



**Public Works Department
[Government of Tripura]**

**Ministry of Development of North Eastern Region
[Government of India]**

**NORTH EASTERN STATE ROADS INVESTMENT PROGRAM
(NESRIP)**

Country: INDIA **ADB Loan No-3073**
North Eastern States Roads Investment Program (Project-2)

**Completion of balance work of Improvement and
Up-gradation of road section of Udaipur to Melaghar
(TR02)
(Tranche-2 road in the State of Tripura)**

CONTRACT NO. TR-CW1.

**BIDDING DOCUMENT
VOLUME 3
TECHNICAL SPECIFICATIONS**

Contains

**Bid Document Part II - Requirements
Section 6 (a) - Employer's Requirements (Specification)**

[September 2020]

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Preface

This Bidding Document for the Procurement of Works is based on the Standard Bidding Document (SBD) for the Procurement of Works (SBD Works) issued by the Asian Development Bank. The Bidding Document consists of three parts, broken up into nine sections and are contained in four volumes as shown below.

This Volume 3 contains Section 6 (a) of Part II of the Bidding Document as highlighted below.

PART I BIDDING PROCEDURES (VOLUME - 1)

Section 1 -Instructions to Bidders (ITB)

This section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Section 2 -Bid Data Sheet (BDS)

This section consists of provisions that are specific to this procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 -Evaluation and Qualification Criteria (EQC)

This Section contains the criteria to determine the lowest evaluated bid and the qualification of the Bidder to perform the contract.

Section 4(a) -Bidding Forms (BDF)

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

(VOLUME 2)

Section 4(b) - Letter of Price Bid & Bill of Quantities

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

(VOLUME 1)

Section 5 -Eligible Countries (ELC) 1

This section contains the list of eligible countries.

PART II REQUIREMENTS

(VOLUME 3)

Section 6 (a) -Employer's Requirements (ERQ)

This Section contains the Specification and Supplementary information that describe the Works to be procured.

(VOLUME 4)

Section 6 (b) -Employer's Requirements (ERQ)

This Section contains the Drawings that describe the Works to be procured.

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS (VOLUME -1)

Section 7 -General Conditions of Contract (GCC)

The General Conditions of Contract are based on FIDIC and are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

Section 8 -Particular Conditions of Contract (PCC)

This Section contains provisions which are specific to this contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC. **Section 9 -Contract Forms(COF)1**

This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

TECHNICAL SPECIFICATIONS

1. PREAMBLE

1.1 The Technical Specifications contained herein shall be read in conjunction with the other sections of Bidding Documents.

1.1.1 General

The Technical Specifications covering the materials and the workmanship aspects as well as method of measurements and payments are included in this section. These specifications cover the items of civil and non-civil works coming under scope of this document. All works shall be carried out in conformity with the same. These specifications are not intended to cover the minute details. The works shall be executed in accordance with good engineering practices followed for achieving high standards of workmanship, thus ensuring safety and durability of the construction.

1.1.2 Inclusive Documents

The provisions of General Conditions of Contract and Particular Conditions of Contract, those specified elsewhere in the bidding document, as well as execution drawings and notes, or other specifications issued in writing by the Engineer shall also form part of the technical specifications of this contract.

1.1.3 Measurement and Payment

The methods of measurement and payment shall be as described under various items and in the Bill of Quantities. Where specific definitions are not given, the methods described in Bureau of Indian Standards (BIS) Code will be followed. Should there be any detail of construction or materials which has not been referred to in the Specifications or in the Bill of Quantities and Drawings but the necessity for which may be implied or inferred therefrom, or which is usual or essential to the completion of the work in the trades, the same shall be deemed to be included in the rates and prices entered by the contractor in the Bill of Quantities.

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

2. GENERAL REQUIREMENTS

The Technical Specifications, in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor, shall comprise the following:

2.1 PART - I- General Specifications

The General Specification shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FOURTH REVISION) Aug 2001" reprinted in March 2007 along with other Addendum/Corrigendum, issued by the Ministry of Road Transport and Highways, Government of India and published by the Indian Roads Congress (IRC) upto 28 days before the final date of submission of the bids.

2.2 PART - II – Supplementary Specifications

The Supplementary Specifications shall comprise various amendments/modifications/additions to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" referred to in PART -I above and also additional specifications for particular item of works not already covered in PART-I. The

Section 6 (a) – Employer’s Requirements – Specifications

amendments/modifications/additions are shown in Appendix A of this document.

A particular clause or a part thereof in "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS referred in PART-I above, when amended/modified/added upon in PART-II, such amendment/modification/addition shall supersede the relevant clause or part of the clause referred to in Part-I.

When an amended/modified/added clause supersedes a clause or part thereof in the said Specifications, then any reference to the superseded Clause shall be deemed to refer to the amended/modified/added clause or part thereof.

In so far as an amended/modified/added clause may come in conflict or be inconsistent with any of the provisions of the General Specifications, Part-I the amended/modified/added clause shall always prevail.

2.3 Additional Specifications

The following clauses have been added in Part II of this document as Additional Specifications.

1. A-1: Clearing of Hume Pipe Culverts
2. A-2: Cleaning and Greasing of Bridge bearings.
3. A-3: Painting on Structures
4. A-4: Water Proof Cement Paining
5. A-5: Cleaning of Drainage Spouts
6. Environmental Management Plan
- A.6: Hollow Brick Wall Panel
- A.7: Precast Cement Concrete Sitting Benches
- A.8: G.I. Barbed Wire Fencing

2.4 Part – III Other Documents

In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference shall be made to the latest codes and specifications of IRC and BIS 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 Engineer and in case of any dispute arising out of the interpretation of the above, the decision of the Engineer shall be final and binding on the Contractor.

2.5 Part – IV Warranties

For items requiring provision of a warranty or guarantee by the Contractor, the Contractor shall provide the warranty or guarantee jointly with the manufacturer and both shall be jointly and severally responsible for repair or replacement of the item free of cost during the warranty or guarantee period as required.

APPENDIX A

Part-II – Supplementary Specifications

AMENDMENTS/MODIFICATIONS/ADDITIONS TO EXISTING CLAUSES OF THE SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FOURTH REVISION)2001

SECTION 100GENERAL

Clause 101.INTRODUCTION

Substitute 28 (twenty-eight) instead of 30 (thirty) in last sentence of Para 2 of this Clause.

Clause 102.DEFINITIONS

The following abbreviations shall be added to the list of abbreviations:

“MORTH	- Ministry of Road Transport and Highways formerly known as Ministry of Surface Transport(MOST)
PWD	- Public Works Department
BIS	- Bureau of Indian Standards
WBM	- Water Bound Macadam
WMM	- Wet Mix Macadam
RBM	- Reference Bench Mark
CPCB	- Central Pollution Control Board
QA	- Quality Assurance
BOQ	- Bill of Quantities
NESRIP	- North Eastern State Roads Investment Program”

Clause 105. SCOPE OF WORK

Clause 105.3.

Add the following to the end of this sub-clause:

“The Contractor shall establish, adhere to, monitor and maintain an adequate Quality Assurance (QA) Programme based on the requirements of EN ISO 9002 and EN ISO 9003.

The QA programme shall cover the quality assurance aspects of all services rendered, all items to be supplied and all construction activities to be performed under the Contract, also including temporary structures and equipment which will influence the quality of the completed works or the progress of the Contract.

The QA programme shall, as a minimum, cover subjects listed below:

- Organization and management responsibility;
- Document and data control;
- Construction programme;
- Method statements;
- Process control;
- Working, inspection, testing and documentation procedures;
- Safety and emergency procedures;
- Control and documentation of purchasing and handling of material;
- Non-conformity and corrective action;
- Internal quality audits;
- Servicing;
- Education and training of staff; and
- Site environmental management plan.

The general procedures, testing criteria and other quality verification documents of the QA programme shall be submitted to the Engineer for approval not later than twenty-eight days after the date of receipt

of notification of award. The Contractor shall take all steps to minimize the negative impact of construction operations on environment as directed by Engineer, during construction stage, in accordance with the Contractor’s Environment Management Plan”.

Clause 106. CONSTRUCTION EQUIPMENT

Add the following Items (g), (h) and (i) after Item (f):

”g) Adequate standby equipment including spare parts shall be available;

h) 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. Accuracy and fitness of measuring devices shall be ensured by proper maintenance ;and

i) The Contractor shall furnish to the Engineer the detailed technical literature and other relevant documents regarding the performance of plant/equipment for approval prior to purchase or mobilization onsite.”

Clause 107.1

Add the following after the end of paragraph:

”After careful study of the drawings issued by the Employer, the Contractor shall prepare, where necessary all supplementary and working drawings with field/construction information and shall submit the same to the Engineer for approval prior to construction.”

Clause 108 SITE INFORMATION

Sub-Clause 108.1.

Delete this sub-clause and replace with:

“**108.1.** The information about the site of work and site conditions in the Tender Documents is given in good faith for guidance only. Test pit logs taken along the road are available at the Employer’s office for the Contractors information. However, the Contractor shall satisfy himself regarding all aspects of site conditions.”

Sub-Clause 108.3.

In this sub-clause replace “Right of Way” with Site of Works”

Sub-Clause 108.4.

Replace this sub-clause with the following:

“**108.4.** Sourcing of materials for inclusion in the works is the responsibility of the Contractor. It is the Contractor’s responsibility to supply materials which fully comply with the Specifications.”

Clause 109. SETTING OUT

Replace sub-clause 109.1 with the following:

“109.1. The works shall be set out from the Reference Bench Marks (RBM) shown on the drawings. Coordinates and levels for RBMs shall be as shown on the drawings. Before the commencement of construction, the Contractor shall confirm that the RBMs have not been disturbed and are true in regard to position and level. If RBMs have been destroyed, disturbed or damaged before the Work Site is handed over to the Contractor, the Contractor will have new RBMs installed and verified by Engineer.

Where a RBM will be affected by the execution of the works, the Contractor shall relocate the mark clear of the work before it is affected. No RBM will be moved by the Contractor without written approval of the Engineer. The relocated mark shall be of the same construction as the original work. The Contractor shall survey and note the co-ordinates and level of the relocated mark and submit in writing full details of the new mark including a location diagram to the Engineer for approval.

The Contractor will ensure the maintenance and safety of the RBMs. Destruction of any RBM will be immediately reported to the Engineer and the Contractor will be responsible for the replacement to the original standard at his cost.

The Contractor shall establish Working Bench Marks tied to the RBMs in an area before commencing work in that area. The Working Bench Marks shall be at a rate of 4 per kilometer and also at or near all drainage structures, over bridges and underpasses. Location and level values for Working Bench Marks shall be subject to the approval of the Engineer. The Contractor will maintain field observation level records of these runs in a systematic manner and transmit these records to the Engineer when seeking approval for acceptance of his working reference.

Checks on Working and Reference Bench Marks shall be carried out by the Contractor once every month and adjustments, if any, shall be agreed with the Engineer. Full details of the checks carried out shall be submitted to the Engineer for approval, immediately after the check is completed. A Bench Mark register recording Working and Reference Bench Mark values and any adjustments shall be maintained by the Contractor. An updated copy of the Bench Mark register shall be supplied to the Engineer each time an adjustment is made to a Working or Reference Bench Mark.

The costs of complying with the requirements of this sub-clause are deemed to be included in the rates for the items of work included in the Bill of Quantities”.

Sub-Clause 109.7.

Delete the sub-clause and replace with:

“109.7. After obtaining approval of the Engineer, work on earthwork can commence and the profile and cross-sections shall form the basis for measurements and payment. The Contractor shall be responsible for ensuring that all the basic traverse points are in place at the commencement of the contract and if any are missing, or appear to have been disturbed, the Contractor shall make arrangements to re-establish these points.

If in the opinion of the Engineer, design modifications of the center line, grade or cross sections are advisable, the Engineer will issue detailed instructions to the Contractor and the Contractor shall design the modifications, produce drawings for the approval of the Engineer and after approval of the Engineer perform the modifications in the field, as required, and modify the ground levels on the cross-sections accordingly as many times as required. There will be no separate payment for any design and printing or survey work performed by the Contractor. The cost of these services shall be considered as being included in the cost of the items of work in the Bill of Quantities.”

Sub-Clause 109.9.

Delete the second and third sentences of this sub-clause and then add:

“Setting out of the road alignment and measurement of angles and distances shall be done using a total station electronic theodolite and traversing targets. The theodolite shall have an accuracy of one second.”

Sub-Clause 109.10.

Add a new sub-clause.

“**109.10.** Before carrying out any survey work the Contractor shall submit to the Engineer for approval a programme and methodology for the calibration of all optical and electronic survey measurement equipment to be used on site during construction of the works. The Contractor will maintain calibration records for all such equipment in his site office, available at all times for inspection by the Engineer.”

Clause 110. PUBLIC UTILITIES

Sub-Clause 110.1.

Delete this sub-clause and replace with:

“**110.1.** Data on the locations of above ground services and approximate locations of underground services was collected during the road survey. This information is available at the Employer’s office. A number of these services have been relocated since the survey was carried out. The information available on the location of existing utilities is therefore approximate only and in some cases may be incomplete. The Employer accepts no responsibility for and does not guarantee or make any representation as to the accuracy of the information. The Contractor shall make such further enquiries and investigations as are required for his own information.

Attention is directed to the possible existence of utilities not shown in the Bidding Documents, or at locations or elevations different from those shown in the Documents. The Contractor shall ascertain the exact location of each utility prior to doing any work that may damage such utility.”

Sub-Clause 110.2.

Delete this sub-clause and replace with:

“**110.2.** If any existing or proposed utility conflicts with the location or elevation of any item of construction shown on the Drawings, the Contractor shall notify the Engineer of such conflict. Any variation to the work required shall be determined in accordance with the General Conditions of Contract.

Where relocations of utilities are noted in the documents as being required to be undertaken during the course of the works, the Contractor shall allow in its programme for the period of notice and the duration of the relocations and will allow for any effects of alterations to these services upon the works. The Contractor shall have no objection if the public utility bodies vary their decision in the execution of their proposals in terms of programs and construction, provided that in the opinion of the Engineer, the Contractor has received reasonable notice thereof.

All service utilities requiring relocation will be moved clear of the Works prior to possession of site being issued to the Contractor. Where, during the course of the Works, additional service relocations are found to be necessary, the relocations will be carried out by the relevant authority. In such cases, the Contractor shall, after obtaining the approval of the Engineer, arrange with the relevant authority to carry out the relocation work. In these instances, the Contractor may be required to provide the various public utility authorities with the opportunity to remove, relocate, or work on their utilities before the Contractor proceeds with succeeding construction operations. Should the Contractor suffer

any delay due to the moving of any such utilities, or the operations of any authority controlling such utilities, the Contractor may apply to the Engineer for an extension of time in accordance with the General Conditions of Contract.

Where the Contractor’s method of working results in additional adjustments being deemed necessary by any utility authority, the Contractor shall arrange for and bear all costs and delays in relation to those additional adjustments, notwithstanding that the Engineer may have approved the method of working.

Any pipe, cable, conduit or other known service of any nature whatsoever which has been damaged as a result of the Contractors operation shall be repaired and reinstated forthwith by the Contractor or the authority concerned at the expense of the Contractor and to the satisfaction of the Engineer.

The Contractor shall conduct its operations so as to interfere as little as possible with the operations of public utility authorities or their contractors on or near the site. The Employer reserves the right to permit public utility authorities and others to work on or near the site.

The Contractor shall arrange regular meetings with the relevant authorities throughout the period of the works to maintain the required co-operation. The costs of all co-ordination with utility authorities shall be deemed to be included in the rates for the items of work included in the Bills of Quantities.

Sub-Clause 110.5.

Delete this sub-clause and replace with:

“110.5. The Contractor may be required to coordinate with various agencies/ bodies and he shall also provide, with the prior approval of the Engineer, such assistance to the various bodies, as may be authorized by the Engineer. Such acts of coordination and assistance during shifting and relocation of utilities shall be deemed to be incidental to the work and no extra payment shall be made for the same.

Clause 111. PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT

Sub-Clause 111.1.General

Add the following at the end of the sub clause:

“The Contractor shall preserve existing trees, plants, and other vegetation that are to remain within or adjacent to the works and shall use every precaution necessary to prevent damage or injury thereto. The Contractor shall ensure that no spalls, material, road embankment/pavement material be stockpiled around the base of existing trees.

On completion of the works, all areas disturbed by the Contractor’s construction activities (such as areas for compounds, material storage, access and haul roads) shall be restored to their original condition, or as may be acceptable to the Engineer. Restoration shall include ripping, top soiling of the area and seeding and planting.

Prior to the commencement of any site works, the Contractor shall develop a Waste Management Plan (WMP) to the satisfaction of the Engineer. The Plan shall provide details of how the Contractor will manage all waste materials generated during the construction phase of the project. Proposed disposal methods shall comply with any relevant laws, rule and regulations in force. The WMP shall include a requirement for the Contractor to obtain written approval from landholders for any disposal sites outside the right of way.

The Contractor shall engage for the full duration of the Contract, the services of a suitably qualified

Environmental Specialist to provide advice about environmental planning, management and mitigation of impacts in accordance with these specifications

If so requested by the Engineer, the Contractor shall on two weeks’ notice, make available site staff of foreman level and above for training in the environmental aspects of road construction. The staff to be included in the training shall be chosen by the Engineer. The training shall be of a maximum of two working days’ duration and shall be held on the site. Training will be arranged by the Engineer.

The environmental protection requirements detailed in Annexure A to Clause 501 shall be applicable not just to the activities associated with Section 500 but to all activities as described in all other Sections as well.”

Contractor shall carry out all tasks and actions detailed in the Environmental Management Action Plan (EMAP) appended to as Annexure-A1 to these specifications, relevant to the project road section applicable at construction phase.

Sub-Clause 111.2. Borrow pits for Embankment Construction

Add the following after the existing paragraph of the sub clause:

“Where borrow material (including subgrade and sub-base) is required to complete the works, details of the location and extraction methods of borrow sites shall be submitted for the approval of the Engineer. Borrow areas in forest or sanctuary areas or other locations deemed environmentally sensitive by the Engineer shall not be approved. The edges of borrow sites shall be no closer than 3 meters from any fence line or boundary. Adequate clearance shall be provided for the construction of catch drains. Borrow sites shall have adequate drainage outlets unless the relevant landowner has agreed that the borrow area is to create a permanent tank or dam. Cut batter slopes shall not be steeper than 3 to 1 and shall be left by the Contractor in a tidy and safe condition to the satisfaction of the Engineer. Written clearance from the land owner/village head shall be obtained before leaving a site from which borrow material has been extracted. Copies of such clearances shall be provided to the Engineer.

Site preparation for borrow areas shall be in accordance with Section 201 of this specification. Topsoil is to be stripped and stockpiled in accordance with Sub-Clause 301.3.2 and replaced and seeded in accordance with Sub-Clause 308.3.

Borrow areas shall be top soiled and seeded immediately after the area is no longer required for borrow as directed by the Engineer.

