



Transmission

OCCUPATIONAL HEALTH
AND
SAFETY M ANUAL

ADANI TRANSMISSION LIMITED

Adani Corporate House, Shantigram, S.G. Highway, Ahmedabad - 382421

	OHS Manual	Doc No: IMS/HSE/002
		Version No: 1.3
		Date: 31/03/2020

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1.0 INTENT

The intention of this document is to build and develop infrastructure across India in a way that will further raise the standards of health and safety on construction sites to a level that will be recognized as the best amongst India and comparable to the highest standards achieved worldwide.

This can only be achieved if there is a commitment from all parties involved in the construction and management of the Projects, from the most senior level of managers within the Owner and the Contractors, to the workers on the sites.

The Owner shall actively support the efforts and initiatives that are instigated by the Contractors and sub-contractors in their efforts for achieving high standards of health and safety on the Project Sites.

The ingredients that are needed to make and achieve a high standard of health and safety are well known to most of us, it is however the level of commitment that is demonstrated that shall determine whether or not we succeed.

This manual represents the minimum standards that the Owner will accept on matters of Occupation Health and Safety. The organization will use its best endeavors to ensure that all of the Contractors employed on the Project achieve these Standards.

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2.0 LEGAL REFERENCES

The procedures in this manual should be read in conjunction with and the amendments issued from time to time;

2.1 Indian statutory requirements

2.1.1 Primary statutory regulations

Contractor shall develop thorough understanding about the primary statutory regulations, (mentioned below) not only to satisfy the regulatory body perspective but to use legislation as the strongest tool for effective implementation of OHS management at construction work sites. Contractor is strongly advised to practice the principle of voluntary compliance.

- "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act" 1996,
- "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules 1998;
- "Building and Other Construction Workers' Welfare Cess Act" 1996 and
- "The Building and Other Construction Workers' Welfare Cess Central Rules" 1998;
- The Factories Act, 1948
- CEA (Safety requirement for Construction, O&M of Electrical Plants & Lines) Regulations 2011.
- Other Laws of India, Regulations, Rules and Codes of Practice on Safety and Health that may be applicable.

In order to facilitate the contractor for better understanding on the various provisions of the above Acts & Rules, a tabulated information highlighting the Sections / Rules referring to the corresponding registration of contractors, maintenance of registers and records, hours of work and wages, welfare, medical facilities and safety requirements are given in **Appendix No: 01**. It is an indicative one and not a limiting list. In addition, the construction works shall be undertaken in accordance with all applicable legislation and Indian statutory requirements listed below but not limiting to:

- The Indian Electricity Act 2003 & amendments
- The Indian Electricity Rules, 1956 & amendments
- Central Motor Vehicles Act 1988 & amendments
- Central Motor Vehicles Rules, 1989 & amendments
- The Environment (Protection) Act 1986 & amendments
- The Environment (Protection) Rules 1986 & amendments
- Hazardous Wastes (management, handling and trans-boundary movement) Rules 2016 & amendments
- The Air (Prevention and control of Pollution) Act, 1981 & amendments
- The Water (Prevention and Control of Pollution) Act, 1974 & amendments
- The Chemical Accidents (Emergency Planning, Preparedness & Response) Rules, 1996
- Manufacture Storage & Import of Hazardous Chemicals Rules 1989 & amendments

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- Noise Pollution (Regulation & control) Rules & amendments
- The Batteries (management & handling) Rules 2001 & amendments
- Bio-Medical Waste Management Rules, 2016 & amendments
- The Explosive Act 1884 & the Explosive Rules, 2008.
- The Explosives Substance Act 1908 & amendments
- The Static and Mobile Pressure Vessel (unfired) Rules, 1981 & amendments
- The Gas Cylinder Rules 1991 & amendments
- The Petroleum Act 1934 & Petroleum Rules 2002
- The Indian Boiler Act 1923 & amendments
- The Indian Boiler Regulations 1950 & amendments
- The Mines Act 1952 & amendments
- The Mines Rules 1955 & amendments
- The Public Liability Insurance Act 1992
- The Workmen's Compensation Act 1923 & amendments
- The Contract Labor (Regulation & abolition) Act, 1971 & amendments
- The Child Labor (Prohibitions & Regulations) Act, 1986 and Rules 1988
- The Minimum Wages Act, 1948 and Rules 1950 & amendments
- Employee State Insurance (Central Rules), 1950 & amendments
- The Recycled Plastic Usage Rules, 1998 & amendments
- Central Ground Water Board, Act January 1997 & amendments
- Notification on Control of Noise from Diesel Generator (DG) sets, 2002 & amendments
- Notification on Fly ash utilization, Sept 1999 as amended in August 2003
- National Building Code, 2005
- Indian Road Congress Code IRC: SP: 55-2001 'Guidelines on Safety in Road Construction Zones

