

OM – 5: SLOPE STABILITY AND EROSION CONTROL

1. INTRODUCTION

1. 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.

2. 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

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

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

4. 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.

5. 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.

6. 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

7. 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 Engineer-in-charge must ensure that the layout and siting of ditches is as per specifications.

4. CONSTRUCTION STAGE

8. 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 stabilisation techniques and erosion control measures such as vetiver grass, stone pitching, use of geotextile 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 seeding would be during monsoon.

Maintenance:

During first six weeks, the planting should be inspected by the EIC 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

9. 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.

10. 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.

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

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

13. 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.

OM – 6: WASTE MANAGEMENT AND DEBRIS DISPOSAL

1. INTRODUCTION

1. 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

2. As part of DPR preparation, R&BD (Panchayat) 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.
 - In case no existing landfill sites are available, identification of landfill site as well as identification of the clearance requirements.
 - Identify sites of disposal of debris.

3. PRE-CONSTRUCTION STAGE

3. 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 Engineer-in-charge. 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 6-1**. 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 Engineer-in-charge prior to commencement of disposal.

4. 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

5. The Contractor shall either reuse or dispose the waste generated during construction for roads depending upon the nature of waste, as specified in **Table 6-1**. 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 Engineer-in-charge. 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.

6. The waste management practices adopted by the Contractor, including the management of wastes at construction camps etc. shall be reviewed by the Engineer-in-charge and the Gujarat Pollution Control Board (GPCB) during the progress of construction.

5. POST CONSTRUCTION STAGE

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

7. On decommissioning of construction sites, the Contractor shall hand over the site free of all debris/wastes to the satisfaction of R&BD (Panchayat). 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 Engineer-in-charge before final payment is claimed.

Table 6-1: 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 Unsuitable material in embankment foundation	Vegetating embankment slopes 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 Granular material	Vegetating embankment slopes 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	
3. Concrete structures Dust				
a)	Storage of material	Dust, Cement, Sand Metal Scrap	Constructing temporary structure, embankment fill	Scrap Yard
b)	Handling of materials	Dust		
c)	Residual wastes	Organic matter Cement, sand Metal scrap	Manure, Revegetation Constructing temporary structure, embankment fill Diversion sign, Guard Rail	
4 Reconstruction works				
a)	Dismantling of existing pavement	Bitumen Mix, granular material Concrete Guard rail sign post, guard stone	sub-base Road Sub-base, reuse in concrete, fill material and as rip rap on roads Reuse for same	
b)	Dismantling of cross drainage structures	Granular material & bricks Metal scrap Pipes	Constructing temporary structure, embankment fill Diversion sign, Guard Rail Culvert 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 Bitumen Mix	Low Grade 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, Plastic and metal scrap Domestic effluent	Manure Irrigation	Scrap Yard

6. Disposal of Debris

8. 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

OM – 7: CONSTRUCTION PLANTS & EQUIPMENT MANAGEMENT

1. GENERAL

1. During execution of the project, construction equipment's, 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

2. Selection criteria for setting up a plant area and parking lot for equipment's and vehicles shall be done as per siting criteria for construction camp specified in Guideline on "Construction and Labour Camps".

3. PRE-CONSTRUCTION STAGE

3. The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipment's. Before setting up the crusher, hot-mix plant and generator, the Contractor shall acquire "No Objection Certificate (NOC)" from the Gujarat State 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, equipment's, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms. The Engineer-in-charge 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