Approach roads/tracks to borrow areas shall be maintained during use and left in good condition after closing down the borrow areas.”

Sub-Clause 111.3. Quarry Operations

Add the following paragraphs after the existing sub clause:

“New stone quarries shall be at least 1.5 km away from settlements, forests and other ecologically sensitive areas. These shall be 1.5 km away from rivers, streams, lakes and 500 meters from ponds. The blasting shall be carried out during fixed hours of the day. The Contractor shall obtain the agreement from the nearby residents as to hours of blasting.”

The Contractor shall not develop any new quarries or borrow pits without prior written consent of the Engineer. Such consent shall only be provided where the Contractor has demonstrated, to the North Eastern State Roads Investment Program (Tranche 2)Rev No. 0

satisfaction of the Engineer, that the proposed quarry or borrow pit is strictly necessary for the material supply. It shall be the responsibility of the contractor to obtain necessary Lease Deed/License/Permits from the concerned department of Mines and Geology or the authorities concerned as per requirements under the Mines and Minerals Act prevailing in the State and clearance from the Forest Department, if required.

When quarries or borrow pits are located in mountains or hilly areas or areas with unstable slopes, the Contractor shall construct terraces on the quarry faces in accordance with best engineering practice. The maximum gradient after refurbishment of each quarry slope shall not exceed an average value 1:3.

Prior to commencement of any quarry or borrow pit operations, the Contractor shall develop a Quarry Management Plan (QMP) to the satisfaction of the Engineer. The plan shall include provisions for maintenance of revegetation for two years after establishment.

Rehabilitation of quarries and borrow pits shall include compliance with the following:

- a) Rehabilitation activity shall commence as soon as the works start and shall proceed in parallel with the extraction of material;
- b) Quarries and borrow pits shall be filled by using material resulting from clearing activities and excess cut material from road construction activities;
- c) Rehabilitation activity is carried out by reutilizing the removed first layer of soil (approximately 50 cm). This is stored in not excessively big and slightly sloped stockpiles, located in the shade and far from areas of extraction. Stockpiles shall be covered by organic matter such as clods of grass or leaves. The seeding of an herbaceous cover shall be preferred. The soil removed and stored is gradually placed again in the pits and then covered by vegetation. Sods, grass, shrubs or plants shall be used for coverage.

If the material is obtained from an external or third party supply source, the Contractor shall provide documented evidence to the Engineer that the quarry or borrow pit has been established and is operated in accordance with all required laws, rule and regulations and environmental standards.

Sub-Clause 111.5. Pollution from Hot Mix Plants and Batching Plants

Add the following after the existing sub clause:

“Hot mix plants should be located at least 1.5 km from the nearest habitation, school, hospital, 1.5 km from any archaeological site, 1.5 km from ecologically sensitive areas including forest, national park, sanctuary etc., 1.5 km from rivers, streams and lakes, 500 m from ponds, 500 m from national highway, 250 m from state highway, unless otherwise required by statutory requirements. Locations for hot mix and batching plants shall be subject to the approval of the Engineer.”

Before setting up the hot mix plant and the batching plant, the contractor shall obtain “consent to establish” and “consent to operate” from the concerned State Pollution Control Board.

Sub-Clause 111.6. Substances Hazardous to Health

Add the following after the existing sub clause:

“The use of any herbicide or other toxic chemical shall be strictly in accordance with the manufacturer’s instructions. The Engineer shall be given at least 6 working days’ notice of the proposed use of any herbicide or toxic chemical.

A register of all herbicides and other toxic chemicals delivered to the site, shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.”

Sub-Clause 111.8.

Add the following after the first sentence:

“At the direction of the Engineer, the Contractor shall provide for the laying of dust palliative on, or the watering, of the works and of roads, and other areas immediately adjacent to the works or affected by the works. This shall also include borrow areas, access tracks to borrow areas, bypass and diversion roads, construction camp areas and access roads, quarry sites and access roads and hot mix plants and access roads. The materials and methods used for dust control shall be subject to the approval of the Engineer.”

Sub-Clause 111.13. Vehicle and Machinery Pollution

Add new sub-clause:

“111.13. Vehicle and Machinery Pollution

Vehicles and machinery used for road construction shall be regularly maintained to conform to State Pollution Control Board rules and regulations.”

Sub-Clause 111.14.Blasting

Add new sub-clause:

“111.14.Blasting

Blasting shall be carried out in accordance with the rules and regulations of the Indian Explosive Act.

People living near such blasting sites should have prior information of operation hours. Workers at blasting sites will be provided with earplugs. Vehicles transporting earth materials will be covered.

Red danger flags shall be displayed prominently in all directions during the blasting operations. The flags shall be planted 200 m and 500 m from the blasting site in all directions for blasting at work site and quarry, respectively. People, except those who actually light the fuse, shall be prohibited from entering this area, and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing, a warning siren being sounded for the purpose.

The Contractor shall notify each public utility body having services in proximity to the site of the work of his intention to use explosives. Such notice shall be given sufficiently in advance to enable the concerned authorities to take such steps as they may deem necessary to protect their services/property from injury. In advance of any blasting work within 50 m of any railway track or structures, the Contractor shall notify the concerned Railway Authority of the location, date, time and approximate duration of such blasting operations.

The Contractor shall adequately compensate in a timely manner for any damage to property/services and life caused by their blasting”

Sub-Clause 111.15. Oil and Bitumen Spills

Add new sub-clause:

“111.15. Oil and Bitumen Spills

Spilling of oil and bituminous products during the construction phase shall be avoided. The Contractor shall remove all oil and bituminous product spills to the satisfaction of the Engineer and dispose of this material in accordance with the laws, rules and regulations in force. Bitumen and new exhausted oils shall be stored in elevated tanks located on concrete bases surrounded by walls sufficiently high to contain liquids in case of break or accidental spill.”

Clause 111.16. Construction Camps

Add new sub-clause:

“111.16. Construction Camps

Construction camps shall be located a minimum of 1.5 km from boundaries of designated Reserve Forest, Sanctuary or National Park, 1.5 km from rivers, streams and lakes and 500 meters from ponds, 250 m from the boundary of state and national highways and 1.5 km from the nearest human habitation. Construction camps shall be properly located to avoid contamination of water through wastewater drainage into river and canals. To prevent such contamination, wastewater generated at the campsite will be discharged in soak pits. For human excreta, proper disposal shall be through septic tanks or deep trenches.”

During construction the Contractor shall:

- a. undertake daily and regular cleaning in accordance with the Waste Management Plan to ensure that site of works, structures, temporary offices and accommodation quarters, are maintained free from accumulations of waste materials, rubbish, and other debris resulting from the site work operations and maintain the site in a neat and orderly condition at all times;
- b. maintain the site in a neat and orderly condition at all times;
- c. dispose of all waste materials in accordance with the Waste Management Plan;
- d. ensure that the drainage system is maintained free of debris and loose materials and is in an operational condition at all times;
- e. provide on-site drum containers with lids for the collection of waste materials, debris and rubbish awaiting removal from the site;
- f. dispose of waste materials, contaminated material at designated dumping areas, and shall not bury rubbish and waste materials on the Project site without the written approval of the Engineer;
- g. not dispose of volatile wastes such as mineral spirits, oils or paint thinners in streams or sanitary drains; and
- h. not dispose of wastes into streams or waterways.

Clause 111.17. Storage and Stockpile Areas

Add new sub-clause:

“111.17. Storage and Stockpile Areas

Storage and stockpile sites shall be free of vegetation and debris, free draining and if necessary shall be elevated. Material placed directly on the ground shall not be used in the Works unless the site has

been prepared and surfaced with a 10 (ten) centimeter layer of sand or gravel to the satisfaction of the Engineer.

Surface run-off from storage and stockpile sites shall not be discharged into any watercourse without prior treatment

The Contractor shall develop a Storage and Stockpile Site Management Plan to the satisfaction of the Engineer to ensure that storage and stockpile sites are returned to a condition in which they do not contribute pollution to surrounding air, surface water, groundwater and land.”

Sub-Clause 111.18. Measurement for Payment and Rate

Add new sub-clause:

“111.18. Measurement for Payment and Rate

The cost of all works associated with environmental protection as described in Clause 111 are deemed to be incidental to the works and are included in the rates for the items of work included in the Bill of Quantities and no separate payment will be made.”

Clause 112. ARRANGEMENTS FOR TRAFFIC DURING CONSTRUCTION

Sub-Clause 112.1.General

Delete the last sentence and add the following:

“No less than two weeks before undertaking work which would involve any obstruction whatsoever to traffic, the Contractor shall submit for the Engineer’s approval, a Traffic Control Plan (TCP). Until such time as the TCP is approved by the Engineer, the Contractor shall not commence this work.”

The plan shall include:

- a. Detailed layout plan showing traffic control devices for CD works with or without diversions;
- b. Detailed layout plan showing traffic control devices for roadworks;
- c. Detouring especially at urban areas;
- d. Organizational set up for traffic safety including defined responsibilities;
- e. Estimates of traffic control devices and its monthly distribution;
- f. Estimates and deployment of trained flagmen;
- g. Lighting at night time;and
- h. Vehicle exclusively for transporting traffic control devices.

Special consideration shall be given in the preparation of the TCP to the safety of pedestrians and workers and delineation of the roadway at night.

The minimum requirements for traffic control shall be shown on the TCP. Alternative arrangements may be used subject to the approval of the Engineer.

The Contractor shall employ a qualified Traffic Management and Safety Coordinator and necessary subordinate staff for the overall control of traffic management including coordination with the state and local traffic authorities with jurisdiction over the project area, so as to minimize traffic obstruction and facilitate the flow of traffic through the construction area and through appropriate and approved diversion roads.

Temporary diversions will be constructed only with the approval of the Engineer and will generally only be constructed at bridge sites where new bridges are to be located on the existing road alignment. Road works shall generally be constructed under traffic.”

Sub-Clause 112.2. Passage of Traffic along a part of the Existing Carriageway under Improvement

Delete this Sub-Clause and replace with:

“112.2. Passage of Traffic along a part of the Existing Carriageway under Improvement

In general, the work will be constructed under traffic with the following being the minimum requirements to be provided by the Contractor.

- a. At least one 3.7m lane to remain open to traffic at all times;
- b. Flag men in contact with each other by radio shall control the flow of traffic at each end of a section being constructed under traffic;
- c. The surface used by the through traffic shall at all times be a firm all weather compacted surface free of pot holes and other defects;
- d. The maximum continuous length over which construction under traffic may take place shall be limited to 1.0 km unless otherwise approved by the Engineer. Passing bays at least 50m long with additional width of 2.5m shall be provided at 0.5 km intervals. At any time, the number of sections on the project being constructed under traffic shall be minimized and shall be subject to the approval of the Engineer; and
- e. During periods when the works are not attended by flagmen, the carriageway shall be restored to a minimum width of 7 meters (or two separate 3.5-meter-wide lanes) to allow passage of two-way traffic.

Full details of proposed traffic control measures are to be submitted to the Engineer for approval as part of the Traffic Control Plan.

The use of the completed works or part of the works in providing for traffic shall not be considered as full opening to traffic and shall not be a reason for issuing of a Taking Over Certificate for the section so used.”

Sub-Clause 112.3. Passage of Traffic along a Temporary Diversion.

Delete this sub-clause and replace with:

“112.3. Passage of Traffic along a Temporary Diversion

Where approved by the Engineer, a temporary diversion shall be constructed with a 7m carriageway and 2.5m wide earth shoulders on each side (total width of roadway 12m) with the following provision for road crust in the 7 m width.

- (i) 200 mm (compacted) granular subbase
- (ii) 225 mm (compacted) granular base course and
- (iii) Premix carpet with seal coat (Mix seal surfacing)

The Contractor shall submit full details of his proposal to the Engineer for approval, as part of a Traffic Control Plan (TCP) prior to undertaking the construction of the diversion.

The TCP shall show:

- a. Pavement construction and surfacetype;
- b. Roadsidefurniture;
- c. Drainage culverts andpits;
- d. Alignment and grading at a horizontal scale of 1:2000 for rural roads and 1:500 for urban roads;
- e. A sight distance diagram if opposing traffic is to use a singlecarriageway;
- f. Sufficient cross-sections to indicate the feasibility of making connections between various parts of thework;
- g. Intersections, and any other locations where traffic may be required to make turning, merging or diverging movement, at a scale of 1:500;and
- h. Pavement markingdetails.

The geometry of the diversion shall be designed for vehicle speeds of 60 km/hr in accordance with IRC guidelines.

Drainage structures shall be provided to prevent ponding if necessary. The drainage structures shall be sized to prevent water flowing over the road in storms with an average recurrence interval (ARI) of one year unless otherwise approved by the Engineer.

The diversion embankment and pavement shall be designed to resist damage during periods of overtopping in storms with ARI greater than 1 year.

The wearing surface of diversions shall be bituminous and shall be firm, even and skid resistant under all weather conditions and shall be designed to remain sound during use. The wearing surface width shall extend across the full width of the traffic lanes. The wearing surface shall be carried on to any existing connecting roadway so as to finish square to the existing roadway centerline.

Diversions shall be constructed in accordance with the technical requirements of this Specification for:

- SiteClearance;
- Earthwork, Erosion Control andDrainage;
- Sub-bases, Bases (Non-Bituminous) and Shoulders;and
- Bases and Surface Courses(Bituminous).

The Contractor shall be responsible for the maintenance of diversions and shall ensure that the road surface is kept safe for traffic. Potholes and other failures shall be repaired without delay. Damage caused by storm water, including overtopping of the diversion, shall be repaired by the Contractor. The cost of all or any work which, in the opinion of the Engineer, is to be carried out by the Contractor to maintain the diversions in a trafficable condition is deemed to be included in the rates in the Bill of Quantities.

All signposting, pavement marking and other traffic control devices shall be completed before the opening of diversions to traffic. Diversions shall not be opened to traffic until they have been inspected and approved by the Engineer. Unless otherwise approved by the Engineer, traffic shall be switched to diversions only where the Contractor’s usual workforce will be on site for a minimum of two days thereafter.

Unless otherwise approved by the Engineer, sections of existing roadway or bridges being replaced shall not be disturbed for at least two days after opening a diversion in case failure of the diversion occurs and there is a need to redirect traffic back onto the existing roadway. The need to redirect

traffic shall be determined by the Engineer. The costs associated with the redirection of traffic back onto the existing roadway shall be borne by the Contractor.

Upon completion of the Work the diversion arrangements shall be removed and the area restored to a condition equivalent to that which existed prior to the commencement of the work.”

Sub-Clause 112.6. Measurements for Payment and Rate

Delete this sub-clause and replace with:

“112.6. Measurements for Payment and Rate

i. Construction UnderTraffic

All arrangements for traffic during construction including provision of temporary cross drainage structures, if required, and treated shoulder as described in clause 112.2 including their maintenance, dismantling and clearing debris, where necessary, shall be considered as incidental to the works and shall be the contractor’s responsibility and included in the rates within the Bill of Quantities generally. If the Contractor fails to provide traffic arrangements to the satisfaction of the Engineer on sections of road being constructed under traffic, liquidated damages shall be applied at the rate of Rs 200,000 per km per month per section of road being constructed under traffic. Liquidated damages shall be applied pro-rata in the case where traffic arrangements are not to the satisfaction of the Engineer for part of amonth.

ii. TemporaryDiversions

The Construction of temporary diversions, including temporary cross drainage structures and flood protection as described in Sub-Clause 112.3 shall be measured on a linear meter basis for each diversion required. The length of the diversion shall be taken as the length along the diversion center line from where the center line of the diversion leaves the edge of the bitumen surface of the existing road to the point where it returns to the edge of the bitumen surface of the existing road. The rate shall be full compensation for construction (including supply of material, labour, tools etc.) maintenance, final dismantling and disposal. If the Contractor fails to carry out maintenance of a diversion to the satisfaction of the Engineer, liquidated damages shall be applied at the rate of Rs. 200,000 per month per diversion. Liquidated damages shall be applied pro-rata in the case where maintenance is not to the satisfaction of the Engineer for part of amonth.

Upon completion of construction of each diversion to the Engineer’s satisfaction, the Contractor shall be paid 60% of the rate per meter for the length of the diversion shown in the Bill of Quantities. The remaining 40% shall be paid upon removal and disposal of the diversion and reinstatement of the area to its original condition to the satisfaction of theEngineer.”

Sub-Clause 112.7. Side Roads and Property Accesses

Add new sub-clause:

“112.7. Side Roads and PropertyAccesses

At all times, the Contractor shall provide safe and convenient passage for vehicles pedestrians and stock to and from side roads and property accesses connecting to the roadway. Work which affects the use of side roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of theEngineer.”

Sub-Clause 112.8. Plant and Equipment

Add new sub-clause:

“112.8. Plant and Equipment

During the day, plant and equipment working in a position adjacent to traffic and having a projection beyond the normal width of the item, for example, a grader blade, shall have a fluorescent red flag attached to the outer end of the projection. During poor light conditions or at night, an additional traffic controller with an illuminated red wand shall direct traffic around such plant and equipment.

At night, all plant items and similar obstructions shall be removed from the normal path of vehicles, to provide a lateral clearance of at least 6m where practicable, with a minimum clearance of 1.2m.

Plant and equipment, within 6 m of the normal path of vehicles, shall be lit by not less than two yellow steady lamps suspended vertically from the point of the obstruction nearest to a traffic lane, and one yellow steady lamp at each end of the obstruction on the side furthest away from the traffic lane.”

Clause 113. GENERAL RULES FOR THE MEASUREMENT OF WORKS FOR PAYMENT

Sub-Clause 113.2. Measurements of Lead for Materials

Delete this sub-clause and replace with:

“113.2. Measurements of Lead for Materials

Payment shall not be paid for haulage of materials required under the contract except as specifically stated in this specification. The rates in the Bill of Quantities are deemed to include the costs of haulage, from source of supply to the site for all materials required for the Works and the cost of haulage from the site to locations for disposal for materials not required for the Works.”

Sub-Clause 113.5. Measurements of Bituminous Courses for Payment on Weight Basis

Delete this sub-clause and replace with the following:

“113.5. Measurements of Bituminous Courses for Payment on Weight Basis

All bituminous surfacing shall be paid on an area or volume basis in accordance with Sub-Clauses 113.3 and 113.4.

Clause 114. SCOPE OF RATES FOR DIFFERENT ITEMS OF WORK

Clause 114.2.

Delete Item (ii) and replace with:

“Detailed resources based construction programme including resource planning (using computerized critical path network method) in a form, which facilitates control of the progress of the works and consequences of any changes in terms of time. The programme shall also include detailed network, activities for the submission and approval of materials, procurement of critical materials and equipment fabrication of special products/equipment and their installation and testing and for all activities of the Contractor that are likely to affect the progress of work etc. including updating all such activities on the basis of decisions taken at the periodic site review meetings or as directed by the Engineer. The Contractor shall submit data via electronic media to the Engineer in a form readily compatible with Engineer’s planning system.

