1.0LIST OF CONTENTS

APPENDIX 1
DRAWING LIST

1. GENERAL

The Tender Documents contains a set of reference/Tender drawings that are applicable to the Contract Works. The Tenderer shall incorporate into the Tender only those drawings from that set which amplify aspects of the Contractor's Technical Proposals. General information drawings will not be included in the Contract. The dimensions mentioned in the tender drawings are indicative and may vary as per the design of the Contractor.

The List of Drawings issued with the Tender documents is stated in Part-2 Employer's Requirements - Tender Drawings and Documents.

APPENDIX – 2

CONTRACT KEY DATES AND COMPLETION DATE

Key Dates	Weeks from Commencement Date	Description of Stage	Delay Damage for each week of delay or part thereof for non-achieving the key dates
Key Date 1	4	Submission of Initial Works Programme with all activities for entire work Package C-5.	
Key Date 2	10	Submission of Preliminary Design & GAD of bridges including RSI except viaduct. (Submission may be in stages but to start NOT later than 6 weeks.)	
Key Date 3	12	Submission and approval of Detailed Works Programme (resources & cost loaded) incorporating all comments of Engineer including 2 weeks for review by the Engineer.	0.01% of the fixed lump sum price quoted in Schedule 'A'.
Key Date 4	14	Submission of Preliminary Design & GAD of viaduct including RSI of viaduct.	
Key Date 5	26	Submission and approval of Definitive Design & GFC drawings for 10 Nos. of Major Bridges, 32 Nos. of Minor Bridges and 1 km length of viaduct. (Submission may be in stages but to start NOT later than -12 weeks from Commencement Date and completed within 26 weeks)	0.02% of the fixed lump sum price quoted in Schedule 'A'.
Key Date 6	40	Completion of substructure of viaduct of at least 05 spans for double line track.	0.02% of the fixed lump sum price quoted in Schedule 'A'.
Key Date 7	75	Completion of all the works from Ch. 2000 m to 12000 m excluding Major Br No.17, 28 & 45, slope protection and drainage works to enable execution of works by T-2 Contractor (track), SYS – 1 Contractor & SYS – 2 Contractor.	
Key Date 8	75	Submission and approval of design of BLT including fastening system.	
Key Date 9	104	Completion of station buildings at Prithla & IMT Sohna stations and all Auto location huts to enable execution of works by SYS-2	0.02% of the fixed lump sum price quoted in Schedule 'A'.

Key Dates	Weeks from Commencement Date	Description of Stage	Delay Damage for each week of delay or part thereof for non-achieving the key dates
		Contractor (Signalling & Telecommunication).	
Key Date 10	125	Completion of all the works from Ch. (-)2296 m to 12,000 m and 18,000.0 m to 20,942 m excluding slope protection and drainage works.	
Key Date 11	130	Completion of all spans of viaduct of one line including deck slab and BLT with transition.	0.02% of the fixed lump sum price quoted in Schedule 'A'.

APPENDIX 3

WORKS AREAS AND TEMPORARY POWER SUPPLY

3. WORK AREA (WITHIN ROW) ACCESS DATES

3.1 General

"Works Areas" means the areas of the Site within the Right of Way of HORC including vacant land in KMP ROW and any additional areas which may be obtained by the Contractor and agreed by the Engineer as additional working area.

a) The dates on which Work Areas (within ROW) are available to the Contractor for the commencement of the Works are defined as Work Area Access Dates (AD).

b) The Work Area Access Dates that apply to this Contract are stated in terms of days after the Commencement Date of the Works.

c) Where Work Areas are to be made available to the Contractor, they shall be available within the specified day. Where Work Areas are to be vacated, they shall be released not later than midnight on the specified day.

3.2 Work Area Access Schedule

The access to and possession of Works Area (within ROW) shall be made available as per Part A Contract Data of Particular Conditions of the Contract (PCC).

3.3 ELECTRICAL GENERAL

Temporary electrical Site installations and distribution systems shall be in accordance with:-

(a) Indian Electricity Rules

(b) The Power Companies' Supply Rules;

(c) Electricity and its subsidiary Regulations;

(d) IEE Wiring Regulations (16^{th} Edition);

(e) BS 7375 Distribution of Electricity on Construction and Building Sites;

(f) BS 4363 Distribution Assemblies for Electricity Supplies for Construction and Building Sites; and

(g) BS 6164 Safety in Tunnelling in the Construction Industry.

(h) Any other applicable national standards

3.4 MATERIALS, APPLIANCES AND COMPONENTS

All materials, appliances and components used within the distribution system shall comply with BS 4363 and BS 7375 Appendix A.

3.5 DESIGN CONSIDERATIONS

(i) Distribution equipment utilised within the temporary electrical distribution system shall incorporate the following features:-

(a) flexibility in application for repeated use;

(b) suitability for transport and storage;

(c) robust construction to resist moisture and damage; and

(d) safety in use.

(ii) All cabling shall be run at high level whenever possible and firmly secured to ensure they do not present a hazard or obstruction to people and equipment.

(iii) The installation on Site shall allow convenient access to authorised and competent operators to work on the apparatus contained within.

3.6 MAINS VOLTAGE

(i) The Site mains voltage shall be as per the Electricity Authority, 415V/ 3 phase 4 wire system.

(a) Single phase voltage shall be as per the Electricity Authority, 230V supply.

(b) Reduced voltages shall conform to BS 7375.

(ii) Types of Distribution Supply

The following voltages shall be adhered to for typical applications throughout the distribution systems:

(a) fixed plant - 415V/ 3 phase;

(b) movable plant fed by trailing cable - 415V /3 phase;

(c) installations in Site buildings - 230V /1 phase;

(d) fixed flood lighting - 230V/ 1 phase;

(e) portable and hand held tools - 115V /1 phase;

(f) Site lighting (other than flood lighting) - 115V /1 phase; and

(g) portable hand-lamps (general use) - 115V /1 phase.

(iii) When the low voltage supply is energised via the Employer's transformer, any power utilised from that source shall be either 415V 3 phase or / 230V. 1 phase as appropriate. The Contractor shall carry out any conversion that may be necessary to enable him to use power from that source.

3.7 PROTECTION OF CIRCUITS

(i) Protection shall be provided for all main and sub-circuits against excess current, under and over voltage, residual current and earth faults. The protective devices shall be capable of interrupting (without damage to any equipment or the mains or sub-circuits) any short circuit current that may occur.

(ii) Discrimination between circuit breakers, circuit breakers and fuses shall be in accordance with:-

(a) BS 88;

(b) BS EN 60898;

(c) BS 7375; and

(d) Any other appropriate Indian Standards.

3.8 EARTHING

(i) Earthing and bonding shall be provided for all electrical installations and equipment to prevent the possibility of dangerous voltage rises and to ensure that faults are rapidly cleared by installed circuit protection.

(ii) Earthing systems shall conform to the following standards:-

(e) IEE Wiring Regulations (16th Edition);

(b) BS 7430;

(c) BS 7375; and

(d) IEEE Standard 80 Guide for Safety in AC Substation Grounding.

3.9 PLUGS, SOCKET OUTLETS AND COUPLERS

Low voltage plugs, sockets and couplers shall be colour coded in accordance with BS 7375, and constructed to conform to BS EN 60309. High voltage couplers and 'T' connections shall be in accordance with BS 3905.

3.10 CABLES

(i) Cables shall be selected after full consideration of the conditions to which they will be exposed and the duties for which they are required. Supply cables up to 3.3KV shall be in accordance with BS 6346.

(ii) For supplies to mobile or transportable equipment where operation of the equipment subjects the cable to flexing, the cable shall conform to one of the following specifications appropriate to the duties imposed on it:

(a) BS 6708 flexible cables for use at mines and quarries;

(b) BS 6007 rubber insulated cables for electric power and lighting; and

(c) BS 6500 insulated flexible cords and cables.

(iii) Where low voltage cables are to be used, reference shall be made to BS 7375. The following specifications shall also be referred to particularly for underground cables:-

(a) BS 6346 for armoured PVC insulated cables; and

(b) BS 6708 Flexible cables for use at mines and quarries.

(iv) All cables which have a voltage to earth exceeding 65 V (except for supplies from welding transformers to welding electrodes) shall be of a type having a metal sheath and/or armour which shall be continuous and effectively earthed. In the case of flexible or trailing cables, such earthed metal sheath and/or armour shall be in addition to the earth core in the cable and shall not be used as the sole earth conductor.

(v) Armoured cables having an over sheath of polyvinyl chloride (PVC) or an oil resisting and flame retardant compound shall be used whenever there is a risk of mechanical damage occurring.

(vi) For resistance to the effects of sunlight, overall non-metallic covering of cables shall be black in colour.

(vii) Cables which have applied to them a voltage to earth exceeding 12 V but not normally exceeding 65 V shall be of a type insulated and sheathed with a general purpose or heat resisting elastomer.

(viii) All cables which are likely to be frequently moved in normal use shall be flexible cables.

Flexible cables shall be in accordance with BS 6500 and BS 7375.

3.11 LIGHTING INSTALLATION

(i) Where Site inspection of the Works is required during the nights, the Lighting circuits shall be run separate from other sub-circuits and shall be in accordance with BS 7375 and BS 4363.

(ii) Voltage shall not exceed 55 V to earth except when the supply is to a fixed point and where the lighting fixture is fixed in position.

(iii) Luminaries shall have a degree of protection not less than IP 54. In particularly

bad environments where the luminaries are exposed to excesses of dust and water, a degree of protection to IP 65 shall be employed.

(iv) The Contractor shall upgrade the lighting level to a minimum of 200 lux by localised lighting in all areas where required by the Engineer,.

(v) Mechanical protection of luminaries against damage by impact shall be provided by use of wire guards or other such devices whenever risk of damage occurs.

3.12 ELECTRICAL MOTORS

(i) Totally enclosed fan cooled motors to BS 4999:Part 105 shall be used.

(ii) Motor control and protection circuits shall be as stipulated in BS 6164. Emergency stops for machinery shall be provided.

3.13 INSPECTION AND TESTING

Electrical installations on Site shall be inspected and tested in accordance with the requirements of the IEE Wiring Regulations (16^{th} Edition)

3.14 IDENTIFICATION

Identification labels of a type reviewed without objection by the Engineer shall be affixed to all electrical switches, circuit breakers and motors to specify their purpose.

3.15 MAINTENANCE

(i) Strict maintenance and regular checks of control apparatus and wiring distribution systems shall be carried out by an electrician (duly qualified to carry out the said checks) to ensure safe and efficient operation of the systems. The Contractor shall submit for review by the Engineer details of his maintenance schedule and maintenance works record.

(ii) All portable electrical appliances shall be permanently numbered (scarf tag labels or similar) and a record kept of the date of issue, date of the last inspection carried out and the recommended inspection period.

APPENDIX 4

PROJECT CALENDAR

4. GENERAL

4.1. For the Project, the Contractor shall adopt 7 days a week calendar, identical calendar for the purpose of programming and Execution of Works. Official documents shall be transacted during 5 days week - Monday through Friday, except for National (Govt. of India) Holidays.

4.2. The Project Weeks shall be commenced on a Monday. A day shall be deemed to commence at 0001 hour on the morning of the day in question. Where reference is made to the completion of an activity by a particular week, this shall mean by midnight on the Sunday of that week. Requirements for the computation of Key Date are given in Appendix 2 to the Employer's Requirements.

4.3. A 7-day week calendar shall be adopted for various (Work) programme schedules for scheduling purposes. For Project purposes, the presentation shall be in 'Week"' units.

APPENDIX – 5

INTERFACE, COORDINATION AND COOPERATION WITH OTHER PARTIES

5.1 LIST OF CONTRACT PACKAGES IN HORC

S. No.	Package	Name of Work
1.	C-1	Priority Section - Construction of Earthwork, Bridges, Station Buildings, Retaining Walls and other miscellaneous works in connection with laying of New BG Double Railway line of HORC Project from Km 49.7 to Km 55.6 and its connectivity (new BG single line) from proposed Manesar Station of HORC to existing Patli Railway Station of IR Network.
2.	T-1	T-1: Laying of Track and track related works including supply of ballast, special sleepers, switches and crossings track fittings but excluding supply of Rails and line Sleepers in connection with laying of New BG Double Railway Line of HORC project from Km 32.00 to Km 61.5 and its connectivities to IR Network from Manesar to Patli Stations and New Patli to Patli & New Patli to Sultanpur Stations.
3.	Br-1	Fabrication, assembly & launching of 1X76.2 m span Open Web Girder (OWG) each over three lines on NH-352W (Pataudi Road) between Manesar and Patli stations including supplying & fixing of H-beam sleepers in connection with laying of New BG Double Railway Line of HORC project at Km 54.498.
4.	C-23	Design and Construction of Civil Works (Earthwork, Bridges, Station Buildings, Retaining Walls and other miscellaneous Works) from km 29.68 to km 49.70 & from km 55.60 to km 61.50 and its connectivities to IR network from New Patli to Patli station & New Patli to Sultanpur station including modifications/civil works at Sultanpur Station in connection with laying of New BG Double Railway line of HORC project.
5.	C-4	Composite Contract package in connection with New BG Railway Line of HORC project for: (i) Design & Construction of Twin Tunnel using NATM and Cut & Cover method from km 24.850 to km 29.580; (ii) Design & Installation of Ballastless Track (excluding supply of rails) from km 24.843 to km 29.680; (iii) Detailed Design, Supply, Installation, Testing & Commissioning of General Electrical Services including Supply, Erection, Testing and Commissioning of 11kV HT/LT Power and Control Cable Network, GIS Substation (11/0.433) kVA, Tunnel lighting system, etc. from km 24.843 to km 29.680; (iv) Design & Construction of Embankment, Bridges and other miscellaneous works from km 12.00 to km 18.00.

S. No.	Package	Name of Work
6.	C-5	**Contract Package C-5:** Composite Contract package in connection with New BG Double Railway Line of HORC project between stations Prithla and Dhulawat for: (i) Design and Construction of Civil Works (Earthwork, Bridges, Stations and Retaining Walls) from km -2.296 to km 12.00 & km 18.00 to km 20.942; (ii) Design & Construction of viaduct from km 20.942 to km 24.844; (iii) Design & Construction of Ballastless track from km 20.842 to km 24.844; and (iv) Design, Supply, Installation, Testing & Commissioning of General Electrical Services from km -2.296 to km 12.00 and Km 18.00 to Km 24.844
7.	C-6	Design and Construction of Civil Works (Earthwork, Bridges, Station Buildings, Retaining Walls & other miscellaneous Works) and General Electrical Services works from km 61.50 to km 125.98 and its connectivities to IR network from proposed Badsa Station of HORC to Existing Sultanpur station and proposed Mandothi station to existing Asaudha Station in connection with laying of New BG Double Railway line of HORC Project.
8.	SYS-1	**Contract Package SYS-1:** Design, Supply, Installation, Testing & Commissioning of 2x25kV, 50Hz, AC, High Rise Overhead Electrification (OHE), Power Supply System and SCADA in connection with laying of New BG Double Railway Line from Prithla to New Harsana Kalan of Haryana Orbital Rail Corridor (HORC) Project from Km (-) 2.099 to Km 125.98 Including Rigid Overhead Conductor System (ROCS) in Tunnel Portion i.e from km 24.850 to km 29.580 and its connectivity to IR/DFC networks at New Prithla, Patli, Sultanpur, Asaudah and New Harsana Kalan including modifications in New Prithla, Sultanpur, Asaudah and New Harsana Kalan Station Yards (approximately 145 RKM and 315 TKM).
9.	SYS-2	Design, Supply, Installation & Commissioning of Signalling & Telecom system in connection with laying of New BG Railway Double line of HORC Project from Prithla station (Ch: Km (-) 2.296 to New Harsana Kalan Junction (Ch: Km 125.98 Km) and single line connectivity from Manesar to Patli station of IR, from New Patli Junction to Patli station of IR, New Patli Junction Station to existing Sultanpur station of IR, Badsa Junction to Sultanpur Station, from Mandothi Junction to existing Asaudha station of IR including modifications in IR stations at Patli, Farukhnagar, Garhi Harsaru, Asaudha, Sonipat, Rathdana and DFCCIL stations New Prithla and New Tauru.

S. No.	Package	Name of Work
10.	T-2	Design, Supply and laying of Track and Track related works in connection with laying of New BG Double Railway Line of HORC project from Km -2.296 to Km 24.87, Km 29.06 to Km 32.00 and from Km 61.50 to Km 125.98 including its connectivities from proposed Badsa station of HORC to existing Sultanpur station on IR Network and proposed Mandothi station to existing Asaudha Station on IR Network.
11.	MSIL* (OHE)	Design, Supply, Erection, Testing & Commissioning of 25kV, 50 HZ, Single Phase, High Rise OHE System for Electrification Works including foundations, structures and all ancillary equipments for (i) Electrification of Maruti Suzuki Railway Yard" and "General Electrical works of proposed Station Building in Maruti Yard in connection with Railway Siding for Maruti Suzuki India Ltd. Manesar" and (ii) OHE modification of PATLI YARD area including provision of double line Sectioning Post (SP) with CB arrangement & SCADA Equipment at PATLI STATION and electrification of PATLI-MANESAR Single line connectivity in connection with HORC Project, in the State of Haryana.
12.	PSC-01	Manufacture and Supply of Pre-stressed Mono Block Concrete Line Sleepers conforming to RDSO Drg. No. T-8746 in connection with laying of New BG Double Railway Line from Prithla to New Harsana Kalan of Haryana Orbital Rail Corridor (HORC) Project

Notes:

1. The above list is only tentative and has been provided for giving overview of the Project to the Tenderers. However, it may undergo change in future at the sole discretion of HRIDC/HORC.
2. Automatic Signalling System is proposed for HORC project
3. *Patli (including)-Manesar-MSIL connectivity line OHE Works

5.2 GENERAL

5.2.1 This Appendix describes the Contractor's responsibilities with regard to interface management and coordination and includes interfacing with other contractors employed by the Employer (referred to as "Interfacing Contractors" hereinafter), and Interfacing Parties including entities such as local authorities, statutory bodies, public utility companies, private service providers, consultants or contractors whether or not specifically mentioned in the Contract. This responsibility is not limited to a particular number of Interfacing Contractors and Interfacing Parties, and all interfaces as required in the Contract are the sole responsibility of the Contractor.

5.2.2 Interfaces internal to the Contract are the sole responsibility of the Contractor and are not covered by this Appendix.

5.3 RESPONSIBILITIES OF THE CONTRACTOR

5.3.1 So as to ensure that the whole Project including Interfacing Contractors' works as well as the Contractor's Works shall be executed in the most efficient manner in the best interest of the Employer, the Contractor shall:

a) Take the lead in the management of the coordination process with Interfacing Contractors and Interfacing Parties.

b) Accord access to the Site and/or services to any related party in the Contract including members of the Interfacing Contractors, Interfacing Parties and the Engineer/Employer.

c) Not impede the work of the Interfacing Contractors and Interfacing Parties and shall accord them all reasonable opportunities and facilities.

5.3.2 The Contractor shall, in accordance with the Employer's Requirements, coordinate and integrate the:

a) Contractor's own Works under the Contract with the works of the Interfacing Contractors and Interfacing Parties.

b) Works of the Interfacing Contractors and Interfacing Parties.

5.3.3 The Contractor shall comply with any instruction which the Engineer may give. The Contractor's responsibilities shall neither be mitigated nor in any way affected by virtue of similar responsibilities being placed on the Interfacing Contractors. The Contractor shall be responsible for the detailed coordination of his manufacturing, installation, construction, testing and commissioning activities.

5.3.4 The Contractor shall carefully review any pertinent information made available by the Engineer relating to the nature and programming of all related parties' contracts and use such information in his planning of the Works.

5.3.5 The Contractor shall communicate and exchange information directly with the Interfacing Contractors and Interfacing Parties with a copy to the Engineer for information. Information as necessary to fulfil the Contractor's interface obligations shall be directly requested and obtained from the Interfacing Contractors and Interfacing Parties with a copy to the Engineer for information and receipt acknowledged.

5.3.6 The Contractor shall ensure that the Contractor's requirements, including any design inputs to other packages, are provided to all related parties of the Interfacing Contractors and Interfacing Parties before the cut-off dates as identified in the Interface Management Plan to be developed by the Contractor and consented to by the Engineer

5.3.7 Where other contracts requiring interface are yet to be awarded, the Contractor shall proceed with coordination activities with the Engineer, until such time as the Interfacing Contractors are employed by the Employer.

5.3.8 The Contractor shall take all reasonable steps to ensure that the Works are integrated with the manufacture, installation, execution and testing of such other works and shall in particular but without limitation to:

a) Comply with any instruction which the Engineer may give for the integration of the Works with the design of any other part of the Project;

b) Consult, liaise and cooperate with those responsible for carrying out such other works, including where necessary, in the preparation of the respective designs and drawings, the preparation of coordinated programmes, method statements, coordination drawings and specifications together with arrangements of service priorities and zoning to coordinate the priorities of tasks and division of the area together with the items mentionedpreviously; and

5.3.9 Participate in the Integrated Testing and Commissioning of the Works with the Interfacing Contractors and Interfacing Parties and demonstrate to the satisfaction of the Engineer that the Works have been constructed in a manner compatible with the works of the Interfacing Contractors and Interfacing Parties.

5.3.10 There shall be a continuous requirement for coordination by the Contractor between Interfacing Contractors/Interfacing Parties.

5.3.11 During the Works the Contractor shall provide within the Site the facilities including, but not limited to, staging, storage and unloading, and temporary storage areas for the temporary use of Interfacing Contractors and/or Interfacing Parties, as may reasonably be required during the construction/installation and commissioning process. Where separate locations need to be provided for each of the Interfacing Contractors and/or Interfacing Parties, prior to construction commencing, specific details shall be coordinated and agreed between the Contractor and the Interfacing Contractors and/or Interfacing Parties.

5.3.12 The Contractor shall attend meetings with Interfacing Contractor and Interfacing Parties (if necessary) and raise/provide correspondence in this regard in accordance with the Employer's Requirements and/or as instructed by the Engineer. The identity of the Interfacing Contractor(s) and/or Interfacing Parties may not be known before the execution of the Contract but this shall not be a grounds for the Contractor to object to the subsequent appointment of any Interfacing Contractor and/or Interfacing Party.

5.3.13 The Contractor shall in accordance with the requirements of the Contract and instructions of the Engineer coordinate his own Works with the works of Interfacing Contractors and/or Interfacing Parties strictly adhering to the Coordination and Interfacing Programme and shall accord the Interfacing Contractors and/or Interfacing Party's all reasonable opportunities for carrying out their works

5.3.14 If the Contractor suffers delay by reason of failure caused by any Interfacing Contractor/Interfacing Party to meet the specified installation interfacing and/or coordination completion dates resulting in delay beyond the extent which could be reasonably foreseen by an experienced contractor at the time when the Coordination and Interfacing Programme is formulated and consented by the Engineer, then the Engineer shall take such delay into consideration in determining any extension of time to which the Contractor is entitled under the Contract

5.3.15 If any act or omission of the Contractor, whether directly or indirectly, results in the delay in execution of the works of an Interfacing Contractor and/or Interfacing Party associated with the execution of the project, the matter shall be settled by the Engineer

5.3.16 All requests for information or clarification, acknowledgement of receipt of information and any official communication between the Contractor and Interfacing Contractors/Interfacing Parties shall be made in writing with a copy to the Engineer for information.

5.3.17 The Contractor shall notify the Engineer in writing of any problems encountered in obtaining necessary information and/or lack of cooperation from an Interfacing Contractor/Interfacing Party. In the event that the Engineer considers that the resolution of an interface is not proceeding satisfactorily, the Engineer shall review the matter and establish a coordinated plan directing the Contractor and the Interfacing Contractors/ Interfacing Parties regarding the required action.

5.3.18 The Contractor shall prepare minutes recording all the matters discussed and agreed at all the meetings.

5.3.19 The Contractor shall ensure that copies of all correspondence, drawings, meeting minutes, programmes, etc. relating to the Contractor's coordination and interfacing meetings with the Interfacing Contractors and Interfacing Parties or the sharing of correspondence, drawings, programmes, etc. are issued to all concerned parties and the Engineer no later than seven days from the date of such meetings and the date of issue of such correspondence, drawings, programmes, etc.

5.3.20 Should it appear to the Engineer that the Three Month Rolling Programme does not conform with the Coordination and Interfacing Programme, the Contractor shall be required to revise all such programmes so as to conform to the approved Contractual Works Programme.

5.4 INTERFACE ADMINISTRATION SYSTEM

5.4.1 The Contractor shall establish an Interface Administration System (the "IAS") and participate in the activities with the Interfacing Contractors and Interfacing Parties. The IAS shall include, but not be limited to, the following provision of:

a) An Interface Manager who shall be responsible for and the authority to resolve interfacematters to the satisfaction of the Engineer;

b) The necessary support team for the IAS;

c) Procedures and details for response to, confirmation of and making written agreements with regard to interfaces;

d) Details of the arrangement for attendance at coordination and interface meetings (including those that may be arranged by Interfacing Contractors, Interfacing Parties or the Engineer). The representatives of Contractor, Interfacing Contractors and InterfacingParties shall be empowered to make agreements on coordination and interfaces. The Contractor shall arrange regular meetings for the Engineer to monitor the status of coordination and interfaces and may arrange special coordination and interface meetingsas may be necessary to resolve specific issues. The Engineer can require the Contractor to arrange a special coordination and interface meetings if necessary. The Contractor mayrequest assistance from the Engineer to arrange coordination and interface meetings on particular subjects;

e) Details to the Engineer of regular status information and/or details of coordination and interfaces including copies of relevant correspondence and material; and

f) Details to the Engineer of access to information for the purpose of conducting audits on interface compliance and for confirming that interface coordination and interface management is proceeding consistently with the requirements of the Contract.

5.4.2 CONSTRUCTION INTERFACE

a) Construction coordination and interface shall be required throughout the duration of the Contract and shall commence from the time of the LOA until the Taking Over of the Works.

b) The Contractor shall coordinate and interface with the Interfacing Contractors and Interfacing Parties to execute the respective construction activities efficiently.

c) The Contractor shall cooperate with Interfacing Contractors and Interfacing Parties on all Site- related matters including but not limited to Site access and occupation, safety, verification of work compatibility and survey control, etc. The Contractor shall advise the Interfacing Contractors and Interfacing Parties in advance when a construction item is ready for site inspection to verify compatibility with the Interfacing Contractors' and Interfacing Parties' needs and shall facilitate access to the Site for the Interfacing Contractors and Interfacing Parties.

d) At or near the completion of the construction of any interface-related element of the Contractor's Work, the Contractor shall:

   i) Advise the Interfacing Contractors and Interfacing Parties that the as-constructed interface- related Works can be inspected and provide the necessary access to the Site and its occupation.

   ii) Agree in writing to the Interfacing Contractors and Interfacing Parties, and as consented bythe Engineer, on the adoption of any Interfacing Contractors' and/ or Interfacing Parties' applicable comments on the constructed Works.

e) On advice from the Interfacing Contractor or Interfacing Party that an as-constructed interface- related element is ready for inspection, the Contractor shall:

f) Conduct on-site inspections of the Works elements and give comments in writing to the Interfacing Contractor and/or Interfacing Party.

g) Agree in writing to the Interfacing Contractor or Interfacing Party that the as-constructed Works meet the coordination and/or interface requirements.

h) Prior to applying for a Taking-Over Certificate, the Contractor shall obtain written confirmation from each Interfacing Contractor and each Interfacing Party, that the interface elements meet the requirements of the Interfacing Contractors and Interfacing Parties. If any Interfacing Contractor or Interfacing Party withholds such confirmation, the Engineer shall decide on further action, as requested by the Contractor prior to the issue of a Taking-Over Certificate.

i) Where Contractor's Works are identified as failing to meet the requirements of the Contract and such shall impact the Interfacing Contractors' works or Interfacing Parties' works, the Contractor shall submit the proposed remedial measures to the Engineer for review and shall copy the same to the Interfacing Contractors and/or Interfacing Parties.

j) The Contractor shall coordinate and interface with the Engineer with respect to all construction/installation activities and shall follow the Engineer's instructions for requesting access for such activities.

k) The Contractor shall undertake construction/ installation in accordance with the approved (Contractual) Works Programme. The Contractor shall coordinate and interface with Interfacing Contractors and/or Interfacing Parties for the planning and execution of the testing and commissioning activities.

5.5 INTERFACE DOCUMENTS

5.5.1 Preparation of Interface Documents

The Contractor shall prepare as required the following coordination and interface documents which shall be used to completely define the Contractor's coordination and interface details:

a. Interface Table;

b. Coordination and Interfacing Programme; and

c. Interface Management Plan (IMP).

5.5.2 These coordination and interface documents shall be submitted for review by the Engineer in order to obtain the Engineer's Approval. For all subsequent updates, these documents shall be submitted to the Engineer for information, review and comment. A summary of principal issues with suitable solutions shall be included in each Monthly Progress Report.

5.6 INTERFACE TABLE FOR SUPPLY AND INSTALLATION ITEMS

5.6.1 The Interface Table shall include at least (but without limitation) the items related with the Contractor's Contract described in Appendix 5. The Interface Table, which describes the relationships between the Contractor and Interfacing Contractors and/or the Interfacing Parties and their roles and responsibilities, shall be submitted to the Engineer for consideration after further development of Interface Table.

5.6.2 The Interface Table shall indicate the demarcation of scope of responsibilities between the Contractor and the Interfacing Contractors and the Interfacing Parties.

5.6.3 Within sixty (60) days of notification from the Engineer of the identity of each Interfacing Contractor, the Contractor shall develop and submit to the Engineer an Interface Table that is mutually acceptable to both the Contractor and the Interfacing Contractors and Interfacing Parties.

5.7 COORDINATION AND INTERFACING PROGRAMME

5.7.1 The Contractor shall prepare and submit a Coordination and Interfacing Programme to the Engineer in accordance with the Employer's Requirements and/or as instructed by the Engineer as detailed below.

5.7.2 The Coordination and Interfacing Programme shall be submitted to the Engineer for consent within sixty (60) days from the Letter of Acceptance (LOA) to allow for checking and monitoring by the Engineer.

5.7.3 The Coordination and Interfacing Programme shall include detailed activities describing all aspects of the works of Interfacing Contractors and Interfacing Parties to meet all Sections or Milestones given in the Contract and be clearly linked to other programmes such as the (Contractual) Works Programme (or Work Segment Programmes) to streamline the Works and the works of the Interfacing Contractors and Interfacing Parties.

5.7.4 The Coordination and Interfacing Programme shall indicate the physical areas to which the Interfacing Contractors and Interfacing Parties require access, with access dates, durations required and the required degree of completion of the Works prior to the access dates by Interfacing Contractors and Interfacing Parties.

5.7.5 It is the Contractor's responsibility to ensure timely coordination with the Interfacing Contractors and Interfacing Parties to review, revise and finalise his Coordination and Interfacing Programmes so as not to affect the progress of the Works and/or the works of the Interfacing Contractors and Interfacing Parties.

5.7.6 The Contractor shall note that the following conditions apply to the works of the Interfacing Contractors and/or Interfacing Parties:

a) The Interfacing Contractors and/or Interfacing Parties shall not have exclusive access to any part of the Site except with the consent of the Engineer;

b) The Contractor shall take note that concurrent time allocations for certain areas may be given to more than one Interfacing Contractors and or Interfacing Parties. The Contractorshall coordinate the Works in such areas with the works of the Interfacing Contractors and/or Interfacing Parties and report to the Engineer for his review and consent;

c) The absence of a Coordination and Interfacing Programme date or construction/ installation period for the Interfacing Contractors and/or Interfacing Parties in a specific area shall not prejudice the right of the Engineer to establish a reasonable Coordination and Interfacing Programme date or construction/installation period for thatarea;

d) The Contractor and the Interfacing Contractors shall comply with the Sections or Milestones and other successive activities specified in the Coordination and Interfacing Programme.

5.8 INTERFACE MANAGEMENT PLAN (IMP)

5.8.1 The Contractor shall develop and submit to the Engineer, within sixty (60) days from the LOA, an IMP for all interface issues that may arise during the construction, testing and commissioning of the Works, in consultation with the Interfacing Contractors / Interfacing Parties and the Engineer. The IMP shall allow adequate time periods for each of the Interfacing Contractors/ Interfacing Parties and the Contractor to install their Plant, equipment and Materials in the designated areas.

5.8.2 The IMP shall:

a) Identify all the systems and sub-systems and facilities with interfacing requirements;

b) Define as far as possible the authority and responsibility of the contractor's, the Interfacing Contractor's and interfacing party's involved in interface management and development;

c) Identify the information to be exchanged, together with the management and technical skills required for the associated development of the works, at each phase of the contractor's and Interfacing Contractor's and Interfacing Parties' project life-cycles;

d) Address the Contractual Works Programme (or Work Segment Programmes) of the Contract to meet the Contractor's sections or Milestones and the Interfacing Contractors' sections or milestones and highlight any programme risks requiring the Engineer's attention;

e) Include relevant consideration of the requirements of "Environment Social Health and Safety Manual" as described in Appendix 13;

f) Address the supply, installation, testing and commissioning programmes of the Contract to meet Interfacing Contractors' Sections or Milestones, and highlight any programme risks requiring management attention; and

g) Indicate dates for commencement and completion of each principal activity by the Contractor and those of the Interfacing Contractors and Interfacing Parties, including delivery and installation of Plant, equipment and Materials.

5.8.3 After the Engineer reviews and issues approval to the IMP, the Contractor shall execute the Works accordingly.

5.8.4 The Contractor shall raise and apprise the Engineer immediately of any difficulty in developing a mutually acceptable IMP.

5.8.5 Employer's / Engineer's Input

a) The Employer or Engineer or both will coordinate the activities of the Contractor with reference to interfacing with third parties during all the phases of the Contract.

b) The Employer or Engineer, within the scope of the relevant Contract provisions, may assist the Contractor in the following fields:

(1) Coordination and interface with state and local authorities for the timely receipt of required permits, certificates and approvals related to the construction process;

(2) Coordination and interface with state and local authorities for the implementation of acquisition procedures for any additional land areas that may be required by the Contractor; and

(3) Any other fields or activities related to the Contract as may be required for the purposes of facilitating the Contractor's performance.

c) The Engineer shall conduct a coordination and interface meeting with the interfacing parties every fortnight with the Contractor which may be attended by the Employer. The primary objective of the meeting will be to review progress of the coordination and interface activities.

d) The support and assistance of the Employer and/or the Engineer shall not release the Contractor of any of his obligations under this Contract.

5.9 DETAILED INTERFACE DESCRIPTION (DID)

5.9.1 The DID is the document that provides a clear technical description of each of interface in the Interface Table.

5.9.2 Any revision to the DID shall be mutually acceptable to both the Interfacing Contractors and Interfacing Parties. Only then shall this be submitted to the Engineer for his review.

5.9.3 DID shall contain the following items:

S. No.	Detailed Interface Description
1	Item number and name of interface in Interface Table
2	Name of the Contractor and Interfacing Contractor/Interfacing Party
3	Confirmation Table of both the Contractor and Interfacing Contractor/Interfacing Party
4	Creation date and modification date
5	Correction history
6	The following items shall be described: physical interface, functional interface, protocols, software and data interface, naming conversion, design constrains, environmental conditions, and drawings
7	Reference Documents

5.10 CONTENTS OF INTERFACE MANAGEMENT PLAN

Interface Management Plan (IMP) should be prepared including necessary contents referring Table 1. The intention of each section is described by the text inside angle brackets.

Table1: Sample Contents of Interface Management Plan

1	Introduction	
	1.1	Purpose of Document <Describe the methodology to be adopted by the Contractor in managing all interface issues >
	1.2	Overview <Project overview of the Contractor and the Interfacing Contractor>
2	Resource Management	
	2.1	Organization and Roles & Responsibilities
	2.2	Resource Requirement <Detailed description of the manpower, tools, logistics shall be included in this section>
3	Interface Requirements	
	3.1	Allocation of Interfacing Requirements <This is an introduction to Section3.2>
	3.2	Interface Description between Contractors <Task Allocation Table (TAT) shall be included in this section>
	3.3	Areas of Concern <Process for managing the interface concern>
4	Process Management	
	4.1	Change of Interfacing Requirement <The process for the management of interface requirement change shall be addressed in this section.>
	4.2	Verification and Validation of Interfacing Requirements <The approach to be adopted by the Contractor to manage verification and validation of interfacing requirements shall be addressed in this section.>
	4.3	Testing and Commissioning on Interfaces <The approach to be adopted by the Contractor for the management of Interface in the Testing and Commissioning stage shall be addressed in this section.>
	4.4	Quality Procedures <All Contractor's internal quality procedures applicable for the interface management shall be listed here.>
	4.5	Systems Assurance Plans <Considered requirement of the Systems Assurance.>

5	Document Management	
	5.1	Reference Documents <All applicable reference documents shall be listed in this section.>
	5.2	Structure of Reference Documents <The Structure of reference documents shall be addressed in this section.>
	5.3	Version Control of Interface Documents <Configuration management of interface documents shall be addressed in this section.>
6	Communication	
	6.1	Terms of Reference of Interface Meetings <The terms of reference of interface meetings shall be addressed here.>
	6.2	Exchange of Information between Contractors <The process for the exchange of information between the pair-wise contractors shall be stated here.>
	6.3	Submission to Employer <The approach to be adopted by the pair-wise contractors on the Submission of the Interface Management Plan to Employer shall be described here.>
	6.4	Request for Employer Attention <The criteria and methodology on requesting for Employer attention shall be mentioned here.>
7	Interface Hazard Management	
	7.1	Strategy and Approach
8	Programme	
	8.1	Key Activities <Include schedule of meetings, schedule of exchange of information, etc.>
	8.2	Section and Milestone <Include Design Freeze Dates, Integrated Test Dates, Critical Items dates, etc. Should include reference to appropriate programmes so that any future changes in programme date need not result in resubmission of this plan for approval.>
	8.3	Critical Items/ Critical Paths <This section shall highlight all the critical items and critical paths to the Employer.>

5.11 INTERFACE TABLE

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
1.	Information exchange on alignment with following details: a) Formation Cross section b) Track alignment Drawings c) Coordinates of track centre d) Curves e) Gradient f) Rail levels, g) Yard layouts	(i) C-5 Contractor shall provide details of formation cross section, Plan & L-Section, curves and gradient to T-2 and SYS-1 contractors.	(i) T-2 contractor shall carry out detailed survey and verify plan & L-section, cross section etc and shall prepare final track alignment drawings, yard ESP, curves, gradients, rail level etc and share with SYS-1 and SYS-2 contractors.
2.	Handing/Taking over of abutment A-2 of viaduct for construction of superstructure.	(i) C-5 Contractor shall provide the design parameters for design of abutment A-2 to C-4 Contractor.	(i) C-4 Contractor shall construct abutment A-2 of viaduct and handover the site to C-5 Contractor for construction of superstructure.
3.	Handing/Taking over of site for laying of track on formation.	(i) C-5 Contractor shall share the handing over schedule with T-2 Contractor. (ii) C-5 Contractor shall complete the work of formation and bridges as per schedule and handover formation to T-2 Contractor for laying of track.	(i) T-2 Contractor shall take access to the formation and complete installation of track.

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
4.	Cross Section of bank at junction with C-4 Contractor.	C-5 Contractor shall complete formation at junctions with C-4 Contractor.	(i) C-4 contractor shall provide stepped profile of bank at junction with C-5 contractor at Ch.12000 and Ch.18000 as shown in Tender drawings
5.	Provide access to site for SYS-1 and SYS-2 contractors for OHE and S&T works	(i) C-5 contractor in coordination with T-2 Contractor shall share the handing over schedule to SYS-1 and SYS-2 Contractors as per schedule.	(ii) SYS-1 Contractor shall take access to the formation /track from Civil and Track Contractors and complete OHE works SYS-2 contractor shall take telecom and signalling access and lay cabels and install S&T outdoors indoor equipment.
6.	Bridges (Concrete / Steel) - OHE Load on the Pier cap of bridges due to OHE Masts	(i) Civil Contractors shall share the relevant bridge drawings with SYS-1 Contractor. (ii) Civil Contractors shall take into account the OHE mast location, loads and bending moment etc. provided by SYS-1 Contractor and ensure that the Pier Caps are designed and constructed for OHE Mast. (iii) Civil Contractors shall supply & provide holding down bolts as per design given by SYS-1 Contractor and also provide template for keeping bolts in	(i) SYS-1 Contractor shall provide OHE Layout Plan (LOP) of proposed locations of OHE Masts. (ii) SYS-1 shall also share values of max direct load, Bending Moment, etc. arising due to the OHE Masts, fittings and anchors, which have to be considered in the design of Piers. (iii) SYS-1 shall coordinate with Civil contractor and confirm for suitability and extend all assistance in providing Holding Down Bolts (HDB) as

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
		position during concreting.	per approved design/drawings. (iv) SYS-1 Contractor shall provide staff to witness the provisions made by the Civil contractor for adequacy and suitability.
7.	Electrical Clearances at Bridges (ROBs),Rail Fly Overs(RFOs) and other Over Head Structures above tracks or OHE	(i) Civil Contractors shall supply list of Bridges (ROBs),Rail Fly Overs(RFOs) and other Over Head Structures indicating their specific locations, cross-sections, height above rail level and dimensional details for evaluation of infringements, if any. (ii) Civil Contractors shall accommodate the requirement of the SYS-1 Contractor as approved by the Engineer.	(i) SYS-1 Contractor shall interface with C-5 Contractor for infringements to Electrical Clearances and required modifications / improvements. (ii) SYS-1 Contractor shall update /modify traction OHE drawings based on the interface information. (iii) SYS-1 Contractor shall interface and get all drawings & schemes approved from the Engineer ascertaining adequacy of electrical clearances.
8.	Earthing and bonding of Steel Bridges.	(i) Civil Contractors shall facilitate SYS-1 Contractor for earthing	(i) SYS-1 Contractor shall provide schematic drawings for earthing &

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
		and bonding of steel bridges.	bonding of overhead steel bridges.
9.	Earthing & Bonding of concrete bridges / Viaduct.	(i) Civil Contractors shall install dedicated reinforcement earth bars in concrete to ensure earth continuity as per approved schemes. (ii) Civil Contractors shall allow witnessing by the Contractor (SYS-1) of casting to ensure the continuity of the Earth conductor as per the schemes. (iii) Civil Contractors shall paint marker on the designated earth bar to facilitate the supervision. (iv) Civil Contractors shall supply and install brought-out connections. Viz. Terminal Plates on every Pier Cap and on consecutive span of Viaduct to ensure earthing & bonding connection with BEC (if required).	(i) SYS-1 Contractor shall provide schematic drawings for earthing & bonding connections with dedicated reinforcement bars in concrete of Piers cap to Piles/legs of concrete bridges. (ii) SYS-1 Contractor shall interface and get all drawings & schemes approved from the Engineer. (iii) SYS-1 Contractor shall supply and install flexible cable / jumper and connect the terminal plates with BEC (if required) at every consecutive spans. (iv) SYS-1 Contractor shall arrange adequate supervision of appropriate level and at various stages of construction to ensure provisions of earth continuity in concrete structures.

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
10.	S&T service structures at stations and auto signal huts	(i) C-5 contractor shall share the handing over schedule of S&T service structures with SYS-1 & SYS–2 contractors and hand over to SYS-2 contractor as per schedule.	(i) SYS-1 and SYS – 2 contractors shall take the access to S&T service structures. SYS-1 contractor shall install electric fitting/fixture and SYS-2 contractor shall install S&T equipment.
11.	Signals post & junction box on viaducts	(i) C -5 contractor shall take into account signal post & junction box location, loads etc. and ensure the viaduct girder is designed and constructed for signals post & junction box. (ii) C-5 contractor shall provide holding down bolts as per details provided by SYS-2 contractor and also provide template for keeping bolts in position.	(i) SYS-2 contractor shall provide location, loads and fixing details of signal posts & junction box to C-5 contractor, which have to be considered in design of viaduct girders. (ii) SYS-2 contractor shall coordinate with C-5 contractor and confirm for suitability and extend all assistance in providing holding down bolts as per approved design / drawing. (iii) SYS-2 contractor shall provide staff to witness the provisions made by C-5 contractor for adequacy and suitability.
12.	S&T cable duct in stations area.	(i) C-5 contractor shall construct S&T cable ducts in station yard. The C-5 contractor shall share handing over schedule to SYS-2	(i) SYS-2 contractor shall take over the cable duct and lay S&T cables as per approved design/drawings.

Item No.	Item Description	Civil Contractor (C-5)	Civil, Track and System Contractors (C-4, T-2, SYS-1and SYS-2)
		contractor and hand over cable ducts to SYS-2 contractor as per schedule.	
13.	Safety Precautions during working in DFCCIL Track.	C-5 Contractor will take necessary precautions while working in Br No.87.	
14.	Working in Prithla Yard of DFCCIL	C-5 Contractor shall interface with DFCCIL for works of Prithla Junction(South) SSP.	

5.12 Interface requirements specified above are by no means exhaustive and it remains the Contractors' responsibilities to develop, update and execute jointly Interface Requirements during design & throughout the execution of Works, to ensure that:

i. all interface issues between the Contracts/Systems are satisfactorily resolved;
ii. design, supply, installation and testing of equipment are fully co-ordinated; and
iii. all equipment and facilities supplied under the Contracts are fully compatible with each other, whilst meeting the requirements of the respective Specifications.

APPENDIX 6

PROGRAMME REQUIREMENTS

6. GENERAL

6.1 PURPOSE OF PROGRAMME

6.1.1 There are two primary purposes for the requirement of Programme (Scheduling) information described in this document:

a) Evaluation of tender.

b) Status Reports during Construction

To provide the Engineer with status reports for managing, monitoring and coordinating the awarded contracts during their execution within the overall multi-contract project schedule.

The requirements are organized in two stages. The first stage is a requirement for all Bidders and shall be submitted as part of Bid. The second stage is a requirement of the Employer and describes a series of reports to be submitted by the Contractor to the Engineer during the execution of contract, following the award of contract.

6.1.2 The Tenderer/Contractor shall programme his work at all times to meet the Key Date stated in Appendix 2 to the Employer's Requirements and the specified interface periods for the design and installation of the Works with those of the Interfacing Contractors and shall during the progress of the Works constantly monitor his progress against the programmes described below.

6.1.3 The Tenderer/Contractor shall include in all programmes his work obligations towards shared access, shared Site areas and other coincident or adjacent Works Areas.

6.1.4 The Works Programme, and all more detailed or revised versions, shall be submitted to the Engineer in hard copy as well as soft copy for his consent in accordance with the provisions of the GC.

6.2 METHODOLOGY

6.2.1 The computerized Critical Path Method (CPM) network using the Precedence Diagramming Method (PDM), has been selected by the Employer as the technique for contract management system and in co-coordinating the multi-contract project. This technique shall also be employed by the Tenderer in preparing their Tender submissions and by the Contractor in their Construction Stage submissions.

6.2.2 Unless otherwise agreed by the Engineer, all programmes submitted by the Contractor shall be produced using computerized Critical Path Method (CPM) Networks developed implementing the Precedence Diagramming Method (PDM) with Cost Loaded Charts and Tables.