4. The Contractor shall undertake measures as per **Table 7-1** 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 7-1: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	<ul style="list-style-type: none"> •Water sprinkling •Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation
	Crushers	<ul style="list-style-type: none"> •Tail board shall be properly closed and sealed to be spill proof •Regular Water Sprinkling to keep the dust below visibility level
	Concrete-Mix Plant	<ul style="list-style-type: none"> • Educate the workers to follow/adopt good engineering practices while material handling
Emissions	Hot-Mix Plant	<ul style="list-style-type: none"> •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	<ul style="list-style-type: none"> • Regular maintenance as per manufacture's recommendation
	Generators	<ul style="list-style-type: none"> • Exhaust vent of long length and emission to confirm to PCB norms.
	Heavy Load Vehicles	<ul style="list-style-type: none"> • Exhaust silencer, Regular maintenance as per manufacture schedule
Noise	Crushers	<ul style="list-style-type: none"> • Siting as per guideline, "Construction and Labour Camps"
	Generators	<ul style="list-style-type: none"> • All generators should have mandatorily acoustic enclosures and confirms to PCB norms.
Oil Spills	Storage and Handling	<ul style="list-style-type: none"> • Good practice, guideline, "Waste Management and Debris Disposal"
Residual waste	Dust Collector and Pits	<ul style="list-style-type: none"> • Guideline , "Waste Management and Debris Disposal"
Concrete waste	Concrete-Mix plant	<ul style="list-style-type: none"> • Guideline, "Waste Management and Debris Disposal"
Bitumen and bitumen mix	Hot-mix Plant	<ul style="list-style-type: none"> • Guideline, "Waste Management and Debris Disposal"
Stone chips	Crushers	<ul style="list-style-type: none"> • Guideline, "Waste Management and Debris Disposal"
Safety	Trajectory of Equipment's	<ul style="list-style-type: none"> • No worker shall be present in the vicinity of the equipment's
	Movable Parts of Equipment's	<ul style="list-style-type: none"> • Caution Sign, awareness among workers
	Plant Area / Site	<ul style="list-style-type: none"> • Caution Sign, Safety Equipment's
	Accidents / Health	<ul style="list-style-type: none"> •First Aid Box, Periodic Medical Checkup Break down of
	Break down of vehicles	<ul style="list-style-type: none"> • Arrangement for towing and bringing it to the workshop

5. 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 equipment's, 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, equipment's at construction camp should be barricaded and kept away from residential quarters of workers.

6. The Engineer-in-chargeshall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

5. POST-CONSTRUCTION STAGE

7. The Engineer-in-chargeshall ensure that all the haul roads are restored to their original state. Incase any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition. The Engineer-in-chargemust ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area to bring its original state.

8. 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.

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 areas¹ 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.

OM – 8: LABOUR AND WORKER’S HEALTH AND SAFETY

1. INTRODUCTION

1. 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

2. 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).

3. 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.

PRE-CONSTRUCTION STAGE

4. In order to incorporate public health and safety concerns, the Engineer-in-charge 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.

3. CONSTRUCTION STAGE

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

- Personal Protective Equipment’s (PPE) for the workers. **Table 8-1** 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.

Health Concerns are adversely impacted.....

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.

Table 8-1: Worker Safety Measures

Sl. no.	Activity	Safety Requirement
1.	Setting out and levelling	<ul style="list-style-type: none"> Luminous jackets; Helmets; Boots for protection against insect bite; and Dust Mask
2.	Tree cutting	<ul style="list-style-type: none"> Helmet Boots Luminous safety jackets
3.	Reinforced yard/ carpentry/ reinforcement cutting/ bending work.	<ul style="list-style-type: none"> Hand gloves
4.	Shuttering work	<ul style="list-style-type: none"> Goggles Hand gloves
5.	Plant and Machinery	<ul style="list-style-type: none"> Hand gloves Boots Helmets Dust Mask
6.	Material handling	<ul style="list-style-type: none"> Hand gloves Dust mask
7.	Batching plant	<ul style="list-style-type: none"> Goggles Hand gloves Dust mask
8.	Weeding	<ul style="list-style-type: none"> Goggles
9.	Binding reinforcement	<ul style="list-style-type: none"> Safety belt Boots
10.	Manual concrete laying	<ul style="list-style-type: none"> Gum boots Hand gloves Helmet
11.	Piling	<ul style="list-style-type: none"> Helmet Hand gloves, gumboots.