The first issue of the detailed construction 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;”

Add Item (xvii):

“Monthly progress report submitted 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. It shall include at least 20 photographs of construction activities;”

Add Item (xviii):

“Contractor will check and survey the existing profile and submit proposed profile for the finished road in accordance with the design parameters to the Engineer for his approval before taking up the roadwork in hand;”

Add Item (xix):

“The establishment of Contractor’s camp, offices and other facilities necessary for the execution and control of the Works”

Clause 115. METHODOLOGIES AND SEQUENCE OF WORK

Delete this clause and replace with:

“115. METHODOLOGIES AND SEQUENCE OF WORK

115.1. Methods Statement

The Contractor shall submit a methods statement to the Engineer for approval within 28 days after the date of the Notification of Award. The methods statement shall be submitted in two parts:

- General Part; and
- Special Part.

General Part

The general part of the methods statement shall describe the Contractor's proposals regarding preliminary works, common facilities, and items that require consideration at the early stage of the contract. The general part shall be issued along with the first issue of the construction programme (refer Clause 114.2) and shall include information on:

- a) Sources of materials such as coarse aggregate, fine aggregate, borrow materials and quantity and quality of materials available from different sources;
- b) Sources of manufactured materials such as cement, bitumen, steel reinforcement, prestressing strands and bearings etc. Wherever possible the Contractor shall identify at least two sources for each of the items; he shall also submit samples/test certificates of recently manufactured materials for the consideration of the Engineer; Location of site facilities such as batching plant, hot mix plant, aggregates processing plant etc.;
- c) Details of facilities/approaches for transportation of men, equipment and materials such as concrete for construction of foundations, substructure and superstructure in riverbeds;

- d) Information on procedures to be adopted by the Contractor for prevention and mitigation of negative environmental impacts due to construction activities;and
- e) Any other information required by the Engineer subsequenttothe scrutiny of method statement submitted along with thebid.

The general part of the QA Programme shall accompany the methods statement.

Special Part

For each item of work or any activity related to work, the Contractor shall submit a special part of the methods statement to the Engineer, as directed by him. These statements shall be submitted in advance of the commencement of the activity or item of work, as stipulated in the contract. The statement shall give information on:

- a) Details of personnel both for execution and quality control of thework;
- b) Equipment deployment with details of number of units, capacity, standbyarrangements;
- c) Sequence of construction, details of temporary or enabling works such as diversions, formwork including specialized formwork for superstructure, details of borrow areas, method of construction of embankment and sub grade, pavements, piles, concreting procedures, details of proprietary processes and products (e.g. details of prestressing systems, proprietary piling systems, bearings, expansion joints, reinforced earth work, etc.) and details of equipment to be deployed. Wherever necessary, technical literature, design calculations and drawings shall be included in the methodsstatement;
- d) Testing and acceptance procedures including documentation;and
- e) Special part of the QA Programme referred in Clause 105.3 for the particular item of work shall be submitted along with the methods statement for the concernedactivity;

The Engineer shall examine and approve the methods statement or direct the Contractor to resubmit the statement with required modifications. The modified statement shall be submitted within 14 days of receipt of Engineer'scomments.

The sole responsibility for the safety and adequacy of the methods adopted by the Contractor shall rest on the Contractor irrespective of any approval given by the Engineer. Approval of these plans will not relieve the Contractor of responsibility to comply with required provisions of Technical Specifications and other contract documents.”

115.2. Approval of ProprietaryProduct/Process/System

Only proprietary products proven by international usage in comparable projects shall be permitted to be used. The manufacturer shall submit fully authenticated details of licensing and collaboration arrangement, where relevant.

Within 28 days of award of work the Contractor shall submit the following information for all proprietary products for approval by theEngineer:

- a. Name of manufacturer and name of product/process/system with complete details of the product/ process/system shall be furnished. Details of projects where similar product/process/ system have been successfully used shall be furnished. Authenticated copies of license/collaboration agreement shall be furnished;
- b. General features of the product/product process/system;
- c. Detailed write up with methods statements shall be furnished for each product/process system. This shall include complete working drawings and installation drawings, and technical

- specifications covering fabrication, materials, system of corrosion protection, etc;
- d. Details of product development and development testing;
- e. Acceptance test and criteria;
- f. Manufacturer shall submit a quality assurance system document;
- g. Details of acceptance test and criteria of acceptance shall be furnished in this document;
- h. Installation procedure;
- i. Maintenance procedure and schedule; and
- j. Warranty proposal.

The Engineer may order any additional tests for the purpose of accepting the product. The facility for such additional tests shall be made available by the manufacturer. The charges of these additional tests shall be borne by the Contractor.

115.3. Sequencing of Pavement Construction

Road Widening and Formation Works

Adequate temporary drainage shall be provided at toe of finished hill slope until such time as permanent drainage system is completed. Final shaping of the subgrade shall be delayed until the subbase is about to be laid to minimize moisture loss and disturbance to subgrade.

Preparation and Surface Treatment of Formation

Sub-surface drains, if specified, shall be completed prior to preparation and surface treatment work. The work shall be carried out prior to laying of Granular Sub Base (GSB) and in accordance with Clause 310 of the technical specifications.

Granular Subbase (GSB) Work

Completed GSB shall be covered with wet mix macadam (WMM) within a maximum of 10 (ten) days of completion of the GSB layer, but in no case shall GSB laying proceed more than 1000 m ahead of WMM laying. In case prolonged exposure is unavoidable, the Contractor shall take suitable measures for protecting and mitigating damage to the GSB. Immediately prior to receiving WMM, GSB surface shall be properly treated. This includes cleaning of the entire surface of dust, loose aggregates, mud and other extraneous materials, reinstatement of soft spots, harrowing of surface, adding required quantity of water and topping up with fresh material where necessary, grading, rolling and compacting to required profile and field density. Additional sampling and testing shall be taken as directed.

Wet Mix Macadam (WMM) Work

Completed WMM shall be covered with bituminous course within a maximum of 7 (seven) days, but in no case shall WMM laying precede more than 500 m ahead of bituminous course laying.

Dense Bituminous Macadam (DBM) and Bituminous Concrete (BC)

DBM shall be covered with BC within a maximum of 48 hours of completion of each section of the DBM layer.

Pre Monsoon Works

Work shall be planned in such a manner that it shall not remain partially completed and be damaged

during the monsoon season. Cross drainage and slope protection works shall be completed ahead of pavement work while side drainage work shall be carried out in tandem with the pavement work. Adequate measures such as provision of temporary drainage system and other measures as directed by the Engineer shall be put in place prior to the onset of the monsoon season for safeguarding and protecting the work. These measures are deemed incidental to the work and shall not be paid separately. The Contractor shall be held fully responsible for making good any damage to the work due to his negligence. Payment for works shall be withheld until such damage is made good.”

Clause 119. USE OF SURFACES BY CONSTRUCTION TRAFFIC

Add the following sub-clause:

“119.4. Granular sub base and base courses shall be kept clean and uncontaminated as long as they remain uncovered by surface treatment. The Contractor may, at his own risk, allow traffic to travel on the sub base and base prior to application of the primer seal and bituminous surface. Should the sub base and base course become contaminated with materials unacceptable to the Engineer, the contractor shall make good by cleaning it to the satisfaction of the Engineer or by removing the layer and replacing it in accordance with the specification at no additional cost.”

Add the following sub-clause:

“119.5. Any damage to existing or new pavements whether on the Site of Works or elsewhere, which, in the opinion of the Engineer, is caused by the Contractor’s construction traffic shall be repaired at the Contractor’s expense as directed by the Engineer in accordance with the requirements of Clause 3000.”

Clause 120 SITE OFFICE FOR ENGINEER & OTHER SUPERVISORY STAFF

Sub-Clause 120.2. Description

Delete this sub-clause and replace with:

“120.2. Description

The Contractor shall arrange to provide fully furnished office accommodation constructed as shown in the drawings or as directed by the Engineer. The Contractor shall provide working drawings and Specifications based on the information provided in this specification for the approval of the Engineer prior to commencement of construction.

The office shall be constructed in accordance with the requirements of State Governments Standard Specification for Building Construction unless modified hereunder. The State Government is the state of the Site of Works.

The office shall have a net usable floor area of 100 m² (excluding verandahs) and consist of at least 5 separate rooms for management offices, one central area, and separate rooms for a kitchen, toilet and shower. The siting and orientation of the office shall be decided upon in consultation with the Engineer and shall be confirmed in writing before erection.

Buildings for the office shall be constructed of concrete and/or masonry or other materials approved by the Engineer. Office shall have concrete floors with approved floor tiles. The walls, up to the level of the plinth level shall be constructed of coursed rubble stone masonry / brick masonry and above this level, up to the roof level, shall be constructed of brick masonry. The roof shall be of reinforced cement concrete of M20 grade. The walls shall be plastered with cement mortar. A potable water supply shall be provided to the toilets, which shall contain a wash hand basin and a shower, and to the tearoom/kitchen which shall contain a sink with suitable built in cupboards and working surfaces.

An electric geyser shall be provided in the tearoom to supply hot water to both the tearoom and toilets. The store shall be fitted with suitable shelving.

Ceilings shall be provided in the office. The clear height of the office between floor and ceiling shall be 2.4m minimum. All windows shall be of the type that can open over the full window area and shall have steel frames. All windows shall be mosquito proofed.

After construction, the office building shall be painted with an approved paint and the paintwork shall be maintained during the contract period. Each door shall be provided with a lock and two keys.

The office shall be provided with a telephone with three incoming operating lines with switchboard and extensions to all rooms. Parking areas and roads around the office shall be treated to make them dust free, either by using crushed stone, suitable dust-laying oils or bituminous surfacing, or by other approved means. They shall be well-drained and kept trafficable and free from mud at all times. Footpaths shall be similarly treated to provide convenient access to all buildings.

The work shall include the provision of 220V electricity connection, all electrical items such as lights, wiring etc. The work shall include the provision of an uninterrupted source of fresh clean potable water supply including all pipes, fittings, tanks, tube wells pumps, valves etc. and sewerage, including septic tanks if necessary. All of the preceding will be considered part and parcel of the accommodation provided and will not be paid for separately.

The Contractor shall provide the office accommodation within 4 months from the date of the commencement of the work or 3 months from the date of providing the land for the construction of office accommodation, whichever is later.

The furniture to be provided and maintained for the Engineer’s site office shall be as in Table 100-2.

Table 100-2

Sl. No.	Item	Specification	Nos. Required
01	Executive table (for the Engineer)	Make - Godrej Model No.T-108 or equivalent	3
02	Executive chair (For the Engineer)	Make - Godrej Model No.PCH-701 or equivalent	3
03*	Table (for Support Staff, Accountant and Head Clerk)	Make - Godrej Model No.T-104 or equivalent	8
04*	Ordinary chair Type I (For the Engineer, Accountant and Head Clerk and visitors)	Make - Godrej Model No.CHR-6 or equivalent	8
05	Conference table (for Participants)	Make - Godrej or equivalent	1
06	Conference room chairs	Make - Godrej Model No.CHR-6 or equivalent	12
07	Ordinary chair-Type II (For visitors)	Make - Godrej Model No.CHR-6 or equivalent	8

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08*	Stool	Make - Godrej Model No.ST-2 or equivalent	4
09*	Steel Almirah 1980mm X 915 mm X 485mm	Make - Godrej Model No.1 Storewel plain or equivalent	8
10*	Steel Almirah 1270mm X 765mm X 440mm	Make - Godrej Model Minor plain or equivalent	5
11*	Racks - 5 Tier 1800mm X 900mm X 375mm	Made of slotted angles and M.S. Sheets of Godrej make	7
12	Hot Water Geyser	10 litre capacity	1
13	Steel Cash Chest of size 450mm X 450mm (approx.)	Make - Godrej Storewel or equivalent	1
14*	Air Conditioners	2.7 kw Carrier or equivalent	5
15*	Ceiling Fans 1400mm size	Ceiling fans shall be of approved make and colour	12
16*	Computers	Core 2 Duo, 2.4 GB RAM 160GB Combo Drive, 17 inch TFT MS OS XPP, MS Office SBE (Word&Excel&Power Point) UPS 600VA and Antivirtus Scanner(Nortan)	8
17	Printers	HP Laser Network Mono A4 HP2015N HP Colour Laser A4 HP2605 dn HP Inkjek A3 – HP K7108	3 2 2
18	Photocopier	Modi Xerox Model 5216	1
19.	Facsimile Machine	20 pages per minute	1

* These items include provision for furniture for laboratory and associated office.

Sub-Clause 120.3.Ownership

Delete the last sentence and replace with:

“The land for the site office shall be provided by the Employer at a location within a town to be nominated by the Engineer and this will be advised to Contractor within 28 days after the date of

Notification of Award.”

Sub-Clause 120.5. Measurement for Payment

Replace first paragraph with the following:

“The item is a lump sum, unit rate item. The area of the office for payment is exclusive of the verandahs which are incidental to the item. The Payment shall be made only after the completion and handing over of the buildings with connected services fully furnished including office equipment for occupation.

In the second paragraph, replace “Rs 15,000” with “Rs 300,000”.

In the fourth paragraph, replace “Rs 5,000” with “Rs 100,000”.

In the fifth paragraph, replace “Rs 15,000” with “Rs 300,000”.

Sub-Clause 120.6. Rate

Include at the end of the first paragraph:

“The contract rate for construction of the site office shall include the preparation of working drawings and Specifications for submission to the Engineer for approval and the supply of all furniture and equipment listed in Table 100-2”.

Clause 121. FIELD LABORATORY

Clause 121.1. Scope

Add the following at the end of the clause:

“It is the contractor’s responsibility to ensure that sufficient numbers of laboratory equipment are provided such that works are not delayed.

This facility will be provided and maintained by the Contractor, as incidental to work and no separate payment shall be made for this item.

The laboratory shall be constructed in accordance with the requirements of State Governments Standard Specification for Building Construction unless modified hereunder. The State Government is the state of the Site of Works.”

Clause 121.3. Laboratory/Equipment

Delete the first sentence and replace with:

“The items of laboratory equipment listed in Sub-clause 121.3.1 shall be procured from reputed manufacturers duly approved by the Engineer and provided in the field laboratory. The manufacturer of these goods shall have a Quality Management System (QMS) that meets the requirements of ISO 9001:2000. This QMS shall be certified by a Third Party and this certification provided to the Purchaser describing the scope of its QMS, and confirming that it conforms to ISO 9001:2000. The Third Party shall be accredited by a nationally or internationally recognized accreditation body verifying the independence and competence of the Third Party to carry out the certification process. All equipment shall conform to accepted international standards and shall be subject to the approval of the Engineer.

All equipment shall be calibrated at site prior to use from an approved accreditation authority. This accreditation certificate may be in the form of supporting letter provided either by accredited Manufacturer and/or by accredited independent institution that will perform calibration of goods or equipment at the final destination which cover dimensional, mechanical, temperature/thermodynamic, and electric and/or electronic equipment.

121.3.1. General

i)	Balance	
a)	7 kg to 10 kg capacity semi-self-indication type - accuracy 1 gm electronic	2 No.
b)	500 gm capacity - semi- self-indicating electronic type accuracy 0.01 gm	1 No.
c)	Chemical balance 100 gm capacity- accuracy 0.0001	1 No.
d)	Pan balance 100 gm capacity- accuracy 0.5 gm.	4 No.
e)	Platform scale - 300 kg capacity	1 No.
f)	Triple beam balance- 25 kg capacity accuracy 1 gm	2 No.
ii)	Ovens electrically operated, thermostatically controlled (including thermometer), stainless steel interior	
a)	Temperature range ambient to 300° C, sensitivity 1° C, capacity 500 Litre	1 No.
b)	Temperature range, ambient to 1500° C, sensitivity 1° C, capacity 250 Litre.	1 No.
iii)	Sieves	
a)	Test sieve set 450 mm internal diameter of sieve sets as per IS of required sieve sizes complete with lid and pan of hole sizes 75 mm, 63 mm, 53 mm, 37.5 mm, 26.5 mm, 13.2 mm, 9.5 mm, 6.7 mm, and 4.75 mm.	2 sets
b)	IS sieves 200 mm internal diameter (brass frame and steel/or brass wire cloth mesh) as per IS complete with lid and pan of required sieve sizes.	2 sets
iv)	Sieve shaker capable of taking 200 mm and 450 mm diameter sieves electrically operated with time switch assembly	1 No.
v)	200 tonne compression testing machine electric cum manually operated fitted with three gauges 0-2000 KN. x 10 KN, 0-1000 KN x 5 KN and 0-500 KN x 2 KN	1 No.
vi)	Stop watches 1/5 sec. accuracy	2 No.
vii)	Glassware comprising beakers, pipettes, dishes, measuring cylinders (100 to 1000 cc capacity) glass rods and funnels, glass thermometers range 0° C to 100° C and metallic thermometers range up to 300° C. (100 to 1000 cc capacity) glass rods and funnels, glass thermometers	1 Doz Each
viii)	Hot plates 200 mm diameter (1500 watt.)	2 No.
ix)	Enamel trays	
	a) 600 mm x 450 mm x 50 mm	6 No.
	b) 450 mm x 300 mm x 40 mm	6 No.
	c) 300 mm x 250 mm x 40 mm	6 No.
	d) Circular plates of 250 mm diameter.	6 No.
x)	Water still, 3 litre/hr. with fittings and accessories	1 set
xi)	Aluminium Tins	
	a) 50 mm x 30 mm	36 No.
	b) 55 mm x 35 mm	36 No.
	c) 70 mm x 45 mm	36 No.
	d) 70 mm x 50 mm	36 No.
	e) 80 mm x 50 mm	36 No.
xii)	Riffle box of slot size 50 ram as per ASTM C-136	1 No.
xiii)	Spatula set of 100 and 200 long	3 sets
xv)	First aid box	1 set
xvi)	Rain Gauge	1 No.