Note: Other Act (Laws of India), Rules, and Regulations, Codes of Practice on Safety and Health that may be applicable.

2.1.2 The Workman Compensation Act, 1923 along with allied Rules.

The contractor shall ensure that all his employees / workmen are covered under 'Workmen Compensation Act' and shall pay compensation to his workmen as and when the eventuality for the same arises.

Notwithstanding the above Act / Rules, there is nothing in those to exempt the contractor from the purview of any other Act or Rule in Republic of India for the safety of men and materials.

2.2 International Standards, Guidelines & Certifications

The works should be undertaken in accordance with the applicable international guidelines, standards and specifications on OHS.

The important Indian Standards and British Standards as applicable to the work of this contract and every contractor shall aim to achieve certification of ISO 45001:2018.

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3.0 DEFINITION OF TERMS

3.1 Introduction

The following terms used in this manual are defined as follows and shall be construed accordingly.

- Project shall mean the Works/Facilities being set up by the Owner at various locations throughout India or abroad.
- Owner means the company who is setting up the Project and shall include its legal successors in title and permitted assignees as well as its authorized Officers / Representatives.
- Contractor means the company / agency who is awarded the Contract for the Project and shall be deemed to include its legal successors in title and permitted assignees as well as its authorized Officers / Representatives.
- Safety means the freedom from unacceptable risks of personal harm, i.e. the avoidance of accidents and incidents.
- Occupational Health means the physical wellbeing of a person and freedom from any illness caused due to working conditions.
- Hazard means a situation with the potential to cause harm including human injury, damage to property, plant or equipment, damage to the environment, or economic loss.
- Risk means the probability of something adverse happening and its severity. It is a combination of the probability, or frequency, of the occurrence of a defined hazard and the magnitude of the consequences of the occurrence.
- Foreseeable means that which is likely or possible.
- Chief Safety Officer means an officer nominated by Owner as Chief Safety Officer (Head-Safety).
- Site Safety Plan means the contract specific safety plan that the Contractor has prepared for safe execution of the contract work.
- Reportable Accident / Incident means an Accident or Incident that is reportable to the Owner's Representative. It shall include all fatalities, major injury accidents, dangerous occurrences and all accidents which result in incapacity for more than 24 hours or more, immediately following the accident
- Major Injury Accident is defined as:
 - Any fracture, loss of a limb or part of a limb;
 - Dislocation of the shoulder, hip, knee or spine;
 - Loss of sight (whether temporary or permanent); Penetrating injury to the eye; or
 - Any other injury that:
 - leads to unconsciousness
 - requires resuscitation
 - requires admittance to hospital
- Dangerous Occurrence is defined as:
 - Collapse or failure of lifting appliances or hoist or conveyors or other similar equipment / machine;
 - Collapse or failure of a crane, derrick, winch, hoist or other appliance used in

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raising or lowering persons or goods or any part thereof, or the overturning of a crane;

- Explosion or fire causing damage to the structure of any room or place in which persons are employed, or to any machine or plant, resulting in the complete suspension of ordinary work;
- Electrical short circuit or failure of electrical machinery, plant or apparatus, attended by explosion or fire, causing structural damage involving its stoppage or disuse;
- Explosion of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas;
- Collapse in whole or part from any cause whatsoever of any roof, wall, floor, Structure or foundation forming part of the construction site in which persons are employed;
- Total or partial collapse of any overburden, face, tip or embankment on the Construction site;
- The overturning of, or collision with any object by any bulldozer, dumper, excavator, grader, lorry or shovel loader, or any mobile machine used for the handling of any substance on the construction site.

