

# TECHNICAL SPECIFICATIONS

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## **PREAMBLE**

### **1. GENERAL**

- 1.1 The Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified in this Volume and Contract Agreement.

### **2. SITE INFORMATION**

The information given hereunder and provided elsewhere is given in good faith by the Employer but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

#### **2.1 Topography**

The area in which works are located is in hilly/ mountainous terrain. The approximate longitude and latitude of the region are 94° 06' to 94° 32' East and 25° 37' to 25° 40' North respectively.

#### **2.2 Climate**

The state of Nagaland and Manipur has a monsoon type climate with high humidity levels. The rainfall months are generally from May to September. The annual average rainfall varies from 175 cm to 250 cm. The state receives maximum rainfall from June to September.

Summer in Nagaland and Manipur starts from March and lasts till September. The temperatures during summer months vary from 16 °C to 31 °C. Humidity is relatively high in summer but the temperature remains moderate.

Winter arrives in the state in the months of December and lasts till February. The temperatures during winter vary from 4°C to 24°C. Winter is characterized by frost at high altitudes and bitter cold days.

Strong north-west winds blow through the state during the months of February and March.

#### **2.3 Seismic Zone**

The works are located in Seismic Zone-V.

Nagaland and Manipur with the rest of the Northeastern states falls under Earthquake Zone –V, making it a very high risk state.



## **Part 1- General Technical Specifications**

### **1.0 Introduction**

- 1.1 Part -1 General Technical specification shall comprise the “Specifications for Road and Bridge Works (Fifth Revision) published by Indian Roads Congress (IRC) in April 2013 on behalf of Government of India, Ministry of Road Transport & Highways (MoRT&H).
- 1.2 Certain provisions of the above Specifications are amended by Part 2-Particular Technical Specifications of these Specifications. In the event of conflict or discrepancies between the IRC Specification and the Particular Technical Specifications, the provisions of the Particular Technical Specifications shall prevail.
- 1.3 Words like ‘Contract’, ‘Contractor’, ‘Drawings’, ‘Works’, ‘Site’ and ‘Provisional Sum’ used in the IRC specification shall have and shall be deemed to have the same meaning as understood from the definitions of these terms in and as included in the Condition of Contract.
- 1.4 Copies of the IRC Specifications may be obtained from:  
Indian Road Congress, Jamnagar House, Shahjahan Road, New Delhi  
OR  
Indian Road Congress, Sector 6, R.K. Puram, Kama Koti Marg, New Delhi
- 1.5 The Contractor shall follow CPWD Specification for Building Works or other standard documents with the approval of the Authority Engineer for the works which are not covered in these specifications.



## Part 2 - Particular Technical Specifications

### 2.0 Introduction

- 2.1 This Part 2 - Particular Technical Specifications of the Specifications revises certain Clauses of MoRT&H Specifications for Road and Bridge Works, 5th Revision 2013.
- 2.2 The amendments, if any, issued to the MoRT&H Specifications for Road and Bridge Works Fifth Revision 2013, shall apply to the relevant Clauses, otherwise as specified in this Section.
- 2.3 These revisions comprise substitutions, modifications or additions to Clauses of the MoRT&H Specifications referred to in Part 1 - General Technical Specifications and accordingly the said Specifications so amended shall form part of the Contract.
- 2.4 The following list shows the Clauses of the MoRT&H Specifications, which are modified or added by this Particular Technical Specifications:

Section 100: 105, 106, 111, 112, 114, 120 and 122

Section 200: 201 and 202

Section 300: 301, 304, 305, 306 and 309

Section 400: 401, 406, 409 and 410

Section 500: 501, 502, 503, 504, 505, 507, 508, 510 and 516

Section 800: 801, 802, 803, 805, 807, 809, 811 and 813

Section 1000: 1002, 1006, 1007, 1008 and 1014

Section 1500: 1501, 1502, 1506 and 1513

Section 1600: 1602, 1603 and 1605

Section 1700: 1705, 1706 and 1715

Section 1800: 1803

Section 2000: 2005, 2009 and 2011

Section 2100: 2104

Section 2200: 2208 and 2210

Section 2500: 2504 and 2507

Section 2700: 2702, 2703, 2706 and 2708

Section 2900: 2910 and 2911

Section 3000: 3001

### 2.5 Additional Specifications

The following Clauses have been added to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision, April 2013).

**Clause A-1 PART – 2 WORKS**

**Clause A-2 INTER LOCKING CONCRETE BLOCKS**

**Clause A-3 TREE PLANTATION**

**Clause A-4 TREE PROTECTION**



- Clause A-5 ENVIRONMENTAL MONITORING**
- Clause A-6 OIL AND GREASE INTERCEPTORS**
- Clause A-7 RAIN WATER HARVESTING STRUCTURE ALONG THE PROJECT ROAD**
- Clause A-8 DOWEL BARS IN DECK SLAB/BRICK MASONRY**
- Clause A-9 DRAINAGE SPOUTS IN EXISTING STRUCTURES**
- Clause A-10 CLEARING OF STEEL ROCKER-ROLLER BEARINGS**
- Clause A-11 REHABILITATION OF CULTURAL PROPERTY**

In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specifications of IRC, BIS, BS, ASTM, AASHTO and CAN/CSA in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the Authority's Engineer.



## **AMENDMENTS/ MODIFICATIONS/ ADDITIONS TO EXISTING CLAUSES OF THE GENERAL SPECIFICATIONS**

### **SECTION 100**

### **GENERAL**

### **CLAUSE 105**

### **SCOPE OF WORK**

#### **Sub Clause 105.3**

#### **Add following at the end of Para 1**

The procedures for inspection shall be IT based and integrated with the PMIS system. The contractor is required to have necessary infrastructure to support IT based system at his own cost.

#### **Add Following as Point xiii) after point xii)**

Contractor shall submit monthly report on accidents on the project road during Part -1 and Part-2 works as per the format approved by the Engineer.

#### **Add the following at the end of Sub Clause 105.3**

The QA programmed shall also conform to the requirements of EN ISO 9001.

### **CLAUSE 106 CONSTRUCTION EQUIPMENT**

#### **Add the following sub Para (1) after sub Para (k):**

- 1) All measuring devices and gauges shall be in good working condition. Measuring devices that can affect product quality shall be calibrated prior to use and at prescribed intervals against certified equipment. Calibration procedures shall be established, maintained and documented and corrective actions taken when results are unsatisfactory. Calibration of all measuring devices and gauges etc., which the Contractor intends to use in the contract, shall be calibrated from a competent/reputed authority/agency accredited to NABL and the frequency of the calibration shall be as directed by the Engineer. Accuracy and fitness of measuring devices shall be ensured by proper maintenance.

### **CLAUSE 111**

### **PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT**

#### **Replace entire clause 111 with the following:**

#### **Sub Clause 111.1 General**

The Contractor shall take all precautions for safeguarding the environment during the course of the construction of works. He shall abide by all rules, regulations and laws in force governing pollution and environmental protection that are applicable to the area where the works are situated.

#### **NOISE:**

The Contractor shall mitigate against any sustained increase in base line ambient Noise levels at sensitive receptors during construction of work.

All construction operation shall be performed in a manner to minimize noise and vibration. The parameters for noise are detailed below:

75 dB (A) for day;

70 dB (A) for night;

50 dB (A) for day and 40 dB (A) for night for sensitive receptors

If the noise levels are found to be above these standards and it is determined by the Engineer



that these levels are due to the equipment or plant being deployed by the Contractor, he shall undertake, at his own cost measures as approved by the Engineer, to bring these levels down to the specified levels. Blasting should be done as per Indian Explosive Act. People living near such blasting sites shall have prior information of operational hazards. Blasting will not be undertaken at night. Workers at blasting sites will be provided with earplugs. Material haulage roads will be properly regulated.

Labour shall be warned against the hunting of wild life, if any. No archaeological site shall be disturbed.

#### **Sub Clause 111.2 Borrow pits for Embankment Construction**

Borrow pits Borrow pits shall not be dug within the Right-of-Way of the road. Arable lands will not be used for earth borrowing. The Contractor will ensure that proper excavation techniques are used to improve stability and safety of the borrow area. The excavation shall be carried out in such a way that the area does not inundate during monsoons or generate cesspools of water to become mosquito-breeding sites. The stipulations in Clause – 305.2.2 shall govern.

#### **Sub Clause 111.3 Quarry Operations**

The Contractor shall obtain material from licensed quarries only after the consent of the forest department or other concerned authorities. The quarry operation shall be undertaken within the purview of the rules and regulations in force. The Contractor shall ensure scheduling the movement of transport carrying material to and from the site during non-peak hours. The trucks carrying all the dusty material, red earth, moorum and fly ash/ pond, ash shall be covered with a tarpaulin and provided with adequate free board to prevent spillage. End boards shall be provided in loaders to prevent spillage.

Stockpiling of material shall be properly planned so as to ensure that no traffic jam takes place on the highway.

#### **Sub-Clause 111.4 Control of Soil Erosion, Sedimentation and Water**

The Contractor shall carry out the works in such a manner that soil erosion is fully controlled, and sedimentation and pollution of natural water courses, ponds, tank and reservoirs is avoided. The stipulations of Clause 306 shall govern.

#### **Sub Clause 111.5 Precautions against Dust**

The Contractor shall take all reasonable steps to minimize dust nuisance during the construction of the works. All existing highways and roads used by vehicles of the Contractor or any of his sub-Contractors or suppliers of materials or plant, and similarly any new roads which are part of the works and which are being used by traffic shall be kept clean and clear of all dust / mud or other extraneous material dropped by the said vehicles or their tyres. Similarly, all dust / or mud or other extraneous material from the works spreading on these highways shall be immediately cleared by the Contractor. Clearance shall be effected immediately by manual sweeping and removal of debris, or, if so directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed entirely from the road surface. Additionally, the road surface including haul road from Quarries and Plants shall be hosed or watered using suitable equipment to avoid dust pollution. Special care shall be taken to combat dust problem originating from use of fly ash/pond ash.

#### **Sub Clause 111.6 Pollution from Hot Mix Plant, WMM Plant, Batching Plant & Crusher and other Construction Machinery.**

The Contractor shall ensure the use of a relatively new, well maintained hot mix plant (batch type) so that any emission conforms to the CPCB norms and be fitted with a dust extraction unit to avoid prolonged engine powered equipment illness. Hot Mix Plant, WMM plant, Batching Plant & Crusher shall be located more than 500 m from any community or residence and 1 km away from



the sensitive receptors (schools, hospitals), unless otherwise required by the statutory requirements. The Contractor has to obtain necessary consent/clearance from State Pollution Control Board to operate Hot Mix Plant, WMM plant, Batching Plant, DG Set & Crusher before commencement of works.

All vehicles, equipment and machinery needed for construction will be regularly maintained to ensure that pollution emission levels conform to CPCB norms. All vehicles should be fitted with silencers.

Construction vehicles, machinery & equipment will move or be stationed in designated areas to avoid compaction of soil to ensure the preservation of the top soil for agriculture.

### Sub Clause 111.7 Road Safety

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. If there are traffic jams during construction, measures shall be taken to relieve the congestion with the assistance of local traffic police. Safety of workers undertaking various operations during construction will be ensured by providing helmets, masks, safety goggles, etc. One Qualified Safety Officer and one Safety Supervisor must be available in the Contractor's working team for the entire construction period.

The Contractor shall submit the **construction safety check** list in the format given below filled up to fourth column to the Engineer by 5th of every month. The Engineer shall fill up the remaining column of the check list and forward to the Employer within a week period.

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
<b>Safety during Construction Stage</b>							
1	Appointment of qualified Construction safety officers						
2	Approval for Construction Safety Management Plan by the Engineer.						
3	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						





Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
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						
15	Safety arrangements for Road users / Pedestrians						
16	Arrangements for detouring traffic to alternate facility						
17	Regular Inspection of Work Zone Traffic Control Devices by authorized contractor personnel						

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
18	Construction Workers safety - Provision of personnel protective equipment's						
19	A. Helmets						
	B. Safety Shoe						
	C. Dust masks						
	D. Hand Gloves						
	E. Safety Belts						
	F. Reflective Jackets						
	G. Earplugs for labour						
20	Workers employed on gumboots etc. bituminous						
21	Workers engaged in welding work works, stone crushers, concrete batching plants etc. provided with protective goggles, gloves, 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 checkup for Labour/ Contractor's personnel.						
25	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camps.						

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Penalty	Remarks
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						
27	Provision for insurance coverage to the contractor's personnel						

#### **Sub Clause 111.8 Sanitation & Waste Disposal in Construction Camp**

The Contractor shall ensure that construction camps are located at a distance of Minimum 200m from water sources. Special attention shall be paid to the sanitary conditions of the camps. The Contractor shall ensure that sufficient measures are taken i.e. provision of garbage tanks and sanitation facilities. Waste in septic tanks shall be cleaned periodically. Garbage shall be collected in four empty drums at each construction site and disposed of daily. The Contractor shall provide adequate measures for the health care of workers and arrange their regular medical check-up to ensure that they do not suffer from any communicable disease. At every workplace, good & sufficient water supply will be maintained to avoid waterborne/ water related diseases. If any pits are dug at construction / camp sites which are not filled and then may turn into mosquito breeding sites during monsoons shall be filled up properly so that no water accumulates.

