Width of Haul road	m		
j	Type of Haul Road	metal/dirt		
k	Size of Borrow Area	sqkm		
l	Area of Borrow Area	km x km		
m	Quantity Available	cum		
n	Distance of Nearest Water Source	Type/Size/Capacity/Present Use/Ownership		
o	Quantity of top soil removed	cum		
p	Detail of storage of topsoil			
q	Daily/occasional use of the Borrow Area by the community, if any	-		
r	Probable reuse of Borrow pit-ask community	-		
s	Drainage channels/slope/characteristics of the area	-		
2	**Enhancement Elements**			
a	Quantity of top soil removed	sq.m		
b	Detail of storage of topsoil	sq.m		
c	Adjoining land use/Natural elements			
d	Nearby catchment for storing water			
e	Erosion Control Programme			
f	Preventive measures for			
i	Leaching			
ii	Mosquito Breeding			
iii	Water run-off/contamination			
iv	Any other environmental degradation			
3	**Details of workforce**			
a	Total No of Labourers	No.		
b	Total no of Male Workers	No.		
c	No of Male Workers below 18 years of age	No.		
d	Total No of Female Workers	No.		
e	No of Female workers below 18 years of age	No.		
4	**Details of redevelopment, Plan to be enclosed**			

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached

Contractor

Authority's Engineer

EM 4 Topsoil Conservation Monitoring

Contract _____

Report No. _____ Date_____

Location (Chainage)	Original Use of Topsoil removed	Measures for preventing spillage of topsoil on Haul Roads(Earthen/ Metalled)	Present Method of Storage	Anticipated period of Storage (Months)	Distance of nearest Water course (m)	Present Slope of Pile (V: H)	Whether silt fencing provided?	Is any other covering / measure provided? If yes, what is it?	Improvements required	Extent of Compliance as on date of report

Certified that the above is true.

Signed_____

Contractor

Verified

Signed_____

Authority's Engineer

EM 5 Redevelopment of Borrow Area

Operation Stage: Report: Date ____ Month_____ Year_____

To be monitored by Authority.

Details of remarks to be appended wherever necessary.

Sl. No	Activity	Particulars	Drawbacks Identified			Improvements Required		
			Construction	Financial	Others (Ask Community)	Technical	Financial	Remarks/ Suggestions
1	Details of Borrow area and Surrounding Land use							
2	End use of the borrow area							
3	Whether rehabilitation has been carried out in line with owners request							
4	Erosion Control Measures							
5	Number of trees planted							
6	Reuse of topsoil							
7	Preventive measures taken for -Mosquito Breeding -Water runoff/ contamination -Other Environmental Degradation							
8	Any problems faced by owner							
9	Any problems faced by the local community							
10	If it has been developed as a fish pond,							
a	Details of available catchment for storing water							
b	Economic Benefits/Utility							
11	If it has been developed as an orchard							
a	Details of suitability of soil and water.							
B	Type of Plantation							
c	Economic Benefits/Utility							
12	Any Other End use							
a	Particulars							
b	Economic Benefits/Utility							

Contractor

Authority's Engineer

EM 6 Checklist for Construction Safety

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Remarks
1	Appointment of qualified Construction safety officers					
2	Approval for Construction Safety Management Plan by the Authority's Engineer.					
3	Approval for Traffic Management/control Plan in accordance with IRC: SP: 55.					
4	Maintenance of the existing road stretches handed over to the Contractor.					
5	Provision of Temporary Traffic Barriers/Barricades/caution tapes in construction zones					
6	Provision of traffic sign boards					
7	Provision for flags and warning lights					
8	Provision of metal drum /empty bitumen drum delineator, painted in circumferential strips of alternate black and white 100mm wide 2 coats fitted with reflectors 3 Nos. of 7.5cm diameter					
9	Providing plastic crash barrier					
10	Provision of adequate staging, form work and access (ladders with handrail) for works at a height of more than 3.0 m					
11	Provision of adequate shoring / bracing / barricading / lighting for all deep excavations of more than 3.0 m depth.					
12	Demarcations (fencing, guarding and watching) at construction sites					
13	Provision for sufficient lighting especially for night time work					
14	Arrangements for controlled access and entry to Construction zones					
15	Safety arrangements for Road users / Pedestrians					
16	Arrangements for detouring traffic to alternate facilities					
17	Regular Inspection of Work Zone Traffic Control Devices by authorized Contractor personnel					
18	Construction Workers safety - Provision of personnel protective equipments					
19	A. Helmets					

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Remarks
	B. Safety Shoe					
	C. Dust masks					
	D. Hand Gloves					
	E. Safety Belts					
	F. Reflective Jackets					
	G. Earplugs for labour					
20	Workers employed on bituminous works, stone crushers, concrete batching plants etc. provided with protective goggles, gloves, gumboots etc.					
21	Workers engaged in welding work shall be provided with welder protective shields					
22	All vehicles are provided with reverse horns.					
23	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound condition					
24	Regular health check-up for labour / Contractor's personnel					
25	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camps.					
26	The Contractor shall provide adequate circuit for traffic flow around construction areas, control speed of construction vehicles through road safety and training of drivers, provide adequate signage, barriers and flag persons for traffic control.					
27	Provision for insurance coverage to the Contractor's personnel					

Contractor

Authority's Engineer

Format EC 1: Target Sheet for Pollution Monitoring

Construction Stage: Report - Date_____ Month_____ Year_____

(Locations at which monitoring to be conducted as per EMP)

Sl. No	Chainage	Details of Location	Duration of Monitoring	Instruments Used	Completion Target		Reason for Delay if any
					Target Date	Date of Completion if task completed	
Air Monitoring							
1							
2							
3							
Noise Monitoring							
1							
2							
3							
Water Monitoring							
1							
2							
3							
Soil Monitoring							
1							
2							
3							

Certified that the Pollution Monitoring has been conducted

Contractor

Authority's Engineer

Format OP 1: Target Sheet for Pollution Monitoring

Maintenance Stage: Report - Date_____ Month_____ Year_____

(Locations at which monitoring to be conducted as per EMP)

Sl. No	Chainage	Details of Location	Duration of Monitoring	Instruments Used	Completion Target		Reason for Delay if any
					Target Date	Date of Completion if task completed	
Air Monitoring							
1							
2							
3							
4							
5							
Noise Monitoring							
1							
2							
3							
4							
5							
Water Monitoring							
1							
2							
3							
4							
5							

Certified that the Pollution Monitoring has been conducted

Contractor

Authority's Engineer

Format OP 2: Survival Rate of Trees

Maintenance Stage: Report - Date_____ Month_____ Year_____

S. No.	Landscape Section	Roadside Trees			Landscaping at Junctions			Turfing on Embankment		
	Km-Km	Total Trees Planted	Total Surviving	% Survival	Total Shrubs Planted	Total Surviving	% Survival	Total Area Turfed	Total Turfed Area Surviving	% Survival
		Nos.	Nos.	%	Nos.	Nos.	%	Sqm.	Sqm.	%

Certified that the above information is correct

Contractor

Authority's Engineer

Appendix 4A

Contractor's Checklist on Environmental and Social Issues

Project Name: _____ Contract /Road No._____

Contractor Details: _____ Project Description:_____

	Questions	Response (see note at the end of the checklist)
Activities		
1.	List the activities you will be undertaking during the works such as rock breaking, blasting, laying asphalt, establishing camp and plants etc.	
Responsibilities		
2.	Do you have any qualified/experienced person on environmental management? If not, how are you going to manage the environment and Social aspects?	
Materials		
3.	What base materials will you transport to the site such as stone, soil, diesel, lubricant?	
4.	Where will you source these materials from (non-manufactured material such as sand, soil and stone)?	
5.	Where will you store these materials?	
6.	How will you ensure materials brought to site will be stored and handled with care to avoid contamination of soil and water, reduce dust, and minimize disruption of traffic, not impairing public safety?	
Emissions to water, soil and air (Pollutants)		
7.	How will you ensure that any construction materials and works will: • Not restrict access to properties and carriageways. • Not damage existing trees. • Be protected from rain to reduce the loss of soil and materials washing down roads and entering drains and waterways. • Be stored to reduce leaks (such as Diesel) into the soil or waterways. • Not generate dust or cause nuisance air emissions.	
8.	How will you ensure proper drainage from the works so that water does not pond and become a hazard to health?	
9.	How will you reduce sediment from the construction activities?	
Fauna and Flora		
10.	No trees shall be felled as part of Construction/ Maintenance activity. How will you protect existing trees from construction activities?	
Waste Management		
11.	How do you plan to store and dispose of: • Construction debris? • Workers refuse and effluent?	

	Questions	Response (see note at the end of the checklist)
	• General litter?	
Noise and Vibration		
14.	Will you be using any noisy equipment that may cause nuisance?	
15.	Are your works close to a school, or hospital or other place where people may be affected by noise?	
16.	What will you do to reduce noise and vibration impacts?	
17.	What will be your working hours?	
Construction Camp / Workers' Camp		
18.	Where you are planning to set up construction and workers camp?	
19.	Does it meet the stipulated siting criteria?	
20.	How you are going to control pollution from contraction plan and equipment?	
21.	What facilities you will provide at camp for workers?	
Community, Awareness, Consultation, Co-ordination		
22.	How will you keep owners and occupants of shops and residences and other people of the adjoining villages and road users, who are affected, informed about the works?	
23.	How will you ensure all the sub-Contractors, supervisor and others on the site, are aware of these environmental and social aspects?	
24.	How will you co-ordinate with utility works (such as electricity, telephone, cable)?	
25.	Can you satisfy the special regulations or environmental conditions identified in the contract for this project?	
26.	Have you attended any training course on environment, health and safety for similar construction project?	
Safety		
27.	What activities could cause harm to people or property?	
28.	How will you reduce the risk of impact on people or their property?	
29.	How will you reduce potential injury to your workers and subcontractors?	

Prepared by: _____ Date _____, Approved by: _____ Date _____

Agreed Comments: _____

Note:

- The Contractor shall fill this Checklist section-wise based on ESMF and Contract stipulation.
- This checklist shall serve as Contractor's road specific Environmental Management Plan and serves as basis for subsequent implementation of the safeguard measures by the Contractor and monitoring the same by the Authority's Engineer / EE, SRP Division.
- This checklist should be filled up during initial road inventory by the Contractor i.e. before any physical works start.

Format EM 7: Tree Felling

S. No	Links	Physical Target				Completion Target		
		Total	Target	Target Achieved	% of task completed	Target Date	Date of Completion if task completed	Reason for Delay if any
		Unit						
1		nos						
2		nos						
3		nos						
4		nos						

Contractor

Authority's Engineer

Appendix 5: Guidelines for Environmental Management

Environmental and Social Guidelines for Practices

These Environmental and Social guidelines practices are part of the Environmental Management Plan (EMP) provided **in Chapter 6 of Volume IV DPR** for Mehsana Palanpur State Highway 41 under Second Gujarat State Highway Project (GSHP II), Roads and Building Department, Govt. of Gujarat, mandatory in nature to follow by the civil works construction agency (i.e. Contractor) at GSHP II and contractor is bound adhered to each of the specifications provided there in for the protection of the environment and safeguarding the environment. Any deviation from here will attract penalties or contract covenant actions against the contractor as mentioned in EMPs.

However, this may be treated as Guidance documents. In case of any difference / deviation in the Guidelines from the Environmental Management Plan (EMP) in table 6.1 and, 6.2 of Chapter 6, the provisions made in the EMP will prevail.

Wherever word "Engineer" is used in below mentioned guidelines, it shall be considered as "Authority's Engineer" as and where applicable.

ESGP-01: SITE PREPARATION

1. GENERAL

The preparation of site for construction involves: (i) clearing of land required for construction; and (ii) management of activities such as traffic during construction. These activities have been detailed out for road construction activities separately.

2. ROAD CONSTRUCTION

2.2 Site Preparation Activities

After obtaining the consent of the community on the alignment, the Project Implementation Unit (PIU) of the Divisional Office shall be responsible to stake out the alignment by establishing working benchmarks on ground. It shall be the responsibility of the PIU to take over the possession of the proposed RoW and hand over the land width required clear of all encumbrances to the Contractor. Activities pertaining to the clearance of land and relocation of utilities need to be initiated by the PIU well in advance to avoid any delays in handing over of site to the Contractor. Assistance of the Revenue Department shall be sought in accomplishing the task. To summarize, the PIU's responsibilities before handing over the site to the contractor include:

- Clearance of encroachments within proposed RoW;
- Initiation of process for legal transfer of land title;
- Alignment modification or Relocation of utilities in consultation with the various government departments; and
- Obtain clearances required from government agencies for cutting of trees and diversion of forest land.

2.2 Site Preparation Activities by the Contractor

Site preparation shall involve formation of the road base wherein it is ready for construction of protective/drainage works, carriageway, shoulders, parapets and other road furniture. The PIU shall transfer the land for civil works to the Contractor after peg marking of the alignment.

The Contractor shall verify the benchmarks soon after taking possession of the site. The Contractor, prior to initiation of site preparation activities, shall highlight any deviations/discrepancies in these benchmarks to the Engineer in writing. The contractor shall submit the schedules and methods of operations for various items during the construction operations to the Authority's Engineer for approval. The Contractor shall commence operations at site only after the approval of the schedules by the Authority's Engineer.

The activities to be undertaken by the contractor during the clearing and grubbing of the site are as follows:
The clearance of site shall involve the removal of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, part of topsoil and rubbish. Towards this end, the Contractor shall adopt the following measures: (i) Limiting the surface area of erodible earth material exposed by clearing and grubbing; (ii) Conservation of top soil and stock piling as per the measures suggested as part of **ESGP-04**, "Top Soil Salvage Storage and Replacement"; and (iii) Carry out necessary backfilling of pits resulting from uprooting of trees and stumps with excavated or approved materials to the required compaction conforming to the surrounding area.

To minimize the adverse impact on vegetation, only ground cover/shrubs that impinge directly on the permanent works shall be removed. Cutting of trees and vegetation outside the working area shall be avoided under all circumstances. In case the alignment passes through forest areas, The Forest Ranger shall be consulted for identification of presence of any rare/endangered species within the proposed road way. Protection of such species if found shall be as per the directions of the Forest Department.

The locations for disposal of grubbing waste shall be finalized prior to the start of the works on any particular section of the road. The selection of the site shall be approved by the Authority's Engineer. The criteria for disposal of wastes shall be in accordance with the measures given in Guideline on, "Waste Management and Debris Disposal" (**ESGP-08**).

In locations 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 and sedimentation control features can follow immediately, if the project conditions permit.

Dismantling of CD structures and culverts shall be carried out in a manner as not to damage the remaining required portion of structures and other surrounding properties. The disposal of wastes shall be in accordance with the provisions given in **ESGP-08**, "Waste Management and Debris Disposal". The following precautions shall be adopted: (i) The waste generated shall not be disposed off in watercourses, to avoid hindrance to the flow, and (ii) All necessary measures shall be taken while working close to cross drainage channels to prevent earthwork, stonework as well as the method of operation from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems.

The designated sites duly approved by Implementing Agency shall be cleared of its existing cover for setting up of the construction sites, camps and related infrastructure facilities, borrow areas and other locations identified for temporary use during construction. The contractor shall comply with all safety requirements in consideration as specified in the **ESGP-12** on, "Labour & Worker's Health and Safety". Before initiation of site preparation activities along these lands to be used temporarily during construction, it shall be the responsibility of the Contractor to submit and obtain approval of the site redevelopment plan from the implementing agency. The letter/contract agreement between the owner(s) of the land parcel for temporary usage shall include site redevelopment to its original status.

The guidelines for the same are furnished in the Guideline on, "Construction Plants & Equipment Management"; guideline, "Construction and Labour Camps"; and "Borrow areas".

2.2 Traffic management during construction

Traffic management during construction is an activity specific to the contractors. Contractors must ensure a reasonably smooth flow of traffic during construction. The following are the general principles to be followed for traffic management during construction:

- Partial pavement construction **over long lengths will not be permitted.** The contractor should concentrate his activities over sections such that he can complete continuous fronts of up to a maximum of 1 km before starting the adjacent front. The contractor may open more than one continuous 1 km front provided that he has the separate resources to do so. The resources working on a 1 km front may not beshifted to another front until no longer required on that front.
- The construction activities should be staggered over sub-sections to the extent that the use of plant and equipment is optimized to maximum efficiency and to avoid idling. For road widening operations, excavation **adjacent to the existing road shall not be permitted on both titles simultaneously.** Earthworks must be completed to the level of the existing road before excavation work on the opposite side will be permitted.
- The construction operations taking place on a particular front must be managed efficiently such that delays between successive pavement layers are minimized.
- Before the start of the monsoon season (June) the contractor shall ensure that the pavement over any front is complete, full width, at least upto Dense Bituminous Macadam, DBM level, but preferably with Asphaltic Concrete, AC wearing course. The contractor **should not start any sections of pavement that he cannot complete by the start of the monsoon season.**
- In the absence of permanent facilities, temporary drainage and erosion control measures, as required by the Specifications, are to be implemented prior to the onset of the monsoon.

In cases where separate traffic diversions are not essential or cost effective the construction methodology should be in accordance with the guidelines following:

On a 1km section, the pavement construction (except new alignments) should be limited to 500m sub-sections with a minimum of 1 to 1.5 km between successive sub-sections to ease traffic management and safety issues. The earthworks in the widening portions are not limited in, this respect. Excavation on both sides of the existing, road over the same sub-section simultaneously shall not be permitted for reasons of safety to the traffic, particularly at night.

Sub-Sections longer than 500 m may be authorized by the Engineer, if two-way traffic flow can be comfortably managed and the Contractor **can demonstrate his ability to maintain dust control, proper road edge delineation, proper signage and traffic control.** Where single file traffic is permitted ('only applicable to final wearing course operations), the sub-sections shall be reduced to a maximum length whereby safe traffic regulation can be physically managed. Single file traffic may not be permitted at certain locations or times of the day when traffic volumes are such that excessive congestion shall occur.

ESGP-02: CONSTRUCTION AND LABOUR CAMPS

1. INTRODUCTION

The scope of this guideline pertains to the siting, development, management and restoration of construction and labour camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The following sections describe the siting, construction, maintenance, provision of facilities in the camps and finally rehabilitation of the construction and labour camps. These are described in three stages, pre-construction, construction and post-construction stage. The issues

related to construction camps are similar in the case of road construction and hence have been taken together.

2. PRE-CONSTRUCTION STAGE

Identification of site for construction and labour camps is the first task. The Contractor shall identify the site for construction camp in consultation with the individual owners in case of private lands and the concerned department in case of Government lands. The suitable sites shall be selected and finalized in consultation with the Authority's Engineer. **Table 2-1** gives the lands that could be avoided for construction camps and conversely those that could be preferred.

Table 2-1: Selection Criterion for Construction Camps.

Avoid the following …	Prefer the following …
• Lands close to habitations. • Irrigated agricultural lands. • Lands belonging to small farmers. • Lands under village forests. Lands within 100m of community water bodies and water sources as rivers. • Lands within 100m of watercourses. • Low lying lands. • Lands supporting dense vegetation. • Grazing lands and lands with tenure rights. • Lands where there is no willingness of the landowner to permit its use.	• Waste lands. • Waste Lands belonging to owners who look upon the temporary use as a source of income. • Community lands or government land not used for beneficial purposes. • Private non-irrigated lands where the owner is willing. • Lands with an existing access road.

The contractor will work out arrangements for setting up his facilities during the duration of construction with the land owner/concerned department. These arrangements shall be in the form of written agreement between the contractor and the land owner (private/government) that would specify:

a) photograph of the proposed camp site in original condition;
b) activities to be carried out in the site;
c) environmental mitigation measures to be undertaken to prevent land, air, water and noise pollution;
d) detailed layout plan for development of the construction and labour camp that shall indicate the various structures to be constructed in the camp including temporary, drainage and other facilities (**Figure Z** gives a layout plan for a construction camp); and
e) Restoration plan of camp site to previous camp conditions.

The arrangements will be verified by the Authority's Engineer to enable redressal of grievances at a later stage of the project.

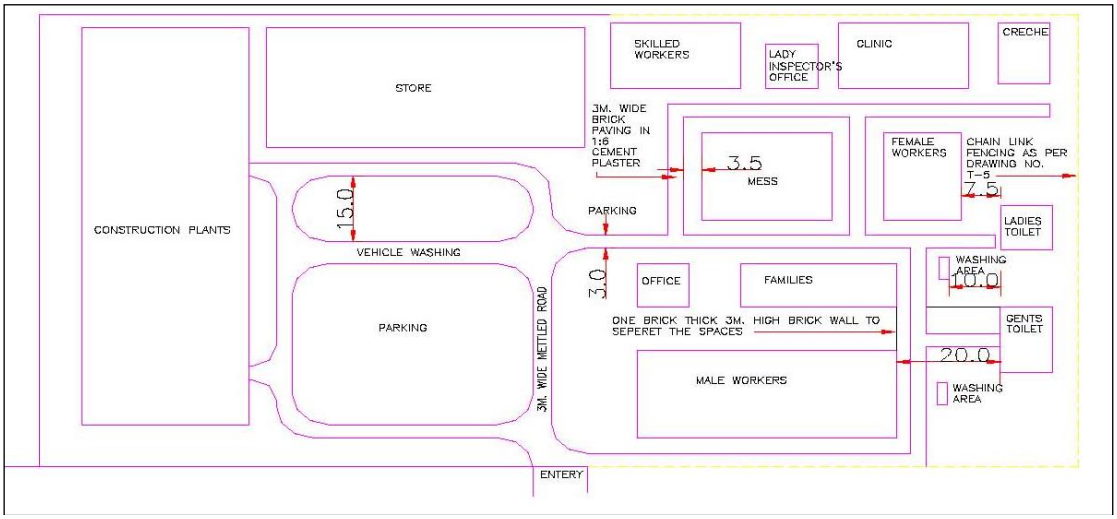


Figure 2: Layout Plan for Construction Camp

2.2 Setting up of labour camp

The contractor shall provide, free of cost in the camp site, temporary living accommodation to all the migrant workers employed by him for complete construction/maintenance work is in progress. A minimum area of 6 SQM per person shall be provided. The rooms of labour shall be well lighted and ventilated. The facilities to be provided for the labour are discussed below:

a) Drinking Water

Towards the provision and storage of drinking water at the construction camp, the contractor shall ensure the following provisions

- The contractor shall provide for a continuous and sufficient supply of potable water in the camps, in earthen pots or any other suitable containers.
- The contractor shall identify suitable community water sources for drinking. Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source only after the testing for its portability. Where water has to be drawn from an existing open well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust proof trap door.
- Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.
- A pump shall be fitted to covered well used as drinking water source, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

b) Washing and Bathing Facilities

In every site, adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein. Separate and adequate bathing shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.

c) Toilets Facilities

Sanitary arrangements, latrines and urinals shall be provided in every work place separately for male and female workers. The arrangements shall include:

- A latrine for every 15 females or part thereof (where female workers are employed).
- A latrine for every 10 males.
- Every latrine shall be under cover and so partitioned as to secure privacy, and shall have a proper door and fastenings.
- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers “For Men Only” or “For Women Only” as the case may be.
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and should have a proper drainage system;
- Water shall be provided in or near the latrines and urinals by storage in suitable containers.

d) Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.
- Kitchen waste water shall be disposed into soak pits/kitchen sump located preferably at least 15 meters from any water body. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. New soak pits shall be made ready as soon as the earlier one is filled.
- Solid wastes generated in the kitchen shall be reused if recyclable or disposed off in land fill sites.

e) Medical and First Aid Facilities

Medical facilities shall be provided to the labour at the construction camp. Visits of doctor shall be arranged twice a month wherein routine checkups would be conducted for women and children. A separate room for medical checkups and keeping of first aid facilities should be built. The site medical room should display awareness posters on safety facilitation hygiene and HIV/AIDS awareness.