121.3.2. For Soils andAggregates

i)	Liquid limit and plastic limit	
a)	Liquid limit device with casagrande and grooving tools and as per IS - 2720	1 No.
b)	Cone penetrometer	1 No.
c)	Moisture content cans	50 No.
d)	Ground glass plate with rounded edges 600 mm x 600 mm x 10 mm	2 No.
ii)	Hydrometer analysis	
a)	High speed stirrer with stainless steel breaker	1 No.
b)	Soil hydrometer set including jar to ASTM E100 and C422	1 set
iii)	Sampling pipettes fitted with pressure and suction inlets, 10 ml capacity	1 set
iv)	Laboratories compaction	
a)	Compaction apparatus (Proctor) to the requirements of IS-T99 complete with collar base plate & 2.5 kg rammer	1 No.
b)	Compaction apparatus (heavy) to the requirements of IS-T180 complete with collar, base plate and 4.5 kg rammer	3 No.
v)	Sand pouring cylinder with conical funnel and top and base plate; (with 152 mm diameter of sand cone) to the requirements of ASTN D 1556	4 sets
vi)	Sampling tins with lids 100 mm diameter x 75 mm ht. 1/2 kg capacity	30 No.
vii)	Laboratory CBR testing equipment to the requirements of IS consisting of following:	1 set
a)	Floor mounted electro-mechanical load frame 5 tonne capacity with automatic strain control	1 No.
b)	CBR moulds complete with collar, base plate, etc.	18 No.
c)	Swell stands for holding dial gauge	18 No.
d)	CBR plunger with penetration dial gauge holder	1 No.
e)	Surcharge weight 2.5 kg wt with central hole	36 No.
f)	Spacer disc with handle	2 No.
g)	Perforated (brass) swell plate with adjustable cap on handle	18 No.
h)	Soaking tank for accommodating 18 CBR moulds	1 No.
i)	High tensile steel calibrated proving rings of 1000 kg, 2500 kg and 5000 kg Capacity	1 set
j)	Dial gauge, 25 mm travel-0.01 mm/division	20 No.
viii)	Speedy moisture tester complete with carrying case ad supply of reagent (rapid moisture meter)	2 No.
x)	Water still	1 No.
xi)	Sand equivalent apparatus complete along with chemicals to the requirements of IS codes	1 set
xiii)	Reagent grade sodium sulphate for soundness test of aggregate chemical sodium sulphate to the requirements of AASHTO T- 104	30 kgs
xiv)	Post-hole augur with extension	1 set
xv)	Core cutter apparatus 10 cm diameter diamond cutting edge	1 set
xvi)	Flakiness and elongation test gauge	1 set
xvii)	Standard measures of 30, 15, 3 litre capacity along with standard tamping rod.	1 set

121.3.3. For Bitumen and BituminousMixes

i)	Constant temperature bath for accommodating bitumen test specimen, electrically operated, and thermo-statically controlled, interior, 100 liters capacity, temperature range ambient to 80° C	1 No.
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ii)	Bitumen penetrometer automatic type, including adjustable weight arrangement, and needles to the requirements of AASHTO T - 49	1 set
iii)	Centrifuge type motorized bitumen extraction apparatus to the requirements of AASHTO I16.4 with stock of solvent & filter paper	1 set
iv)	Bitumen laboratory mixer planetary action, 2 litre capacity, including required accessories electrically operated and fitted with heating jacket	1 No.
v)	Marshall compaction apparatus to the requirements of AASTHO 245 as per ASTM 1559-62 T and complete with electrically operated loading unit, compaction pedestal, heating unit, head assemble, dial micrometer and bracket for flow measurement load transfer bar, 12 Nos. specimen mould 100 mm diameter (4 in) in base plate, collars, specimen extractor, compaction hammer 4.53 kg 10 (b) x 457 mm (18 in) tall (excluding constant temperature bath)	1 set
vi)	Dial type thermometer reading 0-200° C, range, accuracy 2° C	2 No
vii)	Thin film oven test apparatus to the requirements of AASHTO T 179, including accessories	1 No.
viii)	Ring and ball apparatus as per IS 1205 – 1978	1 set
ix)	Asphalt institute vacuum viscometer as per IS 1206 (Part II) - 1978	1 set
x)	BS U- tube modified reverse floro viscometer IS 1206 (Part II1) - 1978	1 set
xi)	Apparatus for determination of ductility test as per IS 1208 - 1978	1 set
xii)	Pan sky - mortars closed tester for testing flash and fire point as per IS 1209-1978 IS 1209- 197'8	1 set
xiii)	Apparatus for float test- IS 1210.-1978	1 set
xiv)	Apparatus for determination of water content (Dean and Shark Method) IS-1211-1978	1 set
xv)	Apparatus of determination of loss on heating IS-1212-1978	1 set
xvi)	Apparatus of determination of specific gravity IS-1202-1978	1 set
xvii)	Emulsion Settlement Test Apparatus	1 set
xviii)	Emulsion Storage Stability Test Apparatus	1 set

121.3.4. For Cement, Cement Concrete and Materials

i)	Vicat needle apparatus for setting time with plungers, as per IS-269-1968	1 set
ii)	Moulds	
	a) 150 mm x 300 mm ht. cylinder with capping component along with the capping set and compound as per IS	48 No.
	b) Cubical 150 mm moulds, 100 mm (each size) as per IS	36 No.
iii)	High frequency mortar cube vibrator for cement testing	1 No.
iv)	Concrete mixer power driven, 1 cu. ft. capacity	1 No.
v)	Variable frequency and amplitude vibrating table size 1 meter x 1 meter, as per the relevant British Standard	1 No.
vi)	Flakiness index test apparatus as per BS 812	1 No.
vii)	Elongation index test apparatus as per BS 812	1 No.
viii)	Aggregate impact test apparatus as per IS 2386 (Part 4) 1963)	1 No.

ix)	Los-angels abrasion apparatus as per IS 2386 (Part 4) 1963	1 No.
x)	Equipment for slump test	4 No.
xi)	Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3), 1963	4 No.
xii)	Flexural attachment to compression testing machine	2 No.
xiii)	Core cutting machine with 10 cm diameter diamond cutting edge	1 No.
xiv)	Needle vibrator	1 No.
xv)	Vibrating hammer as per BS specification	1 No.
xvi)	Air entrainment meter ASTM C – 231	1 No.
xvii)	Soundness testing apparatus for cement	1 set
xviii)	Chemicals solutions and consumable	As required
xix)	Water still	1 No.
xx)	Flow Table as per IS:712-1973	1 No.
xxi)	Chloride Testing Kit for chemical analysis of chloride content	1 set
xxii)	Ion exchange kit for rapid determination of sulphate content	1 set

121.3.5 For Control of Road Geometry, Profile and Surface Evenness

	i) Precision automatic level with micrometer attachment	4 sets
	ii) Total Station survey equipment	2 sets
	iii) Theodolite - Electronically operated with computerized output attachment	2 sets
	iv) Precision staff	8 sets
	v) 3 meter straight edge and measuring wedge	6 sets
	vi) Camber template 2 Lane (a) Crown type crosssection (b) Straight run crosssection	1 set 2 sets
	i) Steeltape ii) 5 mlong a) 10 mlong b) 20 mlong c) 30 mlong	4No. 6No. 6No. 6No. 6No.
	5 th Wheel-car Mounted Bump Integrator	1 No.

The Contractor shall be responsible for the provision of adequately experienced and qualified laboratory staff and field staff, in sufficient numbers to be able to meet all testing and survey requirements to the approval of the Engineer, and for the supply of all transportation of staff, testing and survey equipment and samples necessary to allow the testing and survey to be performed in a time scale compatible with the needs of the Site.

Contractor shall arrange to maintain the Laboratory in satisfactory manner and will carry stocks of spare equipment and laboratory consumables until the issue of “Taking Over Certificate.”

The Contractor shall provide all relevant reference codes, manuals, literatures, publications, etc. as directed by the Engineer in the field laboratory.

Sub-clause 121.4.Ownership

Delete this sub-clause.

Clause 121.5.Maintenance

Delete this sub-clause.

Clause 121.6. Measurement for Payment

Delete this sub-clause and replace with:

" Clause 121.6. Measurement for Payment and Rate

The cost of provision of functional field laboratory including supply of approved laboratory equipment and also provision of an adequate number of qualified personnel, the erection, maintenance and running of the laboratory including all consumables such as chemicals and reagents and provision of electrical and water supply including standby generator, shall be incidental to the work and no separate payment shall be made for these items."

Clause 121.7.Rate

Delete this Sub-clause.

Clause 123. PROVIDING AND MAINTAINING WIRELESS COMMUNICATION SYSTEM

Delete whole of clause and replace with:

"123. PROVIDING AND MAINTAINING COMMUNICATIONS SYSTEM

123.1. Scope

The work covers the provision and maintenance of a communication system with necessary mobile phones.

123.2. Supply

The Contractor shall arrange to supply, install and commission the complete communication system of approved quality suitable for operation in the project area. The system shall consist of the following:

- (a) Mobile Instruments with valid connections, of reputed make such as "NOKIA" or equivalent other reputed make with accessories as approved by theEngineer.
- (b) Fax machine of reputed make with operable telephonenumber.
- (c) The Contractor shall provide the complete communication system within 1 month from the date of commencement of work. He shall submit a replacement guarantee of any defective instruments during the currency of thecontract.

123.3 Connections

The Contractor shall arrange to obtain all necessary connections from the service provider. He shall also fulfil the requirements laid down by the service provider.

123.4 Maintenance

The Contractor shall arrange to maintain the entire connection system including the mobile phones and fax machine and all accessories until the issue of Taking over Certificate for the complete work. He shall replace any instrument or accessory, which goes out of order, at his own cost and provide all necessary spares and attend to all repairs necessary for keeping the complete system in satisfactory working condition.

The mobile instruments and the fax machine shall become the property of the client, after issue of Taking Over Certificate.

123.5 Measurement for Payment

The measurement for supply shall be as per relevant BOQ items.

If the Contractor fails to commission and hand over the complete communication system in the stipulated time, an amount of Rs. 100,000 per month or part thereof shall be debited to the Contractor’s account.

The measurement for maintenance and operations of the system shall be on maintenance months and shall be made on completion of satisfactory maintenance every month. If the Contractor fails to carry out the required maintenance /operations as directed by the Engineer at any stage of work, an amount of Rs.5000 per month or part thereof shall be debited to the Contractor. In addition, the month/months during which the Contractor fails to carry out the required maintenance / operations shall not be measured for payment. If the Contract Works are not completed within the stipulated period or within granted extended time of completion, the maintenance of communication system in accordance with Clause 123.4 shall be carried out by the Contractor at his own cost and as such, no payment shall be made for the same, In case of any failure by the Contractor to do so, an amount of Rs.10, 000 per month or part thereof shall be debited to the Contractor’s account.

123.6 Rates

The Contract unit rate for the supply and installation/connection of communication system shall cover all the expenses towards the supply of all necessary items and expenses towards obtaining necessary communication, installation, commissioning and handing over, guarantee for replacement of the instruments (which are found defective) during the currency of the Contract and all other incidentals.

The Contract unit rate for the maintenance / operations of communication system shall be payment in full for carrying out periodic servicing and checking of the system, replacement of components, attending to all necessary repairs, payment of taxes, if any, and other incidentals to keep the complete system in satisfactory working condition.”

Clause 124. PROVIDING AND MAINTAINING VEHICLES FOR THE ENGINEER

Delete clause heading and replace with:

“124. PROVIDING AND MAINTAINING VEHICLES FOR THE ENGINEER AND EMPLOYER”

Sub-Clause 124.2. Description

Add the following to the end of the first paragraph:

“All vehicles shall be less than one-year-old when first supplied. Should the models described in this specification no longer be available, the Contractor shall supply equivalent vehicles to the satisfaction of the Engineer”

Sub-Clause 124.3.Maintenance

In the 9th line in first paragraph of this Sub-clause change “Rs 500 per day” to “Rs 4,000 per day”.

In the 6th line in second Para of this Sub-clause change “Rs 700 per day” to “Rs 4,000 per day”.

Sub-Clause 124.5. Measurement of Payment

Replace “day/days” with “month/months” in the first sentence of this subclause.

Clause 125. SUPPLIES OF COLOUR RECORD PHOTOGRAPHS AND ALBUMS

Sub-Clause 125.2.Description

Add the following to the end of the first paragraph:

“Besides the prints, the Contractor will provide two CD sets of photographs. All photographs taken on film or by digital camera will be scanned and included on the CDs. The resolution of digitized photographs must be acceptable to the Engineer.”

Clause 126. SUPPLY OF VIDEO CASSETTES

Delete this clause heading and replace with:

126. SUPPLY OF VIDEO CASSETTES AND DIGITISED CDROMS”

Sub-Clause 126.1.Description

Add the words “and CD ROMs” after “video cassettes” in the last sentence of the Sub-clause.

127. SAFETY

Add a new clause.

“127.SAFETY

The Contractor shall, at all times during the continuance of the Contract, comply fully with all existing Acts, Regulations and Bylaws of State and Central Government and other local authorities and any other enactments, notifications and acts that may be passed in future either by the State or the Central Government or local authority with respect to the safety of both the Contractor’s employees and the public.

At every large workplace (Contracts greater than Rs 100 Crore in value), there shall be provided and maintained an ambulance room containing the prescribed equipment and in the charge of such medical and nursing staff as may be prescribed.

At every workplace, there shall be mentioned in a readily accessible place first aid appliance including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good working order and, in large work places, these shall be placed under the charge of a responsible person who shall be readily

available during working hours.

All necessary personal safety equipment as considered necessary by the Engineer shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use. The Contractor shall take adequate steps to ensure proper use of such equipment by those concerned. Workers employed on mixing and placing asphaltic materials, cement/lime mortars, concrete etc. shall be provided with protective footwear and protective goggles. Those engaged in handling any material, which is injurious to the eyes, shall be provided with protective goggles. Those engaged in construction of bridges shall be provided hard hats. Those engaged in welding works shall be provided with welder’s protective eye-shield. Those involved in stone breaking shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals. Those involved in crushing plants shall be provided with protective goggles and ear plugs.”

The cost of provision of safety requirements as specified above and in the General Conditions of Contract shall be incidental to the work and no separate payment shall be made for these items.

SECTION 200 SITE CLEARANCE

Clause 201. CLEARING AND GRUBBING

Sub-Clause 201.1. Scope

Delete the last sentence and replace with:

“Clearing and grubbing shall be performed less than one month in advance of earthwork operations and in accordance with the requirements of these specifications. Areas requiring clearing and grubbing shall be determined by the Engineer.”

Sub-Clause 201.3. Methods Tools and Equipments

Add the following after the fourth sentence of the first paragraph:

“Notwithstanding the above provisions, the Contractor shall obtain the Engineers express approval before removing any trees with girth greater than 300 mm.”

Sub-Clause 201.4. Disposal of Materials

In the second paragraph, last sentence replaces “at specified spots with all lifts and up to a lead of 1000m” with “at specified spots approved by the Engineer with all lifts and all leads”

Sub-Clause 201.6.1.

In last sentence, replace “up to a lead of 1000m” with “all leads”.

Add the following paragraph after existing paragraph:

“The removal from site and disposal of all materials obtained from clearing and grubbing operations, which, in the opinion of the Engineer cannot be used or auctioned, shall be included in the Contract unit rate.”

Sub-Clause 201.6.2.

In last sentence, replace “up to a lead of 1000m” with “all leads”.

Sub-Clause 202.3. Dismantling Pavements and Other Structures

In the first line of the first sentence add the word “concrete” before the word “pavements”.

Add a third paragraph:

“Except for asphalt surfacing on bridge decks, removal of flexible pavements shall be paid for as per items in the BOQ.”

Sub-Clause 202.4.Back-filling

After “operations “add “and wells encountered in the alignment”. Add after last sentence “The wells may be capped thereafter if directed by the Engineer. The filling of wells and capping will be paid separately in relevant items of earthworks, concrete, RCC works as the case may be.”

Sub-Clause 202.5. Disposal of Materials

Delete this sub clause and replace with:

“Materials determined by the Engineer as having salvage value shall be placed in neat stacks of like materials within the Right of Way as directed by the Engineer with all lifts and up to all leads. This material shall be the property of the Contractor, where the Contractor has quoted rebate towards dismantled material, suitable for use in the Work with all leads and lifts and with the approval of the Engineer.

All materials obtained from dismantling operations, which, in the opinion of the Engineer cannot be used or auctioned, shall be removed from the site by the Contractor and disposed off at the nearest tip or other approved location in accordance with all statutory requirements. The Engineer may permit the disposal of boulders, concrete fragments and other incombustible materials by burial within the road reserve, outside paved areas. When buried, the tops of these materials shall not be less than 300 mm below finished surfacelevel.”

Sub-Clause 202.6. Measurements for payment

Delete this sub-clause and replace with:

“(i)	Dismantling brick/stone masonry/concrete (plain and reinforced)	cum
(ii)	Dismantling steel structures	tonne
(iii)	Dismantling timber structures	cum
(iv)	Dismantling pipes, guard rails, kerbs, gutters and fencing	Linear m
(v)	Utility services	Nos.
(vi)	Filling of wells	cum
(vii)	Removing asphalt concrete surfacing frombridgedecks	m ²
(viii)	Reinforced CementConcrete/PlainCement Concrete wellcapping	cum
(ix)	Granular/Macadam base including GSB andDrainagelayers	cum
(x)	Dismantling Guard stone / kilometre stone / sign post/hectometre Stone	Nos.
(xi)	Removal ofSteelrailing	Linearm

In situations where existing bridges are to be totally dismantled, the work shall be measured as a single item. Where existing bridges are to be partially dismantled, the work shall be measured in the

component items listed above.”

Sub-Clause 202.7.Rates

Delete the last sentence of the first paragraph and replace with:

“These will also include excavation and backfilling where necessary to the required compaction and for handling, salvaging, piling and disposal of the dismantled materials with all lifts and leads as specified in Sub-Clause 202.5. The cost of cartage of materials with no salvage value to disposal sites with all leads and lifts is deemed to be included in the rates fordismantling.”

SECTION 300 EARTHWORK, EROSION CONTROL AND DRAINAGE

Clause 301. EXCAVATION FOR ROADWAY AND DRAINS

Sub-Clause 301.2.1. Classification

Delete paragraph (c) (i) and replace with:

“(c) (i) material, to be excavated to achieve the road design cross section including drains, which cannot be ripped and excavated with a track dozer in good condition with matching hydraulic single shank ripper of combined mass not less than 46 tonnes and flywheel horsepower not less than 185 hp (this refers to a Caterpillar D6T or it’s equivalent) at a rate in excess of 60m³ (solid) per hour.”

Sub-Clause 301.3.3. Excavation - General

Delete the last two sentences of last paragraph.

The following paragraph is added to the sub-clause 301.3.3

"Temporary supports to the sides of the excavation necessary to support the foundation of adjoining structures and to prevent any ground movement shall be provided by the Contractor. Where temporary supports are provided these shall be designed and removed such that no ground movement occurs on removal. The Contractor shall submit his proposal in this respect to the Engineer for approval prior to commencement of the excavation. If any damage occurs the Contractor shall be liable to restore the property at its own position. No extra payment will be made against works under this subclause.”

Sub-Clause 301.3.11. Disposal of excavated materials

Delete this sub-clause and replace with:

“All the excavated materials shall be the property of the Employer. Suitable material obtained from the excavation of the roadway, shoulders, verges, drains, cross drainage works, etc. shall be used for:

- i. filling for roadway embankments;
- ii. filling existing pits in the right of way as directed by the Engineer, including levelling and spreading, with all lifts and lead up to all leads;
- iii. for landscaping of the road as directed by the Engineer, including levelling and spreading, with all lifts and leads; and
- iv. All hard materials such as hard moorum, rubble obtained from rock cutting which is suitable for being used as aggregate for road construction or in retaining walls, breast walls etc. shall be used by the contractor in road work/ structures with rebate offered to the Employer as per the BOQ in the contract.

Unsuitable and surplus material, which, in the opinion of the Engineer cannot be used in the Works, shall be removed from site by the Contractor and disposed of at the nearest tip or other approved location in accordance with all statutory requirements and the approval of the Engineer. Unsuitable and surplus material cannot be disposed of by pushing or tipping over the embankment or cutting face or stockpiling within the right of way.”