#### **Sub Clause 111.9 Substance Hazardous to Health**

The contractor shall not use or generate any material in the works, which is hazardous to the health of persons, animals or vegetation. Where it is necessary to use some such substance which can cause injury to the health of the workers, the Contractor shall provide suitable protective clothing or appliances to his workers, viz. earplugs, helmets or dust masks.

#### **Sub Clause 111.10 Damage to existing road/CD Structures**

Any structural damage to the existing roads/structures by the Contractor's construction equipment shall be made good without any extra cost.

#### **Sub clause 111.11 Use of Nuclear Gauges**

Nuclear gauges shall be used only where permitted by the Engineer. The Contractor shall provide the Engineer with a copy of the regulations governing the safe use nuclear gauges he intends to employ and shall abide by such regulations. Without written approval, no such equipment shall be used at any level of the work.

#### **Sub Clause 111.12 Environmental Monitoring**

In order to carry out periodic checks, environmental monitoring will be carried out by the engineer as per schedule and if any parameter is found above the acceptable standards, mitigation measures / control measures as decided by the Engineer shall be complied with by the Contractor.



### **Sub Clause 111.13 Protections of Existing Trees**

Some of the existing trees within the right of way are likely to be cut down by the Employer prior to handing over of the site to the Contractor. The Contractor shall take all necessary measures to ensure safety and protection of the remaining trees from any action whatsoever relating to his construction operations in the adjoining areas.

Giant neighborhood trees recognized locally as important shall be preserved and engineering designs modified to accommodate these wherever possible depending on Engineer's directions.

### **Sub Clause 111.14 Disposals of Materials outside Work Site**

Notwithstanding other relevant provisions in the contract, the excess material generated by dismantling, excavation, waste material and lubricants, used oil, gasoline and other such substance etc., shall be removed from site outside the right of way at regular intervals and site shall be kept clean from all such disposable materials. Grease, cotton and other waste construction materials shall be disposed off in shallow pits and periodically burnt in a incinerator constructed at each construction site. Such intervals shall not exceed one month under any circumstances. The selection of the disposal site shall be the responsibility of the Contractor and he shall ensure that the selected site does not result in any claim for damages to the Employer or violation of any existing laws.

This section of Technical Specifications sets out instructions, recommended standards and technical specifications for the design and implementation of EMP mitigation works associated with construction of roads.

Environmental Management Plan has been prepared for the Project road, which needs to be followed during the implementation of the civil works. The key responsibility of the contractor/sub-contractor will be the successful implementation of the EMP. In addition, he will update MORT&H on the progress of environmental protection and / or enhancement works as envisaged in the EMP. Execution of environmental mitigation measures meeting the requirement of Technical Specifications in conformity with applicable legislation will be the responsibility of the contractor. It shall also be accompanied with relevant documents (statements of compliance, certificates of compliance, test reports, etc.), evidencing their conformity with the statutory regulations.

#### **111.14.1 Disposal of Unserviceable Materials**

The locations of Disposal sites have to be selected such that:

- Locating the disposal sites is the sole responsibility of the contractor with the approval of Engineer.
- Joint inspection of all disposal sites shall be done by Engineer and Contractor prior to approval.
- No residential area is located downwind side of these locations,
- Disposal sites are located at least 1000 m away from sensitive locations like Settlements, Water body, notified forest areas, Sanctuaries or any other sensitive locations.
- Disposal sites do not contaminate any water sources, rivers etc for this site should be located away from water body and disposal site should be lined properly to prevent infiltration of water.
- Public perception about the location of debris disposal site has to be obtained before finalizing the location.
- Permission from the Village/local community is to be obtained for the Disposal site selected.
- Contractor will resolve all claims arising out of waste disposal at his own cost.

Contractor shall utilize the suitable borrow areas, abandoned quarries and other waste land for the debris disposal.



Contractor needs to plan the disposal in the following way:

- Identify the disposal area.
- Prepare a Contractors debris disposal plan with design drawings for each identified area and get it approved by the Engineer.
- Need to photograph the present land use and condition of the area.
- Construct all required structures (e.g. retaining wall).
- The dumpsites filled only up to the ground level with compaction of the debris materials in layers after disposal.
- The 30 cm top layer of disposal pit shall be provided with good earth suitable for development of vegetation/plantation.
- After leveling, the site could be suitably rehabilitated by planting local species of grass (turfing), shrubs and other plants as decided by the Engineer.

#### **111.14.2 Construction of Water Recharge Pits**

Storm water recharge pits shall be located such that it should be in the valley of the surface layout nearby cross drainage structures and other water bodies along the project road. Water recharge pits shall be located at a height of 3 m. above the ground water table of the area as per the Central Ground Water Board norms. Recharge pits are constructed by the side of the guiding drains such that all the storm water shall be directed to the recharge pit. Any proposal for change in number and location recharge pits by the contractor shall be checked and approved by the Engineer.

Pits, trenches, abandoned dug wells, recharge wells or abandoned bore wells shall be connected by the rain water harvesting system with the consent of the respective owner or as approved by the Engineer.

#### **111.14.3 Construction of Silt Traps**

Silt fences shall be planned such that each recharge pit will have one silt fence to prevent silt from entering the nearest water bodies and also prevent choking of recharge pit by the silt coming from runoff water and increase the life of recharge pits. Silt fence are mounted in guiding drains at a distance of 3 to 5M in the upstream direction depending on the gradient of the guiding drains. However any proposal for change in number and location silt fences by the contractor shall be checked and approved by the Engineer. Sand / silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/ silt particles from run-off.

#### **111.14.4 Scarified Bitumen Disposal Pits**

Scarified bitumen generated out of scarification of existing pavement is used for approach roads by mixing it with fresh bitumen or other granular materials to achieve the required strength followed by profiling and compaction.

The left out portion of the scarified bitumen is disposed safely in a clay lined pit or as directed and approved by the Engineer. A typical clay lined bitumen disposal pit with standard dimension has been worked out. The dimension of the bitumen disposal pit may change provided the clay lining of required thickness is adhered to.

The selection of sites for disposal of scarified bitumen is made on following lines:

- Locating the bitumen disposal sites is the sole responsibility of the contractor with the approval of Engineer.
- Selection of bitumen disposal site is avoided in the quarry regions. If the disposal site is located in the abandoned quarry, region is suitably treatment seal the fractures and fissures.
- Joint inspection of all disposal sites shall be done by Engineer and Contractor prior to approval.
- Disposal sites shall be located at least 1000 m away from sensitive locations like



- Settlements, Water body, notified forest areas, Sanctuaries or any other sensitive locations.
- Disposal sites do not contaminate any water sources, rivers etc for this, site should be located away from water body and disposal site should be lined properly to prevent infiltration of water.
- Public perception about the location of bitumen disposal site has to be obtained before finalizing the location.
- Permission from the Village/local community is to be obtained for the Disposal site selected.
- Contractor will resolve all claims arising out of waste disposal at his own cost.
- Contractor needs to plan the bitumen disposal in the following way:
  - Identify the disposal area.
  - Prepare a Contractors bitumen disposal plan with design drawings for each identified area and get it approved by the Engineer.
  - Need to photograph the present land use and condition of the area.
  - Construct all required structures (e.g. retaining wall) along with clay lining and measures to prevent the seepage of bitumen leachate.
  - The dumpsites filled only up to the ground level with compaction of the materials in layers after disposal.
  - The 30 cm top layer of disposal pit shall be provided with good earth suitable for development of vegetation/plantation.
  - After leveling, the site could be suitably rehabilitated by planting local species of grass (turfing), shrubs and other plants as decided by the Engineer and the supervision consultant.

#### 111.14.5 Provision for Oil Interceptors

Location of Oil Interceptors shall be considered such that each construction camp having refueling stations, oil and lubricants storage places will have one oil interceptor to stop & separate the floating oils. However the number of interceptors shall be increased as the situation demands or during the accidental spillages with the consent of the Engineer.

#### 111.14.6 Environmental Monitoring

Environments Monitoring of Air, Noise, Water and Soil parameters shall be carried by the contractor as per the consents and latest environmental. The Contractor shall comply by all obligations and make sure that there are no deviations from them or from the Contract.

Environmental standards for Air, Noise and water are outlined below.

#### 1. Ambient Air Quality Standards National

S. No.	Pollutants	Time weighted average	Concentration in Ambient Air		Method of Measurement
			Industrial, Residential, Rural & other Areas	Ecologically Sensitive Area (notified by Central Government)	
1	Sulphur Dioxide (SO <sub>2</sub> ) µg/m <sup>3</sup>	Annual*	50	20	Improved West and Geake
		24 hours**	80	80	Ultraviolet Fluorescence
2	Nitrogen Dioxide (NO <sub>2</sub> ) µg/m <sup>3</sup>	Annual*	40	30	Modified Jacob & Hochheiser (Na-Arsenite)



S. No.	Pollutants	Time weighted average	Concentration in Ambient Air		Method of Measurement
			Industrial, Residential, Rural & other Areas	Ecologically Sensitive Area (notified by Central Government)	
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10 $\mu\text{m}$ or PM10 $\mu\text{g}/\text{m}^3$ )	Annual*	60	60	- Gravimetric
					- TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5 $\mu\text{m}$ or PM 2.5 $\mu\text{g}/\text{m}^3$ )	Annual*	40	40	- Gravimetric
					- TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O3) $\mu\text{g}/\text{m}^3$	8 hours**	100	100	- UV Photometric
					- Chemiluminescence
		1 hour **	180	180	- Chemical method
6	Lead (Pb) $\mu\text{g}/\text{m}^3$	Annual*	0.5	0.5	- ASS/ICP method after
					- sampling on EPM 2000 or
					- equivalent filter paper
		24 hours**	1	1	- ED-XRF using Teflon filter
7	Carbon Monoxide (CO) $\text{mg}/\text{m}^3$	8 hour	2	2	Non Dispersive Infra Red
		1 hours**	4	4	- Spectroscopy
8	Ammonia (NH3) $\mu\text{g}/\text{m}^3$	Annual*	100	100	- Chemiluminescence
					-24
		24 hours**	400	400	- Indophenol blue method
9	Benzene (C6 H6) $\mu\text{g}/\text{m}^3$	Annual*	5	5	- Gas chromatography based
					- on continuous analyser
					- Adsorption and desorption
					- followed by GC analysis
10	Benzol (O) Pyrene (BaP) – Particulate phase only $\text{ng}/\text{m}^3$	Annual*	1	1	- Solvent extraction followed
					- by HPLC/GC analysis
11	Arsenic (As) $\text{ng}/\text{m}^3$	Annual*	6	6	- AAS/ICP method after
					- sampling on EPM 2000 or
					- equivalent filter paper
12	Nickel (Ni) $\text{ng}/\text{m}^3$	Annual*	20	20	- AAS/ICP method after



S. No.	Pollutants	Time weighted average	Concentration in Ambient Air		Method of Measurement
			Industrial, Residential, Rural & other Areas	Ecologically Sensitive Area (notified by Central Government)	
					- sampling on EPM 2000 or
					- equivalent filter paper
*	Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.				
**	24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.				

## 2. Water Quality Standards (IS 10500:1991)

S. No.	Parameter	Requirement desirable Limit	Remarks
1.	Colour	5	May be extended up to 50 if toxic substances are
2.	Turbidity	10	May be relaxed up to 25 in the absence of
3.	pH	to 8.5	May be relaxed up to 9.2 in the absence of
4.	Total Hardness	300	May be extended up to 600
5.	Calcium as Ca	75	May be extended up to 200
6.	Magnesium as Mg	30	May be extended up to 100
7.	Copper as Cu	0.05	May be relaxed up to 1.5
8.	Iron	0.3	May be extended up to 1
9.	Manganese	0.1	May be extended up to 0.5
10.	Chlorides	250	May be extended up to 1000
11.	Sulphates	150	May be extended up to 400
12.	Nitrates	45	No relaxation
13.	Fluoride	to 1.2	If the limit is below 0.6 water should be rejected. Max.
14.	Phenols	0.001	May be relaxed up to 0.002
15.	Mercury	0.001	No relaxation
16.	Cadmium	0.01	No relaxation
17.	Selenium	0.01	No relaxation
18.	Arsenic	0.05	No relaxation
19.	Cyanide	0.05	No relaxation
20.	Lead	0.1	No relaxation
21.	Zinc	5.0	May be extended up to 10.0
22.	Anionic detergents (MBAS)	0.2	May be relaxed up to 1
23.	Chromium as Cr+6	0.05	No relaxation
24.	Poly nuclear aromatic Hydrocarbons	--	--
25.	Mineral Oil	0.01	May be relaxed up to 0.03
26.	Residual free	0.2	Applicable only when water is chlorinated
27.	Pesticides	Absent	--





S. No.	Parameter	Requirement desirable Limit	Remarks
28.	Radio active	--	--

### 3. Ambient Noise Quality Standards in Respect of Noise

Area code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

#### Note:-

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

\* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

**Leq:** It is an energy mean of the noise level over a specified period.

**Note:** The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2000 vide S.O. 1046(E), dated 22.11.2000 and by the Noise Pollution (Regulation and Control) (Amendment) Rules, 2002 vide S.O. 1088(E), dated 11.10.2002, under the Environment (Protection) Act, 1986.