- First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to carry injured person or person suddenly taken ill to the nearest hospital. The first aid box shall contain the following.
- 6 small sterilized dressings
- 3 medium size sterilized dressings
- 3 large size sterilized dressings
- 3 large sterilized burns dressings
- 1 (30 ml) bottle containing 2 % alcoholic solution of iodine
- 1 (30 ml) bottle containing salvolatile
- 1 snakebite lancet
- 1 (30 gms) bottle of potassium permanganate crystals
- 1 pair scissors
- Ointment for burns
- A bottle of suitable surgical antiseptic solution

In case, the number of labour exceeds 50, the items in the first aid box shall be doubled.

f) Provision of Shelter during Rest

The work place shall provide four suitable sheds, two for meals and two for rest (separately for men and women). The height of the shelter shall not be less than 3.0m from the floor level to the lowest part of the roof. These shall be kept clean.

g) Crèches

In case 20 or more women workers are employed, there shall be a room of reasonable size for use of children under the age of six years. The room should have adequate light and realization. A caretaker is to be appointed to look after the children. The use of the room shall be restricted to children, their mothers and the caretaker.

2.2 Storage of Construction Material in Construction Camps

For storage of Petrol/Oil/Lubricants, brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. These should be kept away from labour residential areas. The storage of cement shall be at Damp-proof flooring, as per IS codes. All materials shall be stored in a barricaded area. In case of electrical equipments, danger signs shall be posted. The batch mix plant is to be located away from the residential area and not in the wind direction. Separate parking areas for vehicles and also workshop areas need to be provided.

2.2 Fire fighting arrangement

- The following precautions need to be taken:
- Demarcation of area susceptible to fires with cautionary signage;
- Portable fire extinguishers and/or sand baskets shall be provided at easily accessible locations in the event of fire;
- Contractor shall educate the workers on usage of these equipments.

2.2 Interactions with host communities

To ensure that there is no conflict of the migrant labor with the host communities, the contractor shall issue identity cards to labourers and residents of construction camps.

3. CONSTRUCTION STAGE

Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies. The following precautions need to be taken in construction camps.

- Measures to ensure that no leaching of oil and grease into water bodies or underground water takes place.
- Wastewater should not be disposed into water bodies.
- Regular collection of solid wastes should be undertaken and should be disposed off safely.
- All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately.
- The debris/scrap generated during construction should be kept in a designated and barricaded area.

The Authority's Engineer will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

4. POST CONSTRUCTION STAGE

At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. Various activities to be carried out for site rehabilitation include:

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- Soak pits, septic tanks shall be covered and effectively sealed off.
- Debris (rejected material) should be disposed off suitably (Refer ESGP-10 on "Waste Management and Debris Disposal").
- Ramps created should be levelled.
- Underground water tank in a barren/non-agricultural land can be covered. However, in an agricultural land, the tank shall be removed.
- If the construction camp site is on an agricultural land, top soil can be spread so as to aid faster rejuvenation.
- Proper documentation of rehabilitation site is necessary. This shall include the following: –Photograph of rehabilitated site;
- Land owner consent letter for satisfaction in measures taken for rehabilitation of site;
- Undertaking from contractor; and
- Certification from Authority's Engineer.

In cases, where the construction camps site is located on a private land holding, the contractor would still have to restore the campsite as per this guideline. Also, he would have to obtain a certificate for satisfaction from the landowner.

ESGP-03: BORROW AREAS

1. INTRODUCTION

Embankment fill material is to be procured from borrow areas designated for the purpose. Borrow areas cause significant adverse environmental impacts if appropriate mitigation measures are not taken. The scope of this guideline includes measures that are required during project planning and design stage, pre-construction, construction stage and post construction stage. Borrow areas are related only to road

construction activities.

2. PROJECT PLANNING AND DESIGN STAGE

Design measures for reduction in the quantity of the earthwork will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement. Borrow area siting should be in compliance with IRC: 10-1961. The DPR shall contain (i) Guidelines for locating site of borrow areas and borrow material specifications.

3. PRE-CONSTRUCTION STAGE

The contractor shall identify the borrow area locations in consultation with the individual owners in case of private lands and the concerned department in case of government lands, after assessing suitability of material. The suitable sites shall be selected and finalized in consultation with the Authority's Engineer. Borrowing to be avoided on the following areas:

- Lands close to toe line.
- Irrigated agricultural lands (In case of necessity for borrowing from such lands, the topsoil shall be preserved in stockpiles. The subsequent Guidelines discuss in detail the conservation of topsoil.
- Grazing land.
- Lands within 0.8 km of settlements.
- Environmentally sensitive areas such as Reserve Forests, Protected Forests, Sanctuary, wetlands. Also, a distance of 1000 m should be maintained from such areas.
- Designated protected areas/forests.
- Unstable side-hills.
- Water-bodies.
- Streams and seepage areas.
- Areas supporting rare plant/animal species;
- Ensure unsuitable soft rock is not prominent within the proposed depth of excavation which will render rehabilitation difficult.

3.1 Arrangements for Borrow Area

The Contractor will work out arrangements for borrowing with the land owner/concerned department. The arrangements will include the redevelopment after completion of borrowing. The arrangements will be verified by the Authority's Engineer to enable redressal of grievances at a later stage of the project. The Authority's Engineer shall approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval by the Authority's Engineer. The contractor shall submit to the Authority's Engineer the following before beginning work on the borrow areas.

- Written No-objection certificate of the owner/cultivator;
- Estimate extent of earth requires;
- Extent of land required and duration of the agreement;
- Photograph of the site in original condition; and
- Site redevelopment plan after completion.

The depth of excavation should be decided based on natural ground level of theland and the surroundings, and rehabilitation plan. In case higher depth of excavation is agreed with backfilling by unsuitable excavated soil (from roadway), then filling should be adequately compacted except topsoil, which is to be spread on the top most layer (for at least 20m thick). The guidelines for location, depth, size and shape of the borrow areas are available in the following:

- Clause 305.2.2.2 of MoRTH specification for roads and bridge works;
- IRC SP 108-2015: Guidelines on EMP
- IRC SP 93-2011: Guidelines on Requirement for EC for Road Projects
- IRC: 10-1961-Recommended practice for borrow pits for road embankments constructed by manual operations, as revised in 1989;
- IRC SP: 58-2001 guideline for use of fly ash in road construction;
- EIA Guidance Manual for Highways prepared by Administrative Staff College of India, February 2010
- Fly Ash Notification 2009 and its amendment on 25th January 2016

3.2 Documentation of Borrow Pit

The contractor must ensure that following data base must be documented for each identified borrow areas that provide the basis of the redevelopment plan.

- Chainage along with offset distance;
- Area (Sq.m);
- Photograph of the pit from all sides;
- Type of access/width/kutcha/pucca etc from the carriageway;
- Soil type;
- Slope/drainage characteristics;
- Water table of the area or identify from the nearest well, etc;
- Existing landuse, for example barren/agricultural/grazing land;
- Location/name/population of the nearest settlement from borrow area;
- Present usage of borrow area; and
- Community facility in the vicinity of borrow pit.

3.3 Redevelopment Plans for Borrow Pits

The following checklist provides guidelines in order to ensure that redevelopment of borrow areas must comply with MoRTH, clause 305.2.2.2 and EMP requirement. Borrow areas can be developed as:

- Ponds (various types) (eg: Drinking Water only; Washing and for other Domestic Chores; Only for Cattle; Mixed Uses etc.) (a large pond can be divided into two parts - each having a defined use)
- Farmland submission
- Water Recharging Zones
- Pastureland
- Fish Ponds (pissiculture)
- Waste disposal Sites (depending upon the location, distance from settlements, pollution risks, safety, associated environmental risks and hazards, regulations/ permissions of appropriate authority and other such factors)
- Plantation Zones
- Recreational Zones (depending upon location, size, potential of the site, willingness of the local bodies to develop it)
- Wildlife Refuge and Drinking Area (applicable only in case of sensitive environs with appropriate planning and understanding including regulation of depth for safety of animals etc.)

The rehabilitation measures for the borrow areas shall be dependent on the following factors:

- Land use objectives and agreed post-borrowing activities;
- Physical aspects (landform stability, erosion, re-establishment of drainage);
- Biological aspects (species richness, plant density,) for areas of native re vegetation;
- Water quality and soil standards; and
- Public safety issues.

Rehabilitation should be simple and maintenance free. Depending on the choice of the individual land owner/community, the contractor shall prepare redevelopment plans for the borrow areas. The options can be: (i) Restoring the productive use of the land (ii) Development of detention ponds in barren areas.

Option I: Suitable in locations with high rainfall and productive areas
Topsoil must be placed, seeded, and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season. Vegetative material used in reclamation must consist of grasses, legumes, herbaceous, or woody plants or a combination thereof, useful to the community for the fuel and fodder needs.

Plants must be planted during the first growing season following the reclamation phase.

Selection and use of vegetative cover must take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth. The vegetative cover is acceptable if within one growing season of seeding, the planting of trees and shrubs results in a permanent stand, or regeneration and succession rate, sufficient to assure a 75% survival rate.

Option II: In barren land, the borrow areas can be redeveloped into detention ponds.
These will be doubled up as water bodies and also for removal of sediment from runoff flowing through the ponds. Design of the detention basin depends upon the particle size, settling characteristics, residence time and land area. A minimum of 0.02 mm size particle with a settling velocity of 0.02 cm/sec (assuming specific gravity of solids 2.65) can be settled in the detention basin.

Following parameters are to be observed while setting up a detention pond:

- Pond should be located at the lowest point in the catchment area. Care should be taken that the horizontal velocity should be less then settling velocity to prevent suspension or erosion of deposited materials.
- Minimum Effective Flow Path: 5 times the effective width
- Minimum Free Board: 0.15 m
- Minimum Free Settling Depth: 0.5 m
- Minimum Sediments Storage Depth: 0.5 m
- Maximum interior slope: 2H : 1V
- Maximum exterior slope: 3H : 1V
- The inlet structure should be such that incoming flow should distribute across the width of the pond. A pre-treatment sump with a screen should provide to remove coarse sediments. Settled sediment should be removed after each storm event or when the sediment capacity has exceeded 33% of design sediment storage volume. Accumulated sediment must be disposed of in a manner, which will prevent its re-entry into the site drainage system, or into any watercourse.

4. CONSTRUCTION STAGE

No borrow area shall be operated without permission of the Authority's Engineer. The procurement of borrow material should be in conformity to the guidelines laid down in IRC: 10-1961. In addition, the contractor should adopt precautionary measures to minimise any adverse impacts on the environment. Checklists for monitoring borrow areas operation and management has been prepared (**Table 3-1**).

Table 3-1: Checklist for Monitoring Borrow Area Operation and Management

Attributes	Requirements
Access Road	Access road shall be used for hauling only after approved
Top soil preservation	To soil, if any, shall be stripped and stored at corners of the area before the start of excavation for material collection; Top soil should be reused / re-laid as per agreed plan; In case of riverside, borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood. In no case shall be borrow pit be within 1.5m from the Toe line of the proposed embankment.

Attributes	Requirements
Depth of excavation	For agricultural land, the total depth of excavation should be limited to 150cm including top 30 cm for top soil preservation; For river side borrow area, the depth of excavation shall be regulated so that the inner edge of any borrow pit, should not be less than 15m from the toe of the bank and bottom of the pit should not cut the imaginary line of 1:4 projected from the edge of the final section of the embankment. To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Authority's Engineer.
Damage to surrounding land	Movement of man and machinery should be regulated to avoid damage to surrounding land. To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
Drainage control	The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the Authority's Engineer.
Dust Suppression	Water should be sprayed on kutcha haul road twice a day or as may be required to avoid dust generation during transportation of material; Depending on moisture content, 0.5 to 1.5% water may be added to excavated soil before loading during dry weather to avoid fugitive dust emission.
Covering material for transport material	Material transport shall be provided with tarpaulin cover
Personal Protective Equipment	Workers should be provided with helmet, gumboots and air mask and their use should be strictly enforced.
Redevelopment	The area should be redeveloped within agreed timeframe on completion of material collection as per agreed rehabilitation plan.

5. POST CONSTRUCTION STAGE

All reclamation shall begin within one month of abandonment of borrow area, in accordance with the redevelopment plan. The site shall be inspected by the Authority's Engineer after implementation of the reclamation plan. Certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The final payment shall be made after the verification by Authority's Engineer.

6. CHECKLIST FOR INSPECTION OF REHABILITATION AREA

Inspection needs to be carried out by the Authority's Engineer for overseeing the redevelopment of borrow areas as per the plan. The checklist for the inspection by the Authority's Engineer is given below.

- Compliance of post-borrowing activities and land use with the restoration plan;
- Drainage measures taken for inflow and outflow in case borrow pit is developed as a detention pond;
- Leveling of the bottom of the borrow areas;
- In case the borrow area is on private property, the contractor shall procure written letter from landowner for satisfaction on rehabilitation. In case of no rehabilitation is desired by the landowner, the letter should include statement "no responsibility of R&BD on contractor in the event of accident.
- Condition of the reclaimed area in comparison with the pre-borrowing conditions.

ESGP-04: TOPSOIL SALVAGE, STORAGE AND REPLACEMENT

1. INTRODUCTION

Loss of topsoil is a long term impact along roads due to (i) site clearance and widening for road formation (ii) development of borrow areas (iii) temporary construction activities such as construction camps, material storage locations, diversion routes etc. The environmental measures for both these activities during all stages of construction activity are discussed in the subsequent sections.

2. PROJECT PLANNING & DESIGN STAGE

At the project preparation stage, the following shall be estimated: (i) Extent of loss of top soil due to widening and siting of construction activities (ii) Estimates of borrow area requirements and (iii) Area

requirement for topsoil conservation. The bid document shall include provisions that necessitate the removal and conservation of topsoil at all locations opened up for construction by the Contractor.

3. PRE-CONSTRUCTION STAGE

The arrangements for temporary usage of land, borrowing of earth and materials by the Contractor with the land owner/concerned department shall include the conservation / preservation of topsoil.

4. CONSTRUCTION STAGE

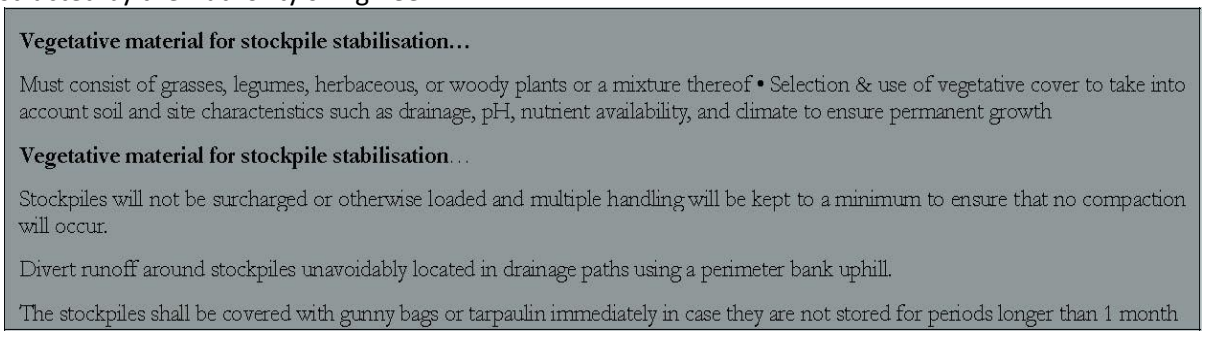
It shall be the responsibility of the Contractor to strip the topsoil at all locations opened up for construction. The stripped topsoil should be carefully stockpiled at suitable accessible locations approved by the Authority's Engineer. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. In case of hilly and desert areas, topsoil with humus wherever encountered while opening up the site for construction shall be stripped and stockpiled. The stockpiles shall be located at:

- Areas away from Grade, Subsoil & Overburden materials;
- Areas away from pit activities and day-to-day operations;
- Areas that do not interfere with future pit expansion; and
- Areas away from drainage paths and uphill of sediment barriers.

The stockpiles for storing the topsoil shall be designed such that the slope should not be less than 1:2 (Vertical to horizontal), and the height of the pile is restricted to 2m. A minimum distance of 1m is required between stockpiles of different materials.

In cases where the topsoil has to be preserved for more than a month, the stockpile is to be stabilised within 7 days of forming. The stabilization shall be carried out through temporary seeding. It consists of planting rapid-growing annual grasses or small grains, to provide initial, temporary cover for erosion control.

After spreading the topsoil on disturbed areas, it must be ensured that topsoil is seeded, and mulched within 30 days of final grading. During construction, if erosion occurs from stockpiles due to their location in small drainage paths, the sediment-laden runoff should be prevented from entering nearby watercourses. The Contractor shall preserve the stockpile material for later use on slopes or shoulders as instructed by the Authority's Engineer.



5. POST CONSTRUCTION STAGE

The topsoil shall be re-laid on the area after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer. The area to be covered with vegetation shall be prepared to the required levels and slope as detailed in the DPR. The stockpile material shall be spread evenly to a depth of 5-15cm to the designed slopes and watering the same as required. The growth of the vegetation shall be monitored at frequent intervals. All temporary arrangements made for stockpile preservation and erosion control are to be removed after reusing the stockpile material. The top soil can also be used for the following purposes:

a. Covering the borrow areas;
b. Embankment and turfing;
c. Median; and
d. Rehabilitation of construction and labour camp.

ESGP-05: QUARRY MANAGEMENT

1. INTRODUCTION

This guideline pertains to the measures to be taken to address environmental concerns in quarry areas. The general practice adopted is to procure materials from existing quarries operating with the requisite permits. The measures to be taken for operation and management for quarries during all stages of construction have been discussed in this Guideline.

2. PROJECT PLANNING AND DESIGN STAGE

The PIU shall provide in the DPR/bid document, a list of licensed quarries operating within the district and adjoining districts. In addition, the DPR shall contain the following: (i) Quantity of materials available in quarries (ii) Lead from the various existing quarries and (iii) Adequacy of materials for the project in these quarries. **Table 5-1** and **5-2** give the format for preparing a list of quarries.

Table 5-1 Details of Sand Quarry

Sample No.	Source of Sand	Name of quarry area	Site Identification/ Location			Approximate Quantity (cum)	Approximate basic cost of the material (Rs.)	Remarks
			Nearest Chainage (Km.)	Left/Right	Offset from nearest chainage (km)			

Table 5-2 Details of Quarry Area for Aggregates

Sample No.	Chainages (Km.)	Left/ Right	Name of Quarry Area	Name of Crusher	Lead from nearest chainage (Km.)	Basic cost of the material (Rs.)	Available land/ terrain	Surrounding land Terrain	Remarks

Only in the event of non-availability of existing quarries, the Contractor shall open a new quarry in accordance with Mines and Minerals (Development & Regulation) Act, 1957. The bid document shall include the exhaust quarry reclaim plan per needs of the landowner / community.

3. PRE-CONSTRUCTION STAGE

The Contractor shall select an existing licensed quarry identified in DPR for procuring materials. The Contractor shall establish a new quarry with the prior consent of the Engineer only in cases when: (i) Lead from existing quarries is uneconomical and (ii) Alternative material sources are not available. The Contractor shall prepare a Redevelopment Plan for the quarry site and get it approved by the Authority's Engineer.

The construction schedule and operations plans to be submitted to the Authority's Engineer prior to commencement of work shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials.

4. CONSTRUCTION STAGE

4.1 Development of Quarry Area

To minimize the adverse impact during excavation of material following measures are need to be undertaken:

- Adequate drainage system shall be provided to prevent the flooding of the excavated area
- At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff.
- Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.

- The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the plant.
- In case of storage of blasting material, all precautions shall be taken as per The Explosive Rules, 1983 and its amendments.

4.2 Setting up of Crushers and other equipments

The following measures shall be undertaken for setting up of crushers are other equipments.

- The contractor shall obtain "No Objection Certificate (NoC)" from the Gujarat State Pollution Control Board.
- All vehicles must possess Pollution Under Control (PUC) Certificate and shall be renewed accordingly
- All machinery, equipments, and vehicles shall comply with existing CPCB noise and emission norms.
- The Authority's Engineer must ensure that contractor shall submit the copy of NoC and PUC Certificate before the start of work.

4.3 Quarry operations

The followings precautions shall be undertaken during quarry operations. vii) Overburden shall be removed and disposed as per **ESGP 08** "Waste Management and Debris Disposal".

- During excavation slopes shall be flatter than 20 degrees Guideline 8 on to prevent their sliding
- In case of blasting, the procedure and safety measures shall be taken as per Explosives Act, 1884and its amendments and Rules, 1983 and its amendments.
- The Contractor shall ensure that all workers related safety measures shall be done as per measures for, "Labour & Workers Health & Safety" (**ESGP 12**).
- The Contractor shall ensure maintenance of crushers regularly as per manufacturer's recommendation.
- Stockpiling of the excavated material shall be done as per stockpiling of topsoil explained in **ESGP 04**, "Topsoil Salvage, Storage& Replacement."
- During transportation of the material, measures shall be taken as per **ESGP 11** "Construction Plants and Equipment Management" to minimize the generation of dust and to prevent accidents
- The Engineer and the concerned authority shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

5. POST CONSTRUCTION STAGE

A quarry redevelopment plan shall be prepared by the Contractor. All haul roads constructed for transporting the material from the quarries to construction site shall be restored to their original state.
The Engineer and the concerned authority shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment Plan.
The plan shall include:

- Photograph of the quarry site prior to commencement
- The quarry boundaries as well as location of the materials deposits, working equipments, stockpiling, access roads and final shape of the pit.
- Drainage and erosion control measures at site
- Safety measures during quarry operation
- Design for redevelopment of exhaust site.

Two options for redevelopment of quarry areas are given below:

Option A: Vegetating the quarry to merge with surrounding landscape. This is done by conserving and reapplying the topsoil for the vegetative growth.

Option B: Developing exhausted quarries as water bodies. The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding areas/ natural drainage slopes towards it.

ESGP-06: WATER FOR CONSTRUCTION

1. INTRODUCTION

The scope of this guideline includes the procurement of water required for construction of roads. Except bituminous works, water is required during all stages of road construction such as Embankment Sub-Grade; Granular sub-base (GSB) and Water Bound Macadam (WBM). Management of water in various stages of construction is given in the following sections.

2. PROJECT PLANNING & DESIGN STAGE

- The Detailed Project Report for both road constructions shall contain the following information:
- Estimate of water requirement during different seasons based on construction schedule of various stages of construction.
- Identification of potential sources of water for construction,
- Arrangements to be worked out by the contractor with individual owners, when water is obtained from private sources, and
- Whether scarcity of water would have any impact on schedule of construction.

In water-scarce regions, provide the following additional information in Project Reports…
• Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
• Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works.
• Identification of alternate water sources, water-harvesting techniques will be explored to avoid water extraction from the existing community sources.

In water scarce regions, if water-harvesting structures are to be constructed, suitable locations and mechanism for siting these structures will be identified. These are envisaged to be permanent water tanks for collection of stream water. Detailed drawings of water harvesting structures based on site conditions will need to be worked out and presented in the DPR. No extra payment shall be generally made for these works and the Contractor has to include the cost of these items in his offer while quoting his tendered rate.

Scheduling Construction in Water Scarce Areas: As part of the project preparation, the Authority's Engineer shall conduct an assessment of water requirement and availability in water scarce regions. As far as possible, schedule for construction in these water scarce areas shall be prepared such that earthwork for embankment is carried out just before monsoon, so that water requirement for subsequent construction works such as granular sub-base and water bound macadam are met in monsoon and post monsoon season. Carrying out these activities even during the monsoon is possible as the rainfall may not be high enough to disrupt construction.

3. PRE-CONSTRUCTION STAGE

Prior to commencement of extraction of water for construction, the contractor shall work out arrangements as specified in the DPR.

In water-scarce regions, provide the following additional information in Project Reports…

- Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
- Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works.
- Identification of alternate water sources, water-harvesting techniques will be explored to avoid water extraction from the existing community sources.