Sub-Clause 301.3.12.Backfilling

After the last sentence add the following:

“Density requirements for backfilling shall be in accordance with Table 300-2.”

Sub-Clause 301.8. Measurements for Payment

Delete the second and third sentences of the third paragraph and replace with:

“Excavation in soil and ordinary rock shall be paid under the same item in all cases except the excavation of bridge foundations.”

Delete items (iv) & (v) and replace with:

- “iv. Stripping including storing or disposal of topsoil. cum
- v. Reapplication of topsoil. cum

Items iv and v above shall also include topsoil quantities relating to embankments. Refer to Clause 305.”

Sub-Clause 301.9. Rates

Sub-Clause 301.9.1.

In item (ii) replace “lead up to 1000 m” with “all leads”.

Add extra item after item (vi):

“(vii) The removal from site and disposal in all leads & lifts of all surplus or unsuitable materials obtained from excavation operations, which, in the opinion of the Engineer cannot be used in the Works, shall be included in the Contract rate.”

Sub-Clause 301.9.2.

Delete sub-clause and replace with:

“**310.9.2.** The Contract unit rate for loosening and re-compacting at subgrade level shall include full compensation for loosening to the specified depth, removing the loosened soil outside the roadway excavation, rolling the surface below, breaking the clods, spreading the excavated soil in layers, watering where necessary and compacting to the requirements.”

Sub-Clause 301.9.5

In the first sentence, replace “lead up to 1000 m” with “all leads”.

Sub-Clause 301.9.6

In the first sentence, replace “lead up to 1000 m” with “all leads”.

Clause 302. BLASTING OPERATIONS

Sub-Clause 302.1.General

Add the following paragraphs to the start of this sub-clause:

“The Contractor shall be required to engage the services of a competent specialist agency for the design and supervision of the controlled blasting work. The agency so engaged shall submit a design, execution methodology plan and together with other relevant aspects of the work for the Engineer’s approval prior to commencement of work. The cost of the services and preparation of plan is deemed to be included in the rate for controlled blasting and shall not be paid separately.”

Clause 304. EXCAVATION FOR STRUCTURES

Sub-Clause 304.3.4. Preparation of Foundation

In Paragraph 2 and 3 of Sub-Clause 304.3.4, substitute “concrete M10” in place of “1.3.6 nominal mix”.

Sub-Clause 304.5.1.

Delete item (v) and replace with:

“(v) backfilling, clearing up the site and disposal of all surplus or unsuitable material with all leads, which, in the opinion of the Engineer cannot be used in the Works, at the nearest tip or other approved location in accordance with all statutory requirements.”

Sub-Clause 304.5.3.

Delete this sub-clause.

Clause 305. EMBANKMENT CONSTRUCTION

Sub-Clause 305.2.1.1.

Delete the subsection (e) in the second paragraph and replace with the following:

(e) Soils having a liquid limit exceeding 35 and a plasticity index exceeding 18;and

Sub-Clause 305.2.1.2.

Delete the paragraph and replace with:

“Highly expansive soils such as CH, MH or OH exhibiting marked swell and shrinkage properties (‘free swelling index’ exceeding 50 per cent when tested as per IS: 2720-Part 40) shall not be used in construction of subgrade and embankment.”

Sub-Clause 305.2.1.4.

Delete second sentence of Sub-Clause 305.2.1.4

Sub-Clause 305.2.1.6.

Add new sub-clause:

“ **305.2.1.6.** Material used as subgrade in embankments (depth of 500 mm immediately below the pavement) shall have a 4 day soaked CBR value at least equivalent to the CBR assumed in the

design and/or indicated in theBOQ”.

Sub-Clause 305.2.2.2. Borrow materials

Delete paragraphs 1 and 2 and replace with the following:

“Borrow areas have not been designated by the Employer. The arrangement for locating the source of supply of the material for embankment as well as compliance to the different environmental requirements in respect of excavation and borrow areas as stipulated, from time to time, by the Ministry of Environment and Forest, Government of India and the local bodies, as applicable shall be the sole responsibility of the Contractor.

Borrow pits along the road shall not be permitted within the right of way or immediately adjacent to the right of way.”

Delete paragraph of this sub-clause given below Table 300-2 and replace with the following:

“The Contractor shall, at least 7 working days before commencement of compaction, submit the following to the Engineer for approval.

- (i) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 8) for each fill material intended for use;
- (ii) The graphs showing values of density against moisture content from which the maximum dry density and optimum moisture content in (i) above were determined;
- (iii) The dry density-moisture content - CBR relationships for each of the fill materials; and
- (iv) The adopted Subgrade CBR value shall be the 4 day soaked CBR value determined in accordance with IS:2720 (Part 16).

Sub-Clause 305.3.4. Compacting ground supporting embankment/subgrade

After the third paragraph add the following:

“A geotextile shall be placed at the base of the excavation after removal of unsuitable material if so directed by the Engineer.”

Sub-Clause 305.3.5. Spreading material in layers and bringing to appropriate moisture content

Clause 305.3.5.1.

Add the following at the end of this sub-clause.

“To monitor the density achieved for each of layer, the Contractor shall prepare a layer chart indicating layer number, level, achieved compaction etc. in a format approved by the Engineer”.

Sub-Clause 305.3.5.2.

In para 3, substitute “IS:2720 (Part 8)” for “IS:2720 (Part 7) or IS:2720 (Part 8) as the case may be”.

Sub-Clause 305.4.3. Earthwork over existing road surface

Replace item (i) with:

“If the existing road surface is of a bituminous type and lies more than 500 mm below formation level, the same shall be scarified to a depth of 50 mm below the underside of the bitumen, or more if specified, so as to provide an ample bond between the old and the new material. Where the existing road surface is less than 500 mm below formation level, the existing bituminous surface shall be removed. The removal of this material from site shall be in accordance with sub-Clause 301.3.11. The surface beneath the bituminous layer shall then be scarified, mixed with water and then compacted by rolling so as to achieve the minimum dry densities as given in Table 300-2.”

Sub-Clause 305.4.7. Earthwork for high embankment

Delete the first paragraph and replace with:

“Material used in high embankments, including subgrade material constituting the 500 mm of embankment immediately below the pavement, shall have a minimum effective angle of internal friction of not less than 20° and minimum effective soil cohesion (c') of not less than 1.0 t/m^2 . High embankment shall be constructed from borrow material in accordance with Sub-Clause 305.2.2.2 unless otherwise approved by the Engineer.”

Sub-Clause 305.8. Measurements for Payment

Delete the fifth paragraph and replace with:

“Stripping including storing and reapplication of topsoil for embankments shall be measured in cubic metres. Payment shall be made under the relevant items of Sub-Clause 301.8”

Delete the last sentence and replace with:

“Filter medium behind abutments, wingwalls and other retaining structures and compacted sand backfill to foundations shall be measured as finished work in position in cubic metres.

Geotextile placed after removal of unsuitable material shall be measured in square metres of geotextile placed.”

Sub-Clause 305.9.1.

Add the following at the end of the sub-clause:

“Except where filter medium or compacted sand backfill to foundations is specified on the drawings or by the Engineer, no additional payment shall be made for backfill to abutments, wingwalls and other retaining structures. Backfill to retaining structures shall be measured as normal embankment.”

Sub-Clause 305.9.2.

Delete this sub-clause and replace with:

“305.9.2. The unit rate for embankment from borrow areas shall include the costs of all leads and lifts from borrow areas.

The unit rates for subgrade, and high embankment shall include the costs of all leads from borrow areas where these items are constructed from borrow material.”

Sub-Clause 305.9.3.

Delete this sub-clause.

Sub-Clause 305.9.6.

Read “all leads and lifts” in place of “1000 m” in the last sentence.

Sub-Clause 305.9.8.

Delete this sub-clause and replace with:

“The Contract unit rate for providing and laying filter material behind abutments and compacted sand backfill to foundations shall be payment in full for carrying out the required operations including all materials, labour, tools, equipment and incidentals to complete the work to Specification.”

Sub-Clause 305.9.11.

Add new sub-clause:

“**305.9.11.** The unit rate for placing geotextile after removal of unsuitable material shall include, cutting and lapping and all labour, materials, tools, equipment and incidental required to complete the work in accordance with Clause 806.”

Clause 306. SOIL EROSION AND SEDIMENTATION CONTROL

Sub-Clause 306.4. Measurements for Payment

Delete this sub-clause and replace with the following:

“All temporary sedimentation and pollution control works shall be deemed as incidental to the earthworks and other items of work and no separate payment shall be made for these items.”

Sub-Clause 306.5. Rates

Delete this sub-clause.

Clause 309. SURFACE/SUB-SURFACE DRAINS

Sub-Clause 309.2. Surface Drains

Add at the end of the third paragraph:

“The concrete lining of the concrete lined drains shown on the drawings shall be constructed in accordance with the requirements of Clause 408.

Metal grates for sumps or covers on concrete lined surface drains shall be heavy duty (trafficable by commercial vehicles) proprietary products with gaps between bars no greater than 25 mm. The Contractor shall submit proposals for grating to the Engineer for approval before commencing construction of the sumps.”

Add at the end of the fourth paragraph:

“Surface drains shall be constructed as soon as possible after or during construction of the embankment and prior to construction of the Base”.

Sub-Clause 309.4. Measurements for Payment

Delete this sub-clause and replace with:

“Surface drains not lined with concrete running adjacent to the road formation (side drains) shall be included in the items for excavation for the roadway in accordance with Sub-Clause 301.8. Surface drains that are not adjacent to the roadway and that therefore cannot be constructed as part of the roadway excavation shall be measured in cubic metres of excavation. Measurement for sub-surface drains shall be per running metre length of drain. Concrete lined surface drains shall be measured per as per unit rate item in cum as perBOQ.

Measurement of inlet sumps and metal grates associated with surface drains shall be by number.”

Sub-Clause 309.5.Rates

In the first sentence delete “except for removal of unsuitable material for which the lead shall be 1000m” and replace with “including removal from site and disposal of all surplus or unsuitable materials, which, in the opinion of the Engineer cannot be used in the Works, through all leads and lifts.”

In the second sentence delete “gratings, sumps,”.

Delete the third sentence and replace with:

“The rate for subsoil drain shall also include geotextile, granular backfill, perforated pipe, connection to pipes or sumps and construction of outlets as detailed. The rate for concrete lined drain shall also include bedding concrete and jointing.”

Clause 310. PREPARATION AND SURFACE TREATMENT OF FORMATION

Delete item (a) and replace with:

“ (a) The surface shall be rolled to achieve the required compaction in accordance with Table 300-2.”

SECTION 400 SUB-BASES, BASES (NON BITUMINOUS) & SHOULDERS

Clause 401. GRANULAR SUB-BASE

Clause 401.2 Materials

Clause 401.2.1.

Delete first paragraph and replace with:

"The material to be used for the work shall be moorum, crushed gravel (not less than 90% by weight of crushed gravel pieces retained on 4.75 mm sieve shall have at least two fractured faces), crushed stone, or combination thereof depending upon the grading required by plant mix method. The material shall be free from organic or other deleterious constituents and conform to one of the three grading given in table 400-2.”

Clause 401.2.2. Physical Requirements

This clause shall read as under:

"The material shall have a 10% fines value of 50 KN or more for sample in soaked condition) when tested in compliance with BS: 812 (Part 111). The water absorption value of the coarse aggregate shall be determined as per IS: 2386 (Part: 3); if the value is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS: 383. The Soundness test shall be carried out in accordance with IS: 2386 (Part 5). The average loss of weight of coarse aggregate after 5 cycles shall not exceed 12% when tested with sodium sulphate and 18% when tested with magnesium sulphate as specified in IS: 383."

Clause 401.4.2. Spreading and compacting

Delete 2nd and 3rd paragraph and replace with the following:

"Manual mixing shall not be allowed under any circumstances. The base material of Grading II and as given in Table 400-2 shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced/positive mixing arrangement like pug mill.

Clause 406. WET MIX MACADAM SUB-BASE/BASE

Clause 406.1. Scope

Delete the 2nd sentence of the 2nd paragraph and substitute as follows:

"The maximum thickness of single compacted Wet Mix Macadam layer shall not be more than 150 mm. The compaction shall only be done with vibratory roller of minimum 80-100kN static weight".

Clause 406.2.1.1. Physical requirements

Add the following at the end of the sub-clause:

"The average loss of weight of coarse aggregate after 5 cycles shall not exceed 12% when tested with sodium sulphate and 18% when tested with magnesium sulphate as specified in IS:383."

Clause 406.3.4. Spreading of Mix

Substitute paragraph 2 of this sub-clause with the following:

"The mix shall be spread only by Paver Finisher for the main pavement under the carriageway and shoulders. In exceptional cases where it is not possible for the paver to be utilized, mechanical means, such as a Motor Grader, may be used with the prior approval of Engineer. The thickness of the loose layer shall be so regulated that the maximum thickness of the layer after compaction does not exceed 150 mm and not less than 75 mm unless otherwise approved by the Engineer after satisfactory site trial (Clause 406.1)."

Clause 406.3.5. Compaction

In paragraph one delete the sentence "If the thickness of single compacted layer does not exceed 100 mm, a smooth wheel vibratory roller of 80 kN to 100 kN weight may be used."

Section 500 BASE AND SURFACE COURSES (BITUMINOUS)

Clause 501.2.1.

Add at the end of the paragraph;

"Paving Bitumen of penetration grade 60 / 70 shall be used."

Clause 501.3.Mixing

Delete first sentence and replace with:

"Pre-mixed bituminous materials, including Bituminous Macadam, Dense Bituminous Macadam, Semi-Dense Bituminous Concrete and Bituminous Concrete, shall be prepared in a hot mix plant of batch type of capacity 100T/hour or more and capable of yielding a mix of proper and uniform quality with thoroughly coated aggregates".

Sub-Clause 501.5.3 Spreading:

Add following before the starting sentence "Except in areas.....".

"Bituminous mix shall be spread with self propelled Paver fitted with electronic sensing device and string line arrangement (supported on steel pegs @ 5 m apart) on either side of paving width for automatic levelling, surface evenness and profile control. Use of string line is mandatory to provide signal to the electronic sensing device fitted to the Paver finisher."

Clause 501.8.2.4. Profile Corrective Course and its application

Add the following at the end of the sub-clause:

"Profile Corrective Course is to be constructed with dense bituminous macadam if the thickness of the Profile Corrective Course is more than 40 mm thick but less than 75 mm thick. For more than 75 mm thickness, wet mix macadam material shall be used in the profile corrective course."

Clause 501.8.3.2. Scarifying existing bituminous surface

Delete last sentence of this sub-clause and replace with:

'Reusable materials shall be stacked and reused as directed by the Engineer with all leads of their origin in the Works Site'.

Clause 501.8.8.1. Rate for Scarifying

In this clause, substitute "1000 m" with "all leads".

CLAUSE 502. PRIME COAT OVER GRANULAR BASE

Clause 502.2.3. Choice of primer

Add to the end of the paragraph:

"The primer shall be Slow Setting Bitumen Emulsion complying with IS 8887."

Clause 502.8. Rate

Delete the last sentence of this clause and replace with

"No adjustment for payment will be made for the variation in application rate of prime coat."

Clause 503.2.1.Binder

Add to the end of the paragraph:

“The binder used for tack coat shall be Rapid Setting Bitumen Emulsion complying with IS 8887.”

Clause 503.8.Rate

In the second sentence replace "0.20 kg per square meter" with "0.25 kg per m²"

Delete the last sentence of this clause and replace with

“No adjustment for payment will be made for the variation in application rate of tack coat.”

Clause 507. DENSE GRADED BITUMINOUS MACADAM.

Clause 507.2.1.Bitumen

Replace "indicated in table 500-10" with "grade of 60/70 grade".

Clause 507.2.2. Coarse Aggregates

Delete the words "crushed gravel or other hard material" from the first sentence of this clause.

Delete paragraph 2 of this clause.

Clause 507.2.3. Fine Aggregates

Delete the words "or naturally occurring mineral" and "or a combination of the two" appearing in the first sentence of the clause.

At the bottom of Table 500-8 replace "** Aggregate may satisfy requirements of either of these two tests" with "** Aggregate shall satisfy requirements of both these two tests"

Clause 507.2.4.Filler

Delete first sentence and replace with "Filler shall consist of cement as approved by the Engineer."

Clause 507.9.Rate

In second line, add the words "except for provision of tack coat" after the words "required operations".

Clause 509. BITUMINOUS CONCRETE

Clause 509.2.1.Bitumen

In third line, delete words "indicated in Table 500-18" and insert "grade of 60/70 grade".

Clause 509.2.2. Coarse Aggregate

At the bottom of Table 500-17 replace “Aggregate may satisfy requirements of either of these two tests” with “Aggregate shall satisfy requirements of both these two tests”.

Clause 511. OPEN-GRADED PREMIX SURFACING

Clause 511.1.2.1.Binder

Delete the words "suitable grade as specified in contract, or as directed by the Engineer" and insert "grade of 60/70 grade" "

Clause 511.1.8.Rate

In second line, add the words "except for item of tack coat" after the words "required operations".

Clause 512. CLOSE-GRADED PREMIX SURFACING/MIXED SEAL SURFACING

Clause 512.8.Rate

In second line add the words "except for item of tack coat" after the words; "required operations" line.

Section 700 GEOSYNTHETICS

Clause 704 : PROTECTION WORKS WITH GEOSYNTHETICS

Delete the existing clause and substitute with following:

“704. GABION RETAINING WALLS AND BREASTWALLS.

704.1 Scope

Gabion walls are built using geogrid cages filled with packed stones and are normally used to retain or protect slopes against mass failure in retaining walls and breastwalls. The gabion crates are usually assembled from perforated geogrids, in modular form, in lengths upto 3 metres long, 2 metres wide, and are normally 1 metre deep, subdivided into compartments with internal walls or diaphragms to provide strength to the structure. The stone fill for the gabions is placed in the compartments by hand or machinery starting at the bottom and working up, filling compartment by compartment to form the gabion structure. Fill used for gabions shall be hard durable stone and not less than 150 mm in dimension. For non-standard shapes the gabion crates can be made or cut to size.

704.2 Design

The design of gabion crate retaining walls and breast walls shall use the principles described in Chapter 9 of IRC:SP:48-1998 (Hill Road Manual).