3.2 Terms

The terms used in this manual are defined as follows and shall be construed accordingly.

- The use of 'shall' indicates a mandatory requirement.
- The use of 'should' indicates a guideline that is strongly recommended. The use of 'may' indicates a guideline that is to be considered.
- 'OHS' means Occupational, Health & Safety.
- BOCWA means Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.
- BOCWR means Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Central Rules, 1998.
- DG means Director General of Ministry of Labor, (Govt. of India).
- OAP means Operation Authorize Person (Permit - Issuer)
- MAP means Maintenance Authorize Person (Permit Holder – Requester)

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4.0 GENERAL

4.1 Introduction

It is the objective of the Owner to ensure that the Contract is completed on time, within budget, and to conforming standards of Occupational Health and Safety as per this Manual.

This manual has system wide application, and therefore not all of the clauses will apply to all Contractors. Each Contractor shall develop their own contract specific Site Safety Plan, which will represent their approach to the management of safety on their work sites under the Contract with the Owner.

The Owner shall levy fines against contractors who do not comply with the requirements of this Manual.

The Owner has built an image of safety conscious organization meticulously over a period of time. Any reportable accident (fatality / injury) results in loss of life and/or property damage. These accidents not only result in loss of life but also damage the reputation of Adani Group. Most of the accidents are avoidable and caused preliminary due to negligence. Hence, Owner shall recover the cost of damages from the contractors for every reportable incident (fatality / injury).

In addition, every Owner's work site is exposed to public scrutiny as the work is executed just on the right-of-way. Any unsafe act / unsafe condition observed by public further damage our reputation, because of the non-voluntary compliance of contractors to the Conditions of contract on Health, Safety and Environment and project HSE Plan, Owner has been forced to establish safety- enforcing organization. The cost of established such is to be recovered from contractors for all observed safety violations at sites.

Without limiting to the unsafe acts and or conditions mentioned above in clauses the Owner shall have the right to deduct penalty charges for any other unsafe act and or condition depending upon the gravity of the situation on a case-to-case basis. The charges shall be at par with that of the similar offence indicated in **Appendix No: 02**

4.1.1 Stoppage of Work

The Owner shall have the right to stop the work at his sole discretion, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipment. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident.

The contractor shall not proceed with the work until he has complied with each direction to the satisfaction of Owner.

The Contractor shall not be entitled for any damages / compensation for stoppage of work, due to safety reasons and the period of such stoppage of Work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.

OHS performance of each contractor will be evaluated on various attributes as details

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given in the **Appendix No: 03** Contractor Score Card (Safety Performance) Sheet and OHS Performance Evaluation will be issued as per attached **Annexure-01**.

Contractor will encourage reporting of near-miss cases on project site, and such reporting shall be properly rewarded by introducing separate reward system for individuals.

4.1.2 Purpose of the Manual

This manual has been produced in order to outline the minimum Occupational health and safety, standards that shall be required by the Owner during execution of the Projects. Furthermore, the manual has been developed to give guidance and assistance to the respective Contractors in the development and production of their Site Safety Plans, to satisfy the required Occupational, health and safety standards established by the Contract Conditions and the Owner's Requirements. This manual represents the minimum standards required and each **Contractor** is encouraged to expand and improve upon it.

This manual is not intended to replace existing standards that are currently in force in India. However, it is intended to support the standards and to highlight to Contractors the areas of concern that shall be addressed in their respective Site Safety Plans in order to establish good health and safety practices.

This document is intended to supplement the Clause on Safety Measures as is contained in the Owner's Requirements.

The obligations and requirements for Health and Safety set out within this document are entirely without prejudice and do not derogate from the Contractor's obligations with respect to the Contract and his statutory obligations with respect to Health and Safety.

4.2 Scope of the Manual

This Occupation Health & Safety Conditions of Contract document defines the principal requirements of the Owner on Occupational Health & Safety (OHS) associated with the contractor / sub-contractor and any other agency to be practiced at construction work sites all the time.

The Contractor is fully responsible for the safety of the Works, his personnel, subcontractors' personnel, the public and all persons directly or indirectly associated with the Works or on or in the vicinity of the Site.