CONSTRUCTION STAGE

During construction, the Contractor shall be responsible to monitor the following:

- The arrangements worked out with the Panchayat/individual land owners for water extraction is adhered to;
- Extraction of water is restricted to construction requirement and domestic use of construction workers;
- Water requirement for curing of concrete shall be minimized by pooling of water over the concrete or by covering with wet gunny bags; and
- The potable water used for drinking purposes of construction workers shall be as per the Indian Standard for Drinking Water IS: 10500, 1991.

from any septic tank/soak pit or other source of pollution.

- **In case of water harvesting structures** (if required), the Contractor shall in consultation with the residents, identify suitable locations for siting the structure and construct the same.
- **In case of perennial sources,** the Contractor shall adhere to all administrative procedures pertaining to procurement of water from such sources.

ESGP-07: SLOPE STABILITY AND EROSION CONTROL

1. INTRODUCTION

Stability of slopes is a major concern in locations of high embankment. In cases of high embankment, water retention at the embankment base initially causes toe failure and subsequently failure of the whole embankment. Soil erosion is consequent to high runoff on hill slopes. Embankments made up of silty and sandy soils get eroded, in the absence of vegetative cover, when the slopes are steep say more than 20 Degree.

The scope of this guideline includes measures to minimize the adverse environmental impacts due to slope instability and soil erosion. The adverse environmental impact can be: (i) Damage to adjacent land, (ii) Silting of ponds and lakes disturbing the aquatic habitat (iii) Erosion of rich and top fertile top layer of soil (iv) Contamination of surface water bodies and (v) Reduction in road formation width due to erosion of shoulders/berms.

2. PROJECT PLANNING AND DESIGN STAGE

During the detailed project preparation phase, the following investigations shall be carried out prior to finalization of alignment.

- Topographical;
- Hydrological;
- Geo-technical; and
- Geological Investigation (in case of roads in hill areas and areas of high seismic activity)

In addition to the slope stability analysis the alignment should be such that (i) steep as well as heavy cuts are avoided, (ii) Flora and fauna of the area are not disturbed and (iii) Natural drainage pattern is not obstructed.
For high embankments, geo-technical investigations (determination of C, ϕ, density etc.) of the available material need to be done to check its suitability as fill material.

In case of the CD structures, measures for preventing siltation and scouring shall be undertaken as per Guideline on, "Drainage".

Following guidelines shall be followed in desert areas while using cohesion-less soils for embankment construction.

- The alignment should follow the natural ground level to the extent possible and the embankment shall be restricted to minimum to achieve ruling grades.
- Slope of the embankment should be 3 (H): 1(V) or flatter.
- The corners of the embankment should be rounded for better aerodynamic performance.

3. PRE-CONSTRUCTION STAGE

Interceptor ditches are constructed along hilly slopes or areas with high rainfall to protect the road bench and hillside slope from erosion due to heavy rainfall and runoff. Interceptor ditches are very effective in the areas of high intensity rainfall and where the slopes are exposed. These are the structures designed to intercept and carry surface run-off away from erodible areas and slopes, thus reducing the potential surface erosion. The Authority's Engineer must ensure that the layout and siting of ditches is as per specifications.

4. CONSTRUCTION STAGE

When alternative material such as fly ash is used for embankment formation, it needs to be ensured that sufficient filter bed is provided along with the top cap. All tests as per IS: 2720 (Parts: 4, 5, 8 & 40) and IRC: SP: 20-2002 are to be conducted on the embankment to keep a check on the compaction achieved. Slope stabilization techniques and erosion control measures such as vettiver grass, stone pitching, use of geotectile and turfing.

Box-1: Detailed specifications for Vegetative cover

Description:

The vegetative cover should be planted in the region where the soil has the capacity to support the plantation and at locations where meteorological conditions favours vegetative growth.

Site Preparation:

- To prevent the seeds from being washed away subsequent to sowing, the area should be protected with surface roughening and diversions.
- Soil samples should be taken from the site and analysed for fertiliser and lime requirements.

Seed Application:

- The seed should be sown uniformly as soon as preparation of the seedbed has been completed.
- No seed should be sown during windy weather. The best time for needing would be during monsoon.

Maintenance:

During first six weeks, the planting should be inspected by the PIC, to check if the growth is uniform and dense. Appropriate moisture levels shall be maintained. There may be requirement of watering the plantings regularly during the dry seasons.

5. POST CONSTRUCTION STAGE

All the exposed slopes shall preferably be covered with vegetation using grasses, brushes etc. Locally available species possessing the properties of (i) good growth (ii) dense ground cover and (iii) deep root shall be used for stabilization.

In case of steep and barren slopes, in order to retain the seedling to the ground asphalt mulch treatment shall be given. Seedling are covered with asphalt emulsion and spread into a thin layer. The asphalt film gradually disintegrates and a carpet of green vegetation and deep-rooted species of grass and clovers, takes its place. Anchoring shall be carried out as per IRC: SP: 48-1998.

Regular inspection of check dams and repositioning/replacement of dislodged or stolen stones need to be carried out.

Repair and maintenance of eroded side drain inverts is to be done in order to arrest retrogation of levels in side drains. Slopes of high embankment can give a fertile base for growth of vegetative cover / sodding.

In arid areas, in order to avoid the deposition of sand over or near the road surface, shrubs are to be planted at an appropriate distance from the formation. The shrubs should not be abutting the road and the distance for carrying out plantation shall be determined based on prevalent wind speeds as well as quantity of sand being carried amongst various other factors. There should be a clear gap between the roadway and shrubs to allow the wind to pick up its velocity and carry along with it any sand that is deposited.

ESGP-08: WASTE MANAGEMENT AND DEBRIS DISPOSAL

1. INTRODUCTION

This guidance describes procedures for handling, reuse and disposal of waste materials during road construction. The Guideline describes waste management measures in all stages of construction. Also, the Guideline discusses the measures to be taken for debris disposal.

2. PROJECT PLANNING AND DESIGN STAGE

As part of DPR preparation, the Authority's Engineer shall carry out the following measures

- Finalize road design and alignment to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal.
- Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse
- Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes
- Identify existing landfill sites if available for disposal of toxic materials.
- Incase no existing landfill sites are available, identification of landfill site as well as identification of the clearance requirements.
- Identify sites of disposal of debris.

Practices to avoid – waste disposal …
•Tipping of waste into stream channels, water bodies, forests and vegetated slopes •Non-cleaning of wastes after day's work •Leaching of wastes •Littering in construction camps / sites •Storing wastes on private land

3. PRE-CONSTRUCTION STAGE

The contractor shall identify the activities during construction, that have the potential to generate waste and work out measures for reducing, reusing and proper disposing of the generated waste in the construction schedule to be submitted to the Authority's Engineer. A sequential listing of the activities during road construction and the nature of wastes together with the possible options for reuse are

specified in **Table 8-1**. For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / concerned department. Any toxic materials shall be disposed in existing landfill sites that comply with legislative requirements. Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community. The NOC shall be submitted to the Authority's Engineer prior to commencement of disposal.

The Contractor shall educate his workforce on issues related to disposal of waste, the location of disposal site as well as the specific requirement for the management of these sites.

4. CONSTRUCTION STAGE

The contractor shall either reuse or dispose the waste generated during construction for roads depending upon the nature of waste, as specified in **Table 8-1**. The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the Authority's Engineer. Wastes that were not reused shall be disposed off safely by the contractor. The contractor shall adopt the following precautions while disposing wastes:

- Bituminous wastes shall be disposed off in 60mm thick clay lined pits and covered with 30cm good earth at top, so as to facilitate growth of vegetation in long run.
- In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken that these low lying areas are not used for rainwater storage
- In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site and away from the residential areas.

The waste management practices adopted by the Contractor, including the management of wastes at construction camps etc shall be reviewed by the Authority's Engineer and the Pollution Control Board (PCB) during the progress of construction.

5. POST CONSTRUCTION STAGE

On decommissioning of construction sites, the Contractor shall hand over the site free of all debris/wastes to the satisfaction of Authority's Engineer. In case of any temporary disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The same is to be submitted to the Authority's Engineer before final payment is claimed.

Table 8-1: Type of wastes and scope for reuse- road construction

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
I	**CONSTRUCTION WASTES**			
1.	Site Clearance and grubbing	Vegetative cover and top soil	Vegetating embankment slopes	
		Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land fill sites
2.	Earthworks			
a)	Overburden of borrow areas	Vegetative cover and soil	Vegetating embankment slopes	
b)	Overburden of quarries	Vegetative cover and soil	Vegetating embankment slopes	
		Granular material	Embankment Fill, Pitching	
c)	Accidental spillages during handling	Dust		
d)	Embankment construction	Soil and Granular Material	Embankment Fill	
e)	Construction of earthen drains	Soil	Embankment Fill	

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
3.	Concrete structures Dust			
a)	Storage of material	Dust, Cement, Sand	Constructing temporary structure, embankment fill	
		Metal Scrap		Scrap Yard
b)	Handling of materials	Dust		
c)	Residual wastes	Organic matter	Manure, Revegetation	
		Cement, sand	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
4	Reconstruction works			
a)	Dismantling of existing pavement	Bitumen Mix, granular material	sub-base	
		Concrete	Road Sub-base, reuse in concrete, fill material and as rip rap on roads	
		Guard rail sign post, guard stone	Reuse for same	
b)	Dismantling of cross drainage structures	Granular material & bricks	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail Culvert	
		Pipes	Culvert	
5	Decommissioning of sites			
a)	Dismantling of temporary structures	Granular material and bricks	Constructing temporary structure, embankment fill	
6	Maintenance operation			
a)	Desilting of side drains	Organic matter and soil	Revegetation	
II	**OIL AND FLUIDS**			
1	Construction machinery – maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
2	Bituminous works			
a)	Storage	Bitumen	Low Grade Bitumen Mix	
b)	Mixing and handling	Bitumen	Low Grade Bitumen Mix	
		Bitumen Mix	Sub-base, Paving access & cross roads	
c)	Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access & cross roads	
III	**DOMESTIC WASTES**			
1	Construction camps	Organic waste,	Manure	
		Plastic and metal scrap		Scrap Yard
		Domestic effluent	Irrigation	

6. Disposal of Debris

For the purpose of disposal of debris, dumping sites need to be selected. The criteria for selection of dumping sites include:

- No residential areas are located downwind side of these locations;
- Dumping sites are located at least 1000 m away from sensitive locations;
- Dumping sites do not contaminate any water sources, rivers etc; and
- Dumping sites have adequate capacity equal to the amount of debris generated;
- Public perception about the location of debris disposal site has to be obtained before finalizing the location;
- Permission from the Village Panchayat is to be obtained for the dumping site selected;
- Productive lands are avoided; and
- Available waste lands shall be given preference

ESGP-09: WATER BODIES

1. INTRODUCTION

Water bodies may be impacted when the road construction is adjacent to it or the runoff to the water body is affected by change of drainage pattern due to construction of embankment. The following activities are likely to have an adverse impact on the ecology of the area:

- Earth moving;
- Removal of vegetation;
- Vehicle/Machine operation and maintenance;
- Handling and laying of asphalt; and
- Waste disposal from construction camps.

Impacts on water bodies impairs …

- Change in Catchment area of the water body
- Drainage system
- Flood level and water logging
- Flora and fauna dependant on the water body
- Ground water recharging
- Animal husbandry as water bodies are used by animals
- Water quality &
- Runoff (increase/ decrease)

2. PROJECT PLANNING AND DESIGN STAGE

All efforts are to be taken to avoid the alignments passing adjacent or close to water bodies. Where possible, it should be realigned away from the water body without cutting its embankment, decreasing the storage area or impairing the catchment area. Adequate drainage arrangements as per IRC guidelines have to be provided. Stream bank characteristics and hydrology of the area are to be studied before finalizing the alignment, the profile and cross-drainage structures.

Complete filling of water body with soil is not contemplated in the project. The DPR and its cost estimates have to accommodate costs of rehabilitation (to be estimated as lump sum at DPR stage) of water bodies impacted by the project. Water body rehabilitation shall be as per the Rehabilitation Plan prepared by the Contractor which should have approval of the Authority's Engineer. Details of the tasks to be performed as per the sequence of activities during the project planning and design are as follows:

- Consultations with the people regarding alternate routes that were devised to avoid the pond. If alternate routes are not available, consent of the villagers is to be sought for affecting the pond and also the measures that would be taken to mitigate the impacts.
- Final design is to be prepared indicating the pond location in the alignment drawings.
- If impacting the pond, the extent of impact is to be clearly indicated on a separate drawing showing blown up portion of the pond. The drawing should aid the contractor in setting up exact lines for cutting the pond.
- All necessary measures for mitigation of impacts and precautionary measures while working close to the water body are to be incorporated into the DPR and cost estimates. The measures to be incorporated shall be as per this guideline.

PRE-CONSTRUCTION STAGE

The Contractor after an assessment of the likely impacts on the water body and review of the provisions of this guideline shall prepare a detailed work plan at the pre-construction stage. The Contractor shall prepare a Rehabilitation Plan for rectifying the likely impact to be caused and approval of Authority's Engineer shall be sought prior to commencement of work. The Rehabilitation Plan should include:

- Locations of erosion protection works and silt fencing to prevent sediment laden runoff entering the water body;
- Location of side drains (temporary or otherwise) to collect runoff from the embankment before entering the water body in accordance with IRC guidelines;
- Work program in relation to the anticipated season of flooding/overflowing of the water body;
- Obstructions likely to cause temporary flooding and information to seek clearance to remove the obstruction; and
- Drawings in Rehabilitation Plan should indicate the landscape details along with species to be planted in the surrounding environs of the water body.

The rehabilitation of water body should be with the objective of restoring it to its original state or to a better state with necessary enhancement of its environs. Rehabilitation Plan shall include:

- Reconstruction and stabilization of embankment in case it is impacted;
- If storage area is lost, then the water body is to be deepened to regain an equivalent volume;
- Further enhancement of the water body as a focal point with place for seating and provision of shade; and
- Costs of rehabilitation

Concurrence of the community has to be sought on the Rehabilitation Plan prepared by the Contractor. Concerns of the community have to be incorporated into the plan before submitting it for approval of the Authority's Engineer.

The Authority's Engineer shall scrutinize the Rehabilitation Plan, verify the implementation on site and finally approve the plan. The Rehabilitation Plan should be implemented by the Contractor immediately after completion of construction at the stretch near the water body.

Working near Water Bodies – Precautions

- Avoid locating roads on pond embankment
- Collect road runoff before entering the water bodies
- Runoff to be filtered of sediments before letting into water bodies
- Avoid debris disposal into water bodies
- Avoid disposal of oil/grease/other contaminants into water bodies

When there is interruption to regular activities of villagers near water body due to construction or rehabilitation work, following are the Contractor's responsibilities:

- Restriction on use of water, if any, should be intimated to the community in advance;
- Alternate access to the water body is to be provided in case there is interruption to use of exiting access. The access provided should be convenient for use of all the existing users whether community or cattle; and
- If the water body affected is a drinking water source for a habitation, alternate sources of water are to be provided to the users during the period for which its use is affected.

3. CONSTRUCTION STAGE

It should be ensured by the contractor that the runoff entering the water body is free from sediments Silt fencing and/or brush barrier shall be installed in the drainage channels for collecting the sediments before letting them into the water bodySilt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be revegetated.Cutting of embankment reduces the water retention capacity and also weakens it, hence:

- The contractor should ensure that the decrease in water retention should not lead to flooding of the construction site and surroundings causing submergence and interruption to construction activities.
- Any perceived risks of embankment failure and consequent loss/damage to the property shall be assessed and the contractor should undertake necessary precautions as provision of toe protection, erosion protection, sealing of cracks in embankments. Failure to do so and consequences arising out of embankment failure shall be the responsibility of the contractor. The Authority's Engineer shall monitor regularly whether safe construction practices near water bodies are being followed.

Alternate drain inlets and outlets shall be provided in the event of closure of existing drainage channels of the water body. Movement of machinery and workforce shall be restricted around the water body, and no waste from construction camps or sites shall be disposed into it.

4. POST CONSTRUCTION STAGE

With the completion of construction, the Authority's Engineer has to ensure implementation of rehabilitation/restoration plan for the water body, as indicated by the Contractor in the bid submission. The precincts of the water body have to be left clean and tidy with the completion of construction. Drainage channels of adequate capacity shall be provided for the water body impacted.

ESGP-10: DRAINAGE

1. INTRODUCTION

Inadequate and faulty drainage arrangements during road construction result in obstruction to natural drainage pattern. The problem is further aggravated in the low-lying areas and flood plains receiving high intensity rainfall, which can lead to the instability of embankment, damage to pavement, sinking of foundation, soil erosion, safety hazards and disruption in traffic. Provision of cross-drainage and longitudinal drainage increases the life of the road and consequently reduces water logging and related environmental impacts. The functioning of the drainage system is therefore a vital condition for a satisfactory road.

However, construction or upgradation of CD structures and longitudinal drains is likely to increase sediments, scour the banks, change water level and flow, and also affect the ecology of the surrounding area. The guideline shall address the environmental concerns related to drainage aspects during different stages of the project execution.

2. PROJECT PLANNING AND DESIGN

Drainage shall be broadly divided as (i) Cross-Drainage and (ii) Longitudinal Drainage both surface & sub-surface drainage. The alignment shall be routed such that minimum drainage crossings are encountered. Also the geometric design criteria as per IRC 73, guidelines for effective surface drainage should be ensured.

All drains crossing the alignment shall be identified on site and marked on map while undertaking transect walk. Basic information on the width of channel, frequency of traffic holdup and flow would provide inputs into screening of alternate alignments as well as fixing the alignment. Consultations with the community shall provide information on the HFL in the area.

In areas of high and medium intensity rainfall (>400 mm/year), flood prone areas and hilly areas, detailed hydrological studies will need to be conducted. The studies shall be conducted as per IRC: SP-13: 1973 “Guidelines for the Design of Small Bridges & Culverts” and IRC: SP-33:1989 “Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures”.

Design of cross-drainage structures shall be based on the inputs from the hydrological studies as per clause 12.2.3 and in other areas, the C-D structure design shall be as per IRC: SP-13. Design of C-D structure shall be such that:

- Normal alignment of the road is followed even if it results in a skew construction of culverts and stream bank protections are incorporated.
- Afflux generated is limited to 30 cm in plains with flat land slopes.
- It is fish friendly – fish passage is not interrupted either in upstream or downstream direction.
- Adequate scour protection measures for stream bank, roadway fill as head walls, wing walls and aprons are included.
- Reinforced road bed (of concrete or rock) for protection against overflow in case of low water crossing (floods/causeways) is included.
- The design of C-D structure (minor and major bridge) should have stairs leading to the bed of the drainage channel, for regular inspection of the sub-structure.
- Schedule of construction of C-D structures should be confined to dry months to avoid contamination of streams.

Longitudinal drains are to be designed to drain runoff from highest anticipated rainfall as per rainfall data for the past 20 years or 50 years as per hydrological analysis in high rainfall areas (annual rainfall > 1000 mm) and hill areas. For design of longitudinal drains in other areas, the design shall be as per IRC: SP-20:2002.

Outfall of the roadside drains shall be into the nearby stream or culvert. The outfall should be at such a level that there would be no backflow into the roadside drain. Wherein pond/low lying areas exist in the vicinity, the flow may be diverted into them after removal of sediment for possible ground water recharge.

In case of high embankment (>1.0m) or bridge approaches, lined channels shall be provided to drain the surface runoff, prevent erosion from the slopes and avoid damage to shoulders and berms. Detailed specifications shall be as per IRC: SP-20:2002. The type of drains that can be constructed include bricklined, pucca with RCC, covered drain with RCC slabs and piped drain.

3. PRE-CONSTRUCTION STAGE

Following measures are to be undertaken by the contractor prior to the commencement of CD/Bridge construction:

- The downstream as well as upstream user shall be informed one month in advance
- The contractor shall schedule the activities based on the nature of flow in the stream.
- The contractor should inform the concerned departments about the scheduling of work. This shall form part of the overall scheduling of the civil works to be approved by Authority's Engineer.
- Erosion and sediment control devises are to be installed prior to the start of the civil works.
- Interceptor drains to be dug prior to slope cutting to avoid high runoff from slopes entering construction sites in case of hill roads
- Runoff from temporary drains and interceptor drains to be directed into natural drains in hill roads
- In case of up-gradation of the existing CD Structures, temporary route / traffic control shall be made for the safe passage of the traffic, depending upon the nature of the stream
- All the safety/warning signs are to be installed by the contractor before start of construction

In case of utilization of water from the stream, for the construction of the CD structures, the contractor has to take the consent from the concerned department (refer Guideline on "Water for Construction")

4. CONSTRUCTION PHASE

Drainage structures at construction site shall be provided at the earliest to ensure proper compaction at the bridge approach and at the junction of bridge span and bridge approach. Velocity of runoff to be controlled to avoid formation of rills/gullies as per guideline, "Slope stability & erosion control"
While working on drainage channels, sediment control measures shall be provided. Silt fencing (as per the detailed specifications of guideline, "Slope Stability & Erosion Control") shall be provided across the stream that carries sediment.

The sediments collected behind the bunds shall be removed and after drying, can either be reused or disposed off as per guideline, "Waste Management and Debris Disposal". Safety devises and flood warning signs to be erected while working over streams and canals.

5. POST CONSTRUCTION

Inspection and cleaning of drain shall be done regularly to remove any debris or vegetative growth that may interrupt the flow. HFL should be marked as per hydrological data on all drainage structure. Temporary structure constructed during construction shall be removed before handing over to ensure free flow through the channels. The piers and abutments should be examined for excessive scour and make good the same if required. The upstream and downstream areas should be cleared of all CD works.

In case of Causeway following aspect shall be taken into consideration:

- Dislocation of stones in stone set pavements, scouring of filler material due to eddy currents.
- Floating debris block the vents. Incase of large amount of floating material, debris arrestor shall be provided in upstream side.
- Damage to guide stones, information board shall be inspected and replaced accordingly.

Schedule of Inspection shall be drawnup for checking cracks, settlements and unusual backpressures. It must be ensured that all the rectification shall be undertaken as and when required. Following are broadly the items to be checked:

- Settlement of piers/abutments & settlement of approach slabs have to be checked;
- Cracks in C-D structures or RCC slabs;
- Drainage from shoulders to be ensured;
- Ditches & drains to be kept clean of debris or vegetation growth; and
- Repairs to parapet of culverts whenever required are to be undertaken.

ESGP-11: CONSTRUCTION PLANTS & EQUIPMENT MANAGEMENT

1. GENERAL

During execution of the project, construction equipments, machinery and plants are likely to cause adverse impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. This guideline describes the activities during the project stages where pollution control measures are required.

2. PROJECT PLANNING AND DESIGN STAGE

Selection criteria for setting up a plant area and parking lot for equipments and vehicles shall be done as per siting criteria for construction camp specified in Guideline on “Construction and Labour Camps”.

3. PRE-CONSTRUCTION STAGE

The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipments. Before setting up the crusher, hot-mix plant and generator, the Contractor shall acquire “No Objection Certificate (NOC)” from the GujaratState Pollution Control Board for the same. The Contractor shall ensure all vehicles must possess Pollution under Control (PUC) Certificate, which and shall be renewed regularly. The Contractor must ensure that all machinery, equipments, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms. The Authority’s Engineer must ensure that the Contractor shall submit a copy of the NOC and PUC Certificates before the start of work. The Contractor shall design the service road with protection measures as black topping at vulnerable points as in low lying areas.

4. CONSTRUCTION STAGE

The Contractor shall undertake measures as per **Table 11-1** to minimize -the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site.

Table 11-1: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	•Water sprinkling •Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation •Tail board shall be properly closed and sealed to be spill proof
	Crushers	• Regular Water Sprinkling to keep the dust below visibility level
	Concrete-Mix Plant	• Educate the workers to follow/adopt good engineering practices while material handling
Emissions	Hot-Mix Plant	•Site Selection as per Clause 6.5.2, Section 6.5, IRC’s Manual for Construction & Supervision of Bitumen Work •Regular maintenance of Dust Collector as per manufacture’s recommendations
	Vehicles	• Regular maintenance as per manufacture’s recommendation
	Generators	• Exhaust vent of long length and emission to confirm to PCB norms.
	Heavy Load Vehicles	• Exhaust silencer, Regular maintenance as per manufacture schedule
Noise	Crushers	• Siting as per guideline, “Construction and Labour Camps”
	Generators	• All generators should have mandatorily acoustic enclosures and confirms to PCB norms.