704.3 Materials

Gabions shall consist of perforated geogrids made of polypropylene having high resistance to impact and weathering besides possessing good strength and elongation characteristics. All wires used in binding and connecting lids and boxes shall be galvanized with an heavy coating of zinc by an electrolytic or hot dip galvanizing process. The size of aperture /mesh in geogrid shall be between 100 mm to 150 mm. Diaphragms (dividers in multiple-unit crates) shall be manufactured of the same materials as the parent gabion box

Aperture	:	Rectangular, Square or oval shaped
Colour	:	Black
Mechanical	:	Peak strength not less than 10kN/m at maximum elongation of 15 percent. Not more than 5% elongation at half Peakload.
Strands/ FabricForum	:	Integration joints with junction strength of 100 percent of plain strands as measured by GRI-GG3 standards. Materials shall have ISO 9002 Certification.
Life	:	At least 8 years in case of continuous exposure and 5 year for buried applications (defined as capable of retaining at least 75% of its original strength after the stated lifespan)

Stones used for filling the gabion crates shall be clean, hard, sound, unweathered and angular rock fragments or boulders. The specific gravity of the stone shall be not less than 2.50 and the stones shall not absorb water more than 5 per cent when tested as per IS:1124-1974 (Method of test for determination of water absorption, specific gravity and porosity of natural building stones). The length of any stone shall not exceed three times the dimension of the mesh of the crate. However smaller size of stones as spalls shall be allowed for filling voids and its volume including voids shall not be more than 20 per cent of the total volume of the stone. Before filling any gabion crates the Contractor shall submit representative samples of the rock he proposes to use in the gabion for approval by the Engineer. Further representative samples shall be submitted for approval each time there is a change in the type and strength of the rock.

Before filling any gabion crates, the Contractor shall submit samples of crates assembled, erected and filled with stones for approval which, when approved, shall be retained for reference and comparison with the crates built as part of the permanent works. The size, type and location of the samples shall be as directed by the Engineer.

704.4 Construction

704.4.1 Assembly and foundation

Gabion shall be assembled, erected and filled with stones in the dry bed on prepared level surfaces.

Foundations must be taken deep enough to rest on sound foundation materials which must be safe from scour, frost and surface water. Rock must be cut in level steps or towards the hill and not away. The necessity of filling foundation pits in front of the toe of the retaining wall back up to original ground level, shall be ensured.

For gabions of 600mm or more height, suitable cross internal ties shall be placed in layers of 300 mm connecting opposite sides in lateral braces tied with polymer braids of ultra-violet stabilized variety so as to ensure protection against bulging of the gabions during filling with stones. The bed on which the gabion crates are to be laid shall be even and conform to the levels shown on the Drawing.

704.4.2 Construction and Installation of gabions

Gabion crates shall be placed such that vertical joints are not continuous, but staggered. If more than one unit is required to obtain the necessary width, units of unequal length shall be used and the joints between should be staggered.

704.5 Measurement

Gabion boxes in crates including all accessories and fixtures, filling stones including fixing of gabion in position, tying with binding wires and tension wires as specified shall be measured as completed work in cubicmetres.

The excavation for keying of gabions in the ground trenches and backfilling in side trenches shall be incidental to the item of work.

704.6 Payment

The Contract unit rate for the provision and construction of gabion walls shall be payment in full for carrying out all the required operations including full compensation for fabrication of gabions, supply transportation and storage of fill materials i.e., boulders and spalls, through all leads and lifts, excavation and backfilling of trenches inclusive of all labour, tools and plant, equipment and incidentalscomplete.

SECTION 800 TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

Sub-Clause 801.1.2.

Replace the paragraph with the following:

"All road signs shall be of retro-reflectorised type and made of high intensity grade with encapsulated lens type reflective sheeting conforming to Clause 801.3, fixed over aluminium sheeting as per these Specifications."

Sub-Clause 801.3.7. Colour

Add the following to the end of the last paragraph:

"All the facility information and place identification signs shall have Blue (Indian standard Colour No. 166: French Blue) background and white letters."

Sub-Clause 801.4.1.

Add the following to the end of the last paragraph:

"Posts shall be embedded in concrete (M-15) foundation as shown in the drawings for safeguard against theft. The cost of concrete foundation shall be deemed to be included in the cost of installing the road sign."

Sub-Clause 803.6.Application

Add the following sub-clause at the end of this Clause.

“803.6.6. General

Road traffic markings shall be constructed to accuracy within the tolerances given below:

The width of lines and other marking shall not deviate from the specified width by more than 5%.

The position of lines, letters, figures, arrows and other markings shall not deviate from the true position specified by more than 20mm.

The alignment of any edge of a longitudinal line shall not deviate from true alignment by more than 10 mm in 15m.

The length of segments of broken longitudinal line shall not deviate from the specified length by more than 150 mm.

In broken lines, the length of segments and the gap between segments shall be as indicated on the drawings. If these lengths are altered by the Engineer, the ratio of the lengths of the painted sections shall remain the same.

Line and curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

803.6.7 Faulty Workmanship or Materials

If any materials not complying with the requirements is delivered at the site or used in the Works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer, at the Contractor's own cost.

Rejected traffic markings and paint that has been splashed or has dripped onto the surfacing, kerbs, structures or other such surfaces shall be removed by the Contractor at his own cost, in such a way that the marking of spilt paint will not show up again."

Clause 804. HECTOMETRE/KILOMETRE STONES

Sub-Clause 804.1.General

Add after the first paragraph the following:

"The work shall also include the removal, repainting, lettering and relocation of distance measurement stones and shall include:

- i. Hectometrestones;
- ii. Kilometre stones;and
- iii. 5th Kilometrestones"

Sub-Clause 804.3.

Add the following after the first paragraph:

"Where directed by the Engineer, the existing distance measurement stones shall be relocated by the Contractor. Repainting of the existing stones in accordance with the above paragraph shall be carried out as directed by the Engineer. The stones shall be embedded in the ground as shown in drawing."

Sub-Clause 804.4. Measurement for Payment

Add the following after the first sentence:

“Measurement of existing distance measurement stones to be relocated shall be in numbers of 200 metre, kilometre and 5th kilometre stones fixed at site.”

Sub-Clause 804.5.Rate

Add the following after the first paragraph:

“The rate for relocation of existing distance measurement stones shall be payment for furnishing labour, materials, tools, equipment, removal of the stones, cleaning and where directed by the Engineer painting, and lettering and relocation and fixing at site and all other incidental cost necessary to complete the work to these specifications.”

Clause 805. ROAD DELINEATORS

Add 805.3 as under. Existing subclause 805.3 & 805.4 may be numbered as 805.4 & 805.5

Sub-Clause 805.3.Scope

805.3.1 Delineators are classified under three types.

- (i) Roadway Indicators
- (ii) Hazard Markers, and
- (iii) Object Markers.

805.3.2 Roadway Indicators

Roadway indicators shall be in the form of guide posts comprising of R.C.C. hume pipes (NP2) type conforming to IS:458-1988, 300 mm dia, 1 m long fixed into ground, at road formation edge, in M-10 cement concrete block of size 600 mm x 600 mm x 450 mm, with pipe filled with compacted earth except top 15 cm which shall be filled with M-10 concrete and half rounded and finished. The pipe exterior shall be painted with synthetic enamel paint in white with a 15 cm mid back band around the pipe. Roadway indicators shall be fixed in accordance with guidelines in IRC:79-1981 and drawings.

805.3.3 Hazard Markers

Hazard Markers shall consist of rectangular plate, 600 mm x 300 mm made out of 2 mm thick aluminium sheet, face full covered by high intensity grade white retro-reflective sheeting of encapsulated lens type. Striped markings shall consist of alternately black stripes sloping downwards at an angle 45° towards the side of the obstruction on which the traffic is to pass. Hazard markers shall be put up wherever there are objects so close to the road as to constitute an accident hazard e.g. bridge parapets, guard rails, etc..

The application and placement of hazard markers shall be generally in accordance with IRC:79-1981.

805.3.4 Object Markers

Object markers shall consist of circular red reflectors arranged on triangular panels of size 300 mm with three red reflectors. The panel shall be made out of 2 mm thick aluminium sheet fully covered with high intensity grade white retro-reflective sheeting of encapsulated lens type. The aluminium plate shall be riveted to MS angle iron frame of size 40 mm x 40 mm x 5 mm. The sign shall be fixed with nuts and bolts and welded to 50 mm (NB) dia medium weight, 500 mm high MS pipe and embedded in ground M-10 Cement Concrete block 30 cm x 30 cm x 30 cm as per drawings. All components of signs and support shall be thoroughly descaled, cleaned, primed and painted with two

coats of epoxy paint. The back of the plate shall be painted in grey and post in white. The part of the post below ground shall be painted with 3 coats of red oxidepaint.

The requirements for reflectors, placement and installation shall conform to IRC:79-1981.

SECTION 900 QUALITY CONTROL FOR ROAD WORKS

Clause 901.GENERAL

Add the followingsub-clause:

Clause 901.16. SiteTrial

The Contractor shall carry out full-scale site trials on all earthwork and pavement items proposed for the Works using the equipment and methods proposed by the Contractor for constructing the Works. The trial shall be carried out with the agreement and in the presence of the Engineer or his authorizedrepresentative.

The trials shall be carried out to enable the Contractor to demonstrate the suitability of his mixing and/or compaction equipment to provide the specified materials and compact the same to the specified density and to confirm that the other specified requirement of the completed earthworks and pavement courses can be achieved.

Each trial area shall be at least 1000 (approx. 8.5 x 120m length) square meters and shall be laid to the specified depth for the materials. It may form part of the works if so ordered by the Engineer provided it complies with the specification. Any trial areas, which do not comply with the Specification, shall beremoved.

The Contractor shall allow in his programme for conducting site trial and for carrying out the appropriate test on them. The trial on earthworks and each pavement layer shall be undertaken at least 14 days ahead of the Contractor proposing to commence full-scale work on earthworks and pavement layers.

The following data shall be ordered at each site trial:

- The composition and grading of the material, including the bitumen content and properties, if appropriate;
- If appropriate, the moisture content at the time oflaying
- If appropriate, the temperature at the time of laying androlling;
- The type and size of compaction equipment and number ofpasses;
- The maximum density or target density as appropriate and the density achieved intrial;
- The maximum compacted thickness oflayer;
- The surface levels and the surfaceirregularities;
- Calibration of machinery for best and efficientresults;
- Any other relevantinformation

Not less than ten sets for test for each type of test shall be made on each 500 square meters of trial area, and provided nine out of ten sets of results meet the specified requirements for the material/work in Clause 903, the site trial shall be deemed successful. The above data recorded in the trial shall become the agreed basis on which the particular material shall be provided and processed to achieve the specifiedrequirement.

If, during execution of the works, the construction control type of test indicates that the requirement for a material is such that consistency is not achieved, then work on that layer shall stop, until the cause

is investigated. Such investigation may include further laboratory and site trial on the material to determine a revised set of data, as above which, when agreed by the Engineer, shall be the basis on which all subsequent material will be provided and processed to achieve the specified requirements. Approval by the Engineer to a set of data recorded, as above in a trial shall not relieve the Contractor of responsibility to comply with the requirements of Technical Specifications.”

Clause 902. CONTROL OF ALIGNMENT LEVEL & SURFACE REGULARITY

Clause 902.4. Surface Regularity of Pavement Courses

Add the following at the end of the sub-clause:

“The Surface regularity for different pavement layers should be verified with the help of either a 5th wheel or a car mounted Bump Integrator. Such measurements should be carried out for each traffic lane in cases of Intermediate and two lane roadway, and should be on the basis of average value of two runs per road over the entire length. The tests should be carried out at the wearing course level.

The values that are allowed for various layers are:
Bituminous Wearing Course up to 2500 mm per km.

Roughness testing shall be carried out in accordance with IRC and CRR I guidelines. The Bump Integrator trailer shall be calibrated as outlined in IRC and CRR I guidelines. If the towing vehicle is changed the Bump Integrator trailer shall be re-calibrated with the new towing vehicle.

Where these values are not achieved and not accepted by the Engineer, the Contractor must rectify the works at his own cost to match with the requirements.”

Clause 903.4.1 Tests & Frequency

Add (xix) in Table 900.4, serial no.6 for Dense Bituminous Macadam / Semi Dense Bituminous Concrete and for Bituminous concrete.

“ (xix) Surface Evenness : The finished bituminous layers (DBM & BC) shall be tested for surface evenness (immediately, before allowing traffic) in accordance with provisions in SP-11:”Handbook of Quality Control for Construction of Roads and Runways”. Besides evenness check by using Straight Edge and the measuring edge, the longitudinal surface evenness shall be checked using Bump Integrator, separately for each lane. Checking with Bump Integrator shall be carried out using procedure recommended in the World Bank Technical Publication No.46. The measured roughness, shall not exceed a value of 2500 mm/km for finished DBM and BC layers.”

SECTION 1700 STRUCTURAL CONCRETE

Clause 1703. GRADES OF CONCRETE

Sub-Clause 1703.1.

Add the following to Table 1700-1:

“

Grade Designation	Specified characteristic compressive strength of 150 mm cubes at 28 days, in MPa.
--------------------------	--

M10	10
-----	----

“

Sub-Clause 1703.2.

Add the following to Table 1700.3 (B):

“

Member	Conditions of Exposure	
	Moderate	Severe
c) Filling material	M10	M15

“

Sub-Clause 1704.2.1. Target Mean Strength

Add the following to Table 1700-5:

Concrete Grade	Current Margin (M Pa)	Target Mean Strength
M10	7	17

Sub-Clause 1704.3. Requirement of Nominal Mix Concrete

Add the following to Table 1700-6:

Concrete Grade	Total Quantity	Proportion
M10	480	1:2

Clause 1707.EQUIPMENT

Delete Item a) and replace with:

“a) For production of concrete:

- (i) For overall bridge length of less than 60 m - batch type concrete mixer diesel or electric operated, with minimum size of 1 cubic metre with automatic water measuring and integral weigher (hydraulic/pneumatic type) shall be used.
- (ii) For overall bridge length of 60 m or more, a fully automatic concrete batching and mixing plant with a minimum capacity of 15 m³ per hour shall be used.”

SECTION 2500 RIVER TRAINING WORK AND PROTECTION WORK**Clause 2504. PITCHING/REVTMENT ON SLOPES****Sub-Clause 2504.1. Description**

Add after the first paragraph:

“This section shall also cover the requirements for grouted stone pitching at culvert inlets and outlets

and other locations shown on the drawings or directed by the Engineer.”

Sub-Clause 2504.2.1.Pitching

Add after the fourth paragraph:

“At culvert inlets and outlets and other locations directed by the Engineer, the gaps in the stone pitching shall be filled with mortar not leaner than 1:3 by volume of cement and sand. Joints and pointing in grouted stone pitching shall be in accordance with Clause 1405 of Technical Specifications.”

SECTION 2700 WEARING COAT AND APPURTENANCES

Add new sub-clause:

“Sub-Clause 2702.4. Dense Bituminous Macadam Profile Corrector Course

Specification for Dense Bituminous Macadam profile corrector course on bridge decks shall be in accordance with Clause 507.

Clause 2706. WEEP HOLE

In second sentence of this clause replace with “AC Pipe” with “PVC Pipe”.

Clause 2708. MEASUREMENT FOR PAYMENT

Add item:

“vi) Dense Bituminous Macadam profile corrector course shall be measured in cubicmetres.”

SECTION 2800 REPAIR OF STRUCTURES

Clause 2801. DESCRIPTION

Add after the second paragraph:

“Repairs to bridges will be confirmed by the Engineer before commencement of the work.”

Clause 2812. MEASUREMENT FOR PAYMENT

Delete the second sentence of a).

Add the following:

“i) Repairs/replacement of concrete railings/crash barriers shall be measured per running metre of the barrier repaired. Repairs and replacement shall be carried out in accordance with Clause 809 of this Specification and the repaired/replaced barriers shall be in accordance with MOST Standard Drawing No SD304.”

Clause 2813. RATE

Add the following after the first paragraph:

“The rate for crack sealing using epoxy grout shall include the cost of nipples required for injection at the rate of one nipple per kg of epoxy. If additional nipples are required, they shall be paid for separately. The rate for repairs/replacement of barriers shall include all costs to complete the work including removal and disposal of existing barrier and supply and fixing of reinforcement.”

Clause 2814. STONE FOR SCOUR HOLES

Add the following new sub-clauses:

“Sub-Clause 2814.1.General

The work shall consist of the supply of materials and placement of rock in scour holes.

Sub-Clause 2814.2.Materials

The rock shall have a least dimension of 300 mm and a maximum dimension of 600 mm. The stone shall conform to the requirements of Clause 2504 of this Specification.

Sub-Clause 2814.3. Measurement for Payment

Payment shall be made for the volume (m³) of material placed to the lines and levels shown on the drawings or as directed by the Engineer.

Sub-Clause 2814.4.Rate

The contract rate shall include full compensation for furnishing all labour, materials, tools, equipment and incidental costs for completing the work.”

SECTION 2900 PIPE CULVERTS

Clause 2902. MATERIALS

Add after the second paragraph:

“In the case of pipe culverts to be extended, the Contractor shall confirm, on site, the diameter of the existing pipes, before ordering the extensionpipes.

Any discrepancy between the pipe diameter indicated in the culvert schedule and that found on the site shall be reported to the Engineerimmediately.”

Clause 2904. BEDDING FOR PIPE

Delete this paragraph and replace with:

“The bedding surface shall provide a firm foundation of uniform density throughout the length of the culvert, shall conform to the specified levels and grades and shall be as specified on the drawings.”

Clause 2907. BACK FILLING

Delete the second sentence and replace with:

“The back fill shall comply with the material and compaction requirements of embankment as defined in Section 300.”

Clause 2910. MEASUREMENT FOR PAYMENT

After the first sentence add the following:

“Concrete pipes for conduits shall be measured along their centre between end locations as directed, in linear metres.”

Clause 2911. RATE

Add after the first sentence:

The rate shall also include clearing out of the existing culvert where the culvert is to be extended.

Backfilling above natural surface level (including behind head walls) shall be paid as embankment under Clause 305.

Delete the second paragraph and replace with the following:

“Ancillary works such as excavation, concrete and masonry in head walls shall be paid for separately under the relevant clauses.”

Section 3000 MAINTENANCE OF ROAD

Clause 3001 GENERAL

This clause shall be read as under:

"The Specifications shall apply to all items of road maintenance works as required to be carried out on the existing road, during construction period under the contract or as directed by the 'Engineer'. The works shall be carried out in conformity with the relevant Specifications to the required level, grade and lines using approved materials. The works shall be carried out using light duty machinery or manual means provided the quality of the end product does not suffer. In execution of maintenance works, a reference is made to the IRC publications: "Manual for Maintenance of Roads", "Code of Practice for Maintenance for Bituminous Surfaces of Highways, IRC 82 - 1982" and "Hill Road Manual-Maintenance of Hill Roads (Chapter '14)", IRC : SP:48-1998 for guidance and compliance wherever applicable." Wherever the specification is not clear, good engineering practice shall be adopted during execution to the satisfaction of the Engineer.

Sub Clause 3002.4 This clause shall be deleted.

Sub Clause 3002.5 This clause shall be read as under,
"The contract unit rate for maintenance of road shall be inclusive of this item of work."

Sub Clause 3003.4 This clause shall be deleted.

Sub Clause 3003.5 This clause shall be read as under.
"The contract unit rate for maintenance of road shall be inclusive of this item of work."

Sub Clause 3004.2.5 This clause shall be deleted.

Sub Clause 3004.2.6 This clause shall be read as under:
"The contract unit rate for maintenance of road shall be inclusive of this item."

Sub Clause 3004.3.2.4 This clause shall be deleted.