#### Sub Clause 111.15

Compliance with the foregoing will not relieve the Contractor of any responsibility for complying with the requirements of any highway authority in respect of the roads used by him.

#### Sub Clause 111.16 Measurement

For Compliance of all provisions made in this Clause 11, it shall be deemed to be incidental to the work and no separate measurement shall be made. The Contractor shall be deemed to have made allowance for such compliance with these provisions in the preparations of his prices for items of work included in the Bill of Quantities and full compensation for such compliance shall be deemed to be covered by them.

### CLAUSE 112 ARRANGEMENTS FOR TRAFFIC DURING CONSTRUCTION

#### Sub Clause 112.1 General

Add at the end of point iv) the following:

Contractor shall coordinate with the Ambulance services offered by Emergency Medical Transport Service (EMTS) provided by Department of Health & Family welfare, Govt. of Nagaland.



Add the following at the end of this Sub-Clause:

“The Contractor shall ensure that all the traffic management devices as per Traffic Management Plan approved by the Engineer are in position before opening of sites of work.”

**Sub-Clause 112.2 Passage of Traffic along a part of the Existing Carriageway under improvement**

**Replace** 2nd sentence of 1st paragraph of the Sub Clause 112.2 with the following: The treatment of the shoulder shall consist of providing at least 150mm thick granular (Wet Mix Macadam) base course covered with 20 mm thick Close-Graded Premix Surfacing/Mixed Seal Surfacing (Type B) as per Clause 508 in a width of at least 1.5m such that the total paved width available for traffic including part of the existing road and treated shoulder is not less than 3.75m and the treated shoulder shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer.

**Replace the Sub Clause 112.3 with the following:**

**Sub Clause 112.3 Passage of Traffic along a Temporary Diversion**

In stretches where it is not possible to pass the traffic on part width of the carriageway, a temporary diversion shall be constructed with 5.5m carriageway and 2.5m earthen shoulders (top 150mm portion constructed with GSB layer) on each side (total width of roadway 10.5m) with the following provision for road crust in the 5.5m width:

- (i) Earthwork
- (ii) 200 mm (compacted) granular sub-base;
- (iii) 225 mm (compacted) granular base course (Wet Mix Macadam);
- (iv) Priming and Tack Coat and
- (v) 20 mm thick Close-Graded Premix Surfacing / Mixed Seal Surfacing (Type B).

The use of Fly ash in temporary diversions shall not be permitted.

The Location of such stretch, alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the engineer.

The Contractor shall be responsible for the design of temporary diversions and submit the design to the Engineer for his approval. If the Contractor finds it necessary to construct part of any diversion outside the Right of Way, the temporary use of additional land shall be arranged for by the contractor at his own risk and cost. Further as per Conditions of Contract, the Contractor shall indemnify the Employer and the Engineer against any claims or proceedings resulting from the occupancy and use of such areas of additional land. Any road side trees that have to be removed for the construction of temporary diversions shall be at the responsibility and cost of the Contractor.

**Sub Clause 112.4 Traffic Safety and Control**

Add following para at the end of this clause:

Should the Contractor fail to make provision as required in the preceding paragraphs, the Employer may provide necessary arrangements, the cost of which shall be recoverable from the Contractor.

**Replace the Sub Clause 112.6 with the following:**

**Sub Clause 112.6 Measurements for Payment and Rate**

- (i) All arrangement for traffic during construction including provision of temporary cross drainage structures, if required and treated shoulder as described in Clause 112.2 and 112.4 including their maintenance, dismantling and clearing debris, where necessary, shall be considered as incidental to the works and shall be the Contractor's responsibility.
- (ii) The construction of temporary diversion including temporary cross drainage structures at



the site of bridge reconstruction location as described in Clause 112.3, shall be payable and measured and paid as per the BOQ. The unit contract rate shall be inclusive of full compensation for construction (including supply of material, labour, tools, etc.), maintenance, final dismantling, and disposal.

## CLAUSE 114 SCOPE OF RATES FOR DIFFERENT ITEMS OF WORK

### Sub Clause 114.2 Add the following at the end of Item (ii) of Clause 114.2:

"The contractor shall submit data via electronic media and hard copy to the Engineer in a form readily compatible with the Engineer's planning system."

### Sub Clause 114.2 Add the following as Item (xix) to sub-Clause 114.2:

"Monthly progress report in a format acceptable to the Engineer" The report shall state the progress which has been achieved compared with the planned progress, illustrate delays in proportion to the progress planned, analyze the consequences and state planned corrective measures. Intermediate progress reports may also be required.

The first issue of the detailed programme including the detailed description of the system and the procedures shall be submitted to the Engineer for acceptance not later than 28 days after the date of receipt of the letter of acceptance."

### Sub Clause 114.2 Add the following as item (xx) to Sub-Clause 114.2

Cost of carrying out Topographic Surveys and Auto Level Surveys.

## CLAUSE 120 FIELD LABORATORY

Replace Sub-Clause 120.2 with the following:

### 120.2 Description

The Contractor shall arrange to provide fully furnished and adequately equipped field laboratory. The field laboratory shall be located in close proximity to the Works site. It shall be provided with electricity supply, electrical wiring and points, all necessary electrical fittings and fixtures; potable water supply including pipes, pumps, storage tanks, plumbing, all necessary fittings and fixtures; septic tank, sewer lines, drains; surfaced access road; fencing and security lighting; security services etc.

The floor space requirement for the field laboratory shall be as indicated in the drawings. It shall include office space for the Materials Engineers, one from the Contractor's side and another from the Engineer's side, space for the installation of equipment, and space for other facilities. The field laboratory shall be fitted complete with laboratory equipment, laboratory tables and cupboards, wash basins, toilet facilities, curing tank around 4m x 2m x 1m in size for the curing of samples, a fume chamber, working platform area of about 1m x 10m against the walls, cupboards above and below the working platform, space for storage of accessories such as sample moulds, space for storage of samples etc. At least 4 racks of slotted angles and M.S. sheets shall also be provided. The furnishing in each of two offices of the Materials Engineers shall include working tables and chairs.

**Table 100-2: List of Laboratory Equipment**

S. No.	Item, Specifications	Nos. Required
<b>A: General</b>		
1)	Weigh Balances	
(a)	5 kg to 20 kg capacity Electronic Type –Accuracy 1 gm	2
(b)	500 gm capacity Electronic Type – Accuracy 0.01 gm	2
(c)	Chemical balance 100gm capacity - Accuracy 0.0001gm	1



S. No.	Item, Specifications	Nos. Required
	(d) Pan balance 5 kg capacity Electronic Type - Accuracy 0.5 gm	2
	(e) Platform Balance Scale – 300 kg capacity	1
	(f) Triple Beam balance-25kg capacity Accuracy 1gm	2
2)	Oven – electrically operated, thermostatically controlled (including thermometer), stainless steel interior	
	(a) From 0°C to 220°C – Sensitivity 1°C	2
3)	Sieves: as per IS: 460-1962	
	(a) IS Sieves 450 mm internal dia. of sieve sets as per BIS of required sieve sizes complete with lid and pan	2 set
	(b) IS sieve 200 mm internal dia. (brass frame and steel/ or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid and pan	2 set
4)	Sieve shaker capable of taking 200 mm and 450 mm dia. Sieves electrically operated with time switch assembly (As per BIS)	1
5)	200 tonnes compression testing machine	1
6)	Stop watches 1/5 sec. Accuracy	2
7)	Glassware comprising of Beakers, Pipettes, dishes, measuring cylinders (100 to 1000 cc capacity) glass rods and funnels, lass thermometers range 0°C to 100°C and metallic thermometers	1 Dozen each
8)	Hot plates 200 mm dia (1500 watt)	6
9)	Enamel trays	
	(a) 600 mm x 450 mm x 50 mm	10
	(b) 450 mm x 300 mm x 40 mm	10
	(c) 300 mm x 250 mm x 40 mm	6
	(d) Circular plates of 250 mm dia.	6
10)	Water Testing Kit	1
11)	First Aid Box	1
12)	Spatula Set of 100 and 200 long	3
13)	Digging Tools (pixels, shovel, fork etc.)	As reqd.
14)	Miscellaneous tools (sledge hammer, lump hammer, wooden pegs	As reqd.
15)	Maximum and Minimum Thermometer	2 Set
16)	Rain Gauge	1 Set
17)	Timer 0-60 minutes with alarm & 1/5 sec accuracy.	3 Sets
<b>B: For Soils and Aggregates</b>		
1)	Water still, 3 liter/hr with fittings and accessories	1
	Liquid limit device with Casagrande and ASTM grooving tools as per IS: 2720	1
3)	Sampling pipettes fitted with pressure and suction inlets, 10 ml.	2 set
4)	Compaction apparatus (Proctor) as per IS: 2720 (Part 7) complete with collar, base plate and hammer and all other accessories	1 set
5)	Modified AASHTO compaction apparatus as per IS. 2720 (Part 8) 1983or Heavy Compaction Apparatus as per IS complete with collar, base plate, hammer and all other accessories	1 set
6)	Sand pouring cylinder with conical funnel and tap and complete as per IS 2720 (Part 28) 1974 including modified equipment	4
7)	Ennore Standard Sand	As Reqd.



S. No.	Item, Specifications	Nos. Required
8)	Sampling tins with lids 100 mm dia x 75 mm ht ½ kg capacity and miscellaneous items like moisture tins with lid (50 grams) etc.	12
9)	Lab CBR testing equipment for conducting CBR testing, load frame with 5 Tonne capacity, electrically operated with speed control as per IS:	1 set
(a)	CBR moulds 150-mm dia – 175-mm ht. complete with collar, base plate etc.	24
(b)	Tripod stands for holding dial gauge holder	24
(c)	CBR plunger with settlement dial gauge holder	24
(d)	Surcharge weight 147-mm dia 2.5 kg wt.	48
(e)	Spacer disc 148-mm dia, 47.7-mm ht. With handle	3
(f)	Perforated plate (Brass)	24
(g)	Soaking tank for accommodating 24 CBR moulds	
(h)	Proving rings of 1000 kg, 2500 kg and 5000 kg capacity	1 each
(i)	Dial gauges, 25 mm travel- 0.01 mm/division	10
(j)	Aluminium Tins	
	50x30mm	36 nos
	55x35mm	36 nos
	70x45mm	36 nos
	70x50mm	36 nos
	80x50mm	36 nos
10)	Standard Penetration test equipment	1
11)	Nuclear moisture Density meter or equivalent	2
12)	Speedy moisture meter complete with chemicals	4
13)	Unconfined compression test apparatus	1 set
14)	Aggregate Impact Test Apparatus	1
15)	Aggregate Impact Test Apparatus as per IS 2386 (Part 4) 1963	1
16)	Los Angeles abrasion Test Apparatus as per IS 2386 (Part 4) 1963	4
17)	Riffle Box of Slot size of 50mm as per ASTM C-136	1
18)	Dynamic Cone Penetrometer	1
19)	Hydrometer with high speed stirrer and jars	2 sets
20)	Post-hole augur (to BS-812)	3
<b>C: For Bitumen and Bituminous Mixes</b>		
1)	Constant temperature bath for accommodating bitumen test specimen, electrically operated and thermostatically controlled (to accommodate minimum six Specimens)	2
2)	Penetrometer automatic type, adjustable weight arrangement and needles as per IS. 1203 – 1978	2
3)	Soxhlet extraction or centrifuge type apparatus complete with extraction thimbles with stocks of solvent and filter paper	1
4)	Bitumen laboratory mixer including required accessories (20 ltrs.)	1
5)	Marshall compaction apparatus automatically operated as per ASTM 1559-62 T complete accessories (with 180 N Marshall)	1 set
6)	Distant Reading Digital Thermometer for Measuring Temperatures in Asphaltic Mixes	As required
7)	Riffle Box	1
8)	Automatic Asphalt Content Gauge [Nuclear or equivalent]	1
9)	Thin film Oven test apparatus for modified binder either with PMB or CRMB	1
10)	Ring Ball Apparatus as per IS 1205- 1978	1