Concern	Causes	Measures
Oil Spills	Storage and Handling	• Good practice, guideline, "Waste Management and Debris Disposal"
Residual waste	Dust Collector and Pits	• Guideline , "Waste Management and Debris Disposal"
Concrete waste	Concrete-Mix plant	• Guideline, "Waste Management and Debris Disposal"
Bitumen and bitumen mix	Hot-mix Plant	• Guideline, "Waste Management and Debris Disposal"
Stone chips	Crushers	• Guideline, "Waste Management and Debris Disposal"
Safety	Trajectory of Equipments	• No worker shall be present in the vicinity of the equipments
	Movable Parts of Equipments	• Caution Sign, awareness among workers
	Plant Area / Site	• Caution Sign, Safety Equipments
	Accidents / Health	•First Aid Box, Periodic Medical Checkup Break down of
	Break down of vehicles	• Arrangement for towing and bringing it to the workshop

During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns. During excavation, water sprinkling shall be done to minimize dust generation. Frequent water sprinkling shall be done on the haul roads to minimize dust generation. In case of loose soils, compaction shall be done prior to water sprinkling. Cautionary and informatory sign shall be provided at all locations specifying the type of operation in progress. The contractor must ensure that there is minimum generation of dust and waste while unloading the materials from trucks. The construction waste generated shall be disposed as per Guideline on, "Waste Management and Debris Disposal". The equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensure that the workers shall remain away from the working areas at such times. Also, equipments at construction camp should be barricaded and kept away from residential quarters of workers.

The Authority's Engineer shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

Safety Measures During Bitumen Construction Work…

- The Contractor shall ensure that bitumen storing, handling as well as mixing shall be done at hot-mix plant or designated areas[1] to prevent contamination of soil and ground water.
- Skilled labour shall be used while hand placing the pre-mixed bitumen material. The hand placing of pre-mixed bituminous material shall be done only in following circumstances:
  - For laying profile corrective courses of irregular shape and varying thickness
  - In confined spaces where it is impracticable for a paver to operate and
  - For filling potholes
- The Contractor shall provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen.
- While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labour shall wear jacket while spraying the bitumen.
- All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.

5. POST-CONSTRUCTION STAGE

The Authority's Engineer shall ensure that all the haul roads are restored to their original state. In case any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition. The Authority's Engineer must ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area to bring its original state.

Designated area refers to paved surfaces and barren parcels of land, with adequate drainage and disposal system. It must be ensure that these are away from agriculture land, water body and other sensitive areas.

ESGP-12: LABOUR AND WORKER'S HEALTH AND SAFETY

1. INTRODUCTION

The safety and health concerns of the workers and the community are impacted due to the hazards created during the construction of road. **Box: 1** gives the safety concerns during construction. This Guideline describes the hazards and measures that need to be taken to mitigate the impacts.

2. PROJECT PLANNING AND DESIGN STAGE

To address health and safety concerns, the DPR shall contain selection criteria for setting up:

- Construction Camps (as per guideline);
- Borrow Areas (as per guideline); and
- In case of opening new quarry areas (as per guideline).

To address the safety concerns to road user during operational phase, the DPR shall contain the following:

- Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road.
-

Box 1: Safety Concerns during Construction

Community due to:

- Improper scheduling of construction activities especially ne
- Parking of equipments and vehicles at the end of the day li during night hours;
- Transportation of uncovered loose material or spillage of users and surrounding settlements.

Workers due to:

- Improper handling of materials like bitumen, oil and oth cause safety concerns to the workers;
- Lack of safety measures such as alarm, awareness and saf with or around heavy machinery / equipments.

Public due to:

- Unhygienic conditions due to water logging (improper drainage of waste water), either by improper decommissioning of Construction Camps and parking lots, or improper disposal of construction wastes, leading to the breeding of vectors that are likely to impact the health of the general public
- Interaction between workers and host community is likely to increase the risk of spread of communicable diseases.

Workers due to:

- Low quality drinking water as well as inappropriate storage of drinking water likely to cause water borne diseases among workers.
- Absence of proper sanitary facility likely to act as a breeding ground for vectors raising health concerns among workers.

PRE-CONSTRUCTION STAGE

In order to incorporate public health and safety concerns, the Authority's Engineer and the Contractor shall disseminate the following information to the community:

- Location of construction camps, borrow areas and new quarry areas;
- Extent of work;
- Time of construction;
- Diversions, if any;
- Precaution measures in sensitive areas;
- Involvement of local labours in the road construction;
- Health issues - water stagnation, exposure to dust, communicable disease; and
- Mechanism for grievances.

The information dissemination could be through the local newspaper, billboards, panchayats meetings, etc.

The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding:

- Awareness on HIV/AIDS awareness and usage of safety measures such as condoms;
- Awareness on hygienic sanitary practices;
- Personal safety measures and location of safety devices;
- Interaction with the host community;
- Protection of environment with respect to:
- Trampling of vegetation and cutting of trees for cooking;
- Restriction of activities in forest areas and also on hunting;
- Water bodies protection;
- Storage and handling of materials;
- Disposal of construction waste.

FIRST AID FACILITIES

- First Aid Kit, distinctly marked with Red Cross on white back ground and shall contain minimum of following:
  - 6 small-sterilized dressings
  - 3 medium and large sterilized dressings
  - 1 (30 ml.) bottles containing 2 % alcoholic solution of iodine
  - 1(30 ml) bottle containing salvolatile
  - 1 snakebite lancet
  - 1 pair sterilized scissors
  - 1 copy of first-aid leaflet issued by the Director General, Factory Service & Labour Institute, Government of India
  - 100 tablets of aspirin
  - Ointment for burns
  - A suitable surgical antiseptic solution
- Adequate arrangement shall be made for immediate recoupment of the equipments, whenever necessary.
- A trained personnel incharge of first aid treatment to be readily available during working hours at construction site
- Suitable transport to the nearest approachable hospital should be made available.
- Tetanus injection must be made compulsory for all workers every 6 months.

3. CONSTRUCTION STAGE

During the progress of work, following are the safety requirements that need to be undertaken by the contractor
at the construction site:

- Personal Protective Equipments (PPE) for the workers. **Table 12-1** gives the safety gear to be used by the workers during each of the construction activities.
- All measures as per bidding document shall be strictly followed.
- Additional provisions need to be undertaken for safety
  at site:
- Adequate lighting arrangement;
- Adequate drainage system to avoid any stagnation of water;
- Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and handling area
  of bitumen and oil, as well as at the location of generator (grease trap); and
- Facilities for administering first aid.

Table 12-1: Worker Safety Measures

Sl. no.	Activity	Safety Requirement
1.	Setting out and levelling	• Luminous jackets; • Helmets; • Boots for protection against insect bite; and Dust Mask
2.	Tree cutting	• Helmet Boots • Luminous safety jackets
3	Reinforced yard/ carpentry/ reinforcement cutting/ bending work.	• Hand gloves
4.	Shuttering work	• Goggles Hand gloves
5.	Plant and Machinery	• Hand gloves • Boots • Helmets

Sl. no.	Activity	Safety Requirement
		• Dust Mask
6.	Material handling	• Hand gloves • Dust mask
7.	Batching plant	• Goggles • Hand gloves • Dust mask
8.	Weeding	• Goggles
9.	Binding reinforcement	• Safety belt • Boots
10.	Manual concrete laying	• Gum boots • Hand gloves • Helmet
11.	Piling	• Helmet • Hand gloves, gumboots.

The following measures need to be adopted by the contractor to address public safety concerns:

- The Contractor shall schedule the construction activities taking into consideration factors such as:
- Sowing of crops;
- Harvesting;
- Local hindrances such as festivals etc.; and
- Availability of labour during particular periods.
- All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed.
- Following case specific measures need to be followed during the progress of the activity:
- In case of blasting, the Contractor must follow The Explosives Rules, 1983.
- In case of construction activity adjoining the water bodies, measures shall be taken as per measures suggested in Guideline on “Water Body”.
- If construction of road is within the settlement, the contractor must ensure that there shall not be any unauthorized parking as well as storage of material, adjacent to road.
- Approved chemicals should be sprayed to prevent breeding of mosquitoes and other disease-causing organisms, at all the water logging areas

The Authority’s Engineer shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per the guideline.

4. POST-CONSTRUCTION STAGE

During this stage a major concern is on road user safety. Following are the measures that need to be undertaken by the Authority’s Engineer to ensure safer roads:

- Inspection and maintenance of installed regulatory and informatory signs.
- Ensure that the location of signage does not obstruct the visibility
- In case of hill roads, maintenance of parapet wall as well as of overtaking zones.

The Authority’s Engineer must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users.
The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users, as per the measures given in Guideline on “Construction and labour Camp” and “Waste Management and Debris Disposal.”

ESGP-13: CULTURAL PROPERTIES

1. INTRODUCTION

The cultural properties located close to the road are likely to be impacted by the road construction. Most of the properties are avoided in general during finalization of alignment. This Guideline discusses the mitigation measures for cultural properties.

2. PROJECT PLANNING AND DESIGN STAGE

Measures for mitigation of impacts on cultural properties during project preparation shall be as per the following steps:

- Identification of locally significant cultural properties should be done;
- Assessment of likely impacts on each cultural property due to project implementation;
- The extent of impact on the identified culture property should be assessed and possible measures for avoidance should be devised based on the site investigation. Incase impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility.

Information to be collected…

- Location
- Direction (North/ South/East/West) With Respect to Road
- Distance of the structure from existing centerline of the road
- Type of Property eg: temple/mosque/shrine/dargah etc
- Plan of the structure
- Importance of the structure – historical/social/archeological
- Ownership of the property
- Probable loss to the property
- Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement
- Choice of community, issue of relocation

In case of relocation, relocated site should be suggested by the local people and the size of relocated structure should at least be equal to the original structure. A written consent letter is to be obtained from the community regarding the relocation site of the cultural property in the form of resolution on the letter pad of the sarpanch/gram panchayat or with the signatures of community members.

A detailed design for the enhancement structure and its site plan along with the necessary items shall be prepared by the contractor and it must be approved by the Authority's Engineer. The relocation and other avoidance measures should be carried out before to start the road work.

3. CONSTRUCTION STAGE

Major impacts on the properties during this stage are mainly due to movement of construction machinery as well as due to construction activity in the vicinity of the cultural property. Following are precautionary measures that need to be undertaken by the contractor while working near these structures:

- Restrict movement of heavy machinery near the structure
- Avoid disposal or tipping of earth near the structure
- Access to these properties shall be kept clear from dirt and grit

During earth excavation, if any property is unearthed and seems to be culturally significant or likely to have archeological significance, the same shall be intimated to the Authority's Engineer. Work shall be suspended until further orders from Authority's Engineer. The State Archeological Department shall be intimated of the chance find and the Authority's Engineer shall carry out a joint inspection with the department. Actions as appropriate shall be intimated to the Contractor along with the probable date for resuming the work.

The Authority's Engineer must ensure that the contractor implements the precautionary measures as suggested. Also, the Authority's Engineer must conduct monitoring for the cultural property.

ESGP-14: TREE CUTTING AND AFFORESTATION

This Guideline discusses the issue of tree cutting and afforestation. Loss of trees creates adverse environmental impacts. In order to mitigate there impacts, suitable measures have been suggested as part of this Guideline. These measures have been given for each of the stages of the road construction activities.

1. PROJECT PLANNING AND DESIGN STAGE

During alignment finalization, due consideration shall be given to minimise the loss of existing tree cover, encroachment of forest areas / protected areas etc as specified in guideline on**,** "Site preparation". Tree felling, if unavoidable, shall be done only after compensatory plantation of at least three saplings for every tree cut is done.

The plantation/afforestation would be carried out by the forest department. It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified giving due importance to local flora (suggested in **Table 14-1**). It is recommended to plant mixed species in case of both avenue or cluster plantation.

The plantation strategy shall suggest the planting of fruit bearing trees and other suitable trees. Development of cluster plantations will be encouraged in the community lands, at locations desired by the community. The choice of species will be based on the preferences of the community. The Authority's Engineer shall oversee the plantation to check the following:

- Whether trees are obstructing live of right at junctions;
- Whether trees are at the inside of the junctions;
- Whether trees are within 5 mts of the proposed centerline.

2. POST-CONSTRUCTION STAGE

The maintenance of the saplings (including activities much as weeding, watering, planting of replacement saplings, etc application of manure etc) shall be the responsibility of the forest department. The Authority's Engineer shall ensure the following:

- Shoulder of roads to be kept clear of weeds/undesirable undergrowth; and
- Branches of trees do not obstruct clear view of the informatory and cautions signs.

Table 14-1: Endemic Species of Gujarat

Sl.no	Tree Species Endemic species)	Sl.no	Tree Species Endemic species)
1	*Tectonagrandis*	9	*Brideliasquamosa*
2	*Anogeissuspendula*	10	*Emblicaofficinallis*
3	*Boswelliaserratta*	11	*Buteamonosperma*
4	*Acacia nilotica*	12	*Diospyrosmelanoxylon*
5	*Euphorbia caducifolia*	13	*Anogeissuslatifoia*
6	*Flacourtiaindica*	14	*Lanneacoromandelica*
7	*Helicteresisora*	15	*Sterculiaurens*
8	*Holarrhenaantidysentrica*	16	*Mitragynaparviflora*

ESGP-15: FORESTS AND OTHER NATURAL HABITATS

1. INTRODUCTION

This guideline envisages measures to be undertaken during blacktopping / widening of road sections passing through natural habitats. These measures shall be undertaken in addition to the measures laid down in the other Guidelines.

Natural Habitats means…
• National Park
• Reserve Forest
• Sanctuaries
• Notified Wetlands
• Fisheries and Aquatic Habitats

Conservation of natural habitats is essential for long-term sustainable development. A precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development has been adopted for the project.

2. PROJECT PLANNING AND DESIGN

To minimize the adverse impact on the ecology of the natural habitats, selection of alignment should be as per guideline. An officer of at least the rank of a forest ranger shall be deputed for detailed inventory of ecological features along the road. The nature and type of impact on natural habitats due to road construction shall be identified. Magnitude of the impact to the extent feasible on the ecological features shall also be assessed.

Ecological Features…	Adverse Impacts…
• Area of natural habitat; • Type and number of endangered species of flora and fauna; • Stream and water bodies; • Breeding ground and seasons; • Migration season of bird species; and • Animal crossing.	• Diversion of forest land; • Cutting of trees; • Trampling of vegetation; • Contamination of water due to the usage of water from the source within the natural habitat; • Loss of breeding grounds; and • Interruption to animal crossings during the construction.

Impacts identified on the natural habitats shall be minimized to the extent required. Minimization shall be through precautionary measures or through appropriate mitigation measures. Following are the measures should be undertaken along the road passing through natural habitats:

- Constricting the road width to 6.0 m and embankment height to 0.5 m to minimize the extent of diversion of forest land and cutting of trees
- Drainage Structures shall be designed strictly in accordance with guideline on “Drainage”.
- Rumble strips shall be provided at every kilometer along the length of the natural habitat and invariably at the start and end of the natural habitat
- Signage (viz. speed limit, animal crossing, switch of headlight etc) shall be provided as per IRC: 67-2001 Code of Practice for road sign (first revision)

In addition to the above measures, specific impacts identified on site shall be mitigated as per the recommendation of the forest department / officer in charge of the identified natural habitat.

In case proposed alignment falls within the catchments of a water body or a stream, a flush causeway shall be constructed without impacting the drainage system. The length of the causeway shall be as per the existing water spread. The causeway shall be strictly in compliance with IRC:SP-20:2002. In no circumstances a water body within the natural habitat shall be cut across or filled for the purpose of laying the road.

3. PRE-CONSTRUCTION STAGE

No Construction Camps, Stockyards, Concrete Batching or Hot Mix Plants shall be located within the natural habitat or within 500m from its boundary.

Contractor in consultation with forest ranger or any other concerned authority shall prepare a schedule of construction within the natural habitat. Due consideration shall be given to the time of migration, time of crossing, breeding habits and any other special phenomena taking place in the area for the concerned flora or fauna.

4. CONSTRUCTION STAGE

Procurement of any kind of construction material (as quarry or borrow material) from within the natural habitat shall be strictly prohibited. No water resources within the natural habitat shall be tapped for road construction. Use of mechanized equipment shall be kept minimum within the natural habitat. Contractor must ensure that there will be no parking of vehicles machine and equipment within the natural habitat. Disposal of construction waste within the natural habitat shall be strictly prohibited and as far as possible reuse shall be undertaken as per **Table 8-1** type of waste of guideline, "Waste Management and Debris Disposal".

5. POST CONSTRUCTION STAGE

The road passing through the natural habitat shall be declared as a silence zone. Compensatory tree plantation within the available Right of Way shall be done in accordance with guideline, on "Tree Cutting and Afforestation". The Authority's Engineer must ensure maintenance of drainage structure shall be undertaken as per guideline, "Drainage"

ESGP-16: AIR AND NOISE POLLUTION

1. INTRODUCTION

This guideline deals with the mitigation of adverse impacts due to air and noise pollution. Both of these have been discussed in the subsequent sections respectively.

2. AIR POLLUTION

The types of air pollution due to construction activities might include generation of dust, emission from hot mix plants and batching plants, odour from construction labour camps, emission from construction machinery/vehicles etc. The measures for mitigation of impacts from each of these are given below.

Generation of Dust

- All vehicles delivering materials to the site shall be covered to avoid spillage of materials.
- The Contractor shall take every precaution to reduce the level of dust emission from the hot mix plants and the batching plants up to the satisfaction of the Authority's Engineer in accordance with the relevant emission norms.
- All existing highways and roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.
- Spillage shall be cleared immediately by manual sweeping and removal of debris or if so directed by the Authority's Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed completely. Additionally, if so directed by the Authority's Engineer, the road surfaces shall be hosed or watered using necessary equipments.
- Plants, machinery and equipment shall be so handled (including dismantling) so as to minimize generation dust.
- All earthwork shall be protected in a manner acceptable to the Authority's Engineer to minimise generation of dust.
- The hot mix plant is sited at least 1000m from the nearest habitation. The hot mix plants shall be

fitted with dust extraction units in order that the exhausts comply with the requirements of the relevant current emission control legislation.

- Generation of dust should be suppressed during unloading of construction material and also during storage of the construction material.

Emission from Hot-Mix Plants and Batching Plants

- Hot mix plants and batching plants shall be located sufficiently away from habitation, agricultural operations or industrial establishments. Where possible such plants will be located at least 1000m away from the nearest habitation.
- The exhaust gases shall comply with the requirements of the relevant current emission control legislation. All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment.

Odour from Construction Labour camps

- Construction labourers camp shall be located at least 500 m away from the nearest habitation.
- The waste disposal and sewerage system for the camp shall be properly designed, built and operated so that no odour is generated. Compliance with the Factory Act, the construction workers (regulation of employment and conditions of service) Act, 1996 and all other relevant legislation shall be strictly adhered to.

Emission from Construction Vehicles, Equipment and Machinery

- The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. All vehicles, equipment and machinery used for construction shall conform to the relevant Indian Standard (IS) norms.
- All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that pollution emission levels\comply with the relevant requirements of SPCB & the Engineer.

Pollution from Crusher

- All crushers used in construction shall confirm to relevant dust emissions control as legislated. Clearance for siting shall be obtained from the SPCB. Alternatively, only crushers already licensed by the SPCB shall be used.
- Dust screening vegetation will be planted on the edge of RoW for all existing roadside crushers.
- If crusher owned by contractor, the suspended particulate matter contribution value at a distance of 40m from a controlled isolated as well as from a unit located in a cluster should be less than 600 ug/Nm^3. The monitoring is to be conducted at least twice a month for all the 12 months in a year during the crushing operation for the project.

3. NOISE POLLUTION

Noise from Vehicles, Plants and Equipment

- The plants and equipment used in construction (including the aggregate crushing plant) shall strictly conform to the GoI noise standards.
- All vehicles and equipment used in construction shall be fitted with exhaust silences. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.
- Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB(A), as specified in the Environment (Protection) Rules, 1986.
- Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction

of the Authority's Engineer, to keep noise from these at a minimum.

- In construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, concrete mixing and batching, mechanical compaction, etc., will be stopped between 2200 hours to 0600 hours. In silence zone (areas up to 100 m around such premises as hospitals, educational institutional and courts) no hot-mix, batching or aggregate crushing plant will be allowed. No construction shall take place within 100m around hospitals between 21.00 hours to 06.00 hours.
- Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall wear earplugs.

Noise from Blasting (or) Pre splitting Operations

- Blasting shall be carried out only with permission of the Authority's Engineer. All the statutory laws, regulators, rules, etc., pertaining to acquisition, transport, storage, handling and use of explosives shall be strictly followed.

Blasting shall be carried out during fixed hours (preferably during mid-day), as permitted by the Authority's Engineer. The timing should be made known to all the people within 500m (200m for pre-splitting) from the blasting site in all directions. People, except those who actually light the fuse shall be excluded from the area of 200m (50m for pre-splitting) from the blasting site in all directions at least 10m minutes before the blasting.

ESGP 17: R&R PLANNING AND RAP FRAMEWORK

Brief Description of Activity

This code relates to identification and verification of project affected people, assets and CPRs and a framework for resettlement and rehabilitation of affected people. the entitlement matrix as per the Gujarat State Highway Project II (GSHP II) guidelines is also provided for better understanding of the type of losses and the corresponding compensation that needs to be paid to the PAFs.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that need to be addressed while undertaking R&R measures include the following:

- Inadequate/improper identification of entitled people
- Inadequate or nonpayment of entitlements
- Forceful evacuation of RoW

The Entitlement matrix

The following entitlement matrix is only for the non-titleholder category. For detailed matrix covering titleholders as well the link provided at the end may be visit Policy, Legal and Administrative Framework. The basic principles that guide this Social Management Framework (SMF) are: Avoidance socially sensitive areas while planning project activities; Minimisation of impacts when project activities occur in socially sensitive areas; Mitigation of any unavoidable negative impacts arising out of its projects; Optimization of land requirement; and Greater transparency through involvement of community and other stake holders. The policy frame work and entitlements for the project are based on the national law The Right to Fair Compensation and Transference in Land Acquisition, Rehabilitation and Resettlement Act, 2013, (LARR 2013).

A. Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCT in LARR Act - 2013) has been effective from January 1, 2014 after receiving the assent of the President of Republic of India. This Act extends to the whole of India except the state of Jammu and Kashmir. The Act replaced the Land Acquisition Act, 1894. 70. The aims and objectives of the Act include: (i)

to ensure, in consultation with institutions of local self-government and Gram Sabhas established under the constitution of India, a humane, participative, informed and transparent process for land acquisition for industrialization, development of essential infrastructural facilities and urbanization with the least disturbance to the owners of the land and other affected families; (ii) provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition; (iii) make adequate provisions for such affected persons for their rehabilitation and resettlement; (iv) ensure that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post acquisition social and economic status and for matters connected therewith or incidental thereto.

Section 27 of the Act defines the method by which market value of the land shall be computed under the proposed law. Schedule I outlines the proposed minimum compensation based on a multiple of market value. Schedule II through VI outline the resettlement and rehabilitation entitlements to land owners and livelihood losers, which shall be in addition to the minimum compensation per Schedule I.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Second Ordinance, 2015: With an intention to overcome the procedural difficulties in land acquisition for important national projects, President of India has issued an amendment ordinance on 30th May 2015. Three main features of the ordinance among others are as following:

I. The Chapter II and III of the RFCT in LARR Act - 2013 regarding determination of social impact assessment and public purpose and special provision to safeguard food security shall not apply to the project such as (a) vital to national security or defence of India and every part thereof, including preparation for defence or defence production; (b) rural infrastructure including electrification; (c) affordable housing and housing for the poor people; (d) industrial corridors ; and (e) 24 infrastructure and social infrastructure projects including projects under public private partnership where the ownership of land continues to vest with the Government.
II. The five year period set by the principal Act in Section 24 under sub-section (2), for lapse of 1894 Act shall exclude the cases where acquisition process is held up on account of any stay or injunction issued by any court or the period specified in the award of a Tribunal for taking possession.
III. The five year period set by the principal Act for any land acquired and unused is now will be a period specified for the setting up of any project or five years, whichever is later.