- This manual provides relevant information and procedures to assist the Contractor to ensure that his employees and sub-contractors work within a safety-conscious and safety-regulated environment. Compliance with the procedures set out in this manual shall not relieve the Contractor of any of his Statutory Duties or his responsibilities under the Contract.

4.3 Implementation of OHS Objectives

The following general approach has been adopted by the Owner with a view to achieving the policy objectives set out above

- Secure a commitment to safe and healthy working practices by all parties involved

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in the construction process, including consultants, Contractors, sub-contractors, workers' unions, and utility providers etc.

- Arrange accident prevention, safety management training for all site staff supervising Contracts etc.
- Establish Site Safety Management Committees to monitor the implementation of safety plans and keep a record of the Meetings of the Committees.
- Build up a database of accidents and dangerous occurrences, as defined in Clause 9 of this manual, for the purpose of monitoring trends, analyzing data, and formulating measures for accident prevention.
- Oversee the safety performance of the Contractors and sub-contractors to ensure that their duties and responsibilities on health and safety under the Contract, this Manual, and other relevant Owner and Government requirements are fully discharged.
- To publish and issue any further instruction / appendices needed for any specific requirement of the Contract.

4.4 Application of this document

This document applies to all aspects of the contractor's scope of work, including all aspects conducted by sub-contractors and all other agencies. There shall be no activity associated to the contract, which is exempted from the purview of this document.

Without giving any prior notice, the OWNER shall from time to time be entitled to add/or amend any or all requirements of its Occupation Health & Safety Conditions of Contract document, with a view to improving safety and occupational health of personnel and safety of work, with immediate effect with no cost to the OWNER, and the same shall be binding on the CONTRACTOR. The contractor agrees to implement all such amendments, which shall be laid down by the OWNER.

4.5 Purpose of this document

The objective of these guidelines is to ensure that adequate precautions are taken to avoid accidents, occupational illness and harmful effects on the environment during construction.

This document:

- Describes the OHS interfaces between Owner and the Contractor.
- Details the processes by which the contractor shall manage OHS issues while carrying out the work under the contract.
- Describes by reference, the practices and procedures as given in the Project Health, Safety & Environment Plan for best HSE performance.

These requirements shall be read together with:

- Project HSE Plan (Owner Project Specific Safety Plan will be prepared at the time of execution and updated time to time)
- General Guidance of ISO 45001:2018 OH&S Management System/ Management Systems.
- Definition of key terms used in ISO 45001:2018 Standard

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4.6 GENERAL DUTIES OF CONTRACTORS AND OTHERS

4.6.1 Introduction

Securing safe, healthy places of work requires the full co-operation of Contractors and subcontractors and the persons employed by them. It is imperative that there is no ambiguity with regard to the responsibilities of any individuals in connection with duties relating to health and safety.

- Contractors and those actually doing the construction work are most at risk of injury and ill health. They have a key role to play, in co-operation with the Owner, in planning and managing the work to ensure that risks are properly controlled.
- All contractors (including utilities, specialist contractors, contractors nominated by the client and the self-employed) have a part to play in ensuring that the site is a safe and healthy place to work. The key to this is the proper co-ordination of the work, underpinned by good communication and co-operation between all those involved.
- Anyone who directly employs, engages construction workers or controls or manages construction work is a contractor for the purposes.

This includes companies that use their own workforce to do construction work on their own premises. The duties on contractors apply whether the workers are employees or self-employed and to agency workers without distinction.

All the projects contractors must aware of their duties and satisfy themselves that

- They and anyone they employ or engage are competent and adequately resourced.
- Plan, Manage, Supervise and Monitor their own work to make sure that workers under their control are safe from the start of their work on site.
- Ensure that any contractor who they appoint or engage to work on the project is informed of the minimum amount of time which will be allowed for them to plan and prepare before starting work on site.
- Workers under their control (whether employed or self-employed) are provided with necessary information, including about relevant aspects of other contractors' work, and site induction which they need to work safely,
- To report problems or to respond appropriately in an emergency;

Ensure that any design work they do comply with regulation and comply with any requirements listed in our company.