Sub Clause 3004.3.2.5 This clause shall be read as under:

"The contract unit rate for maintenance of road shall be inclusive of this item."

Sub Clause 3004.3.3.4 This clause shall be deleted.

Sub Clause 3004.3.3.5 This clause shall be read as under:

"The contract unit rate for maintenance of road shall be inclusive of this item."

Sub Clause 3004.4.4 This clause shall be deleted.

Sub Clause 3004.4.5: This clause shall be read as under:

"The contract unit rate for maintenance of road shall be inclusive of this item."

Clause3005: DELETED

Add new Clause 3006:

Sub Clause 3006: Measurements for Payments

Maintenance of existing road during construction period shall be measured in Kilometer/month basis. The time period for maintenance shall start when a section of the existing road is handed over to the contractor for construction under the contract. The stretch/stretches of the road, where the contractor takes up construction activities as per contract, shall be excluded from the measurement scope. Only such stretch/stretches shall be considered for maintenance, in which no construction activity is taken up.

Add new Clause 3007:

Sub Clause 3007:RATE

The Contract unit rate for maintenance of road shall be in full compensation for and inclusive of all labour, materials, machinery and equipment, as per site requirement and as detailed in the foregoing specifications.

SECTION 3200 DAY WORKS

Add new section:

Clause 3201. SCOPE

This section covers the hire of the Contractor’s equipment, labour and materials for use as directed by the Engineer for carrying out Dayworks.

Clause 3202. MEASUREMENT FOR PAYMENT

Payment for labour used for Dayworks shall be made on the basis of the approved number of man days at the rate quoted in the Bill of Quantities. For periods less than one-day payment shall be made pro-rata on the time actually worked assuming a standard 8 hour working day. Similarly, when more than 8 hours are worked in a day, payment will be made pro-rata for the additional hours.

Payment for equipment used for Dayworks shall be made on the basis of the approved number of hours at the rate quoted in the Bill of Quantities.

Payment of sums expended against the provisional sum for materials, labour and machinery for Dayworks will only be made when adequate and sufficient documentary evidence is produced to the

Engineer showing that the sums claimed were in fact properly expended and actually paid by the Contractor.

Clause 3203.RATES

The rates quoted for labour and equipment shall include full compensation for provision of the item requested by the Engineer, including all overheads and profit. The rates for equipment shall include the cost of driver, fuel, supervision by foreman and all other costs incidental to the supply and operation of the equipment.

The rate for labour include transportation to the location on the site requested by the Engineer, supervision by foreman and all other costs incidental to the supply of the labour. The rates quoted for supply of materials shall include full compensation for procurement, transportation and storage by the Contractor of the materials requested by the Engineer.

ADDITIONAL TECHNICAL SPECIFICATIONS

ADDITIONAL TECHNICAL SPECIFICATION

A-1 CLEARING OF EXISTING HUME PIPE CULVERTS

1. **Scope:** The work involves clearing of existing hume pipe culverts including clearing debris from inlet and outlet ends of such culverts.
2. **Work Procedure:** The silt and muck deposit at the entry and exit of the hume pipe culvert shall be first cleared with the help of JCB/Excavator and / or manually upto the invert level of the hume pipe culverts. In case of a space constraint, the entry and exit of the pipe shall be cleared manually.

A jet of water at high speed shall then be forced through the pipe so as to remove any blockage from within, thoroughly.

The existing inlet chambers of the pipe culvert shall be cleared of deposits, debris, vegetation including the inlet channels into the chamber and repaired. The toe wall / headwall on downstream side shall be repaired and cleaned of all deposits, debris including any vegetation growth.

3. **Measurement for payment:**
The contract unit rate for the work shall include payment for all operations, tools, plants, machinery, equipment, manpower etc. required to carry out the work as per above specifications and shall be measured in linear meters of the pipe culvert so cleared.

ADDITIONAL TECHNICAL SPECIFICATION

A-2 : Cleaning & Greasing of Steel Bearings of the Existing Bridges and Structures.

1. **Scope:** The work involves cleaning and greasing of existing bridge bearings to improve their workability and maneuverability for their efficient functioning.

The work shall be carried out as per procedure described below and in accordance with directions of the Engineer.

2. **Materials:** Abrasives,
Grease,
Red Oxide Primer

3. **Tools & Plants:** Air Compressor & hose & nozzle
Painting brushes
Wire brushes
Miscellaneous equipments

4. **Work Procedure:** The existing steel rocker-roller and plate bearings of the bridges shall be thoroughly cleaned and dusted of all loose dirt, debris or any other droppings of scales by application of air compressor directly on the surface and around bearings parts. Debris around the bearings shall be removed by water jetting and thoroughly dried before application of grease. The external surfaces of the bearings shall be thoroughly rubbed with abrasives to remove all crust cakes, rust and dusted thoroughly. The surfaces then shall be painted with two coats of red oxide primer paint of approved quality. The bearings shall then be lubricated with approved quality grease with the help of a grease gun. Grease used shall be such that it retains its properties for long and shall not affect the bearing parts.

5. **Measurement for payment:** The work shall be measured in numbers of each bearing assemblies so cleared and greased complete for all operations.

6. **Rate:** The contract unit rate for the work shall include payment for all operations, including all manpower, machinery tools, plants, materials, equipment, etc. required to carry out the work as per specifications.

ADDITIONAL TECHNICAL SPECIFICATION

A-3 : Painting and Numbering Bridges and & Culverts IdentificationNumbers.

1. **Scope:** The work involves painting and lettering identification numbers on bridge & culverts parapet / railing ends.
2. **Materials:** Synthetic enamel paint conforming to IS : 2932 of approved brand and manufacture of the required colour shall be used. For priming the surface, primer coat of approved make shall be used.
3. **Work Procedure:** The surface shall be thoroughly cleaned and dusted off. All dirt, mortar droppings and grease shall be thoroughly removed before paint is applied. The prepared surface shall have received the approval of the Engineer after inspection, before painting is commenced.

Application of Primer Coat: The surface so prepared shall be treated with primer coat.

- (a) **Under coat:** One coat of the specified paint of shade shall be applied and allowed to dry overnight. It shall be rubbed with abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.
 - (b) **Top Coat:** Two coats of synthetic enamel paint of required shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.
 - (c) **Lettering and Numbering on New Surface:** The letters and numbers for bridges/culverts span and number shall be as per IRC-7-1971. The size of area for painting shall be varied depend upon the numbers and letters.
4. **Measurement for payment:** The identification numbers and span arrangement shall be measured in numbers of each side facing traffic.
 5. **Rate:** Rate shall include the cost of materials, labour and other operations described above complete in all respects.

A-4 WATER PROOF CEMENT PAINTING.

1. **Scope:** The work includes application of water proof cement paint on parapets and railings of bridges and culverts, where required due to repairs and replacement of damaged parapets, railings.
2. **Materials:** The water proof cement paint shall be (conforming to IS:5410) of approved brand and manufacture. The water cement paint shall be brought to the site of work by the contractor in its original container in sealed condition.
3. **Work Procedure:**

Preparation of Surface: For new work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing. Pitting in plaster shall be made good and a coat of water proof cement paint shall be applied over patches after wetting them thoroughly.

Preparation of mix: Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing to avoid setting in accordance with manufacture directions for use to obtain workable and uniform consistency.

Application: The solution shall be applied on the clean and wetted surface with brush or spray gun. The solution shall be kept well stirred during application. The method of application of cement paint shall be as per manufacturer’s specification. The completed surface shall be

watered after the day’s work.

The second coat shall be applied after the first coat has set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For the work, the surface shall be treated with two or more coats of waterproof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

Water proof cement paint shall not be applied on surfaces already treated with lime, colour wash, distemper dry or oil bound, varnishes, paints, etc. It shall not be applied on gypsums, wood and metal surfaces.

If water proof cement paint is required to be applied on existing surfaces previously treated with lime, colour wash, etc., the surface shall be thoroughly cleaned by scrapping off all the lime, colour wash etc., completely. Thereafter, a coat of cement primer shall be applied followed by two or more coats of water proof cement paint.

4. Measurement for payment:

The painting shall be measured in square metre of surface area treated.

Rate:

Rate shall include prime coat and two coats (and more as and where required) of the paint over the prime coat, cost of all labour and materials involved in all operations complete.

ADDITIONAL TECHNICAL SPECIFICATION

A-5 CLEANING OF DRAINAGE SPOUTS FOR EXISTING BRIDGES

1. **Scope:** The work involves cleaning and clearing of existing drainage spouts to improve their functioning.

The work shall be carried out as indicated in the specifications below and as per the directions of the Engineer.

2. **Machinery and Equipment:** Air Compressor
3. **Work Procedure:** All loose materials from the drainage spout gratings shall be removed carefully, so that deck concrete is not damaged. Thereafter with air compressor, air under pressure shall be applied on the spout and surface around to remove all dirt, muck and other blockages through the conduit of the spout. The gratings of the spout shall then be secured to the deck concrete thoroughly.
4. **Measurement for payment:**
The contract unit rate for the work shall include payment for all operations, tools, plants, machinery, equipment, manpower etc. required to carry out the work as per above specifications and shall be measured in number of drainage spouts so cleaned.

ENVIRONMENTAL MANAGEMENT PLAN

A.6: **HOLLOW BRICK WALL PANEL NOISE BARRIERS**

The work shall consist of providing and constructing hollow brick wall panel noise barriers as per contract drawing near sensitive locations such as schools and hospitals along the project road.

1. Material

Bricks shall conform to Section 1000 of Specifications for Road and Bridge works published by MOSRT&H (4th Revision).

The mortar used for the brick masonry shall be cement mortar of mix 1:3 (1 part cement: 3 parts coarse sand) and shall conform to Section 1000 & 1300 of Specifications for Road and Bridge works published by MOSRT&H (4th Revision).

The brick masonry works shall conform to Section 1300 of Specifications for Road and Bridge works published by MOSRT&H (4th Revision).

Excavation for noise barrier shall be carried out as per Clause 304 of Specifications for Road and Bridge works published by MOSRT&H (4th Revision).

Plain cement concrete grade M-15 and Reinforced cement concrete grade M-15 shall conform to Section 1000, 1500, 1600, 1700, 2100 and 2200 of Specifications for Road and Bridge works published by MOSRT&H (4th Revision).

2. Measurements

The complete noise barrier shall be measured in running meter corrected to a cm.

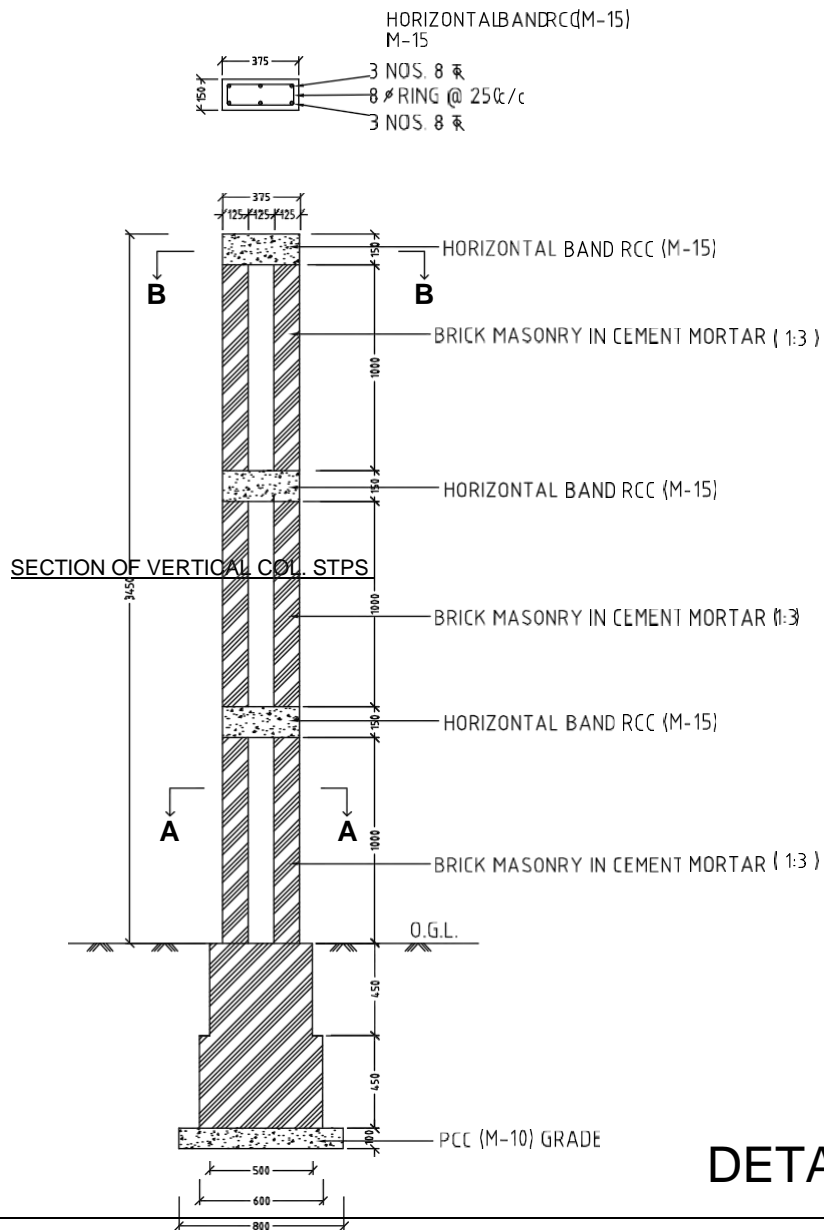
3. Rate

The above rate shall include the cost of excavation, PCC M-15 grade leveling course, RCC

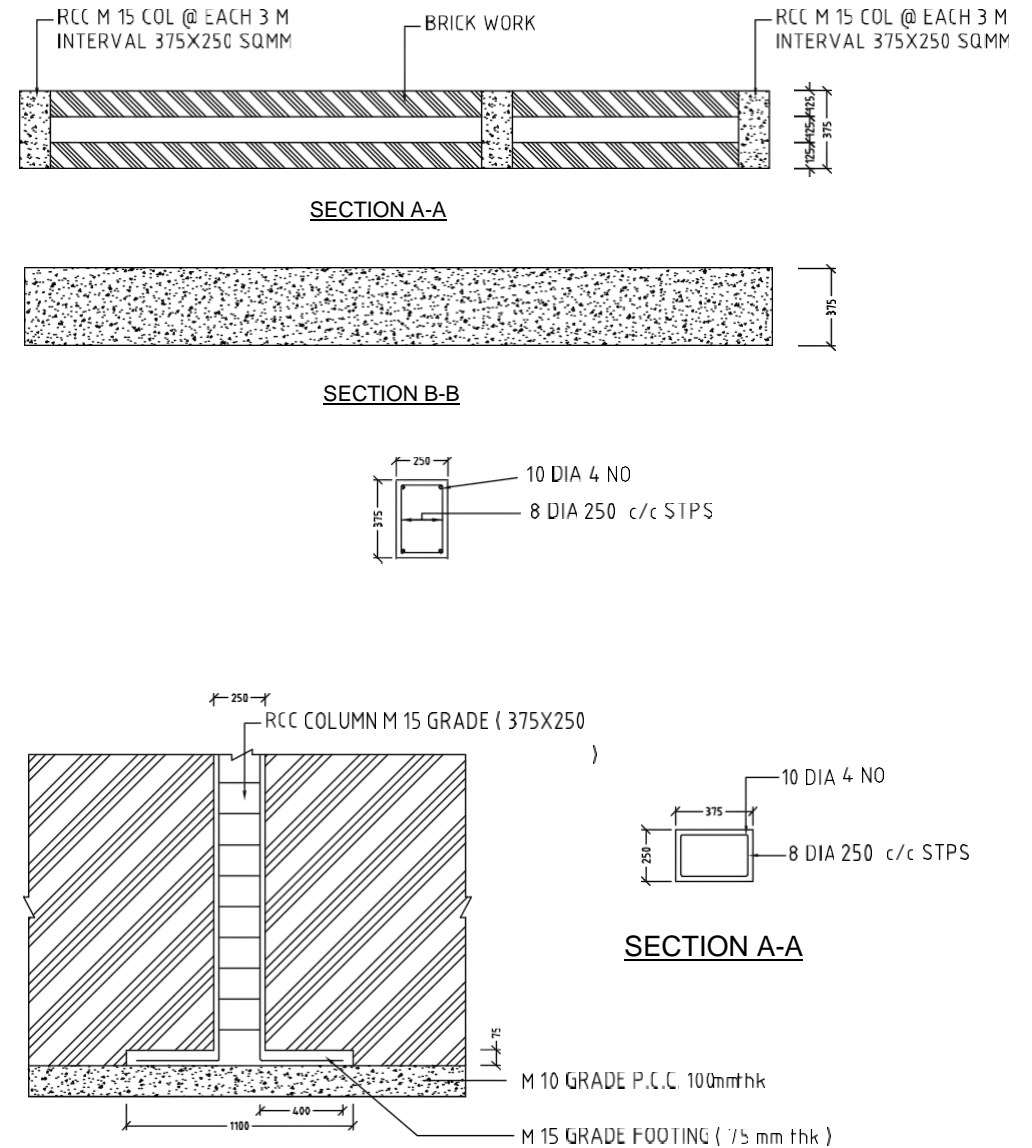
M-15 grade band, Reinforcement cutting, bending, binding and fixing.

The contract unit rate for noise barrier shall include the cost of all labour, materials, tools and plant, scaffolding and other expenses incidental to the satisfactory completion of the work, sampling, testing and supervision as described in the specifications above and as shown on the drawings.

DRAWING OF HOLLOW NOISE BARRIER WITH BRICK WALL PANELS



PLAN OF NOISE BARRIER



DETAILS OF VERTICAL COLUMN OF NOISE BARRIER

A.7 PRECAST CEMENT CONCRETE SITTING BENCHES

The Works shall consist of providing and installing pre cast cement concrete sitting benches.

1. Material

The pre cast concrete benches shall be cast in Reinforced cement concrete of M-30 grade of concrete. All materials shall conform to Section 1000, Section 1500, Section 1600 & Section 1700 of Specifications of Roads and Bridge works published by MOSRT&H (4th Revision). All precast elements shall be joined together using Galvanized nuts, bolts and washers conforming to IS 1363, IS 1364, IS 1367, IS 3757, IS 6623 and IS 6639 as appropriate.

Bench top and back planks shall be treated with anti-corrosive, water proof coating so as to make surfaces glossy and water proof.

All the reinforced cement concrete components shall be compacted using the vibro compaction process.

The forms for the precast units shall be constructed of metal or fibre glass and designed to with stand casting pressure without distortion.

2. Dimensions

Seating length of the Bench:1500 mm; Seating height of the Bench:450 mm; Total height of the Bench:1000 mm. The legs of the benches shall be firmly grouted in the ground in M-15 grade plain cement concrete conforming to Section 1000 & Section 1700 of Specifications of Roads and Bridge works published by MOSRT&H (4th Revision).