6. 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:
 - Incase of blasting, the Contractor must follow The Explosives Rules, 1983.
 - Incase 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

7. The Engineer-in-charge shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per the guideline.

4. POST-CONSTRUCTION STAGE

8. During this stage a major concern is on road user safety. Following are the measures that need to be undertaken by the Engineer-in-charge to ensure safer roads:

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

9. The Engineer-in-charge 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.

10. 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.”

OM – 9: FORESTS AND OTHER NATURAL HABITATS

1. INTRODUCTION

1. 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.

2. 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.

Natural Habitats means...

- National Park
- Reserve Forest
- Sanctuaries
- Notified Wetlands
- Fisheries and Aquatic Habitats

2. PROJECT PLANNING AND DESIGN

3. 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...
<ul style="list-style-type: none">• 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.	<ul style="list-style-type: none">• 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.

4. 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)

5. 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.

6. 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

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

8. 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

9. 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 6-1** type of waste of guideline, “Waste Management and Debris Disposal”.

5. POST CONSTRUCTION STAGE

10. 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”.

ANNEXURE - 2: No Objection Certificate Water Resource

(WATER RESOURCE)

No Objection Certificate

This is to certify that the Gram Sabha has no objection to the use of the available water resources like boring, wells, ponds etc. falling in the village of
..... of the development block / revenue circle
..... of the
district....., for the construction of the proposed road
..... under the
MMGSY.

Signature (Gram Pradhan)

..... Gram Panchayat

ANNEXURE - 3: 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

PMC

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 R&BD, Panchayat) 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)	m xm		
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	m xm		
C	No of openings per dwelling	nos		
D	Minimum size of opening	m xm		
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	m xmxm		
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

Engineer-In-Charge

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 R&BD, Panchayat) for establishing Borrow Areas Borrow Area No. BA ____
Location of Borrow Area (Km ____)

Sl. No	Item	Unit	Details	Remarks, 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	Sq. km.		
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	Near by 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

Engineer-In-Charge

Format EM4: Tree Felling

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

Contractor

Engineer-In-Charge

Format EM 5 Topsoil Conservation Monitoring

Contract _____

Report No. _____

Date _____

Location (Chainage)	Original Use of Topsoil removed	Measures for preventing spillage of topsoil on Haul Roads(Earthe n/ 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?	Improvement s required	Extent of Compliance as on date of report

Certified that the above is true.

Signed _____

Contractor

Verified

Signed _____

Engineer-In-Charge

Format EM 6 Redevelopment of Borrow Areas

Operation Stage: Report: Date ____ Month____ Year____

To be monitored by R&BD, Panchayat during operation period

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 Landuse							
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

Engineer-In-Charge

Format EM 7 Checklist for Construction Safety

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
Safety during Construction Stage							
1	Appointment of qualified Construction safety officers (there should be provision in the conditions of the contract regarding appointment of qualified construction safety engineer to look after environmental aspects)						
2	Approval for Construction Safety Management Plan by the Engineer-in charge.						
3	Approval for Traffic Management/control Plan in accordance with IRC: SP: 55-2001						
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 equipment						
19	A. Helmets						
	B. Safety Shoe						
	C. Dust masks						
	D. Hand Gloves						

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
	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 healthcheck-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

Engineer-In-Charge

Format EC1: 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							
4							
5							
Water Monitoring							
1							
2							
3							
4							
5							
Noise Monitoring							
1							
2							
3							
4							
5							

Certified that the Pollution Monitoring has been conducted at all the locations specified in the EMP

Contractor

Engineer-In-Charge

Reporting System

The contractor will operate the reporting system for environmental condition and environmental management indicators. The Contractor will report to the Executive Engineer (Panchyat Division) Roads and Building Department, Govt. of Gujarat on the progress of the implementation of environmental conditions and management measures as per the EMP. The reporting formats; environmental monitoring formats are enclosed in the **Annexure 3** and the summary of reporting is given in the **Table 4**.