The responsibilities shall be clearly detailed in the HSE plan from the level of the most Senior Manager downwards; these duties shall be explained to the individuals concerned in order to ensure that they clearly and concisely understand them.

4.6.2 General Duties of Persons Employed

Every person employed by Contractors and sub-contractors on construction sites are obliged to comply with the general duties imposed on them under the Contract. Every person employed should, not only avoid careless or reckless behavior, but should also take positive steps to understand workplace hazards. They must follow all necessary safety rules and regulations and procedures, and ensure that their acts or omissions at work do not put the health and safety of self or others at risk.

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4.7 Contractors and Sub-Contractors Responsibilities

- Contractors and sub-contractors are responsible for complying with all statutory and contractual requirements on construction safety and health including the general duties imposed on them under the Laws and Regulations of the Government of India and State Government.
- The Owner shall only deal with health and safety matters through the Contractor and shall hold the Contractor responsible for all his and his Sub- contractors, actions. All Sub-contractors shall be responsible to the Contractor.
- All Contractors and Sub-contractors shall ensure that an adequate level of competent supervision is maintained at the workplace at all times with all supervisory staff having the relevant knowledge, training, and experience to enable them to supervise the work in a proper manner.
- Contractors shall ensure that all sub-contractors are able to demonstrate a successful track record with regard to the management of health and safety. The type of information that shall be requested from the sub-contractors during the tendering process in order to determine their suitability shall include amongst other things the following information relating to their activities over the last five years
 - Fatal accidents
 - Major Injury Accident
 - Accidents involving members of the public (other than employed by contractor)
 - Dangerous Occurrences
- Contractor shall submit the Safety Performance Certificates issued by the Owner of the respective Projects for last five years along with the Annexure 3.
- Contractors and sub-contractors are responsible for submitting written statements on their policies relating to construction safety within fifteen days of a requirement to do so by the Owner.
- Contractors and sub-contractors are responsible for providing comprehensive health and safety plans for the review and approval by the Owner,
- Contractors and sub-contractors are responsible for the provision of suitably trained and qualified safety staff to carry out regular safety inspections, safety promotion, and safety audits and for retention of records of all such activities for inspection by the Owner.
- Contractors and sub-contractors are responsible for providing health and safety training to all workers and supervisors on site, and for retention of records of such activities for inspection by the Owner.
- Contractors and sub-contractors are responsible for organizing site safety committees which shall meet at least monthly.
- Contractors and sub-contractors are responsible for reporting dangerous occurrences and accidents to the Owner's Representative by the quickest practicable means.

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4.8 Duties of Contractors and Sub-Contractors

Where a project is declared or cleared for construction, no contractor shall carry out construction work in relation to the project unless—

- He has been provided with the names of the Project Manager
- He has been given access to such part of the construction phase plan as is relevant to the work to be performed by him, containing sufficient detail in relation to such work; and

Every contractor shall—

Promptly provide the Owner with any information (including any relevant part of any risk assessment in his possession or control) which —

- Might affect the health or safety of any person carrying out the construction work or of any person who may be affected by it,
- Might justify a review of the construction phase plan, or
- Has been identified for inclusion in the health and safety file in pursuance of rules & regulations
- Promptly identify any contractor whom he appoints or engages in his turn in connection with the project to the Owner;
- Comply with any directions of the Owner given to him under applicable Acts, rules & regulation and any site rules;
- Promptly provide the Owner with the information in relation to any death, injury, condition or dangerous occurrence which the contractor is required to notify or report under the Reporting of Injuries,

The contractor shall take all reasonable steps to ensure that the construction phase plan identifies the risks to health and safety arising from the construction work (including the risks specific to the particular type of construction work concerned) and includes suitable and sufficient measures to address such risks, including any site rules.