S. No.	Item, Specifications	Nos. Required
	Asphalt Institute Vacuum Viscometer as per IS 1206 (part II) – 1978	
12)	BS U- Tube Modified Reverse Flow Viscometer IS 1206 (Part III) – 1978	1
13)	Apparatus for Determination of Ductility Test as per IS 1208 – Pen Sky – Martin closed Tester for testing flash and fire point as per IS 1209 – 1978.	1
14)	Apparatus for Float Test – IS – 1210 – 1978	1
15)	Apparatus for Determination of water content (Dean and Stark Method) IS – 1211 – 1978	1
16)	Apparatus for Determination of Loss on Heating IS – 1212-1978.	1
17)	Apparatus of Determination of specified Gravity IS-1202-1978	1
18)	Core cutting machine suitable for upto 150mm dia. Core	1
19)	Apparatus for Elastic Recovery test for Modified Bitumen	1
20)	Apparatus for Storage Stability test for Modified Bitumen	1
21)	Apparatus for Separation test for Modified Bitumen	1
22)	Sand Equivalent test apparatus	1
23)	Mastic Asphalt Hardness testing equipment	1
24)	Automatic Asphalt content Meter	1
<b>D: For Cement, Cement Concrete and Materials</b>		
1)	Water still	1
2)	Vicat needle apparatus for setting time with plungers, as per IS.269-1967	1
3)	Moulds	
	(a) 150 mm x 300 mm ht cylinder with capping component along with the capping set and compound as per IS	As required
	(b) Cube 150mm, and 100mm (each size)	As required
	(c) 150mmx100 mm x600mm beam for flexural strength	As required
4)	Concrete permeability apparatus	1
5)	High frequency mortar cube vibrator for cement testing	1
6)	Concrete mixer power driven, 1 cu ft capacity	1
7)	Variable frequency and amplitude vibrating table size 1 metre x 1 metre as per the relevant British Standard	1
8)	Flakiness & Elongation test apparatus	2each
9)	Aggregate impact test apparatus as per IS 2386 (Part 4) 1963	2
10)	Los Angeles abrasion apparatus as per IS. 2386 (Part 4) 1963	1
11)	Flow table as per IS 712-1973	1
12)	Equipment for slump test	2
	(a) Compaction factor test equipment	1
13)	(b) Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3) 1963	2
14)	Compression and Flexural strength testing machine of 200T capacity with additional dial for flexural testing	1
15)	Core cutting machine with 100 mm dia. Diamond cutting edge	1
16)	Needle vibrator	1
17)	Vibrating hammer as per BS specification	1
18)	Air entrainment meter ASTM C - 231	1
19)	0.5 Cu. ft, 1 Cu. ft cylinder for checking bulk density of aggregate with tamping rod	1
20)	Soundness testing apparatus for cement (Lee Chatterlier)	1
21)	Flexural Beam testing machine with accessories	



S. No.	Item, Specifications	Nos. Required
22)	Chemicals solutions and consumable	As reqd.
23)	Chloride Testing kit for chemical analysis of chloride content.	1
24)	ION Exchange kit for rapid determination of sulphate content.	1
<b>E: For Control of Profile and Surface Evenness</b>		
1)	Precision automatic level with micrometer attachment	2 sets
2)	Distomat or equivalent	2 Nos.
3)	Theodolite – Electronically operated with computerised output attachment	2 sets
4)	Total Station with all accessories	2 sets
5)	Roughometer (Towed Fifth Wheel Bump Indicator)	1 set
6)	3 metre straight edge and measuring wedge	2 sets
7)	Camber templates 2 lane	
	(a) Crown type cross-section	2 sets
	(b) Straight run cross-section	2 sets
8)	String line Arrangement with sensor paver	1
9)	Steel tape	
10)	(a) 5 m long	as reqd
	(b) 10 m long	as reqd
	(c) 20 m long	as reqd
	(d) 30 m long	as reqd
	(e) 50 m long	as reqd
	Precision Staff	3 Sets
11)	BBD Test Equipment with Accessories	1 Set

**Notes:**

- 1) The laboratory set-up must be complete including a set of reference standards, adequately staffed and operational to the satisfaction of the Engineer not later than 1) The laboratory set-up must be complete including a set of reference standards, adequately staffed and operational to the satisfaction of the Engineer not later than 2 months from the date of receipt of Notice to commence the works. The Contractor shall be responsible for the provision of adequately experienced and qualified laboratory staff, in sufficient numbers to be able to meet all testing requirements to the approval of the Engineer, and for the supply of all transportation of staff, testing equipment and samples necessary to allow the testing to be performed in a time scale compatible with the needs of the Site.
- 2) The laboratory setup may be reduced after issue of Taking Over Certificate with the approval of Engineer.

**Sub Clause 120.4 Maintenance**

This Clause shall read as under:

This Contractor shall arrange to maintain the laboratory in satisfactory manner and will carry stocks of spare equipment and laboratory consumables until the issue of Performance Certificate. Maintenance include the day to day upkeep of the laboratory building and the surroundings, attending to repairs to various parts of the building, furniture, fittings, office/laboratory equipment's and the concerned services as and when necessary, including the periodic white/colour washing of building and painting of wood, steel work, replacing the broken window/door/ventilator, glasses, furniture and other hardware and maintaining necessary watch and ward during the day and night.



The Contractor shall arrange to provide uninterrupted supply of electricity and water for the laboratory building. In case of failure of main power/water supply, alternate source shall be available for providing uninterrupted supply.

## **CLAUSE 122 PROVIDING AND MAINTAINING VEHICLES FOR THE EMPLOYER**

### **Sub-Clause 122.1 Scope**

The work covers providing and maintaining of hard top, non AC passenger car for use by the Employer.

### **Sub-Clause 122.2 Description**

The passenger cars shall be petrol or diesel driven having adequate cylinder capacity. The number of vehicles to be provided by the Contractor shall be decided by the Engineer at Various times, out of the total provision in the Bill of Quantities and indicated in writing.

The Contractor shall provide within one month from the date of order by the Engineer, vehicles as indicated above. The vehicles shall be provided and maintained until issue of the taking over Certificate for the complete work. Initially, new vehicles shall be provided in case of vehicles of Indian make, a vehicle shall be replaced with a new vehicle after a maximum run of 75,000 km or two years whichever is earlier. All necessary taxes for operating the vehicles shall be fully paid and all necessary papers shall be provided as required by prevailing Motor Vehicles Act with comprehensive insurance cover for the vehicles. The vehicles shall be provided day and night as required by the engineer The Contractor shall also make available drivers having valid license at such times and for such duration as instructed by the Engineer.

### **Sub-Clause 122.3 Maintenance**

The vehicles shall be maintained in a smooth running condition. All expenses required for keeping the vehicles in smooth running condition such as fuel, lubrication oil and other consumables, necessary service and maintenance, drivers, repairs and replacement etc. are to be met by the Contractor. In the event of any vehicle being off the road for maintenance work or on account of breakdown, the Contractor shall provide substitute vehicle(s) or substitute vehicle(s) immediately. If the contractor at any time fails to provide vehicle(s) or substitute vehicle(s) as specified above, an amount of Rs 3000 per day or part thereof for each vehicle (that the Contractor failed to provide) shall be debited to the Contractor's account. Also the number of days for which the vehicle(s) were not provided shall not be included for payment.

If the contract works are not completed within the stipulated period or within the granted extended time of completion, provision and maintenance of vehicles in accordance with clause 122.1 through 122.4 shall be carried out by the Contractor at his own cost and no payment shall be made for the same. In case of any failure by the Contractor to do so, an amount of Rs 3000 per day or part thereof per vehicle shall be debited to the Contractor's account.

### **Sub-Clause 122.4 Withdrawal of Vehicles**

The Contractor shall withdraw particular vehicle/vehicles for the non-use by the Employer if so directed by the Engineer. In such cases the instructions for non-use of vehicle shall be given in writing 15 days in advance and the withdrawal of vehicles shall not be for a period of less than 15 days continuously at a time.

### **Sub-Clause 122.5 Measurements for Payment**

The payment for providing and maintaining vehicles shall be on vehicle day basis for actual number of days the vehicles were provided in satisfactory working order. No payment shall be made for the period of withdrawal as per clause 122.4 irrespective of the fact whether vehicle was available or not.





## Sub-Clause 122.5 Rates

The Contract unit rate for providing and maintaining vehicles for the Engineer shall include all expenses towards providing and keeping the vehicles in smooth running condition including taxes etc., mentioned in the preceding paras.

## SECTION 200 SITE CLEARANCES

### CLAUSE 201 CLEARING AND GRUBBING

**Sub Clause 201.5 Delete 1st sentence in the 1st Paragraph in Sub-Clause 201.5 and add the following sentence.**

Clearing and grubbing for road embankment, drains and cross drainage structures shall be measured on area in plan basis in terms of hectares.

### CLAUSE 202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES / PAVEMENTS

#### Sub-Clause 202.6 Measurements for Payment

This Clause shall read as:

The work of dismantling shall be paid for in units indicated below by taking measurements before and after, as applicable:

i	Dismantling brick/stone masonry / plain cement concrete / reinforced cement concrete including reinforcement	Cum
ii	Dismantling pavement structures such as Granular Course, Bituminous course, Concrete pavement	Cum
iii	Dismantling pipes, guard rails, road kerbs, gutters and fencing	Linear Meter
iv	Dismantling guard Stones/KM stones/Sign post/Hect. Stones/5th KM stones	Nos
v	Dismantling RCC railing	Linear Meter
vi	Dismantling angle type expansion joints of bridges	Linear Meter
vii	Dismantling of railing kerb	Linear Meter
viii	Dismantling of Concrete Edge strip without damaging existing structure	Linear Meter
ix	Dismantling of drainage spout including cleaning entire area, enclosure of metallic bearing	Nos
x	Dismantling of Stone pitching/ boulder apron/ brick soling/ Stone soling	Cum

## SECTION 300 EARTHWORK, EROSION CONTROL AND DRAINAGE

### CLAUSE 301 EXCAVATION FOR ROADWAY AND DRAINS

#### Sub-Clause 301.3.5 Rock Excavation

The first sentence of first paragraph shall read "Rock, when encountered in road excavation shall



be removed up to a level of 150mm below the base of WMM.”

**Sub-clause 301.3.7 Excavation of road shoulders/verge/medians for widening of pavement or providing treated shoulders:**

The 2nd sentence of this Clause shall read as under:

The Subgrade material within 500mm from the bottom of the pavement for the widened portion and paved shoulder shall be loosened and recompacted as per Clause 305 if it does not meet the compaction requirement of Table 300-2.”

**Sub Clause 301.6 Preparation of Cut Formation**

Third paragraph shall be read as under:

“In rock formation, the rock shall be cut 150mm below the specified elevation of base of WMM and the surface irregularities shall be corrected. The gap between rock cut and base of WMM shall be filled with 150mm thick granular sub-base as per Grading-V of Table 400-1 of Clause 401. The unsuitable material shall be disposed of in accordance with Clause 301.3.11”.

**Sub Clause 301.8 Measurements for Payment**

In first line of first paragraph add “and drains” after the word “roadway”

**CLAUSE 304 EXCAVATION FOR STRUCTURES**

**Sub Clause 304.3.2 Excavation**

At the end of 1st paragraph of Clause 304.3.2 insert the following additional sentences:

“The Contractor shall ensure the stability and structural integrity of adjacent existing foundations and structures and if necessary shall, at his own expense, install temporary or permanent sheet piles, coffer dams, shoring or similar support or protection to the satisfaction of the Engineer.”

**CLAUSE 305 EMBANKMENT CONSTRUCTION**

**Clause 305.2.1.6 The 1st sentence of this Clause shall read as under:**

“The material to be used in subgrade shall conform to the design CBR value of not less than as specified in the drawing at the specified density and moisture content of the test specimen.”

**Clause 305.2.2.4 Compaction Requirements**

In Clause 305.2.2.4 after the 1st paragraph delete Table 300-2 and substitute the following:

**Table 300-2: Compaction Requirements for Embankment and Sub-grade**

S. No.	Type of Work/ Material	Relative Compaction as %age of maximum laboratory dry density as per IS 2720 (Part 8)
1	Subgrade and earthen shoulders	Not less than 97%
2	Embankment (Except top 200mm)	Not less than 95%
3	Embankment (For top 200mm)	Not less than 97%
4	High Embankment (Height >6m)	Not less than 97%
5	Expansive clays	Not allowed
6	Design CBR of Subgrade & Shoulder shall be as per Drawing, but not less than 8%	

**Sub-Clause 305.9.1**

Add new sub section as (xv) “slush removal”

**Sub Clause 306.4 Replace Sub-clause 306.4 with the following:**

“The soil erosion, sedimentation and pollution control works shall be deemed as incidental to the



earthwork and other items of work and, as such, no separate payment shall be made for the same

#### **Sub Clause 306.5 Rates**

This Clause shall be deleted.