ENTITLEMENTS, ASSISTANCE AND BENEFITS

A. Introduction

The project will have three types of displaced persons i.e., (i) persons with formal legal rights to land lost in its entirety or in part; (ii) persons who lost the land they occupy in its entirety or in part who have no formal legal rights to such land, but who have claims to such lands that are recognized or recognizable under national laws; and (iii) persons who lost the land they occupy in its entirety or in part who have neither formal legal rights nor recognized or recognizable claims to such land. The involuntary resettlement requirements apply to all three types of displaced persons and the RP describes provision for all type of DPs and accordingly formulated the entitlement matrix.

B. Cut-off-Date for Entitlement

- In the cases of land acquisition affecting land holders the cut-off date would be the last date of publishing Notification for land acquisition u/s 11 (1) of RTFCTLARR Act, 2013 in the local newspaper. Those without any valid pass, the cut-off date would be the start date of the Census and Socio-Economic survey which is 4th & 5th July 2017. DPs who settle in the affected areas after the cut-off date will not be eligible for compensation. The cut-off date for non-titleholders will be officially declared by the EA along with the disclosure of RP and notified in the project area through

newspaper and other methods to ensure people who are illiterate are made aware. They, however, will be given sufficient advance notice, requested to vacate premises and dismantle affected structures prior to project implementation. Their dismantled structures materials will not be confiscated and they will not pay any fine or suffer any sanction.

C. Project Entitlement

In accordance with the R&R measures outlined in the previous chapter, all displaced households and persons will be entitled to a combination of compensation packages and resettlement assistance depending on the nature of ownership rights on lost assets and scope of the impacts including socio-economic vulnerability of the displaced persons and measures to support livelihood restoration if livelihood impacts are envisaged. The displaced persons will be entitled to the following five types of compensation and assistance packages:

a) Compensation for the loss of land, crops/ trees at their replacement cost;
b) Compensation for structures (residential/ commercial) and other immovable assets at their replacement cost;
c) Assistance in lieu of the loss of business/ wage income and income restoration assistance;
d) Assistance for shifting and provision for the relocation site (if required), and
e) Rebuilding and/ or restoration of community resources/facilities.

Entitlement Matrix

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
1A Code	Title holder – Agriculture Land / Non-agriculture land / Homestead Land and assets	Loss of land and assets	Land owner(s)	1. Cash compensation at "actual market values". 2. Option for compensation of residual unviable land parcels[10]. 3. Registration and stamp duty charges (currently applicable) for the land acquired. 4. All fees, taxes and other charges, as applicable under the relevant laws, shall be borne by the project. 5. Replacement of water-yielding bores shall be done subject to availability of water in the remaining landholding or anywhere near the beneficiary land in consultation with the affected community. If water is not available, replacement cost of the bore-well at rates decided on case-by- case (without depreciation) based on Gujarat Water Supply and Sewerage Board (GWSSB) Schedule of Rates. 6. Financial assistance for replacement of Cattle shed: One-time financial assistance of Rs.15000 for displaced households. 7. In case land owners become landless or marginal, financial assistance equivalent to 12 months of minimum agricultural wages of Gujarat (calculated for 25 days in a month), as subsistence allowance. 8. Ex-gratia assistance of Rs.20000 for land owners losing upto 500 sq.m of land in lieu of all other benefits. 9. In case of severance of agricultural land, an additional grant of 10 percent of the amount paid for land acquisition. 10. Advance notice of 4 months to harvest standing crops. 11. Crop/tree damage compensation as assessed by the concerned Government Departments. 12. Right to salvage materials from affected land or structure.	1. Compensation shall be determined as per LA Act, 1894. Difference, if any, between the compensation award as per the LA Act, 1894 and the market value, shall be paid by the project in the form of assistance. The updated Guideline / Jantri values will be adopted for determination of actual market value for the specific land parcel to be acquired. 2. Compensation for Timber Trees shall be decided by Forest Department, Gujarat. Compensation for perennial trees and standing crops shall be decided by Agriculture and Cooperation Department, Government of Gujarat. 3. The rates for determination of assistances and compensation shall be revised annually during the project implementation period. The revision shall be effected from the 1st day of April every year. The real value of monetary compensation and assistance shall be assessed as follows: Compensation for land shall be based on updated Jantri value; (ii) Compensation for structures/assets shall be based on updated Schedule of Rates; and (iii) Allowances and assistances shall be based on Consumer Price Index (CPI), updated 1st of April every year. In case, if Jantri Value or Schedule of Rates is not updated by the 1st of April, compensation and assistance shall

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
					be provided based on existing rates. Differences if any, between the existing rates and the updated rates will be provided by the project after publication of the updated rates.
1B	Titleholder – Residential Structure	Loss of structure	Land / structure owner(s)	1. Compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 2. Affected structures of size less than 20 sq.m., which are fully affected or if rendered unviable, shall have option to compensation equivalent to cost of provision of residential structure of size 20 sq.m. 3. Shifting Allowance: One-time financial assistance of Rs. 10,000. 4. Transitional allowance of Rs.10,000 towards temporary arrangements and rentals during the transition period. 5. Right to salvage materials from affected land or structure.	1. Cost equivalent to the area mentioned in Para-2 shall be estimated based on R&BD Schedule of Rates without depreciation.
1C Code	Titleholder-Commercial/ industrial Structure	Loss of structure	Land / structure owner(s)	1. Compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 2. Affected structures of size less than 10 sq.m which are fully affected, or rendered unviable, shall have option to compensation equivalent to cost of provision of commercial structure, of size 10 sq.m. 3. Shifting Allowance: One-time financial assistance of Rs. 10,000. 4. Transitional allowance of Rs.10,000 towards temporary arrangements and rentals during the transition period. 5. Right to salvage materials from affected land or structure.	1. Cost equivalent to the area mentioned in Para-2 shall be estimated based on R&BD Schedule of Rates without depreciation.
1D	Titleholder-Residential-cum-commercial/ industrial structure	Loss of structure	Land / structure owner(s)	1. The entitlement provisions that shall be higher among 1B and 1C shall be provided.	
2A Code	Tenants-Residential / commercial / industrial Structure	Loss of structure	Individual / Household	1. For tenants (residential category) requiring relocation, rental allowance for 6 months at the rate of Rs.1000/month in rural areas and Rs.1500/month in urban areas, if the structure is fully affected or the unaffected part of the structure is unviable. 2. For tenants (commercial/industria l category), requiring relocation, rental allowance for 6 months at the rate of Rs.1500/month in rural areas and Rs.2000/month in urban areas, if the structure is fully affected or the unaffected part of the structure is unviable. 3. Shifting Allowance: One-time financial assistance of Rs. 5000. 4. For impacts to structures constructed by the EP, compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 5. Right to salvage materials from affected land or structure.	
3A	Squatter-	Loss of	Individual /	1. Compensation for impacted structures at	1. Training programmes will be

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
	Residential / Commercial / Residential-cum-commercial	structure	Household	replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation (or) 2. (i) Costs towards land and house construction (of area as applicable to EWS housing scheme in Gujarat), for residential squatters (ii) Costs towards land and shop construction (of 100 sq ft area) for commercial squatters, whichever is higher among 3A.1 and 3A.2. 3. Shifting Allowance: One-time financial assistance of Rs. 5000. 4. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority.	offered in coordination with any of the following agencies; ○ Education Department, Govt. of Gujarat (self employment programmes for women). ○ Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). ○ Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women). ○ Commissionerate of Rural Development, Govt. of Gujarat. 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter- departmental coordination, as required.
3B	Encroachers	Loss of Assets	Household	1. Ex-gratia for impacted assets at replacement cost. 2. Encroachers shall be given advance notice of 4 months in which to remove assets (except trees), and harvest standing crops, if any	
4A Code	Additional support to vulnerable groups		Individual / Household	1. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority (or) 2. Lump sum amount of Rs.15000 as grant to those who cannot be provided with alternative livelihood sources.	1. Training programmes will be offered in coordination with any of the following agencies; ○ Education Department, Govt. of Gujarat (self employment programmes for women). Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). ○ Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women). ○ Commissionerate of Rural Development, Govt. of Gujarat ○ 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter-departmental coordination, as required.
5A	Employees in shops, agricultural laborers, sharecroppers	Loss of livelihood	Individual	1. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority. (or) 2. Lump sum Financial assistance equivalent to 6 months of minimum agricultural wages of Gujarat (calculated for 25 days in a month), to those who cannot be provided with training on alternative livelihood opportunities.	1. Training program will be offered in coordination with any of the following agencies; ○ Education Department, Govt. of Gujarat (self employment program for women). ○ Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). ○ Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women).

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
					○ Commissionerate of Rural Development, Govt. of Gujarat. 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter- departmental coordination, as required.
6A Code	Community Assets	Loss of community assets	Community	1. Resources such as cultural properties and community assets shall be conserved (by means of special protection, relocation, replacement, etc.) in consultation with the community. 2. Adequate safety measures, particularly for pedestrians and children, landscaping of community common areas, improved drainage, roadside rest areas, etc shall be provided in design of the highways.	
7A	Scheduled Tribes	Loss of land, structure or both	Household	1. Cash compensation at the actual market value based on the latest Jantri values. In the event of the latest Jantri values not being equivalent to market rates due to lack of evidence of recent land transactions, enhanced cash compensation for land equivalent to 1.5 times of latest Jantri value of affected tribal land parcel. 2. Entitled for assistance applicable for vulnerable groups. 3. Additional one-time financial assistance equivalent to 500 days minimum agricultural wages towards the loss of customary rights/usages of forest produce.	
8A	Disruption	Temporary Impact	Owner(s)	1. Compensation for temporary use of land or structures outside Right of Way for construction activities shall be made by the Contractor. The use of such land or structure, compensation for the temporary occupation/use of lands and restoration post completion of the occupation shall be through written agreement between land/structure owner and the contractor. 2. Temporary access would be provided, where necessary.	As laid down in Clause 111 on Precautions for safeguarding the environment, Technical Specifications in the Bid Document.
9A Code	Unforeseen impacts Category of PAP	Type of Impact	Unit of Entitlement	1. Any unforeseen impacts shall be Entitlement documented and mitigated in accordance with the principles and objectives of the Policy.	

ERMS AND DEFINITIONS

a) **Agricultural land** means land being used for the purpose of: (i) agriculture or horticulture; (ii) raising of crops, grass or garden produce; and (iii) land used by an agriculturist for the grazing of cattle, but does not include land used for cutting of wood only;

b) **Assistance** refers to the support provided to PAPs in the form of ex-gratia payments, loans, asset services, etc. in order to improve the standard of living and reduce the negative impacts of the project.

c) **Below poverty line or BPL Family** means below poverty line families as defined by the Planning Commission of India, from time to time, and those included in the State BPL list in force.

d) **Compensation** refers to the amount paid under Consent Award as part of The Land Acquisition Act, 2013. For private property, structures and other assets acquired for the project, it refers to the amount as given in the Entitlement Matrix for the project.

e) **Cutoff Date:** In the cases of land acquisition affecting land holders the cut-off date would be the last date of publishing Notification for land acquisition u/s 11 (1) of RTFCTLARR Act, 2013 in the local newspaper. Those without any valid pass, the cut-off date would be the start date of the Census and Socio-Economic survey.

f) **Encroachers** are those person/family, who transgresses into the public land (prior to the cut-off date), adjacent to his/her own land or other immovable assets and derives his/her additional source of shelter/livelihood.

g) **Family** includes a person, his or her spouse, minor children, minor brothers, and minor sisters, dependent on him or her for their livelihood.

h) **Government** refers to the Government of Gujarat.

i) **Land acquisition** means acquisition of land under the Land Acquisition Act, 2013, as amended from time to time.

j) **Marginal farmer** means a cultivator with an un-irrigated land holding up to one hectare or irrigated land holding up to one-half hectare;

k) **Non-Perennial Crop:** Any plant species, either grown naturally or through cultivation that lives for a season and perishes with harvesting of its yields has been considered as a non-perennial crop in the project. For example, paddy, sugarcane, groundnut, etc.

l) **Notification** means a notification published in the Gazette of India, or as the case may be, the Gazette of State and expression 'notify 'shall be construed accordingly;

m) **Perennial Crop:** Any plant species that live for years and yields its products after a certain age of maturity is a perennial crop. Generally trees, either grown naturally or by horticultural and yield fruits or timber have been considered as perennial crop in the project. For example, tamarind, coconut, mango, etc. are perennial crops.

n) **Project Affected Family (PAF)** means- (i) a family whose primary place of residence or other property or source of livelihood is adversely affected or involuntarily displaced by the acquisition of land for the project (ii) any tenure holder, tenant, lessee or owner of other property, who on account of acquisition of land in the affected area of otherwise, has been involuntarily displaced from such land or other property; (iii) any agricultural or non-agricultural labourer, landless person (not having homestead land or agricultural land) rural artisan, small trader or self-employed person; who has been residing or engaged in any trade, business, occupation or vocation in the affected area, and who has been deprived of earning his livelihood or alienated wholly or substantially from the main source of his trade, business, occupation or vocation because of the acquisition of land in the affected area or being involuntarily displaced for any other reason.

o) Project Affected Household (PAH): A social unit consisting of a family and/or non- family members living together, and is affected by the project adversely and/or positively.

p) Project Affected Persons (PAPs), any persons who have economic interests or residence within the project impact corridor and who may be adversely affected directly by the project. PAP include those losing commercial or residential structures in whole or part, those losing agricultural land or homestead land in whole or part, and those losing income sources as a result of project action. PAPs would be of two broad categories, 'PAPs with Major Impact' and 'PAPs with Minor Impact'.

q) **Major Impact (Fully):** those properties where the major part of the structure/land is affected and becomes untenable and the affected party is unable to live/do business in the unaffected portion of the property, OR, 25% or more portion of the property is affected.

r) **Minor Impact (Partial):** all other impacts other than major impact will be treated as minor impacts, OR, those properties where a part of the structure/land is acquired and the remaining portion is intact and the affected party can continue to live/do business in the unaffected portion of the property.

s) **Replacement Cost** of the acquired assets and property is the amount required for the affected

household to replace/reconstruct the lost assets through purchase in the open market. Replacement cost will be calculated at R&BD current Schedule of Rates without depreciation. Replacement cost shall be in line with the provisos of the Entitlement Matrix of the project.

t) **Small farmer** means a cultivator with an un-irrigated land holding upto two hectares or with an irrigated land holding upto one hectare, but more than the holding of a marginal farmer.

u) **Squatter** means a person/family that has settled on the public land without permission or has been occupying public building without authority prior to cut-off date and is depending for his or her shelter or livelihood and has no other source of shelter or livelihood.

v) **Tenants** are those persons having bonafide tenancy agreements, written or unwritten, with a private property owner with clear property titles, to occupy a structure or land for residence, business or other purposes.

w) **Vulnerable Persons:** persons who are physically challenged, widows, persons above sixty years of age, below-poverty line households and woman-headed household.

x) **Woman-Headed Household:** A household that is headed by a woman who is the major bread-earner of the household. This woman may be a widow, separated or deserted person.

References and Recommended further reading:

1. GSHP-II Resettlement Policy Frame Work

***2.* Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013.**

http://WWW.R&B Dept, GoG.gov.in/files/Acts/R&R%20Policy_eng.pdf

ESGP 18: LOCAL TRAFFIC MANAGEMENT DURING CONSTRUCTION

Brief Description & Scope of Activity

This code relates to making arrangements for maintaining traffic movement along part of the existing carriageway under improvement, rehabilitation, up-gradation and or routine maintenance works or making arrangements for traffic movement along a temporary diversion.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are anticipated during the activity include the following:

- Fugitive dust emission
- Traffic congestion and incessant traffic snarls
- Traffic induced high noise levels
- Pedestrians and public transport commuters exposed to hazardous conditions/safety risks
- Hazardous conditions for night time traffic movement

If traffic is diverted along newly constructed diversion roads, following additional issues will have to be addressed while selecting the alignment at design/ preparation phase:

- Surrounding land use such as residential area, industrial or commercial areas
- Presence of sensitive receptors such as schools, hospitals, educational institutes, religious sites, prayer halls etc.
- Duration of diversion road in operation and reinstatement of land after dismantling Safe pedestrian and commuter movement

ESGP 19 for prior information and disclosure to the public shall also be referred and construed along with this ESGP

Policy and Legal requirements, if any

There are no policies to be complied during execution of the activity. In an urban area, any change to traffic scheme has to be effected after consultation and approval from city traffic police department. In rural areas, the concerned R&B Dept, office shall be consulted for undertaking such diversions or change

to normal traffic scheme. Besides, Clause 112 of MoRT&H specifications and IRC SP 55 2014 govern this activity.

Recommended Environmental Practice/ Management Measures

Traffic Management Plan: Contractor shall be responsible for analysing viable options for local traffic management and a final traffic management plan after having discussions with Traffic Police Department/ local PWD officials or other appropriate stakeholders such as Mandi Board and local community.

The plan shall be assessed from environmental perspective. The plan shall include methods and procedures to be adopted to control: fugitive dust emission, traffic congestion, traffic induced high noise levels, pedestrian & commuter movement, and night-time driving safety. The items that will be required to implement the plan shall be included in the contract price of the intended work and budgeted.

Traffic Police / R&B Dept, Approval: The Contractor as part of his work programme submission to Authority's Engineer, R&B Dept, shall include final traffic management plan. Contractor shall develop the plan based on stakeholder consultations and intended work schedule. The environmental and safety issues referred earlier shall be included in the final plan and methodology for their management shall be presented in detail. Contractor's traffic management plan shall comply with minimum provisions of MoRT&H clause 112. The detailed traffic management plan after review by Authority's Engineer, R&B Dept, shall be submitted to concerned Traffic Police department/ local PWD office, for review and approval. Only after receiving such approval, the work shall start.

Traffic along temporary diversion: In case the traffic needs to be diverted along a temporary diversion, the Contractor will be responsible for: identifying such diversion route alignments; conducting stakeholder consultation; addressing environment, health and safety issues along diversion alignment; propose traffic management plan including recommendation for managing construction stage environmental issues; Plan shall be reviewed and approved by Authority's Engineer, R&B Dept,. The plan shall meet the minimum provisions of Clause 112.3 of MoRT&H Specification.

Traffic Management Plan Implementation: During implementation, the road users shall be informed of traffic plan suitably by placing information/sign boards at appropriate locations as identified in the plan. In case of temporary diversion of traffic off the project area, the plan shall be communicated prior through advertisements in local newspapers and placing sign boards. The sign boards and other devices shall be maintained throughout construction stage or till such required time as per Clause 112.5 of MoRT&H.

Traffic safety and control: The provisions of Clause 112 of MoRT&H shall be included in the intended work scheduled by Contractor. The contractor shall adhere to the provision of Clause 112 of MoRT&H Specification to ensure traffic safety and control in addition to the practices recommended by traffic police/ local PWD office in their approval letter.

Construction Equipments Movement: Whenever construction machinery, equipments and vehicles movement is expected to occur, the following practices shall be adopted to the extent possible:

- Planning the movement during non-peak hours or during clear traffic flow through the road.
- Slow moving equipments and machinery shall be escorted by at least three men at front, rear and side respectively to guide the traffic and driver & the Construction machinery.
- The escorting men shall wave red flags in day time or red lanterns in night to warn the traffic on the road about the movement.

Construction vehicles and lorries: The vehicles such as lorries, vans and other fast moving construction vehicles shall be maintained in good operational condition. Headlamps, turning indicators, parking rights, and other such accessories shall be maintained in operational condition. The drivers of the vehicle shall be trained for traffic safety rules, sober driving and need to maintain cool head at all times.

Vehicle movement if significant in numbers from or to construction site such as debris removal, construction material supply, Hot Mix/RMC delivery etc. shall be preferred during non-peak hours. During peak hours and night time, the vehicle movement shall be guided by red flag/red lantern holding helpers on the road to avoid traffic congestion, if needed.

The entire stretch where traffic is allowed on part of existing carriageway or through temporary diversion, a 7m wide strip (for a 2-lane traffic) shall be maintained free of hawkers, 3- wheeler/taxi or private vehicles parking and any other obstruction to free flow of traffic. In this regard the traffic police/local police help shall be sought.

Special provisions and arrangements shall be provided for public transport commuters in consultation with Public Transport Authorities and local Traffic Police/ Police. In a constricted carriageway, the commuter shall be provided with temporary bus bays and a safe walking strip of at least 0.5 m width off the road edge to avoid accidents. Shifting existing bus stations (stops) to nearest convenient points or providing speed breakers (humps) on either side of bus stops to aid commuters cross the road etc can be some of the measures that can be implemented.

Near residential, commercial and industrial areas where pedestrian movement could be in large numbers, provision for safe movement along constricted carriageway and access to areas/properties shall be planned and provided

References and Recommended further reading

Clause 112 of MoRT&H specifications for road and bridge works, 2013

ESGP 19: PRIOR INFORMATION AND DISCLOSURE TO THE PUBLIC

Brief Description of Activity

This code relates to informing the general public as well as PAPs in advance, about any activity related to road up gradation or maintenance to be undertaken by the contractor so as to minimise inconvenience that may be caused due to the activities to be undertaken

Environmental, Health and Safety (EHS&S) Issues

EHS&S issues that are addressed by prior information and disclosure include:

- Public inconvenience and nuisance
- Reduced damages to public and private property
- Disclosure about R&R activities
- Participation in resettlement planning

Policy and Legal requirements, if any

There is no legal requirement for any prior information or disclosure to local community about any activity under the OPR contract, except for undertaking R&R activities or blasting operations, if required. However, as a good practice and in long term interest of the project, the contractor should undertake the following recommended measures.

Recommended Measures

Any intervention under the OPR contract, for up-gradation or general maintenance works will lead to temporary detouring of the traffic and chances of damages to private property and CPRs. Therefore, it will cause certain level of inconvenience to general public and road users depending on the duration of activities.

The contractor and its team shall therefore, inform the local community about their entry and range of activities they would undertake. The contractor shall also inform the local community about the measure s/he will adopt in order to reduce the inconvenience including presence of his team to ease the traffic.

This prior information will also allow the local community in helping the contractor avoid any damages to private property or CPRs. The local community will get time to relocate their assets as well.

In addition, the prior information and disclosure to public in cases of major road work involving more than 2 days of work on site and thus diversion of traffic etc, shall be by way of display of information at prominent places so that the intended audience gets the information. Also the information about grievance redressal system shall be made to general public and local community along with introducing the team of LO/CRM (refer ESGP 22 for Grievance Management)

In cases other than where emergency services are required, the contractor shall visit the site at least three days in advance and inform the local community about the planned intervention/ maintenance two days later.

ESGP 20: GENERAL WORKMANSHIP

Brief Description of Activity

This code of practice relates to general workmanship that is to be followed during execution of road and bridge works. This practice specifically covers the following works:

- Providing and laying interlocking concrete blocks in footpath and medians
- Providing and fixing chequered tiles in traffic island
- Road markings - Providing and laying hot applied thermoplastic road marking compound for centre/edge line, pedestrians, chevrons, directional arrows etc marking
- Traffic signs and road furniture
- Providing and applying one coat of zinc-rich epoxy primer and coal tar epoxy on cement surfaces
- Providing and applying epoxy Phenolic primer and epoxy Phenolic coating
- Providing and compacting sand in footpath and median
- Landscaping and other vegetation works
- Onsite bitumen Hot Mix/concrete mixing plant operations

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues could arise during execution of various activities listed above. Some of the issues which need to be considered include the following:

- Good workmanship
- Location of stockpiles of sand and other material
- Removal of excess material
- Health and safety of workers
- Clearing and cleaning work site after work is completed

Policy and Legal requirements, if any

There are no policy or legal requirements to be complied during execution of this practice. The general workmanship expected of and recommended in various clauses of MoRT&H specifications shall however be applicable and specifically the following:

Good Workmanship: Good quality of work as expected/specified in contract documents, concerned MoRT&H specifications etc. shall be achieved in each of the works carried out by the contractor. Good workmanship greatly enhances aesthetic value of the project. Contract Manager or his site incharge shall be responsible to approve completion of activities after field staff achieves minimum required workmanship as specified in project specifications and concerned MoRT&H clauses.