6.2.3 The Contractor shall implement and use throughout the duration of the Contract, a computerized system to plan, execute, maintain and manage the planning, design, pre-construction, construction, and sub-contracts in executing the CPM scheduling by PDM. The reports, documents and data provided shall be an accurate representation of the current status of the Works and of the work remaining to be accomplished; shall provide a sound basis for identifying problems, deviations from the planned works, and for making decisions; and shall enable timely preparation of the same for presentation to the Engineer.

6.3 PROGRAMME MANAGEMENT SOFTWARE

6.3.1 CPM programming software used shall be Primavera Project Planning (P6) Program - Ver 21.12 or later. Any other compatible system capable of direct file interchange capability with software program used by the Employer - Primavera (P6), Ver 21.12 or later can be used with Engineer's consent. Scheduling software and relevant instruction manuals, licensed for use in connection with the contract, shall be provided by the Contractor according to the Employer's specifications

6.3.2 The Tenderer may use a system other than Primavera but will be required to demonstrate that full electronic data transfer to Primavera is available and that the various levels of reporting and coding capabilities are at least equivalent to Primavera. Compatibility and comparable performance between Primavera and the Tenderer's proposed system shall be demonstrated in his Tender submission. Should compatibility not be demonstrated to the Employer's satisfaction the Contractor shall utilise Primavera for development, stat using, updating and revision of all the Programmes during the duration of the Contract. Upon the Engineer's consent of a system other than Primavera, the Contractor shall supply the Engineer with an original licensed copy, including manuals and approved training of the software and any subsequent versions thereof at no extra cost.

6.4 POST CONTRACT AWARD

6.4.1 The Contractor shall develop his Tender Programme into the Initial Works Programme including an outline Narrative Statement and submit its more detailed version as per the key dates mentioned in Appendix 2 to the Engineer for approval.

6.4.2 The first Three Month Rolling Programme shall be submitted within thirty (30) days of the date of commencement and all subsequent editions shall accompany the Monthly Progress Report. The Monthly Progress Reports shall also include a Programme Update as described below. These programmes shall subsequently be updated as described below.

6.4.3 The Contractor shall take into account the programmes of Interfacing Contractors while finalizing the Works Programme It is the Contractor's responsibility to ensure timely co-ordination with the Interfacing Contractors to review, revise and finalise his Work Programme so as not to affect the progress of Works/ and or the works of the Interfacing Contractors. The Detailed Works Programme when approved by the Engineer after incorporating requirement of Interfacing Contractors shall form the Baseline Programme and shall be called "Programme" against which actual progress of the Contract shall be reckoned. As the work progresses, it may be necessary to update/ revise the Baseline programme but such updating shall only be carried out with the prior consent of the Engineer or when directed by them.

6.4.4 For Initial & Detailed Work Programme submission, one (1) original and three (3) copies each of the following Programmes and Reports shall be submitted to the Engineer:

a) Programme: Baseline CPM Network

b) Programme: Baseline Milestone based Cost Activity Schedule

c) Baseline Schedule Report

d) Narrative Statement

e) Baseline Physical Progress 'S' curve

f) Baseline Resource Charts

6.4.5 The Engineer shall review and comment on the Contractor's programmes and information submitted under this Clause. The Engineer will confirm his consent or otherwise of the

submissions within thirty (30) calendar days.

6.4.6 The Engineer shall require the Contractor to re-submit within thirty (30) calendar days if he is of the opinion that the programmes and information submitted by the Contractor is unlikely to meet the Contract Key Date.

6.4.7 If in the opinion of the Engineer, any of the Contractor's revised programmes or Baseline Schedule Report is not acceptable, it shall be construed as a failure of the Contractor to meet the Contract Key Date.

6.4.8 Notwithstanding the above, the Engineer may at any time during the course of the Contract require the Contractor to reproduce the computer-generated Baseline Schedule Report described above to reflect actual activity dates and generate schedules based upon "what if" statements. The initial computer-generated report after receiving the Engineer's consent will serve as the base against which the contract progress will be measured. Any changes to the Report reflected in subsequent Baseline Schedule Reports shall also require the Engineer's consent.

6.4.9 Failure to include any element of work required for performance of the Contract shall not relieve the Contractor from completing all works required under the Contract to achieve the original or any extended key completion date.

6.5 WORKS PROGRAMME

6.5.1 The Works Programme shall show the Contractor's plan for organising and carrying out whole of the Works.

6.5.2 The Works Programme shall be a computerised Critical Path Method (CPM) network developed using the Precedence Diagramming Method (PDM) and shall be present in bar chart and time-scaled network diagram format to a weekly or monthly time scale.

6.5.3 Tasks in the Works Programme shall be sufficiently detailed to describe activities and events that include, but are not limited to, the following:

a) Key Date,

b) all physical work to be undertaken in the performance of the Contract obligations, including Temporary Works,

c) the requested date for issue of any drawings or information by the Engineer,

d) incorporation of principal aspects of the Design Submission Programme,

e) procurement of major materials and the delivery and/or partial delivery date on-Site of principal items of Contractor's Equipment,

f) any off-site work such as production or pre-fabrication of components,

g) installation of temporary construction facilities,

h) interface periods with Interfacing Contractors or utility undertakings,

i) design, supply and/or construction activities of sub-contractors,

j) any outside influence which will or may affect the Works.

6.5.4 The Works Programme shall show achievement of all Key Date.

6.5.5 Activity descriptions shall be unique, describing discrete elements of work. Any activity creating an imposed time or other constraint shall be fully defined by the Contractor.

6.5.6 The Works Programme shall be organised in a logical work-breakdown-structure

including work stages and phases, and shall clearly indicate the critical path(s).

Each activity in the Works Programme shall be coded to indicate:

a) Activity ID and Activity Code.

b) The Engineer may request additional activity coding to the extent available without restraint to the Contractor's utilisation of the programme software. When requested the Contractor shall add the required additional coding to the Programme. The Contractor shall use additional code fields as requested to comply with the requirements and for the use of the Contractor.

6.5.7 Activity duration shall not exceed two (2) weeks, unless otherwise consented to by the Engineer, except non-construction activities such as submittals, submittal reviews, procurement and delivery of materials or equipment and concrete curing. The Contractor shall submit a Programme/Project Calendar cross reference clearly indicating the allowance for holidays.

6.5.8 The Works Programme, in each submission, shall be accompanied by an Activity Report and a Narrative Statement as described below in both electronic and hard copy format (time scale logic diagrams in A1 size, reports in A4 size).

6.5.9 Activity Report shall list all activities, and events in the Works Programme, sorted by activity identification number.

The Activity Report shall include the following for each activity and event:

a) activity identification number and description,

b) duration expressed in Days,

c) early and late start, & early and late finish dates. Planned start and finish dates,

d) calculated total float and free float,

e) predecessor(s) and successor(s), accompanying relationships and lead/lag duration,

f) imposed time or date constraints,

g) calendar.

6.5.10 Narrative Statement

The Narrative shall be a comprehensive statement of the Contractor's plan and approach for the execution of the Works and the achievement of Key Date, handover dates, submission dates and any intermediate dates. It shall incorporate outline method statements in respect of major items of work including construction sequences and primary item of plant, Construction Equipment, Temporary Works and the like. It shall fully explain the reasons for the main logic links in the Programme and include particulars of how activity durations are established. This shall include estimated quantities, production rates, hours per shift, work days per week and a listing of the major items of Construction Equipment planned for use on the project. Activities, which may be expedited by use of overtime or additional shifts, shall be identified and explained. A listing of holidays, and other special non-work days being used for the computer reports shall be included.

6.5.11 Baseline Physical Progress 'S' Curve

The Contractor shall also submit a forecast Cumulative Physical Progress 'S' curve based on the time-phased distribution of cost in the CPM Network Logic Diagram, expressed in percentage terms. This 'S' curve shall be generated from the computerized CPM Network Logic Diagram.

6.5.12 Baseline Resource Charts

The Contractor shall also submit a Resource Charts, generated from the Contractor's CPM Network Diagram, showing the anticipated manpower and main Construction Equipment usage during the execution of the Project.

As an additional monitoring facility, indicator resources shall be assigned to relevant activities for the major items of work. Indicator resources shall be directly allocated for excavation (cum.), piling (no.), diaphragm walling (m.), concrete (cum.), tunnel lining (m), etc. Resource indicators may be input as a daily rate, expected required rate, or as an activity total in the relevant units. These are purely indicative quantities and do not form part of contract.

6.5.13 All submissions of proposed Works Programmes subsequently, after approval of the Initial Works Programme, shall include the actual physical progress of work and forecast of the remaining work. Actual progress shall be stated in percent complete, remaining duration, and actual start and finish dates for each activity in the Works Programme.

6.6 INITIAL WORKS PROGRAMME

6.6.1 The Initial Works Programme submitted as under Clause 6.4 above need not include the full details. It should be a condensed version with combined activities of longer. The outline Narrative Statement shall be in sufficient detail to clearly show the Contractor's intention.

6.6.2 After the Engineer's consent to the Initial Works Programme, the Contractor shall submit to the Engineer an expanded and more detailed version of the Initial Works Programme containing all of the information and detail required as per Key Date mentioned in Appendix 2.

6.6.3 Such submission shall make use of the Tender Programme submitted earlier but refined to include the best estimates of dates for the work of Interfacing Contracts which has impact on the Contractor's programme. Such programmes shall be amended subsequently to incorporate the actual dates/ schedule of the affecting contracts. It is the Contractor's responsibility to ensure timely co-ordination with the Interfacing Contractors to finalise the Initial Programme, without affecting progress of the work.

6.7 WORKS PROGRAMME REVISIONS

6.7.1 The Contractor shall immediately notify the Engineer in writing of the need for any changes in the Works Programme, whether due to a change of intention or of circumstances or for any other reason. Where such proposed change affects timely completion of the Works or any other Key Date the Contractor shall within fourteen (14) days of the date of notifying the Engineer submit for the Engineer's consent its proposed revised Works Programme and accompanying Narrative Statement. The proposed revised Works Programme shall show the sequence of operations of any and all works related to the change and the impact of changed work or changed conditions.

6.7.2 If at any time the Engineer considers the actual or anticipated progress of the work reflects a significant deviation from the Works Programme, he may request the Contractor to submit a proposed revised Programme which together with an accompanying Activity Report and Narrative Statement, shall be submitted by the Contractor within fourteen (14) days after the Engineer's instruction. The proposed revised Works Programme shall show the sequence of operations of any and all work related to the change and the impact of changed work or changed conditions.

6.7.3 All activities that have negative float must be analysed by the Contractor to identify the impact on the timely completion of the Works or on the achievement of Key Date.

6.8 THREE MONTH ROLLING PROGRAMME

6.8.1 The Three-Month Rolling Programme shall be an expansion of the current Works Programme, covering sequential periods of three months. The Three-Month Rolling Programme shall provide more detail of the Contractor's plan, organisation and execution of the work within these periods. In particular, the Contractor shall expand each activity planned to occur during the next three (3) month period, if necessary, to a daily level of detail.

6.8.2 The Three-Month Rolling Programme shall be developed as a Critical Path Method (CPM) network, and shall be presented in bar chart and time-scaled network diagram format. Bar charts shall be presented on an A4 and time-scaled networks diagrams on an A1 size reproducible media. Tasks in the programme shall be derivatives of and directly related to tasks in the approved Works Programme.

6.8.3 The Contractor shall describe the discrete work elements and work element inter-relationships necessary to complete all works and any separable parts thereof including work assigned to sub-contractors.

6.8.4 Activity duration shall not exceed two (2) weeks unless otherwise consented to by the Engineer.

6.8.5 Each activity in the Three-Month Rolling Programme shall be coded, or described so as clearly to indicate the corresponding activity in the Works Programme.

6.9 THREE MONTH ROLLING PROGRAMME REVISIONS AND UPDATE

6.9.1 The Three-Month Rolling Programme shall be extended forward each month as described under Clause 6. 4 above. Each submission of the Three-Month Rolling Programme shall be accompanied by a Programme Analysis Report, describing actual progress to date, and the forecast for activities occurring over the next three-month period.

6.9.2 If the Three Month Rolling Programme is at variance with the Works Programme, the Programme Analysis Report shall be accompanied by a supporting Narrative Statement describing the Contractor's plan for the execution of the activities to be undertaken over the three-month period, including programme assumptions and methods to be employed in achieving timely completion.

6.9.3 The Contractor shall revise the Three-Month Rolling Programme or propose revisions of the Works Programme, or both, from time to time as may be appropriate to ensure consistency between them.

6.10 THREE WEEK ROLLING BAR CHART SCHEDULE

Once a week, on a day mutually agreed to by the Engineer and the Contractor, a meeting will be held to assess progress by the Contractor during the previous work week. The Contractor shall submit a construction schedule listing activity completed and in-progress from the previous week and the activities scheduled for the succeeding two weeks based on the detailed Works Programme. Copies of the schedule shall be submitted on A3 sized paper.

6.11 PROJECT CALENDAR

For the Project, the Contractor shall adopt 7 days a week calendar, identical calendar for the purpose of programming and Execution of Works. Official documents shall be transacted during 5 days week - Monday through Friday, except for National (Govt. of India) Holidays. For Project purposes, a week begins at 0001 hours on a Monday and ends at 2359 hours on a Sunday. The completion of an activity or the achievement of an event when given a week number shall be taken to mean midnight on the Sunday at the end of the numbered week. An access date or activity start date when given as a week number shall be taken to mean 0001 hours on a Monday of the Numbered week.

6.12 PROGRAMMING PERSONNEL

The Contractor shall submit, as part of its Staff Organization Plan, the names and required information for the staff to be employed on Works Programming. The Works Programmer shall hold reputable professional qualifications and relevant experience as per Attachment C-1 to Employer's Requirements – Construction .The programmer shall be employed by the Contractor full time on the Contract until the completion or such earlier time.

6.13 PROGRAMME AND REPORT SUBMISSION FORMAT

The Contractor shall submit one (1) original and three (3) copies and a soft copy of all submissions to the Engineer. All submissions shall be in A0, A1, A3 or A4 size, as appropriate except as may otherwise be agreed by the Engineer.

The format for all Programme and Report submissions shall be strictly in accordance with the format or as requested by the Engineer.

APPENDIX 7

MEETINGS

7. MEETINGS

7.1 Kick-Off Meeting

The Engineer shall hold Kick-Off Meeting within 7 calendar days from the Commencement Date. Purpose of the Meeting is formally to notify all parties concerned under the Contract thatthe project has begun, and every party has a common understanding and his role from the Commencement Date until issuance of the Taking-Over Certificate.

At the Kick-Off Meeting, followings will be, but not limited, discussed.

a) Outline of the Works

b) Communication rules (process, emails, approvals, etc.)

c) Other matters regarding proceeding and management of the Contract.

d) Profile of the Site

e) Time Schedule List of Contractual Events/Submissions, including Milestones, Time(s) for Completion and Defects Notification Period(s).

f) Introduction of key persons of the Contractor and Employer, with role, Function and authority of each person.

g) Role and responsibility of Emergency notification process.

7.2 Regular Meetings

7.2.1 The Engineer shall hold regular meetings with the Contractor as necessary for the proper management and co-ordination of the Works. The Contractor's representative and other personnel as considered necessary by the Engineer, shall attend such meetings.

7.2.2 Within twenty eight (28) days after the Commencement Date, the Engineer and the Contractor's Representative shall agree upon a programme for weekly and monthly meetings covering the first three (3) months after such twenty eight (28) days. The Contractor's Representative shall make sure that the Contractor's Personnel designated to attend meetings make themselves available for the meetings. The Engineer shall prepare the agenda for the meetings and the relevant documents to be submitted to the meeting, including as a minimum the minutes of the previous meeting. Thereafter, the programme for weekly and monthly meetings shall be updated monthly in the monthly progress meetings.

7.2.3 The Engineer may initiate ad-hoc meetings as and when the need arises, through prior consultation with the Contractor's Representative where possible, and the Contractor's Representative and other Contractor's Personnel designated by the Engineer and/or the Contractor's Representative shall attend such meetings. The Engineer shall prepare a proposed agenda of the meeting, for prior consultation with the Contractor's Representative where possible.

7.3 Monthly Progress Meeting

A Monthly Progress Meeting shall be called by the Engineer and shall be held every month within three (3) days following issuance of the Contractor's Monthly Progress Report. If the day specified, is not a working day, then the meeting shall be heldon the next working day after the specified date. The Engineer shall notify the Contractor of any change in the date or time, or both, of the meeting. The main purpose of the meeting is to discuss progress of the Works and if there is any delay in progress, being encountered by the Contractor, the Contractor shall indicate the cause of delay and present the method of recovery.The results of the discussions of the meeting shall be included in the Contractor's next MonthlyProgress Report to be provided.

7.4 Co-ordination Meeting

The Contractor shall organize co-ordination meetings as required with related parties. Before conducting such co-ordination meetings with the related parties, the Contractor shall give priornotice and agenda of the meeting to the Engineer and the Employer.

7.5 Meetings called by the Contractor

The Contractor's Representative may request the Engineer to meet him and other Contractor's Personnel whenever necessary to discuss the issues pertaining to the Works and the Contract. The Engineer shall comply with the request where physically possible. The Contractor shall prepare a proposed agenda for the meeting and submit it to the Engineer when making request for the meeting.

7.6 Other Meetings

The Contractor's Representative shall attend, and shall arrange for representatives of the Subcontractors, public departments, transportation companies, utility undertakings and other contractors employed by the Employer to attend, meetings when required by the Engineer. The Contractor shall inform the Engineer in 48 hours (or such a shorter period as agreed by the Engineer) before conducting meetings with the public departments, transportation companies, utility undertakings and/or the other contractors and shall give the Engineer an opportunity to attend such meetings.

7.7 Minutes of Meetings

The Engineer in principle shall be responsible for the preparation of the minutes of meetings, circulating it to the parties who attended the meeting before the next relevant meeting. The Engineer shall also be responsible for the minutes of ad-hoc meetings in a similar manner, unless otherwise agreed with the Employer.

7.8 MONTHLY PROGRESS REPORTS

7.8.1 GENERAL

The Contractor shall submit to the Engineer, a Monthly Progress Report. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates. It shall be submitted in a format to which the Engineer shall have given his consent and shall contain sections/sub-sections.

7.8.2 FINANCIAL STATUS

a) A narrative review of all significant financial matters, and actions proposed or taken in respect to any outstanding matters.

b) A spread sheet summarising each activity, the budget, costs incurred during the period, costs to date, costs to go, cost forecast (total of costs to date and costs to go) and cost variance (difference between cost forecast and budget).

c) A spread sheet indicating the status of all payments due and made.

d) A report on of the status of any outstanding claims. The report shall in particular provide interim updated accounts of continuing claims.

7.8.3 PHYSICAL PROGRESS

a) It shall describe the status of work performed, significant accomplishments, including critical items and problem areas, corrective actions taken or planned and other pertinent activities, and shall, in particular, address interface issues, problems and resolutions.

b) It shall include a simplified representation of progress measured in percentage terms compared with percentage planned as derived from the Works Programme.

7.8.4 PROGRAMME UPDATE (For Entire Project)

a) The monthly Programme Update which shall be prepared by recording actual activity completion dates and percentage of activities completed up to the end of the month together with estimates of remaining duration and expected activity completion based on current progress. The Programme Update shall be accompanied by an Activity Report and a Narrative Statement. The Narrative Statement shall explain the basis of the Contractor's submittal:

(1) Early Work and Baseline Submittals – explains determination of activity duration and describes the Contractor's approach for meeting required Key Date as specified in the Contract.

(2) Updated Detail Programme Submittals – state in narrative the Works actually completed and reflected along Critical Path in terms of days ahead or behind allowable dates. Specific requirements of narrative are:

i. If the Updated Detailed Work Programme indicates an actual or potential delay to Contract Completion date or Key Date, identify causes of delays and provide explanation of Work affected and proposed corrective action to meet Key Date or mitigate potential delays. Identify deviation from previous month's critical path.

ii. Identify by activity number and description, activities in progress and activities scheduled to be completed.

iii. Discuss Variation Order Work Items, if any.

b) The Programme Status which shall:

(1) show Works Programme status up to and including the current report period, display Cumulative progress to date and a forecast of remaining work.

(2) be presented as a bar-chart size A3 or A4 and as a time-related logic network diagram on an A1 media, including activity listings;

c) The Activity Variance Analysis which shall analyse activities planned to start prior to or during the report period but not started at the end of the report period as well as activities started and/or completed in advance of the Works Programme.

7.8.5 KEY DETAILS STATUS

A report on the status of all Key details due to have been achieved during the month and forecasts of achievement of any missed Key details, and those due in the next month.

7.8.6 THREE MONTH ROLLING PROGRAMME

The monthly issue of the Three-Month Rolling Programme.

7.8.7 PLANNING AND CO-ORDINATION

a) A summary of all planning/co-ordination activities during the month and details of outstanding actions.

b) A schedule of all submissions and consents/approvals obtained/outstanding.

7.8.8 PROCUREMENT REPORT

a) A summary of all significant procurement activities during the month, including action taken to overcome problems.

b) A report listing major items of plant and materials which will be incorporated into the Works. The items shall be segregated by type as listed in the Specifications and the report should show as a minimum the following activities:

(1) purchase Order Date - Scheduled/Actual,

(2) manufacturer/Supplier and Origin,

(3) letter of Credit Issued date,

(4) manufacturer/Supplier Ship Date - Scheduled/Actual,

(5) method of Shipment,

(6) arrival Date in India- Scheduled/Actual.

7.8.9 SAFETY

A review of all safety aspects during the month including reports on all accidents and actions proposed to prevent further occurrence.

7.8.10 ENVIRONMENTAL AND SOCIAL

A review of all the environmental and social issues during the past month to include all monitoring reports, mitigation measures undertaken, and activities to control environmental impacts.

APPENDIX 8

MANAGEMENT PLANS AND SUBMISSIONS

8 MANAGEMENT PLANS

8.1 General

8.1.1 In order to ensure the Contractor understands and complies with the requirements of the Contract, a series of Management Plan shall be developed. These Management Plans will serve to structure the submittals in a manner that the Contractor can develop and prepare the submittals and the Engineer can review and comment on a prescribed programme.

8.1.2 The Management Plans shall be configured as a family of "stand-alone" plans and associated documents, each covering one of the subjects listed below.

8.1.3 The plans and documents shall be co-ordinated with each other and shall collectively define describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities etc. and shall show how these combine together to assure that the work truly meets the requirements of the specifications in respect of the subject listed.

8.1.4 All plans and documents shall be submitted as per Key Dates mentioned in Appendix 2. Further submissions shall be made:

a) when required in accordance with the Works Programme;
b) whenever the development of the Contractor's designs or planning allows the plan to be developed further;
c) in response to comments made by the Engineer:
d) whenever any change occurs that invalidates the information contained in the previously submitted and reviewed document, within 14 days of the occurrence of such change; and
e) when requested by the Engineer from time to time.

8.2 General Organisation

The plans listed below shall be developed and submitted by the Contractor for the Engineer's review:

a) Project Management Plan
   1) Contractor's Project Plan
   2) Interface Management Plan

b) Works Quality Management Plan
   1) Works Quality Management Plan
   2) RAMS Plan
   3) Electromagnetic Compatibility Management Plan
   4) Software Quality Assurance Plan

c) Design, Procurement and Manufacturing Management Plan
   1) Design Plan
   2) Factory Testing Plan
   3) Procurement, Manufacturing and Delivery Plan

d) Construction and Installation Management Plan

1) Construction and Installation Plan
2) Environment, Social Health and Safety, Management Plan

e) Completion Management Plan
1) Commissioning Plan
2) Operational and Maintenance Manuals Plan
3) Training Plan
4) Spares Management Plan
5) Defects Management Plan

8.3 Project Management Plan

The overall management of the Works shall be the Contractor's responsibility. The organisation of the resources for the design, procurement, manufacture, delivery, installation, testing and commissioning, and setting to work is to be developed into a Project Management Plan. Each section of this plan shall fully describe the Contractor's understanding of the Works and management skills and structure required to achieve the same.

8.3.1 Contractor's Project Plan

a) The Contractor's Project Plan shall provide a clear overview of the Contractor's organisation, management systems and methods to be used for execution and completion of the Works.

b) The Contractor's Project Plan shall include a summary description of each and every stage of implementation of the Works, clearly showing the principal organisational interfaces both within the Contractor's own organisation (including sub-contractors of every tier) and with Other Contractors and Relevant Authorities, defining how each of these interfaces is to be managed and controlled. An organisation chart shall be produced to illustrate the subdivision of the work into elements for effective technical and managerial control, the reporting structure and the interface relationship among all parties involved. Names, addresses, telephone and fax numbers of all principle contacts shall be listed.

c) The Contractor's Project Plan shall contain structured organisation charts showing the hierarchical relationship of the Contractor's organisation (including sub contractors of every tier). The organisation charts shall be produced as a "family" such that the basic chart shows the overall organisation structure supported by subsidiary charts detailing the internal structure of various departments or sections of the overall organisation.

d) The Contractor's Project Plan shall include full details of the qualifications, experience, authority and responsibility of the personnel assigned to all key positions of the Contractor's organisation (including sub-contractors of every tier). As a minimum, this shall include all levels down to senior managers and shall include the personnel responsible for each individual department and functional group. A clear reference shall be given as to the location of staff (e.g. site resident or factory based, etc). Names, addresses, telephone and fax numbers of all principle contacts shall be listed.

e) The Contractor's Project Plan shall define the Contractor's management structure for the execution of the Works and for the control of the quality of the Works and shall, without limitation, identify and set out:

(1) the procedure for audit;

(2) the procedures for the control of receipt and issue of all Works related correspondence so as to ensure traceability;

(3) the procedures for filing system to be implemented to maintain the Contractor's records during the course of the work. The filing systems used by the Contractor and sub contractors of any tier shall be compatible as for as is necessary;

(4) the procedures for the identification, production, verification, internal approval, review (when required) by the Engineer, distribution, implementation and recording of changes to all drawings, reports and specifications;

(5) the procedures for the evaluation, selection, engagement and monitoring of sub-contractor/suppliers together with the means of application of quality assurance to their work including audit and acceptance;

(6) the procedure for the regular review and revision of each type of quality plan and its supplemental individual specific quality plans to ensure their continuing suitability and effectiveness, in addition to the methods to be used for revision and issue of revised documentation;

(7) the procedures for the control, calibration and maintenance of inspection, testing and measuring equipment;

(8) the procedures for the selection, indexing, disposition and maintenance of project record for storage in the archives. A list of items to be archived, including their periods of retention shall be submitted for review by the Engineer;

(9) the procedures for identifying training needs and for the provision of training of all personnel performing activities affecting quality; and

(10) the procedures for the control of non-conformity.

f) The Contractor's Project Plan shall include details of Contractor's Office.

8.3.2 Interface Management Plan

The Contractor shall prepare Interface Management Plan in accordance with Appendix 5.

8.4 **Works Quality Management Plans**

8.4.1 The Contractor shall submit for review by the Engineer Works Quality Management plan in accordance with the requirements of Appendix 11.

8.4.2 RAMS Plans

a) The Contractor shall implement a formal Reliability Plan and a formal Maintainability Plan in accordance with the PS.

b) The Contractor shall submit for review by the Engineer the Contractor's Reliability Plan and Maintainability Plan in accordance with the requirements of General Specification (S&T). The Contractors Reliability Plan and a Maintainability Plan shall include Failure Modes, Effects and Criticality Analysis and the production of a Reliability Critical Items List.

c) The contractor shall submit for review by the Engineer the Contractor's Systems Safety Plan. The Systems Safety Plan shall address all the factors referenced in this Specification and as required by the Particular Specification(S&T).

8.4.3 Software Quality Assurance Plan

Where software is a design deliverable, the Contractor shall submit a Software Quality Assurance Plan in accordance with the requirements of Appendix 11 The Software Quality Assurance Plan shall address all elements of the design and development of software

required as part of the Works.

8.5 **Design, Procurement and Manufacturing Plan**

The Design, Procurement and Manufacturing Plan shall be configured as a family of "stand- alone" plans and associated documents each covering one of the subjects listed below. The plans shall be coordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organization, sequencing of activities, etc. and shall show how these combine together to assure that the Works fully meet the requirements of the Specification in respect of the subjects listed.

8.5.1 Design Plan

a) Design shall be undertaken in various phases to ensure a smooth flow of information for review by the Engineer. Submissions shall be strictly in accordance with the Design Submissions Programme.

b) The Contractor shall perform his designs for the Works and prepare a Design Plan for his design work in accordance with the following design stages. The Contractor shall submit to the Engineer for his review, relevant design information.

8.5.2 Factory Testing Plan

a) The Contractor shall prepare and submit for review by the Engineer the Contractor's Factory Testing Plan detailing and explaining how the Contractor will plan, perform, and document all inspections and tests that will be conducted to verify and validate the Works prior to delivery to the Site. The plan shall consist of a narrative description supported by graphics, diagrams and tabulations as required.

The plan shall contain but not be limited to the following topics:

(1) the Contractor's strategy for inspection and Factory Acceptance Tests of all constituent parts of the Works and how this relates to the sequence of delivery;

(2) the sequencing and interrelationships of the inspections and tests including:

i. First Article Inspection

ii. all Quality Hold Points; and

iii. all Quality Control Points;

(3) the type and extent of inspection and Factory Acceptance Tests to be undertaken and the parts of the Works to be proven by that testing;

(4) the objective of each inspection or test, what particular design and operating criteria the test or inspection will prove and how the success of the test or inspection will be demonstrated or measured;

(5) organisation chart and CV of key personnel in inspection and test team;

(6) the plan for the production and submission of the inspection and test procedures tothe Engineer for review including the submission of the inspection and test reports and records; and

(7) Type Tests, Routine Tests, First Article Inspections and any other tests constituting

the Factory Acceptance Tests.

~~b)~~ The Contractor shall arrange for all equipment and systems manufactured for incorporation into the Permanent Works to undergo a Factory Acceptance Test (FAT) before shipment from the place of manufacture. Any particular requirements for inspection and testing at the place of manufacture are prescribed in the PS.

c) The Contactor shall be responsible for re-inspecting and re-testing any failed inspection and Factory Acceptance Test including regression testing on previously passed items.

d) Inspections and tests that are to be witnessed by the Employer or the Engineer shall be sensibly grouped and scheduled so that as many inspections and tests as possible may be witnessed during a single visit.

e) If required, Type Tests as detailed in relevant Particular Specifications shall be performed on all items of equipment to be installed as part of the Permanent Works under the Contract. The Type testing shall be based on the environmental class of the sites into which the equipment will be installed.

f) For all production items a First Article Inspection shall be undertaken. Latest drawings, inspection & test procedures, specifications and quality documentation for inspection of equipment shall be submitted for First Article Inspection to the Engineer. Routine production testing methods shall be detailed for review by the Engineer. Routine testing shall ensure that all samples of a production item are within the tolerances required for complete interchangeability.

g) The Contractor shall prepare two copies of an inspection or test report immediately after the completion of each inspection or test whether or not witnessed by the Employer or the Engineer. If the Employer or the Engineer has witnessed the inspection or test, he will countersign the inspection or test report to indicate his review of the information and conclusions (i.e. whether or not the equipment being inspected or tested has passed satisfactorily) contained therein. If the Employer or the Engineer has not witnessed the inspection or test (i.e. if a waiver has been granted, or the Employer or the Engineer has not witnessed the inspection or test for some other reason in accordance with the Contract), the Contractor shall forward two copies of the inspection or test report without delay to the Engineer. The Engineer will countersign the report to indicate his review of the information and conclusions (i.e. whether or not the equipment being inspected or tested has passed satisfactorily) and return one copy to the Contractor. Where the results of the inspection or test do not meet the requirements of the Specification, the Employer or the Engineer may call for a re-inspection or re-test.

h) For standard equipment which is serial or bulk manufactured, manufacturer's type test certificates (or equivalent) may, subject to review by the Engineer be accepted.

i) Test equipment and instrumentation shall be subject to approved calibration tests within a properly controlled calibration scheme, and signed calibration certificates shall be supplied to the Engineer in duplicate. Such calibration checks shall be undertaken prior to testing and if required by the Engineer shall be repeated afterwards.

j) Materials and equipment shall not be released for shipment until all applicable inspections and tests including Factory Acceptance Tests have been satisfactorily completed.

8.5.3 Procurement, Manufacturing and Delivery Plan

a) The Contractor shall prepare a procurement, manufacturing and delivery plans in respect of all items and goods. Separate parts of the plan shall be prepared for Contractor or sub-contractor off-site activities. Each plan shall identify the scope of work to be applied. In relation to such scope of work, it shall, without limitation, define:

(1) the organization of the Contractor's staff directly responsible for the day-to-day management of the manufacturing activity on or off the Site;

(2) the specific allocations of responsibility and authority given to identified personnel for the day-to-day management of the work with particular reference to the supervision, inspection and testing of the work;

(3) the interfacing or co-ordination required with the Contractor's other related plans;

(4) the specific methods of manufacture to identify any relevant method statements and develop those method statements to a degree of sufficient detail reviewed by the Engineer; and

(5) the list of procedures and work instructions to manage and control the quality of work during purchasing, manufacturing and delivery, including without limitation:

i. the purchasing of items and goods and ensuring they comply with the requirements of the Specification, including (without limit) purchasing documentation and specific Verification arrangements for Contractor/Engineer inspection of material or manufactured product prior to release for use;
ii. the manufacturing process so as to ensure compliance with the design;
iii. the manufacturing process so as to ensure clear identification and traceability of material and manufactured parts;
iv. the inspection and testing of incoming materials, in process and final product so as to ensure specified requirements for the material and/or manufactured product are met;
v. the identification of the inspection and test status of all material and manufactured products during all stages of the manufacturing process to ensure that only products that have passed the required inspections and tests are dispatched for use and/or installation;
vi. review and disposal of non-conforming material or product so as to avoid unintended use;
vii. the assessment and disposal of non-conforming material and manufactured product and approval for reworking or rejection as scrap;
viii. the identification of preventive action so as to prevent recurrence of similar non-conformance; and
ix. the handling, storage, packaging, preservation and delivery of manufactured product.

b) The Contractor shall prepare and submit the inspection and testing plans to manage and

control any test and inspection activities ;

c) The Contractor shall propose a structured set of inspection hold points. The hold points shall be structured such that a formal hold point is allowed for each significant element of the manufacturing process. At each hold point, the Engineer shall hold a formal inspection or advise that the inspection had been waived.

d) Once the inspection and any required remedial actions are completed to the satisfaction of the Engineer, the Engineer shall not withhold his notice of no objection for shipping unreasonably, provided all pre-delivery assembly and testing has been successfully completed.

e) Any unit delivered without the Engineer notice of no objection shall be rejected at the Site and all expenses thereby shall be borne by the Contractor.

8.6 Construction and Installation Management Plan

The Construction and Installation Management Plan shall be configured as a family of "stand-alone" plans and associated documents each covering one of the subjects listed below.

The plans shall be co-ordinated with each other and shall collectively define, describe andencompass the Contractor's proposed methods, procedures, processes, organization, sequencing of activities, etc and shall show how these combine together to ensure that theworks truly meet the requirements of the Specification in respect of the subjects listed

8.6.1 Construction and Installation Plan

a) The Contractor shall prepare plans for the construction and installation activities on and off the site and shall ensure that these are properly related to the subsequent testing and commissioning activity.

b) Separate parts of the plan shall be prepared for other contractor(s) or sub-contractor(s) off-site activities.

c) Each construction plan shall identify the scope of activity to be controlled. In relation to scope of such activity, it shall, without limitation, define:

(1) the organisation of Contractor's staff directly responsible for the day to day management of the activity on or off the site;

(2) the specific allocations of responsibility and authority given to identified personnel for the day to day management of the works with particular reference to the supervision, inspection and testing of works;

(3) the interfacing or co-ordination required with the Contractor's other related plans;

(4) the specific methods of construction and installation to identify any relevant method statements to a sufficient degree of detail reviewed by the Engineer;

(5) a detailed method statement which shall include but not be limited to;

i. description of main operations and sub-operations;

ii. sequence of sub-operations;

iii. quantities of the work and production rates to be achieved;
iv. resources to be employed; and
v. quality checks to be carried out, supervision being exercised and safety precautions to be employed;

(6) the list of procedures and work instructions to manage and control the quality of construction and installation works, including without limitation:

i. the inspection and testing activities of incoming materials, in process and final product so as to ensure specified requirements for the material and/or product are met;
ii. the purchasing of materials and ensuring they comply with the requirement of the specification, including purchasing documentation and specific Verification arrangements for Contractor/Engineer inspection of material or manufactured product prior to release for use/installation;
iii. the construction processes including Temporary Works so as to ensure compliance with drawings and specification. In addition, any software to be used in construction, installation and commissioning process shall be identified and details of the Verification and validation processes for the software application shall be given;
iv. the construction and installation process so as to ensure clear identification and traceability of material and manufactured product;
v. the identification of the inspection and test status of all material and manufactured product during all stages of the construction and installation process to ensure that only products that have passed the inspections and tests are dispatched for use and/or installation;
vi. review and disposition of non-conforming material or product so as to avoid unintended use/installation;
vii. the assessment and disposition of non-conforming material and product and approval of reworking or rejection as scrap;
viii. the identification of preventive action so as to prevent recurrence of similar non- conformance; and
ix. The handling, storage, packaging, preservation and delivery of product; and

d) The Contractor shall prepare and submit inspection and test plans to manage and control any test and inspection activities.

e) The following particulars shall be submitted to the Engineer for review within 28 days of the Commencement Date of the Works;

(1) drawings showing the layout within the Site of the Contractor's accommodation, project signboards, access roads and major facilities required early in the Contract;
(2) drawings showing the details to be included on Project signboards.

f) Drawings showing the location of stores, storage areas, work areas and other major facilities shall be submitted to the Engineer for review as early as possible, but in any case, not later 28 days before construction of the facilities.

8.6.2 Environment, Social, Health and Safety (ESHS) Plan

ESHS plan shall be submitted by the Contractor in accordance with ESHS manual given in Appendix 13 for the Engineer's review within 28 days of issue of Letter of Acceptance.

8.6.3 Completion Management Plan

General

a) The Contractor shall organise the services required under the Contract to bring the Works into service under one plan. This co-ordinated approach shall allow the Engineer to review all aspects of completion in an integrated manner.

b) The Completion Management Plan shall be configured as an integrated plan with associated documents, covering the subjects described herein.

c) The plans shall be co-ordinated with each other and shall collectively define, describe and encompass the Contractor's proposed methods, procedures, processes, organisation, sequencing of activities and the like, and shall show how these combine together to assure that the Works truly meet the requirements of the Contract with respect to the matters listed herein after.

8.6.4 Commissioning Plan

a) The Contractor shall submit the first draft of the Commissioning Plan to the Engineer within 180 days of the Commencement Date of the Works.

b) The Commissioning Plan shall consist of the following for all Signalling & Telecommunication work:

(1) Installation Tests Schedule

The Contractor shall submit to the Engineer a comprehensive schedule of the installation tests as required by relevant Particular Specifications and in accordance with the Installation Programme. The schedule shall be submitted within the period of time laid down in the Particular Specifications , or, if none is given, not later than 56 days in advance of the date for the commencement of the Installation Tests. Pre-Installation Inspection shall include the verification of FAT/Quality test report, Invoice, OEM manuals etc. Post installation test shall include the installation of equipment as per approved drawing, Particular specification etc. Power supply test shall be the part of Post-installation test.

(2) System Acceptance Tests Plan

The Contractor shall submit to the Engineer, a comprehensive System Acceptance Tests Plan including all requirements detailed in the relevant Particular Specification(S&T). The plan shall be submitted within the period of time laid down in the Particular Specification(S&T) or, if none is given, not later than 112 days in advance of the date for the commencement of the System Acceptance Tests. System Acceptance test shall include the functional test of all equipment from the SM panel.

(3) Integrated Testing & Commissioning Plan

The Contractor shall submit to the Engineer a comprehensive Integrated Testing and Commissioning Plan including all requirements detailed in Particular Specifications . The plan shall be submitted within the period of time laid down in Particular Specifications , or, if none is given not later than 112 days in advance of the date for the commencement of Integrated Testing and Commissioning. This test shall include the test of equipment from the IMD/ control centre of the project.

8.6.5 Operation and Maintenance Manuals Plan

a) The Contractor shall develop an Operation and Maintenance Manuals Plan to suit staged commissioning of the system and to ensure timely preparation of the Operation and Maintenance Manuals and the "As-Built" Documents in a format and to a level of detail reviewed without objection by the Engineer.

b) The Contractor shall submit the Operation and Maintenance Manuals Plan not later than 45 days prior to the issue of the Taking Over certificate for the works and according to the staged commissioning, if applicable, of the proposed systems.

8.6.6 Training Plan

a) The Contractor shall ensure the timely preparation of the Contractor's Training Plan in a format and to a level of detail reviewed without objection by the Engineer and fulfilling the requirements.

b) The Contractor shall submit the Training Plan by the date stated in the Particular Specifications , or, if none is given, not less than 84 days prior to the start of installation activities for the works.

8.6.7 Spares Management Plan

a) The Contractor shall submit for review by the Engineer a Spares Management Plan to furnish a priced manufacturer-recommended list of spare parts, necessary to support continuous operation of all such equipment for a minimum period of 24 months after the commencement of revenue operations.

b) The Contractor shall submit the Spares Management Plan not less than 182 days prior to the issue of the Taking Over Certificate for the Works.

8.6.8 Defects Management Plan

The Contractor shall submit for review by the Engineer a Defects Management Plan to repair, replace and perform any remedial item upon the Works identified by the Engineer during Defects Notification Period (DNP). The first submission of this

plan is required not less than 365 days prior to the issue of the Taking Over Certificate for the Works. The Contractor shall;

a) endeavour to complete all necessary work in a timely responsible manner;
b) not proceed with any remedial work without the consent of the Engineer;
c) submit a plan that details the method and timing of any proposed work; and
d) update the plan monthly, showing progress of the work and time to completion.

APPENDIX 9

DOCUMENTS, DRAWING AND CAD STANDARDS

9. General

A document may consist of document cover, revision history, table of contents, text and attachment(s) in this sequence where applicable.

1) Cover format (Times New Roman)
2) Heading and name of client shall be on top, in capital, size 10.
3) Name of the project in bold letters, size 22.
4) Content of document in bold capitals, size 16.
5) Document reference number in bold capitals, size 12.
6) Company name: capitals, size 14.
7) Company logo in size 35 x 40 (W x H) mm.
8) Address of the company in regular letters, size 10.
9) Document Format (Time New Roman)
10) General Regulations
11) Letter size: 12.
12) Paper size A4 (A3 is used for table and figures).
13) Periods and semicolons shall be placed right after the preceding letter or number.
14) The space between paragraphs and headings shall be 1.15 lines.
15) Main headings shall be placed in number order, with a period placed right after the number, followed by a space, with a heading text in bold capital letters. For example.:

9.1 IN BOLD CAPITAL

Other headings are placed in number order, with a period placed right after the number, followed by a space, with a heading in regular letters. For ex.:

a) In normal letter.
b) Notes

Notes relating to tables shall be included in the table; in case they are not able to be included, it shall be clearly specified that they are notes relating to a particular table reference.

The text of notes is usually given in italics.

9.2 Language of Communication and Units

The language for communications shall be the English language. The Contractor shall utilize the SI system of measurement units.

9.3 Photographs

The Contractor shall take digital photographs of the Works at least on monthly basis and include them in the Contractor's Monthly Progress Reports. These photographs shall be taken at locations agreed with the Engineer as appropriate to record progress, quality and

other relevant aspects of the Works. The number of the photographs shall be sufficient to cover all aspects of the Works in progress.

The digital photograph shall be colour jpeg image format with standard aspect ratio 4:3 and resolution of 300 DPI for all graphics in the printing. Read Only Memory (ROM) based electronic media of digital photographs shall be included as an integral part of the submittal. The locations and directions of the photographs taken shall be marked on a key plan of the Site, to be included in the submittal.

Each photograph shall be properly numbered and dated and include a brief explanatory note of the subject matter of the photograph, for ease of understanding.

Immediately before the issue of any Taking-Over Certificates for Works or Sections, the Contractor shall commission a professional photographer (or any person with equivalent skills) and take photographs of (where applicable, the interior to be taken by wide angle lenses) of exterior and all salient sections and features of the Works, for record purposes. The Contractor shall submit to the Engineer for approval as an integral part of the As-Built Documents, four (4) separately bound sets of colour prints of such record photographs, including one (1) set of Read Only Memory (ROM)-based electronic media containing an original jpeg image file of each photograph in accordance with the directory and naming convention agreed with the Engineer. The number of colour print images in a set shall not exceed 100, and each hard copy set of photographs shall be of A4 size with a cover page indicating information such as date, titles of the project and the Contract, and name of the Employer and the Contractor. Each of the photographs shall be properly numbered, dated and include a brief explanatory note of the subject matter.

9.4 Videos

On a monthly basis, or earlier if directed by the Engineer, the Contractor shall take digital video records to record the progress of the Works on Site (minimum duration of each to be ten minutes, covering all the areas of the Site where works are ongoing) as agreed with the Engineer, and submit the videos every month along with the Monthly Progress Report. The first video shall be made before the Commencement of the Works on the Site.

Within twenty-eight (28) days of receipt of the Letter of Acceptance, but in no case later than the Commencement Date, the Contractor shall submit to the Engineer a proposal for the provision of digital video recordings along with commentary of the progress of the Works.

The videos shall be taken by a competent person from an approved professional service provider (or any person with equivalent skills). The video shooting locations are to be identified in the afore mentioned proposal. This video should be submitted in a video format acceptable to the Engineer, with or without editing.

Immediately before the issue of the Taking-Over Certificate for the whole of the Works, the Contractor shall complete video recording and start editing the videos taken, to produce a 60- minute digital video-audio presentation with a suitable title. Each section of the video shall indicate the date on which it was taken. The presentation material shall have narration in English. The Contractor shall use a professional service provider to video, edit and produce the presentation material.

9.5 DRAWING AND CAD STANDARDS

a) The purpose of this document is to define the minimum Drafting and CAD standard to be achieved by the Contractor for all drawings produced by the Contractor for the purpose of the works.

b) By defining a common format for the presentation of drawings and CAD files, the exchange of drawn information is improved and will maximize the use of CAD in the coordination process.

c) All submissions shall be made in accordance with the Employer's Requirements in a format reviewed without objection and in accordance with the requirements in:

   i. The Contract;

   ii. The Document submittal instructions to Consultants and Contractors.

d) Paper and drawing sizes shall be "A" series sheets as specified in BS3429.

e) The following software (latest and updated version) compatible with Intel-Windows based computers shall be used, unless otherwise stated, for the various required electronic submissions.

Document Type	**Electronic Document Format**
Text Documents	**MS Word**
Spread Sheets	**MS Excel**
Data Base Files	**MS Access**
Presentation Files	**MS PowerPoint**
Programmes	**Primavera for Windows, Suretrack**
AutoCAD Graphics	**AutoCAD**
Photographic	**Adobe Photoshop**
Desktop Publishing	**Page Make 6.5,5**
CADD Drawings	**AutoCAD**

f) Media for Electronic File Submission - Email

One copy shall be submitted unless otherwise stated in CD-ROM

g) Internet File Formats/Standards

The following guidelines shall be followed when the Contractor uses the Internet browser as the communication media to share information with the Employer.

a) All the data formats or standards must be supported by Microsoft Internet Explorer (latest version) running on windows professional (latest version).

b) The following list shows the file types and the corresponding data formats to be used on Internet. The Contractor shall comply with them unless prior consent is obtained for a different Data format from the Employer's Requirements:

File Type	Data Format
Photo Image	Joint Photographic Experts Group (JPEG)
Image other than Photo	GIF to JPEG
Computer Aid Design files (CAD)	Computer Graphics Metafile (CGM)
Video	Window video (.avi)
Sound	Wave file (.wav)

h) The following states the standards to be used on Internet when connecting to database(s). The Contractor shall comply with them unless prior consent is obtained for a different standard from the Employer's Requirements

Function to be Implemented	Standard to be Complied With
Database connectivity	Open Database Connectivity (ODBC)
Publishing hypertext language on the World Wide Web	Hypertext Markup Language (HTML)

The hard copy of all documents shall be the contractual copy.