#### **Sub-Clause 309.4 Measurements for Payment**

This Clause shall read as:

“Construction of drains shall be measured as finished work in position as below:

a)	Excavation for drain	As per Clause 301
b)	Plain Cement concrete grade M15	Cubic metre
c)	Reinforced Cement Concrete grade M25	Cubic metre
d)	Steel Reinforcement	Tonne
e)	Weep holes	Nos.
f)	Grating	Nos.
g)	Drainage Chute	Running metre
h)	Energy Dissipation Basin	Nos.
i)	Loose Boulder Apron	Cubic meter

### **SECTION 400 SUB-BASES, BASES (NON-BITUMINOUS) AND SHOULDERS**

#### **CLAUSE 401 GRANULAR SUB-BASE**

##### **Sub Clause 401.2 Materials**

##### **Sub Clause 401.2.1 The Clause shall read as follows:**

“The material to be used for the work shall be crushed stone conforming to the physical requirements stipulated in Sub-Clause 401.2.2. The material shall be free from organic or other deleterious constituents and conform to Grading-V of Table 400-1.”

##### **Sub Clause 401.3 Construction Operations**

##### **Sub-Clause 401.3.1: Preparation of Sub grade**

**Add the following paragraphs at the end of the 1st paragraph of Sub-Clause 401.3.1: Preparation of Sub grade**

Where the existing pavement is to be overlaid by a granular base/ sub-base, then the pavement shall be scarified in accordance with Sub Clause 501.8.3.2. Where the existing pavement contains multiple bituminous layers the scarification shall be to the underside of the lowest bituminous layer. The Contractor will verify that all bituminous layers have been removed using appropriate methods approved by the Engineer. The bituminous surfacing material removed from the existing pavement may be used in other parts of the works as directed by Engineer provided it complies with the relevant specification clauses.

After scarification and removal to the satisfaction of the Engineer of the bitumen surface from the existing pavement to be overlaid, the surface shall be lightly sprinkled with water if necessary and rolled with three passes of an 8-10 Ton smooth wheeled roller. The existing pavement shall then be proof rolled with an 8 tonne single drum vibrating roller in the presence of the Engineer who shall determine suitability of the surface for overlay.

#### **CLAUSE 406 WET MIX MACADAM SUB-BASE/BASE**

##### **Sub Clause 406.2 Materials**

##### **Sub-Clause 406.2.1 Physical requirements**

**Add following after 2nd Sentence in 1st Paragraph in the Sub Clause 406.2.1.1 and replace with the following Sentence:**



“The constituents of the aggregates shall be produced by an integrated crushing and screening plant (200T/hour) having appropriate primary crusher, secondary cone crusher, vertical shaft impactor and vibratory screen, unless otherwise instructed by the Engineer, crushing shall be carried out in at least two stages. The fraction of material passing through 4.75mm sieve shall also be crusher run screening only.”

### **Sub-Clause 406.3 Construction Operations**

#### **Sub Clause 406.3.4 Spreading of Mix**

**Replace “may” with “shall” in the 1<sup>st</sup> sentence of 2<sup>nd</sup> paragraph of Sub-Clause 406.3.4.**

**Delete the last paragraph of Sub-Clause 406.3.4.**

#### **Sub-Clause 406.3.5 Compaction**

**Delete second sentence of Paragraph 1 of Clause 406.3.5.**

### **CLAUSE 410 FOOTPATHS AND SEPARATORS**

**Replace the entire Clause 410 with the following:**

#### **410.1 Scope**

The work shall consist of constructing footpaths and/or separators at locations as specified in the drawings or as directed by the Engineer. The lines, levels and dimensions shall be as per the drawings. The scope of the work shall include provision of all drainage arrangements as shown in the drawings or as directed.

#### **410.2. Materials**

The footpaths and separators shall be constructed with the following type:

Precast cement concrete block/tiles of Grade M20 as per Sections 1700 of the Specifications. The minimum thickness of the cement concrete block/tile shall be 25 mm and minimum size shall be 300 mm x 300mm.

#### **410.3. Construction Operations**

**410.3.1** Drainage pipes below the footpath originating from the kerbs shall be first laid in the required slope and connected to the drains/sumps/storm water drain/drainage chutes as per provisions of the drawings, or as specified.

**410.3.2** Portion on back side of kerbs shall be filled and compacted with granular sub-base material as per Clause 401 of the Specifications in specified thickness.

**410.3.3** The base shall be prepared and finished to the required line, levels and dimensions as indicated in the drawings with the following:-

- a) Minimum 150 mm thick, compacted granular sub-base material as per Clause 401 of the Specifications.
- b) Minimum 25 mm thick cement concrete of Grade M15.

Over the prepared base, precast concrete tiles shall be set/laid as described in Clauses 410.3.4.

#### **410.3.4 Precast cement concrete tiles:**

The tiles shall be set on a layer of average 12 mm thick cement-sand mortar (1:3) laid on prepared base in such a way that there is no rocking. The gaps between the tiles shall not be more than 12 mm and shall be filled with cement-sand mortar (1:3).

#### **410.4 Measurements for Payment**

Footpaths and separators shall be measured in sq. meter between inside of kerbs.



## **410.5 Rates**

Contract unit rates shall be inclusive of full compensation of all labour, materials, tools, equipments and incidentals to construction of footpaths. Cost of providing pipes and arrangement for their discharge into appropriate drainage channels shall be incidental to the construction of footpaths.

## **SECTION 500 BASE AND SURFACE COURSES (BITUMINOUS)**

### **CLAUSE 501 GENERAL REQUIREMENTS FOR BITUMINOUS PAVEMENT LAYERS**

#### **Sub Clause 501.2 Materials**

##### **Sub-Clause 501.2.2 Coarse Aggregates**

Delete “, crushed gravel or other hard material” from 1<sup>st</sup> Line of Para 1.”

Para 2 is deleted.

#### **Sub Clause 501.3 Mixing**

**Line 1, Paragraph 1, replace “Adequate Capacity” with “Hot mix plant of Batch Mix type of minimum capacity of 160 T per hour.”**

#### **Sub Clause 501.6 Compaction**

**Replace** the sentence “The intermediate rolling .....0.56 MPa.” **With** “The intermediate rolling shall be done with a smooth wheeled tandem vibratory roller of 8-10 tonne weight followed by a pneumatic tyre roller of 12-15 tonnes weight having nine wheels, with a tyre pressure of at least 0.56 MPa.” **in 2<sup>nd</sup> paragraph.**

### **CLAUSE 502 PRIME COAT OVER GRANULAR BASE**

#### **Sub-Clause 502.2 Materials**

##### **Sub-Clause 502.2.1 This Clause shall be read as under:**

**"502.2.1** The primer shall be cationic bitumen emulsion SS1 grade conforming to IS: 8887 and shall be refinery produced."

#### **Sub Clause 502.8 Rate**

This Clause shall be read as under:

“The contract unit rate for prime coat shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8 and as applicable to the work specified in these Specifications.”

### **CLAUSE 503 TACK COAT**

#### **Sub-Clause 503.2 Materials**

This Clause shall be read as under:

“The binder used for tack coat shall be low viscosity paving bitumen of VG10 grade conforming to IS: 73 and shall be refinery produced.”

#### **Sub Clause 503.8 Rate**

This Clause shall be read as under:

“The contract unit rate for tack coat shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 501.8.8 and as applicable to the work specified in these Specifications.”



## **CLAUSE 505 DENSE BITUMINOUS MACADAM**

### **Sub-Clause 505.2.1 Bitumen**

This Clause shall be read as under:

“The bitumen shall be paving bitumen of viscosity grade VG-30 complying with Indian Standard Specifications for “Paving Bitumen”, IS: 73.”

### **Sub-Clause 505.2.2 Coarse Aggregates**

**Delete** the words “, crushed gravel or other hard material’ from the first sentence of Clause 505.2.2.

**Delete** 2<sup>nd</sup> paragraph of Clause 505.2.2.

### **Sub-Clause 505.2.3 Fine Aggregates**

**Replace** the words “or natural occurring mineral material, or a combination of the two” with “material” in the 1<sup>st</sup> sentence of the Clause 505.2.3.

**Delete the 4<sup>th</sup> sentence** of the Clause 505.2.3.

### **Sub Clause 505.2.4 Filler**

“The first sentence of this clause shall read as “Filler shall consist of finely divided hydrated lime”

### **Sub Clause 505.2.5 aggregate Grading and Binder Content**

**Add** the following at the bottom of **Table 500-10**:

“The grading of the aggregate mix as used in work shall be a smooth curve within and approximately parallel to the envelope in Table 500-10”.

### **Sub-Clause 505.9 Rate**

Add the words “except for item of prime coat and tack coat” after the words “required operations” in 2nd line.

## **CLAUSE 507 BITUMINOUS CONCRETE**

### **Sub-Clause 507.2.1 Bitumen**

This Clause shall be read as under:

“The bitumen shall be paving bitumen of viscosity grade VG-30 complying with Indian Standard Specifications for “Paving Bitumen”, IS: 73.”

### **Sub-Clause 507.2.2 Coarse Aggregates**

Delete the words “and where crushed gravel is proposed ..... two fractured faces” from the first sentence of Clause 507.2.2.

### **Sub Clause 507.2.5 aggregate Grading and Binder Content**

**Add** the following at the bottom of **Table 500-17**:

The grading of the aggregate mix as used in work shall be a smooth curve within and approximately parallel to the envelope in Table 500-17”.

### **Sub-Clause 507.9 Rate**

Replace “504.9” with “505.9” in the Clause 507.9.





## **CLAUSE 508 CLOSE GRADED PREMIX SURFACING/MIXED SEAL SURFACING**

### **Sub Clause 508.1 Scope**

#### **Sub Clause 508.1.2**

This Clause shall read as under

Close graded Premix surfacing shall be “Type B”

### **Sub Clause 508.2 Materials**

#### **Sub-Clause 508.2.1 Binder**

This Clause shall be read as under:

“The binder shall be paving bitumen of viscosity grade VG-30 complying with Indian Standard Specifications for “Paving Bitumen”, IS: 73.”

#### **Sub-Clause 508.2.2 Coarse Aggregates**

Replace “511.1.2.2” with “510.1.2.2” in the Sub-Clause 508.2.2.

#### **Sub-Clause 508.2.3 Fine Aggregates**

Delete the words “, or natural sand or a mixture of both” with “material” in the 1st sentence of the Clause 508.2.3.

### **Sub Clause 508.8 Rate**

Add the words “except for item of prime coat and tack coat” after the words “required operations” in 2nd line.

## **Clause 510 OPEN GRADED PREMIX SURFACING**

### **Sub Clause 510.1 Open-Graded Premix Surfacing using Viscosity Grade Paving Bitumen**

#### **Sub Clause 510.1.2 Materials**

##### **Sub Clause 510.1.2.1 Binder**

This Clause shall read as under

“The binder shall be paving bitumen of viscosity grade VG-30 complying with Indian Standard Specifications for “Paving Bitumen”, IS: 73.”

##### **Sub Clause 510.1.8 Rate**

Add the words “except for item of prime coat and tack coat” after the words “required operations” in 2nd line.

## **CLAUSE 516 MASTIC ASPHALT**

### **Sub-Clause 516.2 Materials**

#### **Sub-Clause 516.2.2 Coarse Aggregates**

**Delete** the words “, crushed gravel/shingle or other stones” from the first sentence of Clause 516.2.2.

#### **Fine Aggregates**

Delete the words “, natural sand or a mixture of both” in the 1<sup>st</sup> sentence of the Clause 516.2.2.

#### **Sub-Clause 516.4.5 Spreading**

**Replace** “Table 500-6” with “500-5” in sub-paragraph 2) of 4<sup>th</sup> paragraph of Sub- Clause 516.4.5.



#### **Sub-Clause 516.4.7 Surface Finish**

**Replace** “retained on the 6.7 mm sieve” with “retained on the 9.5 mm sieve” in 4<sup>th</sup> line of Sub-Clause 516.4.7.

### **SECTION 800 TRAFFIC SIGNS, MARKINGS AND OTHER ROAD APPURTENANCES**

#### **CLAUSE 801 TRAFFIC SIGNS**

**Sub-Clause 801.2.1** This clause shall read as under: “Concrete shall be M25 grade.”

**Sub-Clause 801.2.5** The 1<sup>st</sup> sentence shall read as under:

“The substrate shall be either Aluminium sheeting or Aluminium Composite material (ACM) Aluminium sheets used for sign boards shall be smooth, hard and corrosion resistant aluminium alloy conforming to IS 736 Material Designation 24345 or 1900”

#### **Sub-clause 801.4 Installation**

**Sub-clause 801.4.1** The 1<sup>st</sup> sentence of Clause shall read as follows:

Traffic Signs shall be mounted on support posts, which shall be of MS pipe 80mm dia. (NB-MW) or as shown in the drawing.

**Sub-clause 801.4.2** Add following at the end of this clause:

“The sign back shall be painted with two coats of grey colour epoxy paint. The sign post shall be painted in black & white alternate bands with two coats of epoxy paint.”