Location of Material Stockpiles: Location of material stockpiles, temporary tents, labour resting areas shall be in such a way that health and safety of workers as well as traffic is not compromised. Stockpiles shall be periodically checked for integrity and any slump towards carriageway shall be corrected immediately. Sand and other fine material stocks shall not be located near drainage channels or drain

openings. Stockpiles shall not cause any obstruction to traffic flow or pedestrian/commuter movement. All the activities shall be executed within the time allowed and if delayed for some reasons by more than three months, the stockpiles shall be removed from the site. Contract Manager or his site incharge shall be responsible for periodically supervising such minor activities at least once in three days and instruct the field staff.

Excess Material: Any excess material or any material that has been brought to site and has not been used shall be removed and disposed off immediately. Materials should be removed, howsoever, small or meagre quantity is left at site. Contract Manager or his site incharge shall thoroughly inspect the project site and get cleared all the excess material found within RoW and outside RoW. The areas where stockpiles were located or any spill on carriageway shall be cleaned by brooming or other appropriate methods. Similarly, while erecting traffic signs, light poles or any other information boards etc, excavated earth from pits shall be stored, collected, transported and disposed as per ESGP 20. If poles are grouted using cement mortar or concrete, practices as per recommended guidelines. Contract Manager or his site incharge shall check each location where poles have been erected for compliance to this measure before approving the work. A layer of sand or other fine earth material on carriageway is a traffic hazard.

The project site shall be taken over by Contract Manager or his site incharge after getting every inch of space cleared and cleaned by field staff. Especially the following works, after completion shall be cleared off all debris and excess material:

- Providing and laying interlocking concrete blocks
- Providing and laying interlocking concrete blocks in footpath and medians
- Providing and fixing chequered tiles in traffic island
- Road markings - Providing and laying hot applied thermoplastic road marking compound for centre/edge line, pedestrians, chevrons, directional arrows etc marking
- Traffic signs and Road furniture
- Providing and applying one coat of zinc-rich epoxy primer and coal tar epoxy on cement surfaces
- Providing and applying epoxy Phenolic primer and epoxy Phenolic coating
- Providing and compacting sand in footpath and median
- Landscaping and vegetation works
- Routine maintenance works involving patchwork or potholes filling on pavement; road embankment strengthening; storm drain cleaning; and shoulder repair and strengthening etc.

Health and Safety of workers: All the activities listed in this ESGP shall be carried out with due care and attention to health and safety of workers. Many of the activities listed under this ESGP may be scheduled for execution after opening new carriageway or infrastructure to traffic. Small segments of road area shall be taken up at a time for execution of various activities. The work area shall be adequately barricaded as per Clause 112.4 of MoRT&H Specification. One experienced worker or supervisor shall be deployed to oversee workers straying outside barricaded region and onto traffic carriageway.

References and Recommended further reading

Specifications for Road and Bridge Works, 5th Revision, MoRT&H, 2013

ESGP 21: ONSITE CONCRETE PREPARATION

Brief Description of Activity

This activity relates to concrete preparation at site either manually or using mechanical mixers which are diesel engine driven and tyre mounted. Scope of this practice covers the procedures to be followed during execution of the activity.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are anticipated during execution of the activity include the following:

- Noise pollution form mechanical mixers
- Air emission form diesel engine
- Wash water discharge
- Location of material stockpiles
- Spillage of concrete while transport
- Oil, fuel and lubricant leakage
- Impact on soil environment
- Debris and other waste concrete
- Reinstatement of land area used for onsite concrete preparation

Policy and Legal requirements, if any

Air Pollutant Emissions

Air pollutant emissions from non-road construction equipments, engines and vehicles are yet to be regulated and as of now there are no legal or statutory regulations.

Noise Emissions

Under Environment (Protection) Rules, 1986 (*Schedule VI, Part E*) the noise generation standards applicable for construction equipments, machinery and vehicles at the manufacturing stage are presented below:

Noise Limits for Automobiles (Free Field distance at 7.5 metre in dB (A) at the Manufacturing Stage)

Recommended Mitigation Measures

Noise Emission: Noise generation is expected form diesel engine driven mechanical mixers. The following measures shall be practised to the extent possible

- Orientation of mixer in such a way to reduce noise nuisance to nearest sensitive receptor.
- Locating Stockpiles to act as noise barrier
- Operating and maintaining the mixer in good condition to reduce noise generation
- Checking vibration induce noise and rectifying the same
- Operating the engine with factory recommended silencers

Air Emission: Air pollutant emitted from engine driven mechanical mixer is not a significant problem. However in an urban area, it is better to follow good O & M practices. Any dark, thick smoke emitted from engine which is persistent lasting more than 10 seconds in air shall be checked. Fugitive emissions from fuel tank shall be controlled by maintaining leak proof tank and cover.

Wash water discharge: Mechanical mixer will have to be washed with large amount of water after every production cycle is complete. Wash water will have cement and grit in large quantities and hence indiscriminate throwing of the same in nearby areas shall be prohibited. The wash water can be stored in a tank or a pit dug on ground. After about 30-90 minutes of setting, the clear water can be reused for cement preparation, washing, dust control sprinkling or even in curing newly cost concrete members. Throwing wash water on nearby land will form an impermeable layer due to cement content. Repeatedly throwing was water at one location may result in formation of hard, crusty, cement concrete layer, the crusty hard layer shall be removed after the work is complete and disposed off along with other debris.

Location of stockpiles: Stockpiles shall be located without obstructing any public activity in the area. Slumping towards carriageway or drainage channels/nallahs shall be prevented or rectified. Location of stockpiles shall be near to concrete preparation site to prevent material spillage on the way. Other stockpile related problems such as wind-borne and water-borne erosion shall be prevented by following appropriate preventive measures. Cement bags storage and its handling shall not be result in dust generation.

Spillage of Concrete: Concrete shall be prepared close to work site where concrete is to be place to avoid spillage on the way. After the concrete work is completed, any spillage on the way shall be cleaned and cleared.

Oil, Fuel or Lubricant Spill/Leak: In a mechanical mixer, any spill or leak of oil, fuel or lubricant shall be avoided by following good O & M practices. Refuelling diesel engines, applying oil or lubricants to various mechanical parts of the mixer shall be carried out using appropriate tools and equipments. If unavoidable spreading a jute bag or other such cover on the ground below when refuelling or lubricating can prevent spillage onto ground.

Soil Environment: Soil environment especially the topsoi*l environment will be adversely impacted during onsite concrete preparation. The impact can be* significant if manual mixing of concrete or cement mortar is made on ground. Besides stockpile area, wash water disposal on ground, waste concrete or excess concrete/mortar disposal on ground, spillage of concrete, oil, fuel spill etc may also have adverse impacts on top soil environment. These impacts can be mitigated to some extent by following the measures recommended in this ESGP and proper reinstatement of the area after completing all concreting activities at the site.

Debris Disposal: Debris generated from stockpile area, waste/reject concrete/mortar, excess quantity of concrete/mortar, hard crusty soil surface formed due to manual mixing on ground etc. shall be disposed off as debris as per ESGP 8.

Reinstatement: The entire area used for concrete/mortar preparation shall be reinstated to pre- use or pre-construction status. All of the following areas shall be cleared:

- Stockpile area
- Concrete mixer area
- Manual mixing area
- Wash water disposal point, if any

In case of private land being used, a satisfaction certificate will be secured form the landowner upon handing back the land. This certificate as well as photographs of restored land shall be kept as a document of proof and shall be provided to Employer during any inspection.

References and Recommended further reading

Schedule VI, Part E, Environment (Protection) Rules, 1986

ESGP 22: GRIEVANCE MANAGEMENT

Brief Description of Activity

This code relates management of grievances due to any project activity, routine or emergency during the entire project period.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are encountered by grievance management include:

- Public inconvenience and nuisance due to maintenance activities
- Public grievances due to damages to private property or CPRs
- Grievances due to labour camps and labour interaction with local community
- Grievances due to improper use of contractor's vehicles and construction machinery
- Excessive fugitive dust and noise emission
- Repeated grievances/ residual impacts after mitigation measures taken
- Contamination of local land resources, water bodies etc due to operation of project machinery

Policy and Legal requirements, if any

There is legal requirement for grievance management under the OPR contract. However, a World Bank funded project is required to maintain minimum standards of good practice in social, labour and environmental issues and achieving operational excellence. Grievance management not only helps in managing issues of potential risks to the project but also helps in maintaining a good relationship with the local community and thus helps in garnering over all support in favour of the project.

The following measures are recommended forest abolishing and managing a good grievance handling mechanism. The contractor shall undertake the following measures.

Grievance Redress Mechanism

The project proposes to establish a Grievance Redress Committee (GRC) to hear the complaints of project affected persons and resolve the same. The process will promote settlement of disputes and reduce litigation. GRC will be set up at the district level with District Collector as head. The following persons will be the members of GRC:

- District Collector or his designated representative of at least the rank of Assistant District Collector (preference would be given to women officers);
- The District Development Officer of the Department of Revenue;
- The Executive Engineer, PIU; and
- Representative from Social Sector/Local NGO (not involved with implementation) /Person conversant with similar issues and he/she should be widely respected and having problem solving skills (to be selected by DM / Collector).

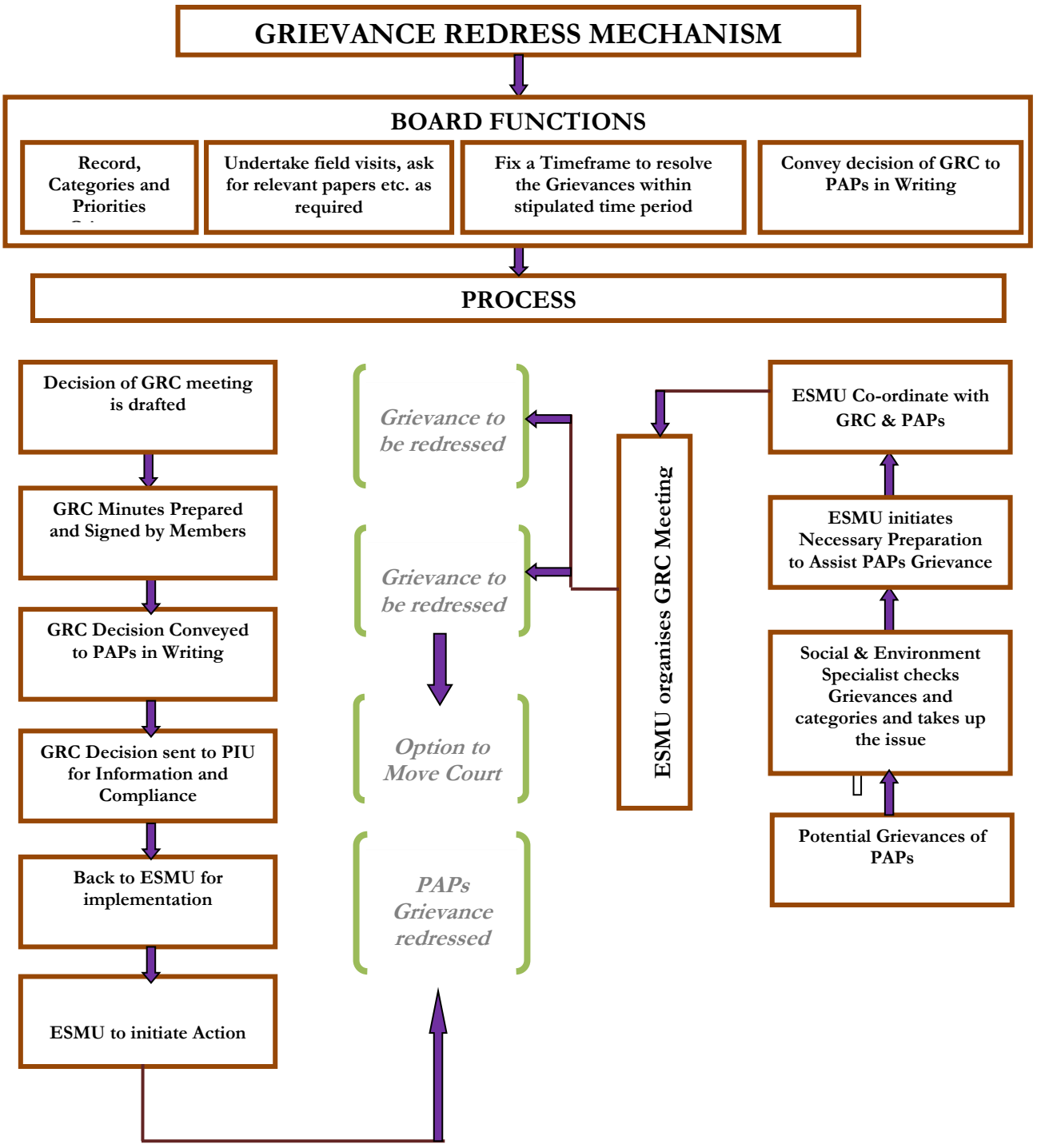
GRC will be responsible for the following:

(i) Support PAPs in resolving issues related to Environment and R&R;
(ii) Record grievance and resolve them within stipulated time; and
(iii) Inform PIU about any serious cases. ESMU will provide all necessary help to PAPs in presenting his/her case before the GRC. The GRC will respond to the grievance within 15 days.

The GRC will normally meet once in a month but may meet more frequently, if the situation so demands. A time period of 45 days will be available for readressing the grievance of EPs. The decision of the GRC will not be binding to PAPs. The PAPs has the option of taking resource to the court of law, is he she so desires. Broad function of GRC as under:

- Record the grievances of PAPs, categorise and prioritize them and provide solution to their grievances related to environment loss and damage.
- The GRC may undertake site visit, ask for relevant information from project authority and other government and non government agencies, etc in order to resolve the grievances of PAPs.
- Fix a time frame within the stipulated time period of 45 days for resolving the grievances.
- Inform PAPs through ESMU about the status of their case and their decision to PAPs for compliance.

The GRC will be constituted within three months by an executive order from GoG from the date of mobilization of Contractor and RAP implementing NGO.



ESGP 23: E&S Regulatory Compliance

Brief Description & Scope

This code relates to systems and procedures that need to be adopted by OPR Contract or to ensure sustained policy and regulatory compliance through the OPR Contract tenure.

Environmental Health Safety &Social (EHS&S) Issues

The issues anticipated during OPR Contract tenure include the following:

- Regulatory compliance in a sustained manner through contract period.
- Negative media coverage upon OPR Contractor's regulatory non-complaint activities.
- Legal ramifications, risks and liabilities to OPR Contractor as well R&B Dept, as an employer.
- Non-governmental organisations, civil society movements and local community groups precipitate issues against OPR Contract or for non-compliance against any policy and regulations.
- People complaining to the World Bank and other State /Central Government Departments against OPR Contractor on regulatory issues.

Policy and Legal requirements, if any

The policy and legal framework applicable on the EPC Project is highlighted below for reference and review. Contractor may do well under take a thorough review of regulations applicable on the project as part of the Environmental Management Framework processes recommended in the Contract.

Policy Framework Relevant to the Project

- National Environment Policy–2006 (Ref : http://moef.gov.in/mef/policy.htm)
- National Conservation Strategy and Policy Statement on Environment and Development, June1992
- Policy Statement for Abatement of Pollution,1992
- National Forest Policy,1988
- Wildlife Conservation Strategy 2002
- National Water Policy, 2002
- Gujarat State Water Policy
- R&R Policy for GSHP II

Regulatory Framework applicable on the Project: Environmental Regulations

- Environment (Protection) Act, 1986
- EIA Notification, 2006 and amendment thereof.
- Air (Prevention & Control of Pollution) Act, 1981
- Water (Prevention & Control of Pollution) Act,1974
- CPCB Notification for National Ambient Air Quality Standards, 18th November 2009
- Noise Pollution (Regulation and Control) Rules, 2000 and subsequent amendments
- The Plastics (Manufacture, Usage and Waste Management) Rules, 2009
- Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016
- The Batteries (Management and Handling)Rules,2001
- The Solid Waste Management Rules,2016
- Construction and Demolition Waste Management Rule, 2016
- The Manufacture, Storage and import of Hazardous Chemical Rules,1989 & amended 2000
- The Bio-Medical Waste Management Rules,2016
- Fly Ash Notification, January 2015
- Eco-sensitive zones specified in any of the Project or project related foot print are as
- Forest(Conservation)Act,1980anditsamendments;
- Forest(Conservation)Rules,2003anditsamendments;
- Forest (Conservation)Act,1980

- Wildlife(Protection)Act,1972;
- Wildlife(Protection)AmendmentAct,2002;
- TheAncientMonumentsandArchaeologicalSitesandRemainsAct,1958;
- TheMotorVehiclesAct,1988andCentralMotorVehicleRules,1989;

Other guidelines

- EIA Guidance Manual for Highways prepared by Administrative Staff College of India, February 2010
- IRC SP 93-2011: Guidelines on Requirement for EC for Road Projects
- IRC SP 108-2015: Guidelines on EMP
- IS Codes & CPCB Guidelines for monitoring & analysis of air, water, soil etc;
- The World Bank Operational Policies (http://go.worldbank.org/4D2JSWFIW0)

Health and Safety related regulations

- The Factories Act, 1948
- Explosives Act, 1884 and The Explosives Rules, 1983
- The Petroleum Act, 1934
- The Petroleum Rules, 2002
- The Gas Cylinder Rules, 2004.
- The Building and other Construction Workers (Regulation of Employment and Conditions of Service)Act,1996andCentralRules,1998

Social and labour regulations

- The Trade Unions Act,1926
- The Industrial Employment (Standing Orders) Act, 1946 and Rules, 1946
- The Industrial DisputesAct,1947
- The Payment of Wages Act,1936 and Rules,1937
- TheMinimumWagesAct,1948and(Central)Rules,1950
- The Minimum Wages (Gujarat) Rules 1961
- The Payment of Bonus Act, 1965 and Rules, 1975
- The Factories Act, 1948
- The Plantation Labour Act, 1951
- The MinesAct,1952
- The Motor Transport Workers Act,1961
- The Contract Labour (Regulation & Abolition) Act, 1970
- TheInter-StateMigrantWorkmen(RegulationofEmploymentandConditionsof
- Service)Act,1979
- The Interstate Migrant Workers (Gujarat) Rules 1981
- The Shops and Establishments Act
- The Building & Other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996
- The Gujarat (Amendment) Act, 2015)
- The Maternity Benefit Act, 1961 and amended 2016
- TheEqualRemunerationAct,1976
- The Bonded Labour System (Abolition) Act, 1976
- The Child Labour (Prohibition & Regulation) Act, 1986 & Gujarat Rules 1994
- The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour (P & R)(Gujarat) Rules 1972
- The Workmen's Compensation Act, 1923
- The Employees' State Insurance Act, 1948
- The Employees' Provident Fund & Miscellaneous Provisions Act, 1952
- The Payment of Gratuity Act, 1972

- The Employment of Manual Scavengers and Construction of Dry latrines Prohibition Act, 1993
- The Fatal Accidents Act, 1855
- The Weekly Holiday Act,1942
- The National and Festival Holidays Act
- The Personal Injuries (Emergency) Provisions Act, 1962
- The Personal Injuries (Compensation Insurance) Act, 1963
- The Labour Laws (Exemption from Furnishing Returns and Maintaining Register by Certain Establishments) Act, 1988
- The Public Liability Insurance Act, 1991

The Contractor shall be aware of the following clearances (list is not exhaustive and final) that are specific to the operation of the project network including any subsequent amendments:

- Forest Clearance for felling and branches trimming of trees from RoW of existing roads from the Forest and Environment Department, Government of Gujarat;
- Permission for withdrawal of ground water for construction from Central Ground Water Board, West Central Region (WCR), Ahmadabad;
- Permission for withdrawal of surface water from rivers and canals from Water Resource Department, Government of Gujarat;
- Permission for locating and operating borrow area pits from Local Administration/ Panchayats;
- Installation and operation of Hot Mix plants, Concrete batching plants and Crushers require Consent from Gujarat Pollution Control Board under Water and Air Acts;
- Authorization for Storage, handling, transport and disposal of hazardous materials from Gujarat Pollution Control Board under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016;
- Consent for discharge of air/water pollutants from workers camp, DG set installations, equipment and storage yards from Gujarat Pollution Control Board under Air, Water Acts and HWM Rules;
- License for Quarries (in case of opening of new quarries) from Department of Mining, Govt of Gujarat;
- Permission for sand mining from river bed from Department of Mining, Govt of Gujarat;
- Authorization for disposal of bituminous wastes, if any from Gujarat Pollution Control Board under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016;
- All Construction vehicles and off-road equipments are to be registered with Regional Transport Office as required under Central Motor Vehicles Act and possess appropriate PUC certificate;
- Traffic Police clearance to divert traffic or change traffic scheme within an urban area; and
- Licenses and certificates as per labour legislations.

List of International conventions and treaties to which India is a signatory given below to this code for reference and review.

- Ramsar Convention on Wetlands of International Importance - Provides the intergovernmental framework for international co-operation for the conservation and wise use of wetland habitat and species.
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 12 November 1972) - Protect cultural monuments and natural sites within their territory that are recognised to be of such outstanding universal value that safeguarding them concern humanity as a whole.
- Convention on International Trade in Endangered Species in Wild Fauna and Flora (Washington, 3 March 1973) - To ensure, through international co operation, that the international trade in specimens of species of wild fauna and flora does not threaten the conservation status of the species concerned.
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 23 June 1979) - To conserve migratory species by Parties restricting harvests, conserving habitat and controlling

other adverse factors. Sustainable utilisation is an implicit goal.

- The International Tropical Timber Agreement (Geneva, 18 November 1983) - To promote the management of tropical forests on a sustainable basis and to provide a framework for co-operation between production and consuming member states in the tropical timber industry.
- International Undertaking on Plant Genetic Resources (Rome, 23 November 1983) as supplemented - To ensure that plant genetic resources are preserved, particularly cultivated varieties of plants, plants or varieties which have been in cultivation in the past, primitive versions of cultivated plants, wild relatives of such plants and certain special genetic stocks and restrict destructive impact of development activities to conserve plant varieties which are threatened with extinction as a result of deforestation (especially in tropical areas) or changes in agricultural practices
- Vienna Convention for the Protection of the Ozone Layer (Vienna, 22 March 1988) and Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 16 September 1987) - To protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations and bearing in mind the developmental needs of developing countries.
- The Convention concerning Protection against Hazards of Poisoning Arising from Benzene (ILO Convention 136, Geneva, 23 June 1971) (hereafter, Benzene Convention, 1971); It contains 13 substantive articles providing, inter-alia, that whenever harmless or less harmful substitute products are available, ratifying States should use such substitutes instead of benzene.
- The International Convention on Civil Liability for Oil Pollution Damage, Brussels 1969 (CLC) - To portion the liability of oil pollution on the owner of oil tanker.
- The International Convention on the Establishment of an International Fund for Compensation of Oil Pollution Damage, Brussels 1971 (Fund Convention);

Provide for a compensation system in order to ensure full compensation to victims; and (b) to distribute the economic burden between shipping and cargo interests.

Source: http://envfor.nic.in/divisions/iass/eia/Annex3.htm

Recommended Practice /Measures

Policy and Regulatory Review: A scan be inferred from the above list of applicable policies, regulations and guidelines, it is clear that a host of regulations are to be complied in a sustained manner during the EPC contract tenure.