1) GENERAL REQUIREMENTS

General:

i) The Contractor shall adopt a title block similar to that used in the Drawings for all drawings prepared under the Contract.

ii) Each drawing shall be uniquely referenced by a drawing number and shall define both the current status and revision of the drawing.

iii) The current status of each drawing shall be clearly defined by the use of a single letter code as follows:

P - Preliminary Design Drawing

D - Definitive Design Drawing

C - Construction Reference Drawing

W - Working Drawing

B - As-Built Drawing

M - As Manufactured Drawing

E - Employer's Drawing

Types of drawings:

i) 'Design drawings' mean all drawings except shop drawings and as-built drawings.

ii) 'Working drawings' are design drawings of sufficient detail to fully describe the Works and adequate to use for construction or installation.

iii) 'Site drawings and sketches' are drawings, often in sketch form, prepared on site to describe modifications of the Working drawings, where site conditions warrant changes that do not invalidate the design.

iv) 'Shop drawings' are special drawings prepared by the manufacturer or fabricator of various items within the Works to facilitate manufacture or fabrication.

v) 'As-built drawings' show the Works exactly as constructed or installed. They are usually prepared by amending the working drawings to take into account changes necessitated by site conditions and described in Site drawings. These drawings shall be completed on a regular basis as the works progress, and shall not be left until completion of the entire works.

2) COMPUTER AIDED DESIGN STANDARDS

a) Introduction
Scope of Use

Data input procedures between the Engineer and contractors must be co- ordinated, and the key parameters used to form CAD data files must be standardized. The production of all CAD data files shall comply with the following requirements.

b) Objectives

The main objectives of the CAD standards are as follows:

i. To ensure that the CAD data files produced for Project are co-ordinated and referenced in a consistent manner.

ii. To provide the information and procedures necessary for a CAD user from one discipline or external organization to access (and use as background reference), information from a CAD data file prepared by another discipline or external organization.

iii. To standardize the information contained within CAD data files which may be common to more than one discipline such as drawing borders, title boxes, grid lines etc.

iv. To establish procedures necessary for the management of CAD data files.

v. To ensure all contractors use 'Model space' and "Paper space' in the production of their CAD files.

c) General

i. To facilitate co-ordination between contractors, it is a requirement that all drawings issued by contractors for co-ordination or record purposes shall be produced using CAD methods. Drawings shall be issued in digital format in addition to the paper copies.

ii. The intent of the issue of digital information is to aid the related design by others. The definitive version of all drawings shall always be the paper or polyester film copies which have been issued by the contractor or organization originating the drawing.

iii. (Drawings and drawing packages issued for co-ordination, record purposes or for acceptance shall be accompanied by a complete set of the corresponding CAD data files.

iv. Any contractor or organization making use of the CAD data from others shall be responsible for satisfying himself that such data is producing an accurate representation of the information on the corresponding paper drawing which is satisfactory for the purpose for which he is using it. Provided the general principles of this section have been achieved by the originator of the CAD data, contractors making use of the CAD data from others shall not be entitled to require alterations in the manner in which such CAD data is being presented to them.

v. In particular, automatic determination of physical dimensions from the data file shall always be verified against the figured dimensions on the paper or polyester drawings. Figured dimensions shall be taken as correct where discrepancies occur.

vi. The purpose is to ensure that total co-ordination is achieved between the CAD 'Model Space" file and the "Paper Drawing" output during the revision cycle of the design and production process. Duplicated data in "Model and Paper Space" file will not be acceptable unless an automatic update link exists between the two data sets. "Paper Space" files are not typically required as part of the CAD Media Receipt from contractors, unless specifically requested.

d) CAD Quality Control Check

(i) Random CAD Quality Control Audits will be carried out by Engineer on all CAD media received and transmitted.

(ii) These checks DO NOT verify the technical content of the CAD data received or transmitted (as this is the responsibility of the originating organization), however compliance with Project CAD and Drafting Standards shall be checked.

(iii) In addition, all contractors who transmit and receive CAD data from the Project shall have CAD quality control procedures in place. A typical control procedure shall contain CAD data quality checking routines coupled with standards for CAD data transmittal and archiving.

e) CAD Data Transfer Media and Format

i. Data exchange format between the Engineer and the Contractor, shall be as follows:

Documents including design sheets, tables and figures: Word (*.docx), Excel (*.xlsx) and PDF (*.pdf).

Drawings: Autodesk's AutoCad 2016 or higher release. Electronic

Data Transfer Media: Pen Drive/Hard disk.

ii. All documents/drawings shall be labelled on the data shield with: Name of Company/ Consultant

Project Tile Document/Drawing

Filenames

iii. The Contractor shall ensure the supplied media is free from virus.

f) CAD Media Receipt & Transmittal

i. CAD Media Transmittal (from the Contractor to Engineer) – this will consist of the following:

a) CAD Digital Media (disk(s), CD's or tape(s)) shall typically contain CAD "Model Space" and "Paper Space" files.

b) CAD data sheet

c) CAD issue/revision sheet

d) CAD quality Checklist confirming compliance

e) Plot of each "Model Space" file issued on an A1 drawing sheet (to best fit).

ii. The above CAD media will be collectively known as "CAD Media Transmittal Set". The CAD data file transmittal format required by Employer' Representative from all contractors shall be in AutoCAD (version 14)

iii. All CAD media received from contractors will be retained by Engineer except for SCSI disk (if used) as an audit trial/archive of a specific contractor's design evolution.

iv. CAD Media Receipt (from Engineer to the Contractor)

a. CAD Media should normally be obtained from the respective interfacing contractor(s), but should Engineer issue CAD media it will consist of the following:

a) CAD Digital Media (disk(s) or tape(s) typically contain only CAD "Model Space" files.

b) CAD data sheet

c) CAD issue/revision sheet

b) The above CAD media will be collectively known as the "CAD Media Receipt Set". The CAD data file transmittal format used by Engineer to all contractors will be in AutoCAD (version 14).

c) Each CAD transmittal disk/tape will be labelled with proper disk label as approved by the Engineer. Any CAD data transmitted without this label is assumed to be provisional information not to have been quality checked and therefore not formally issued.

a) Revisions

i. All "Revisions", 'In Abeyance' and 'Deletions' shall be located on a common layer. This layer can be turned on or off for plotting purposes.

ii. The following example text indicates the current CAD file revision, i.e., "Revision [A]". This shall be allocated to a defined layer on all CAD "Model Space" files, in text of a size that will be readable when the CAD "Model Space" file is fitted to the screen, with all levels on.

iii. Libraries, Blocks, & Block Names

a. All Construction Industry symbols produced as CAD Cells shall typically conform to British Standard BS1192 – part 3.

b. All Blocks created shall be Primitive (i.e., Not Complex) and shall be placed Absolute (i.e. NOT Relative).

c. The Contractor's specific block libraries shall be transmitted to Engineer together with an associated block library list containing the filename (max. 6 characters) and block description. The contractor shall ensure that the library is regularly updated and circulated to all other users, together with the associated library listing.

d. All Blocks of a common type, symbols or details should initially be created within a CAD "Model Space File" specifically utilized for that purpose. These files will be made available on request by Engineer.

e. All Blocks created will typically be 2D unless 3D is specifically requested. In both instances they shall have an origin at a logical point located within the extents of each Block's masked area or volume.

b) CAD Dimensioning

Automatic CAD Dimensioning will be used at all times. Any dimensional change must involve the necessary revision to the model space file. If the CAD Quality Control Checks find that the revisions have not been correctly carried out, the rejection of the entire CAD submission will result.

c) CAD Layering

All CAD elements shall be placed on the layers allocated for each different discipline. The layer naming convention to be adopted by the Contractor shall be submitted for acceptance and inclusion within these standards.

d) Global origin, Location & Orientation on the Alignment Drawing.

Location or Plan information in "Model Space" files shall coincide with the correct location and orientation on the Project grid for each specific contract.

Location plans shall have at least three setting out points shown on each CAD "Model Space" file. Each setting out point shall be indicated by a simple cross-hair together with related Eastings and Northings co-ordinates. The Civil Contractor(s) will establish the three setting out co-ordinates for their respective works, which will then be used by all other contractors including the Contractor.

e) Line Thickness and Colour

To assist plotting by other users, the following colour codes will be assigned to the following line thickness/pen sizes.

Colour	Code No	Line Thickness
Red	10	0.18
White	7	0.25
Yellow	2	0.35
Brown	34	0.5

Blue	130	0.7
Orange	30	1.0
Green	3	1.4
Grey	253	2.0

f) CAD Utilization of 2D & 3D Files

Although the project standard is 2D CAD files, certain disciplines and contractors may use 3D CAD files for specific applications or where the isolated use of 3D aids the design and visualization process (i.e. Architecture, Survey and Utilities). In these specific instances 3D CAD data will only be transmitted if all other users can use this data. If this is not the case, a 3D to 2D translation shall be processed by the creator prior to issue.

g) CAD File Numbering

Contractors CAD File Numbering shall be described in 5.2.1 above. Employer CAD File Numbering Unlike most of the contractors, Employer will not be required to produced numerous CAD files. This will follow the numbering system Except that the status of the drawing in 5.2.1 (E) shall be "E".

h) CAD File Naming Convention – General
CAD "Model Space" files shall be named in accordance with general drawing conventions

APPENDIX- 10

CONSTRUCTION & SITE MANAGEMENT

10. THE SITE

10.1 Location and Boundaries

10.1.1 Works Areas are those areas identified in Appendix 3 to these Employer's Requirements and on the Drawings.

10.1.2 Within 28 days from Commencement Date, the contractor shall submit detailed and comprehensive Site Environmental, Social, Health and Safety plan (Appendix 13 of Employer's Requirements) based on Environmental, Social, Health and Safety (ESHS) manual.

10.1.3 Within 28 days of the date commencement, the contractor shall submit detailed Quality Plan (Appendix 11 of Employer's Requirements) demonstrating the proposed method of achieving the required quality standards of the Employer as defined in the Employer's Requirements.

10.1.4 Normal working hours at site will be as stated in the Contract Data. However, the Contractor, if required, shall carry out work during night hours or in shifts with the approval of the Engineer. No increase in rates or extra payments shall be admissible for night work.

10.2 ACCESS TO THE SITE

10.2.1 The Contractor shall be deemed to have inspected, examined and made himself fully familiar with the access routes necessary for the proper execution of the Works and accounted for in the Accepted Contract Amount any costs arising in connection with the accessibility to the ROW. The Employer will not be responsible for any claims which may arise from the use of or otherwise in connection with any access route. The Employer does not guarantee the suitability or availability of any particular access route and will not entertain any claim for any non- suitability or non-availability of any such route for use (whether continuous or otherwise) during the Contract Period.

10.2.2 The Contractor shall make its own arrangements for access required to the Site. The Contractor shall negotiate with the landowners or other appropriate government agencies to seek temporary occupation of land and seeking necessary permission for construction of temporary access roads.

10.3 CONTRACTOR OPERATIONS OUTSIDE THE SITE

10.3.1 The Contractor shall be solely responsible for acquiring any additional land (land in addition tothe Site) required by him for his Temporary Works areas outside the ROW, at his own expense,including maintaining and reinstating the same on completion of the Works to the entire satisfaction of the land owner and the Engineer.

10.3.2 The Contractor shall make the necessary arrangements with landowners and relevant government authorities for any work to be undertaken outside the Site. Two copies of all the relevant documents/ permissions/ agreements, etc., as required by the Engineer in respect of the land arranged by the Contractor outside the Site, shall be submitted to the Engineer. Before commencing operations, the Contractor shall also submit to the Engineer a detailed plan and a programme of the Works to be carried out in the works area, including areas outside the Site.

10.3.3 When using and/or occupying works areas on existing public roads, the Contractor shall undertake all necessary procedures and mitigation measures as per the requirements set by the relevant authorities.

10.3.4 The Contractor shall submit to the Engineer proposals for the use and occupation of such works areas. Any such proposal shall be submitted to the Engineer at least twenty-eight (28) days prior to the start of the programmed use of the specific works area.

10.3.5 On completion of the Works, the land arranged by the Contractor outside the Site shall be restored back to its original condition to the entire satisfaction of the land owner and the Engineer.

10.4 SITE SECURITY

10.4.1 The Contractor shall be wholly responsible for security on the Site and any other areas being used by him or any Subcontractors for the purposes of the Contract. The Contractor shall implement and cause Subcontractors to implement proper security management procedures in accordance with the approved security management plan described in Appendix 13 (Environmental, Social, Health and Safety Management Manual)

10.4.2 The Contractor shall assign on the Site an appropriate safety and security organisation headed by experienced and professionally qualified safety and security personnel, who shall be primarily responsible for the Contractor's security services and shall fully cooperate with the Employer's security organization throughout the Time for Completion.

10.4.3 The Contractor shall prepare and submit to the Engineer for approval a security management plan (it may be included in the Environment, Social, Health and Safety Management Plan) fully complying with not only the relevant applicable Laws but also the regulations of the Employer which may be imposed from time to time on the Project within twenty-eight (28) days after the Commencement Date or at least one week before commencing the Works on the Site or any other area being used by the Contractor (whichever is the earlier). The plan shall include detailed procedures for daily security management operations as described in Appendix 13 (ESHS Manual) of General Specifications.

10.5 Possession of Third Parties Facilities

10.5.1 The definition of "Possession" to be applied in this Clause is 'possession of a segment or stretch of the Works and/or Indian Railways (IR) track(s) and/or other related authorities required by the Contractor from the Employer and/or IR and/or other related authorities for execution of the Works during the Time for Completion and/or after issue of the Taking- Over Certificate and during the Defects Notification Period for maintenance / rectification of any defects in the Works.

10.5.2 While undertaking construction activities within an existing railway line or road under the Contractor's Possession, the Contractor shall abide by the rules/guidelines included within the relevant manuals of Indian Railways and/or the National Highways Authority of India (NHAI)/Public Works Department (PWD)/ Panchayats/ Municipal Corporations and/or any other authority.

10.5.3 The Contractor shall undertake any construction activities on existing 'live' or operating lines only after the grant of Possession by the relevant authorities.

10.5.4 An area under the Contractor's Possession is the sole responsibility of the Contractor and all issues relating to safe working within that area, including the movement of traffic, are his responsibility.

10.5.5 If the Contractor has more than one work front within the same Possession, one person shall be nominated by the Contractor as the person responsible for the coordination for all work fronts within the Possession.

10.5.6 The Contractor shall ensure that construction activities shall be undertaken strictly within the area which is under the Contractor's Possession.

10.5.7 The Contractor shall appoint a responsible person who shall coordinate with the Employer, IR/ relevant authorities, Interfacing Contractors and Interfacing Parties as applicable and who shall act as the Possession Coordinator for the Contractor. The person appointed shall have experience of IR/ relevant authorities operations and shall be fully aware of IR Rules and Regulations related to possession of track for construction of railway works and in accordance with IR/ relevant authorities regulations to issue Possession requests. For the purposes of the Works, such person shall be duly certified in accordance with the said Rules and Regulations, if required.

10.5.8 The Contractor shall use Possessions on the line as follows:

10.5.9 For each particular Possession and depending on the duration and the location of the Possession, alternative route(s) may be required, such alternative diversion route(s) if required to be constructed, shall be at the Contractor's cost.

10.5.10 The normal alternative mode of transport will be proposed by the Contractor, and the route and timings of this alternative transport are to be agreed with the Engineer / IR / Road Authorities / Panchayat prior to obtaining Possessions.

10.5.11 The Employer shall provide assistance necessary to the Contractor to enable him to obtain the Possessions required by him, subject to being approved by IR, NHAI or relevant authorities. No claim shall be entertained by the Employer on this account.

10.5.12 The Contractor's request for Possession shall include a technical and organizational schedule and submit the same to the Engineer for his consent.

10.5.13 The Contractor shall submit his requests for Possessions well in advance as per requirements of relevant authorities.

10.6 Damage and Interference

10.6.1 General

Work shall be carried out in such a manner that there is no damage to or interference with:

a) watercourses and drainage system,

b) Utilities,

c) Structures (including foundations), roads including street fixtures or other properties;

d) Public or private vehicular or pedestrian access, and

e) Monuments, graves or burial grounds other than to the extent that it is necessary for themto be removed and reinstated to permit the execution of the Works.

10.6.2 Heritage structures shall not be damaged or disfigured on any account. The Contractor shall inform the Engineer as soon as practicable of any items which are not stated in the Contract to be removed or diverted but which the Contractor considers necessary to be removed or diverted to enable the Works to be carried out. Such items shall not be removed or diverted until the approval of the Engineer has been obtained.

10.6.3 Assets/ items of the Employer, Indian Railway (IR), Other Contractors and any other entities and relevant authorities which include, but are not limited to, water, sewage, gas authority, electrical, OFC communication cables etc. carried out shall be replaced /

reinstated by the Contractor to the same condition as existed before the Works started and to the satisfaction of the Engineer and the concerned entity.

10.6.4 In case of damage to the existing cables, the Contractor shall have suitable procedure for cable joining under the technical supervision of IR or the relevant authority.

10.6.5 The Contractor shall indemnify the Engineer, Employer, Indian Railway, Other Contractors and relevant authorities against any damages or any penal action, any claim or legal action as a result of the damages.

10.7 Utilities

The Contractor shall follow the requirements on care for utilities as specified in this Appendix below.

10.8 Structures, Roads and Other Properties

10.8.1 The Contractor shall carry out a precondition survey of all roads and structures and drainage channels adjacent to the Site. Contractor originated deterioration of the roads and damage to adjacent structures and drainage facilities shall be reported to the Engineer with appropriate records.

10.8.2 The Contractor shall maintain / replace / reinstate to the same condition as existed before the Works started and to the satisfaction of the Engineer and the concerned entity.

10.9 Access

10.9.1 Where existing access to premises either public or private is damaged or unusable, alternative access shall be provided by the Contractor to enable the Works to proceed. The arrangements for the alternative access shall be as agreed by the Engineer, the relevant authorities and the owners of the premises affected.

10.9.2 Unless agreed otherwise, the permanent access shall be reinstated as soon as practicable after the Works are complete and the alternative access shall be removed immediately when it is no longer required, and the ground surfaces reinstated. Proper signage and guidance shall be provided for traffic/ users diversions.

10.10 Trees

10.10.1 Materials, including excavated materials, shall not be banked around trees. Trees shall always be protected from damages.

10.10.2 Unless otherwise consented to by the Engineer, trees shall not be trimmed or cut as stated in Appendix 13 [ESHS Manual]

10.11 Removal of monuments, graves, burial grounds and other obstruction

If any graves and other obstructions are required to be removed in order to execute the Works and such removal has not already been arranged, the Contractor shall draw the Engineer's attention to them in good time to make the necessary arrangement for authorization for removal.

10.12 Protection of the Other Adjacent Structures and Works

The Contractor shall take all necessary precautions during the construction to protect structuresor works being carried out by others, adjacent to or within the Site from the effects of vibrations,undermining or any other earth movements or the diversion of water flow, arising from its work

10.13 Defined Area and Train Operation

10.13.1 When the Project under construction has been made available for track and system related installation works, the area will be classified as a Defined Area for train movement. The definedarea shall be controlled by the Lead Contractor (as nominated by Engineer) with regard to access.

10.13.2 All persons whose duties require them to work within a Defined Area must have been required to be examined for safety knowledge and to have been safety inducted. Evidence of safety induction must be exhibited whenever present or working in a defined area. All persons present in defined areas are required to observe safety rules and procedures to be defined by the Contractor and reviewed without objection by the Engineer.

10.13.3 The Contractor shall ensure that the necessary rules and procedures for all persons are published from time to time and communicated to the workers and/or agents and the Interfacing Contractors on the Site. The Contractor shall also ensure that all such rules and procedures are being followed during the course of all works and construction activities at the Site.

10.13.4 When overhead lines are energized, Train Sets/Cars may be moving in the Defined Area. No work shall be undertaken on the tracks when Train Sets/Cars are moving. Procedures for obtaining access to the energized tracks will be detailed in the rules. The Contractor shall make requests for obtaining access to the energized track or in the vicinity of the tracks as per the approved and notified rules and procedures.

10.13.5 After overhead lines are installed, the lines are energized, the Contractor shall comply with the rules / measures against electric shock.

10.14 Site Clearance

The Contractor shall clear the Site as required by demolishing all buildings, structures (above and below ground such as brick, concrete, steel, etc.) and removing all rubbish as agreed by the Engineer. If any payment/compensation is payable to the structures owner, the same shall be paid by the Employer to the structures owner. The Site shall also be cleared of vegetation, trees, stumps roots, etc. Cutting of trees within ROW wherever required for execution of the Works shall be done by the Contractor. Permission for cutting of trees will be obtained by the Employer. Compensatory plantation is not included in the Scope of the Works. All material so cleared from the site shall be disposed off by the Contractor outside the ROW as directed by the Engineer. The list of structures to be demolished is given in Section VII:8-Tender Drawings and Documents, Part-2 Employer's Requirements. The above list is indicative and the Contractor shall visit the site and ascertain all the existing structures required to be demolished for clearing the site.

10.15 MOBILIZATION AND DEMOBILIZATION

10.15.1 General

a) The Contractor shall mobilize to the Site the Contractor's Equipment and the Contractor's Personnel as appropriate for the execution and completion of the Works in strict accordance with the requirements of the Contract.

b) The Contractor shall demobilize Contractor's Equipment and Contractor's Personnel from the Site as appropriate when they are no longer required to be on the Site.

10.15.2 Engineer's Consents

a) The Contractor shall inform the Engineer regarding mobilization of Contractor's Equipment, including that required for use by any Subcontractor, at least seven (7) days

before the date planned for the mobilization of same to the Site. The Contractor should note that:

i. the Contractor shall be solely responsible for the consequence of any such mobilization;

ii. the relevant insurances shall be in place as evidenced by insurance documents included in the application;

b) The Contractor's Equipment shall be mobilized to the Site complete with all necessary spare parts, consumables and the like indispensable for proper operation and maintenance thereof. The Contractor shall provide maintenance facility complete with qualified maintenance personnel on or in the vicinity of the Site.

c) The Contractor shall obtain a written consent from the Engineer before removing any of the Contractor's Equipment from the Site or any managerial person among the Contractor's Personnel mobilized exclusively for the Contract. Provided that the proposed demobilization is in accordance with the Contractual Works Programme to which the Engineer has given consent and that the Contractor shall be solely responsible for any consequences of such demobilization, the Engineer shall not unreasonably withhold consent.

d) Although they are deemed intended for exclusive use on the Works as set forth in Sub-Clause4.17 of the General Conditions of the Contract, the Contractor may divert any of the Contractor's Equipment to other uses within the Site, provided that the Contractor's written undertaking to return the same to the Works whenever needed is submitted to the Engineer and the Engineer's written consent to such diversion is granted.

10.16 Records

In addition to the Monthly Progress Reports described in Appendix 7 of the Employer's Requirements, the Contractor shall submit to the Engineer, on a daily basis, details of the mobilization and demobilization of any of the Contractor's Equipment or any managerial person among the Contractor's Personnel.

Without undue delay after demobilization from the Site, the Contractor shall submit to the Engineer copies of certified evidence of lawful re-export from the Country of any Contractor's Equipment imported into the Country on a temporary basis exclusively for use on the Contract.

10.17 Mobilization

10.17.1 The Contractor shall mobilize to the Site the Contractor's Equipment and the Contractor's Personnel as appropriate for the execution of the design, construction and completion of the Works. An Initial Mobilization Plan for the 3 months following the Commencement Date shall be submitted to the Engineer within 7 days after the Letter of Acceptance has been received by the Contractor. An overall Mobilization Plan for the Works shall be submitted to the Engineer for his approval within 90 days after the Commencement Date.

10.17.2 In the event that manufacturing activities are to be carried out outside the Republic of India, the Contractor shall submit detailed organizational structure(s) for such manufacturing teams. This submission shall include the organization of such teams and details of the key personnel, including contact address, i.e., the addresses of the locations where such manufacturing activities are carried out and the e-mail address of each key personnel.

10.17.3 The Mobilization Plan shall include, but not be limited to the following:

a) Details of each major item of Contractor's Equipment, i.e., the name, size and capacity etc. of each item.

b) The number of each equipment and the time of mobilization and duration of the use of each equipment.

c) The name and details of key personnel for each section of the Works and their responsibilities.

d) Details and time for installation of temporary facilities for the Works including temporary facilities for the Employer and the Engineer.

e) The numbers of Contractor's Personnel, including site engineers, administrative staff and labour in each trade category.

10.18 Demobilization

Demobilization shall be carried out in accordance with the provision of Sub-Clause 4.22 [Contractor's Operation on Site], and Sub-Clause 11.11 [Clearance of Site] of General Conditions. Upon receiving the Performance Certificate under Sub-Clause 11.9 [Performance Certificate], the Contractor shall carry out the Clearance of the Site and the Contractor shall inform in writing to the Employer the completion of Demobilization or Clearance of Site and obtain the consent of the Employer. In case the Clearance of Site has not been completed in a specified period by the Contractor, the Employer may carry out the Clearance of Site. The Employer shall be entitled subject to Sub-Clause 20.2 [Claims for Payment and/or EOT] to payment by the Contractor of the costs reasonably incurred in connection with, or attributable to, such sale or disposal and reinstating and/or cleaning the Site, less an amount equal to the moneys from the sale (if any). In case the Taking-Over is conducted section by section, the Contractor shall inform in writing to the Employer the completion of Demobilization of the section and obtain the consent of the Employer or the Engineer as a representative or on behalf of the Employer.

10.19 SITE ACCOMMODATION FOR THE EMPLOYER/ ENGINEER

10.19.1 One Site Accommodation (total area 250 sqm) for the Engineer's & Employer's Staff including Meeting Room shall be provided. In addition, one resting accommodation of about 300 sqm area consisting of four suites with attached toilet facilities, drawing, dining, kitchen and other incidental facilities along with full furnishing shall also be provided by the Contractor. The land for the above accommodation shall be provided by the Employer free of cost. The Contractor shall provide one cook and one housekeeping staff round the clock at the resting accommodation. In office, one pantry staff and one housekeeping shall be provided round the clock.

10.19.2 Offices shall be accessible only from a corridor within the building. The corridor and reception area shall be provided with an external double door. The office will be provided with electronic surveillance system as approved by Engineer.

10.19.3 Materials for the construction shall be new, robust and durable. The building shall be weather proof, vermin proof, well insulated thermally and acoustically. Internal walls shall be soundproof. Electrical power/lighting, shall be provided to each room, including air-conditioning and heating to maintain the internal temperature within the range of 20 to 24 degrees Celsius at all times.

10.19.4 Internal doors shall be flush, fitted with door closers, mortice locks with keys and lever handles.

10.19.5 External doors shall be a pair of solid core doors, external quality, hung on heavy duty hinges, one leaf fitted with barrel bolts top and bottom and the other leaf fitted with a Yale or similar lock.

10.19.6 Windows, of area not less than 10% of the floor area, shall be provided to all rooms, securely barred, fitted with blinds and having opening sections fitted with locks and mosquito screens.

10.19.7 The building shall be provided with a continuous water supply and drainage to Kitchen, Washroom and Toilets. The Toilets shall be equipped with low level suites and be adequately ventilated through the ceiling.

10.19.8 The Kitchen shall be fitted out with a 2-drainer stainless steel double sink unit, worktop with cupboards under, tiling above the sank and worktop and wall mounted cupboards.

10.19.9 Fire and Safety regulations shall be complied with and fire fighting equipment shall be provided in accordance with the statutory requirements.

10.19.10 The Contractor shall provide, erect, and maintain appropriate name boards as specified, for each of the offices. The working shall be agreed with the Engineer.

10.19.11 The Contractors shall provide the following new furniture and equipment for the exclusive use of the Engineer's Staff:

No.	Item	Nos
	Furniture	
1	Sofa set	2
2	Desk with side drawers.	10
3	Swivel Office Chair with arm rests	8
4	Swivel Office chair without arm rests.	10
5	Typist Chair	12
6	Visitor's Chair	1
7	3-Shelf Bookcase	2
8	4-Drawer Lockable Filing Cabinet	5
9	Lockable Cupboard 2m high, with shelves.	10
10	Table	3
11	Book shelf 2000x850x350mm (5 shelves)	5
12	White Board 2000x1000mm	4
13	TV set LED Screen	1
14	Projector Screen for Meeting Room (72"x72")	1
15	Wall Clock	2
16	Coffee Machine	1
17	Cupboard Table height	1
18	Printer cum scanner cum Photocopier A4/A3 capable of reduction	2
19	Wifi internet connectivity with 100mbps	1 set
20	Desktop Computers (Dell, HP) with following configuartions:	4

	Processor- i5 12th GEN Intel; Operating System- Windows 11 Professional 64 bit; Video Card- intel; Memory- 16 GB Ram, DDR4; Hard Drive-1TB SSD; Monitor- 22 inch	
21	Paper shredder	1
22	Desk Tray sets	2
23	Desk mounted pencil sharpeners	4
24	4-hole paper punches	4
25	Wastepaper baskets	2
26	Refrigerator 400 litres	1
27	Potable Water-cooler cum dispenser	1
28	Microwave oven (700W)	1
29	Cups, glasses, plates, cutlery for 12 persons,	2 sets
30	Electric kettle, coffee and tea pots	As required
31	Office consumables for the duration of site activities	As required
32	Front Door Mat	As required
33	Flashlight	1
34	Locker with Key (900x300x500)	For 10 Persons

10.19.12 The Contractor shall provide 04 SUV type vehicles (Innova/Scorpio/XUV500) having make not later than 2022 for use of the Employer's Staff from the Commencement Date till completion of the Contract. The vehicles shall be replaced after two years with vehicles of current make. The Contractor shall also bear the expenditure of deploying experienced drivers along with fuel and other incidental expenses associated with the operation of the vehicle. The approximate kilometers to be run every month will be 3000 km for each vehicle. Only experienced drivers shall be deployed. Vehicles along with drivers shall be made available round the clock throughout the Contract period.

10.19.13 The Contractor shall provide brand new protective clothing and safety equipment for 30 persons for exclusive use of the Engineer's/Employer's Staff, comprising, as a minimum – Safety Helmets Safety Harness, Steel-toed construction boots (size to be notified), Gum boots, Day-Glo waistcoat, industrial safety goggles, Ear protectors. These shall be replaced as and when required, however, they shall be replaced at least once a year. The consumables for PPE kit i.e mask, ear plugs etc. shall be supplied on daily basis.

10.19.14 The Contractor shall provide an adjacent shaded parking area for 5 cars.

The Contractor shall arrange for upkeep, service and security of the offices and compound. The office area shall be thoroughly cleaned and rubbish and waste to be removed, at least once a day as per current rules and regulations.

10.20 SURVEY AND SETTING OUT

10.20.1 General

a) A survey shall be carried out of the Site to establish its precise boundaries and the existing ground levels within it. This survey shall include a drone cum photographic survey sufficient to provide a full record of the state of the Site before commencing the work with particular attention paid to those areas where reinstatement will be carried out later on. The survey shall be carried out before the site clearance wherever possible and in any case prior to the commencement of work in any Works Area. The survey shall be carried out by the Contractor and agreed with the Engineer. Survey by drone shall also be done at all work places every one month as per Outline Construction Specifications (OCS)-Civil & BLT for Civil & BLT Works.

b) The Contractor shall plan and programme for the validation of any Site data provided by the Employer and develop a Survey Plan and Programme. The Contractor shall submit a Survey Plan and Programme to the Engineer for consent within 28 days after the Commencement Date. Generally, the contents of the Survey Plan and Programme shall comprise the following:

(1) The Contractor shall revalidate/derive the elevations of Secondary Control Points (SCPs) and Tertiary Control Points (TCPs) using the Reduced Level (RL) of the Standard Benchmark (Type M) at SDC Quarters, Palwal with MSL value of 195.41 metres. Survey and levelling should be done using Total Station and Digital level. Thereafter, the Contractor shall establish a horizontal and vertical control system (x, y, z) at the Site which shall be approved by the Engineer. Final drawings and profiles shall be prepared based on the above Reduced Levels.

(2) The Contractor shall carry out validation of the Site data provided by the Employer, and any additional topographic surveys considered necessary by the Contractor, in order to:

i. validate the Horizontal and Vertical Alignment with no change in alignment;

ii. prepare Alignment "Plan and Profile" Drawings; and

iii. review the data with which the Contractor shall eventually draw up the cross-section drawings at required locations.

The Contractor shall summarize the results of their validation of the Site data and any additional surveys carried out in a Survey Report and develop a Site Location Map, and aStructure Setting-Out Map and submit them to the Engineer for consent. Finally, the Contractor shall set out the Works to commence the construction with consistent accuracy and entirely throughout the construction stages.

10.20.2 Horizontal and Vertical Control System

a) A set of the benchmarks comprising a horizontal control system (x, y) and vertical control system (z) shall be established at the Site based on the Temporary Bench Marks which are established and maintained by the Employer only after revalidation is done as per Sub-Clause 10.20.1 (b) of Appendix 10, Section VII-9: Appendices and the Global Navigation Satellite System (GNSS) Survey, applying the Universal Transverse Mercator (UTM) coordinate system and World Geodetic System 84 (WGS 84). A description of the various benchmarks along the route alignment has been provided by the Employer along with their height above Mean Sea Level. The Contractor shall ensure that the horizontal and vertical position (x, y. z) of each HORC benchmark shall not be subject to any interference and that they shall not be affected by any of the Permanent and Temporary Works.

b) All pillars shall be of CC in dimensions of 450 mm x 450 mm x 900 mm with a projection of 300 mm above ground . The exposed surfaces of the pillars shall be appropriately painted with enamel paint of a colour as specified by the Engineer so as to be easily identifiable. The foundation shall be as indicated in the Reference Information/Reports. Details shall be developed by the Contractor and be submitted to the Engineer for review. Each pillar shall be protected by retractable fencing or other similar measures so as to prevent the occurrence of any movement, disturbance, interference and/or damage.

c) The Contractor shall establish additional benchmarks (x, y, z) which shall be staked and identified, and clearly painted in a different colour from the HORC benchmarks as approved by the Engineer. These temporary benchmarks shall be used for running a closed traverse for checking the HORC benchmarks. The pillars for additional benchmarks shall be staked at an interval of 500 m on both sides of the alignment at ROW and at abutment locations of major RUB.

d) The Contractor shall plan and programme to establish a horizontal and vertical control system at the Site by GNSS and correlate and adjust the system based on the benchmarks provided by the Employer or with reference to the existing control points as specified by the Engineer. The Contractor shall develop such plan and programme as part of the Survey Plan and Programme and submit to the Engineer. The Survey Plan shall include, but not be limited to, details of survey methods, error adjustment/correction, accuracy achieved, means to maintain accuracy, and coordination with others with respect to consistent accuracy in entirety.

e) The Contractor shall summarize the Traverse Survey results with verification studies in a HORC Benchmark Establishing Report.

f) Upon establishing the HORC Benchmarks and completing all necessary adjustments, the final and detailed survey data of the HORC Benchmarks shall be submitted to the Engineer for consent. Upon receipt of the Engineer's consent to the HORC Benchmark Establishing Report, the system shall be the sole horizontal and vertical control system (x, y, z), with reference pillars provided with coordinates (x, y, z), as described herein and shall be referred to as the HORC Benchmarks which shall be consistently applied to the Works under this Contract. A HORC Benchmark Establishing Report containing Traverse Survey results shall also be included as part of the Survey Report.

g) The HORC Benchmarks shall be periodically checked (at such intervals as consented to by the Engineer) by running closed traverses and closed level works. The Contractor shall submit the results to the Engineer for review. The periodical checks shall include the nearest equivalent benchmarks established by Interfacing Contractor(s), with whom the Contractor shall communicate and coordinate. If any discrepancy deemed to be crucial is found, the Contractor shall carry out appropriate corrective measures under the instruction of the Engineer.

h) The equipment to be used in the survey to establish the horizontal control system shall be Static GNSS System (horizontal/vertical) and Total Stations of 1" accuracy and to establish the vertical control system shall be Digital Level (and/or auto levels) which have sufficient accuracy to meet the requirements given hereinafter. The Contractor shall submit a certificate from the manufacturer or his authorized service agent for the equipment and peripherals. The date of the calibration certificate shall not be more than one (1) month from the date of commencing the survey. The calibration shall be checked and re-validated at pre-determined intervals, and in any event before the expiry of the calibration certificate.

i) Universal Transverse Mercator & Global Coordinates of TBM are described in Reference Information/Reports for the Contractor's reference.

10.20.3 Requirements for Horizontal Control

a) The Contractor shall establish a horizontal control system at the Site by GNSS, providing each HORC Benchmark with a horizontal coordinate (x, y). The horizontal coordinate (x, y) shall be checked with reference to the existing control points, if available. The Contractor shall coordinate with adjacent Interfacing Contractor(s) to ensure that the HORC Benchmarks established by the Contractor and the equivalent benchmarks established by the Interfacing Contractor(s) are consistent. The Contractor shall include the survey results and the description in the Survey Report as described in the following paragraphs. Upon consent of the Engineer, the system shall be the sole horizontal control system for the Works under this Contract.

b) The horizontal control system shall be developed by GNSS and by running a closed traverse on the HORC Benchmarks and the temporary benchmarks along the alignment.

c) The maximum length of a traverse to be closed shall be around 5km and the number of azimuth courses within an azimuth check shall not exceed twenty-five (25). The Contractor shall compute angular closing error of the traverse followed by linear error. Limits of traverse for horizontal control shall have the following accuracy:

Angular error of closure:	15" (N)0.5 (N: number of angles measured) Where N shall not exceed twenty-five (25)
Total linear error of closure:	1 in 25,000 (after angular adjustment)

d) The error within the permissible limits of the traverse line shall be balanced by the Transit Method. In case the errors are beyond the above permissible limits, a traverse survey shall be carried out until the resulted error is within the permissible limits.

e) The Contractor shall summarize the established coordinates (x, y) with necessary adjustments of all HORC Benchmarks, along with raw observation data downloaded from the Total Station, together with the calculation process and descriptions of all HORC Benchmarks and submit them to the Engineer for his review.

10.20.4 Requirements for Vertical Control

a) The Contractor shall establish a vertical control system at the Site by Direct Levelling, providing each HORC Benchmark with a vertical coordinate (z). The vertical coordinate (z) shall be established using the Reduced Level (RL) of the Standard Benchmark (Type M) at SDC Quarters, Palwal with MSL value of 195.41 metres, to ensure the entire vertical control system is consistent, including the equivalent system of adjacent Interfacing Contractor(s). The Contractor shall include the survey results and the description in the Survey Report as described in the following paragraphs. Upon consent of the Engineer the system shall be the sole vertical control system for the Works under this Contract.

b) The vertical control system shall be developed by running a closed level work on the HORC Benchmarks and the temporary benchmarks along the alignment. The Contractor shall close the level work at an appropriate interval and find out the closing error as described in the following paragraph.

c) Each level work shall be connected with the HORC Benchmarks which have consistent accuracy and entirety in the system and the system of adjacent Interfacing Contractor(s)

and shall be properly maintained at the Site. The closing error of loop closure shall not exceed 12 (K)0.5 [mm], where K is the circuit length in kilometres, where K shall not exceed 5 kilometres. In case the accuracy of loop closure exceeds the limit defined herein, the entire loop shall be repeated until the desired accuracy is achieved.

d) The Contractor shall summarize the established coordinates (z) of all HORC Benchmarks with necessary adjustments along with raw observation data, calculation sheets and descriptions of all control marks in spreadsheet (MS Office Excel) format and submit to the Engineer for review.

10.21 Topographic Survey

a) The Contractor shall be responsible for carrying out validation of any Site data provided by the Employer and any additional surveys considered necessary by the Contractor for the execution of the Works, and shall ensure that the topography of the Site has been accurately recorded so that he can be fully satisfied to commence and proceed with the Works. The HORC Benchmarks as established by the Contractor shall be consistently used for surveys.

b) The Contractor shall confirm and locate all the Right of Way (ROW) marks given by the Employer at the Site and provide them with coordinates (x, y, z) so that both the Alignment and ROW are located based on the same horizontal control system.

c) The Contractor shall develop the documents including all reports, drawings, and maps. The Contractor shall summarise the results of Validation of Data, Additional Survey and Setting Out in the Survey Report. The submittals to be developed by the Contractor shall include but not be limited to the following:

a) the HORC Benchmark Establishing Plan;

b) the Survey Plan;

c) the HORC Benchmark Establishing Report;

d) the Survey Report;

e) the Site Location Map;

f) the Structure Setting-out Map;

g) the As-Built Alignment Plan and Profile Drawings; and

h) the Cross-Section Alignment Drawings (as required).

d) During the traversing of peripheral areas, the Contractor shall survey and record the broad alignment of important geographical and other features such as roads, watercourses and the locations of important buildings and facilities, etc., whenever considered necessary for development of the design.

10.22 Horizontal Alignment Staking

a) The Horizontal Alignment defined by the coordinates (x, y) of the centerline of the track shall be staked at an interval of twenty (20) meters in addition to TPTC, TP, TPCC points along the proposed alignment. While staking the Horizontal alignment at Site, the Contractor shall confirm the Right of Way (ROW) staking already done by the Employer at Site and provide and install any missing stakes. The Contractor shall ensure that staking of the ROW is carried out as per the relevant provisions of Indian Railways Engineering Code.

b) The Contractor shall use the TBMs provided by the Employer only after revalidation is done as per Sub-Clause 10.20.1 (b) of Appendix 10, Section VII-9: Appendices, in addition to the benchmarks established by the Contractor for staking the alignment.

c) Upon completing the Horizontal Alignment staking and providing all the ROW marks with coordinates (x, y, z), the Contractor shall submit to the Engineer the final coordinates (x, y, z) data of the Vertical Alignment at an interval of twenty (20) meters, the ROW coordinates (x, y, z) at an interval approximately twenty (20) meters, horizontal alignment calculation report including curve details at every twenty (20) meters (transition curves, circular curves, IP coordinates (x, y, z) and direction).

d) The Contractor shall summarize the survey results of the Right of Way marks given to the Contractor by the Employer and the Centre Line Survey and the Right of Way staking and submit to the Engineer for his consent.

e) Upon the consent of the Engineer to the report, the confirmed Alignment and Right of Way marks, including maps and drawings which confirm the ROW as well as any control points established by the Centre Line and Right of Way staking, shall become the responsibility of the Contractor. The Contractor shall ensure that these marks and control points are protected and maintained and remain consistent throughout the Time for Completion.

10.23 Setting Out

a) The Contractor shall set out the Works at the Site. The Contractor shall ensure that all the

b) Permanent Works are accurately set out.

c) The setting-out of the Works shall be carried out based upon the Drawings which have been issued with a approval and have been issued to the site ''For Construction''

d) The Contractor shall consistently apply the HORC Benchmarks to the setting-out.

10.24 Auxiliary Works

In addition to the requirements specified elsewhere in the Employer's Requirements and the Conditions of Contract, the Contractor shall follow good industry practice when carrying out surveying, setting out and associated activities, which includes but is not limited to the following:

a) performing all necessary calculations accurately and presenting all computations and results clearly in order to facilitate verification by the Contractor and Engineer;

b) removing machinery and obstructions from required sight-lines;

c) prior to carrying out surveys, setting out or similar works, stopping or relocating any operating machinery, drilling, blasting, pile driving or the like which may cause ground or structure vibration; and stopping any activity which could generate smoke, dust, gas, etc., thereby obscuring clear views or causing refraction, which would thereby interfere with such survey works;

d) restricting or stopping pedestrian and/or vehicular traffic near instruments or in sight-lines during instrument observations, as required;

e) providing adequate equipment, labour and materials as deemed necessary and suitable to carry out control and any other surveys required.

10.25 Geotechnical/Geological Survey

a) Contractor's Surveys

b) The Contractor shall be responsible for carrying out validation of any Site data provided by the Employer and any additional geotechnical/geological or other surveys which, in the Contractor's opinion, are considered necessary for the execution of the Works.

c) Geotechnical Interpretative Report

d) The Contractor shall prepare and submit to the Engineer for review a Geotechnical Interpretative Report which includes site investigation results and the geotechnical interpretation of site investigation work including that undertaken by the Contractor in sufficient detail to confirm and justify parameters used in the design of temporary works. The report shall include full borehole logs, geological profile and descriptions of confirmatory boreholes drilled by the Contractor. The requirements for this Report are described in the Employer's Requirements.

10.26 Other Related Surveys

The Contractor shall be responsible for carrying out validation of any Site data provided by the Employer and any other surveys considered necessary by the Contractor for the execution of the Works. Such surveys may include, but are not limited to, the following:

a) Topographic Survey

b) Utilities Survey including Adjacent Structures and Works with Works Areas

c) Environmental Survey

d) Hydrological/ Hydro-Meteorological Survey

10.27 Temporary Facilities

10.27.1 General

a) The Contractor shall be entirely responsible for the provision, erection, maintenance and removal on completion of all required temporary facilities, as part of the Temporary Works, which are required for the proper execution and completion of the Permanent Works. Such temporary facilities shall include the Contractor's offices, laboratories, workshops, stores, utilities, services, accommodation, canteens, recreational and welfare facilities, health, safety, security and environmental protection facilities and the like, whether on or off the Site.

b) The Contractor's Personnel shall not be allowed to live on the Site. A limited number of security personnel designated to secure the Contractor's facilities will be permitted to stay after working hours subject to the approval of the Engineer. The Contractor shall make all necessary arrangements for suitable off-Site accommodation and transportation for the Contractor's Personnel.

c) All of the Contractor's temporary facilities on the Site or elsewhere within the Project site shall be designed, provided, erected, maintained and removed to the satisfaction of the Engineer and in strict accordance with applicable Laws. The Contractor shall obtain all necessary approvals and permits from the relevant authorities having jurisdiction for the provision, erection, operation, maintenance and removal of the Contractor's temporary facilities.

d) All of the Contractor's temporary facilities, other than those designated to remain, are to be removed on the completion of the Works and the ground surfaces reinstated to the satisfaction of the Engineer.

e) When deemed essential for the preservation or maintenance of health, safety, security and/or environmental protection, the Engineer may instruct the Contractor to modify the Contractor's temporary facilities, regardless of any approvals or consents previously given, and the Contractor shall promptly comply with such instructions. These instructions shall not constitute Variations.

10.28 Location of Area for Temporary Facilities

10.28.1 The Contractor shall be aware that the area for temporary facilities is not for the Contractor's exclusive use, and the Contractor shall cooperate fully with the Interfacing Contractors if it becomes necessary for the efficient use of a limited area among the said Interfacing Contractors.

10.28.2 The precise locations of the Contractor's Temporary Works including the temporary facilities within and outside the Site area shall be proposed by the Contractor and approved by the Engineer.