#### **Clause 802 OVERHEAD SIGNS**

**Sub-Clause 802.4.2** Replace the words “they shall .... IS Specifications.” with “they shall be thoroughly descaled, cleaned, primed along with all other components of signs, except reflective portion. They shall be painted with two coats of epoxy paint. The sign back side shall be painted with grey colour and post shall be painted in black & white alternate bands. The post below ground shall be painted with three coats of red lead paint.

**Sub-Clause 802.4.3** The last sentence of this Clause shall read as under: “The thickness of aluminium sheet shall be 2 mm.”

#### **CLAUSE 803 ROAD MARKINGS**

##### **Sub Clause 803.2 Materials**

This clause shall read as under:

“Road markings shall be of hot applied thermoplastic compound and the materials shall meet the requirements as specified in Clause 803.4.

##### **Sub Clause 803.8.11 Measurement for Payment**

The 1<sup>st</sup> sentence of this Clause shall read as under:

“The Audible and Vibratory pavement markings shall be measured in square metre of area including the gaps.”

#### **CLAUSE 805 DISTANCE INDICATOR POST**

**Sub Clause 805.3** The first sentence of this Clause shall read as under:

“The hectometre/kilometer/5th kilometer distance indicator posts shall be made of concrete of grade as shown in the drawing.”

##### **Sub Clause 805.5 Rate**

This Clause shall read as under:





“The Contract unit rate for hectometre/kilometer/5th kilometer distance indicator posts shall be payment in full compensation for furnishing all labour, materials, tools, equipment including cost of excavation, foundation in M15 grade concrete, formwork, backfilling, etc and making the posts, painting and lettering and fixing at site and all other incidental costs necessary to complete the work to these Specifications.”

## **CLAUSE 807 BOUNDARY STONES**

### **Sub Clause 807.1 Scope**

Add at the end of Paragraph 1, “The boundary stones shall be of concrete as shown in drawing.” The words ‘SH-.....’ or as directed by the Engineer should be engraved on each stone appropriately.

## **CLAUSE 809 TUBULAR STEEL RAILING**

**Sub Clause 809.3** Add the following to the end of this Sub-Clause:

“The railing shall be embedded in the concrete foundation of size and the grade of concrete along with the depth of the embedment of post as indicated in the drawing.”

### **Sub Clause 809.5 Rate**

After the words “test and final erection at site” in 3rd line of this Clause, add the words “including cost of excavation, concrete foundation etc.”

## **CLAUSE 811 CRASH BARRIER**

### **Sub Clause 811.2 Concrete Crash Barrier**

#### **Sub Clause 811.2.1 Materials**

**Sub Clause 811.2.1.2** This Clause shall read as under: “The grade of concrete shall be M-40.”

#### **Sub Clause 811.2.2 Construction Operations**

**Sub Clause 811.2.2.2** Replace “Clause 810.2.2.3” with “Clause 811.2.2.3” in the 4th line of 1st paragraph of Clause 811.2.2.2.

### **CLAUSE 811.3 Metal Beam Crash Barrier**

**Sub Clause 811.3.1.2** Replace 1st paragraph of Sub-Clause 811.3.1.2 with the following:

Metal beam is a “W” profiled corrugated beam as specified in drawings made from hot dip galvanised rail of 3.0 mm thick using high strength steel of IS:5986 Fe 510 grade and have properties as under:

Ultimate Tensile Strength (Min.): 483 MPa.

Yield stress (Min.): 345 MPa.

Elongation (Min.) in 50mm: 12%

The beam after forming shall have formed width of 312 mm and depth of 81 mm and shall have punched holes for fixing as specified in drawings.

The steel post and the blocking out spacer shall both be channel section of 75 mm x 150 mm & size 5 mm thick conforming to IS: 5986 grade Fe.360 as specified in drawings. The rail shall be 73 cm above the ground level and posts shall be spaced 2.0 m centre-to centre. Double “W” beam barrier shall be as indicated in the drawing.

The Guardrail reflector shall be hot dip galvanized 0.55 kg per square meter.

Test specimens for mechanical properties and coating shall be prepared and tested as specified in relevant IS codes.



**Sub Clause 811.3.1.3** This Clause shall read as under:

“Concrete for bedding and anchor assembly shall conform to Section 1700 of these Specifications. The size of the concrete foundation block for embedding the posts and grade of concrete shall be as shown in the drawing.”

**Sub-Clause 811.3.3 Installation of Posts**

The sub-clause 811.3.3.1, 811.3.3.2, 811.3.3.3 and 811.3.3.4 are replaced as below:

“The steel posts shall be embedded in the concrete foundation of size and the grade of concrete along with the depth of the embedment of post as indicated in the drawing.”

**Sub Clause 811.3.3.5** This Clause shall read as under:

“Posts and end section for metal beam guardrails on bridges shall be bolted to the structure as detailed in the drawings. The anchor bolts shall be set to proper location and elevation with templates and carefully checked.”

**Clause 811.3.4.3** Add at the end of this Clause:

“The guard rail reflector shall be bolted replacing splice washer at every 10th posts interval.”

**Sub-Clause 811.3.7 Measurements for Payment**

**Sub-Clause 811.3.7.1** The 2<sup>nd</sup> sentence "Terminals/ anchors of various types shall be paid by numbers" is deleted.

**Sub-Clause 811.3.7.2** This Clause shall read as under:

“No separate measurement for payment shall be made for Terminals/anchors of various types required for the work. The cost of these elements shall be deemed to be included in the rate quoted by the Contractor. Furnishing and placing anchor bolts and/or devices for guard rail posts on bridges shall be considered incidental to the construction and the costs thereof shall be included in the price for other items of construction.”

**Sub-Clause 811.3.7.3** The words “and concreting” shall be added after the words “or backfilling”.

**Sub Clause 811.3.8 Rate**

Add the words “and drawings” at the end of the last sentence in Sub-Clause 811.3.8.

**CLAUSE 813 TRAFFIC CONTROL AND SAFETY DEVICES IN CONSTRUCTION ZONE**

**Sub Clause 813.11 Measurement**

This Clause shall read as under:

The Provisions made in Bill of Quantities shall be the ceiling for the Contract during the Contract Period. The Additional claims due to damage and theft of the same shall be deemed incidental to works. No extra payment shall be made towards additional quantities for these bill items.

**Sub Clause 813.12: Rate**

All arrangements for traffic control and safety device in construction zone during construction including their maintenance, dismantling and clearing debris, where necessary, shall be considered as incidental to the works and shall be the Contractor's responsibility, unless provided as a separate payable item in the BOQ.”

**SECTION 1000 MATERIALS FOR STRUCTURES**

**CLAUSE 1002 SOURCES OF MATERIALS**

Add the words “at his own expense” at the end of 3<sup>rd</sup> paragraph of Clause 1002.



## **CLAUSE 1006 CEMENT**

The 1<sup>st</sup> paragraph of this Clause shall read as follows:

“Cement to be used in bridge structures shall conform to the following standard: IS:12269 – Specification for 53 Grade Ordinary Portland cement.

For other works Ordinary Portland cement 43 grade, conforming to IS 8112 shall be used with the prior approval of the Engineer.”

## **CLAUSE 1007 COARSE AGGREGATES**

Delete the following from 3rd and 4th lines of 1st paragraph “Crushed gravel .....inert material”

## **CLAUSE 1008 SAND/FINE AGGREGATES**

Delete from the 1<sup>st</sup> line the word “or crushed gravel sand” and from the 2<sup>nd</sup> line “or gravel” in Paragraph 2.

## **CLAUSE 1014 STORAGE OF MATERIALS**

**Sub Clause 1014.3: Add the following to the Sub-clause 1014.3:**

“Aggregates shall be stored or stockpiled in their respective size in such a manner that the various sizes will not become intermixed before proportioning. They shall be stored, stockpiled and handled in such a manner that will prevent contamination by foreign materials.”

## **SECTION 1500 FORMWORK**

### **CLAUSE 1501 DESCRIPTION**

Add the following paragraphs at the end of this Clause:

“The Contractor shall prepare a formwork mobilization and utilization plan and submit the plan for Engineer’s approval at least 21 days before the commencement of construction of structures. The requirement of formwork shall be worked out considering the overall construction program of all the structures to be cast in one or more stages, as specified in the drawings. The plan shall take into account the time required for erection of formwork, retention in position, stripping, and removal and subsequent use in the next and subsequent structures.

Notwithstanding Engineer’s approval of mobilisation plan, if due to any reason, Contractor has to arrange additional formwork, to meet the requirements of the construction program, it shall be done by the Contractor without any extra cost to the Employer.”

### **CLAUSE 1502 MATERIALS**

Delete the last sentence in 1<sup>st</sup> paragraph.

Delete the word “or timber” in 1<sup>st</sup> line of 2<sup>nd</sup> paragraph.

### **CLAUSE 1506 PRECAUTIONS**

Add the following as items (vii) and (viii) to this Clause:

- vii) Adequate support against sideway and lateral loads due to construction operations and wind shall be provided.
- viii) In case cantilevers are supported directly from the ground, the supports for cantilevers shall be removed simultaneously with main supports only after approval for the same from the Engineer.

### **CLAUSE 1513 RATE**

Add the following at the end of the first paragraph:



“The unit rate shall also include all costs for preparation of erection scheme, designs of false work and formwork.”

## SECTION 1600 STEEL REINFORCEMENT

### CLAUSE 1602 GENERAL

Paragraph 2 of Clause 1602 shall read as follows:

“Reinforcements shall be High Strength Deformed Steel Bars (HSD) of grade Fe 500D conforming to IS: 1786. Only uncoated steel shall be used as reinforcement unless specified.”

### CLAUSE 1603 PROTECTION OF REINFORCEMENT

Replace “1010.3.2” with “1009.3.2” in 2nd line of 3rd paragraph of Clause 1603.

### CLAUSE 1605 PLACING OF REINFORCEMENT

Add the following as sub Para (f) to this **Clause**:

#### Tolerances:

1. Tolerance of cover: Deviation shall not exceed + 10 mm No negative tolerance is allowed.
2. Tolerance in position: Tolerance for deviation from the positions shown in the drawings shall not exceed the following:

Structural depth d (mm)	Tolerance (mm)
$d < 1000$	$< 10$
$1000 < d < 2000$	$< 0.01d$
$2000 < d$	$< 20$

## SECTION 1700 STRUCTURAL CONCRETE

### CLAUSE 1705 ADMIXTURES

#### Sub Clause 1705.1: Chemical Admixtures

Replace “Clause 1007” with “Clause 1012” in the 3<sup>rd</sup> paragraph of Sub-Clause 1705.1.

### CLAUSE 1706 SIZE OF COURSE AGGREGATE

Table 1700-7 shall be modified as given below:

Components	Maximum nominal size of Coarse aggregate (mm)
a. RCC Well Curb.	20
b. RCC / PCC well steining, PCC below foundations and approach slab, annular filling around foundations.	40
c. Well cap or pile cap; solid wall type abutments, piers, median walls, splayed wing walls and their foundations.	40
d. RCC works in T-beam and slab / solid slab / voided slab and box girder superstructure, wearing coat, kerb, crash barrier, approach	20



Components	Maximum nominal size of Coarse aggregate (mm)
slab, dirt walls, coping on masonry wing walls, hollow abutments and piers, pier / abutment caps, pedestals, dirt walls, piles, all components of counter fort type abutments, columns, cantilever return walls etc.	20
e. All PSC works	As specified by the Engineer
f. Any other item	

## Clause 1707 EQUIPMENT

The Para “a (i) & (ii)” shall be replaced with the following:

For production of concrete, batching and mixing of the concrete shall be done in a concrete batching and mixing plant fully automatic of a minimum capacity of 15 cum/hour. The plant shall be approved by the Engineer.”

## CLAUSE 1715 HIGH PERFORMANCE CONCRETE

### Sub Clause 1715.9: Additional Tests for Concrete

Replace “Clause 1714.3” with 1714.4 in 2<sup>nd</sup> line of Sub-Clause 1715.9.

## CLAUSE 1800 PRESTRESSING

## CLAUSE 1803 MATERIALS

### Sub Clause 1803.2.2

Replace “1804.6” with “1805.6” in 3<sup>rd</sup> line of 3<sup>rd</sup> paragraph of Clause 1803.2.2.

## SECTION 2000 BEARINGS

## CLAUSE 2005 ELASTOMERIC BEARINGS

### Sub Clause 2005.4: Acceptance Specifications

In Paragraph 5, substitute the words "Engineer or his authorised representative" for the word "Inspector".

### Sub-Clause 2005.4.5 Inspection Certificate

Substitute the words "Engineer or his authorised representative" for the word "Inspector".

### Sub-Clause 2005.4.6 Quality Control Certificate

Delete the words “/Inspector” in sub-paragraph b) of 1st paragraph.

## CLAUSE 2009 MEASUREMENTS FOR PAYMENT

Add the following after Paragraph 2:

"Tar Paper bearings shall be measured in square meters."

## CLAUSE 2011 TAR PAPER BEARING

Add the new Clause 2011 at the end of the Section 2000. “2011 TAR PAPER BEARING

Tar Paper bearing shall be reinforced bitumen laminated Kraft paper conforming to the requirements of IS- 1398.”