Contractor as part of the EMF processes recommended in the contract shall undertake a review of Policy and Regulatory framework that would be applicable on the project. This review shall be repeated at least once every 6 monthly to re-assess and re-establish the applicable frame work to integrate and take on-board any changes in policy and legal environment in the future. In the interim between wore views, a regulatory register as mentioned below shall be maintained to keep track of applicable regulations.

Regulatory Register: Based on the regulatory review, formulating and maintaining a regulatory register applicable to project will prove useful to Contractor.

The regulatory register should shortlist policies, acts, rule and standards; those are applicable and relevant to the project activities. The register should enlist all required permit sand consents that are required by the Contractor to do project activities and through the contract period and the competent authority details who issue such permit and consents. The register should highlight the periodicity of individual permit sand consents and renewal of same.

The register can be made in a user friendly format with appropriate trigger points for timely renewal of permits and licenses.

The register shall be reviewed and updated at least once in a year either through in-house staff or using external resources. This will help in updating the register to prevailing policy and legal environment and integrate regulatory changes as applicable to the project.

Timely Renewal and Update of Regulatory Documents: As stated above, it is imperative on the part of EPC Contract or to set in systems that will enable him to renew and or update licenses, consents and permits upon expiry of the current ones. EPC Contract or will be held responsible for all regulatory compliance issues and his performance in this regard will be measured as part of the Environmental Performance Indicator.

Co-ordination with Regulatory Authorities: Contractor shall establish firm relationship and credible contact points at each of the regulatory authority to have a smooth functioning of the project. This co-ordination will help in getting timely updates of any upcoming regulations; clear and unambiguous clarifications on the law provisions; smooth applicatory process including prior knowledge of appropriate supporting document requirements etc. Contractor as part of his routine training and capacity building program of his field staff especially the management staff, can organise and conduct regulatory training sessions to understand the regulations; clearance procedures; penal procedures for contravening the law etc. The key contact personnel in each of the regulatory authorities can be sourced as training faculty in a periodic manner.

References and Recommended further reading:

Most of the regulations and policies are uploaded on the following web links which can be referred and reviewed:

- http://moef.nic.in/index.php; http://cgwb.gov.in/
- http://cpcb.nic.in/# ; http://www.moef.gov.in/mef/regional_offices.pdf

http://go.worldbank.org/4D2JSWFIW0

ESGP 24: Managing the risks of adverse impacts on communities from temporary project induced labour influx.

The guidance note on managing the risks of adverse impacts on communities from temporary project induced labor influx is available at World Bank's web site as public documents. Its electronic is ***http://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf***

This note shall be read in conjunction with bid documents. **The provisions of this note shall apply mutatis mutandis to the works undertaken by the Contractor under this contract.**

Appendix 6: "Environmental Management Plan"

Examples of some good practice in traffic control and safety during construction, Figures 1 to 13

The colour and size of the Work zone signs are as per IRC:SP:55-2014 (Guidelines on Traffic Management in work zones). This diversion works diagrams are for guidance only, bidder must follow IRC:SP:55-2014 for diversion works details.

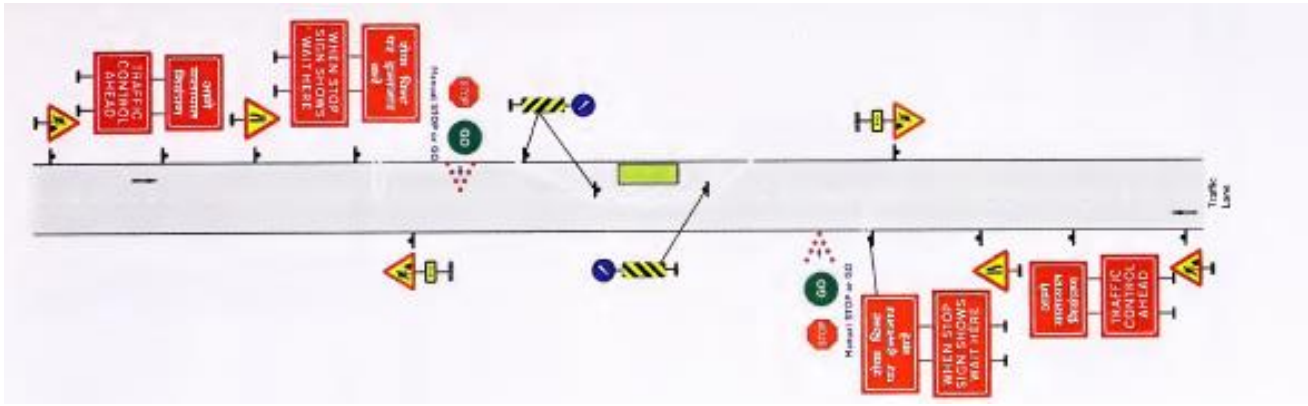


Figure-1a Traffic control by Stop / Go boards

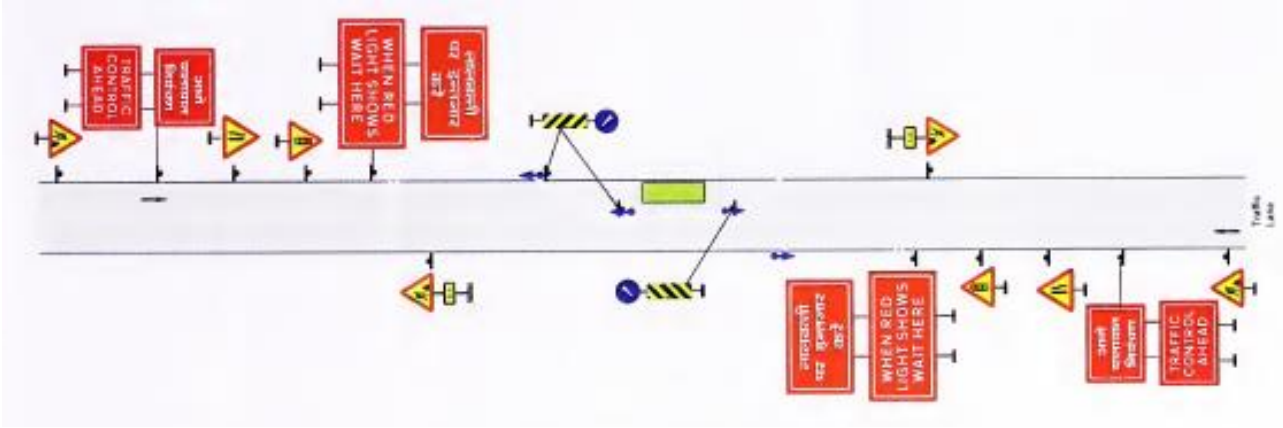


Figure-1b Traffic control by portable traffic Signals

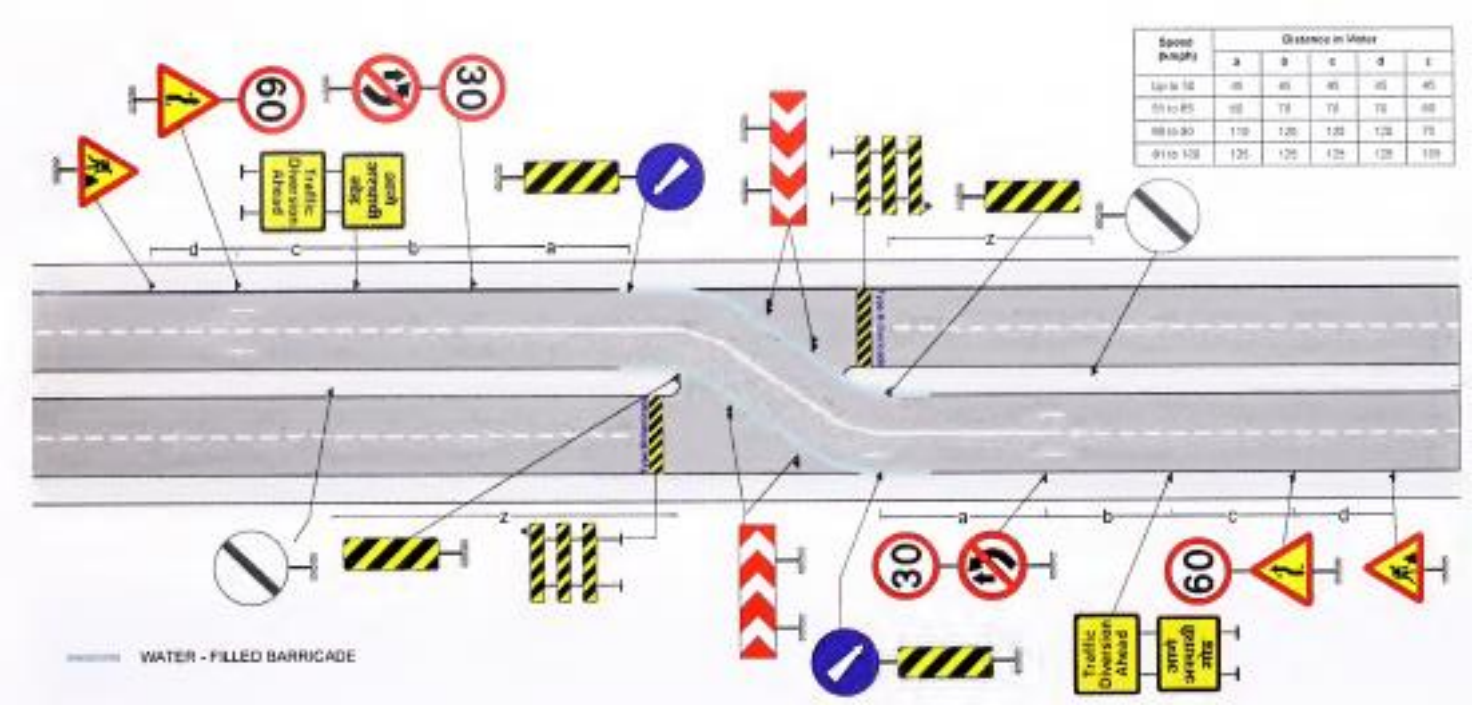


Figure-2 Two lane to four lane (Shifting of traffic from one carriageway to other

APPLICATION :

The layout is applicable for the second stage of eccentric widening when new carriageway has been constructed and existing carriageway is taken up for strengthening or overlay, where traffic has to be shifted from one carriageway to other. In shifting traffic from one carriageway to other, the cross over length is critical and shall be carefully provided, meeting the site requirements such that the layout is clearly visible with adequate signs and markings in a well guided way, to be visible both day and night . In the cross over length the camber also shall be properly given for safe transfer to avoid overturn due to reverse camber. It would be advisable to bring about gradual reduction in speed. Layout of signs and barriers would be as shown.

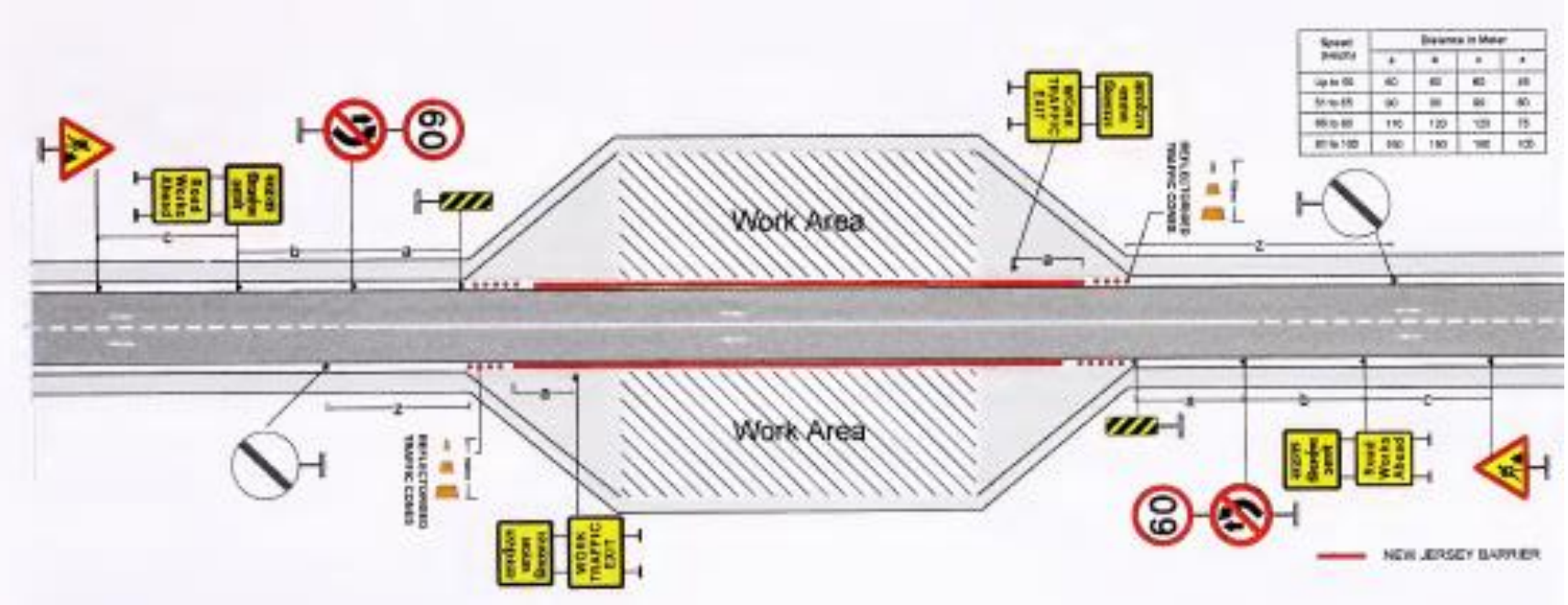


Figure-3 Two lane to four lane (Concentric Widening)

APPLICATION :

The layout shown is applicable for concentric widening of a two lane highway 4-lane highway. In the first stage, construction of service road or diversion road would be taken up on the sides and traffic would continue to move on main highway on both directions.

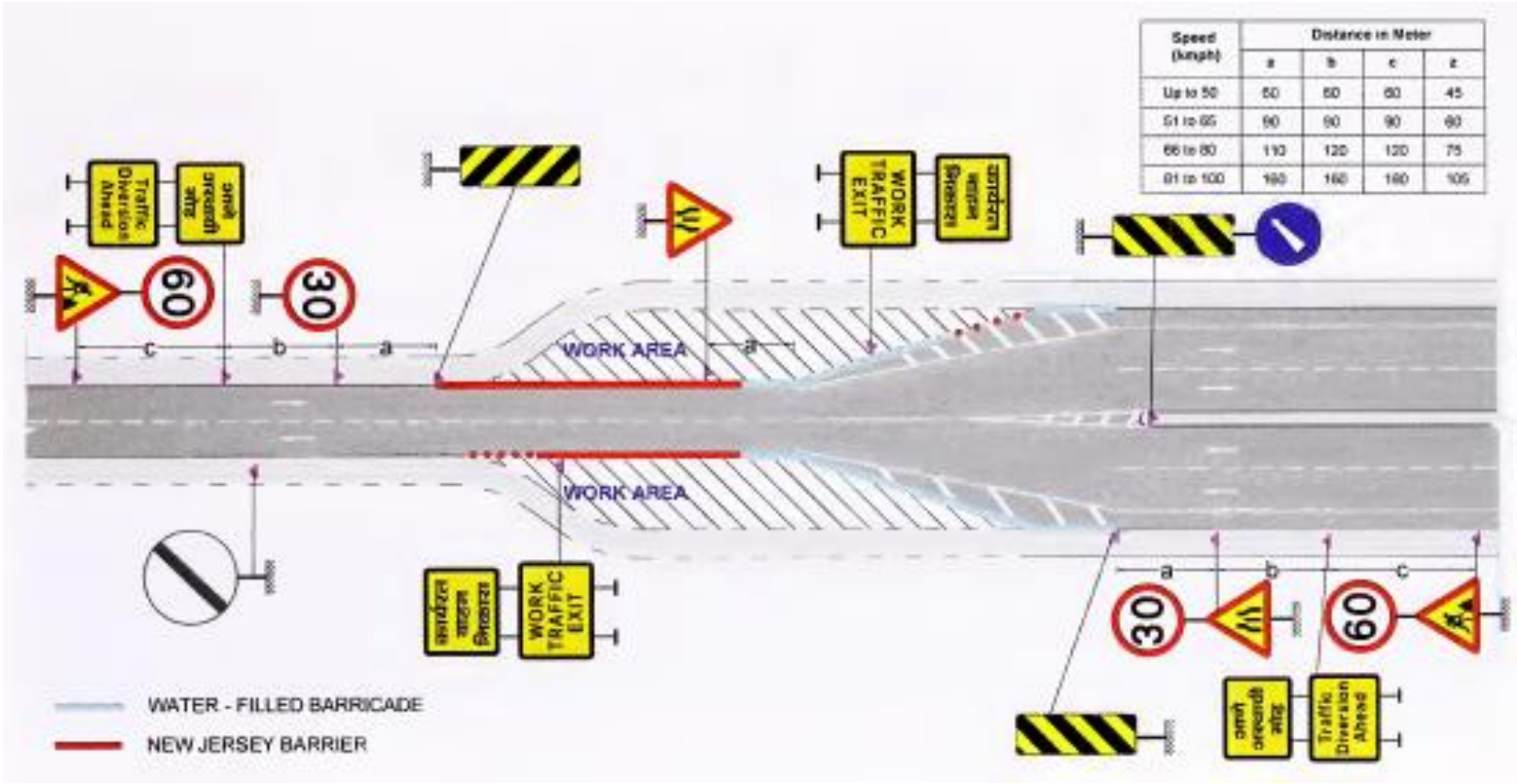


Figure-4 2 lane to 4-lane Concentric

APPLICATION :

The layout is the third stage of concentric widening for 2-lane to 4-lane showing the shifting/forward movement of work zone to the next stretch for progress of construction activities.

Figure-5 Temporary Diversion for Reconstruction of CD works

APPLICATION :

The layout shown is applicable when a Cross Drainage structure has to be constructed and where a temporary diversion will need to be constructed for maintaining the traffic flow. The diversion in most cases would be on embankment; therefore delineation is essential for both day and night time.

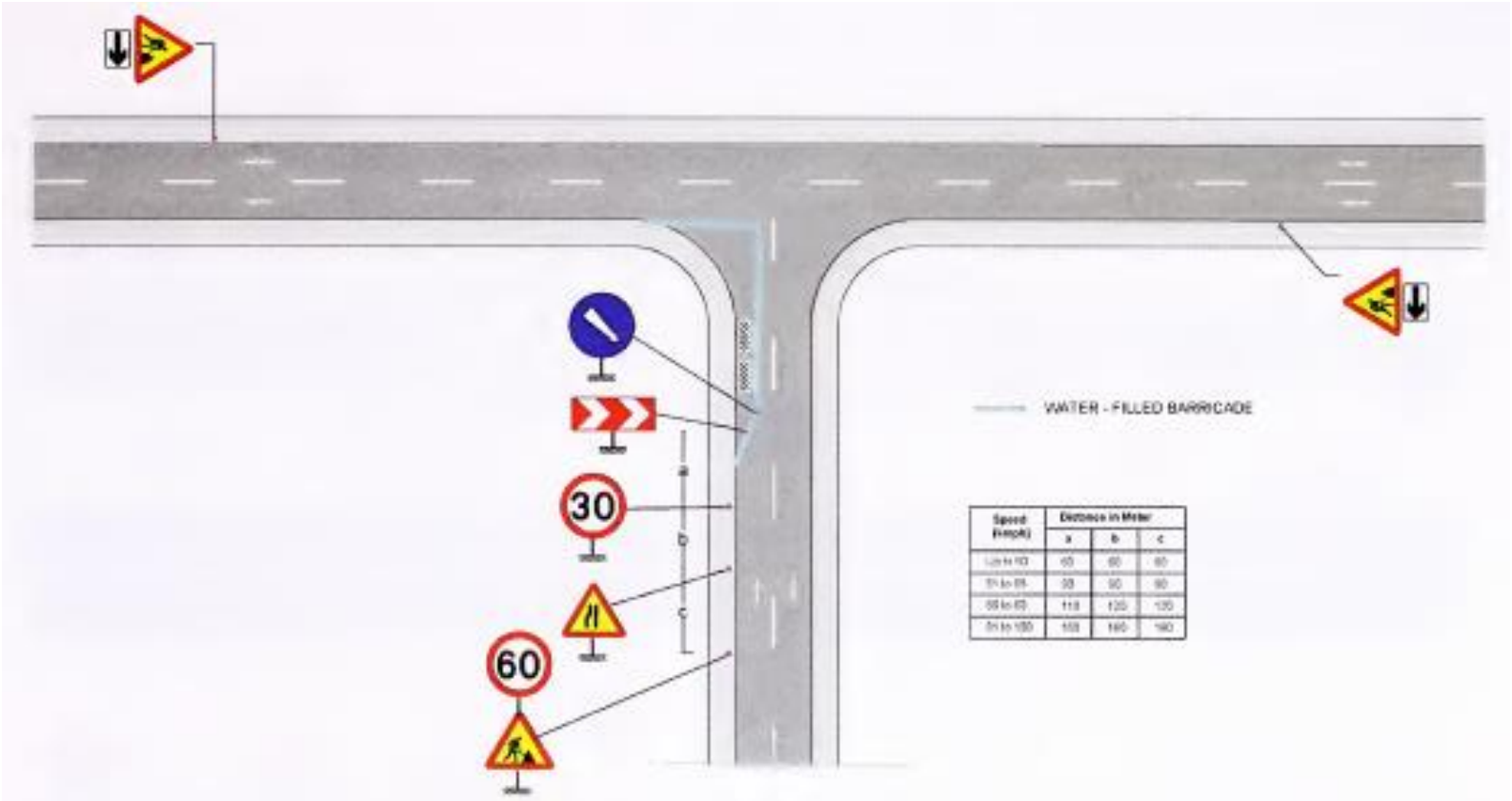


Figure-6 Road work in Junction area

APPLICATION :

The layout shown is applicable some work at the junction area involving deflection of traffic.

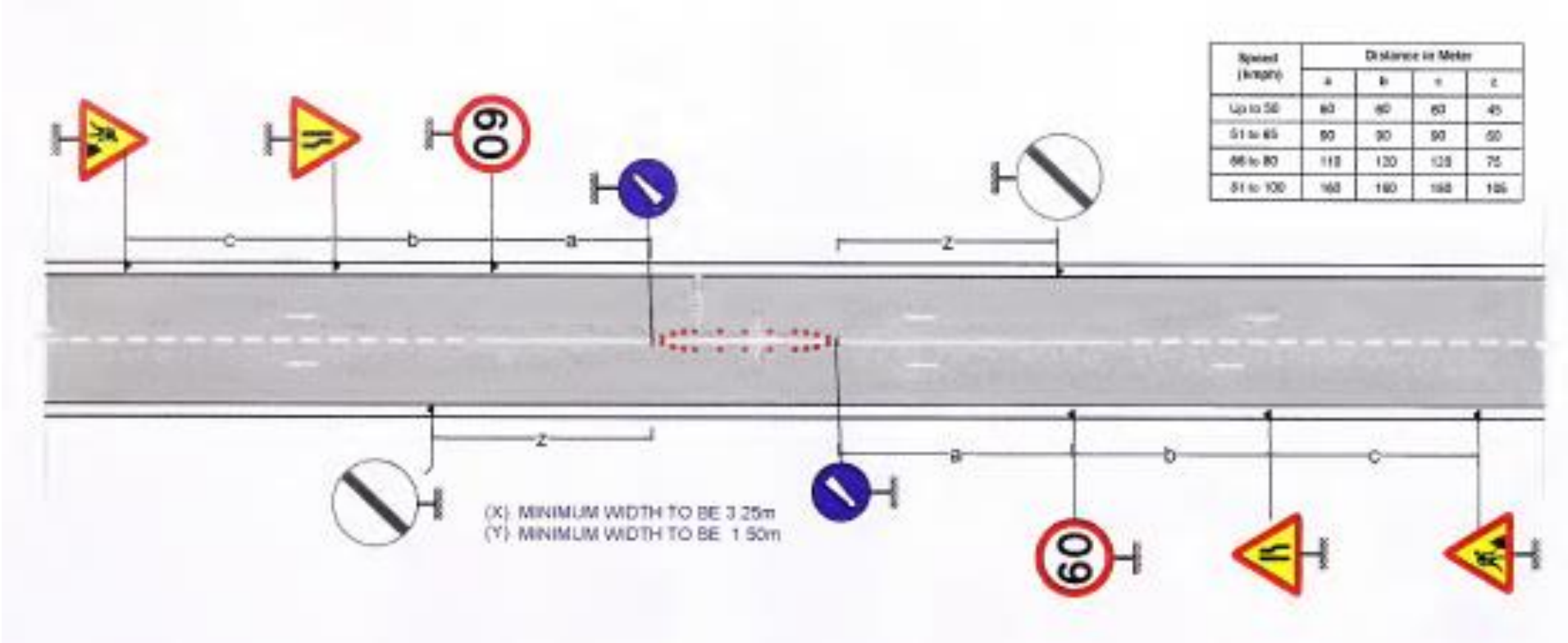


Figure-7 Work of centre of carriageway

APPLICATION :

The layout shown is applicable for short term maintenance activities at the center of a carriageway. Generally traffic cones are used that it can be placed and removed easily.