10.28.3 The Contractor shall submit drawings showing the proposed locations and outlines of the proposed temporary facilities. Drawings and details of the Temporary Works for a particular part of the Permanent Works may be submitted as part of the shop or working drawings and/or the work method statements forming part of the Contractor's Documents. These locations and outline drawings for the temporary facilities shall be submitted twenty-eight (28) days before commencing the construction of any temporary facility or twenty-eight (28) days after the Commencement Date. These drawings and outlines shall be updated whenever addition or removal of any facility is planned. Detailed drawings for any particular temporary facility, showing all necessary utilities and services, shall be submitted at least fourteen (14) days before the planned commencement date of construction thereof.

10.28.4 The areas for the Contractor's temporary facilities may also be used for temporary storage of excavated material suitable for reuse in embankment or fill for the Works, or for use by the Employer in future projects or on other works packages.

10.28.5 The Contractor shall dispose of all surplus topsoil and all subsoil materials arising from the Works in the designated area wherever available within the ROW of the Project as agreed by the Engineer. In case area for disposal of surplus soil is not available, the Contractor shall make his own arrangements outside the ROW and the Contractor shall bear all costs including royalty for using/disposing of excavated material unless otherwise specified in the Contract.

10.28.6 The Contractor is free to make his own arrangements for any additional areas required for the proper execution of the Works, and the costs of same shall be borne by the Contractor.

10.29 Site Offices

10.29.1 The Contractor shall be responsible for identifying and establishing suitable facilities for the Contractor's office facilities as approved by the Engineer.

10.29.2 The Contractor's Site offices and facilities shall be provided within or in the vicinity of the work site, with all necessary facilities including furniture, office equipment, office supplies, utility services, sanitary system and vehicle parking. The Engineer will have one

(1) Sub-Site Office established for this Contract. The Contractor shall establish the same number of Sub-Site Office and Site Huts in close proximity to the Engineer's Offices.

10.30 Project Information Signboards

10.30.1 The Contractor shall provide project profile sign board at each of the Site Offices and at prominent public places along the alignment of the project as directed by the Engineer of a size, minimum 1.5 m x 2.5 m, and maintain them in good condition. All information on the signboards will be written in English and local language for separate signboard. The signboards will be positioned on a steel frame as directed by the Engineer. The Contractor shall submit proposals for the signboard materials, the text layout (in English and local language) and installation of the signboards at the Site Offices of the Engineer and the Contractor for Engineer' s approval. Each sign board shall show:

a) The name of the Project and the Works,
b) The Location Map,
c) The name of the Bank,
d) The name of the Employer,
e) The name of the Engineer,
f) The name of the Contractor,
g) Date of Commencement of the Works,
h) Time for Completion,
i) Cost of the Works and
j) All other details as required by the Engineer

10.30.2 The Contractor shall maintain the sign boards and remove them on completion of the Works or when instructed by the Engineer. The Contractor shall clean, update, maintain and replace the signboards if damaged, throughout the duration of the Contract. No additional payment shall be applicable for damaged signs which are required to be replaced.

10.30.3 Within twenty eight (28) days from the Commencement Date, the Contractor shall provide and install a Project information sign, as per the requirements for signboards at the Employer's/Engineer's Site Offices, at each of the entrance points to each Site Office location (both the Contractor's and Employer's/Engineer's offices) and the Site entrances, or, as directed by the Engineer.

10.30.4 The Contractor shall maintain the signboards and remove them on completion of the Works or when instructed by the Engineer, so as to inform the public of the implementation of the Works and the Project and to advise road users of on-going construction.

10.30.5 The Contractor shall clean, update, maintain and replace the signboards if damaged, throughout the duration of the Time for Completion. No additional payment shall be applicable for damaged signs which are required to be replaced.

10.31 First Aid Station

10.31.1 The Contractor shall construct, equip, and maintain First Aid stations at a sufficient number of appropriate locations on the Site and at each labour camp.

10.31.2 The Contractor shall comply with all requirements specified in the Employer's Requirements (including Appendix 13 [Environmental, Social, Health and Safety Management]) and the Conditions of Contract.

10.32 Labour Accommodation Camps

10.32.1 The Contractor shall supply, equip and maintain facilities as necessary for the living accommodation, feeding and welfare of its employees by providing, servicing, and maintaining a camp at appropriate location(s), as necessary.

10.32.2 The Contractor shall comply with all requirements specified in the Employer's Requirements (including Appendix 13 [Environmental, Social, Health and Safety Management]) and the Conditions of Contract.

10.33 Site Storage and Yards

10.33.1 The Contractor's Site storage areas and yards shall be utilized for, among other things, material and equipment storage, casting of precast structural elements, workshops, warehouses and secure storage.

10.33.2 The Contractor shall erect a 2.0 metres high chained security fence around the Site storage areas and yards, complete with suitable lighting and lockable gates.

10.33.3 The location of each Site storage area and yard shall be determined prior to the commencement of the works and the Contractor shall propose the locations and details of same and submit to the Engineer for consent.

10.34 Borrow Areas and Quarries

10.34.1 It shall be the responsibility of the Contractor to arrange for borrow areas (for fill material) and quarry sites (for ballast, aggregate and rock material) using his own resources. The Contractor shall be responsible for carrying out his own investigations to verify the availability, sufficiency, quality and quantity of materials from such sources. The Contractor may also arrange any additional borrow areas and quarry sites as required by him, all at his own discretion. No claim whatsoever shall be entertained by the Employer in this regard.

10.34.2 All costs and charges, including but not limited to permits, royalties, duties, taxes, rental or other costs associated with land or the temporary use of same, etc. as applicable, for arranging borrow areas and quarry sites and access thereto, including for the extraction of material therefrom, shall be borne by the Contractor.

10.34.3 Before commencing operations in each of the borrow areas and quarry sites, the Contractor shall submit a detailed plan of his operations and demobilization/grading and finishing/reinstatement, etc. in respect of the same to the Engineer for his approval, together with relevant drawings.

10.34.4 The quality of fill material, aggregates, etc. extracted from borrow areas and quarry sites shall meet the Employer's Requirements and be subject to the consent of the Engineer.

10.34.5 Borrow areas, quarry sites and the installation of rock crushers shall not be permitted within the ROW.

10.34.6 On completion of the Works, the Contractor shall leave borrow areas in a safe and stable condition.

10.34.7 The Contractor shall indemnify the Employer against all claims in relation to borrow areas and quarry sites both during the Time for Completion and after the Works are completed and taken over.

10.35 Stockpile Areas

10.35.1 The land available, if any, within the ROW may be used by the Contractor for storage of materials required for the project, subject to the consent of the Engineer.

10.35.2 The Contractor may also arrange any additional stockpile areas as required by him at his own discretion and cost.

10.35.3 The location and size of stockpile areas proposed by the Contractor shall be subject to consent of the Engineer. The Engineer's consent may be withheld, if:

a) in the opinion of the Engineer, a stockpile area or access thereto may be such as:
   i. would have a detrimental effect on the natural and social environment;
   ii. would disturb drainage system(s) around the stockpile areas;
   iii. would constitute a danger to the public; or
b) at the Engineer's discretion, a stockpile would become too high.

10.35.4 Before commencing operations, the Contractor shall submit detail drawings of the proposed stockpile areas, together with the proposed method of operation, including stockpile heights, angles of repose, runoff / dust control measures, access road layouts, drainage, measures to be taken for restoration, all verified by appropriate calculations and analysis.

10.35.5 On completion of stockpiling operations, the Contractor shall reinstate stockpile area(s) to a safe and stable condition.

10.35.6 The Contractor shall indemnify the Employer against all claims in relation to stockpile area(s), both during the Time for Completion and after the Works are completed and taken over.

10.36 Contractor's Plants.

10.36.1 The Contractor shall plan, install, erect, maintain, dismantle and remove all plants required for the Works, including but not limited to major items such as concrete batching/mixing plants, rock crushers, casting yard, curing yard, stacking yard etc. of sufficient number and capacity to meet planned peak requirements during construction. The capacity of such plants shall be subject to consent by the Engineer. The location of concrete batching plants is subject to environmental approval from the appropriate authorities and shall not able to operate until such approval is obtained. All control and measuring equipment shall be regularly checked and calibrated and the Contractor shall regularly submit calibration certificates for same to the Engineer.

10.36.2 The land available, if any, within the ROW may be used by the Contractor for storage of materials, concrete batching/mixing plants, casting yards, curing yard and stacking yards subject to the consent of the Engineer. The Contractor shall arrange any additional areas as required by him at his own discretion and cost.

10.37 Material Testing Laboratories

10.37.1 The Contractor shall design, construct, equip, maintain, dismantle and remove all required material testing laboratories and associated facilities on the Site and / or at work areas as are required for the sampling and testing of materials as required in the Employer's Requirements. The Engineer's consent shall be obtained to the location of material testing laboratories.

10.37.2 Laboratory buildings shall be supplied with adequate electricity, water, air-conditioning, etc., and shall have sufficient area(s) for storing samples.

10.37.3 The laboratory equipment to be supplied and the methods of testing shall be in accordance with relevant International, Indian and/or other standards and codes as detailed in the Works' Requirements. All apparatus and equipment shall be brand new and of the latest design and manufactured by a reputable manufacturer. The proposed type and number of

items of laboratory equipment shall be submitted to the Engineer for review and consent prior to purchase.

10.37.4 The laboratory equipment and apparatus shall be checked and calibrated before testing starts and thereafter at regular intervals as specified by the manufacturer and as directed by the Engineer. The Contractor shall regularly submit calibration certificates for same to the Engineer.

10.37.5 The Contractor shall complete the design, construction and installation of the laboratory facilities for operation within one hundred and forty (140) days after the Commencement Date and operate and maintain the facilities until the issue of Taking-Over Certificate, unless otherwise authorized by the Engineer. The Contractor shall also make all facilities and services available to the Engineer as required. All sampling and testing to be undertaken shall be under the direct supervision of the Engineer. The material testing laboratory shall be staffed by Contractor's personnel fully experienced in the sampling and testing of materials, and quality control.

10.37.6 Any testing which may be required in accordance with the Employer's Requirements and which cannot be performed in the Contractor's laboratory due to lack of time or equipment shall be assigned to an independent organization having NABL accreditation and as duly consented to by the Engineer. The Contractor shall accept all results, instructions or restrictions stipulated by the Engineer based on such tests.

10.38 Wheel Washing Facilities

10.38.1 In and around residential and commercial area, the Contractor is required to install wheel washing area within ROW at the "Exit" points/gates of the construction area to ensure the removal of wheel/band dirt from construction vehicles and machines. Wheel washing area design shall be proposed in CEMP. As a part of the Contractor's method statement for the site preparation plans, wheel washing area shall be proposed and approved by the Engineer before the commencement of the work. The facilities are required to have access for cleaning out the sludge which collects together with provision for 2 high pressure hose connections and adequate water supply.

10.39 Temporary Roads

10.39.1 The Contractor at his own discretion construct and dismantle/alter/dispose of the temporary roads after the completion of Contract as directed by the Engineer.

10.39.2 Before constructing any temporary roads outside the ROW, the Contractor shall make all necessary arrangements, including payment if required, with the public authorities or landowners concerned, for the use of the required land and shall obtain the consent of the Engineer. Such consent will be dependent on the Engineer being satisfied with the Contractor's proposals for items such as capacity, signage, lighting and surface quality of the temporary road, together with proposed maintenance arrangements. Such consent shall not relieve the Contractor from any of its responsibilities under the Contract.

10.39.3 The Contractor shall note that temporary road shall not be for the Contractor's exclusive use and shall be subject to relocation or restrictions at his cost during the execution of the Works as and when such relocation or restriction is inevitable. Except in an emergency, the Contractor will be given a prior notice of any such relocation or restriction. The road layout and design proposal shall be revised and re-submitted to the Engineer for consent whenever road arrangements are to be modified for whatsoever reasons.

10.39.4 Within forty-two (42) days after the Commencement Date and consequent to the surveys performed by the Contractor, the Contractor shall submit for the Engineer's review and approval of the proposed design, including layout, and details of the temporary road,

fences, protection to underground pipes and culverts at road-crossing points and all additional temporary pipes and culverts that shall be provided by the Contractor, to sustain road traffic, irrigation and drainage flow in all existing streams, irrigation canals and ditches, drainage canals and ditches, and utilities or services, whether buried or exposed, all of which, in the opinion of the Engineer, are necessary for the proper execution of the Works.

10.39.5 During the transportation of Goods and Contractor's Personnel, the Contractor shall be responsible for keeping all railways, roads, bridges, watercourses, utilities services, etc. free from damage and from spillage of construction materials, detritus, oils, etc. and shall repair any damage howsoever caused to any such structure or property (whether on or off the Site) by Contractor's Equipment (including that of any Subcontractor). In that respect the Contractor will be required to carry out a condition survey of all roads and other facilities in and adjacent to the works area which will show in detail the state of those items prior to the commencement of construction. The full records shall be submitted to the Engineer and the status monitored throughout the course of construction with further records maintained.

10.39.6 At the junction of temporary roads with existing roads, the Contractor shall provide suitable traffic marshals to warn and regulate the traffic as per the requirements.

10.39.7 The Contractor shall be responsible for upholding and protecting all slopes at the boundaries of the Site against slippage into adjacent properties. As adjacent areas may be irrigated, this requirement will also therefore include the provision of temporary coffering as appropriate.

10.39.8 All temporary roads, culverts, ditches and the like required for the Contractor's or Subcontractors' or any other Contractor's operations shall be provided and maintained by the Contractor, kept in good condition by cleaning, watering, rolling, grading, repairing and maintaining, all to the approval of the Engineer.

10.39.9 If the Engineer has provided drawings or details of any temporary works, then such drawings or details shall be understood to be indicative of the minimum required standard only. The Contractor shall remain responsible for the design of Temporary Works.

10.39.10 Unless otherwise approved by the Engineer, the demolition of any existing roads, culverts, etc. shall not commence until the replacement facilities therefore have been completed by the Contractor.

10.39.11 When any of the temporary approach roads are no longer required, or earlier if so directed by the Engineer, the Contractor shall carefully dismantle the temporary bridge or road, and remove and dispose of all surplus materials in compliance with the applicable Laws, and reinstate the area to its original condition to the approval of the Engineer.

10.40 Vehicles

10.40.1 The Contractor shall provide all necessary vehicles required for the transportation and movement of Goods and Contractor's Personnel, including but not limited to trucks, cranes, trailers, cars, motorcycles, etc.

10.40.2 The Contractor shall provide competent and licensed drivers and operators for all such vehicles. Vehicles shall be licensed and insured in accordance with the applicable Laws and the Contractor shall be responsible for all servicing, repairs and maintenance required.

10.41 Contractor's Equipment

10.41.1 The Contractor shall ensure that all Contractor's Equipment whether on or in the vicinity of the Site, including apparatus, machinery, vehicles and other similar things to be

operated by him or his Sub-Contractors for the execution and testing of the Works, are maintained and operated in a good and safe condition.

10.41.2 All lifting and hoisting equipment shall be regularly certified in accordance with the applicable Laws, and the safe working load limits shall not be exceeded.

10.41.3 The Contractor shall operate and maintain an equipment repair facility within or in the vicinity of the Site, so that downtime of Contractor's Equipment can be minimized. Temporary fuel and lubricant stores shall be properly designed, constructed, secured, fire- and spill-guarded, and be well ventilated so as to comply with the relevant applicable Laws.

10.42 Utilities for Temporary Facilities

10.42.1 Power Supply and Lighting:

i. Electric power supplies for the Contractor's temporary facilities, including but not limited to Contractor's camps, offices, Site, work areas and other facilities as described herein, shall be arranged by the Contractor.

ii. The Contractor shall install, operate and maintain its own electrical distribution systems for the electrical supply required for his temporary facilities as described in paragraph (1) above.

iii. The Contractor shall also furnish, install and keep operational the diesel power generating facilities of such capacity as the Contractor considers necessary to prevent any interruption to the progress of the Works.

iv. The Contractor shall ensure adequate lighting is provided for all his operations at the Site and the temporary facilities and camp according to the National Building Code of India (2016).

10.42.2 Water Supply

i. The Contractor shall design, install, operate and maintain water supply systems including pumps, piping systems, valves, storage tanks etc., at the Site with respect to:

a) Industrial water supply system
For construction use the water quality shall meet the quality requirements in the Employer's Requirements.

b) Potable water supply system
For supply to all the Contractor's temporary facilities including but not limited to Contractor's camps, offices, Site, work areas and other facilities for human consumption and use.

ii. In case the Contractor plans to install bore well(s) for water supply, he shall thoroughly investigate the relevant legislation and regulations imposed by the competent authorities and the installation shall be subject to approval by the said competent authorities and/or consent of the Engineer.

iii. Throughout the Time for Completion the Contractor shall take samples from all water supplies at regular intervals and test it for suitability for the intended use.

10.42.3 Sanitation and Sewerage

i. All operational parts of the Site, offices, workshops, fabrication yards, laboratory, camp and other facilities, etc. shall be provided with sanitation and sewage handling and disposal systems complying with the statutory requirements and applicable Laws, codes and standards.

ii. If required, portable sanitary facilities including chemical toilets shall be provided and maintained by the Contractor for the use of all personnel at all work locations.

iii. All the requirements of the Employer's Requirements (including Appendix 13 [Environmental, Social, Health and Safety Management] of the General Specifications) and the Conditions of Contract shall also be complied with.

10.42.4 Waste and Garbage Disposal

i. The Site and the work areas shall be kept clean and free of detritus at all times.

ii. The Contractor shall collect waste material and garbage from Site, camp, offices, yards, workshops, etc. on a daily basis and dispose of same in an approved disposal area(s) and as per guidelines prescribed by local and governmental authorities having jurisdiction. No waste of any kind shall be deposited in any watercourses.

iii. All the requirements of the Employer's Requirements (including Appendix 13 [Environmental, Social, Health and Safety Management Management] of the General Specifications) and the Conditions of Contract shall also be complied with.

10.42.5 Fencing, Site Security and Safety

i. The Contractor shall be responsible for the security and safety of the Site. Accordingly, the Contractor's temporary facilities including offices, workshops, fabrication yards and storage compounds, campsites, all construction areas, storage areas shall be adequately fenced, gated, lighted and guarded on a twenty-four hour, seven days a week basis. Firefighting equipment shall be provided in accordance with the applicable Codes and the requirements of local authorities.

ii. Any storage facilities for explosives shall comply with the relevant Laws and regulations of India and shall be situated at locations approved by the competent authorities. Detonators and fuses shall be stored in facilities separate from explosives. In no case shall detonators and fuses be transported in the same vehicle as explosives. Storage facilities for explosives, detonators, fuses, etc. shall be secure, kept locked and the keys shall be accounted for at all times.

iii. All the requirements of the Employer's Requirements (including Appendix 13 [Environmental, Social, Health and Safety Management Management] of the General Specifications) and the Conditions of Contract shall also be complied with.

iv. The Contractor shall be responsible for any losses occurring within the Site premises.

10.42.6 Inspection by the Employer or Engineer

The Employer and the Engineer have the right at any time to inspect any part of the Contractor's temporary facilities and to require immediate rectification to comply with the specified requirements.

10.42.7 Final Clean-Up

i. Upon the completion of Works, or when any of the Contractor's Equipment and/or temporary facilities have fulfilled or completed their function, the Contractor shall dismantle and demobilize such Contractor's Equipment and/or temporary facilities and remove all equipment, machinery, materials, refuse, debris, objectionable material, and reinstate, including filling, grading and dressing all areas to their original condition prior to completion of the Works.

ii. The Contractor shall not proceed with any demobilization and/or removal of temporary facilities and equipment without the prior consent of the Engineer.

10.43 Maintenance of Temporary Facilities

10.43.1 The Contractor shall provide all necessary maintenance requirements and shall keep the temporary facilities and other areas established for the Works, clean, tidy and litter-free.

10.43.2 The Contractor shall be responsible throughout the Time for Completion for keeping the Site and temporary facilities to the satisfaction of the Engineer.

10.43.3 The Contractor shall maintain all existing security fences required for the Works until completion of the Works. Existing fences which interfere with construction operations, shall not be relocated or dismantled, until written permission has been obtained from the fence owner.

10.44 Damage to Existing Property

10.44.1 The Contractor shall be responsible for any and all damage that may occur to any existing structures, works, materials, or equipment that is due to any operation(s) for which the Contractor is responsible, including any operation(s) of any Subcontractor.

10.44.2 The Contractor shall repair or replace any damaged structures, works, materials, or equipment to the satisfaction of the Engineer.

10.44.3 The Contractor shall be responsible for all damage to roads, railway infrastructure, curbs, sidewalks, highways, shoulders, embankment, ditches, drains, culverts, bridges, or other public or private property, which may be caused by their construction activities and shall indemnify for losses due to such damages.

10.45 UTILITIES

10.45.1 General

a) The Contractor shall at all times work with due diligence to ensure the safety of all personnel and property from injury and damage from known ("Charted Utilities") and unknown utilities ("Uncharted Utilities").

b) The Contractor shall always take care of concerning buried Charted and Uncharted Utilities and if any such Utilities infringe the work, the Contractor shall make the area affected safe and ensure that no unauthorised member of the workforce or members of the public shall enter such area.

c) Contractor shall be responsible for relocation/diversion/shifting/modification of all charted (except specified otherwise) and uncharted utilities infringing the Works.

d) Contractor shall indemnify the Employer against any losses/claim/damage cost to any damage to utility/services during execution of Works.

10.46 Utilities, Services and Facilities

10.46.1 The Utilities are categorised as (i) Charted Utilities, which have been identified by the Employer and may be affected during the execution of the Works. and, (ii) Uncharted Utilities, which are not known and would get identified during the execution of the Works.

10.46.2 Charted Utility

The Charted Utilities identified by the Employer are enclosed in Part 2, Section VII-8-Employer's Requirements, Tender Drawings and Documents. These are further categorised as discussed under:

i. Type A –Overhead Electrical Crossings

a. These are Overhead Electrical Crossings, traversing the proposed HORC alignment and likely to infringe during execution of the work primarily due to inadequate ground clearance. The Employer has already taken action to remove these infringements by either raising or laying underground cables. 75% of infringements due to LT and HT (up to 33 KV) utilities shall be removed by the Employer within 90 days of the Commencement Date. Balance 25% shall be removed in a phased manner within 180 days of the Commencement Date. It is pertinent to point out that these infringements are of minor nature and are unlikely to significantly hamper the progress of the work. Hence, for any delay in removal of any of these utilities, no claims on these grounds by the Contractor shall be accepted. The Contractor shall plan his works taking this aspect into consideration. The Crossings shifted underground shall normally be laid within ten (10) meters of the chainages given in the list of Overhead Electrical Crossings except at locations where stations and buildings of HORC are proposed. At the stations and HORC buildings, the utility will be shifted beyond the structure area. For cables crossing the HORC alignment, extra length of 3m to 5m is being provided on both sides, so that cable can be slewed if required during construction. The Contractor shall consider the effect of these shifted utilities in his work planning and price. The coordinates of the new locations where utilities have been shifted will be shared with the Contractor once the shifting is completed. Electrical utilities which have been laid underground will be considered as charted utilities. The Contractor shall design the span in such a way that further utility shifting is avoided unless inescapable. *However*, in case such utilities are not dismantled by the Employer and which may affect execution of work, the Contractor will be asked for relocation /diversion/ shifting/ modification of utilities. The cost of relocation/diversion/shifting/modification of utilities shall be payable by the Employer as per Conditions of the Contract. If any payment/compensation is payable to the utility owner, the same shall be paid by the Employer to the Utility owner.

b. The infringements due to EHT (above 33 KV) Utilities will be progressively removed by the Employer and is likely to be completed within 12 months from the Commencement Date. It is pertinent to point that these infringements are of minor nature and are unlikely to significantly hamper the progress of the work. Hence, for any delay in removal of any of these utilities, no claims on these grounds by the Contractor shall be applicable. The Contractor shall plan his works taking this aspect into consideration.

ii. Type C- Underground S&T Cables

Between Chainage (-) 2296m to 10000m S&T signal and telecom cables of DFCCIL runs generally parallel to HORC alignment. These cables will get buried under the HORC embankment and will be required to be shifted. Shifting of cables shall be done by the Contractor and shall be paid under Schedule 'D'

10.46.3 Uncharted Utility

The Uncharted Utilities will be those unknown utilities which get identified during execution of the Works. These may be identified during Ground Penetration Survey or anytime during execution of the Works.

10.46.4 The Contractor shall do a general survey and Ground Penetrating Radar (GPR) Survey of the Site after possession and notify the Engineer of Charted & Uncharted Utilities, which may obstruct the works and need to be relocated.

10.46.5 For all Charted & Uncharted Utilities requiring relocation identified by the Contractor in the Utilities survey, the Contractor shall inform the Engineer and provide relevant details, including but not limited to, the following:

i. location of the Utility;

ii. date on which Utility was encountered;

iii. nature and size of the Utility;

iv. condition of the Utility

v. type of the Utility & its owner:

a) Electrical cables;

b) OFC & Telecom cables;

c) Gas pipelines;

d) Water/sewerage/drainage/storm water/hume pipelines;

e) Irrigation pipelines/channels;

f) Telecom towers;

g) Overhead Water tanks and others overhead tanks;

h) Others, if any

vi. Reasonable estimate of time required for shifting of Unchartered Utilities.

vii. The information shall also cover the details of the agency/department carrying out the utility shifting.

10.46.6 The trial trenching, arrangements and working methods to be employed in respect of such Charted & Uncharted Utilities which warrants removal/relocation, including proposed protection measures, diversions, reinstatements in consultation with utility owner shall be done within 56 days after Handing Over of the Site by the Employer. The Contractor shall provide relevant justification for the identified utilities (Charted & Uncharted) which require removal/diversion for proceeding with the works.

10.46.7 The Engineer will accord approval within 21 days to the Contractor for initiating required action for the utilities warranting removal/relocation/modification.

10.46.8 The Contactor shall be responsible for taking prompt necessary action for such identified utilities (Charted & Uncharted) including the following but not limited to:

i. Identification of the extent of the utility to be relocated

ii. Coordinate and get permissions from utility owner & all relevant authorities.

iii. Preparation and submission of relevant documentation to the authorities.

iv. Mitigate the situation and re-arrange the work to minimise the effect on the timeline of the Works

v. Continue with other related works in as much as possible to maintain the timeline of the Works.

Any relocation/removal/diversion of Charted Utility shall be entirely the Contractor's responsibility and any cost on this account shall be borne by the Contractor.

10.46.9 The relocation/removal/diversion of identified Uncharted Utilities shall be assigned to the Contractor to be carried out through the utility agencies, or their specified contractor or

by the Contractor himself. The cost of relocation/removal/diversion of Uncharted Utility shall be paid by the Employer as mentioned below:

i. If Uncharted Utility relocation/removal/diversion is carried out by Utility agency or theirspecified contractor, the Contractor shall make the payment to such agency or specified contractor. The Employer shall reimburse such amount as Specified Provisional Sum based on invoices.

ii. If Uncharted Utility relocation/removal/diversion is carried out by Contractor himself, then he shall be paid under Specified Provisional Sum.

10.46.10 The Contractor shall not divert, remove or relocate any such identified Charted & Uncharted Utilities without having first received the Engineer's consent to such diversion, removal or relocation.

10.46.11 The Contractor shall liaise and co-ordinate with the relevant Utilities Companies to ensure that all the above-mentioned works of relocation/diversion, support and protection are executed satisfactorily. Contractor shall obtain necessary clearances from the Utility company/owner prior to the start of any relocation/removal/diversion works of the utilities. The same shall be submitted to the Engineer prior to start of the works.

10.46.12 Throughout the execution of the Contract, the Contractor shall reasonably comply, in all respects, with the requirements of all the utility owners and authorities regarding the handling, protection and maintenance of the utility facilities. The responsibility in respect of diversion/ modification/ relocation/ protection etc. of the Utilities (Charted or Uncharted) to facilitate safe construction lies with the Contractor. If required, the employer shall provide support to facilitate approvals/permits from utility owner/concerned department for the proposed diversion/relocation of utilities.

10.47 Prevention of Damage and Interference

10.47.1 Temporary supports and protection methods proposed by the Contractor and agreed by the utility owner shall be provided to the utilities. The permanent supports and protection shall be provided wherever required for the safety and security of the utility service.

10.47.2 The Contractor shall not interfere in any manner with the Utility lines and services without prior approval of the Utility owner and Engineer. Whenever the interfering necessity arises, the Contractor shall submit a proposal to the Engineer for his approval. Any unintentional interference caused shall be immediately corrected without causing danger and trouble to any on-going operations or the existing utility lines or services. The Contractor shall immediately inform the Engineer and the utility agencies of:

i. damage to utilities;

ii. leakage of utilities;

iii. discovery of utilities not previously identified; and

iv. Any hazardous material found during the excavation.

a) location of utility

b) date on which the utilities were encountered;

c) nature and sizes of the utilities;

d) condition of utility;

e) temporary or permanent supports provided; and

f) diversions made –temporary or permanent

The Contractor shall include the details (plan, location, ownership, size and material) of all suchutilities in the As-built Drawings.

10.48 Drainage Systems

10.48.1 All existing drainage systems that are affected by the Temporary and the Permanent Works shall be protected, relocated and/or diverted as required for the Works, by the Contractor.

10.48.2 Such protection, relocation or diversion works shall be carried out by the Contractor, and his designs shall be approved by the utility owners / relevant authorities and the Engineer.

10.48.3 Upon completion of the works, all the diverted or temporarily diverted drains/box culverts and canals shall be fully reconstructed to their original size or to a revised size as required by the utility owners /relevant authorities. However, if the utility owner or relevant authority requires to keep the Utility at the original location, the same shall be reconstructed at the original location.

10.49 Building Service Connections

10.49.1 Building service connections shall be maintained and protected or if required to be shifted, shall be informed to the Engineer during the execution of the works. The Contractor shall take necessary steps to ensure these services with the approval of utility owner and the Engineer.

10.49.2 Building service connections shall include the branch pipes from the main water pipe, water meter chambers/bulk meter, sewer and drainage discharge pipes, grease traps, etc.

10.49.3 Building service connections shall be identified by trial trenches or other methods approved by the relevant Utility Companies. Where these service connections interfere with the works, the Contractor shall follow the methodology as approved by the relevant Utility Companies and the Engineer.

10.50 Street Furniture and Minor Service

Where street furniture, including lamp posts, traffic lights, fire hydrants, signage, minor electrical cables, water services, etc. are required to be dismantled and stored or relocated temporarily or permanently, the Contractor shall propose such works to the Engineer and Utility Companies or relevant authorities for their approval.

10.51 TRAFFIC MANAGEMENT PLANS

10.51.1 General

a) The Contractor shall thoroughly acquaint itself with existing traffic conditions and understand the importance of maintaining traffic safety and the avoidance of excessive traffic delay. The Contractor shall co-operate with the relevant agencies regarding traffic control and all details shall be subject to the Engineer's approval.

b) The requirements concerning temporary road works shall include, but not be limited to, construction of detours, temporary bridge approach roads, traffic control devices and services for the control and protection of traffic through areas of construction.

c) The Contractor shall be responsible for investigating and establishing the requirements for traffic control and ensuring safety at each site and shall submit such details in the form of a Temporary Traffic Control Plan for the Engineer's review and consent.

d) All temporary roadworks and traffic management shall be as specified in this appendix, unless specified otherwise elsewhere in the Contract or local Indian regulations and standards, and the more onerous provision shall apply.

10.52 Temporary Traffic Control Plan (TCP)

10.52.1 Submission, Consent and Change

a) Within twenty-eight (28) days after the Commencement Date, the Contractor shall submit a Temporary Traffic Control Plan (TCP) to the Engineer for review and consent. The Engineer's consent shall be obtained prior to the start of Works on Site.

b) The Contractor shall comply with the TCP which has received the Engineer's approval and any Engineer's instructions issued concerning traffic control.

c) Should the Contractor propose any to change to the TCP which has received the Engineer's approval, the Engineer shall be notified in writing at least seven (7) calendar days prior to the date planned for the implementation of any such proposed change. Changes proposed are subject to receipt of the Engineer's consent. If the Engineer makes any subsequent recommendations or issues instructions concerning the TCP in writing, the Contractor shall revise the TCP accordingly.

10.52.2 Contents of Temporary Traffic Control Plan

a) The main contents of the Temporary Traffic Control Plan shall include, but not be limited to,the following:

i. Type and main specifications of traffic control devices and facilities;

ii. A scale plan of the location(s), clearly identifying existing road(s), proposed diversions ofpedestrian and road traffic, locations of warning signs and traffic control measures;

iii. Details of all lane widths, temporary surfaces, etc.;

iv. Construction details of any proposed diversion(s);

v. Safety measures including signage and staffing;

vi. Program for installation and erection of traffic control devices and facilities;

vii. Traffic control means during non-working time and during night time;

viii. Protection/diversion of any existing utilities;

ix. Environmental measures to be implemented, e.g. dust suppression, noise abatement,

x. watercourse diversion and the like; and

xi. Person responsible for overseeing implementation of all aspects of the TCP.

b) In addition to the above and prior to the implementation of any Site-specific traffic control schemes, the Contractor shall obtain any necessary approval letters from relevant authorities who have jurisdiction over or ownership of the existing traffic way including the Traffic Police, NHA, PWD and any other local government/authorities and other related parties having jurisdiction, as applicable and as required.

10.52.3 Number of Lanes for Traffic Control

a) The existing traffic on roads at the Site must be maintained at all times during the execution of the Works and if diversions are required these must be of the same traffic capacity as the original road. Notwithstanding the above, the Engineer may give consent to reductions in traffic capacity if the Contractor can demonstrate that such will not cause excessive delays to traffic flow. If such consent is given, the Engineer may specify the hours during the day when the reduction in capacity may be applied and it should be anticipated by the Contractor that these hours will not include any peak periods for the traffic movement.

b) The Contractor shall cooperate with relevant authorities having jurisdiction regarding traffic control and all details will be subject to receipt of the Engineer's consent.

10.52.4 Temporary Traffic Ramps and Speed Breakers

a) In locations where it is necessary (for example, pipeline crossing a road above ground), the Contractor shall construct and maintain temporary traffic ramps.

b) In cases where it is necessary (for example, requirement by an agency having jurisdiction) or required by the Engineer, the Contractor shall provide and maintain temporary speed breakers.

10.52.5 Traffic Control for Public Roads

a) The Contractor shall maintain close liaison with the Traffic Police, NHAI, PWD and any other local government/authorities and other related parties having jurisdiction, as applicable to traffic control requirements and shall comply with all approval and permit requirements from such authorities.

b) In order to facilitate traffic through or around the Works, or wherever ordered by the Engineer, the Contractor shall erect and maintain at prescribed points on Site roads and at approaches to the Works, a temporary fence made of corrugated metal sheet supported by hard posts with foundations and horizontal bars, traffic signs, lights, barricades, traffic cones with traffic warning lamps and other facilities for the direction and control of traffic. The fence is to be painted and maintained in good condition. Drawings and details of the fence are to be prepared and submitted to the Engineer for review and issue of a approval.

c) Where required, or as directed by the Engineer, the Contractor shall provide competent flagmen whose sole duties shall consist of directing the movement of traffic through or around the Works.

d) In addition to the requirements as described above, the Contractor shall furnish and erect, within or near Works areas, such warning and guide signs as may be ordered by the Engineer.

e) For all traffic safety precautions, the Contractor shall refer to Traffic Management and Site Barricading. The Contractor shall refer to Section VII-8, Tender Drawings and Documents for details of barricading.

f) The repair of any existing roads that have been damaged by the Contractor during the execution of the Works (including any damage caused by Contractor's Equipment) shall be at the risk and cost of the Contractor.

10.53 Extraordinary Traffic

The Contractor shall be responsible for carrying out any necessary investigations and the obtaining of approvals, licenses, escorts and any other necessary facilities in order to enable extraordinary traffic to be moved on the roads in the Works area.

10.54 Maintenance and Protection of Traffic

10.54.1 During the execution of the Works the Contractor shall keep open to traffic existing roads, provided that where required or as directed by the Engineer, the Contractor shall arrange detours subject to the consent of the Engineer. The Contractor shall at all times keep roads and footpaths affected by its operations, free from obstruction and nuisance and suitable for public use.

10.54.2 The Contractor shall take necessary care at all times during the execution of the Works to ensure the convenience and safety of residents along and adjacent to public roads and highways that may be affected by the Works. Street lighting shall be relocated as

necessary to maintain the same standard of lighting during the course of the Works, until new lighting facilities are brought into operation.

10.54.3 Any failure of the Contractor to meet these requirements will entitle the Engineer to carry out such works as he deems to be necessary and to charge the Contractor with the full cost thereof plus ten percent of such cost, which sum will be deducted from any money due or which may become due to the Contractor under the Contract.

10.55 Vertical Clearance

In general, any Temporary Works placed over roads or diversions used by public traffic shall maintain a vertical clearance of at least 5.5 metres unless otherwise directed by the Engineer. Where required by the Engineer the Contractor shall erect and maintain suitable check-gates, fitted with warning signs indicating the vertical clearance.

10.56 Materials

Materials and other specifications related to traffic control devices shall conform to IRC Standards unless otherwise specified elsewhere in the Contract.

10.56.1 Retro-reflective Material

Unless otherwise specified in the Contract, sign panels, barricades, traffic cones, vertical panels, and flagmans' paddles shall have retro-reflective sheeting, as consented to by the Engineer.

10.56.2 Sign Panels

Sign panels shall be yellow with black legend unless otherwise specified in the Contract or local Indian regulations and standards.

10.56.3 Sign Posts

Sign posts shall be fabricated from materials as acceptable to the Engineer. Signs shall be provided with suitable foundations and be designed so as to be capable of remaining in position during normal traffic flow and wind conditions.

10.56.4 Barricades

The Contractor shall erect barricades demarketing public areas to ensure safety of pubic and vehicular traffic in accordance with the Tender drawings.

10.56.5 Traffic Cones

a) Traffic cones shall be capable of withstanding impact without damage to the cones or vehicles. All cones shall be orange with highly reflective white bands which is easily visible both in daylight and darkness. Traffic cones shall be capable of remaining visible and in position during normal traffic flow and wind conditions in the area where they are used. Lamps for cones shall be suitable for purpose.

b) Where traffic cones are used for the diversion of pedestrians the cones shall be fitted with yellow/black reflective cone bars to prevent pedestrians walking outside the protected walk area.

c) All cones shall be as above unless otherwise specified in the Contract or local Indian regulations and standards, whichever is more onerous.

10.56.6 Warning Lights (flashing or steady-burn)

High visibility traffic warning lights shall be provided and used at all locations where Works are being carried out and visible warnings are required, i.e. road works, excavations, pedestrian diversions, etc. The requirements for warning lights shall be:

i. Lens colour shall be amber;

ii. Lens diameter shall be not less than 185mm;

iii. Flashing shall be 110 per minute;

iv. Suitable for fitting to traffic cones;

v. Battery operated; and

vi. Continuous operation of more than 600 hours.

10.57 Construction Requirements

10.57.1 The Contractor shall keep the length of construction areas to manageable lengths such that traffic will be accommodated safely. Traffic control devices and services shall be provided and maintained both inside and outside the limits of work as required to facilitate traffic guidance, should this be necessary. The provision of traffic control devices and services shall comply with the provisions of the Employer's Requirements and the Conditions of Contract and local Indian regulations and standards.

10.57.2 Prior to the start of construction operations, the Contractor shall erect such signs, barricades, and other traffic control devices as may be required by the Employer's Requirements and the Conditions of Contract or as directed by the Engineer. Traffic control devices shall be operated only when required and only those devices that apply to conditions actually in existence shall be operable.

10.57.3 Wherever required or directed by the Engineer, temporary fences shall be placed to provide a visual barrier between the work area and adjacent traffic or buildings.

10.57.4 Any devices provided under this clause that are lost, stolen, destroyed, or deemed unacceptable while in use on the Works shall be replaced by the Contractor at the Contractor's risk and cost.

10.57.5 During non-working hours and following completion of a particular construction operation, all warning signs, except those necessary for the safety of the public, shall be removed or entirely covered with either metal or plywood sheeting so that the sign panel will not be visible.

10.57.6 Retro-reflective sheeting on signs, barricades, and other devices shall be kept clean. Stretches, rips, and tears in the sheeting shall be promptly corrected by the Contractor. Retro-reflective sheeting shall have a maintained retro-reflection.

10.57.7 Nighttime operations shall be illuminated by a lighting system which has received the Engineer' s consent. The lighting system shall be positioned and operated to avoid glare to road users. The heat produced by any lighting system shall be considered and allowed for. The use of lights with flames (such as gas-powered lighting) will not be permitted.

10.57.8 The Contractor shall ensure that no Contractor's Equipment leaves the work sites with mud, debris or rock that may drop or be deposited on a public highway or private right-of-way, and the roads in the vicinity of the Site shall be kept clean. Suitable vehicle washing facilities shall be provided by the Contractor.

10.58 PACKAGING STORAGE SHIPPING AND DELIVERY

10.58.1General

a) Unless otherwise required by the Particular Conditions, Plant and the Materials shall be delivered to the Site at the most suitable time(s) in accordance with the Works Programme and Procurement Work Segment Programme, so as to avoid undue damage and/or deterioration due to a storage period of excessive duration.

b) All Plant and the Materials, if manufactured or assembled off-Site, shall be properly and securely packed at the point of origin, in order to prevent damage during transport to the Site and due to storage in the weather conditions to be encountered at the Site.

c) The Contractor shall securely crate or box all consignments for ocean shipment in a manner suitable to protect them from damage in transit and shall be responsible for and rectify any and all damage due to any improper packing. Crates shall have external markings identifying the Contract reference number, origin, destination, contents and consignee.

d) The Contractor may be required to furnish the Employer, by courier or other approved means with advance copies of shipping documents, invoices and other pertinent papers showing the date and origin of shipment, a description of the Goods, the shipping weight of each item, destination, name of the vessel and other pertinent information.

e) The Contractor shall also be responsible for the trans-shipment up till the delivery to the installation sites.

f) The Contractor shall ensure, prior to delivery of Plant or Material, that adequate storage facilities and/or areas are available on Site to properly store and protect the Plant or the Material so as to prevent any damage or deterioration. Air-conditioned or other controlled-environment storage shall be provided for Plant items sensitive to high humidity and/or temperature.

g) Materials of an inflammable, explosive, toxic or similarly hazardous nature shall be securely stored separately at approved locations. The Contractor shall provide adequate security and safety control at such locations throughout the storage period. Before delivery of such Materials to Site, all necessary permits and licenses shall have been obtained from the authorities having jurisdiction, all in accordance with the applicable Laws.

h) When Plant or Materials arrive on Site it shall as soon as practicable be inspected by the Contractor in the presence of the Engineer, for damage or deterioration. The Contractor shall be responsible for unpacking and re-packing in an appropriate manner and for provision of all necessary equipment, tools, materials and labour at his own expense. If damage or deterioration has occurred as determined by the Engineer, payment for shall not be made for such damaged or deteriorated Plant or Materials, and such shall be removed from the Site and repaired or replaced according to the instructions of the Engineer, at the Contractor's risk and cost.

i) For the Plant or the material which is subject to deterioration after opening the packing, appropriate alternative inspection measures shall be determined on Site between the Engineer and the Contractor. No payment shall become due to the Contractor for those uninspected Plant or Material, unless otherwise determined by the Employer.

j) Packing materials shall remain the property of the Contractor and shall be removed from the Site immediately when no longer required on the Site, as determined by the Engineer.

k) The Contractor shall be responsible for the safe and secure storage and handling of Plant and Materials on Site until the issuance of the Taking-Over Certificate for the relevant part of the Works, regardless of any transfer of ownership thereof to the Employer.

l) Any action taken by the Engineer in inspecting Plant or Materials upon arrival on Site or any determination subsequently made by the Engineer shall not relieve the Contractor of any of his responsibilities under the Contract.

10.59 Storage of Plant and Materials

10.59.1 The Contractor shall provide and maintain storage facilities at acceptable locations in consultation with the Engineer, for the equipment and materials of all kinds intended for use in carrying out the Permanent Works or for incorporation into the Permanent Works.

10.59.2 The Contractor shall prepare, protect, provide security and store in an agreed manner for all Works, Contractor's Equipment, equipment and materials until the Project completion so as to safeguard them against any loss, damage and any other hazards arising during shipment, storage on/off the Site or climatic influences.

10.60 Crating

The Contractor shall provide all packing, crates and markings. In doing so, it shall comply with the following requirements:

a) Each case, crate or package shall be waterproof, rot, insect and rodent proof. It shall be of robust construction and fit for its intended purpose. The Contractor shall, in determining the packaging materials to be used, take into consideration the climatic conditions likely to occur during the period of transport, shipment and storage.

b) Each case, crate or package shall be legibly and indelibly marked in large letters with the Site address, Contract number, "right way up", opening points and other markings as necessary to permit materials to be readily identified and handled during transit and when received at the Site.

c) Each case, crate or package shall contain a comprehensive packing list showing the number, mark, size, weight and contents, together with any relevant drawings. A second copy of the packing list shall be enclosed in a watertight enclosure on the outside of each case, crate or package. Distribution of additional copies of each packing list shall be in accordance with the Engineer's instructions.

d) All items heavier than 100 kg shall be marked on the outside of the case, crate or package, indicating the gross and net weights, the points for slinging, and where the weight is bearing.

e) Care shall be taken to prevent movement of items within cases, crates or packages by the provision of bracing, straps and securing bolts as necessary. Bags of loose items shall be packed in cases and shall be clearly identified by well-secured metal labels on which the quantity and name of the parts and their index or catalogue number have been stamped.

f) All packing shall be free from sharp edges to prevent injury to persons or other objects.

g) Each bulky/heavy case, crate or package shall include wedge(s) for easy loading and unloading by mechanical handling equipment such as forklift truck.

h) Electronic circuit boards, integrated circuits and the like shall be well protected by using appropriate packing, e.g. anti-static bubble wrap or similar.

i) Rubber products and the like shall be suitably packed to avoid damage including but not limited to hardening, deformation and peel-off.

10.61 General Precautions

10.61.1 Spare parts shall be tropicalized in their packing for prolonged storage in accordance with appropriate international/ Indian standards and shall be suitably and individually labelled to indicate:

a) Name of parts;

b) Shelf life and date of manufacture;

c) Type or condition(s) of storage and special handling information;

d) Description of item and relevant part number;

e) Serial number, if applicable;

f) Inspection/test certificate number and batch number; and g) Contract number, order number and item number.

10.61.2 Tubes, cable, conductor and other similar openings shall be properly sealed and blanked off to prevent ingress of dirt or moisture.

10.61.3 Spare ball and roller bearings and similarly protected items shall not be removed from the manufacturer's wrappings or packing.

10.61.4 Fragile materials shall be packed in such a way that they shall not be damaged during transit and when they are properly unpacked for quality inspection. Glass items shall be capable of being easily re-packed without removing the original wrappings or packing for long- term storage within the same packing case.

10.61.5 Appropriate precautions in accordance with the Contractor's safety regulations, the regulations of the Employer, Appendix 13 [Environmental, Social, Health and Safety Manual] and statutory regulations in respect of all hazardous, toxic, inflammable, etc. materials.

10.62 Packaging Procedures

10.62.1 All required inspection/test certificates shall be supplied and packed together with individual materials. All packaging materials and procedures shall be subject to review by the Engineer.