Each bench consists of 2 Nos.L-shape base support in grey cement color (thickness:100 mm, Back height:1000 mm, front height:450 mm, Base width:620mm) and 5 Nos. reinforced concrete planks in red color of size 1500mm X 100mm X 50mm, and 1 No. of reinforced concrete plank of size 1500mm X 200mm X 50mm.

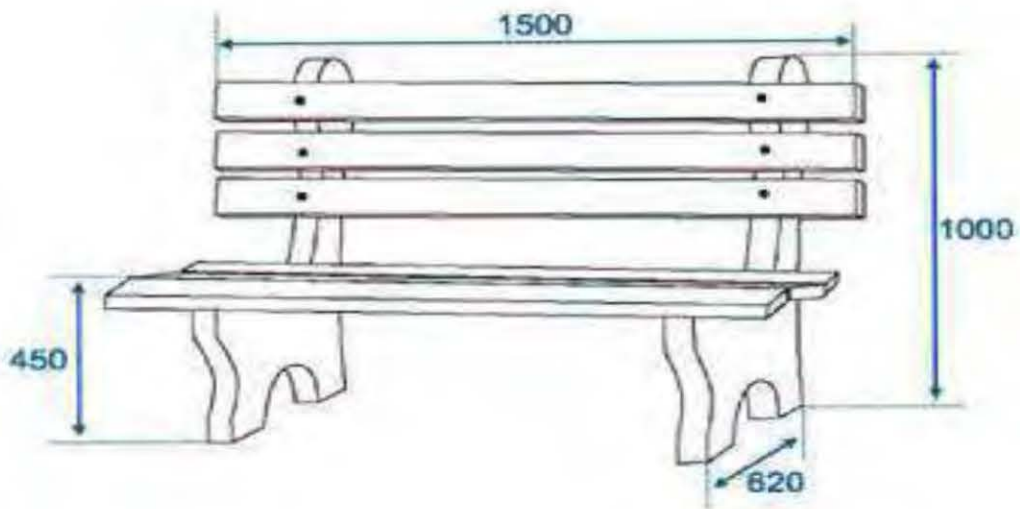
3. Measurements

The concrete benches shall be measured in numbers.

4. Rate

The rate shall include the cost of all labour and materials involved in the operations described above including fixing in position.

Chair Bench with Back Rest



A.8G.I. BARBED WIRE FENCING

1. Materials

GI barbed wire fencing shall comprise of barbed wire stretched on RCC posts. All RCC posts shall be of size 150mm x 150mm at the bottom and taper to 100mm x 100mm at the top, and struts shall be of size 100mm x 100mm, the length of posts being 1.8 m or as specified and that of struts being minimum of 2.0 m. These shall be cast in cement concrete 1:1 ½ :3 (1 cement : 1 ½ coarse sand : 3 graded stone aggregate 12.5 mm nominal size) reinforced with 8 mm diameter tor steel bars as directed. The specifications for R.C.C. works shall apply. The posts and struts shall be free from cracks, twists and such other defects. G.I. staples on wooden plugs or 6 mm bar nibs will be provided as directed by Engineer-in- Charge while casting the posts.

G.I. Barbed wire shall conform to IS 278 – 1978 – Specifications for galvanized steel barbed wire for fencing (3rd Revision).

2. Spacing of Posts and Struts

The spacing of posts shall be 2.50 metres centre to centre, unless otherwise specified, to suit the dimensions of the area to be fenced. Every 10th, last but one end post and corner posts shall be strutted on both sides and end posts on one side only.

3. Fixing of Posts and Struts

Pits 45 x 45 cm and 75 cm deep or as directed shall first be excavated true to line and level to receive the posts. In the case of struts, pits 70 x 45 x 75 cm deep or as directed shall be excavated to suit the inclination of the strut so that it is surrounded by concrete by not less than 15 cm at any point. The pits shall be filled with a layer of 15 cm thick cement concrete 1:3:6 (1 cement: 3 fine sand: 6 graded stone aggregate 40 nominal size). The posts and struts shall then be placed in the pits, the posts projecting 1.2 m or to the specified height above ground, true to line and position. The cement concrete 1:3:6 shall be filled in upto 15 cm for posts and 25 cm for struts below ground level at the base of the concrete so that the posts are embedded in the cement concrete block of size 45 x 45 x 60 cm and strut in block of size 70 x 45 x 50 cm. The concrete in foundations shall be watered for at least 7 days to ensure proper curing. The remaining portions of pits shall be filled up with excavated earth and the surplus earth disposed off as directed by the Engineer-in-Charge and site cleared.

4. Fixing G.I. Barbed Wire

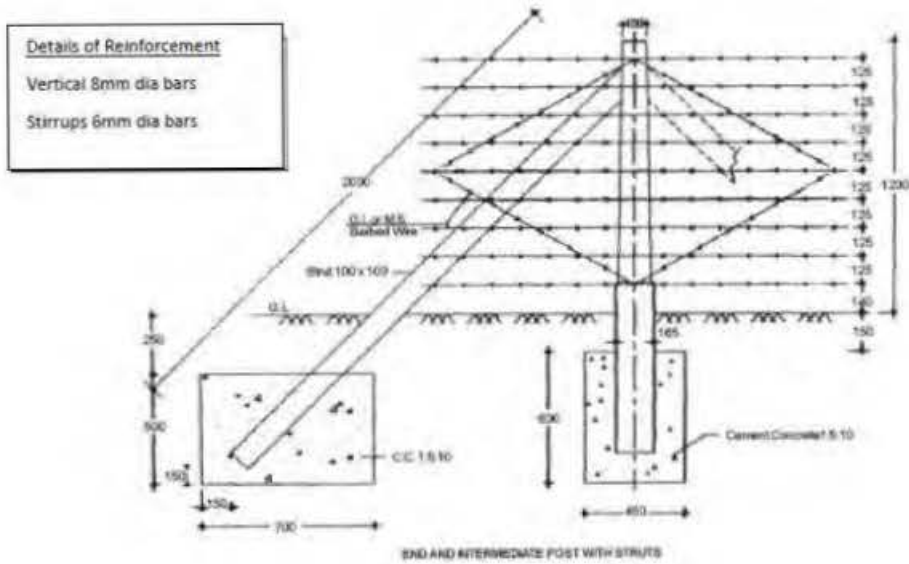
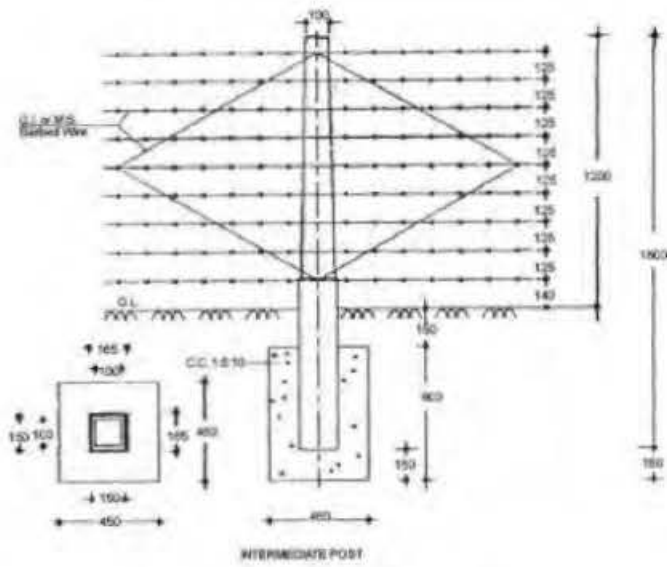
The barbed wire shall be stretched and fixed in specified number of rows and two diagonals. The bottom row shall be 14 cm above ground and the rest at 12.5 cm centre to centre. The diagonals shall be stretched between adjacent posts from top wire of one post to the bottom wire of the second post. The diagonal wires will be interwoven with horizontal wires by fixing the odd-rows of wires first, then the diagonal cross wires and lastly the even rows of wires. The barbed wire shall be held to the R.C.C. posts by means of G.I. staples fixed to wooden plugs or G.I. binding wire tied to 6 mm bar nibs fixed while casting the posts. Turn buckles and straining bolts shall be used at the end posts, if so specified.

5. Measurements

The complete fencing shall be measured in running meter corrected to a cm.

6. Rate

The rate shall include the cost of labour and materials involved in all the operations described above including the cost of posts, struts, turn buckle, straining bolts, excavation, backfilling, concrete in foundations and reinforcement cutting, bending and binding for which no separate payments shall be made.



Annexure A

Environmental Management Action Plan (EMAP)

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
Pre-Construction Phase					
1	Tree cutting	Cutting of about 1852 nos. trees during site clearance	<ul style="list-style-type: none"> Restricting tree cutting within construction limit Avoiding tree cutting at ancillary sites Providing and maintaining compensatory tree plantation of 5556 numbers i.e. three times of cutting 	Forest Dept. / PIU	PIU
2	Removal of utilities	Work site clearance	<ul style="list-style-type: none"> Necessary planning and coordination with concerned authority and local body Prior notice to and consultation with concerned authority, local body and public to be affected so as to ensure that work does not get affected and impact on public is minimum 	Concerned utility agencies / PIU	SC/ PIU
3	Religious places	Work site	<ul style="list-style-type: none"> Suitable mitigation measures will be incorporated in Social report. 	PIU	SC / PIU
Construction Phase					
1	Air Pollution	Construction plants, equipment and vehicles	Refer Sub-Clause 111.5 of Part I General Specifications and sub-clause 111.13 of Supplementary Specifications of the Technical Specifications under the Contract.	Contractor	SC/PIU
		Temporary diversion	<ul style="list-style-type: none"> Maintaining diversion and detour for road traffic in good shape and traffic regulated. Regular sprinkling of water, as necessary. 	Contractor	SC/PIU
		Dust during earth works or from spoil dumps	<ul style="list-style-type: none"> Maintaining adequate moisture at surface of any earthwork layer completed or non-completed unless and until base course is applied, to avoid dust emission. Stockpiling spoil at designated areas and at least 5 m away from traffic lane. Refer sub-clause 111.1 of Technical Specifications	Contractor	SC/PIU
		Borrow pits and haul road	Refer sub-clause 111.2 of Technical Specifications	Contractor	SC/PIU
		Storage of construction materials	<ul style="list-style-type: none"> Sprinkling of water as necessary. 	Contractor	SC/PIU

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
2	Water Pollution	Construction of Bridges or Culverts - Earthwork and marginal spillage of construction materials causing temporary turbidity and suspended solids	<ul style="list-style-type: none"> Constructing and maintaining diversion channel, sedimentation basin, dykes, etc. as may be required to temporarily channelise water flow of streams /river Storage of construction material and excavated soil above high floodlevel 	Contractor	SC/PIU
		Construction vehicles	<ul style="list-style-type: none"> Strictly avoiding cleaning / washing of construction vehicle in any waterbody 	Contractor	SC/PIU
		Soil erosion from construction site	<ul style="list-style-type: none"> Proper planning of site clearing and grubbing so as not to keep the cleared site before working for longduration. Providingtemporarysidedrains,catchwaterbankordrains, sedimentation basin, as necessary to avoid or minimize erosion and prevent sedimentation to receiving water bodies 	Contractor	SC/PIU
		Seepage from Construction Debris	Refer sub-clause 111.17 of Technical Specifications	Contractor	SC/PIU
		Construction camp and workers' camp	Refer sub-clause 111.16 of Technical Specifications	Contractor	SC/PIU
3	Ground water Pollution	Wastewater logging	<ul style="list-style-type: none"> Allwastewaterwillbedivertedtoaditchthatwillbe managed for the period of construction and after construction such ditches will be filled and restored to original condition. 	Contractor	SC/PIU
		Borrow pit excavation	<ul style="list-style-type: none"> Excavation of borrow pit should not touch theaquifer 	Contractor	SC/PIU
		Human wastes and wastewater at construction camp	<ul style="list-style-type: none"> Providing septic tanks for treating sewage from toilets before discharging through soakpits Locating soak pits at least 50m from any ground water sources Decanting and or controlled disposal of oil and grease as collected at collection tanks of maintenance yard and chemical storageareas Refer sub-clause 111.16 of Technical Specifications	Contractor	SC/PIU

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
4	Noise Pollution and Vibration	Vehicles and Construction machinery	<ul style="list-style-type: none"> • Site Controls: Stationary equipment will be placed along uninhabited stretches as per distance requirements computed above as far as practicable to minimize objectionable noise impacts. • Scheduling of Project Activities: Operations will be scheduled to coincide with period when people would least likely to be affected. Construction activities will be avoided between 9 P.M. and 6 A.M. near residential areas. • Protection devices (ear plugs or ear muffs) will be provided to the workers operating in the vicinity of high noise generating machines. • Construction equipment and machinery should be fitted with silencers and maintained properly. • Source-control through proper maintenance of all equipment. • Use of properly designed engine enclosures and intake silencers. • Noise measurements should be carried out along the road to ensure the effectiveness of mitigation measures. • Vehicles and equipment used should conform to the prescribed noise pollution norms. • Constructing noise barriers as proposed for schools and hospitals prior to taking up road construction activities at those sections. • Movements of heavy construction vehicles and equipment near public properties will be restricted. • Comply with siting criteria for stone crushers, Hot Mix Plant/s (HMP) and concrete batching plant/s (CBP), and installations and maintenance of pollution control devices as mentioned in sub-clause 111.5 of Technical Specifications • Refer sub-clause 111.3 of Technical Specifications for identification, and operation of quarry areas and adopting controlled blasting 	Contractor	SC/PIU

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
5	Land Pollution	Spillage from plant and equipment at construction camp	<ul style="list-style-type: none"> • Providing impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle maintenance platform • Collection oil and lubes drips in container during repairing construction equipment vehicles • Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area • Providing bulk bituminous storage tank instead of drums for storage of bitumen and bitumen emulsion • Providing impervious base at bitumen and emulsion storage area and regular clearing of any bitumen spillage for controlled disposal • Reusing bitumen spillage • Disposing non-usable bitumen spills in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least 0.5m) Refer sub-clause 111.16 of Technical Specifications	Contractor	SC/PIU
		Domestic solid waste and liquid waste generated at camp	<ul style="list-style-type: none"> • Collecting kitchen waste at separate bins and disposing of in a pit at designated area/s • Collecting plastics in separate bins and disposing in deep trench at designated area/s covering with soil • Collecting cottons, clothes etc. at separate bins and burning in a pit (with sand bed) 	Contractor	SC/PIU
		Borrow pits	<ul style="list-style-type: none"> • Controlled operation and redevelopment of borrow pits to avoid water logging and land contamination 	Contractor	SC/PIU

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
6	Loss of topsoil	All construction sites	<ul style="list-style-type: none"> The topsoil from all areas of cutting and all areas to be permanently covered shall be stripped to a specified depth of 150 mm and stored in stockpiles. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. The stockpile shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile be restricted to 2m. To retain soil and to allow percolation of water, the edges of the pile shall be protected by siltfencing. Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or tarpaulin. It shall be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes. Residual topsoil will be distributed on adjoining/proximate barren/rocky areas as identified by the SC in a layer of thickness of 75mm – 150mm. Top soil shall also be utilized for redevelopment of borrow areas, landscaping along slopes, medians and incidental spaces. 	Contractor	SC/PIU
7	Compaction of soil	All construction sites	<ul style="list-style-type: none"> Construction vehicle, machinery and equipment shall move or be stationed in the designated area (RoW or Col, as applicable) only. While operating on temporarily acquired land for traffic detours, storage, material handling or any other construction related or incidental activities, topsoil from agricultural land will be preserved as mentioned above. 	Contractor	SC/PIU
8	Ecology	Site clearance	<ul style="list-style-type: none"> Restricting tree cutting within corridor of impact 	Contractor	SC/PIU

S.No.	Environmental Issue	Location/sources	Mitigation Measures	Implementing Agency	Supervising & Monitoring Agency
		Ancillary sites	<ul style="list-style-type: none"> Minimizing tree cutting and vegetation clearance during site selection Preservation of trees within ancillary sites and avoiding impact on forest resources by providing buffer area from boundary of PF, RF, national park and wildlife sanctuary of 1km for locating construction plants, construction camp, and quarry and 500 m for borrowareas Preservation of trees of ecological, socio-culturalimportance Providing cooking at camp for discouraging and prohibiting use of fire-wood i.e. cutting of trees by theworkers. 	Contractor	SC/PIU
9	Occupational health and safety of workers	Construction camp	<ul style="list-style-type: none"> Water supply, sanitation, drainage and medical health facilities atcampsite Providing and usingPPEs Using working reverse horn for all construction equipment andvehicles Providing earth link circuit breaker (ELCB) for all electrical connections Maintaining first aid at constructionsites Maintaining emergency responsesystem Refer sub-clause 111.16 of Technical Specifications	Contractor	SC/PIU
10	Accidents and safety	Construction sites	<ul style="list-style-type: none"> Providing and maintaining traffic management comprising diversion; warning, guiding and regulatory signage; channelisers and delineators; lighting, flagmen; dust control system etc. as specified in thecontract. Providing adequate light at construction zone if working during night time is permitted by theEngineer Conducting induction and periodic training for all workers and supervisors 	Contractor	SC/PIU
		Construction camp	<ul style="list-style-type: none"> Conducting periodic mock drilling on critical accident prone activities Conducting periodic training for all personnel working at plant site 	Contractor	SC/PIU

S. No.	Environmental Issue	Source of Pollution	Mitigation Measures	Implementing Agency	Supervision / Monitoring Agency
Operation Phase					
1	Air Pollution	Vehicular gaseous emission	<ul style="list-style-type: none"> Periodicals monitoring of air pollutants and if values exceed the standard limits, suitable mitigation measures to be taken. 	PIU	SPCB and Traffic Police
2	Noise Pollution	Vehicular	<ul style="list-style-type: none"> Periodical monitoring of noise level will be carried out. If values exceed the standard limits, suitable measures will be taken. Providing and maintaining signage on noise regulation at silence zones 	PIU	SPCB
3	Road Safety	Traffic and Vehicles	Maintenance of standard Highway Safety Signage and Traffic Management.	PIU	PIU and Traffic Police
		Slow moving traffic			
		Lighting	Maintenance of road / flyover lighting.	PIU	PIU/Traffic police
4	Tree plantation	-	Roadside tree plantation three times of cutting	Forest Dept. / PIU	PIU
5	Contamination of Soil and Water Resources from Spills due to traffic & Accidents	Vehicular Traffic	<ul style="list-style-type: none"> Contingency plans to be in place for cleaning up of spills of oil, fuel and toxic chemicals. Spill of oil, fuel and automobile servicing units without adequate preventive systems in place to be discouraged. 	PIU	PIU
6	Soil Erosion and Sedimentation		<ul style="list-style-type: none"> Maintaining the slope protection measures provided at stretches of high embankment and protection measures for bed scouring at cross drainage locations as per maintenance manual to be prepared before operation 	PIU	PIU
7	Maintenance of drainage system	-	<ul style="list-style-type: none"> The drains will be periodically cleared to maintain storm water flow. Road drains will be cleared of debris before onset of every monsoon. 	PIU	PIU