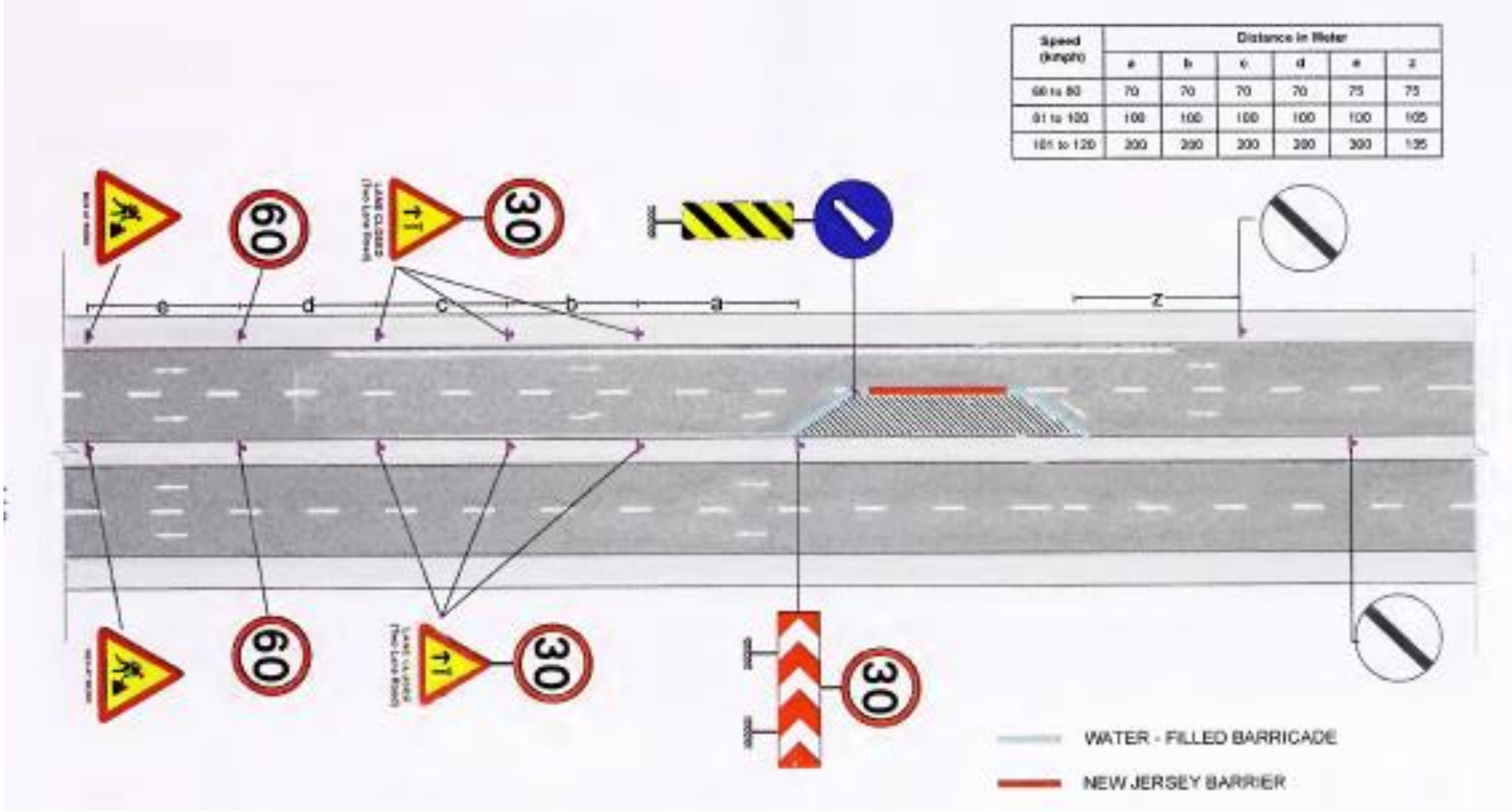


Figure-8 Fast lane taken up for work

APPLICATION :

The layout shown is applicable when the fast extreme right lane in a multi-lane highway is taken up for work.

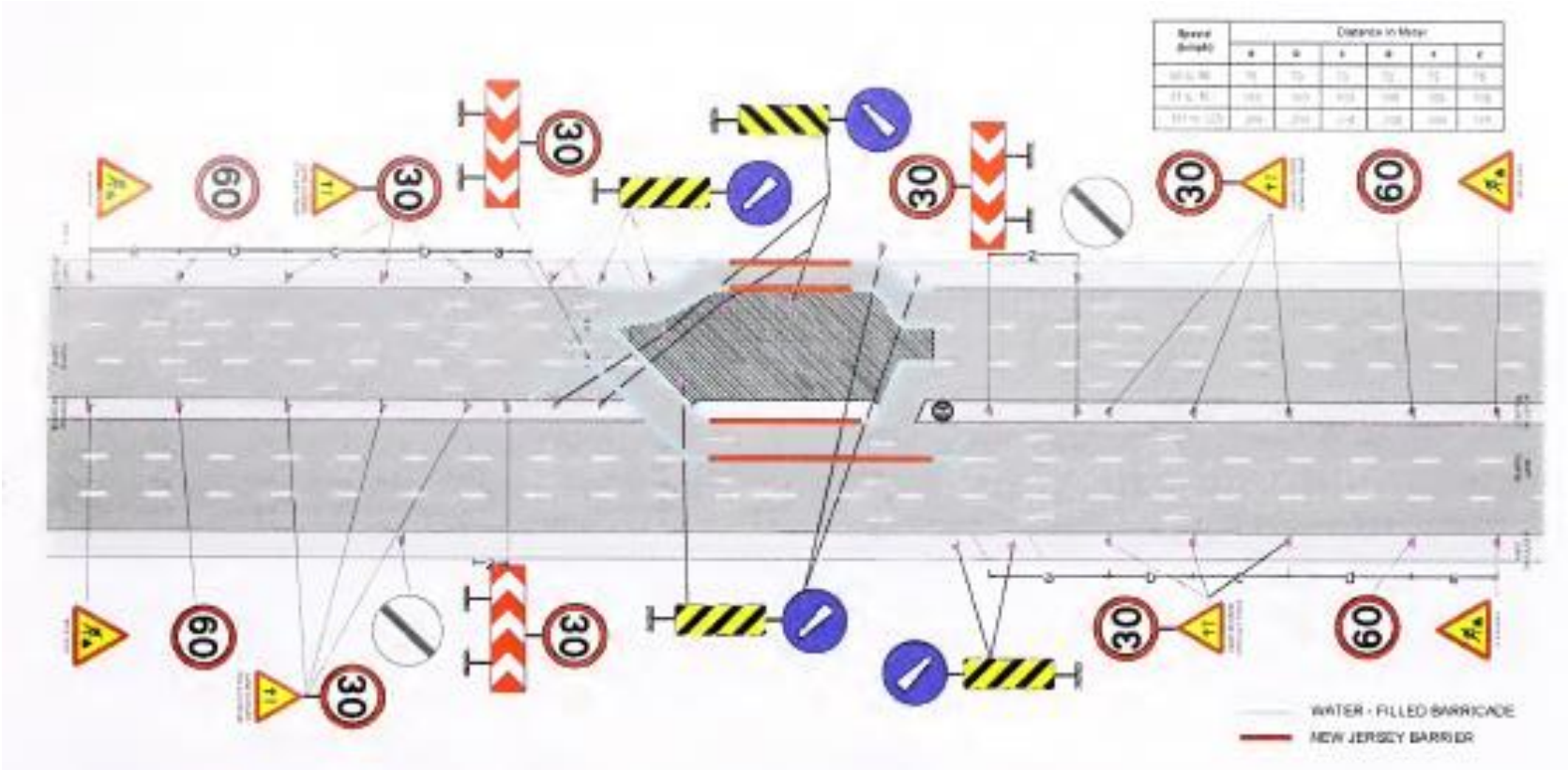


Figure-9 Roadwork Affecting both carriageways of Expressway

APPLICATION :

The layout shown is applicable in an access controlled expressway as the ongoing work affects both carriageways, involving delicate diversions.

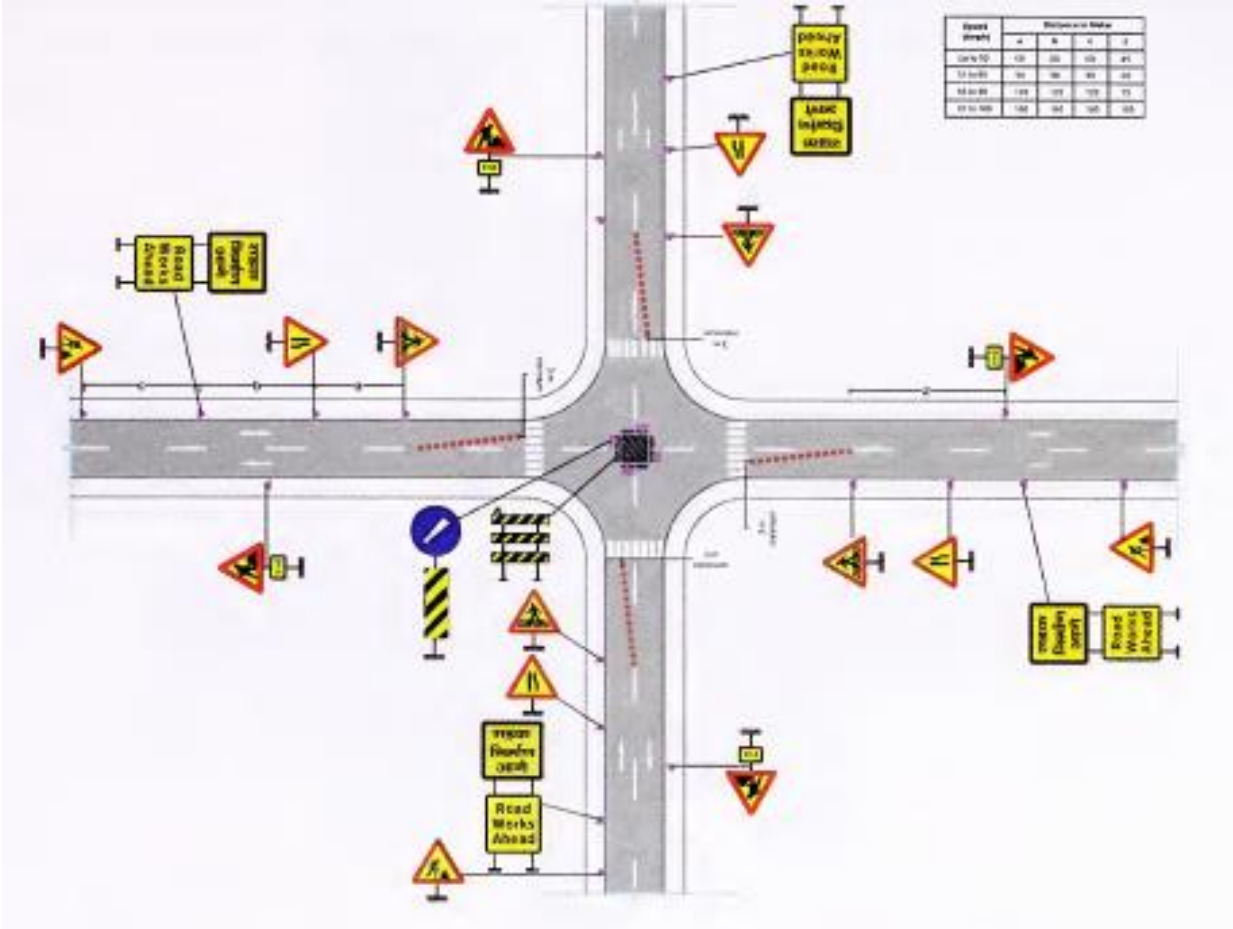


Figure-10 Road work at the centre of a junction

APPLICATION :

The layout shown is applicable when works are to be carried out at the centre of junction

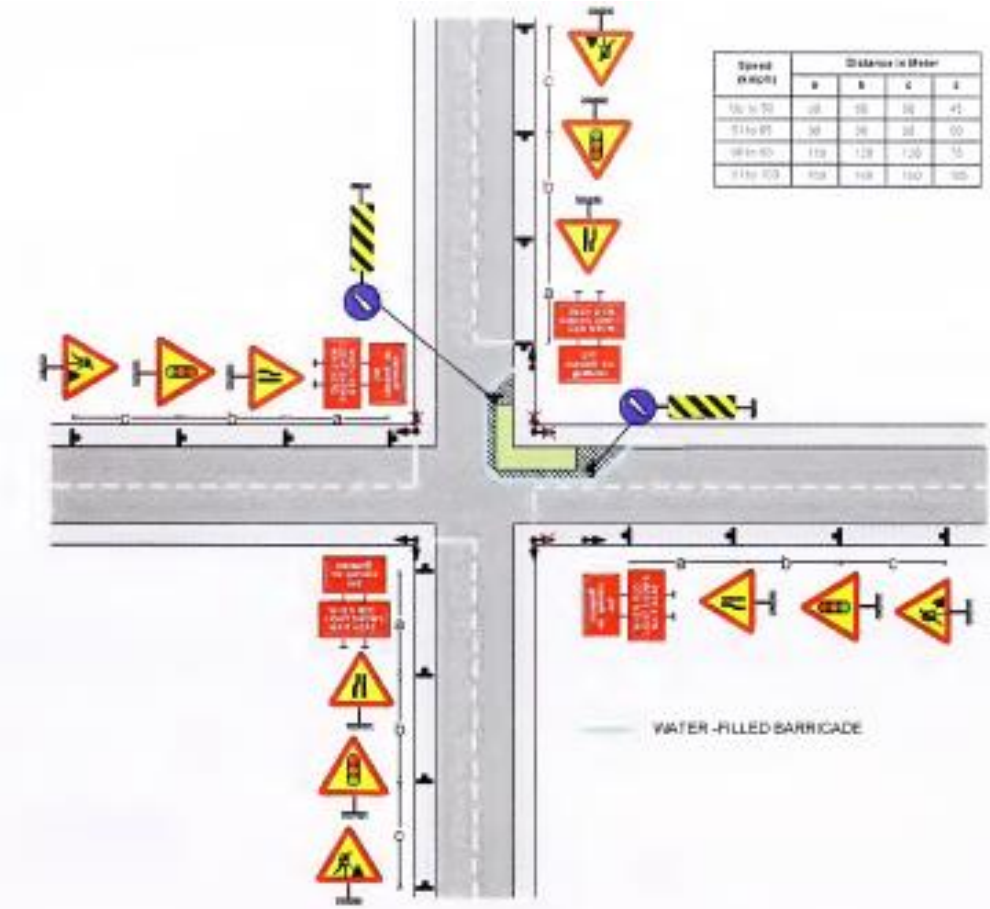


Figure-11 Road work at the corner of a junction with Temporary signal control

APPLICATION :

The layout shown is applicable when some works to be carried out at the corner with temporary signal control arrangement.

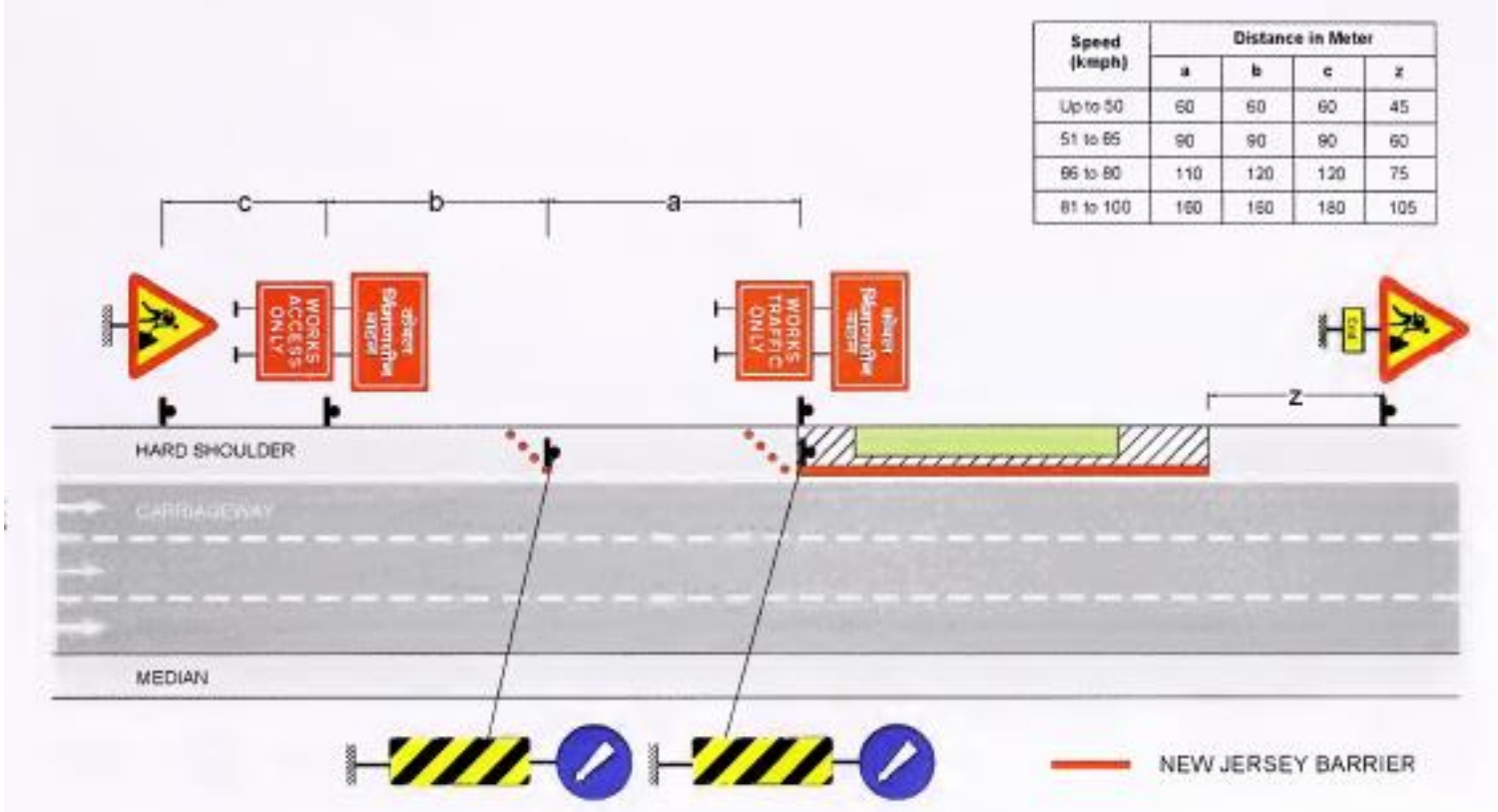


Figure-12 Hard shoulder in a Multilane highway taken up for works

APPLICATION :

The layout shown is applicable when the hard shoulder in a multi-lane is taken up for work, where the trafficable carriageway is no way affected or encroached. Layout of signs and barriers would be as shown.

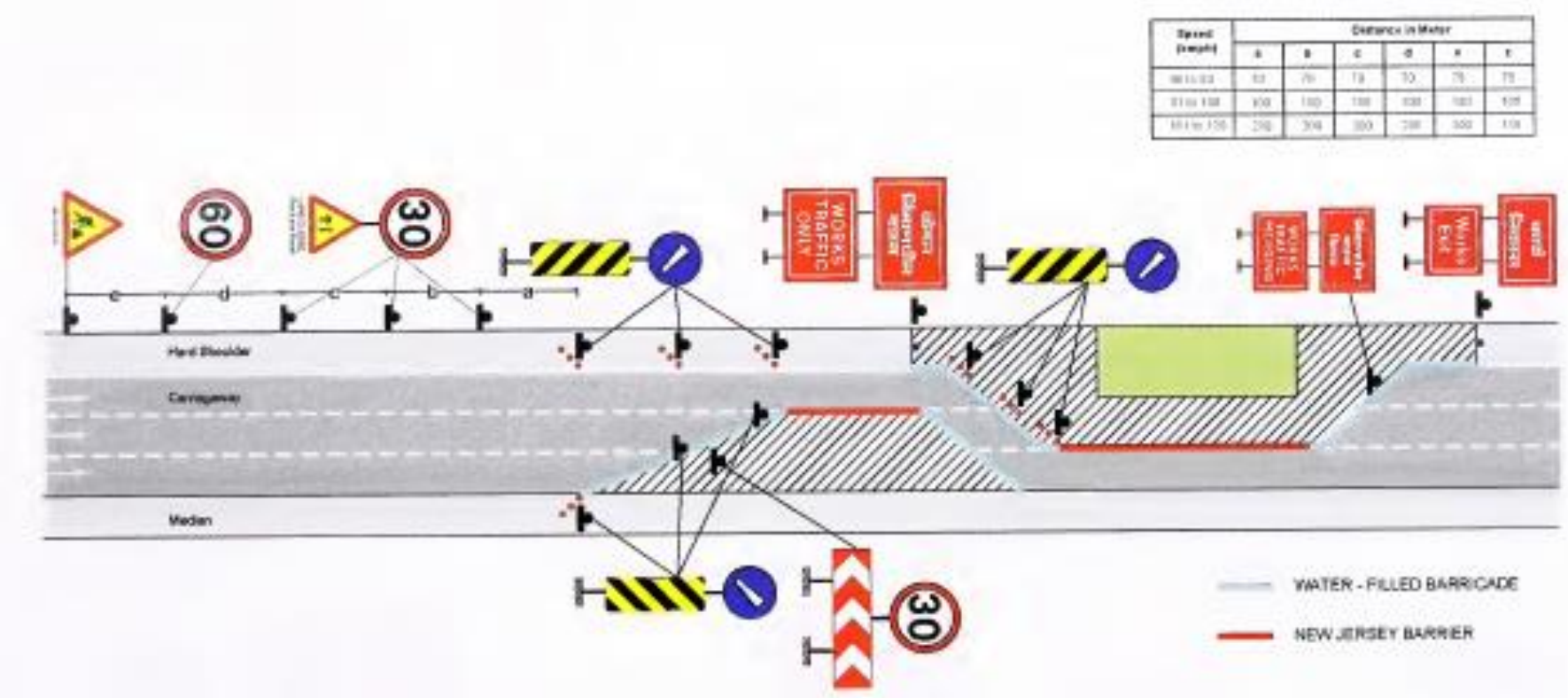


Figure-13 Major works with Entry/Exit provisions for works traffic

APPLICATION :

The layout shown is applicable major road situations where two lanes out of three lanes have been blocked for works activities, involving delicate diversion, and also showing entry/exit provisions for Work Traffic. Layout of signs and barriers would be as shown.