10.62.2 All empty cases, crates or packages, whether or not returnable, shall be removed from the Site by the Contractor or stored by the Contractor in such a way that they do not interfere with the progress of the Works.

10.63 Shipping

10.63.1 The Contractor shall notify the Engineer at least fifteen (15) days in advance of any expected shipment date and give further notification of the actual shipment date and routing when such information is subsequently established. This shall complement the inspection requirements prior to delivery as specified herein.

10.63.2 Two (2) copies of packing lists and quality certificates shall be attached with each case or package to be shipped. One copy shall be placed inside the package and the second copy shall be enclosed in a watertight enclosure on the outside of each case or package. A copy of packing lists and quality certificates shall be sent to the Engineer after each package of the Works, the equipment, spare parts and other items have been shipped.

10.63.3 Without prejudice to any other provisions of the Contract, the Contractor shall be responsible for all legal requirements, insurance, customs, duties, dues, taxes and other such requirements and expenditures required for the plant, equipment, spare parts and other items to be supplied under the Contract.

10.64 Delivery

10.64.1 The Contractor shall deliver Plant and Materials required for the Works and all items to be supplied under the Contract to the Site.

10.64.2 The Contractor shall unload all items to be supplied under the Contract at the designated delivery point and place them in position or store them.

10.64.3 Any part of the Works or any item to be supplied under the Contract that is damaged in transit shall not be considered as delivered until repairs or replacements have been made and all necessary spare parts or items have been delivered to the Site.

10.64.4 All documents, manuals, drawings and other deliverables shall be delivered to an address to be designated by the Engineer in writing.

10.64.5 The Contractor shall store and secure Plant and Materials until the same have been inspected by the Engineer and are considered delivered at the designated point.

10.64.6 The Contractor shall remove temporary fittings required for shipment and re-assembly of Plant and Materials and shall complete this prior to the inspection of same and before they are considered delivered.

10.64.7 An item shall be considered delivered when all damage has been repaired and all documentation and post-delivery preparation has been completed.

APPENDIX 11

WORKS QUALITY MANAGEMENT PLAN

11.1. General

The Contractor shall implement a Project Quality Management Plan in accordance with ISO-9001 "Quality System - Model for Quality Assurance in Design/Development, Production, Installation and Servicing" to ensure that all materials, workmanship, plant and equipment supplied and work done under the contract meets the requirements of the contract. This plan shall apply to all activities related to the quality of items, including designing, purchasing, inspecting, handling, assembling, testing, storing, and shipping of materials and equipment and different elements of construction work and installations of system components.

The Quality Plan to be prepared by the Contractor and submitted to the Engineer shall follow the requirements of ISO 9000 and address each element therein.

Registration of the Contractor's organisation, or subcontractors or subconsultants is not required for this Project but the Project Quality Management Plan as submitted shall meet the intent of the ISO 9000 requirement in that there is a comprehensive and documented approach to achieving the project quality requirements.

11.2. Works Quality Management Plan

The Works Quality Management Plan (WQMP) shall as a minimum address the quality system elements as required by ISO 9001, generally noting the applicability to the Contractor's Works Programme for the Project. Procedures or Quality Plans to be prepared by others (Suppliers, Subcontractors, Subconsultants) and their incorporation in the overall WQMP shall be identified.

The Contractor shall provide and maintain a Quality Assurance Plan (QA) to regulate methods, procedures, and processes to ensure compliance with the Contract requirements. The QA Plan, including QA written procedures, shall be submitted to the Engineer for his review.

Adequate records shall be maintained in a readily retrievable manner to provide documented evidence of quality monitoring and accountability. These records shall be available to Employer at all times during the term of the Contract and during the Defects Liability Period and for a five-year period thereafter.

The Plan shall identify:

- Design Process: that control, check and verify the accuracy, completeness and integration of the design shall be performed by certified personnel and in accordance with documented procedure that have the written consent of the Engineer.
- Special Processes: that control or verify quality shall be performed by certified personnel and in accordance with documented procedures that have the written consent of the Engineer;
- Inspection and Test: Inspection and testing instructions shall provide for reporting nonconformances or questionable conditions to the Engineer; Inspection shall occur at appropriate points in the installation sequence to ensure compliance with drawings, test specifications, process specifications, and quality standards. The Engineer shall designate, if necessary, inspection hold points into installation or inspection planning procedures;
- Receiving Inspection: These procedures shall be used to preclude the use of nonconforming materials and to ensure that only correct and accepted items are used and installed;
- Identification and Inspection Status: a system for identifying the progressive inspection status of equipment, materials, components, subassemblies, and assemblies as to their acceptance, rejection, or non-inspection shall be maintained;

- Identification and Control of Items: an item identification and traceability control shall be provided;
- Handling, Storage, and Delivery: provide for adequate work, surveillance and inspection instructions.

The Plan shall ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, and defects in materials and equipment shall be promptly identified and corrected.

The Plan shall provide for establishing, and maintaining an effective and positive system for controlling non-conforming material including procedures for the identification, segregation, and disposal of all non-conforming material. Dispositions for the use or repair of non-conforming materials shall require the Engineers consent.

11.3. Plan Implementation and Verification

The Plan shall clearly define the QA Organisation. Management responsibility for the QA shall be set forth on the Contractor's policy and organisation chart. The Plan shall define the requirements for QA personnel, their skills and training. Records of personnel certifications shall be maintained and monitored by the QA personnel. These records shall be made available to the Engineer for review, upon request.

The QA operations shall be subject to the Engineers, Employer or Employer's authorised representative's verification at any time, including: surveillance of the operations to determine that practices, methods and procedures of the plan are being properly applied; inspection to measure quality of items to be offered for acceptance; and audits to ensure compliance with the Contract documents.

Monthly Quality Report (MQR): The contractor shall submit the Monthly Quality Report to the Engineer. MQR will contain, apart from the Material Testing Reports, the following major items:

a) Status of Approval of Method Statements: The Contractor shall submit Method Statements including check lists & ITP (Inspection & Test Plan) for execution of each and every item of work including temporary works at least four weeks before their execution, conforming to the Outline Construction Specifications (OCS) -Civil & BLT given in the contract document for review and approval by the Engineer. (copies of sample Method Statements are available with the Engineer).

b) Quality Walk: Quality Walk of the project site shall be held once in a week by the employer/Employer's authorized representative.

c) Weekly Quality Report (WQR): The contractor shall submit the Weekly Quality Report for review of the quality by the Engineer in weekly progress review meeting. The WQR will be based on the lines of MQR.

d) Internal Quality Audit (IQA): The contractor shall conduct an internal audit of the quality of the project by the quality team of their HQ every month and shall submit the report to the Engineer.

e) External Quality Audit (EQA): The contractor shall get conducted the External Quality Audit quarterly by the reputed agency approved by the Engineer and shall submit the report to the Engineer.

f) Calibration of Batching Plant: The contractor shall be done the calibration of batching plant, immediately after installation of the batching plant and at an interval of six months thereafter, by a reputed external agency approved by the Engineer. However, the contractor shall check the calibration in presence of Engineer's authorized representative on regular basis at least once in a month.

g) Laboratory at Site: The contractor shall get calibrated the Laboratory equipment and their dial gauges from the reputed agency/laboratory accredited by NABL and approved by the Engineer. The calibration certificate including their validity shall be displayed near each and every equipment of the Lab.

h) External Laboratory for Conducting Tests: The contractor shall get conducted the tests of materials and elements of the work for which testing facility is not available in the field Lab, from the external laboratories having valid accreditation of NABL approved by the Engineer. In addition to this, the contractor shall get conducted 5% of the tests, for which testing facility is available in field Lab also, in the external Lab, to facilitate independent review.

i) Water: The contractor shall get the water tested, from the reputed external laboratory approved by the Engineer, at the start of the work and at an interval of three months thereafter. The contractor shall also conduct the testing of the water at least once in a month in the field laboratory.

j) Status of deployment of Machinery and other T&P (Tools & Plants): The contractor shall deploy machinery and other T&P as per the provisions of the contract. Method statements approved by the Engineer and as per the requirement of the site. The contractor shall indicate the schedule of deployment of the machinery and other T&P in the Monthly Quality Report. The fitness of the machinery and other T&P shall be regularly got checked by the contractor by external inspection/Audit Team.

k) NCNs (Non-Conformity Notice) of quality issued by Engineer/Employer & NCR's (Non-Conformity Report) of quality raised by the Contractor: The status of NCNs and NCRs of quality shall be included by the contractor in the Monthly Quality Report.

The Contractor shall provide all necessary access, assistance and facilities to enable the Engineer to carry out on-site and off-site surveillance of Quality Assurance Audits to verify that the quality system which has the consent of the Engineer is being implemented fully and properly.

APPENDIX 12

CONTRACTOR'S SITE LABORATORY

12. SITE LABORATORY

12.1 The Site Laboratory shall be approximately 250m^2 in area. It shall consist of the following accommodation:

1 concrete laboratory	60 m^2 floor area
1 Soil laboratory	30 m^2 floor area
2 office	each 15 m^2 floor area
1 storeroom	10 m^2 floor area
1 kitchen	10 m^2 floor area
Male & female toilets, changing room & shower	sufficient for 6 persons

12.2 The remainder of the 250m^2 shall consist of storage area for concrete cube curing tanks. The laboratory, office etc. shall be in one building; the curing tank storage building may be in a separate building, but if so, it shall be adjacent to the laboratory building & connected to it by a level, weatherproof passageway. In addition, an area of covered hard standing of 50m^2 for motor vehicles shall be provided adjacent to the laboratory.

12.3 STANDARD OF CONSTRUCTION

12.3.1 The laboratory shall be constructed to the best Engineering practice and as approved by the Engineer. Two independent telephone lines with two extensions each shall be provided for the laboratory. Telephones shall be in areas as agreed with the Engineer.

12.3.2 A water tank with minimum capacity of 2000 litres shall be installed, as a source of constant water pressure (15 kPa minimum) for each laboratory.

12.3.3 In the case of sinks used for washing samples, adequate trapping and/or separating devices shall be provided to ensure the proper functioning of the facility.

12.4 FURNISHINGS AND FIXTURES

The contractor's site laboratory shall be provided with required furnishings and fixtures.

12.5 LABORATORY EQUIPMENT

12.5.1 The laboratory equipment, as listed below, shall be approved by the Engineer. The Contractor shall submit for the Engineer's approval within 2 weeks of the order to commence work the name of the supplier it intends to use for each piece of apparatus together with the relevant catalogue number. All the equipment shall be ISI marked. The list of equipment for earthwork shall be as per Annexure-VIII and Appendix -N of RDSO Specification No. RDSO/2020/GE:IRS-0004, September 2020. Equipment for concreting shall conform to specification given in relevant IS codes.

12.5.2 The layout of the equipment in the testing laboratory shall be instructed by the Engineer. The equipment shall be maintained to an accuracy appropriate to the required testing methods with routine calibration by an accredited organization as recommended by the appropriate Authority. Equipment shall also be calibrated after maintenance or relocation.

12.5.3 The Contractor's site laboratory shall be equipped with the following material testing equipment as a minimum. The nature and quantity of equipment required for testing may be varied by the Engineer depending on the detail of the Contractor's Design and

Construction methods or for any other reason which he deems to be valid and necessary for the proper control of quality:

S. No	Description	Unit
1.	Determining Liquid Limit	1 complete set.
2.	Liquid limit device (Casagrande type)	2 Set.
3.	Cone penetrometer	2 Nos.
4.	Grooving tools	3 Nos.
5.	Evaporating dish	2 Nos.
6.	Spatula 100mm blade	2 Nos.
7.	Laboratory balance, capacity 500 gm, (Sensitivity 0.01 gms.)	1Nos.
8.	Wash bottle, capacity 500 ml.	3 Nos.
9.	Wash bottle, capacity 1 lit.	2 Nos.
10.	Moisture cans, capacity 50 ml.	36 Nos.
11.	Determining Plastic Limit	(1 complete set)
12.	Glass plate 50cm x50cm x10 mm	3 Nos.
13.	Stainless steel rods, 3 mm dia.	2 Nos.
14.	Determining Moisture Content	1 complete set.
15.	Micro Oven- thermostatically controlled to maintain a temperature 105 to 110 °c.	1 No.
16.	Electronic weighing machine capacity 200 gm., sensitivity 0.01 gm.	2 Set.
17.	Lab. Tongs	1 No.
18.	Moisture cans 75ml. with lid	36 Nos.
19.	Compaction Characteristics	1 complete set.
20.	Standard compaction mould 100mm dia.	6 Nos.
21.	Modified compaction mould 150mm dia.	6 Nos.
22.	Standard compaction Rammer, 2.6 kg.	2 Nos.
23.	Modified compaction Rammer, 4.89 kg.	2 Nos.
24.	Straight edge 300mm long	2 Nos.
25.	Sample ejector for 100mm and 150mm mould	2 Nos.
26.	Sample tray 60 x 60 x 8 cm	10 Nos.
27.	Wash bottle, 500 ml.	2 Nos.
28.	Moisture cans 250 ml.	80 Nos.
29.	Density of soil in-place by sand cone method	2 complete set.
30.	Sand density cone apparatus, 150mm	2 Nos.
31.	Plate, 300mmx300mm with center hold 150mm	2 Nos.
32.	Glass jug for sand cone	2 Nos.
33.	Chisel 25mmx 150mm	6 Nos.
34.	Hammer	6 Nos.
35.	One-gallon field cans	24 Nos.
36.	Sampling spoon	3 Nos.
37.	Soft hairbrush	3 Nos.

S. No	Description	Unit
Sieve Analysis		
38.	Electric Sieve shaker (portable)	1 unit
39.	Coarse sieves in Sizes from 100mm to 10mm (As per IS 383 table no. 2) Fine Sieves 10mm, 4.75mm, 2.63mm, 1.18mm, .600mm, .300mm, .150mm) Pans & Covers Specific Gravity and Absorption of Coarse Aggregate Wire basket, 200mm dia.	1 Set each
40.	Heavy duty suspension balance, 20 kg x 1 gm. with accessory for weight in water.	2 Set.
41.	Suitable water container	1 Nos.
42.	Unit Weight of Aggregate Balance, 100 kg. capacity with 10 gm precision	1 No.
43.	Tamping rod 16mm diameter x 600mm long	3 Nos.
44.	Measuring containers (3,10,15,30 liters)	1 each
45.	Flakiness and Elongation Flakiness gauge, elongation index	2 Set.
46.	Soundness Test	
47.	Sodium sulphate	25 Kg.
48.	Soaking tank	1 Nos.
49.	Balance, Capacity 3 kg., Sensitivity 0.1 gm.	1 Set.
Concrete		
50.	Buckets for concrete sampling	12 Nos.
51.	Slump cone	12 Nos.
52.	Tamping rod	12 Nos.
53.	Base plate	12 Nos.
54.	Mixing pan for concrete	2 Nos.
55.	Scoop for general purpose	6 Nos.
56.	Concrete thermometer	6 Nos.
57.	Concrete cylinder mould, 150 mm * 300 mm;	30 each
58.	150 mm * 200 mm	30 each
59.	Concrete cube mould, 100 mm cube & 150 mm cube	10+100 each
60.	Adjustable spanners for dismantling cube moulds	6 Nos.
61.	Capping set	2 Nos.
62.	Capping Compound	As per requirement
63.	Riffle	1 No.
64.	Concrete curing tank with capacity for 270 cubes, temperature controlled, with circulation system drain and lockable cover	2 Nos.
65.	Schmidt test hammer	1 No.
66.	Compression testing machine (Fully automated)	1 No.
67.	Mould oil	As per requirement
68.	Temperature chart recorder	1 No.
Miscellaneous		
69.	Vernier calipers to measure up to 200mm, with elongated jaws	5 Nos.
70.	Steel rule, 300 mm long graduated	2 Nos.
71.	Rubber gloves	10 pr.
72.	Cotton working gloves	20 pr.

S. No	Description	Unit
73.	First aid kit	1 Set.
74.	Wire brush	6 Nos.
75.	Steel tape, 3m, 5m, 30m	3 each.
76.	Ball peen hammer, 1 kg	2 Nos.
77.	Paint scraper. Approx. 100mm wide	8 Nos.
78.	Float, steel Approx.280 x 120 mm	8 Nos.
79.	Sack barrow	1 No.
80.	Shovel: Square Mouthed	2 Nos.
81.	Round Mouthed	2 Nos.
82.	24- wheel trolley, heavy duty, approx. 0.7m x 1.0m long pneumatic tyred type	2 Nos.
83.	Wheelbarrow, rubber tyred	1 Nos.
84.	Comprehensive tool kit. To include screwdrivers, pliers, claw hammer, multi-grips, spanners (adjustable)	1 No.
85.	Type NR Schmidt Hammer and tester with recording device	1 No.
86.	Testing Anvil for Schmidt Hammer test (SHT)	1 No.
87.	Chart recording paper for SHT	10 pkts.
88.	Cover meter for detecting metal objects to depth of 100mm below the surface of non-magnetic objects	3 Nos.
89.	Noise meter	1 No.
90.	RCPT Testing Machine with mould	1 No.
91.	Permeability Testing Machine	1 No.
92.	Rain Gauge	1 Set.
93.	Loss angeles abrasion machine	1 Set.
94.	Mortar cube casting machine	1 Set.
95.	Cement testing kit as per Is-4031	1 Set.
96.	Nuclear Moisture Density Gauge (NMDG) Apparatus	2 Set.
97.	Core cutter with dolly and hammer (as per appendix D od RDSO-004)	4 Set.

S. No.	Consumable Item
1	Sieve brush Wire brush
2	Sodium carbonate
3	Sodium hexa meta phosphate.
4	Kerosene Mercury

S. No.	Additional Equipment
1	Hand auger 150mm dia with extension rod
2	Sampling tube 100mm dia. And 450mm length

Note: All machines and equipment should have a Calibration Certificate.

Appendix 13

Environment, Social, Health and Safety Management Manual

Table of Contents

1.0 ESHS FRAMEWORK

1.1 General

1.1.1. The Contractor shall be responsible for the Environment, Social, Health and Safety (ESHS) on the Site and any other areas being used by him for the purposes of the Contract. Each Contractor shall develop his own contract specific ESHS Management Plan, which will represent his approach to the management of ESHS activities on his work sites under the Contract with the Employer. The ESHS Management Plan should contain all the measures as given in the project Environmental and Social Management Plan (ESMP) which is part of the project ESIA.

1.1.2. The Contractor shall ensure that all appropriate ESHS measures are implemented throughout the execution of the Works.

1.2 Scope

1.2.1 The ESHS Manual defines the principal requirement of the Employer and forms an essential part of the overall Environment, Social, Health and Safety Management System proposed to be employed by the Employer for the construction of the Project.

1.3 Application of This Document

1.3.1 This document applies to all aspects of the Contractor's Scope of Work including Sub-contractors and all other agencies. There shall be no activity associated to the Contract, which is exempted from the purview of this document.

1.4 Purpose of This Document

1.4.1 The objective of these guidelines is to ensure that adequate precautions are taken for incident/occupational illness free safe work execution as well as to avoid harmful effects on the environment and social during construction.

1.4.2 This document:

a) Describes the Environment, Social, Health and Safety interfaces between the Engineer and the Contractor.

b) Details the processes by which the Contractor shall manage Environment, Social, Health and Safety issues while carrying out the work under the contract.

1.4.3 These requirements shall be read together with, ISO 45001: 2018 Occupational Health and Safety Management System and ISO 14001: 2015 Environmental Management Systems.

1.4.4 The Contractor shall be responsible for obeying all Laws, Rules & Regulations in force at any point of time regarding the Environment, Social, Health & Safety of workers.

2.0 ESHS MANAGEMENT

2.1 General

2.1.1 This document defines the principal requirements to be practiced at the Site at all times.

2.2 ESHS Targets and Goals

2.2.1 Following ESHS targets and goals shall be set and achieved by the Contractor/Sub-contractor based on time bound work plan:

a) Zero total recordable injuries;

b) Zero non-conformances in respect of statutory laws related to Environment, Health, Social and Welfare measures, living conditions and Safety regulations;

c) Total compliance of recording and reporting of all types of incidents;

d) 100% compliance on Safety Induction of all personnel;

e) Total compliance of conducting inspections and audits as per approved ESHSManagement Plan;

f) 100% incident recording and reporting;

g) 100% adherence to usage of appropriate PPEs at work;

h) Executing construction work with least disturbance to the environment, adjoining road users and traffic;

i) Minimize waste generated at sites and maximize reuse of materials;

j) Maintaining environment conditions of site as per statutory requirement of HPCB, NGT etc. to avoid penalty;

k) To achieve construction site as zero discharge site as far as possible.

2.3 Contractor's Obligation to Abide by Mandatory Legislations and Standards

2.3.1 The construction works shall be undertaken in accordance with the Employer's ESHS Management Policy and Management Systems as amended from time to time.

2.3.2 The construction works shall be undertaken in accordance with all updated applicable legislation listed below, but not limiting to:

a) Indian Electricity Act 2003 and Electricity Rules, 2005;

b) National Building Code, 2016;

c) Factories Act, 1948 and state respective factory Rules;

d) Motor Vehicles Act as amended in 1994 and The Central Motor Vehicles Rules,1989;

e) Indian Road Congress Code IRC: SP: 55-2014 'Guidelines on Safety in Road Construction Zones';

f) The Petroleum Act, 1934 and Rules, 1976;

g) Gas Cylinder Rules, 2003;

h) Indian Explosives Act, 1884, along with the Explosives Substance Act, 1908 andthe Explosives Rules, 1983;

i) Environmental and Social Legislations as listed in Clause 6.0 of this document.

2.4 Contractor's Environmental, Social, Health and Safety Management Policy and Plan

2.4.1 The Contractor as per Rule 39 of the BOCW Central Rules shall formulate an Environment,

Social, Health & Safety policy and display it at conspicuous places at work sites in English and Hindi so that the policy shall be understood by majority of the construction workers.

2.4.2 The Contractor shall revise the policy whenever any modification having implication on the Environment, Social, Health and Safety of the workers is made or any new construction work, substances, or technique are introduced which have implication on environment, health and safety of workers.

2.4.3 The contractor shall submit the ESHS Management plan for review by the engineer within 28 days after the commencement date.

2.4.4 The Contractor shall revise and submit the ESHS Management Plan if at any time the ESHS Management Plan is insufficient in the Engineer's opinion. The Contractor, within 7 days of such intimation shall submit the revised ESHS Management Plan to the Engineer for review.

2.4.5 Any omissions, inconsistencies, and errors in the ESHS Management Plan or the Engineer's acceptance or rejection of the ESHS Management Plan and/or supplements thereto shall be without prejudice to the Contractor's obligations with respect to site ESHS and shall not be excused for any failure by the Contractor to adopt proper and recognized ESHS practices throughout the execution of the Works. The Contractor shall adhere to the ESHS Management Plan and shall ensure, as far as practically possible, that all supervisors and sub-contractors of all tiers have a copy of the ESHS Management Plan on the Site and comply with its provisions.

2.4.6 The details of contents to be covered in the ESHS Management Plans are given in Clause 8.0, Attachment -1[Contents of ESHS Management Plan] of this document.

2.5 Designer's Role

2.5.1 The Designer's primary role includes to minimize the risk to Environment, Social, Health and Safety of those who are going to construct, maintain, clean, repair, dismantle or demolish the structures and anyone else like adjoining road users/public, who might be affected by the work.

2.5.2 Every temporary structure like scaffold, temporary deck, earth retaining structures etc. shall be properly designed.

2.6 Site ESHS Organisation

2.6.1 The Contractor shall appoint the required ESHS Management Personnel as prescribed in the Contract.

2.6.2 **Conduct and Competency**

The Contractor shall ensure that all personnel are competent to perform the job assigned to them. In the event that the Contractor is unable to demonstrate the competency of any person whose activities can directly impact the Works' ESHS performance, the Engineer shall remove that person from the Site without any procedural formalities.

2.6.3 **Approval from The Engineer**

The name, address, educational qualification, work experience of each ESHS personnel deployed shall be submitted to the Engineer for approval well before the start of the Works or before deployment whichever is earlier. These personnel are authorized to work only after approval of the Engineer. In case any ESHS personnel leaves the Contractor, the same shall be intimated to the Engineer within a week. The Contractor shall recruit new personnel and fill up the vacancy before relieving a person. Proper handing over of all the documents shall be ensured before relieving an ESHS person.

2.7 Responsibility of ESHS Personnel

2.7.1 The Contractor ESHS Management Personnel shall report to Contractor's ESHS Expert who shall always report directly to the Contractor's Project Manager. Their primary role is to oversee Environment, Social, Health and Safety aspects at work Site. The Engineer shall always monitor

adherence to this procedure.

2.7.2 No Contractor shall engage ESHS manpower from any outsourcing agencies as in that case the effectiveness would be lost. All ESHS manpower shall be on the payroll of the main contractor only and not on the payroll of any sub-contractor or outsourcing manpower agencies etc.

2.8 ESHS Committee

2.8.1 The Contractor shall form Site ESHS Committee within 60 days of award of the Contract and notification regarding the same shall be communicated to the members.

2.8.2 The Terms of Reference for the Site ESHS Committees shall be as follows:

a) To oversee implementation of the Contractor's Environment, Social, Health and Safety policies and practices;

b) To monitor the adequacy of the Contractor's ESHS Management Plan and ensure its implementation;

c) To review ESHS training;

d) To review the Contractor's ESHS monthly reports;

e) To identify probable causes of accident and unsafe practices in construction work and to suggest remedial measures;

f) To stimulate interest of the Workers in ESHS by organizing environment/safety week, safety competition, talks and film-shows on environment/safety, preparing posters or taking similar other measures as and when required or as necessary;

g) To go around the Site with a view to check unsafe practices and detect unsafe conditions and to recommend remedial measures for their rectifications including first-aid medical and welfare facilities;

h) Committee team members should perform a site inspection before every committee meeting and to monitor ESHS inspection reports;

i) To bring to the Notice of the Engineer hazards associated with use, handling and maintenance of the equipment used during the course of construction work;

j) To suggest measures for improving environment, social, health and safety in construction work at the Site;

k) To investigate the health hazards associated with handling different types of explosives, chemicals, and other construction materials and to suggest remedial measures including personal protective equipment; and

l) To review the last ESHS committee meeting minutes and the remedial measures taken for Non-Compliance.

m) Following shall be the composition of the Site ESHS Committee:

2.8.3 Site ESHS Committee meeting shall be conducted once in a calendar month and participation of following members shall be ensured.

Chairman	Project Manager
Secretary	ESHS Expert (Will be nominated by Project Manager)

Members	i) Contractor's ESHS staff. ii) Labour Welfare Officer; iii) In -charge of Plant and Machinery & Site Electricals; iv) In-charge of Special Work Operations (e.g. bridge, viaduct, and tunnel, etc.); v) In-charge of Stores; vi) Subcontractor's representative; and vii) Workers' representatives;
Engineer's Representatives	To be nominated by the Engineer

2.8.4 **Minimum time between two monthly ESHS Committee meetings**

A minimum period of 21 days shall be maintained between any two ESHS monthly committee meetings.

2.8.5 **Agenda**

The Secretary shall circulate the agenda of the meeting at least seven working days in advance of the scheduled date of the meeting to all members as well as to the Employer.

2.8.6 The agenda should broadly cover the following:

a) Chairman's overview of ESHS Management Performance;
b) Confirmation of minutes of last meeting;
c) Previous month ESHS statistics;
d) Incident and accident investigation/Dangerous occurrence/Near miss report;
e) Site ESHS inspection and compliance report;
f) The Contractors' ESHS issues;
g) Report from the Employer and Engineer;
h) Non-compliances raised by Engineer/Statutory Authorities;
i) Report and compliance of GRC; and
j) Any other concern.

2.8.7 In case of station and other contiguous areas where more than one main Contractor is working together, the Engineer shall instruct the other Contractors/ Sub-contractors to join for the monthly ESHS committee meeting of the main civil Contractor, to discuss and decide about the common provision of safety, security, lighting, toilet, drinking water etc. and sharing the maintenance cost of the same etc.

2.8.8 The Minutes of the Meeting shall be prepared as per the format provided and sent to all members within 2 working days by mail. Minutes of ESHS Committee Meeting shall also be displayed on the notice board for wider publicity to all concerned.

2.9 ESHS Induction Training and ID Card

2.9.1 The Contractor shall ensure that all personnel working at the Site receive an ESHS induction

training immediately on the first day of joining explaining the nature of the work, the hazards that may be encountered during the site work. Personnel shall only be deployed at site once he/she has completed ESHS induction training. The training shall cover the contents as given in Clause 8.0, Attachment-4 [General Instruction: ESHS/GI/001].

2.9.2 All personnel shall be issued a photo identity card as per the format given in Clause 8.0, Attachment-4[General Instruction: ESHS/GI/002].

2.9.3 The Contractor shall also issue a Personnel pocket ESHS Booklet in a language known to the Workers, which provides information on ESHS and emergency procedures.

2.10 Other ESHS Training

2.10.1 The Contractor shall organize the ESHS trainings to managers, supervisors and other personnel in behavioral change and improve ESHS performance.

2.10.2 The Contractor shall provide a training/workshop on ESHS to all its workers/staff/employees/subcontractors of at least 2 days. It shall be completed in various modules and each employee/worker shall have a record of completing all modules.

2.10.3 On-the spot practical skill development training on height safety including scaffold safety, crane safety, welding safety, electrical safety, and traffic safety for marshals shall also be conducted.

2.10.4 Every employee including workman shall take a ESHS oath followed by toolbox talk every day.

2.10.5 All vehicles and machine drivers including heavy work vehicle and machine operators shall be trained on defensive driving with necessary certificate or license.

2.11 ESHS Inspections

2.11.1 The Contractor shall evolve and administer a system of conducting ESHS inspection and other risk management analysis on a periodical basis.

2.11.2 The purpose of ESHS inspection is to identify any deviation in construction activities and operations, machinery, plant and equipment and processes against the ESHS Management Plan and its supplementary procedures and programs.

2.11.3 The Contractor shall initiate a monthly joint site ESHS Management inspection with the Engineer and report shall be generated on the same day with the corrective action and accepted target date (within a week) by the Engineer.

2.11.4 The Contractor project manager & ESHS expert with site team shall be participating in the ESHS inspection.

2.11.5 The Compliance of the joint inspection "Non-Conformance" shall be witnessed/accepted by the Engineer.

2.11.6 The Contractor shall submit follow up compliance report of the ESHS inspection report within six days of the date of Inspection in a coloured soft copy.

2.11.7 Following ESHS inspections program shall be adopted:

a) Planned general inspection;
b) Routine inspection;
c) Specific inspection; and
d) Other inspection.

2.11.8 **Planned general inspections** are performed at predetermined intervals. Inspections that will be

classified under this inspection program are:

a) Monthly Contractor and sub-contractor's Site ESHS committee inspection;

b) Weekly ESHS inspection by construction supervisors (the Contractor and the Subcontractor); and

c) Daily ESHS inspection by the Contractor Site ESHS team.

2.11.9 **Routine inspections** are often referring to the inspection of the Site, equipment and temporary structures performed by the Site and equipment operators and temporary structure erectors.

Inspections that will be classified under this inspection program are:

a) Daily inspection of plant and equipment by operators;

b) Weekly inspection of scaffold by scaffolding supervisors;

c) Monthly Inspection of electrical hand tools by competent electrical supervisors;

d) Quarterly inspection of temporary electrical systems by competent electrical supervisors; and

e) Half-yearly inspection of lifting machinery, lifting appliances, equipment and gears by Govt. approved competent persons.

f) Quarterly inspection of lifting gears, tools tackles and appliances.

g) Quarterly colour coding of lifting gears, tools & tackles. The recommended colour coding for the 4 quarters of the years shall be as under

i) January – March: GREEN

ii) April – June: YELLOW

iii) July – September: BLUE

iv) October – December: WHITE

2.11.10 The list mentioned above is not exhaustive. The Contractor may add additional categories. The ESHS Expert shall ensure that a system of routine inspections is carried out periodically to all plants, equipment, powered tools and any other temporary structures that will pose a hazard to operators and workmen.

2.11.11 **Specific Inspection**

Specific inspections are performed on activities without a predetermined date. Competent supervisors usually perform inspections for ensuring an activity whether it is executed in accordance to a general set of rules; Method Statement submitted or developed procedures.

The following are examples that will be commonly performed as required on the Site:

a) Inspection performed before a heavy lifting operation;

b) Inspection performed before and after the entry of person into a confined space;

c) Inspection performed before and after a welding and gas cutting operation;

d) Inspection of formwork before concreting by formwork erector.

2.11.12 The list mentioned above is not exhaustive. The Contractor shall ensure that a competent supervisor inspects all high-risk processes and activities.

2.11.13 **Other inspections** include the following:

a) Mandatory inspections by Labour Department of Government of Haryana; and

b) HRIDC/Engineer site ESHS management team.

c) Inspections by Central Pollution Control Board, Haryana Pollution Control Board, Ministry

of Environment and Forest and Climate Change, National Green Tribunal etc.

2.11.14 The Contractor shall prepare all required ESHS inspection checklists for all activity operations and equipment. Checklists will be prepared based on the Indian SafetyStandards, Rules and Regulations and the Works requirements.

2.11.15 All inspection records and reports will be properly kept and filed for audit purpose. Inspection reports of planned general inspection and routine inspection will be used for discussion during safety committee meetings.

2.12 ESHS Audit

2.12.1 The purpose and scope of ESHS Audit is to assess potential risk, liabilities and the degree of compliance of the ESHS Management Plan and its supplementary procedures and programs against applicable and current ESHS legislation regulations and the Works requirements.

2.12.2 The Contactor's project manager shall hold the ultimate responsibility in ensuring implementation of ESHS audit program during the construction work.

2.12.3 Monthly Audit Rating Score (MARS)

2.12.4 Monthly Audit Rating Score (MARS) will be performed once in a month. A team consisting of the Contractor's project manager, ESHS experts and the Engineer's representative based on the pre-designed score-rating format will conduct it.

2.12.5 This Monthly ESHS Audit Rating Score (MARS) report will enable the Engineer to evaluate the general compliance by the Contractor with the Conditions of Contract, and the ESHS Management Plan. A Minimum Compliance level to achieve 75% overall Audit Rating is essentially required. Failing this, the Engineer will take punitive action which includes non-processing of running account bills.

2.12.6 **Timing**

The Monthly Audit Rating Score (MARS) should be conducted at least 7 days prior to the scheduled date of monthly ESHS Committee Meeting.

2.12.7 **Evaluation**

The numerical scoring has been weighed on a 1-10 scale. The audit team will use their observations noted in evaluating the points to be awarded against each of the elements of the audited section. Wherever some topics and sub-topics are not applicable the score rating need not be given. The overall audit ratings shall be achieved by:

$$\text{Overall Audit rating} = \frac{\text{Actual Score Achieved}}{\text{Maximum Possible Score}} \times 100$$

The criticality of the required actions for the respective sections of the Audit will be classified as:

S.No.	Score	Description	Action
1	< 60%	Immediate	Require the Contractor to rectify within 24 hours
2	< 75%	Improvement Necessary	The Contractor rectification within 7 days and confirmed in writing to the Engineer
3	< 90%	Improvement Desirable	The Contractor rectification within 1 month and confirmed in writing to the Engineer

2.12.8 **Report**

A copy of each Audit Report will be sent to the Engineer and to all subcontractors, with whom it will then be discussed in detail at the monthly ESHS Committee Meeting to ensure that any corrective actions are agreed upon.

2.12.9 **External ESHS Audit**

External ESHS Audit is to be conducted by external agencies that are competent with ISO qualified auditors with the prior approval of the Engineer.

a) Areas of Competence of Audit Team

i) The Audit team shall have practical understanding of BOCWA/R statutory requirements on health/medical and welfare of workmen, construction hazards and its prevention and control, traffic management, electrical safety, rigging, safety of construction equipment and environment and social management.

ii) The Audit team shall have a Team leader and at least one Team member.

iii) Audit shall be conducted as per the guidelines of ISO, ILO and national standards. Audit report shall also be presented as per the formats given in thestandards; and

iv) External ESHS Audit shall be conducted on a quarterly basis throughout the currency of the Contract.

b) Targets of ESHS Audit

The contents and coverage of the audit shall include the following items:

i) ESHS Management:

- ESHS Organization;
- ESHS Policy and Plan;
- ESHS committee;
- ESHS orientation;
- ESHS training;
- ESHS communication and motivation;
- ESHS submittals to the Employer;
- ESHS promotional and awareness program;
- Incident reporting &investigation;
- Onsite/offsite emergency preparedness plan;
- Hazard identification and risk assessment;
- Implementations of work permit system.

ii) Technical

- Work Method Statement;
- Operational control procedures/ Safe operating procedures;
- Working at height;
- Hand tools and power tools;
- Electrical safety;
- Fire prevention and control;

- Housekeeping;
- Overhead protection;
- Slipping, tripping, cutting, drowning and falling hazards;
- Lifting appliances and gear, tools and tackles;
- Lifting and launching operation;
- Construction plant and machinery;
- Machine and area guarding;
- Material handling;
- Hot work;
- Demolition;
- Excavation and tunnelling;
- Work permit system;
- Traffic management;
- Chemical handling;
- Dangerous and harmful Environments;
- Maintenance matrix of mechanical and electrical machines / equipment;
- Working on or under water;
- Working near or under high tension line;
- Personal protective equipment;
- Visitors at Site;
- Occupational health and welfare measures;
- All statutory forms, returns under various statutes;
- First-aid and medical facilities;
- Welfare measures; and
- Environmental and Social management.

c) Audit Documents

The Contractor shall make the below itemized documents available for review by the Audit team;

a) ESHS Policy;

a) ESHS Management Manual;

b) ESHS Rules and Regulation;

c) ESHS Organization chart;

d) Annual ESHS objectives/programs;

e) Accident/near miss statistics and analysis;

f) ESHS training program/records for all personnel;

g) Operating manuals and maintenance manual of all equipment;

h) Safe worthiness certificates of all lifting appliances and gears;

i) Medical fitness record for all personnel;

j) Risk identification, assessment and control details;

k) Environmental and Social management reports;

l) Emergency management records including mock drill;

m) Housekeeping inspection records;

n) Minutes of ESHS committee meetings;

o) Calibration and testing records;

p) Records of previous audits;

q) ESHS inspection records;

r) First Aid, medical facilities and other welfares measures;

s) Maintenance procedure of plant &machinery;

t) Records of Industrial hygiene surveys (noise, ventilation, and illumination level, airborne and toxic substances, explosive gases).

d) Audit Preparation

i) Audit team members are required to gather information by observations through interviews and by checks of documentation.

ii) Audit team shall prepare checklist to cover all parts based on ESHS legislations Rules and Regulations and ESHS Conditions of Contract requirements.

iii) Audit team members shall verify the facts and findings of leading to the identified gaps and weakness.

iv) Audit leader has overall responsibility for reaching a conclusion**.**

e) Reporting

Audit report shall be prepared and directly sent to the Engineer within 7 days of conducting the audit.

f) Report Contents

a) *Executing Summary* - Based on the finalized checklists as written the findings to the Engineer by the audit team members, the audit leader will compile a concise and accurate summary of observations and findings;

b) *Introduction* - This will contain basic information regarding the facilities or organization audited, the specific audit dates (inclusion of those for preparation and post-audit activities);

c) *Principal Positive Findings* - This will contain the summary of positive aspects as observed by the auditors. It will also contain highlights of those issue, which may warrant dissemination as best practice regarding methodology used or achievement;

d) *Audit Findings* - All audit findings as detailed in the audit checklists shall be grouped together as priority 1 and 2 as detailed below in a separate listing:

i. *Priority 1*: Actions to rectify gaps or weakness should generally be implemented within two-weeks' time if risk potential is high or unacceptable; and

ii. *Priority 2:* Actions should be generally implemented or rectified with a maximum of 3- 4 weeks, if not rectified would create a likelihood of minor injury or business loss.

g) Conformity Report Action to the Engineer

a) The auditor shall inspect the Site after 14 days of conducting initial audit for checking the adequacy of implementation of items maintained under priority 1 by the Contractor and shall submit a Conformity/Non-conformity Report to the Engineer within 7 days ;

b) The auditor shall again inspect after 28 days of conducting initial audit for checking the adequacy of implementation of items mentioned under priority 2 by the Contractor and shall submit a Conformity/Non-conformity Report to the Engineer within 7 days; and

c) In case of non-conformity of items mentioned by auditor, the Engineer shall take necessary steps including stoppage of work and suggestion for corrective action to the Contractor.

2.13 ESHS Communication

2.13.1 The Contractor shall make every effort to communicate the ESHS Management measures through posters campaigns/billboards/banners/glow signs being displayed around the Site as part of the effort to raise ESHS awareness amongst the work force. Posters should be in Hindi, English and other suitable language deemed appropriate. Posters/billboards/ banners/glow signs should be changed at least once in a month to maintain the impact.

2.13.2 The Contractor shall also observe important days as listed in Clause 8.0, Attachment-4 [General Instruction: ESHS/GI/003] and printing and displaying ESHS signage and posters as listed in Clause 8.0, Attachment-4 [General Instruction: ESHS/GI/004].

2.14 ESHS Submittals

2.14.1 The Contractor's ESHS Management shall send the following reports to the Engineer periodically in soft copy:

a) Daily reporting of total number of workmen;

b) Monthly ESHS Report;

c) Minutes of ESHS Committee meeting;

d) ESHS inspection and compliance reports; and

e) ESHS audits reports;

- Monthly Audit Rating Score (MARS) reports;
- External ESHS audits;

2.14.2 The Contractor shall prepare a Monthly ESHS Report consisting of the following within 7th of next month to the Engineer:

a) Monthly man-hour details as specified in the ESHS Management Plan;

b) Monthly accident/incident details as specified in the ESHS Management Plan;

c) ESHS committee details;

d) ESHS inspection and compliance report;

e) ESHS internal audit details;

f) ESHS communication activities undertaken in the month indicating the number of posters displayed and balance availability in stock;

g) Monthly Environment (including air, noise, water and soil testing results) and Social Report;

h) Graphical representation of monitored results over past four reporting periods;

i) Details of Clearance/ Permission//Permit obtained;

j) Compliance status for conditions of all relevant clearances /permissions / consents/permits for the Work, including quarries, etc.;

k) Tree felling, transplanting and compensatory planation details;

l) Details of consumption of construction material, energy and water;

m) Details of different types of waste and scrap generated during the month and sold to authorised recyclers;

n) Summary of complaints, results of investigations and follow-up actions;

o) Gender: Number of female workers, percentage of female workforce, gender issue raised and dealt with;

p) HIV/AIDS: Provider of health services, information& training;

q) GBV/SEA: Details of training conducted;

r) Grievances: List of grievances received in the reporting period and unresolved past grievances by date received, complaint how received, to whom referred to for action, resolution and date (if completed), date of resolution of community grievances if any.

s) Toolbox talks details;

t) PPE details: Quantity purchased, issued to the workmen and stock available;

u) Details on IP 44 panel boards, lighting poles, welding and cutting equipment, Ladders, Hoists, Tools & Tackles;

v) Monthly lux meter study results;

w) Housekeeping;

x) Barricade maintenance details;

y) No of critical excavations;

z) Health and welfare activities;

aa) ESHS activities planned for next month.

2.15 Accident Reporting and Investigation

2.15.1 All accidents and dangerous occurrences shall immediately be informed through message to the Engineer. This will enable the Engineer to reach the scene of accident/dangerous occurrences to monitor/assist any rescue work and/or start conducting the investigation process so that the evidences are not lost.

2.15.2 Reports of all accidents (fatal/injury) and dangerous occurrences shall also be sent to the Engineer within 24 hours by the Contractor.

2.15.3 In addition to the above verbal and written reporting to the Engineer, as per Rule 276 of HBOCWR, notice of any accident to a worker at the Site that:

a) Causes loss of life; or;

b) Disables a worker from working for a period of 48 hours or more immediately following the accident; shall forthwith be sent by telegram, telephone, fax, orsimilar other means including special messenger within 4 hours in case of fatal accidents and 72 hours in case of other accidents, to:

i) The Assistant Director, Industrial Safety and Health having jurisdiction in the area in which the establishment in which such accident or dangerous occurrence took place is located. The Assistant Director, Industrial Safety and Health shall be the authority

appointed under section 39 of the Act;

ii) Board with which the building worker involved in accident was registered as a beneficiary;

iii) Chief inspector; and

iv) The next of kin or other relative of the Worker involved in the accident.

2.15.4 Further, notice of any accident shall be sent in respect of an accident which:

a) Causes loss of life; or;

b) Disables the injured worker from work (for a period of more than 10 days) to;

i) The Officer-in-charge of the nearest police station;

ii) The District Magistrate or, if the District Magistrate by order so desires to;

iii) The Sub-Divisional Magistrate.

2.15.5 In case of an accident-causing minor injury, first-aid shall be administered, and the injured worker shall be immediately transferred to a hospital or other place for medical treatment.

2.15.6 Where any accident-causing disablement that subsequently results in death, notice in writing of such death, shall be sent to the authorities within 72 hours of such death.

2.15.7 The following items are defined as dangerous occurrences and shall be reported to the inspector having jurisdiction, whether any disablement or death caused to the Worker, namely:

a) Collapse or failure of lifting appliances, or hoist, or conveyors, or similar equipment for handling of building or construction material or breakage orfailure of rope, chain or loose gears; or overturning of cranes used in construction work;

b) Falling of heavy objects from height;

c) Collapse or subsidence of soil, tunnel, pipelines, any wall, floor, roof or any other part of any structure, launching girder, platform, staging, scaffolding or means of access including formwork;

d) Fire and explosion causing damage to any place on the site where the Workers are employed;

2.15.8 In case of failure of launching girder, lifting appliance, loose gear, hoist machinery and transport equipment at the site, such appliances, gear, hoist, machinery or equipment and the site of such occurrence shall, as far as practicable, be kept undisturbed until inspected by the Inspector having jurisdiction.

2.15.9 Every notice given for fatal accidents or dangerous occurrences shall be followed by a written report to the concerned Authorities under Section 39 of BOCWA and the Chief Inspector of Government of Haryana in the specified Form **XLVI** of the **HBOCWR.**

2.15.10 Actions to be taken post incident/accident:

a) In case any incident/accident happens at site leading to injury to the worker,the worker/s is/are required to be taken to the nearest hospital immediately;

b) Project Manager/ESHS Manager/Labour Welfare Officer of the Contractor needs to report the incident to the Engineer immediately without fail for all the death cases including natural deaths;

c) In case of fatal accident, doctor from the nominated hospital is the only authorized person to declare the death of the worker. It is not to be decided suo-moto by any other person. FIR should be registered for all the fatal cases which happen at the Site/labour camp;

d) Post Mortem of the dead body is mandatory in all the death cases i.e. whether it is natural or due to any incident / accident;

e) Family members of the injured / deceased worker are to be informed immediately;

f) In case of fatal accident, the dead body is to be handed over to the family members. Arrangement of sending the dead body to the native place shall be made by the contractor including cash payment for meeting out last rites expenses as per Rules;

g) Fatal accident report is to be sent to State Labour Authority in Form EE (as per workmen's compensations act) within seven days and to the Licensing Authority in Form XLVI within 24 hours of the incident/accident;

h) Copy of all the documents deposited with any labour authority, FIR, Post Mortem, Medical Reports etc. shall be submitted to the Engineer in duly approved Labour Welfare Fund (LWF) Form;

i) The Contractor shall be liable for getting disbursement of Provident Fund benefits, compensation under Employee compensation Act, benefits of ESI Act to the workman/dependents of the deceased workman. The Contractor shall also provide accommodation and transportation to dependents of the deceased workman or to the disabled workman who come for settlement ofterminal claims.