## **CLAUSE 2100 OPEN FOUNDATIONS**

### **CLAUSE 2104 WORKMANSHIP**

#### **Sub Clause 2104.1 Preparation of Foundations**

Replace “M10” with “M15” in 5<sup>th</sup> line of 1<sup>st</sup> paragraph of Clause 2104.1.

#### **Sub Clause 2104.3 Construction**

Replace “M10” with “M15” in 1<sup>st</sup> & 7<sup>th</sup> line of sub-paragraph ii) of Clause 2104.3.

## **SECTION 2200 SUB-STRUCTURE**

### **CLAUSE 2208 TOLERANCES IN CONCRETE ELEMENTS**

Add the following paragraph at the end of Clause 2208:

Variations at top levels of side drains,  $\pm 10 \text{ mm}$

Precast slabs, haunches supporting precast slabs

Structures not meeting dimensional tolerances shall be rectified to the satisfaction of Engineer – failing with structures shall be dismantled and reconstructed at the expense of the Contractor and no additional payment shall be made for this..

### **CLAUSE 2210 RATE**

This Clause shall read as under:

“The contract rate for masonry, concrete reinforcement and weep hole in substructure shall include all works as given in respective sections of these Specifications and cover the cost of all incidental items like providing cofferdams, dewatering, providing special formwork, where necessary, and all other items for furnishing and providing substructure as mentioned in this Specifications and shown on the drawings.

The necessary material (asphaltic/bituminous board or equivalent material) and labour, tools etc. required for maintaining 20 / 40 mm gap between faces of various structures (old / new) wherever required / as shown in drawing shall be incidental to work and shall not be measured / paid separately.”

## **SECTION 2500 RIVER TRAINING AND PROTECTION WORK**

### **CLAUSE 2504 PITCHING/ REVETMENT ON SLOPES**

#### **Sub Clause 2504.3 Construction Operations**

Replace “Clause 1405.3” with “Clause 1405.1.3” in 3<sup>rd</sup> line of 3<sup>rd</sup> paragraph of Clause 2504.3.

### **CLAUSE 2507 CURTAIN WALL AND FLEXIBLE APRON**

#### **Sub Clause 2507.1 Curtain Wall**

The last sentence of this Clause shall read as:

“The curtain wall shall be in cement concrete grade as shown in the drawing.”

## **SECTION 2700 WEARING COAT AND APPURTENANCES**

### **Sub Clause 2702.1 Bituminous Wearing Coat**

Add following para at the end of this clause:

“In case of structures having strip seal expansion joint, wearing coat shall be laid first and expansion joint shall be installed thereafter matching with the profile of already constructed wearing coat.”







## **ADDITIONAL TECHNICAL SPECIFICATIONS**

The Additional Technical Specifications provided here in this section shall be read in conjunction with General Technical Specifications and Particular Specifications included.

### **CLAUSE A-1 SPECIFICATIONS FOR PART – 2 WORKS**

#### **Clause A-1.1 General**

During the Part-2 Works, the Employer shall provide to the Contractor access to the Site for Maintenance in accordance with this Contract. The obligations of the Contractor hereunder shall include:

- a) permitting safe, smooth and uninterrupted flow of traffic;
- b) undertaking routine maintenance of all the works undertaken as Part-1 Works including but not limited to repairs of potholes, cracks, joints, drains, embankments, structures, pavement markings, road signs and other traffic control devices;
- c) undertaking repairs to structures;
- d) informing the Engineer of any unauthorised use;
- e) informing the Engineer of any encroachments; and
- f) operation and maintenance, route patrolling and administrative systems necessary for the efficient maintenance of the Project Road in accordance with the provisions of this Contract.

The Contractor shall remove promptly from the Project Road any waste materials (including hazardous materials and waste water), rubbish and other debris (including, without limitation, accident debris) and keep the Project Road in a clean, tidy and orderly condition, and in conformity with the Applicable Laws, Applicable Permits and Good Industry Practice.

#### **Clause A-1.2 Maintenance Requirement**

The Contractor shall ensure and procure that at all times during the Part-2 Works; the Project Road conforms to the maintenance requirements set forth in these specifications.

#### **Clause A-1.3 Components of Part-2 Works**

The Part-2 Works for the roads shall in general consist of the following activities:

- a) Maintenance of carriageway and paved/earthen shoulders
- b) Maintenance of side slopes, drainage and CD works
- c) Maintenance of Road side furniture including Road Signage, pavement marking, Kerbs and delineators
- d) Maintenance of Road lighting if any
- e) Maintenance of horticulture and avenue trees
- f) Maintenance of Rest area and other project facilities
- g) Maintenance of Bridges including foundation, sub structure, superstructure, bearings and expansion joints

The Contractor shall repair and rectify the defects and deficiencies specified in the table below within the time limit set forth.





Nature of Defect or deficiency		Time limit for repair/rectification
<b>ROADS</b>		
<b>(a)</b>	<b>Carriageway and paved shoulders</b>	
(i)	Breach or blockade	Temporary restoration of traffic within 24 hours; permanent restoration within 15 (fifteen) days
(ii)	Pot holes	24 hours
(iii)	Any cracks in road surface	15 (fifteen) days
(iv)	Any depressions, rutting exceeding 10 mm in road surface	15 (thirty) days
(v)	Bleeding/skidding	7 (seven) days
(vi)	Any other defect/distress on the road	15 (fifteen) days
(vii)	Damage to pavement edges	15 (fifteen) days
(viii)	Removal of debris, dead animals	6 hours
<b>(b)</b>	<b>Granular/ earth shoulders, side slopes, drains and culverts</b>	
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi-urban areas	24 hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
<b>(c)</b>	<b>Road side furniture including road sign and pavement marking</b>	
(i)	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/Once every year
(iii)	Damaged/missing road signs requiring replacement	7 (seven) days
(iv)	Damage to road marking	7 (seven) days
<b>(d)</b>	<b>Road lighting (if any)</b>	
	Any failure of the system including bulb Replacement	24 hours



Nature of Defect or deficiency		Time limit for repair/rectification
<b>(e)</b>	<b>Trees and plantation</b>	
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	24 hours
(ii)	Removal of fallen trees from carriageway	4 hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
<b>(f)</b>	<b>Other Project Facilities and Approach roads</b>	
(i)	Damage in approach roads, pedestrian facilities, truck lay-byes, bus-bays, bus-shelters, cattle crossings	15 (fifteen) days
(ii)	Cleaning of toilets	Every 4 hours
(iii)	Defects in electrical, water and sanitary	24 hours
(iv)	Damaged vehicles or debris on the road	4 (four) hours
(v)	Malfunctioning of the mobile crane	4 (four) hours
<b>BRIDGES</b>		
<b>(a)</b>	<b>Superstructure</b>	
(i)	Any damage, cracks, spalling/ scaling a. Temporary measures b. Permanent measures	a. within 48 hours b. within 15 (fifteen) days or as specified by the Engineer
<b>(b)</b>	<b>Foundations</b>	
(i)	Scouring and/or cavitations	15 (fifteen) days
<b>(c)</b>	<b>Piers, abutments, return walls and wing walls</b>	
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
<b>(d)</b>	<b>Bearings (metallic) of bridges</b>	
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) days Greasing of metallic bearings once in a
<b>(e)</b>	<b>Joints</b>	
(i)	Malfunctioning of joints	15 (fifteen) days
<b>(f)</b>	<b>Other items</b>	
(i)	Deforming of pads in elastomeric bearings	7 (seven) days

Nature of Defect or deficiency		Time limit for repair/rectification
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger to safety)
(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation on the structure or obstructing the waterway	15 (fifteen) days

#### Clause A-1.4 Maintenance Programme

The Contractor shall prepare a monthly Maintenance Programme in consultation with the Engineer and submit the same to the Engineer not later than 10 (ten) days prior to the commencement of the month in which the Maintenance is to be carried out. For this purpose a joint monthly inspection by the Contractor and the Engineer shall be undertaken. The Maintenance Programme shall contain the following:

- The condition of the road in the format prescribed by the Engineer
- the proposed maintenance works; and
- deployment of resources for maintenance works.

#### Clause A-1.5 Safety, vehicle breakdowns and accidents

The Contractor shall ensure safe conditions for the Users, and in the event of unsafe conditions, lane closures, diversions, vehicle breakdowns and accidents, it shall follow the relevant operating procedures for removal of obstruction and debris without delay. Such procedures shall conform to the provisions of this Contract, Applicable Laws, Applicable Permits and Good Industry Practice.

The Contractor shall maintain and operate vehicle patrol, a round-the-clock vehicle rescue post with one mobile crane having the capacity to lift a truck with a Gross Vehicle Weight of 30,000 (thirty thousand) kilograms; and such post shall be placed at the location as decided by the Engineer.

Contractor shall report all accidents to the police forthwith and submit a monthly report in the format approved by the Engineer. Contractor shall coordinate with the Ambulance services offered by Emergency Medical Transport Service (EMTS) provided by Department of Health & Family welfare, Govt. of Nagaland.

#### Clause A-1.6 Lane Closure

The Contractor shall not close any lane of the Project Road for undertaking maintenance works except with the prior written approval of the Engineer. Such approval shall be sought by the Contractor through a written request to be made at least 5 (five) working days before the proposed closure of lane and shall be accompanied by particulars thereof. Within 3 (three) working days of receiving such request, the Engineer shall grant permission with such modifications as it may deem necessary and a copy of such permission shall be sent to the Employer.

#### Clause A-1.7 Measurement for payment

The Measurement shall be in Km-month i.e. length in km certified by the Engineer for the satisfactory maintenance of the Works multiplied with the time in the month for which maintenance works are performed.



### **Clause A-1.8 Rate**

Rate shall include the cost of materials, labour, equipment and other incidentals to complete the work as per the specifications.

## **CLAUSE A-2 INTER LOCKING CONCRETE BLOCKS**

### **Clause A-2.1 Scope**

The scope of work involves laying of Precast M-50 grade interlocking concrete blocks of 100mm thick laid on 30 mm thick prepared sand bed conforming to IRC: SP: 63 and as directed by Engineer. The shape of blocks, the source of supply, the methodology for laying of blocks shall be got approved from Engineer before the start of the work. The bedding sand and joint filling sand should conform to para 6.6 of IRC: SP: 63.

### **Clause A-2.2 Unit of measurement**

The unit of measurement shall be the area of the finished item of work of interlocking blocks measured in plan in sq m.

### **Clause A-2.3 Rate**

The unit cost includes full compensation for laying the sand bed and laying the interlocking tiles, edge restraint blocks including the cost of all materials, labour and other incidentals to complete the work as per these Specifications.

## **CLAUSE A-3 TREE PLANTATION**

### **Clause A-3.1 Scope**

The scope of work involves the plantation along the project road and as directed by Engineer. All the plants will be produced from established nursery. All plants are to be supplied in standard container/bags and shall have grown to the approved heights. The source of sampling, tree plantation plan and drawings shall be approved by the Engineer.

The contractor shall mark proposed planting locations for the approval of the Engineer, minimum 7 days before planting is to commence. Planting holes will be excavated to the dimensions as shown on the drawings or as per direction of the Engineer. The use of an auger or similar implement to excavate planting holes is not acceptable. The contractor shall test the fertilizer for conformance of constituent elements prior to using the fertilizer in the work. The plant fertilizer shall be a slow release type in pellet form with 8-9 month release period and an N:P:K ratio approximately equal to 20:4:8. Fertilizer shall delivered to the site not less than two weeks prior and in unopened standard bags or containers bearing the manufacture's description, analysis of constituents and quantity. The contractor shall submit the proposals for mulch to the Engineer for approval, 21 days before planting. The mulch will be free of soil, weeds, stones, vermin, insects or other foreign material. Mulch will be spread to a depth as required by the drawing and specification. The maintenance period for planting will end at the completion of the defects liability period for the relevant road section or 12 months from the completion of planting, whichever occurs. The contractor will be responsible for all maintenance requirements from the time of seeding and planting to the end of the maintenance period. During the maintenance period the contractor will be responsible for keeping all plants and materials secure from damage by animals or left. The contractor will submit a written report to the Engineer within four (4) days of each maintenance inspection. The Contractor will obtain the Engineer's written approval to the type of chemical proposed for spraying before spraying is carried out spraying will also be carried out in accordance with the manufactures recommendations and only on windless days. The Engineer as required may direct additional spraying. In no circumstances are pesticides to be used without the written consent of the Engineer. Pesticides and their application shall comply with requirements of the relevant laws and regulations.



### Clause A-3.2 Unit of measurement

The unit of measurements for tree planting shall be per “each” “surviving” plant (the surviving plants will be counted at the end of the defects liability period for the respective section or road or 12 months from the completion of planting on the said section of road, whichever is later.

The rate for planting is to include supply from storage site, site preparation, excavation (in all types of material), backfilling, mulching fertilizing, watering and maintenance of trees of the specified size.