Table 4: Summary details of Reporting

Format No.	Item	Stage	Contractor	EE (Panchyat), R & BD., GoG
			Implementation & Reporting to EE, (P), R & Bd., GoG	Oversee / Field Compliance Monitoring
EM 1	Identification of Disposal Locations	Pre-Construction; Construction	One Time	One Time
EM 2	Setting up of Construction Camp	Pre-Construction	One Time	One Time
EM 3	Borrow Area Identification	Pre-Construction	One Time	One Time
EM 4	Top Soil Monitoring	Construction	Quarterly	Quarterly
EM 5	Status Regarding Rehabilitation of Borrow Areas	Construction	-	Half Yearly
EM6	Construction Safety	Construction	Quarterly	Quarterly
EC 1	Pollution Monitoring	Pre-Construction; Construction	As Per Monitoring Plan	Quarterly
		Post Construction (DLP)		
		End of Maintenance		

Clearance Requirements of Government of Gujarat

Sr. No.	Clearances	Acts	Approving Agency	Applicability to the Project	Time Required	Responsibility	
						Execution	Monitoring (Supervision)
PROJECT IMPLEMENTATION STAGE							
1	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	Engineer-in-charge
2	Permission for Sand Mining from river bed	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of geology and mining, GoG	Applicable	2 month	Contractor	Engineer-in-charge
3	Permission for Opening of New Quarry	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of geology and mining, GoG	Applicable	2 month	Contractor	Engineer-in-charge
4	Hot mix plant, Crushers, Cement Batching Plant	Air (Prevention and Control of Pollution) Act. 1981	Gujarat Pollution Control Board	Applicable	3 months	Contractor	Engineer-in-charge
5	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	Engineer-in-charge
6	Disposal of Hazardous Waste	Hazardous Waste (Management and Handling) Rules 1989	Gujarat Pollution Control Board	Applicable	2 months	Contractor	Engineer-in-charge
7	Disposal of Construction Waste and liquid effluent from Labour camps	Water (Prevention and Control of Pollution) Act 1974	Gujarat Pollution Control Board	Applicable	2 months	Contractor	Engineer-in-charge
8	Pollution Under Control Certificate	Central Motor Vehicles Act 1988	Transport Department (GoG)	Applicable	1 Month	Contractor	Engineer-in-charge
9	Employing Labour	Executing Agency of Building and other construction act, 1996	Labour& Employment Department, GoG	Applicable	1 Week	Contractor	Engineer-in-charge
10	Registration of Workers	Labour welfare Acts.	Labour& Employment Department, GoG	Applicable	1 Month	Contractor	Engineer-in-charge

To,
Superintending Engineer
R&B (Panchayat)circle
Ahmedabad/Gandhinagar/
Rajkot-1/Rajkot-2/
Vadodara/Surat.

Sub:- “Inclusion of special conditions of contract” regarding implementation of ESMF mitigation measures.

You are well aware that MMGSY project is now financially assisted by AIIB in the form of Loan worth \$ 329 mill. Loan agreement is already signed on 4th August 2017, with AIIB. Under this there is an obligatory requirement of AIIB to study ESIA, TPPF and ESMF and to implement the mitigation measures in ongoing MMGSY project.

In view of above, a special condition of contract has been framed in consultation with AIIB authority, which is attached here with . It is directed to include this special condition along with SMART operational manual in invariably the tender document which are to be processed for the procurement after 4th August 2017. It is also to be noted that no separate. BOQ/extra item shall be made against implementation of this special condition. and same shall be specifically mentioned in the tender conditions. Moreover, for the tenders, which are already processed after 4th Aug 2017, suitable corrigendum/ Addition shall be issued for inclusion of this special conditions.

Actions taken for above, shall be intimated to this office.

Encl : “Special Condition and SMART operational manual

CE(P) & AS

Gandhinagar