2.15.11 **Accident Investigation:**

a) Investigations shall be conducted in an open and positive atmosphere that encourages the witnesses to talk freely. The primary objective is to ascertain the facts with a view to prevent future and possibly more serious occurrences;

b) Accidents and dangerous occurrences which result in death, serious injury or serious damage must be investigated by the Contractor immediately to find out the cause of the accident/occurrence so that measures can be formulated to prevent any recurrence; and

c) Near misses and minor accidents should also be investigated by the Contractor as soon as possible as they are signals that there are inadequacies in the ESHS Management System.

2.15.12 Procedure of Incident Investigation

It is important after any accident or dangerous occurrence that information relating to the incident is gathered in an organized way. The following steps shall be followed:

a) Take photographs and make sketches;

b) Examine involved equipment, work piece or material and the environmentalconditions;

c) Interview the injured, eye-witnesses and other involved parties;

d) Consult expert opinion where necessary; and

e) Identify the specific Contractor or subcontractor involved.

2.15.13 Having gathered information, it is then necessary to make an analysis of incident:

a) Establish the chain of events leading to the accident or incident;

b) Find out at what stage the accident took place;

c) Considering all possible causes and the interaction of different factors that led up to the accident and identify the most probable cause, the cause of an accident should never be classified as carelessness; and

d) The specific act or omission that caused the accident must be identified.

2.15.14 The next stage is to proceed with the follow-up action:

a) Report on the findings and conclusions;

b) Formulate preventive measures to avoid recurrence; and

c) Publicize the findings and the remedial actions taken.

2.15.15 The Engineer's Independent Incident Investigation

In case of fatal/dangerous occurrence, the Engineer shall also conduct independent investigation. The Contractor and his staff shall extend necessary co-operation and testify about the accident.

2.15.16 The Contractor shall take every effort to preserve the scene of accident till the Engineer completes the investigation.

2.15.17 All persons summoned by the Engineer in connection to witness recording shall obey the instructions without delay. Any wilful suppression of information by any person shall be removed from the site immediately and/or punished.

2.16 Emergency Preparedness Plan

2.16.1 The Contractor shall prepare, as required under BOCWR, an Emergency Response Plan for the Site as a part of the Contractor ESHS Management Plan. The plan shall integrate the emergency response plans of the Contractor and all other Subcontractors. The Emergency Response Plan shall detail the Contractor's procedures, including detailed communication arrangements, for dealing with all emergencies that could affect the Site. The plan shall address items such as injury, sickness, evacuation, fire, chemical spillage, severe weather and rescue.

2.16.2 The Contractor shall ensure that the Emergency Response Plan is prepared to deal with emergencies arising out of, but not limited to:

a) Fire and explosion;

b) Collapse of lifting appliances and transport equipment.

c) Collapse of building, sheds or structure etc.

d) Landslides getting workers buried, floods, earthquake, storms and other natural calamities etc.

The above list is not exhaustive and other emergencies can also be included.

2.16.3 Arrangement shall be made for emergency medical treatment and evacuation of the victim in the event of an accident or dangerous incident occurring, the chain of command and the responsible persons of the Contractor with their telephone numbers and addresses for quick communication shall be adequately publicized and conspicuously displayed in the workplace.

2.16.4 The Contractor shall require to tie-up with the hospitals and fire stations located in the neighbourhood for attending to the casualties promptly and emergency vehicle kept on standby duty during the working hours for the purpose.

2.16.5 The Contractor shall conduct an onsite emergency mock drill once in every quarter for all his workers and his sub-Contractor's workers.

2.16.6 It shall be the responsibility of the Contractor to keep the Local Law and other Authorities informed and seek urgent help to mitigate the consequences of an emergency. Prompt communication to the Employer and Engineer, through telephonically initially and followed by a written report, shall be made by the Contractor.

2.17 Experts/Agencies for Environment, Social, Health & Safety Services

2.17.1 The Contractors may utilise the services of experts/agencies empanelled for the purpose of training, audit and any other ESHS services with prior approval of the Engineer. This approval can be withdrawn by the Engineer at any time if the quality of output of the agency is found not satisfactory.

3.0 LABOUR PROTECTION

3.1 General

3.1.1 The Contractor shall comply in full of the project Workplace Policy as described in Attachment-2 [Work Place Policy on HIV/AIDS, Prevention & Control] and Attachment -3 [Covid 19 policy].

3.2 Engagement of Staff and Labour

3.2.1 The Contractor shall ensure that the employees deployed by him in the premises of the Employer are physically and mentally fit and do not have any criminal record.

3.3 Payment of Minimum Wages

3.3.1 The Contractor shall ensure payment of at least the minimum wages as prescribed and applicable from time to time under the Minimum Wages Act, 1948 in the presence of an authorised representative of the Engineer and shall maintain proper records of their timely disbursement. These records shall be preserved for a period of at least 3 years and made available even after the Contract is over for any verification by the statutory authorities.

3.4 Conditions of Labour

3.4.1 The Contractor shall observe conditions of labour that are no less favourable than those established for the relevant trade or industry.

3.4.2 During the work, the Contractor shall afford all employees all basic rights enumerated in the conventions of the International Labour Organisation, including freedom of association, right to freedom from forced labour, and right to freedom from discrimination based on race, colour, sex, religion, political opinion and social origin.

3.4.3 The Contractor shall ensure coverage of his employees under the Employees Provident Fund and Miscellaneous Provisions Act, 1952 and the Employees State Insurance Act, 1948 via independent code numbers allotted to them by the Central Provident Fund Organisation and Employees State Insurance Corporation respectively.

3.4.4 The Contractor shall insure all his employees under Group Personal Accident Insurance scheme through a recognised and registered insurance company.

3.5 Labour Laws

3.5.1 The Contractor shall ensure that all his employees and the Subcontractors obey applicable following laws and regulations, including those concerning safety at work.

a) Minimum Wages Act, 1948;
b) Payment of Wages Act, 1936;
c) Equal Remuneration Act, 1976;
d) Employees Provident Fund and Miscellaneous Provisions Act, 1952;
e) Employees State Insurance Act, 1948;
f) Maternity Benefit Act, 1951;
g) Child Labour (Prohibition and Regulation) Act, 1986;
h) Building and Other Construction Workers (Regulation of Employment of Service) Act, 1996;
i) Haryana Building and Other Construction Workers (Regulation of Employment and

Conditions of Service) Rules, 2005;

j) Building and Other Construction Workers Welfare Cess Act, 1996;

k) Building and Other Construction Workers Welfare Cess Rules, 1998;

l) Haryana Major Accident, Hazard Control Rules, 2009; and

m) Workmen's Compensation Act. 1923;

3.5.2 The Contractor shall comply with all other statutory requirements, rules, regulations and notifications in relation to employment of his staff and workers that may be issued from time to time by the concerned government authorities.

3.6 Working Hours

3.6.1 No work shall be carried out beyond the statutory limit given under BOCWA, 1996.

3.6.2 No work shall be carried out outside the normal working hours stated in the Contract unless otherwise:

a) The Engineer gives his consent in writing for additional work; and

b) The work is unavoidable or necessary for the protection of life or property or forthe safety of the Works, in which case the Contractor shall immediately inform the Engineer.

4.0 SAFETY GENERAL

4.1 General

4.1.1 The following standards whichever is more stringent shall be applicable:

a) The BOCW Acts 1996 and the Haryana BOCW Rules 2005 framed there under;
b) Other relevant National Legislations & IS Codes.

4.2 Housekeeping

4.2.1 General Housekeeping shall be carried out by the Contractor and ensured always at the Site, Construction Depot, Batching Plant, Labour Camp, Stores, Offices and Toilets/Urinals.

4.2.2 Full height fence, barriers, barricades etc. shall be erected around the Site to prevent the surrounding from excavated soil, rubbish etc., which may cause inconvenience to and endanger the public. The barricade especially those exposed to public shall be aesthetically maintained by regular cleaning and painting as directed by the Engineer. These shall be maintained in one line and level.

4.2.3 All surplus earth and debris are removed/disposed of from the working areas to officially designated dumpsites. Trucks carrying sand, earth and any pulverized materials etc. to avoid dust or odour impact shall be covered while moving. The tyres of the trucks leaving the site shall be cleaned with water, wherever the possibility of spillage on carriageways meant for regular road traffic exists

4.2.4 No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.

4.2.5 Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete, chips and brick etc. shall not be allowed on the roads to obstruct free movement of road traffic

4.2.6 Proper and safe stacking of material are of paramount importance at yards, stores and such locations where material would be unloaded for future use. The storage area shall be well laid out with easy access and material stored/stacked in an orderly and safe manner. Lumber with protruding nails shall be bent/removed and properly stacked.

4.2.7 Drip pans of suitable size shall be used to collect oil leakages and spills while plants/equipment/machinery maintenance.

4.2.8 The Contractor shall make available Material Supply Data sheet (MSDS) for material/chemicals/substances used at Site. Such material/chemicals/substances used shall be treated, handled, stored, transported and disposed off, by the Contractor, in a manner specified in the MSDS

4.3 Working at Height

4.3.1 Working at height means work in any place, including a place at or below ground level.

4.3.2 The Contractor shall ensure that work at height is properly planned, appropriately supervised, and carried out in a safe manner and without any appreciable risk. Appropriate care shall be taken during bad weather.

4.3.3 Adequate protection in the form of working platform with railing, toe board, safe access, safety net, roof ladder etc. shall be provided. Where fall hazards cannot be eliminated, use fall-arrest systems while erecting, modifying, and dismantling scaffolds.

4.3.4 A trained and certified person shall check working platform, railing, toe board, safe access, safety net, roof ladder etc. after erection and once in a week. A certificate shall be tagged on this equipment.

4.3.5 Employees involved in the erection, dismantling, moving, repairing, etc., of scaffolding and also workers who perform work on a scaffold shall receive training from a competent person. The purpose of the training is to recognize any hazards associated with the work.

4.3.6 When the height of a scaffold exceeds three times of the smallest width of the base, secure it to the building or structure at every other lift and every 9.0 m horizontally. The scaffold and scaffold working platform with handrails approximately 1.0 m high, mid rails, and toe boards, all secured rigidly by both ties and braces to prevent movement. Working platforms should be completely decked with safety planks, manufactured scaffold decking, or metallic planks.

4.3.7 Only metal frame working scaffold is permitted. Steel stairs are used as a means of raising and lowering the metal frame working scaffold, except for special cases. It is prohibited to directly raise and lower the framework with limbs or to use only ladder.

4.3.8 The Contractor shall ensure that following areas are clearly indicated:

a) where a workplace contains an area in which, owing to the nature of the work, there is a risk of any person at work;

b) Falling a distance; or

c) Being struck by a falling object:

4.3.9 The Contractor shall ensure that work equipment exposed to conditions causing deterioration, which is liable to result in dangerous situations, is inspected at suitable intervals and after any exception occurrence jeopardizing the safety of work/equipment.

4.3.10 In relation to work at height involved in construction work;

a) The top guard-rail or other similar means of protection shall be at least 1100 mm above the edge from which any person is liable to fall;

b) Toe-boards shall be suitable and sufficient to prevent the fall of any person, or any material or object, from any place of work; and

c) Any intermediate guardrail or similar means of protection shall be positioned sothat any gap between it and other means of protection does not exceed 550 mm.

4.3.11 Requirements for all Working Platforms:

a) Every working platform requires a firm & stable supporting structure for holding it;

b) A working platform shall possess a suitable surface and be so constructed that the surface of the working platform has no gap through which a person/material/object could fall;

c) A working platform and any supporting structure shall not be loaded to give rise to a risk of collapse or to any deformation, which could affect its safe use;

d) When altered or modified, it should be so altered or modified as to ensure that it remains stable;

e) A working platform shall be of sufficient dimension to permit the safe passage of persons and the safe use of any plant or materials required to be used and to provide a safe working area having regard to the work being carried out there;

f) Depending on the complexity of the scaffolding selected, a responsible person shall draw up an assembly, use and dismantling plan;

g) A copy of the plan, including any instructions it may contain, shall be kept available for the use of persons concerned in the assembly, use, dismantling or alteration of scaffolding until

it has been dismantled; and

h) While a scaffold is not available for use, including during its assembly, dismantling or alteration, it shall be marked with general warning signs in accordance with and be suitably delineated by physical means preventing access to the danger zone.

4.3.12 Requirements for collective safeguards for arresting falls:

a) Collective safeguard is a safety net, airbag or other collective safeguard for arresting falls;

b) A safeguard shall be used only if:

i) A risk assessment has demonstrated that the work activity can (so far as is reasonably practicable) be performed safely while using it and without affecting its effectiveness;

ii) The use of other safer work equipment is not reasonably practicable; and

iii) A sufficient number of available persons have received adequate training specific to the safeguard, including rescue procedures.

4.3.13 Requirements for personal fall protection systems:

a) A personal fall protection system shall be used only if a risk assessment hasdemonstrated that;

i) The work can (so far as be reasonably practicable) be performed safely while using that system; and

ii) The use of other safer work equipment is not reasonably practicable.

The user and a sufficient number of available persons have received adequate training specific to the operations envisaged, including rescue procedures; and

b) A personal fall protection system designed for use with an anchor shall be securely attached to at least one anchor, and each anchor and the means of attachment thereto shall be suitable and of sufficient strength and stability to supporting any foreseeable loading.

4.3.14 Requirements for Ladders:

a) Every Contractor shall ensure that a ladder is used for work at height only if a risk assessment has demonstrated that the use of more suitable work equipment is not justified because of the low risk;

i) The short duration of use;

ii) Existing features on the Site, which he cannot alter;

b) Only metal ladders shall be allowed. Bamboo ladders are prohibited;

c) Any surface upon which a ladder rests shall be stable, firm, of sufficient strength and of suitable composition safely to support the ladder so that its rungs or steps remain horizontal, and any loading intended to be placed on it;

d) A ladder shall be so positioned as to ensure its stability during use;

e) A suspended ladder shall be attached in a secure manner and so that, with the exception of a flexible ladder, it can not be displaced and swinging is prevented.

f) A portable ladder shall be prevented from slipping during use by:

i). Securing the stiles at or near their upper or lower ends;

ii). An effective anti-slip or other effective stability devices; or

iii). Any other arrangement of equivalent effectiveness.

g) A ladder used for access shall be long enough to protrude sufficiently above the place of landing to which it provides access, unless other measures have been taken to ensure a firm

handhold.

h) No interlocking or extension ladder shall be used unless its sections are prevented from moving relative to each other while in use;

i) Where a ladder or run of ladders raises a vertical distance of 9.0 m or more above its base, there shall, where reasonably practicable, be provided at suitable intervals sufficient safe landing areas or rest platforms;

4.4 Overhead Protection

4.4.1 The Contractors shall provide overhead protections as per BOCW Act & Haryana BOCW Rules.

4.5 Slipping, Tripping, Cutting, and Falling Hazards

a) The Contractor shall follow guideline of Slipping, Tripping, Cutting and falling hazards as Per Rule 98 of HBOCWR.

b) Sharp projections or any protruding nails or similar objects shall be suitably guarded or shall even be avoided to make the place safe to work and All places should be free from dust, debris or similar materials;

c) Suitable safety net shall be provided at places of material / man falling is possible in accordance with national standards.

d) Reinforcement of pier/columns/walls/abutments shall be secured from the risk of tilting through provisioning of minimum four guy wires ropes/ steel bracing anchored to any concrete block/counterweight of sufficient capacity.

e) The Collapse of formwork in the construction industry has the potential for severe injury and death. The four stages of the use of formwork (erection, adjustment, concrete placement and dismantling) all need to be managed in a risk assessment framework. Implementing suitable control measures can eliminate or reduce the potential for events such as the collapse of formwork. Suitable control measures include:

i). Keeping the documentation for the formwork at the workplace;

ii). Follow the schematic drawing for erection of formwork;

iii). Erecting the formwork on foundations which will support the loads to be imposed on the formwork;

iv). Not erecting formwork near excavation;

v). Ensuring materials used in the erection of formwork are not defective;

vi). Securing loose material which may be dislodged as a result of inclement weather;

vii). Inspecting the formwork assembly before and during the placement of concrete;

viii). Not attaching equipment to the formwork assembly unless specifically designed for this purpose; and not using a stripping process which may cause damage to the permanent structure.

4.6 Lifting Appliances including Cranes

4.6.1 Lifting appliances means a crane, hoist hydra, derrick, winch, gin pole, sheer legs, jack, hoist drum, slewing machinery, slewing bearing fasteners, lifting machinery sheaves, pulley blocks, hooks or other equipment used for lifting materials, objects or the Workers and lifting gears means ropes, chain slings, shackles, hooks, lifting lugs, wire ropes, lifting eyebolts and eye nuts and other accessories of a lifting appliance.

4.6.2 Each of the lifting appliances and lifting gear including all parts thereof, whether fixed or moveable shall be thoroughly tested and examined by a competent person once at least in every 6 months or after it has undergone any alterations or repairs liable to affect its strength or stability. Within

the validity, if the lifting appliances are shifted to a new site, re-examination by the competent person for ensuring its safety shall also be done.

4.6.3 The Contractors shall utilize the services of any competent person as defined in Factories Act, 1948 with the permission of the Engineer.

4.6.4 No machine shall be selected to do any lifting on a specific job until its size and characteristics are considered adequate:

a) The weights, dimensions and lift radii of the heaviest and largest loads;

b) The maximum lift height, the maximum lift radius and the weight of the loads that must be handled at each;

c) The number and frequency of lifts to be made;

d) How long the crane will be required on site;

e) The type of lifting to be done (for example, is precision placement of loads important;

f) The type of carrier required (this depends on ground conditions and machine capacity In its operating quadrants: capacity is normally greatest over the rear, less over the side, and non-existent over the front;

g) Whether loads will have to be walked or carried;

h) Whether loads will have to be suspended for lengthy periods;

i) The site conditions, including the ground where the machine will be set up, access roads and ramps it must travel, space for erection and any obstacles that might impede access or operation.

4.6.5 The Contractor shall ensure that a valid certificate of fitness issued is available for all lifting appliances including synchronized mobile jacks, pre-stressing hydraulic jacks, jacks fitted with launching girders etc. and the Engineer approval is obtained before inducting to the site. Only after obtaining the approval from the Engineer any lifting appliances and gear shall be used.

4.6.6 The laminated photocopies of fitness certificate issued by competent person, the Engineers approval letter, the operators photo, manufactures load chart and competency certificate shall always be either kept in the operator cabin or pasted on the visible surface of the lifting appliances.

4.6.7 All lifting appliances and loose gears shall be clearly marked for its safe working load and identification by stamping or other suitable means.

4.6.8 The Contractor shall also maintain a register containing a system of identification of all tools and tackles, its date of purchase, safe working load, competent person date of examination etc.

4.6.9 Sufficient lighting arrangement shall be ensured at all lifting operations.

4.6.10 **Qualification of operator of lifting appliances etc.:** The Contractor shall not employ any person to drive or operate a lifting machine-like crane, hydra etc. whether driven by mechanical power or otherwise or to give signals to work as an operator of a rigger or derricks unless he:

a) Is above 21 years of age and possesses a valid heavy transport vehicle driving license as per Motor Vehicle Act and Rules;

b) Is competent and reliable;

c) Possesses the knowledge of the inherent risks involved in the operation of lifting appliances by undergoing a formal training at any institution of national importance acceptable to the Engineer; and

d) Is medically examined periodically as specified in schedule VII of BOCW Rules.

4.6.11 All hydraulic piping and fittings shall be maintained leak proof.

4.6.12 Only four legged slings shall be allowed which includes master link (ring), intermediate master link (ring) if necessary, chain / wire rope sling, sling hook or other terminal fitting.

4.6.13 Hand spliced slings up to 32mm diameter shall not be used at site for any lifting purpose. The slings used shall confirm to IS 2762: 2009 Wire rope slings and sling leg specification.

4.6.14 No load shall be slewed over public areas without stopping the road traffic first.

4.6.15 Automatic safe load indicator (ASLI) to be provided in crane with audible and visible warning system and made functional and calibrated by the manufacturer or its authorized representative every 6 months or after repair of the lifting equipment.

4.6.16 **Automatic safe load indicators and data logger in lifting appliances**

As stipulated in Rule 123 of HBOCW Rules, every lifting appliances and gears like cranes, hydras etc., if so constructed that the safe working load may be varied by raising or lowering of the jib or otherwise, shall be attached with an automatic indicator of safe working loads approved by Bureau of Indian standards/International certifying bodies which gives a warning to the operator whenever the load being handled exceeds the safe working limit.

a) Provision of functional data logger with alert facility through SMS and web in all cranes shall be mandatory;

b) Cut-out shall be provided which automatically arrests the movements of thelifting parts of every crane if the load exceeds the safe working limit.

4.6.17 The crane should have a substantial/durable safe working load chart which has clearly legible characters in English and Hindi and figures displayed inside the crane and is easily visible to the crane operator.

4.6.18 General Requirements

The sweep area (work area) of the construction machinery shall be always free from obstructions. All hydraulic piping and fittings shall be maintained leak proof. The operator cab shall posses good and safe:

a) Structure, windows and windshield wipers;

b) Drivers chair and footrest;

c) Control handles;

d) Cab instrumentation;

e) Telecommunication;

f) Cab outfitting;

g) Wind indicator with an adjustable set point shall be in a position representative for the wind on the crane. The indicator shall give continuous information regarding constant speeds and gusts.

4.6.19 Mandatory Rigging requirement

a) Rigging shall be done under experienced and qualified rigger only. All Load shall be adequately and safely rigged to prevent any danger;

b) The primary requirement in rigging shall be to assess the weight of load before attempting any lift;

c) All hooks shall be fitted with Master Rings having certificate of fitness from the competent person, so that the hooks are subjected to balanced vertical loading only;

d) Only four legged slings shall be allowed which includes master link (ring), intermediate master link (ring) if necessary, chain / wire rope sling, sling hook or other terminal fitting;

e) Requirements of outriggers

i) All outriggers shall be fully extended and at all tyres are clear of theground;

ii) Heavy duty blocking having large bearing area shall be necessary to prevent sinking of floats;

iii) Provision of heavy steel plates/ high density interconnected wooden logs of required dimension shall be used to uniformly distribute the load;

iv) The crane shall be setup on fully compacted ground;

4.6.20 Pick & carry operation

Prohibition on Use of "Tractor transmission type Pick and Carry Hydra Crane": Tractor transmission type Pick and Carry-1st Generation model is prohibited at HORC Project works. Contractor shall mobilize "Truck transmission type" Pick and Carry (Hydra)Crane– minimum 2nd Generation model only or higher model.

4.6.21 Operation of lifting appliances

Every Contractor shall ensure that:

a) The complete lifting operation shall be governed by signals as per established standards;

b) Adequate measures to be taken to ensure that no workers is allowed to stand, pass, rides or sit under the suspended load;

c) No lifting appliances shall be left by the operator while power is on or load is suspended;

d) After completion of the lifting operation, all doors of the appliances shall be closed by the operator and ignition/operation key should be handed over to competent reliever operator or site In-charge;

e) All loads are provided with minimum two tag lines to ensure that the load can be controlled at all times;

f) No close working to any live over head power line is permitted without system of a 'Permit to Work' and prior permission of the engineer shall be obtained before performing such operation;

g) Danger zone shall be identified and cordoned off for all lifting appliances during their operation;

h) All lifting gears & slings shall be stamped or appropriate tags for their identification no & SWL;

i) Knotting/wrapping of chains & slings shall not be allowed at site;

j) Lifting appliances shall not be used for any dragging or pulling purposes. Contract shall refer to 75% capacity load chart for ascertaining the suitability of crane for safe lifting of load;

k) During tandem lift, available capacity of crane in respect of SWL shall be considered after reduction of 15% for 75% (DIN) load chart respectively. In addition, additional de rating as advised by third party testing and certified agency shall also apply;

l) During hoisting of long material, use of suitable lifting beam is recommended;

m) Only original equipment manufacturer (OEM) supplied/provided load chart shall be used during lifting operation;

n) Before performing any lifting operation, all electronic devices, control levers, hydraulic oil, wind pressure etc. shall be checked and necessary spare parts to be kept in stock to handle any breakdown during time bound lifting operation;

o) Lifting point shall be considered on the I-Girders/U Girder/C Girder/Steel girder/parapet etc.

during the casting of the same. Design load calculation for the same should be conducted;

p) All lifting activities shall be stopped in case of high speed wind and similar adverse whether condition or as prescribed by the crane manufacturer; and

q) All cranes shall be provided with fail safe devices to avoid any hoist free fall in case of brake failure.

4.7 Launching Operation

4.7.1 As launching operation is one of the riskiest jobs, the Contractor shall take utmost precaution at all stages like; planning, establishing casing yard, casting segments, transporting segments, fabrication and erection of launching girders, launching of segments, pre-stressing, auto launching of girders and dismantling of launching girders.

4.7.2 The Contractor shall prepare a comprehensive Method Statement for the launching operation, adhering to the ESHS conditions laid down in conditions of contract on the ESHS Management Manual. Reference shall be made to the provisions on working at height. As the entire process of launching must be undertaken at an elevated level the safety of workers and the girder is paramount important. In addition to general precautions, such as trained personnel, PPE, etc. listed in earlier clauses, the following general guidelines shall be adhered to throughout the launching operation:

a) The segments shall rigidly secure to the truck with necessary wooden wedges and necessary red indicators/safety tapes provided so that the vehicle is clearly seen by other road users both in day/night time;

b) Every launching operation shall have a responsible engineer on duty all the time;

c) All the time from erection to dismantling the area between the two piers wherein launching is in progress shall always be barricaded;

d) Auto launching shall be done only after approval from the Engineer. After every auto launching the stability of launching girder shall be ensured;

e) The vertical deflection of launching girder shall be monitored at all critical stages like with/without loads and after every auto launching;

f) A register containing all important operational details from erection to dismantling of launching girders shall be maintained and made available to the Engineer whenever called for;

g) Driver shall also have undergone proper medical examination as per sub-Clause-5.2 (Medical Facilities) and checked for influence of alcohol before any kind of lifting operation;

h) Test certificate for all lifting gears including Macalloy Bars shall be maintained at a

i) location closer to the launching girder itself so that it can be referred during all inspections;

j) Proper & safe access stairways shall be maintained for safe ascending /descending of workmen /engineers to or from launchers;

k) Adequate collective and personnel fall protection measures like provision of safety nets while working over live roads/railways, lifeline for anchoring of safety harness, safe means of access on main box girder shall be ensured;

l) Before starting of the launching, valid third party test certificate of the launcher hoist shall be available;

m) Safe and fully deck working platform duly covered from all side shall be ensured for stressing work at front support;

n) Safety checklist for all activities of launching cycle shall be prepared, got approved & implemented;

4.8 Construction Machinery

4.8.1 Construction machineries may include dumpers and dump trucks, lift trucks and telescopic handlers, piling rigs, vibration hammers, rail welding equipment, mobile elevating work platforms, cranes, tipper lorries, lorry loaders, skip wagons, 360° excavators, 180° backhoe loaders, crawler tractors, scrapers, graders, loading shovels, trenchers, side booms, pavers, planers, chippers, road rollers, locomotives, tankers and bowsers, trailers, hydraulic and mechanical breakers etc.

4.8.2 Every construction equipment shall be in sound mechanical working condition and certified by either competent person under Factories Act or manufacturers' warranty in case of brand new equipment or authorized persons/firms approved by the Engineer before induction to any site.

4.8.3 Fitness of the machine shall be carried out on regular basis or after every maintenance work excluding any minor service/oil or filter change and be documented properly. The certificate shall be available in operator/driver cabin.

4.8.4 All vehicles shall be fitted with audible reverse alarms and maintained in good working condition. Reversing shall be done only when there is adequate rear-view visibility or under the directions of a banksman.

4.8.5 **General operating procedures:** Drivers entering site shall be instructed to follow the safe system of work adopted on site. These shall be verbal instructions or, preferably, written instructions showing the relevant site rules, the site layout, delivery areas, speed limits, etc.

a) No passengers shall be carried, unless specific seating has been provided in accordance with the manufacturer's recommendations;

b) Working on gradients beyond any equipment's capability shall not be allowed.

c) Prevention of dumper and dump truck accidents should be managed by providing for adequate lateral clearances, wheel stops at a sufficient distance from the edgesof excavations, spoil heaps, pits, markers, etc.;

d) No construction material, other than soil shall be carried in excavator buckets;

e) When two or more scrapers are working on the same job, a minimum distance of at least 25m shall be kept between them;

f) Every contractor shall ensure that Competency certificate for driver/operatorsshall be issued by their Plant and Machinery In-charge. The certificate shall be pasted on the machine body in such a way that drivers/operator vision is nothindered;

g) Checklist shall be prepared for all construction machinery and be filled on daily basis by the operator and be counter signed by plant & machinery person;

h) Provision of helper is mandatory for each construction appliances and vehicles during their movement inside and outside of site; and

i) All wood working machines shall be fitted with suitable guards and devices such astop guard, riving knife, push stick, guards for drive belts and chains, and emergency stop switch easily accessible by the operator.

4.9 Machine Guarding

4.9.1 The Contractor shall ensure at the site all motors, cog wheels, chains and friction gearing, fly wheels, shafting, dangerous and moving parts of machinery are securely fenced or legged.

4.9.2 Fencing of dangerous parts of machinery shall not be removed while the machinery is in use or in motion and when removed, it shall be replaced as soon as practicable and in any case before the machinery is again brought into use.

4.10 Site Electricity

4.10.1 The Contractor shall refer to the applicable guideline "Indian Electricity Rules, 1956" and any

amendment thereafter. ESHS requirements are:

a) Graduate Electrical Engineer having Electrical Supervisory Competency Certificate.

b) Diploma Electrical Engineer having Electrical Supervisory Competency Certificate.

c) ITI Certificate Holder Electrician with Wiremen Permit; and

d) Assessment of Electrical Load and properly designed power distribution system;

4.10.2 The Contractor shall assess the size and location of the electrical loads and the manner in which they vary with time during the currency of the Contract.

4.10.3 The Contractor shall elaborate as to how the total supply is to be obtained/generated. The details of the source of electricity, earthing requirement, substation/panel boards, distribution system shall be prepared and necessary approval from the Engineer obtained before proceeding of the execution of the job.

4.10.4 The main Contractor shall take consideration, the requirements of the Subcontractors' electric power supply and arrive at the capacity of main source of power supply from diesel generators.

4.10.5 No electrical equipment shall be put into use where its strength and capability may be exceeded in such a way as may give rise to danger.

4.10.6 Adverse or Hazardous Environments:

a) Power supply from public utility service provider is preferable;

b) The Contractor shall provide sufficient ELCBs (maintain sensitivity 30 mA)/ Residual Current Circuit Breakers (RCCBs) for all the equipment (including Potable equipment), electrical switchboards, distribution panels etc. to prevent electrical shocks to the Workers;

c) Lightening Protection for all structures, gantry, metal portable cabins, silos etc; Lighting ought not to introduce the risk of electric shock. Therefore, 230V supplies should be used for those fittings, which are robustly installed, and well out of reach e.g. flood lighting or high-pressure discharge lamps;

d) No single insulation cable shall be used;

e) Cables shall be selected after full consideration of the condition to which they shall be exposed and the duties for which they are required. Supply cable up to 3.3 kV shall be in accordance with BS 6346:1997;

f) Cables buried directly in the ground shall be of a type incorporating Armor or metal sheath or both;

g) Cabling passing under the walk way and across way for transport and mobile equipment shall be laid in ducts at a minimum depth of 0.6 m;

h) The Contractor shall ensure plugs, socket-outlets, and couplers available in the Site as "splash EM proof" type. The minimum degree of Ingress Protection should be of IP44 in accordance with BS EN 60529;

i) Only plugs and fittings of the weather proof type shall be used and they should be colour coded in accordance with the Internationally recognised standards for example as detailed as follows:

    i) 110 volts: Yellow;

    ii) 240 volts: Blue;

    iii) 415 volts: Red.

j) No loose connections or tapped joints shall be allowed anywhere in the Site, office area, stores and other areas also;

k) All equipment shall have the provision for major switch/cut-off switch in the equipment itself;

l) Isolate exposed high-voltage (over 415 Volts) equipment, such as transformer banks, open switches, and similar equipment with exposed energized parts and prevent unauthorised access;

m) All temporary metal structures like barricade boards, temporary metal containers/shed etc. shall be adequately earthed through suitable means;

n) All the earth pits shall be properly numbered along with display of resistance value and inspection records of the same shall be maintained

4.10.7 Work on or near live conductors

No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless-

a) It is unreasonable in all the circumstances for it to be dead;

b) It is reasonable in all the circumstances for him to be at work on or near it while it is live; and

c) Suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

4.10.8 Whenever pilling work is undertaken manually through tripod in the influence zone of live OHE, method statement shall be prepared, submitted and got approved before start of work.

4.10.9 All electrical equipment should be permanently numbered, and a record kept of the date of issue, date of last inspection and recommended inspection period.

4.10.10 Appropriate electrical protection shall be provided for all circuits, against overload, short circuit and earth fault current.

4.10.11 For supplies to mobile or transportable equipment where operating of the equipment subjects the cable to flexing, the cable shall conform to any of these codes BS 6007/BS 6500/BS 7375.

4.10.12 Flexible cords with a conductor cross sectional area smaller than 1.5 mm2 shall not be used and insulated flexible cable shall conform to BS 6500 and BS 7375.

4.10.13 Power Tools:

The Contractor shall ensure that:

a) Electric tools are properly grounded or/and double insulated;

b) Ground Fault Circuit Interrupters (GFCIs)/Residual Current Circuit Breakers (RCCBs) shall be used with all portable electric tool operated especially outdoors or in wet condition;

c) Only trained employees shall use explosive actuated tools and the tool shall also be

d) unloaded when not in use;

e) Usage of such explosive actuated tools shall be avoided in case of places where explosive/flammable vapours or gases may be present;

f) Explosive actuated tools and their explosives shall be stored separately and be taken out and loaded only before the time of immediate use; and

g) Misfired cartridges of explosive actuated tools must be placed in a container of water and be removed safely from the project.

4.11 Illumination

4.11.1 The Contractor shall provide sufficient site lighting, of the right type and at the right place for it to be properly effective as per the relevant national standards & guidelines.

4.12 Welding and Cutting

4.12.1 Gas cylinders in use shall be kept upright on a custom-built stand or trolley fitted with a bracket to accommodate the hoses and equipment or otherwise secured. The metal cap shall be kept in place to protect the valve when the cylinder is not connected for use.

4.12.2 Test Certificate for cylinders and Vendor license shall be obtained. Gas Cylinder Act & Rules shall always be followed at workplace.

4.12.3 All gas cylinders shall be fixed with pressure regulator and dial gauges. clamp or clip shall be used to connect hoses firmly in both sides of cylinders and torches.

4.12.4 Non-return valve and flashback arrester shall be fixed at both end of cylinder and torch.

4.12.5 Domestic LPG cylinders shall not be used for gas welding and cutting purpose.

4.12.6 Dry Chemical Pressure (DCP) or CO2 type Fire Extinguisher not less than 5 kg shall be fixed at or near to welding process zone in an easily accessible location. Fire extinguisher should confirm to IS 2190:1992.

4.12.7 Oxygen cylinders and flammable gas cylinders shall be stored separately, at least 6.6 m (20 feet) apart or separated by a fireproof, 1.5 m (5 feet) high partition. Flammable substances shall not be stored within 15m of cylinder storage areas.

4.12.8 Welding grounds and returns should be securely attached to the work by cable lugs, by clamps in the case of stranded conductors, or by bolts for strip conductors. The ground cable will not be attached to equipment or existing installations or apparatus.

4.12.9 All electrical installations shall meet the IS: 5571: 1997 and NFPA 70 for gas cylinder storage area and other hazardous areas.

4.12.10 Use firewatchers if there is a possibility of ignition unobserved by the operator (e.g. on the other side of bulkheads).

4.12.11 Transformer used for electrical arc welding shall be fixed with ammeter and voltmeter and fixed with separate main power switch.

4.12.12 Use a low voltage open circuit relay device if welding with alternating current in constricted or damp places.

4.12.13 The current for Electric arc welding shall not exceed 300 A on a hand welding operation.

4.13 Excavation General

4.13.1 References:

a) The Haryana Building and other construction workers (Regulation of Employment of conditions of Service) Rules, 2005;

b) IS: 3764 -1992 (Re-affirmed 1996): Code of Safety for Excavation Work;

c) IS: 4756 -1978 (Reaffirmed 1996): Safety Code for Tunnelling Work;

d) IS 4081:2013 Blasting and related drilling operations-code of safety.

4.13.2 The Contractor shall ensure:

a) Where any construction & building worker engaged in excavation is exposed to hazard of falling or sliding material or article from any bank or side of such excavation which is more than 1.5 m above his footing, such worker shall be protected by adequate piling and bracing against such bank or side;

b) Undercutting during excavation shall be avoided. Whenever it is inescapable and banks of an excavation are undercut, adequate shoring is provided to support the material or article overhanging such bank;

c) Excavated material is not stored at least 0.65 m from the edge of an open excavation or trench and banks of such excavation or trench are stripped of loose rocks and the banks of such excavation or trench are stripped of loose rocks and other materials which may slide, roll or fall upon a construction building worker working below such bank;

d) Metal ladders and staircases or ramps are provided, as the case may be, for safe access to and egress from excavation where, the depth of such excavation exceeds 1.5 m and such ladders, staircases or ramps comply with the IS 3696 Part 1&2 and other relevant national standards;

e) Trench and excavation is protected "against falling on a person by suitable measures if the depth of such trench or excavation exceeds 1.5m and such protection is an improved protection in accordance with the design and drawing ofa professional engineer, where such depth exceeds 4.0m;

f) Full height fence, barriers etc. will be installed at the site in order to preserve the surrounding area from excavated soil, rubbish etc. which may cause inconvenience to public.

4.13.3 Warning Signs and Notices:

The Contractor shall ensure that suitable warning signs or notices, required for the safety of workers carrying out the work of an excavation, shall be displayed or erected at conspicuous places in Hindi and in a language understood by most of such workers at such excavation work.

4.14 Material Transportation

4.14.1 The Contractor shall develop the method statement for heavy/big material/machinery transportation such as Rolling Stock, Transformer, and Bridge Main Girder, etc.

4.14.2 The Contractor shall ensure that the person in charge should inspects the safety implementation like properly fixing of wire with vehicle slab bed, condition of vehicle breaks etc. before starting the job.

4.14.3 The Contractor shall ensure that every vehicle/moving machinery should have a signal man who has a whistle, a flag or a signal light (in the night) with striking clothes and stands at a safe visible place from a machine operator by means of the proper signal and way determined.

4.14.4 Training related to moving and parking safely should be given to driver/operator like parking construction vehicles at a specified place with a parking brake and making sure to put a drag.

4.15 Foundation Works

The Contractor is required to evaluate the risk in each activity and suggest a control measures of piling works:

a) Covering of bore holes with adequate warning signs;

b) Cage to be lowered by using crane;

c) The auxiliary hook of the rig shall not be used to pull or lower the cage in bore hole;

d) The tremie pipe lowering and lifting after concreting shall be done by using crane;

e) Control measure to arrest polymer spillage from the Site to avoid contaminating the surface drains;

f) An entry restraining fence shall be provided around the pier excavation completion;

g) No man suffering from any chronic disease, alcoholic excess, ear or heart troubles or having a sluggish blood circulation or who has excess of fat should be employed as a diver;

4.16 Batching Plant and Casting Yard

The Contractor is required to evaluate the risk in each activity and suggest Control Measures:

a) Adequate space between the casting bed, segment storage area and the adjoining road shall be

maintained so that a steel railing could be installed to segregate the gantry crane movement area from the road;

b) All safety precautions stated in Sub-Clause 4.8 [Construction Machinery], Automatic Safe Load Indicator (ASLI) for crane and gantry shall be complied during erection of gantry crane and other equipment;

c) The aggregate/sand storage area shall be kept under the full coverage of effective water sprinkler to avoid dust generation;

d) The entire batching plant/aggregate storage Area shall be adequately walled of sufficient height, above which the Contractor is required to erect green dust protective net. This is a mandatory requirement to avoid dust in surrounding environment;

e) The batching plant and casting yard required to obtain ''Consent to Establish'' and ''Consent to Operate'' certificate from State Pollution Control Board;

f) LOTO (Lock Out Tag Out) system shall be installed.

g) The batching plant/casting yard shall be barricaded and made as a compulsory Personal Protective Equipment (PPE) zone;

h) Time office, canteen, drinking water, toilet and rest place shall be suitably located for the easy access to workers. All the facilities shall be properly cleaned and maintained during the entire period of operation;

i) Drainage shall be effectively provided, and waste water shall be disposed after proper treatment; and

j) Manual handling of cement shall be avoided. Whenever it is necessary the workmen shall be given full body protection, hand protection and respiratory protection as a basic measure of ensuring better health.

4.17 Form Works

a) Ensure the inspection of formwork assembly before and during the placement of concrete; and

b) Ensure no attaching equipment to the formwork assembly unless specifically designed for this purpose; and not using a stripping process which may cause damage to the permanent structure.

4.18 Concrete Works

a) Concrete pumping equipment, trucks etc. are not to be washed down on site and any waste-water, concrete slurry or other contaminants are to be contained, ball catcher should be used during washing of the concrete; and

b) These contaminants are not to be discharged into or onto roadways, footpaths, gutters, drainage systems, watercourses or any other surface area that will result in damage to the environment or contravenes environmental legislation.

4.19 Pier Casting Works

a) Using crane to hold the pier reinforcement during the time gap between de-staging and placement of shutter; and

b) Location and pier height specific securing arrangement and specific Method Statement for pier more than 9.0 m shall be submitted and approved by the Engineer.

4.20 Bridge Erection Works

4.20.1 References:

a) The BOCW Acts and Rules;

b) The Haryana BOCW Rules 2005;

c) Indian Railways Bridge Manual; and

d) Safety Assessment with regard to Steel Bridge Erection Works 1985, Ministry of Health, Labour and Welfare;

4.20.2 General

As bridge erection works are one of the riskiest jobs, the Contractor shall take utmost precaution at all stages like; planning, establishing temporary yard, casting segments, transporting segments, fabrication and operation of erection machinery, if any, launching of segments/lifting of segments, pre-stressing, cutting and welding, auto (or manual) launching and dismantling of erection machineries. For pre-stressed concrete bridges, the Contractor shall further ensure that:

a) a responsible person should be appointed for post-tensioning works testing and inspection of tendon tensioning devices and using material;

b) installation of protective board behind a tensioning jack and keep out behind a jack during tensioning;

c) use of protective glasses, laver gloves, and masks during grouting for safety of the Workers; and

d) fall prevention installation of overall boarding at the bottom of a bridge and installation of funnel type boarding at the side of a bridge during construction in case of RFO (Railway Flyover) or ROB (Road over Bridge) for preventing the flying and fall of materials and tools by safety net, should be ensured.

4.20.3 The Contractors Obligation

The Contractor shall prepare a comprehensive method statement for the bridge erection works, adhering to the ESHS conditions laid down herein. Particular reference shall be made to the provisions on working at height. As the entire process of launching/lifting has to be undertaken at the Site especially during night time, the safety of workers is of paramount important. Daily inspection of scaffold structure and mechanical equipment for the traveller crane should be done.

4.20.4 Basic Consideration under Site Condition:

Erection works over or adjacent roads or highways:

a) The work area should be demarcated properly, and route map and traffic management plan should be developed and implemented with proper signages and

b) caution;

c) The Contractor shall ensure the implementation of proper stop traffic and detour plan;

d) The Contractor shall arrange the proper guide and signs to be followed while working on highway or adjacent roads, railways; and

e) The Contractor should plan and establish all the required measures for the protection of overhead wires and buried utilities.

i) The regular inspection is done for all the installed protection equipment;

ii) The movement restriction site plan to be developed with defined operation path for safe working at site;

iii) watchmen should be appointed who are given training related to all type of traffic management and all signals used for smooth traffic flow and site transportation and works;

iv) The railway schedule is taken in consideration while planning the site works and ensures the safe management system with the details given regarding the kind of works suspended while a train is passing and clarifying the way of opening or closing railway in case of track

closure works. For steel truss bridges;

v) The Contractor must install the protective net just after erecting truss upper chord material;

vi) The Contractor must install safety operation path to an end of erected member and a cross point of lateral bracing;

The Contractor may use any of the erection methods. However, following general points will be kept in view and ensured as applicable-

A. The Contractor should develop and confirm the Engineer his Method Statement with details of position of bearing, jacking operation, roller passing etc.;

B. Detailed inspection report related to the movement and condition of superstructure from the place of launching equipment and rollers should be given to the Engineer;

C. The Contractor shall give confirmation of binding situation such as a bolting erection member;

D. The Contractor shall give confirmation of displacement per every erection phase;

E. The Contractor shall give confirmation of fixing situation for bearings;

F. The Contractor must take measures to avoid a fall and lateral buckling of member; and

G. The Contractor shall take measures of fall prevention for main superstructure.

4.21 Building and Roof Erection Works

4.21.1 The Contractor shall prepare plan, erection sequence and work procedures properly under competent and experienced personnel to ensure the safety of workers and prevent structure failure during erection:

a) Contractor shall develop and confirm with the Engineer his method statement with details;

b) The stability of structural members is to be ensured by means of ties, braces, anchor/fixing bolts, or other suitable means before releasing lifting gear, slings, chains etc;

c) Tag lines must be attached to the ends of components/loads to maintain control during crane lifting operations;

d) Structure stability is to be ensured always. Unattended and incomplete buildings/structures are NOT to be left in an unsafe and hazardous condition, to pose a risk to the safety and health of site personnel or the public;

e) The Workers placing and securing roof battens are to be protected and are to work from an enclosed environment (e.g. scaffolding, deck guardrail or equivalent) and work up from the bottom of the truss/rafter towards and finish at the ridge /peak of the roof framing; and

f) When the spacing of trusses and roof battens exceed 600mm the appropriate procedures are to be considered and applied after conducting a risk assessment to provide the optimum fall protection.

4.22 Overhead Contact Wire Works

4.22.1 During starting of works using rack vehicle/moving scaffold/ladder/insulation tower/step ladder, etc., the Contractor's operation in charge shall confirm as follows:

a) The work sequence shall be determined while using Ariel Track vehicle. Communication system between drivers and conductors shall be developed and adopted;

b) A deck which must be used by workers, shall have enough capacity of carry necessary loads for work at a high place with a pre-operation inspection;

c) The workers shall be given the safety protection equipment which has enough capacity to hold necessary loads to prevent any accidental fall with a pre-operation inspection;

d) State of electrical equipment installation and a route of going up and down from ground;

e) The Worker is given required training for electrical works at height and the Worker must use a safety rope, an auxiliary rope, a fall prevention equipment such as a rolip which is a fall arrest device for a fixed rope when they work at high place;

f) The Worker shall fix the grip of an auxiliary ropes at the upper position of their safety ropes and uses special wires or a lift when delivering materials and tools from ground to high place;

g) The Contractor shall ensure that no one lean out of the rail of the track vehicles, or take a foot on the rail; and Shall take all the precautions for self-propellant or roll prevention when bringing the track vehicle to a stop;

h) The installation of medium rail at the place where handrail is more than 85cm high;

i) The training is given to all, for putting on a foot brake when bringing the rolling tower to a stop or working on the deck of the rolling tower suspended;

j) Putting on a foot brake and fixing the insulation tower by an assistant when bringing the insulation tower to a stop or working on its suspension;

4.22.2 While going up and down along an Electric Pole, Power Pylon or a High Steel Structure or working above it, the Contractor shall ensure the safety precautions mentioned below:

a) Use of a safety rope, an auxiliary rope and a fall prevention equipment with using an exclusive scaffold when going up and down along the electric pole;

b) Use of an escort rail, or both a Full Body Harness and an auxiliary rope when going up and down along the power pylon or the high steel structure;

c) While working on a Beam, the Contractor shall ensure the safety precautions mentioned below:

i. Use of a horizontal rope on working consecutively on the beam or painting the beam surface without an auxiliary rope; and

ii. Use of a safety rope and an auxiliary rope when moving on the beam under unavoidable circumstances.