Payment of 50% of the scheduled rate shall be paid at the satisfactory completion of planting. The final payment of 50% shall be made at the end of the maintenance period for those trees, which are healthy at that time.

The unit of measurement shall be number of tree survived for 1 year after plantation of the same along the project road.

### Clause A-3.3 Rate

The unit cost includes tree survived for 1 year after plantation of the same along the project road.

## CLAUSE A-4 TREE PROTECTION

### Clause A-4.1 Scope

Protection of tree shall be done by the Contractor with tree guard of brick work. The half brick circular tree guard shall be provided having 2nd class brick, internal diameter 1.25 metres, height 1.5 metres above ground and 0.50 metre below ground with cement mortar 1:6 as per complete design. The source of 2nd class brick and drawings of brick tree guard shall be approved by the Engineer.

### Clause A-4.2 Unit of measurement

The unit of measurements for brick tree guard planting shall be “number” for each tree guard.

### Clause A-4.3 Rate

The unit cost includes brick tree guard survived for 1 year.

## CLAUSE A-5 ENVIRONMENTAL MONITORING

### Clause A-5.1 Scope

The Contractor shall conduct the environmental monitoring through NABL/approved monitoring agencies during construction stage of the project as per following monitoring plan and final approval of environmental monitoring shall be given by the Engineers. Environmental Monitoring Plan:

Parameters	Standards	Locations	Frequency	Duration
PM10 g/m <sup>3</sup> , PM2.5 g/m <sup>3</sup> , SO <sub>2</sub> , NO <sub>x</sub> , CO	National Ambient Air Quality Standard. (CPCB, Nov, 2009) 18 <sup>th</sup>	Plant site, HMP Stone Crusher and construction site in consultation with Engineers	Once in 3 month for 2 years excluding monsoon period	Continuous 24 hours
pH, Temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform	Surface Water Quality Standard	The water bodies along the project road at 3 locations in consultation	Once in a season excluding monsoon for 2 Years	Grab Sampling



Parameters	Standards	Locations	Frequency	Duration
pH, Temperature, TSS, Total hardness, Suspended Solid, Chlorine, Iron, Sulphate, Nitrate	Ground Water Quality Standard- IS: 10500, 1991	Construction site (2 locations at camp site)	Once in 3 months for 2 Years	Grab Sampling
Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	At equipment yards and locations as identified along the project road by Engineers	In the interval of 3 months for 2 Years	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night
Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio	Soil	Near Construction sites along the road as identified by the PMC (3 locations)	In the interval of 3 months for 2 Years	-

#### Clause A-5.2 Measurement of Payments

The unit number of Ambient Air, Ambient Noise, Surface water, Ground water and Soil shall be measured and shall be verified by the Engineer.

#### Clause A-5.3 Rate

The contract rate for environmental monitoring shall include the sampling of environmental components and submission of reports to the Engineers and the sampling and report submission shall only be done by NABL environmental monitoring agency or approved agencies.

### CLAUSE A-6 OIL AND GREASE INTERCEPTORS

#### Clause A-6.1 Scope

The oil and grease interceptors shall be provided at camp site. The schematic plan of Oil & Grease Interceptor is given in ANNEX-A and same shall be approved by the Engineer.

#### Clause A-6.2 Unit of measurement

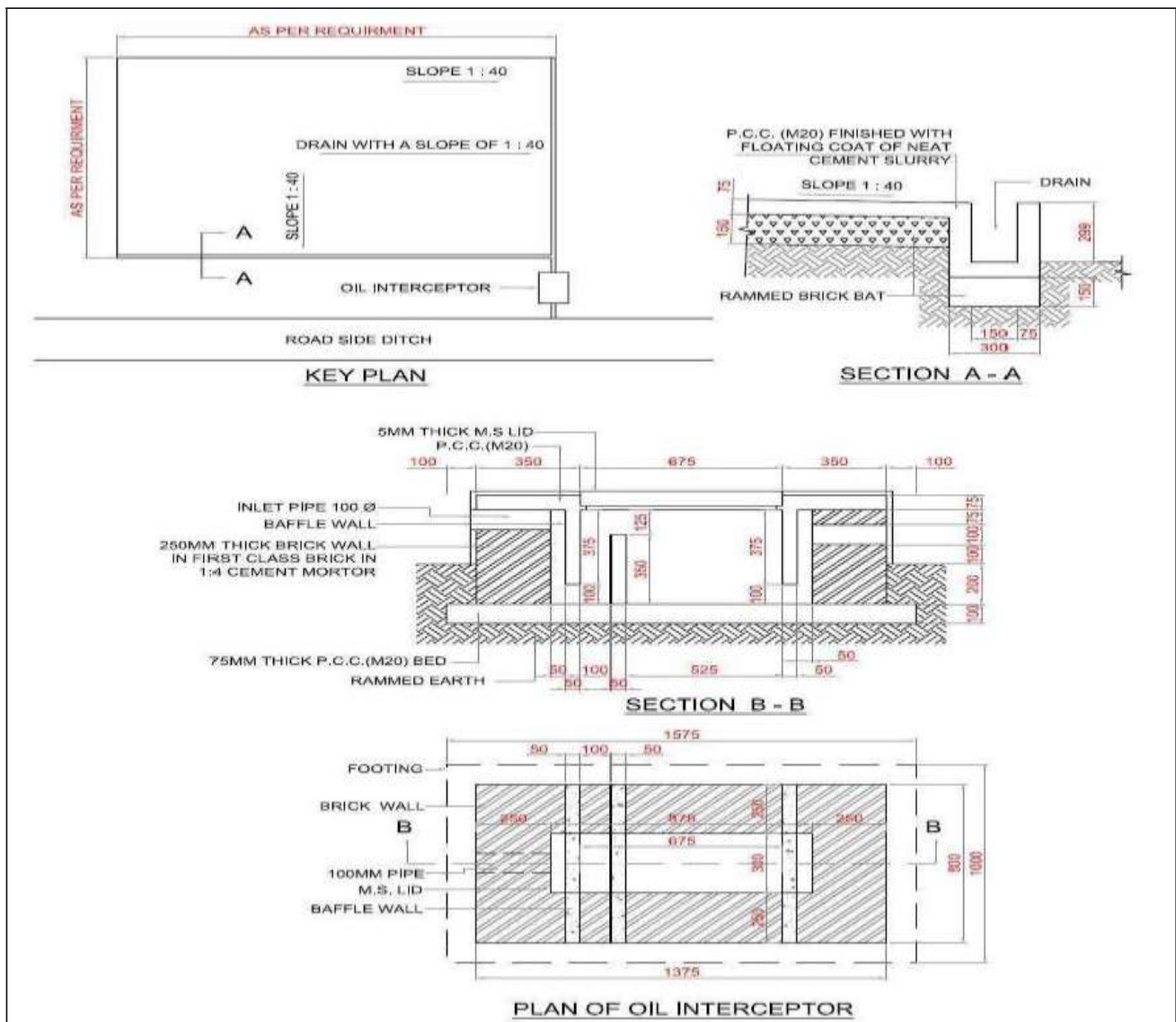
The unit of measurements for Oil and Grease Inceptor shall be “each” number provided in camp site.

#### Clause A-6.3 Rate

The unit cost includes functioning of Oil & Grease Interceptors throughout the construction period and payment shall be in two parts i.e. 50% at the time of construction & functioning for next 3 months and 50% at the end of the project.



**ANNEX-A: Schematic plan of oil interceptor for removal of Oil & Grease Interceptors**



**CLAUSE A-7 RAIN WATER HARVESTING STRUCTURE ALONG THE PROJECT ROAD**

## Clause A-7.1 Scope

The Water harvesting structure along shall be provided at an interval of 500m along both side of the project road. The purpose of water harvesting structure is to recharge the water table along the project area. The schematic plan of Water harvesting structure is given in ANNEX-B. The contractor shall submit a detailed drawing based on this schematic plan and got it approved by the Engineer before the start of the work

### Clause A-7.2 Unit of measurement

The unit of measurements for Water harvesting structure shall be number provided along the project road. Payment shall be in two parts with 50 % at the time of construction and 50 % at the time of completion of Part-1 Works at satisfactory functioning of the same. The confirmation of satisfactory functioning shall be certified by the Engineer.



The unit cost of water harvesting structure shall be inclusive of all labour, material, machineries and other incidentals to complete the work as per these Specifications.

**DETAIL - A**

EARTHEN DRAIN

BERM TOP LEVEL

0.5%

IL OF EARTHEN DRAIN

600

100

RAIN WATER HARVESTING UNIT

4500

1500

PERCOLATION WILL COME RIGHT FOR RAIN WATER HARVESTING

15000 CM LPT 150 MM DIA RISER PIPE

Holes shall be drilled vertically using rotary drill machines. Care shall be taken that the holes are drilled vertical and the deck concrete / brick masonry is not damaged. It shall be drilling by avoiding locations above reinforcement. Rebar detector shall be used for this purpose. 16mm dia dowel bars shall be inserted in the hole and kept in undisturbed position with appropriate fixture. The annular space shall be filled by epoxy grouting.

Epoxy resin shall be Resicrete 21 or equivalent with following properties:

Compressive strength	-	min MPa at 24 hours
Tensile Strength	-	15-20 MPa at 7 Days
Flexural Strength	-	30-40 MPa at 7 Days

Viscosity @ 250° C - 900-1200 cps

#### **Clause A-8.1 Unit of measurement**

Drilling of holes [300 mm deep for concrete and 500 mm deep for brick masonry] for dowel bars and grouting with epoxy shall be measured separately in numbers. Reinforcement shall be measured separately.

#### **Clause A-8.2 Rate**

Rate for drilling holes shall be all inclusive for machinery, labors, materials and other incidentals to complete the work as per these specifications.

### **CLAUSE A-9 PROVIDING AND FIXING DRAINAGE SPOUTS IN EXISTING STRUCTURES**

For all existing bridge decks drainage spouts to be replaced with new drainage spouts as shown in the drawings for solid slab / box & girder superstructure. The work shall be executed in accordance with Section 2700 of these specifications to the extent modified below.

The work shall be done after the existing wearing coat is removed. The existing spouts shall be removed carefully with minimum damage to surrounding concrete. The pocket formed ~ 500mm x 500 mm shall be sufficiently large to ensure good flow and compaction of non-shrink cement sand mortar of strength > M 35 around the new drainage spout adequately.

#### **Clause A-9.1 Unit of measurement**

Replacing old or installing new drainage spouts in concrete deck shall be measured in numbers.

#### **Clause A-9.2 Rate**

Rate for replacing old or installing new drainage spouts in concrete deck shall be all inclusive for machinery, labors, materials and other incidentals to complete the work as per these specifications.

### **CLAUSE A10 CLEARING OF STEEL ROCKER-ROLLER BEARINGS AND REMOVAL OF ALL DEBRIS AROUND BEARINGS INCLUDING FIXING MISSING PARTS**

All existing steel rocker-roller and plate shall be thoroughly cleared. The abutment caps / pier shall be cleared of all debris around the bearings. Debris shall be removed by water jetting and other suitable means as approved by the Engineer. All bearings shall be cleared and missing parts shall be installed as per manufacturer, s specifications duly approved by Engineer.

#### **Clause A-10.1 Unit of measurement**

Cleaning and retrofitting of missing parts of roller – rocker bearings like stopper plate, spacer plate etc. shall be measured in number of bearings.

#### **Clause A-10.2 Rate**

Rate for Cleaning and retrofitting of missing parts of roller – rocker bearings like stopper plate, spacer plate etc shall be all inclusive for machinery, labors, materials and other incidentals to complete the work as per these specifications.

### **CLAUSE A-11 REHABILITATION OF CULTURAL PROPERTY**

#### **Clause A-11.1 Scope**

The rehabilitation of Cultural Property shall be done for the temple situated at chainage 2+625, RHS. The Contractor shall undertake following works but not limited to dismantling of existing cultural property, excavation, PCC, brick work, concrete slab, marble flooring, door and windows of teak wood with iron grills. All works shall be done as per relevant sections of these specifications. The plinth area of rehabilitated cultural properties shall be equal to the existing cultural properties to be dismantled or 50 Square Meter, whichever is more. The Contractor shall



provide the detailed drawing and shall take the approval from the Engineer before rehabilitation of Cultural Property. The land for rehabilitation of temple shall be provided by the Employer. The Contractor shall follow CPWD Specification for Building Works or other standard documents with the approval of the Engineer for the works which are not covered in these specifications.

**Clause A-11.2 Unit of measurement**

The unit of measurements for rehabilitation of Cultural Properties shall be in terms of plinth area measurement. Payment shall be in two parts with 50 % at the time of construction and 50 % at the time of completion of Part-1 Works.

**Clause A-11.3 Rate**

The plinth area cost of rehabilitation of Cultural Property shall be inclusive of all labour, material, machineries and other incidentals to complete the work as per these Specifications.