4.23 Locomotives and Wagons

4.23.1 Speed limit is determined, and traffic signs of speed limits, lights and related hazards signage and cautions shall be installed at work place.

4.23.2 Person in charge shall be nominated as maintenance officer to inspect and repair temporary rails or track surface situation regularly.

4.23.3 Ensure the installation of an alarm device such as a horn and a buzzer, a head light, and a flood light for the driver's seat.

4.23.4 Training and education shall be given to the driver and the signal man regarding how to send standard signal and operate vehicle diagram and turning off and putting on the brakes while the driver leaves his seat. And making sure to set wheel stoppers when stopping or parking at the slope track.

4.23.5 Each locomotive shall carry an extinguisher for fires

4.24 Fire Protection

4.24.1 The contractor shall ensure that the construction site is provided with—

a) Fire extinguishing equipment sufficient to extinguish any probable fire at such construction site;

b) An adequate water supply at ample pressure as per national standards;

c) Number of trained persons required to operate the fire extinguishing equipment provided;

and

d) Is properly maintained and inspected at regular intervals of not less than once in a year by the responsible person and a record of such inspections is maintained.

4.24.2 The extinguishers shall be chosen as per type of fire load and surrounding location.

4.24.3 All construction machinery including crane shall carry a portable fire extinguisher in operator's cabin.

4.24.4 The Contractor shall prepare an emergency plan and Fire Evacuation plan and same shall be a part of Site ESHS Management Plan. Mock drills should be held on a quarterly basis to ensure the effectiveness of the arrangements and as a part of the programme, the telephone number of the local fire brigade should be prominently displayed near each telephone on site.

4.24.5 Recharging of fire extinguishers and their proper maintenance should be ensured and as a minimum should meet Indian National Standards.

4.24.6 All drivers of vehicles, foreman, supervisors and managers shall be trained on operating the fire extinguishers and firefighting equipment.

4.25 Demolition

4.25.1 All demolition works shall be carried out in a controlled manner under the management of experienced and competent supervision.

4.25.2 The concerned department of the Government or local authority should be informed, and permission obtained wherever required.

4.25.3 All glass or similar materials or articles in exterior openings should be removed before commencing any demolition work and all water, steam, electric; gas and other similar supply lines must be disconnected.

4.25.4 No demolition work should be performed if the adjacent structure seems to be unsafe unless and until remedial measures life sheet piling, shoring, bracing or similar means to be ensured for safety and stability for adjacent structure from collapsing.

4.25.5 Debris/bricks and other materials or articles should be removed by means of chute, bucket or other safe method.

4.25.6 No person other than the Workers or other persons essential to the operation of demolition work shall be permitted to enter a zone of demolition and the area be provided with substantial barricades.

4.26 Permit to Work

4.26.1 The Contractor shall develop work permit system, which is formal written system used to control certain types of work that are potentially hazardous. A work permit is a document, which specifies the work to be done, and the precautions to be taken.

4.26.2 Work Permits form an essential part of safe systems of work for many construction activities. They allow work to start only after safe procedures have been defined and they provide a clear record that all foreseeable hazards have been considered. Permits to Work are usually required in high-risk areas as identified by the Risk Assessments.

4.26.3 A permit is needed when construction work can only be carried out if normal safeguards are dropped or when new hazards are introduced by the work.

4.26.4 Examples of high-risk activities include but are not limited to:

a) Entry into confined spaces;

b) Hot work;

c) To dig where underground services may be located;

d) Work with heavy moving machinery;

e) Heavy lifting operations and lifting operations closer to live electric power line;

f) Work with using track motor vehicles etc.; and

g) Work under electric facility and overhead electric (OHE) line energized.

4.26.5 The Contractor shall prepare operation manuals above mention and implement training course at any time based on such manuals to the Workers given completion of certificates before the commencement of works.

4.26.6 The permit-to-work system should be fully documented, laying down:

a) How the system works;

b) The jobs it is to be used for;

c) The responsibilities and training of those involved; and

d) How to check its operation.

4.26.7 A work permit authorization form shall be completed with the maximum duration period not exceeding 12 hours or end of shift, which is earlier.

4.26.8 A copy of each permit to work shall be displayed at work place. during its validity, in a conspicuous location in close proximity to the actual works location to which it applies.

4.27 Traffic Management and Site Barricading

4.27.1 The basic objective of the following guiding principles is to lay down procedures to be adopted by the Contractor to ensure the safe and efficient movement of traffic and also to ensure the safety of workmen in the all work areas.

4.27.2 The guiding principles to be adopted for safety in construction zone are to:

a) Warn the road user clearly and sufficiently in advance;

b) Provide safe and clearly marked lanes for guiding road users;

c) Provide adequate traffic marshals to regulate the movement of traffic;

d) Provide safe and clearly marked buffer and work zones; and

e) Provide adequate measures that control driver behaviour through construction zones.

4.27.3 In all cases, the Contractor shall take proper precautions. Wherever operations undertaken are likely to interfere with public traffic, Specific Traffic Management Plans shall be drawn up and implemented by the Contractor in consultation with the approval of Local Police Authorities and/or the concerned politburo/Civil Authorities and followed to the IRC: SP;55- 2014 (Guidelines on Traffic Management in work zones) & IRC: 67 (Code of Practice for Road Signs).

4.27.4 Full height fence, barriers, barricades etc. shall be erected around the site in order to prevent the working area from the risk of accidents due to speedy vehicular movement. Same the way barricades protect the road users from danger due to construction equipment and other temporary structures.

4.27.5 All barricades shall be conspicuously seen in the dark/nighttime by the road users so that no vehicle hits the barricade. Conspicuity shall be ensured by affixing retro reflective stripes of required size and shape at appropriate angles at the bottom and middle portion of the barricade at a minimum gap of 1000mm. In addition minimum one red light blinker or rope light should be placed at the top of each barricade.

4.28 Working near Railway

4.28.1 The details of Safe work procedure for work near Railway Track are given in Clause 8.0,

Attachment -5 of this document.

4.29 Other Works to be Scrutinized

4.29.1 Other works including, but not be limited to, the works in the Site (the ROW), the works in the Borrow Pit, the works in the Quarry and Works on road shall be included to be scrutinised with respect to the accident prevention.

4.29.2 If blasting is anticipated in excavation in rock, preventive measures against accidents and protective measures against environmental/social impacts shall be of paramount importance.

4.29.3 The Contractor shall include all those items as well as work elements to formulate the preventive and protective measures considering envisaged conditions, situations, and activities of the works which may induce accidents or hazard to environment and/or society.

4.30 Personal Protective Equipment

4.30.1 The Contractor shall provide required PPEs to workmen to protect against safety and/or health hazards. Primarily PPEs are required for the following protection:

a) Head protection (Safety helmet with a chin strap);

b) Foot protection (Safety footwear, Gumboot, etc.);

c) Body protection (High visibility clothing (Waistcoat/Jacket), Apron, etc.);

d) Personal fall protection (Full body harness, Rope-grip fall arrester, etc.);

e) Eye protection (Goggles, Welders Glasses, etc.);

f) Hand protection (Gloves, Finger coat, etc.);

g) Respiratory protection. (Nose mask, Self-contained breathing apparatus, etc.); and

h) Hearing protection (Ear plugs, Ear muffs, etc.).

4.30.2 The PPEs and safety appliances provided by the Contractor shall be of the standard as prescribed by Bureau of Indian Standards (BIS). If materials conforming to BIS standards are not available,.

4.30.3 The Contractor shall provide the PPEs which the Contractor deems necessary including; but not be limited to, safety helmets, safety shoes and Hi-Viz to all the Contractor's Employees including workmen (including those of its sub-contractors). High visibility clothing as per the following requirement.

a) Hi-visibility jacket covering upper body and meeting the following requirements as per BS EN 471:1994;

b) Background in fluorescent orange-red in colour;

c) Jackets with full-length sleeves with two bands of retro reflective material, which shall be placed at the same height on the garment as those of the torso. The upper band shall encircle the upper part of the sleeves between the elbow and the shoulder; the bottom of the lower band shall not be less than 5cm from the bottom of the sleeve;

d) Two vertical green strips of 5cm wide on front side, covering the torso at least 500 cm2;

e) Two diagonal strips of 5 cm wide on back in an 'X' pattern covering at least 570cm2;

f) Horizontal strips not less than 5cm wide running around the bottom of the vertical strip in front and 'X' pattern at back;

g) The bottom strip shall be at a distance of 5cm from the bottom of the vest; and

h) Strips shall be retro reflective and fluorescent.

Safety Helmet Colour Code (Every Helmet should have the LOGO*affixed/painted)	Person to use
Hard hat with company Logo (Employees)	Hard hat with reflective tape (Marshals)
White	Employer/Engineer
Grey	All designers, Architect, Consultants, etc.
Violet	Main Contractors (Engineers/Supervisors)
Blue	All subcontractors (Engineers/Supervisors)
Red	Electricians (Both Contractor and Subcontractor)
Green	Safety professionals (Both Contractor and Subcontractor)
Orange	Security guards/Traffic marshals
Yellow	All workmen
White (with "VISITOR" sticker)	Visitors
Safety Shoes (Anyone at the Siteincl. Marshals)	
All employees of the contractor including workmen	Traffic marshals

Note: LOGO·

a) Logo shall have its outer dimension 2"X2" and shall be conspicuous
ii) Logo shall be either painted or affixed
iii) No words shall come either on Top / Bottom of Logo

Logo of the corresponding main contracting company for their employees and sub-contracting company for their employees shall only be used.

4.30.4 In addition to the above any other PPEs required for any specific jobs like, welding and cutting, working at height, tunnelling etc. shall also be provided to all workmen and also ensure that all workmen use the PPEs properly while on the job.

4.30.5 The Contactor shall not pay any cash amount in lieu of PPEs to the workers/sub- contractors and expect them to buy and use during work.

4.30.6 The Contactor shall at all-time maintain a minimum of 10% spare PPEs and safety appliances and properly record and show to the Engineer during the inspections.

4.30.7 It is always the duty of the Contactor to provide the required PPEs for all visitors. Towards this required quantity of PPEs shall be kept always at the security post.

4.31 Visitor at Site

4.31.1 No visitor can enter the Site without permission. All authorised visitors should report at the Site office. The Contractor shall provide visitor's helmet (White helmet with visitor sticker) and other PPEs like Safety Shoe, reflective jacket, respiratory protection etc. as per requirement of the Site.

4.31.2 The Contractor shall be fully responsible for safety and health of all visitors within the Site.

4.32 Site Security

4.32.1 The Contractor shall be wholly responsible for security on the Site and any other areas being used by him or the Subcontractor's for the purposes of the Contract.

4.32.2 The Contractor shall assign on the Site a security officer (adequately trained person,) and his alternate(s), who shall be primarily responsible for the Contractor's security services and fully cooperate with the Engineer's security organization throughout the Time for Completion.

4.32.3 Where necessary, the Contractor shall install, modify, maintain the temporary security fences, gates, posts, security lightings and other facilities required for proper security control, in addition to those to be constructed as part of the Works. The Contractor shall operate these facilities to properly control ingress to and egress from the areas under his control throughout the Time for Completion. This control shall apply to every person including the Employer's Personnel.

5.0 OCCUPATIONAL HEALTH AND WELFARE

5.1 Physical Fitness of Workmen

5.1.1 The Contractor shall ensure that his employees/workers subject themselves to such medical examination as required under the law or under the contract provision and keep a record of the same.

5.1.2 The Contractor shall not permit any employee/workers to enter the work area under the influence of alcohol or any drugs.

5.1.3 The Contractor shall maintain the confidential records of medical examination or the physician authorized by the Engineer.

5.1.4 No worker is charged for the medical examination and the cost of such examination is borne by the Contactor employing such worker.

5.2 Medical Facilities

5.2.1 Occupational Health Centre (First Aid Station)

The Contractor shall ensure at the construction Site an occupational health center, mobile or static is provided and maintained in good order. Services and facilities as per the scale lay down in Schedule IV of HBOCWR. A construction medical officer appointed in an occupational health center, possess the qualification as laid down in Schedule V Rule no 113 of HBOCWR:

5.2.2 The Contractor shall appoint appropriate full-time staff including one nurse, one dresser- cum-compounder, one sweeper-cum-ward boy with each construction medical officer.

5.2.3 The Contractor shall communicate the complete details including name, qualification and experience of the construction medical officer, to the inspector having jurisdiction under HBOCWR.

5.2.4 Ambulance Room, Ambulance Van and Stretchers:

The Contractor shall ensure at a construction site of a building or other construction work that an ambulance van and room are provided at such construction Site, or an arrangement is made with a nearby hospital for providing such ambulance van for transportation of serious cases of accident or sickness of workers to hospital promptly and such ambulance van and room are maintained in good repair and is equipped with standard facilities specified in Schedule VI of Rule 114 & Schedule VII of Rule 115 of HBOCWR.

5.2.5 The Contractor shall provide enough stretchers at each site for use in an emergency.

5.2.6 First Aid Boxes and Emergency Care:

The Contractor shall ensure at construction site one First-aid box for 100 workers for providing first-aid to the workers. Every First-Aid box is distinctly marked "First-Aid" and is equipped with the articles specified in Schedule IX of Rule 119 of HBOCWR. Adequate no. of trained first aid persons shall be available at each work site in each shift.

5.2.7 HIV/AIDS Prevention and Control:

a) The Contractor shall adopt the Employer's "Workplace Policy on HIV/AIDS Prevention and Control for Workers Engaged by Contractors" and implement it. A copy of the policy is given in Clause 8.0, Attachment-2 [Workplace Policy on HIV/AIDS Prevention & Control];

b) The Contractor shall prepare and submit the plan for HIV/AIDS Prevention and Control for his workers in terms of the aforesaid Employer's Policy within 28 days of the date of notification of the Contract.

c) The Contractor shall organize awareness program for labourers on the risks of AIDS and STDs in coordination with Haryana State AIDS Control society.

5.2.8 COVID -19 Prevention and Control

The Contractor shall ensure that the latest guidelines issued by Ministry of Health and Family Welfare (MoHFW), local government and the district administration are strictly followed at the construction works site. The Workplace Policy on COVID-19 Prevention and Control is given in Clause 8.0, Attachment-3 [Workplace Policy on COVID-19 Response]. The Contractor shall undertake a COVID-19 risk assessment of project area and prepare and submit COVID-19 Response and Management Plan.

5.2.9 Prevention of Mosquito Breeding

Measures shall be taken to prevent mosquito breeding on the Site. The measures to be taken shall include:

a) Empty cans, oil drums, packing and other receptacles, which may retain water, shall be deposited at a central collection point and shall be removed from the site regularly;

b) Stagnant water shall be treated at least once every week with oil to prevent mosquito breeding;

c) The Contractor's equipment and other items on the site, which may retain water, shall be stored, covered, or treated in such a manner that water could not be retained; and

d) Water storage tanks shall be provided.

5.2.10 Posters in local language, Hindi and English, which draw attention to the dangers of permitting mosquito breeding, shall be displayed prominently on the Site.

5.2.11 The Contactor at periodic interval shall arrange to prevent mosquito breeding by fumigation/spraying of insecticides, and the ideal larvicide etc.

5.2.12 Alcohol, Smoking and Drugs

a) The Contactor shall always ensure that no employee is working under the influence of alcohol/drugs which are punishable under BOCWR;

b) Smoking at public places by any employee is also prohibited as per Government Regulations. The Contractor shall comply with the legal provisions in this regard, such as; Prohibition of Smoking in Public Places Rules, 2008. He shall be solely responsible for any penalty or punitive action by the government authorities because violations of the provisions contained in these rules by him or his representatives or his employees or his Subcontractors. Requisite notice boards, posters, etc., shall be put by him, as per the Rules.

5.3 Welfare Measures for Workers

5.3.1 Latrine and Urinal Accommodation:

a) Latrine and urinals shall be provided as per Chapter VI, Part – II of Rule 80 of Haryana BOCWR and shall also comply with the requirements of public health authorities; and

b) When women are employed, separate latrine and urinals accommodation shall be provided.

5.3.2 Moving Sites:

a) In case of works like track laying, the zone of work is constantly moving. In such cases,

mobile toilets with proper facility to drain the sludge shall be provided at reasonably accessible distance; and

5.3.3 **Canteen**

In every workplace wherein not less than 250 workers are employed, the Contractor shall provide an adequate canteen conforming to Chapter VI, Part – II of Rule 81 of Haryana BOCWR

5.3.4 **Drinking Water.**

As per Section 32 of BOCWA, the Contractor shall make in every site, effective arrangements to provide sufficient supply of wholesome drinking water. Quality of the drinking water shall conform to the requirements of national standards on Public Health Laws. While locating these drinking water facilities due care shall be taken so that these are easily accessible from the place of work for all workers at all location of the Site. All such points shall be legible marked "Drinking Water" in a language understood by most of the workmen employed.

5.3.5 **Crèche**

In every workplace where in more than 50 female workers are ordinarily employed, there shall be provided and maintained a suitable room for use of children under age of 6 years, conforming to the provisions of Section 35 of BOCWA.

5.3.6 Labour Accommodation Camps

The Contractor shall prepare Labour camp management plan as part of site ESHS plan. Where workers are based some distance from their normal place of residence, the Contractor shall provide them with suitable and safe accommodation free of charge and shall take all necessary precautions to protect their health and welfare. The accommodation shall conform to the requirements of Section 34 of BOCWA and include but not be limited to the further measures specified hereunder.

5.3.7 All accommodation camps shall be provided always with a sufficient supply of clean drinking water (of potable quality according to national legal standards), in suitable and easily accessible locations:

5.3.8 The quality of drinking water shall be tested once a fortnight as prescribed in IS 10500:2012and immediate remedial action shall be taken if quality falls below the standard. Test results shall be provided to the Engineer at least monthly.

5.3.9 The Contractor shall provide all accommodation camps with clean and properly equipped and staffed kitchen and canteen facilities to supply meals for workers.

5.3.10 The Contractor shall provide sufficient toilet and bathroom facilities for the numbers of workers accommodated in each camp. Separate accommodation and toilet/bathroom facilities shall be provided for men and women and all facilities shall be kept in full working order always and cleaned and re-equipped daily.

5.3.11 The Contractor shall provide a laundry facility at the Labour Accommodation Camps.

6.0 ENVIRONMENT AND SOCIAL MANAGEMENT

6.1 General Conduct of the Works

6.1.1 The purpose and objective of these guidelines is to outline how the project will avoid, minimise or mitigate effects on the environment and surrounding area. These guidelines detail the implementation of measures in accordance with environmental and social commitments of HRIDC. These guidelines will be 'live' guidelines that will be reviewed and updated at regular intervals throughout the project life cycle. These guidelines will ensure that the development is compliant with current Environmental and Social legislations and will guide and assist the Contractor in exploring all reasonable and feasible means for reducing construction related Environmental and Social impacts.

6.1.2 The Contractor shall comply with the Environment and Social Management Plan (ESMP) given in the Environmental and Social Impact Assessment (ESIA) report available on HRIDC portal for information disclosure and will note and implement any requirements therein, in addition to those found in this specification.

6.1.3 The Contractor is required to build good public relations before the commencement of the Works particularly with the local level representatives such as the Gram Panchayat, by informing the expected impacts by the Works and their schedule and dispute resolution mechanism known as GRM set by the Employer.

6.2 Environmental Legislation

6.2.1 The Contractor shall always comply with all relevant National and State legislations regarding environmental protection, pollution prevention and control, waste management and other relevant environmental matters, including but not necessarily limited to, the following with their latest amendments:

a) The Environment (Protection) Act, 1986 and Rules 1986

b) The Indian Wildlife (Protection) Act, 1972;

c) The Forest (Conservation) Act, 1980 &Rules;

d) Punjab Land Preservation Act, 1900;

e) The Noise Pollution (Regulation and Control) Rules, 2000;

f) Notification on Control of Noise from Diesel Generator (DG) sets, 2002;

g) The Air (Prevention and Control of Pollution) Act, 1981and Rules 1981;

h) The Water (Prevention and Control of Pollution) Act, 1974 and Rules 1974;

i) Guidelines to control and regulate ground water extraction in India, 24th September2020, Central Ground Water Authority;

j) The Solid Management Rules, 2016;

k) The Construction and Demolition Waste Management Rules, 2016;

l) The Hazardous and Other Wastes (Management and Transboundary Movement)Rules, 2016;

m) The Bio-medical Waste Management Rules, 2016;

n) Plastic Waste Management Rules, 2016;

o) E-Waste (Management) Rules 2016;

p) The Batteries (Management and Handling) Rules, 2001;

q) Manufacture, Storage, and Import of Hazardous Chemical (Amendment) Rules,1989;

r) Ancient Monuments and Archaeological Sites and Remains (Amendment andValidation) Act 2010;

s) Fly ash utilization notification, Sept 1999;

t) Applicable NGT Guidelines issued time to time; and

u) Provisions of Graded Response Action Plan notified by the MoEF&CC.

6.2.2 The Contractor shall comply the Environmental and Social Framework (ESF) of Asian Infrastructure Investment Bank (AIIB) February 2016.

6.2.3 If the requirements stated in this document are in conflict or inconsistent with the requirements of applicable laws, the more stringent requirements shall apply.

6.2.4 It is also the Contractor's responsibility to obtain all environmental clearances, official approvals, consents, or other authorizations as may be necessary to comply with the relevant statutes, and to pay all related fees and other costs. The Contractor shall obtain all authorizations in a timely manner and submit to the Engineer as the evidence for the regulatory obligations before commencement of any related construction activity. The indicative clearances/permission/permit are presented in Table below and Contractor is required to take any other clearance as required for its construction activities.

Clearance/ Permission/Permit	Relevant Acts/Rules	Concerned Agency
Consent to Establish and Consent to Operate batching plants and casting yards	• The Water (Prevention and Control of Pollution) Act, 1974, and its amendments; • The Air (Prevention and Control of Pollution) Act 1981 and its amendments	Haryana Pollution Control Board
Authorization for generation, handling, storage, and transportation of hazardous waste	Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016	Haryana Pollution Control Board
Permission for extraction of ground water	Central Ground Water Authority guidelines to regulate and control ground water extraction in India, 24th September, 2020	Haryana Water Resources (Conservation, Regulation and Management) Authority
Pollution Under Control Certificate	Central Motor and Vehicle Act 1998 Vehicular Exhaust Norms, CPCB 2007	Department of Transport, Government of Haryana
Construction and Demolition Waste Management Plan	Construction & Demolition Waste Management Rules, 2016	Local Authority (Municipal Corporation)

6.3 Environmentally Friendly Construction Practices

6.3.1 Containment of Air Pollution

a) All construction equipment's should be cleaned of visible dirt/mud before exiting the construction sites and streets shall be promptly cleaned by manual sweeping, or by deploying electro – mechanical devices if such material has been dropped;

b) The Contractor shall provide a wash pit or a wheel washing and/or vehicle cleaning facility at the exits from work sites such as construction depots and batching plants. This facility will be provided with efficient drainage, water re-circulation apparatus and silt traps to prevent any excessive buildup of water. Where wheel-washing facility is not possible, the Contractor shall ensure manual cleaning of wheels by wire brushes or similar suitable means;

c) The Contractor shall ensure that vehicles carrying dust generating material shall be covered with tarpaulin, shall have properly fitted side and tailboards and dust potential material shall not be loaded to a level higher than the side and tail boards;

d) Materials should not be dropped from more than 1.5 m to limit fugitive dust generation;

e) Necessary water sprinkling to be carried out for dust control. For water sprinkling, emphasis should be given on use STP treated water or RO reject water;

f) Stockpiles of sand and aggregate greater than 20m3 for use in concrete manufacture shall be enclosed on three sides, with walls extending above the stockpile and two (2) meters beyond the front of the stockpile;

g) Areas within the Site such as construction depots and batching plants, where there is a regular movement of vehicles shall have an approved hard surface that is kept clear of loose surface material;

h) Unless the Engineer has given notice otherwise, the Contractor shall restrict all motorised vehicles on the Site to a maximum speed of 15 kilometers per hour and confine haulage and delivery vehicles to the designated roadways inside the site;

i) The Contractor shall erect hoardings as specified in Engineer requirements securely around all construction work sites during the main construction activity, to contain dust within the site area and also to reduce air turbulence caused by passing traffic. The hoarding shall be safely secured to the ground to prevent from toppling with minimum gap between the base of hoarding and ground surface.

j) Water spray should be used to control dust during breaking of rock/concrete;

k) The contractor shall take all necessary actions to control air pollution as per guidelines issued by the Commission for Air Quality Management (CAQM) in National Capital Region time to time;

l) The contractor shall take necessary actions as per the provisions of Graded Response Action Plan (GRAP) issued from time to time.

6.3.2 **Containment of Water Pollution and Efficient Use of Water**

a) List of sources (surface/ground) to be provided for approval from Engineer;

b) A water meter shall be installed to quantify the consumption of water;

c) Prior to use of source, written permission to be obtained from authority to use the water in construction activity, and submit a copy to Engineer;

d) During construction only permitted quantity (permission taken) from approved sources to be used in construction activity;

e) A Drainage system should be constructed during the commencement of the works, drain off all surface water at the site into suitable drains;

f) At construction depots and batching plants temporary drainage works should be maintained, removed, and reinstated as necessary and all other necessary precautions should be taken for avoidance of damage by flooding and silt;

g) The Contractor shall provide a hard surface with suitable drainage system for Transit Mixture washing at Casting Yard and/or Batching plant. The slurry water from Transit Mixture washing area shall go to sedimentation tank of suitable capacity to treat the slurry water. The contractor shall ensure the facility remains functional till the end of the contract;

h) The Contractor shall take measures to prevent discharge of oil on land and in water bodies. Oil separator/interceptors shall be provided at Batching Plant and Construction Depot location for vehicle maintenance to prevent the release of oils and grease into the drainage system. These shall be cleaned on a regular basis;

i) Rainwater pumped out from trenches or foundation excavation should be discharged into storm water drains after obtaining notice of no objection from the Agency controlling the system;

j) The Contractor shall always ensure that all existing wells, stream courses and drains within, and adjacent to the site are kept safe and free from any debris and any excavated materials arising from the Works;

k) The Contractor shall discharge wastewater arising from site offices, canteens or toilet facilities constructed by him into sewers after obtaining prior notice of no objection of agency controlling the system;

l) The Contractor shall ensure that earth, bentonite, chemicals and concrete agitator washings etc. are not deposited/drained in the watercourses but are suitably treated and effluents and residue disposed off in a manner approved by local Regulatory Authorities;

m) Construction works should be programmed to minimize soil excavation works in rainy season. If carried out during rains, temporarily exposed slope surfaces should be covered by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds.

n) Wastewater from Concrete Batching & Precast Concrete Casting and that generated from the washing down of mixer trucks and drum mixers and similar equipment should wherever practicable be recycled. The discharge of wastewater should be kept to a minimum;

o) The road between the vehicle washing bay and the public road should be paved to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains;

p) R.O. rejected water will be used for following purposes:

- TM washing,
- Batching Plant washing,
- Toilets and Urinals,
- Gardening activity,
- Wheel Washing ,
- Sprinkling water for dust control, and
- Any other feasible use

Proper arrangement will be made at Batching plant area for storage of RO reject water.

6.3.3 **Containment of Noise and Vibration**

a) Contractor shall minimize the use of impact devices, such as jackhammers, and pavement breakers and instead use concrete crushers or pavement saws;

b) Equip noise producing equipment such as jackhammers and pavement breakers with acoustically attenuating shields or shrouds recommended by the manufacturers thereof, to meet relevant noise limitations;

c) Use hydraulic tools instead of pneumatic impact tools and electric instead of diesel-powered equipment. If pneumatic impact tools and equipment are used, they shall have intake and exhaust mufflers recommended by the manufacturers thereof, to meet relevant noise limitations;

d) Provide mufflers or shield panelling for other equipment, including internal combustion engines, recommended by manufacturers thereof;

e) Employ prefabricated structures instead of assembling on-site;

f) Provide enclosures for stationary equipment and barriers around noisy areas;

g) Locate and operate stationary equipment in such a way, so as to minimize noise and vibration impact on community, sensitive locations and nearby buildings.

h) Schedule truck loading, unloading, and hauling operations in such a way so as to minimize noise impact near noise sensitive locations and surrounding communities;

i) Plan noisier operations during times of highest ambient noise level, keep noise levels relatively uniform and avoid excessive and impulse noises;

j) Use only well-maintained, regular serviced plant/equipment, and not to be kept idling when not in use;

k) Maintain equipment such that parts of vehicles and loads are secure against vibrations and rattling;

l) Grading of surface irregularities on construction sites to prevent the generation of impact noise and ground vibrations by passing vehicles;

m) If back-up alarms are used on construction equipment, their noise emission level near noise sensitive receptors such as residences, schools, hospitals and similar areas where calmness is essential, should be regulated, especially at night time;

n) Avoid operating truck on streets that pass by schools during school hours;

o) Efforts to be made to bring down the noise levels due to the DG set, outside the premises, within the ambient noise requirements by proper setting and control measures;

p) The Contractor shall ensure that all necessary permissions/ approvals/consent is obtained from relevant authorities before installation and operation of Generator set;

q) A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacture;

r) At all times noise levels of DG sets shall comply the standards set out by CPCB/SPCB;

6.3.4 **Containment of Waste**

a) Construction activities are expected to generate a variety of waste such as:

   i) General refuse;

   ii) Construction and Demolition waste including waste from excavated material;

   iii) Chemical waste;

   iv) Hazardous waste; and

   v) Biomedical waste.

b) The Contractor is required to develop, institute and maintain a Waste Management Plan (WMP) during the construction of the project for his works. Such mechanism is intended to ensure that the designated area for the segregation and temporary storage of reusable and recyclable materials are incorporated in the WMP. The WMP shall be prepared and submitted to Engineer for approval.

General Refuse

c) General refuse like paper and food waste shall be stored in enclosed bins.

d) The refuse shall be stored and transported in accordance with good practice and disposed at licensed landfills;

e) An authorized waste collector shall be employed by the Contractor to remove general refuse from the site, on a daily basis to minimise odour, pest and litter impacts;

f) The Contractor shall not burn debris or vegetation on the site.

Construction and Demolition (C&D) Waste

g) C&D Waste would mainly arise from the project construction activities and from the demolition of existing structures where necessitated. It will include: material and equipment wrapping packaging material, unusable/surplus concrete/grouting mixes, damaged/contaminated/surplus construction materials, wood from formwork and false work, concrete rubble, plastics, metal, glass, asphalt, wood and refuse obtained from demolition of houses.

h) The Contractor shall be responsible for collection, segregation, storage and disposal of C&D waste as directed or notified by the concerned local authority in consonance with the Construction & Demolition Waste Management Rules, 2016;

i) The Contractor shall ensure that there is no littering, deposition and disposal of C&D waste along the natural drainage and in water body;

j) The C&D waste should be disposed off either when the quality of C&D waste is 15 Tons from entire contract or such C&D waste has been stored for 15 days (irrespective of quantity) whichever is earlier;

k) A proper arrangement for record keeping has to be maintained to ensure disposal of C&D waste to C&D waste recycling plant. Contractor shall submit the record of C&D waste disposal to recycling facility, in his Monthly Environment Report;

Hazardous Waste

l) Hazardous waste would mainly arise from the maintenance of equipment. These may include, but not be limited to: Used engine oils, hydraulic fluids, waste fuel, spent mineral oils/cleaning fluids from mechanical machinery, scrap batteries or spent acid/alkali, spent solvents/solutions. Hazardous waste shall be disposed off in a manner in compliance with the procedure given in "Hazardous Waste (management, handling and trans-boundary movement) rules, 2016" only to authorized recyclers under intimation to the Employer's Representative;

m) Chemicals classified as hazardous chemicals under "Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 of Environment (Protection) Act, 1986 shall be disposed off in a manner in compliance with the procedure given in the rules under the aforesaid act;

n) The hazardous waste shall be stored on an impermeable surface with containment bunding to retain leaks, spills and ruptures;

o) All waste collection containers shall be of appropriate size with a closed lid. Each container will be clearly labelled with a colour code system in local language and English. Original labels of empty containers should be completely covered and the contents of the type of waste stored in the used containers clearly indicated;

p) Drip pans of suitable size and numbers shall be used to collect oil leakage and spills. The area shall be cleaned after completion of maintenance/repair and generated waste disposed off in approved manner.

Bio medical waste

q) Collection, segregation, storage and disposal of Bio Medical waste shall be in accordance with The Bio-medical Waste Management Rules, 2016;

r) Storage time of waste shall be as less as possible so that waste storage, transportation and disposal is done within 48 hours;

s) The contactor shall ensure that Posters/ placards for bio-medical waste segregation are installed at the point of generation;

t) Disposal of biomedical waste shall be through a licensed waste collector, duly authorized by MoEF&CC or Haryana Pollution Control Board as the case may be. License of the waste collector shall be shown to the Employer's Representative on demand. Staff handling the biomedical waste shall be provided with PPEs;

Colour coding of Waste storage bins

u) All waste shall be stored in different coloured bins as per table below:

Type of Waste	Colour
Wet/Organic/ Bio-Degradable Waste	Green Bins with lids
Dry/Recyclable waste (excluding Bio-medical waste/ hazardous waste)	Blue
Bio-Medical waste	Red with lids
E-Waste	Black
Hazardous Waste	Brown
COVID Waste	Yellow

6.3.5 **Landscape, Greenery and Aesthetics**

a) As far as is reasonably practicable, the Contractor shall maintain ecological balance by preventing deforestation and defacing of natural landscape. In respect of ecological balance, the Contractor shall observe the following instructions.

i) Prevent any avoidable destruction, scarring or defacing of natural surroundings in the vicinity of work;

ii) Any damage shall be repaired, replanted or otherwise corrected at Contractor's expense.

iii) Directional shielding for light used for illumination shall be used to prevent from striking adjacent areas, where feasible;

b) Tree Felling

i) All trees and shrubs, which are not specifically required to be cleared or removed for construction purposes, shall be preserved and protected from any damage by use of protective barriers or other methods approved by Engineer;

ii) The Contractor shall not fell, remove or dispose of any tree or forest produce in any land handed over to him for the construction of works and facilities related to project except with the previous permission obtained from the Forest Department;

iii) Trees shall not be used for anchorage.

6.3.6 **Energy Management**

a) The Contractor shall use energy efficient pumps and motors. The efficiency shall be measured during installation and also periodically;

b) The Contractor should rigorously follow the maintenance regime of his DG sets;

c) The Contractor shall maximize the use of energy efficient luminaries such as LED's, metal halide lamps and ensure optimum illumination levels to save energy;

d) The Contractor shall make provision of Earth Leakage Circuit Breakers (ELCBS) to prevent loss of excessive earth currents which are unsafe;

e) The Contractor shall plan in advance and select locations to receive and store material such that these are at the least distance from place of use;

f) The Contractor shall design site offices for maximum daylight and minimum heat gain.

6.3.7 **Archaeological And Historic Resources**

a) If any archeological and historic structure is likely to be affected, a resource protection plan shall be prepared by the Contractor in consultation with the Archaeological Survey of India (ASI) to identify and assess construction effects and seeks ways to avoid, minimize or mitigate adverse effects on such monuments;

b) The Contractor shall stop work immediately and notify the Engineer if, during construction, an archaeological or burial site is discovered. The work will not recommence until approval of the Engineer is obtained for the same.

6.3.8 **Fly Ash**

MoEF&CC fly ash notification dated September 1999 and its subsequent amendments makes it mandatory for use of fly ash-based products in construction activities located within 300Km from coal or lignite based thermal power plants. The Contractor shall use fly ash as a percentage substitution of cement, in concrete for certain structures and works as prescribed in the latest amendment. The Contractor shall provide details of usage of such products to Engineer and shall maintain a detailed record of usage of Fly Ash.

6.4 Environmental Monitoring

6.4.1 **Baseline Study:** Before commencement of actual construction work, all items and parameters as specified in ESHS manual shall be monitored once as the baseline of the environmental condition prior to the construction and compared with the monitored values during the construction period;

6.4.2 **Qualification of Monitoring Agency:** Monitoring shall be conducted by MoEF&CC approved or NABL accredited laboratory and approved by the Engineer;

6.4.3 **Enforcement of the Monitoring**: Monitoring plan shall be proposed in the Contractor's ESHS Management Plan and must be approved by the Engineer before commencement of the monitoring. If the monitoring results are more than baseline and standards, cause analyses and necessary counter measures shall beproposed to the Engineer in the monitoring reports;

6.4.4 **Parameters, Location and Frequency of the Monitoring:** Environmental Monitoring parameters, locations and frequency is given in following table.

Parameters, Standards, Location and Frequency of Monitoring

Parameters	Sampling Standards	Location	Frequency
Air (PM_{10}, $PM_{2.5}$)	CPCB (2011) Guidelines for the Measurement of	One representative location within each construction yard and batching plant	Monthly

Parameters	Sampling Standards	Location	Frequency
	Ambient Air Pollutants, Manual Sampling & Analyses	Closest residential or commercial area (one location) within 100m from each active construction site or representative locations approved by theEngineer.	Monthly
		$PM_{2.5}$ In Tunnel portion	Bi-weekly
Noise **Day Time** (6 AM – 10PM) L_{max}, L_{min}, L_{eq}, L_{10}, L_{90}, L_{50} **Night Time** (10PM – 6AM) L_{max}, L_{min}, L_{eq}, L_{10}, L_{90},L_{50}	CPCB (2015) Protocol for Ambient Level Noise Monitoring	One representative location within each construction yard and batching plant	Weekly
		Closest residential or commercial area (one location) within 100m from each active construction site or representative locations approved by the Engineer.	Weekly
Vibration (in mm/s orVdB)	IS 14884 (2000)	During complaints or as directed by employer.	
Drinking/GW (pH, Total Alkalinity, Electrical Conductivity, Total Dissolved Solids, Fluoride, Arsenic, Nitrate, Iron, Lead, Cadmium, E-coli)	IS 3025 (2008) & IS 10500 (2012)	**Drinking water**: construction yard, batching plant andlabour camps	Quarterly (April, July, October, January)
		Groundwater: one representative tube/bore well in the adjacent residential area or within 100m from each active construction site	Quarterly (April, July, October, January)
Surface Water pH, Total Dissolved Solids, Fluoride, Arsenic, Iron, Lead, E-coli	IS 3025 (2008) & IS 2296 (1982) & CPCB (2012) Guide Manual Water and Wastewater Analysis	Upstream and downstream of the river/stream if any. Any natural water course (ex. Pond etc.) located or within 100 m of each a) construction yard,	Quarterly (April, July, October, January)

Parameters	Sampling Standards	Location	Frequency
		b) labour camp, and c) active construction site	
Waste	Not available but fully complying with monitoring the quantities of wastes specified by the Solid Management Rules2016 & the Construction and Demolition Waste Management Rules2016	Each construction yard and construction site	Quarterly (April, July, October, January)
Hazardous waste	Not available but typed reporting (not handwriting) fully complying with monitoring the quantities of wastes specified by the Hazardous and Other Wastes (Managementand Transboundary Movement) Rules2016,	Each construction yard and active construction site	Quarterly (April, July, October, January)
Complaints if any		All Works' related locations	Weekly

6.5 Complaint Response Process

6.5.1 Enquiries, complaints and requests for information can be expected from a wide range of individuals and organisations both private and government. Most complaints are likely to be received by HRIDC, although the site offices are also likely to be contacted;

6.5.2 The objective of complaint process is to ensure that public and agency complaints are addressed and resolved consistently and expeditiously;

6.5.3 The Contractor's Project Manager will be notified immediately on receipt of complaint that may relate to environmental impacts. The Project Manager will immediately inform the Engineer;

6.5.4 Field investigation shall determine whether the complaint has merit, and if so, action shall be taken to address the complaint;

6.5.5 The outcome of the investigation and the action taken shall be documented on a complaint Performa prepared by the Contractor and submitted for notice by the Engineer in advance of the works;

6.5.6 Where possible, a formal response to each complaint received shall be prepared by the Contractor within seven days to notify the concerned person(s) that action has been taken.

6.6 Social Legal Requirement

6.6.1 The Contractor shall always comply with all relevant national and state legislations regarding social safeguard including but not necessarily limited to, the following with their latest amendments.

a) National Policy for the Empowerment of Women, 2001;

b) The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013;

c) The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Rules, 2013;

d) The Protection of Children from Sexual Offences Act, 2012;

e) The Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (Prevention and Control) Act, 2017;

f) Child Labour (Prohibition & Regulation) Act 1986

Some of the key International instruments for the protection of women include the following:

a) United Nations General Assembly, Resolution 52/86 on Crime Prevention and Criminal Justice Measures to Eliminate Violence Against Women, 2 February1998;

b) United Nations Security Council Resolution 1325 on Women, Peace and Security, 31 October 2000;

c) Environmental and Social Framework (ESF) of Asian Infrastructure Investment Bank (AIIB) February 2016

6.7 Gender equality

6.7.1 The Contractor is responsible for providing equal opportunities to both genders and end gender related discrimination, if any. The ESHS Committee will proactively identify cases of gender discrimination with key focus on the following topics:

a) Gender based violence, including sexual harassment at the workplace;

b) Disparity in benefits provided;

c) Termination on account of pregnancy.

6.7.2 The Contractor shall enhance female workforce participation and maintain sex -disaggregated data for periodic reporting.

6.7.3 The Contractor shall ensure that women workers are paid at par with male workers

6.7.4 If women workers are deployed at site then day crèche facilities shall be provided to facilitate the women with infant working on site.

6.8 Labour Requirements

6.8.1 The contractor shall use unskilled labour drawn from local communities to avoid any additional stress on the existing facilities (medical services, power, water supply etc.)

6.8.2 The recruitment of women and members of vulnerable groups shall be prioritized.

6.8.3 The Contractor shall provide training to build the skills of locally recruited labour.

6.8.4 All staff, skilled and unskilled labours employed on a site shall be required to sign Code of Conduct that shall ensure compliance with the ESHS provision (Refer 6.11).

6.9 Cultural and Religious Issues

6.9.1 Disturbance from construction works to the cultural and religious sites, and Contractors lack of knowledge on cultural issues cause social disturbances. The Contractor shall

a) Communicate to the public through community consultation, informing the peers and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction;

b) Not block access to cultural and religious sites and sites of importance for livelihood activities, wherever possible;

c) Need to take mitigation measures while working near religious place/ educational institutions close to the construction sites;

d) Provide freedom to construction workers to observe their cultural and religious practices;

e) Monitor and be responsible for the behaviour of construction workers especially migrant workers towards the community. The workers must be debriefed well regarding local aspects and need to follow good behaviours, and informed regarding unexpected behaviours at the time of employing;

f) Provision of cultural sensitization training for migrant labours regarding engagement with local community;

g) Resolve cultural issues in consultation with local leaders and Project Manager;

h) Establish a mechanism that allows local people to raise grievances (directly and indirectly) arising from the construction process;

i) Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters.

6.10 Guidelines for Addressing GBV in Projects

6.10.1 The Contractor's ESHS Plan shall include implementation of Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) Prevention and Response Action Plan. This action plan shall describe Code of Conduct (CoC), mechanism to address such incidents, assess the project scenario and potential risks of GBV/SEA/SH, training plan for workers on GBV/SEA/SH and awareness programme amongst workers regarding socially, culturally appropriate behaviour that would ensure that the project community and women in particular are safe, secured, and not vulnerable to abuse. A sample GVB/SEA/SH action plan is given in Table below.

Table - GBV/SEA/SH Prevention Action Plan

Objective	Activity	Responsibility
Assess Potential Riskof GBV	Rapid assessment of worksite, project footprint (e.g. community structure, local self-governance, national regulations, history of incidence), type of workers (local or migrant) for possible GBV risk.	As part of the social impact assessment (to be updated at the time of construction).

Objective	Activity	Responsibility
Inclusive development	• Engage women in project planning and implementation • Incorporate women's feedback in project designand construction schedule • Organize systematic consultations with women to ensure continuous feedback on projects and identify any gender- sensitive adverse impacts	
Training – women	• Sensitization of women on GBV and women's rights to avoid/avert such incidents • Sensitization of women on actions to be taken in case of GBV	
Training – men	• Sensitization of male workers on GBV and women's rights to avoid/avert such incidents. • Sensitization of maleworkers on actions to be taken in case of GBV • Sensitization of male workers on appropriate socially and culturally acceptable behaviour towards women • Training of managers on methods of dealing with cases of GBV.	
Awareness generation	• Distribution of leaflets propagating gender-appropriate behaviour. • Signing of self-declaration format on commitment towards gender-sensitive behaviour. • Awareness raising programme to the local communities on GBV/SEA,HIV/AIDS,COVID-19 and Human Trafficking.	

6.10.2 The Contractor shall constitute an appropriate Grievance Redress Mechanism (GRM) for addressing grievances at worksite. Grievances of workers will be first brought to the attention of supervisor at site. Grievances not redressed by the supervisor within 7 days will be brought to the Grievance Redress Committee (GRC). The composition of GRC will have representatives from workers, women representative, ESHS staff of the Contractor ESHS staff of GC. The main responsibilities of the GRC are to: (i) provide support to workers on problems arising at worksite, (ii) record workers grievances, categorise, prioritize grievances and resolve them, (iii) immediately inform the Engineer of serious cases and (iv) report to workers on development regarding their grievances and decisions of GRC. The panel of the GRC will function without any prejudice or fear of retaliation. The well-being of the panel members will be protected by HRIDC. The GRC will redress the grievances within 14 days. The Contractor shall provide grievance box at Project Site Office.

6.10.3 This project has zero tolerance of any form of:

a) **Gender-based violence (GBV)**, that is perpetrated against a person's will and that is based on socially ascribed gender-related differences between people.

b) **Sexual exploitation and abuse (SEA)** which is attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another.

c) **Sexual harassment (SH)** which is unwelcome sexual advances, requests for sexualfavors, and other unwanted verbal or physical conduct of a sexual nature.

6.10.4 Any incidence of GBV, SEA or SH should be reported to the Grievance Redress Committee (GRC). The panel of the GRC should take appropriate gender-sensitive actions to verify authenticity of the incident with due consideration to the safety, security, and dignity of the offended person. The investigation should be concluded within three days of receiving the report or as reasonably possible. Depending on the severity of the incident, the panel may report the case to appropriate authorities.

Following the investigation, the GRC shall recommend appropriate actions to the company which may include but not limited to:

a) Informal warning

b) Formal warning

c) Additional training

d) Loss of up to one week's salary

e) Suspension of employment (without payment of salary), for a minimum period of one month up to a maximum of six months

f) Termination of employment

6.10.5 The affected person will be provided with appropriate support (e.g. psychological counselling, medical support and any other support as needed).

6.10.6 A self-declaration format for adherence to gender-sensitive behaviour should be signed by all contractors, subcontractors, employees, and senior managers, engaged by the Project to avoid GBV/SEA/SH at worksite. A self-declaration format is given in below:

6.10.7 **Commitment Statement for all Project Workers**

(to be translated into local language or explained in a manner that is appropriate for general understanding of the signee)

I, (name of person), acknowledge that preventing Gender-Based Violence (GBV), Sexual exploitation and abuse (SEA) and Sexual harassment (SH) is essential, and that preventing it is my responsibility. At [Company], GBV activities constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. All forms of GBV are unacceptable, be it on the worksite, the worksite surroundings, at workers' camps, or inthe community. Prosecution of those who commit GBV may be pursued if appropriate.

I agree that while working on the [Project], I will:

- Cooperate with any relevant investigations.
- Treat women, children (definition of "child" shall be as specified in Child Labour (Prohibition and Regulation) Act, 1986) and men with respect regardless of race; color; language; religion; political or other opinion; national, ethnic or social origin; sexual orientation or gender identity; disability; birth or other status.

- Not use language or behaviour towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
- Not request or engage in sexual favors - for instance, making promises or favorable treatment dependent on sexual acts, in or outside the work site.
- Refrain from abusive and violent behaviour, in the workplace, labor camp or surrounding communities.
- Attend and actively partake in training courses related to HIV/AIDS, GBV, SEA and SH as requested by my employer.
- Report through the grievance redress mechanism or to my manager any suspected or actual GBV by a fellow worker, whether in my company or not, or any breaches of this Code of Conduct.

[Company] recognizes that false accusations of sexual harassment can have serious effects on innocent persons. If, after the investigation, it is found that the complainant has maliciously or recklessly made a false accusation, the complainant will be subject to appropriate sanctions. In such a case, the company will also take appropriate action to restore the reputation of the accused.

I understand that it is my responsibility to use common sense and avoid actions or behaviours

that could be construed as GBV or breach this Self-declaration format. I do hereby acknowledge that I have read the foregoing Self-declaration format, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to GBV. I understand that any action inconsistent with this Self-declaration format or failure to act, as mandated by this Self-declaration format may result in disciplinary action and may affect my ongoing employment.

I have familiarized myself with the contents of this Self-declaration format. By my signature below, I acknowledge, understand, accept and agree to comply with the information contained in the Self-declaration format provided to me.

I hereby confirm I have read and understand the Self-declaration format.
Name (Employee)

Signature
Date

6.11 Code of Conduct for Contractor's Workers

6.11.1 The Contractor shall have a Code of Conduct for the Contractor's Personnel. The Contractor shall ensure that each Contractor's Personnel is provided a copy of this Code of Conduct, written in a language comprehensible to that person, and shall seek to obtain that person's signature acknowledging receipt of the same. Reference code of conduct is place below:.

Code of Conduct for Contractor's Workers

We are the Contractor, [*enter name of Contractor*]. We have signed a contract with [*enter name of Employer*] for [*enter description of the Works*]. These Works will be carried out at [*enter the Site and other locations where the Works will be carried out*]. Our contract requires us to implement measures to address environmental and social risks related to the Works, including the risks of sexual exploitation and abuse and gender-based violence.

This Code of Conduct is part of the measures to deal with environmental and social risks involving

the workers, related to the labor camps and the workplace. It applies to all our staff, laborers and other employees at the Works Site or other places where the Works are being carried out. It also applies to the personnel of each subcontractor and any other personnel assisting us in the execution of the Works. All such persons are referred to as "**Contractor's Personnel"** and are subject to this Code of Conduct.

This Code of Conduct identifies the conduct that is required from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive, or violent behavior will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

Contractor's Personnel shall:

1. Make earnest efforts to understand his/her responsibilities detailed in this Code of Conduct and any other documents and training, as directed by the Employer. Proactive seek clarifications to enable work to be undertaken in strict compliance with this Code of Conduct.
2. Carry out his/her duties competently and diligently.
3. Comply with this Code of Conduct and all applicable laws, regulations, and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Workers and any other person.
4. Maintain a safe working environment including by:
    a. ensuring that workplaces, machinery, equipment, and processes under each person's control are safe and without risk to health.
    b. wearing required personal protective equipment.
    c. all works are conducted with safety clearance and under appropriate supervision.
    d. using appropriate measures relating to chemical, physical, and biological substances and agents.
    e. following applicable emergency operating procedures.
    f. providing separate, safe, and easily accessible working and accommodation facilities for women and men working on the site.
5. Report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and serious danger to his/her life or health.
6. Treat other people with respect, and not discriminate against specific groups such as women, gays, people with disabilities, migrant workers, or children.
7. Not engage in sexual harassment which includes unwelcome sexual advances, requests for sexual favors, and other unwanted verbal or physical conduct of a sexual nature.
8. When engaging with the community and/or project affected persons, this should be done professionally and with utmost respect. Intimidation, threats, and coercive behavior will not be tolerated.
9. Not engage in sexual exploitation and abuse, which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another.
10. Not engage in sexual assault, which means any form of non-consensual sexual contact.
11. Not engage in any form of sexual activity with individuals under the age of 18.

12. Not make any inappropriate and unwanted sexual advances to people in the adjoining communities or settlements.
13. Not work or be present in the worksite(s) under the influence of any intoxicating substances, such as alcohol or drugs.
14. Not possess alcohol or any other intoxicating substances while on duty or in the labor camps.
15. Return to the labor camp no later than 22:00, unless working on night shift.
16. Complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, Gender-based violence (GBV), Sexual Exploitation, Abuse and Harassment (SEAH).
17. Report violations of this Code of Conduct.
18. Not retaliate against any person who reports violations of this Code of Conduct, whether to AIIB or the Employer, or who makes use of the grievance mechanism for Contractor's Workers or the project's Grievance Redress Mechanism.

RAISING CONCERNS

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert*] in writing at this address [X] or by telephone at [X] or in person at [X]; or
2. Call [X] to reach the Contractor's hotline *(if any)* and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country law. Anonymous complaints or allegations may also be submitted and will be given all due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

CONSEQUENCES OF VIOLATING THE CODE OF CONDUCT

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

FOR CONTRACTOR'S PERSONNEL:

I have received a copy of this Code of Conduct written in [X] language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person with relevant experience in handling gender-based violence*] requesting an explanation.

Name of Contractor's Personnel: [insert name]

Signature: _____
Date: (day month year): _____

Countersignature of authorized representative of the Contractor: [insert name]
Signature: _____
Date: (day month year): _____

7.0 FINANCIAL DEDUCTION/WITHHOLDING

7.1 Financial deductions from Contractor on occurrences of an incident.

7.1.1 Table No. 1 below indicates ESHS incidents and the corresponding deductions to be made from the Contractor under Sub-Clauses 20.1 [Employer's Claims], Sub-Clauses 14.3 [Application for Interim Payment], Sub-Clauses 14.6 [Issue of Interim Payment Certificates] and Sub-Clauses 14.7 [Payment] of the General Conditions of Contract.

7.1.2 The affected part of the Works shall remain suspended until all necessary investigations are completed as prescribed in Clause 2. [ESHS Management], Sub-Clause 2.15 Accident Report and Investigation and as per the related local laws of the state.

7.1.3 Upon submission of the Contractor's Request for Inspection (RFI), a joint inspection of the affected part of the Works shall be carried out by the Engineer and the Contractor. On receipt of the Engineer's Consent (Notice of No Objection: NONO), the Contractor may resume the work.

7.1.4 The Contractor shall not be entitled to any extension of time or to the payment of any cost or profit due to any suspension in accordance with this Sub-Clause 8.5 [Extension of time for Completion]

7.1.5 The maximum amount of delay damages set out in Sub-Clause 8.8 [Delay Damages] of the General Conditions of Contract shall not be applicable where the cause of delay to completion is suspension of part of the Works due to the Contractor's non-compliance as described in this clause 7.1.

7.1.6 The Engineer may issue a notice to the Contractor in accordance with Sub-Clause 3.5 [Engineer's Instruction] of the General Conditions of Contract to rectify any unsafe act or condition (including but not limited to error, default, or omission) upon discovery of same on the Site by the Engineer, in a form of Nonconformity Report.

7.1.7 The Contractor shall promptly comply with such notification, investigate the noncompliance of the Condition of Contract on ESHS and Project ESHS Manual as soon as possible (but no later than 7 days, or within such other period from receipt of the Engineer's notification as may be approved by the Engineer), submit to the Engineer for review full details of the proposed correction, prevention and any other measures (hereinafter referred to as the "measures") to be taken by the Contractor to rectify and close-out the matter and to prevent re-occurrence. Such measures shall be to the satisfaction of the Engineer.

7.1.8 The Contractor shall not proceed with the affected works until its measures are accepted by the Engineer.

Table No. 1: Incidents

Sl. No.	Incident		Financial deductions from the Contractor in Indian Rupees
1.	Injury and Incidence reporting	i) Fatal accidents	i) Rs.100,000 for the first fatality and Rs.200,000 for every subsequent fatality.
		ii) Injury accident	ii) Rs.50,000 for first grievously injured person and Rs.75,000 for every subsequent grievously injured person (Grievous Injury as defined by Workmen's Compensation Act)

8.0 ATTACHMENT

Attachment -1 Contents of ESHS Management Plan

1.0 General

1.1 The Contractor shall prepare an Environment, Social, Health and Safety (ESHS) Management Plan, which provides measures to protect the Environment, Health and Safety of workers and the public.

1.2 The Contractor's ESHS Management Plan shall be based on Environment, Social, Health and Safety considerations submitted with the Tender and shall have the content shown in the following section [Contents of ESHS Management Plan].

1.3 The Contractor shall submit his ESHS Management Plan for review by the Engineer within 28 days after the Commencement Date and shall amend the ESHS Management Plan to address any comments made by the Engineer and submit a Final ESHS Management Plan within 14 days of receipt of comments.

1.4 The Final ESHS Management Plan shall be binding on the Contractor for the duration of the Contract.

2.0 Content of ESHS Management Plan

2.1 The Contractor's ESHS Management Plan shall cover the following aspects:

Site ESHS Management Plan	
Contract No.	
Contractor Name	
Project Name	
1	Project Highlights i) Title of the content; ii) Contract number; iii) Brief scope of work; iv) Location map/key plan; v) Period of the project;
2	ESHS Management Policy
3	Site organization chart Chart indicating reporting of ESHS Management personnel, appointment, duties, and responsibilities
4	Roles &responsibility Individual responsibility of the i) The Contractor's representative ii) Health & Safety Expert/manager iii) Environment Expert/manger

	iv) Social expert v) Construction manager vi) ESHS Committee members vii) ESHS Engineer viii) Site Engineer ix) Bridge Engineer x) Construction Supervisors xi) Subcontractors
5	ESHS Site Committee i) Details - Chairman, secretary, members, and employer's representative ii) Procedures for effective conduct of meeting
6	ESHS Training
7	Subcontractor Evaluation, Selection, Control and ESHS Code of Conduct
8	ESHS Inspection and audit
10	Accident, Incident, Near miss, Dangerous occurrence, investigation reporting procedures
11	First Aid, Occupational Health and Emergencies measures
12	Staff and labour welfare measures
13	Hazards and Risks with Risk assessment and mitigation procedures
14	Safe Work Procedures e.g. i) Excavation ii) Structural steel erection iii) Form works iv) Concrete placement v) Work at height vi) Switch-over works vii) Floor, wall openings and stairways viii) Welding, cutting and bracing ix) Lifting appliances x) Electrical equipment xi) Mechanical equipment xii) Fire prevention xiii) Hazardous chemicals and solvent

	xiv) Lighting xv) Abrasive blasting xvi) Launching operation/girder erection.
15	Work permit system
16	List of standard job specific PPEs to be used in the site
17	Maintenance of regime for construction equipment and machinery
18	Traffic management plan
19	Housekeeping
20	i) Environmental and Social Management ii) Applicable National and State legislation and regulations iii) Specific procedures for achieving environmental and social performance requirements as given in the Employer's requirements on Environment. iv) Details on air monitoring and noise monitoring control plan which details mitigation measures / corrective action / preventive action and monitoring schedule. v) The ESHS Management Plan must contain procedures on prevention and control of water pollution, storage, handling and disposal of waste, including municipal, C&D, plastic, bio-medical, chemical and hazardous wastes, reuse/recycle of waste, selling to authorised recyclers and records thereof, preservation of landscape disturbed due to construction, housekeeping/Environmental sanitation and traffic management as required under the contract. vi) Procedures for recording environmental complaints and response process. vii) Waste Management Plan viii) HIV Prevention and Control Plan ix) Gender Based Violence (GBV) and sexual Exploitation and Abuse (SEA) Prevention and Response Plan x) COVID-19 Response and Management Plan xi) Labour Camp Management Plan
21	Emergency Response plan
22	Visitors and security arrangement
23	Safety and Health promotion and awareness;
24	Safety and Health equipment and Safety and Health of the Contractor's construction and office equipment;

Note: -The Environment, Social, Health and Safety (ESHS) Management Plan shall be incorporated

in the relevant sections.

Attachment -2 Workplace Policy (on HIV/AIDS Prevention & Control)

Haryana Rail Infrastructure Development Corporation Limited (HRIDC) recognizes HIV/AIDS as a developmental challenge and realizes the need to respond to it by implementing regular HIV/AIDS prevention programmes and creating a non- discriminatory work environment for HIV infected workmen engaged by Contractors. For the purpose of making conscientious, sensitive and compassionate decision in addressing the realities of HIV/AIDS, HRIDC has established these guidelines based on ILO code of practice on HIV/AIDS.

- Creating awareness through professional agency using IEC (Information, Education and Communication) package specially designed for migrant workers.
- Institutional capacity building by training the project implementation team, Environmental, Social, Health & Safety (ESHS) Managers, establishing linkages for deficient diagnosis and treatment of the affected workers, effective monitoring of implementation and documentation for further learning.
- Establishing peer educators by selecting them in consultation with Contractors and training them through professional agencies so that they become focal point for any information, education and awareness campaigns among the workmen throughout the contract period.
- Promotion of social marketing of condom

Attachment -3 Workplace Policy on COVID-19 Prevention and Control

It is likely that Corona virus Disease 2019 (COVID-19) will continue to occur in the community in the foreseeable future. It is therefore necessary to have a plan/policy in place to prevent the spread of this virus within the workplace. In order to reduce the risk of infection, Haryana Rail Infrastructure Development Corporation Limited (HRIDC) recommends to the Contractor to consider the following measures:

a) The Contractor shall ensure that the latest guidelines issued by Ministry of Health and Family Welfare (MoHFW), local government and the district administration are strictly followed at the construction works site.

b) On day 0, before resuming the work on sites post lockdown period, mandatory medical check-up will be arranged for all workers.

c) Only medically fit workers will be deployed at site and medical assistance will be arranged for unfit workers.

d) A unique photo identity card with serial number will be issued to all the workers and their family members staying at site.

e) All the essential items will be made available to them at site only. Mandatorily wear face masks while working on site or going outside.

f) No outside worker will be allowed to stay at site without following proper procedure and instructions.

g) The workers staying outside (which are always nearby) shall reach the site either by walking or by their individual mode of transport (bicycle, two-wheeler etc.).

h) During attendance, training and other sessions, social distancing guidelines will be followed along with provision of no-touch attendance.

i) All workers may be advised to take care of their own health and look out for respiratory symptoms/fever and, if feeling unwell, shall leave the workplace immediately after informing their reporting officers.

j) Workers shall not shake hands when greeting others and while working on the site.

k) Avoid large gatherings or meetings. Maintain at least 1 metre (3 feet) distance from persons, especially with those having flu-like symptoms, during interaction.

l) Workers shall clean hands frequently by washing them with soap and water for at least 40 seconds.

m) Workers shall not share their belongings like food, water bottles, utensils, mobile phones etc. with others.

n) The utensils shall be washed properly post use at designated places.

o) Post work, workers shall change their clothes before leaving the site and clothing shall not be shook out.

p) Avoid touching your eyes, nose, or mouth with unwashed hands.

Attachment -4 Reference for ESHS Activities

General Instruction: ESHS/GI/001

Topics for ESHS Orientation Trainings for Workmen for First Day at Work

1) **Hazard Identification Procedure**

Hazards on site:

- Working at Height, Electricity, lifting work, Work close to railway tracks or roads, Construction machinery and Safety of nearby located structures.

2) **Personal Protective Equipment**

- What is available?
- How to obtain it?
- Correct use and care.

3) **Health**

- Site welfare facilities;
- Potential health hazards;
- First Aid/Cardiopulmonary Resuscitation (CPR). /Automated External defibrillator (AED).

4) **Duties of the Contractor**

- Brief outline of the responsibilities of the Contractor by law;
- Details of the Contractor's ESHS Policy;
- The Employer ESHS Management Manual (if any);
- Building and other Constructions Welfare Law.

5) **Employee's Duties**

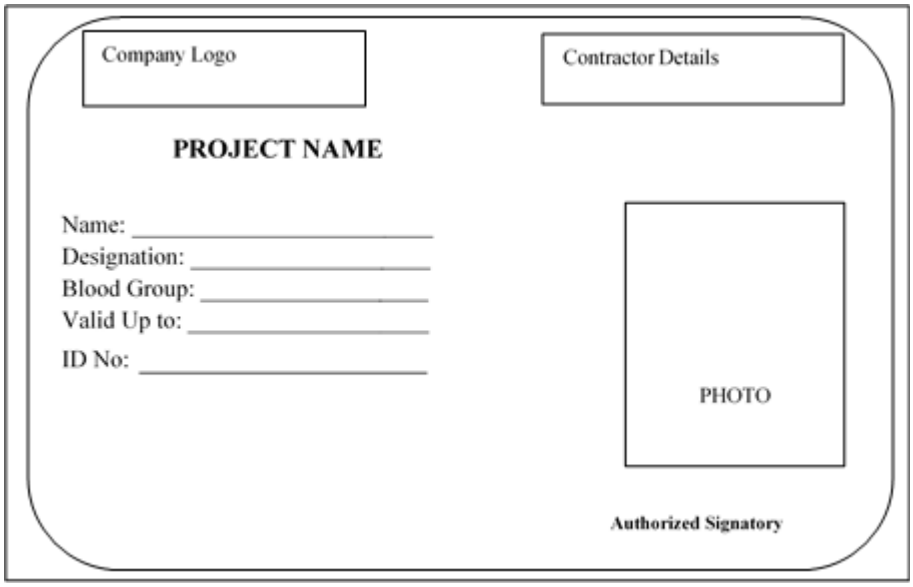
- Brief outline of responsibilities of employee under law

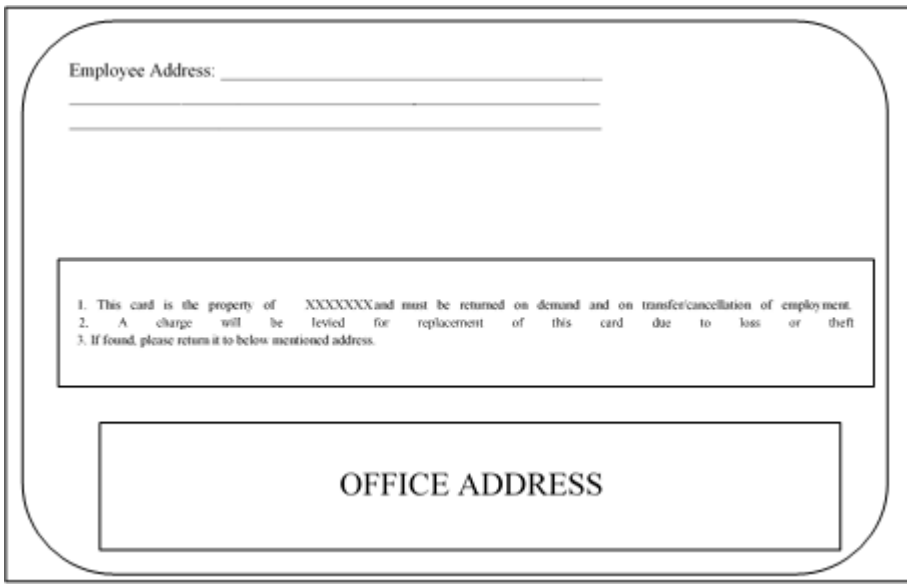
6) **Environment And Social**

- Contractor's Environment Policy
- Key legal requirements
- Avoidance of Nuisance
- Environmental Sanitation
- Dust Control Measures
- Water Pollution and Control
- Occupational noise mitigation
- Waste Management and Disposal
- Gender Based Violence and Sexual Exploitation and abuse (GBV/SEA)
- HIV/AIDS prevention
- Grievance Redressal Mechanism for GBV/SEA

General Instruction: ESHS/GI/002

ID CARD FORMAT (85 mm x 55mm) FRONT SIDE OF ID CARD:





General Instruction: ESHS/GI/003

WEEK/DAYS TO BE OBSERVED FOR CREATING ESHS AWARENESS

1st Monday to Sunday of January	Road Safety Week (Subjected to confirmation from Ministry of Road Transport, Govt. of India every year.)
16th February	Kyoto Protocol Day
March	Red Cross Month
4th March	National Safety Day
8th March	International Women's Day
22ndMarch	World Water Day
7th April	World Health Day
14th April	Fire Safety Day
18th to 22nd April	Earth Week
20th April	Earth Day
20th April	Noise Awareness Day
28th April	ILO World Day for Safety and Health at Work Day
1st to 7th May	Emergency Preparedness Week
5th June	World Environmental Day
12th June	World Day against Child Labours
21st June	World Yoga Day
9th July	Occupational Health Day
17th October	World Trauma Day
1st December	World AIDS Day

General Instruction: ESHS/GI/004

Minimum Requirements of ESHS Communication Posters/Signage/Video:

a) Every Contractor shall prepare a ESHS Communication Plan as a part of site specific ESHS Management Plan and shall include the following minimum requirement of Posters/Signage/Video as applicable. In case readymade posters are available in any of the category from National Safety Council or any other safety related organizations they may procure the same and display it. In case the same is not available, then the Contractors shall make necessary arrangements to get the posters designed and printed on their own. All posters shall each be in Hindi, English and the regional language; and

b) All the above is to be detailed in the Contractor's ESHS Management Plan and he shall obtain the Engineer's prior consent for the numbers, contents, locations, etc.

Table No.: 1 - Minimum No. of Posters

Sl. No	ESHS Poster Title	No. of Posters/Signages
1.	Daily Safety Oath	5
2. a)	Signage to display the messages like PPE ZONE,NO PPE ZONE, HARD HAT AREA etc.	5
b)	Helmet	5
c)	Shoe	5
d)	Goggles & Ear Protection	5
e)	Full Body Harness	5
f)	Hi-Vi Jacket	5
3.	Working at Heights	5
a)	Ladder, Stairway, Scaffold -Signage to display the messages like SAFE, UNSAFE, FIT FOR USE, AVOID USE etc.	5
4.	Site Electricity	5
5.	Crane Safety	5
6.	Rigging Procedures	5
7.	Excavation	5

7.	Occupational Health (Mosquito Control, HIV/AIDS awareness, DustControl, Noise Control, No Smoking/Spitting, etc.)	5
8.	First – Aid	5
9.	Labour Welfare Measures (Payment of Minimum Wages, Avoidance of Child labour, signing in the MusterRoll, in case of accidents- what to do? Etc.	5
10.	Traffic Safety (Speed limit, safe crossingand working within barricaded area etc.)	5
11.	Environmental Management	5

Note: The above minimum numbers are for guidance only. The actual number, material of posters/signages will be as per project specific requirement.

Table No.: 2 – Size of Posters/Signage

Sl. No	Item	Size
1.	Posters – Standard	17"x22" –135 GSM 4 Colour Printing
2.	Posters – Special (Wherever required)	17"x22" card laminated FA Poster
3.	Posters - Mega size (Wherever required)	32"x40" Flex FA Poster
4.	First-Aid Booklet	6"x4"
5.	Safety Handbook	6"x4"
6.	Signage	Small: 12"x6" Big: 24"x12"
7.	Road Traffic Sign Boards	Strictly as per Indian Road Congress (IRC) specifications

Table No.: 3 – Safety Signage Colour (as per IS: 9457)

Sl. No	Type of signage	Colour
1	Mandatory	Blue
2	Danger	Yellow
3	Prohibitory	Red
4	Safe conditions	Green

Attachment -5 Safe Work Procedure for Work Near Railway Track

1.0 Safety precautions and measures to be observed during execution of ROB/ RUB/ Viaduct/ any other works in Railway and adjoining areas:

1.1 The Contractor(s) shall not allow any road vehicle belonging to him or his suppliers, etc. to ply in HRIDC/railway land next to the running line. If for execution of certain works viz. earthwork for parallel railway line and supply of ballast for new or existing rail line gauge conversion, etc. road vehicles are necessary to be used in railway/HRIDC land next to the railway line, the Contractor(s) shall apply to the Engineer-in-Charge for permission giving the type and number of individual vehicles, names and license particulars of the drivers, location, duration and timings for such work/movement. The Engineer-in-Charge or his authorized representative will personally counsel, examine and certify the road vehicle drivers, Contractor(s)' flagmen and supervisors and will give written permission giving names of road vehicle drivers, Contractor(s)' flagmen and supervisors to be deployed on the work, location, period and timing of the work. This permission will be subject to be following obligatory conditions:

1.2 **Construction Activities and Safety:**

a) The 'Methodology of Working' shall be incorporated in GAD and Temporary Arrangement Drawings.

b) The activities of work to be taken up during the railway traffic block/under speedrestriction, etc. should be clearly mentioned in such drawings. If at any stage of execution, any discrepancy is found in the drawing with respect to the site condition affecting safety or some new activity of work is required to be done, the same should be brought to the notice of Railway & HRIDC Engineers and such works should be done only after approval by Railways & HRIDC representative. In such cases, scheme may be modified and, if required, fresh CRS sanction shall have to be obtained.

1.2.1 The works required to be done under traffic block protection, are to be carried out only in the presence of Railway & HRIDC Engineering Officials. The Railway's and HRIDC's Supervisor has to certify safe conditions for passage of trains before resumption of traffic. The works to be done under traffic shall be carried out under the provision of banner flag and protection by Engineering Flagman.

1.2.2 Following important activities of works shall be carried out under supervision of Railway/HRIDC Engineer or his nominated Supervisor:

a) Excavation at foundation/ground level near to railway track

b) Concrete casting and/or masonry work very close to railway track

c) Erection of temporary structures near to running lines.

d) Casting of structures like girder/slab over railway track

e) Stage-prestressing of girders when placed across railway tracks properly supported

f) Launching of precast/pre-assembled girders across railway tracks

g) Any work of lifting, side shifting and slewing of girders over the railway track

h) Dismantling of temporary structures, shuttering, scaffolding, etc. adjacent to and above the railway track. For carrying out activities of casting, erection, launching, handling, and dismantling as listed above, the Contractor's Engineer shall furnish the Construction Programme in advance to HRIDC Supervising Engineer & Engineer representative. No such work should be taken up in absence of the HRIDC Supervising Engineer & Engineer representative. For the activities which are to be done in presence of the HRIDC Engineer and prior intimation shall be given in writing and acknowledgement obtained from HRIDC's representative.

1.2.3 To ensure 'Safety' during construction activities, HRIDC Site Engineer & Engineer representative may direct the Contractor's Supervisor/Engineer or their nominated representative for safe working procedures/ instructions, notwithstanding the contractual or MOU conditions prevailing between/ among Railways/other Departments like NHAI/Contractors/ Concessionaire.

1.2.4 All the records of Quality Assurance/Quality Control, testing of the materials and satisfactory completion of an activity shall be maintained at site by the Contractor's Engineer and Supervisor. On the basis of these records, HRIDC Site Engineer shall do stage-wise clearance of the works at following stages:

i) Completion of foundation

ii) Completion of substructure

iii) Completion of superstructure

Without such stage clearance, the work in next stage of construction shall not be allowed by the HRIDC Supervisor, unless proper system of check and exercise is followed at the site.

1.2.5 Normally, the high beam PSC girders are designed with wider top flange and shorter bottom flange with very high beam which makes the girder unsuitable during lowering, slewing and launching time.

1.2.6 During launching of girders and subsequent adjustments for placement of bearing, special attention and precautions are required at site to be followed rigorously without resorting to shortcut practice or leaving the work at site to untrained or inexperienced Engineers. Normally, end diaphragms are not cast for the extreme both side girders. These shall be cast minimum 300mm on both sides for all 'I' beam girders to provide temporary supports for ensuring stability.

"OR"

For side adjustments and bearing placements below 'I' section girders, end brackets made of steel angles should be provided for all 'I' beams sequentially to avoid side titling of individual girders. End brackets shall be removed only after placing girders on bearing and casting of diaphragms.

1.2.7 During lowering, the jacks shall be operated duly keeping wooden packing of various thicknesses fixing the amount of lowering to the barest minimum, so that even if the jack fails, the wooden packing will take load and further stability of girder is not endangered.

1.2.8 Temporary crib support staging shall be interlaced with clamps and angles. Adequate base width shall be maintained proportionate to the height of stage, which is very essential for avoiding the oblong effect during launching of girders. During launching by RH girder method, the movement of the PSC girders shall be controlled both from front and rear with sync mechanism having simultaneous operation, so that the speed of the launching is always under the control. Spare hydraulic jacks shall always be kept at site. Lowering of girder shall always be carried out at one end only. Further, other end should be adequately secured by wire ropes, end brackets, etc. Thereafter, the process shall be continued alternately.

1.2.9 As far as possible, launching of girders by temporary staging shall be avoided and launching by heavy capacity cranes, wherever feasible, shall be adopted.

1.2.10 Steel girder launcher if used for launching of PSC girders should be pre-tested for the critical loading (likely to be encountered during actual launching) before deployment on the approaches regarding its strength as well as amount of permissible deflection using actual test PSC girder as a testing load. Connections at supports shall be inspected and certified prior to actual launching. It shall be adequately secured to the base support system

on the pier cap.

1.3 General Construction Safety:

1.3.1 General safety precautions as applicable for civil works shall be adopted in field.

1.3.2 Working near running line: Safe practices at site and at all times non-infringement to moving trains shall be ensured. Road vehicles, material trolleys, dollies with any tendency to roll off towards the running lines to be checked by providing chains, locking arrangements, blocks, etc. shall be ensured and the Site-in-Charge of the Contractor shall be primarily responsible, secondary responsibility being of Contractor's Consultant.

1.3.3 Testing of cranes, lifting jacks and other equipment: All equipment like cranes, lifting jacks shall be tested, duly calibrated and certified prior to the use at construction site.

1.3.4 Routine safety checks, validity of test certificates for load bearing equipment especially for cranes outsourced from third party shall be ensured prior to deployment.

1.3.5 Construction workers at site shall be provided with personal safety gear like reflective vest, helmet, Safety shoes, gloves & eyewear approved as per construction industry standards. For persons working at pier top/girder level, temporary supports, hand railing, protection with help of ropes, slings and temporary railings shall be provided.

2.0 **Safety Guidelines and Precautions for working close to Railway tracks**

2.1 A large number of men and machinery are deployed by the contractors for track renewals, gauge conversions, doublings, bridge rebuilding etc. It is therefore essential that adequate safety measures are taken for safety of the trains as well as the work force. The following measures should invariably be adopted.

A. The contractor shall not start any work without the presence of HRIDC Engineer at site.

B. Wherever the road vehicles and/or machinery are required to work in the close vicinity of railway line, the work shall be so carried out that there is no infringement to the Railway's schedule of dimensions. For this purpose, the area where road vehicles and/or machinery are required to ply, shall be demarcated and acknowledged by the contractor. Special care shall be taken for turning/ reversal of road vehicles/machinery withoutinfringing the running track. Barricading shall be provided wherever justified and feasibleas per site conditions.

C. The look out and whistle caution orders shall be issued to the trains and speed restrictions imposed where considered necessary. Suitable flagmen/detonators shall be provided where necessary for protection of trains.

D. The supervisor/workmen should be counseled about safety measures. A competency certificate to the contractor's supervisor as per Performa annexed shall be issued by DGM/HRIDC, which will be valid only for the work for which it has been issued.

E. The unloaded ballast/rails/sleepers/other P-Way materials after unloading along track should be kept clear off moving dimensions and stacked as per the specified heights and distance from the running track.

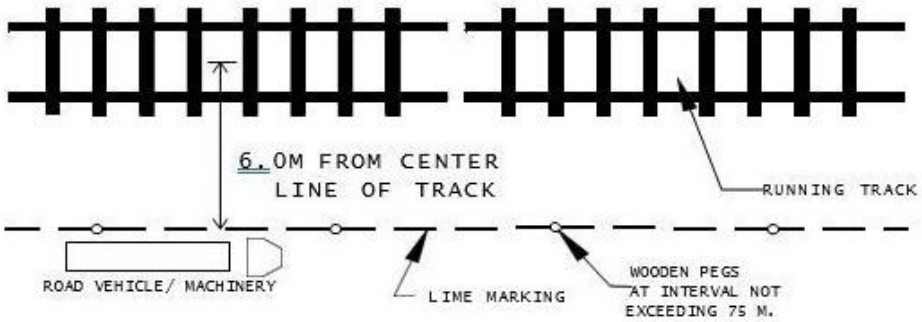
F. Supplementary site-specific instructions, wherever considered necessary shall be issued by the HRIDC's representative.

2.2 PLYING OF ROAD VEHICLES AND WORKING OF MACHINERIES CLOSE TO RUNNING TRACKS

A. Normally, the road vehicles shall be run, or machinery shall be worked so as not to come closer than 6.0m from centre line of nearest running track.

B. The land strip adjacent to running tracks, where road vehicle is to ply or machinery is to work, shall be demarcated by lime in advance in consultation with the Railway's &

HRIDC's Engineer. Wooden pegs at interval not exceeding 75mtr. shall be provided along the line marking as permanent marks. The road vehicles shall ply or machinery shall work so as not to infringe the line of demarcation.



C. If a road vehicle or machinery is to work closer to 6.0m due to site conditions or requirement of work, following precautions shall be observed:

a) In no case the road vehicle shall run or machinery shall work at distance less than 3.5m from centre line of track.

b) Demarcation of land shall be done by bright colored ribbon/nylon cord suspended on 120 cm high wooden/bamboo posts at distance of 3.5 m from centre line of nearest running track.

c) Presence of an authorized HRIDC's representative shall be ensured before plying of vehicle or working of machinery.

d) Railway's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train. Whistle boards shall be provided wherever considered necessary.

e) Lookout men shall be posted along the track at a distance of 800m from suchlocations who will carry red flag and whistles to warn the road vehicle/machinery users about the approaching trains.

f) On curves where visibility is poor, additional lookout men shall be posted.

D. If vehicle/machinery is to be worked closer to 3.5m from running track - Under unavoidable conditions, if road vehicles is to ply or machinery is to work closer to 3.5m due to site conditions or requirement of work, following precautions shall be observed:

a) Plying of vehicles or working of machinery closer to 3.5m of running track shall be done only under protection of track. Traffic block shall be imposed wherever considered necessary. The site shall be protected as per provisions of Para No. 806 & 807 of P-Way Manual as case may be.

b) Presence of a Railway's/, HRIDC's Supervisor shall be ensured at worksite.

c) Railway's& HRIDC's Supervisor shall issue suitable caution order to Drivers of approaching train about road vehicles plying or machineries working close to running tracks. The train drivers shall be advised to whistle freely to warn about the approaching train.

E. Precaution to be taken while reversing road vehicle alongside the track

The location where vehicle will take a turn shall be demarcated duly approved by Railway's/HRIDC's representative. The road vehicle driver shall always face the Railway track during the course of turning/reversing his vehicle. Presence of an authorized

Railway/HRIDC representative shall be ensured at such location.

F. Road vehicle shall not be allowed to run along the track during night hours generally. In unavoidable situations, however, vehicles shall be allowed to work during night hours only in the presence of an authorized Railway's/HRIDC's representative and whereadequate lighting arrangements are made and where adequate precautions as mentioned earlier have been ensured.

G. Road vehicles/machinery/plant etc. when stabled near running tracks shall be properly secured against any possible roll off and always be manned even during off hours.

2.3 EXECUTION OF WORKS CLOSE TO OR ON RUNNING LINES

A. Any work close to or on running tracks shall be executed under the presence of a HRIDC's Supervisor only.

B. **Precaution to be taken to ensure safety of trains while execution of work close to the running line or on running lines**.

a) Such works shall be planned and necessary drawings particularly with regard to infringement to moving dimensions shall be finalized duly approved by competent authority before execution of work. The work shall be executed only as per approved procedure and drawings.

b) All temporary arrangements required to be made during execution of work shall be made in such a manner that moving dimension do not infringe.

c) Suitable speed restriction shall be imposed, or Traffic block shall be ensured as required. *The requirement of Traffic and Power Blocks shall be submitted by the Contractor to the Engineer for approval. The Traffic and Power Blocks will be finalized in consultation with Delhi Division of Northern Railway. No cost shall be charged for Traffic and Power Blocks from the Contractor.*

d) Necessary equipment for safety of trains during emergency shall be kept ready at site.

C. Precaution to be taken to ensure safety of electrical/signal/ telephone cables while excavating near tracks.

a) Particular care shall be taken to mark the locations of buried electrical/signal/telephone cables on the plans jointly with S & T/Electric supervisor and also at site so that these are not damaged during excavation.

b) Copy of the cable plan should be given to the contractor's authorized representative before handing over the site to start the work.

c) Due care shall be taken to ensure that any part of the equipment or machinery or temporary arrangement does not come close to cables while working.

d) Joint procedure order No. 17/2013 issued by Railway Board vide letter No.2003/Tele/RCIL/1 Pt IX dated 24.06.2013 shall be followed for undertaking digging work in the vicinity of underground signaling, electrical and telecommunication cables.

D. Precaution to be taken during execution of works requiring traffic blocks.

a) Any work, which infringes the moving dimensions, shall be started only after the traffic block has been imposed.

b) Before closing the work, the track shall be left with the proper track geometry so that the trains run safely.

c) After completion of work the released sleeper and fittings should be properly stacked away from the track to be kept clear of moving dimensions.

d) Block shall be removed only when all the temporary arrangement, machineries, tools, plants etc. have been kept clear of moving dimensions.

E. Precaution to be taken during execution of works during night:

The work close to running line, generally, shall be carried out only during day hours. At locations, however, where night working is unavoidable, proper lighting arrangement should be made. The engineering indicator boards shall be lighted during night hours as per the provisions of IRPWM. The staff deputed for night working should have taken adequate rest before deploying them in night shift. We can specify duration of night shift from 20.00 hrs to 04.00 hrs. All other safety precautions applicable for daytime work should be strictly observed during night working.

F. Precautions to be taken to ensure safety of workers while working close to running lines:

a) Necessary lookout men with red flags and whistles shall be provided to warn the workmen about the approaching train.

b) Railway's/HRIDC's supervisor shall issue suitable caution order to Drivers of approaching train for whistling to warn the workers about the approaching train. Whistle boards shall be provided wherever considered necessary.

c) A "First aid kit" shall always be kept ready at site

G. Precaution shall be taken for safety of public or passengers, while executing works at locations, used by passengers and public

The worksite shall be suitably demarcated to keep public and passengers away from work area. Necessary signage boards such as "Work in progress. Inconvenience is regretted" etc. shall be provided at appropriate locations to warn the public/ passengers. Adequate lighting arrangement of worksite wherever required shall be done to ensure safety of public/passengers during night.

H. Precaution to be taken before stacking materials alongside the track to ensure that safety of trains is not affected –

The following precautions shall be taken before stacking the materials along the track for stacking of ballast, rails, sleepers etc.

a) The sites for material stacking should be selected in advance in such a manner as to ensure that no part of the material to be stacked is infringing the Standard Moving Dimensions. A plan of proposed stacking locations be made and signed jointly by an authorized HRIDC's/Railway's representative and contractor's representative.

b) The selected locations shall be marked by lime in advance.

c) Presence of an authorized HRIDC's/Railway's representative while unloading and stacking shall be ensured.

d) The material shall be stacked in such a height so as to not to infringe SOD in case of accidental roll off.

I. Precaution for handling of departmental material trains –

Instructions for working of material trains are contained in Chapter VIII of IRPWM which should be brought to the notice of the supervisors and other staff working on the material trains. In addition to this,following precautions should be taken:

a) Issue of 'fit to run' certificate:

As per Para 848 before a material train is allowed to work, the complete rake should be examined by the Carriage and Wagon staff and a 'fit to run' certificate issued tothe Guard.

b) As per Para 849 of IRPWM, a qualified Engineering official should be deputed on the train to ensure working of the material train as the Guard is not qualified to carry out such duties like Supervising of loading and unloading of materials.

c) As per Para 845 of IRPWM, the material train should not be permitted to work during the period of poor visibility due to fog, storm or any other cause except with the permission of the ADEN/DEN. Working of the material trains carrying labour should not be permitted between sunset and sunrise except in an emergency.

d) While unloading rail panels by the side of the running track, placement of the panels, clear of the maximum moving dimensions should be ensured.

e) Unloading of rail panels should be done by a team of trained staff under the active supervision of competent Supervisor/Officer.

f) Before unloading of rail panels, site should be prepared by way of leveling/removing extra ballast, if any, from the crib and shoulder with the objective to ensure requisite lateral and vertical clearances so as to prevent slippage of rail panels due to vibration during the passage of trains.

g) Reasonably adequate block should be asked and provided for unloading of the material and the work should be done preferably in day light to avoid shortcut in haste which may infringe the safety requirements.

J. Safety aspects to be observed while working in OHE area

a) No electrical work close to running track shall be carried out without permission of HRIDC representative.

b) A minimum distance of 2m has to be maintained between live OHE wire and body part of worker or tools or metallic supports etc.

c) No electric connection etc. can be tapped from OHE.

d) Authorized OHE staff should invariably be present when the relaying work or any major work is carried out.

e) Power block is correctly taken and 'permit to work' is issued.

f) The structure bonds, track bonds, cross bonds, longitudinal rail bonds are not disturbed and if disconnected for the work, they are reconnected properly when the work is completed.

g) The track level is not raised beyond the permissible limit during the work

2.4 PROTECTION OF TRACK DURING EMERGENCY

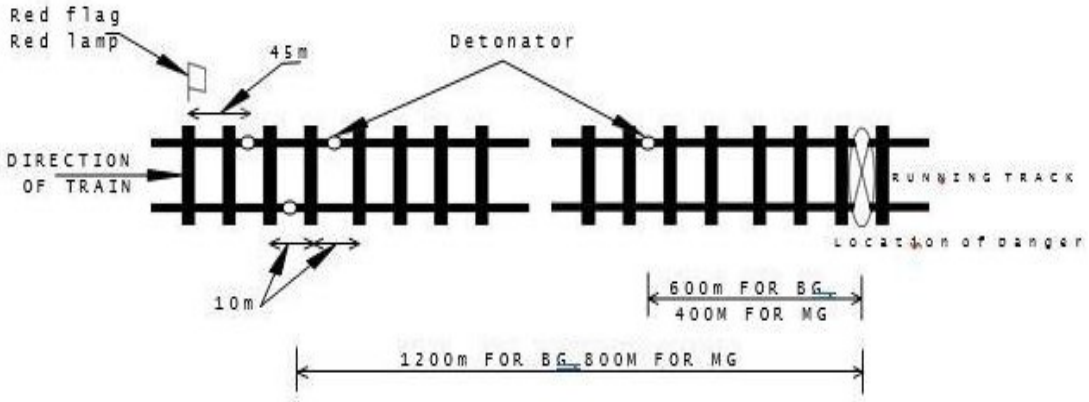
A. Action to be taken when a contractor's supervisor or vehicle operator apprehends any unusual circumstances likely to infringe the track and endanger safe running of trains.

a) At any time if a contractor's supervisor or vehicle operator observes any unusual circumstances likely to infringe the track and apprehend danger to safe running of track, he shall take immediate steps to advise a HRIDC official of such danger and assist him in protection of track.

b) The track shall be protected as under. One person shall immediately plant a red flag (red lamp during night) at the spot and proceed with all haste in the direction of approaching train with a red flag in hand (red lamp during night) and plant a detonator on rail at a distance of 600m from the place of obstruction of BG track (400m for MG track) after which he shall further proceed for not less than 1200m from the place of obstruction from BG track (800m for MG track) and plant three detonators at 10m apart on rails. After this he shall display the red flag (red lamp during night) at a distance of

45m from the detonators.

c) Attempts shall also be made to send an advice to nearest Railway/HRIDC station about the incident immediately.



B. Action to be taken if train is seen approaching to site of danger and there is no time to protect the track as per guidelines mentioned above.

In such a case the detonators shall be planted on rails immediately at distance away from place of danger as far as possible and attention of driver of approaching train shall be invited by whistling, waving the red flag vigorously, gesticulating and shouting.

C. What action shall be taken if more than one track is obstructed.

a) In case of single line protection as above shall be done in both the directions from place of danger.

b) In case of double line or multiple lines, if other tracks are also obstructed, theprotection as above shall be done for other track also.

c) The protection shall be done in that direction and on that track first on which train is likely to arrive first.

d) The Contractor's Supervisors, Operators and lookout men shall be properly explained about the direction of trains on running tracks.

D. Equipment required for protection of track.

Minimum compliment of protection equipment i.e. 10 detonators, 4 red hand flags, 4 red hand lamps, 4 banner flags and whistles etc. shall always be kept ready at worksites for use in case of emergency. HRIDC will arrange to provide detonators, whereas Contractor shall arrange other equipment at his own cost.

E. Arrangement of lookout men and competency required for lookout man to warn labour about approaching train.

a) Contractor will provide lookout men.

b) The lookout men shall be properly trained in warning to staff at worksite about approaching train.

c) Only those lookout men shall be provided at site who have been issued with a competency certificate by the Railway's/HRIDC's Supervisor.

d) In case, it is felt necessary to provide lookout men by Contractor, the charges for the same as fixed by HRIDC Administration shall be recovered from Contractor.

2.5 Training to Supervisors and Operators of Contractor

The Supervisors and Operators of the contractor proposed to be deployed at wok site, which is close to the running track, shall be imparted mandatory training by the HRIDC at site free of cost about the safety measures to be adopted while working in the vicinity of running track. HRIDC's Engineer-in charge of the work shall decide the scale, extent & adequacy of training. In case training is imparted at a recognized Railway training institute, the charges for the same, as decided by HRIDC, shall be recovered from the Contractor. A competency certificate to this effect to the individual Supervisor/Operator shall be issued as given below,by a HRIDC Officer not below the rank of DGM/HRIDC. No Supervisor/Operator of the Contractor shall work or allowed to work in the vicinity of running track that is not in possession of valid competency certificate.

All the labour, materials, tools, plants etc. except detonators, required for ensuring safe running of trains shall be provided by Contractor at his own cost. Wherever lookout men are provided by HRIDC, charges at the rate of Rs. 1000/- per man day shall be recovered from Contractor.

A sample of training competency certificate is provided below for reference:

Competency Certificate

Certified that Shri …… Supervisor/Operator of M/s. ……has been trained and examined in safety measures to be followed while working in the vicinity of running railway track for the work. His knowledge has been found satisfactory and he is capable of supervising the work safely.

This certificate is valid only for the work mentioned in this certificate only.

Signature and designation of the officer