4.9 The contractor's duty in relation to cooperation & consultation with workers

4.9.1 The contractor shall -

- Make and maintain arrangements which will enable him and the workers engaged in the construction work to co-operate effectively in promoting and developing measures to ensure the health, safety and welfare of the workers and in checking the effectiveness of such measures;
- Consult those workers or their representatives in good time on matters connected with the project which may affect their health, safety or welfare, so far as they or their representatives are not so consulted on those matters by any Owner of theirs;
- Ensure that such worker or their representatives can inspect and take copies of any information which relates to the planning and management of the project or which otherwise may affect their health, safety or welfare at the site, except any information -
 - The disclosure of which would be against the interests of national security or

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Which he could not disclose without contravening a prohibition imposed by or under an enactment,

- Relating specifically to an individual, unless he has consented to its being disclosed,

The disclosure of which would for reasons other than its effect on health, safety or welfare at work, cause substantial injury to his undertaking or where the information was supplied to him by some other person to the undertaking of that other person or Obtained by him for the purpose of bringing, prosecuting or defending any legal proceedings.

4.10 The contractor's duty in relation to Health & Safety on construction sites

- Every contractor carrying out construction work shall comply with the requirements of applicable Act, rules & regulations insofar as they affect him or any person carrying out construction work under his control or relate to matters within his control.
- Every person (other than a contractor carrying out construction work) who controls the way in which any construction work is carried out by a person at work shall comply with the requirements of applicable Act, rules & regulations insofar as they relate to matters which are within his control.
- Every person at work on construction work under the control of another person shall report to that person any defect which he is aware may endanger the health and safety of himself or another person.

4.11 The contractor's duty in relation to Safe places of work

- There shall, so far as is reasonably practicable, be suitable and sufficient safe access to and egress from every place of work and to and from every other place provided for the use of any person while at work, which access and egress shall be properly maintained.
- Every place of work shall be made and kept safe for and without risks to health to, any person at work there.
- Suitable and sufficient steps shall be taken to ensure, so far as is reasonably practicable, that no person uses access or egress, or gains access to any place, which does not comply with the requirements of paragraph (1) or (2) respectively.
- Every place of work shall, so far as is reasonably practicable, have sufficient working space and be so arranged that it is suitable for any person who is working or who is likely to work there, taking account of any necessary work equipment present.
- Every part of a construction which is used as a place of work shall be kept in a reasonable state of cleanliness.
- Where necessary in the interests of health and safety, a construction site shall, so far as is reasonably practicable and in accordance with the level of risk posed, either have its perimeter identified by suitable signs and be so arranged that its extent is readily identifiable, or be fenced off, or both.
- No timber or other material with projecting nails (or similar sharp object) shall be used in any work; or be allowed to remain in any place, if the nails (or similar sharp object) may be a source of danger to any person.

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4.12 Discipline

Any major breaches of the Site Safety Plan, relevant Statutory Provisions and Safety Codes, or any other blatant disregard for the health and safety by any person directly or indirectly associated with the works may result in the Owner exercising their authority in requiring the removal from the Site of the Contractor's Site Manager and/or other personnel.

The Contractors shall develop a system of disciplinary measures and procedures, which shall be implemented immediately that the site activities commence. These measures and procedures should include amongst other things:

- The issue of Warning Notices.
- The removal from site of personnel who disregard safety instructions.

Any person who is removed from the site for breach of safety measures shall not be allowed to be reemployed on any other Owner's worksite without specific approval from the Owner's Project Head/ CEO.

4.13 Stage wise Safety Clearances for Contractors

4.13.1 Pre-bid Contractor Selection and review (Contractor HSE Evaluation)

- Contractors will submit Annexure-01 Pre-Bid Contractor OHS Qualification Evaluation Form during pre-bid submission.
- The received filled annexure Pre-Bid Contractor OHS Qualification Evaluation Form will be reviewed and evaluated by concern Engineer-in-charge of the contract who wants to hire the services of that contractor & Site Safety Head.
- The contractor firm having ISO 45001:2018 Certification with established safety management setup will be given preference.
- The contractor firm does not have OHS Management systems have to abide and follow Owner's site specific OHS management system and training requirement.
- Based on the evaluation and rating the Contractor will be approved for further bidding or selection process.

4.13.2 Pre Bid Meeting

The contractor can schedule site visit and meeting with work requesting Manager along with Safety-in-charge to understand the RFQ scope including OHS responsibility.

Pre-bid meetings shall be arranged by Techno Commercial Department if required by the contractor for clarification on OHS requirements as defined in Occupation Health & Safety Conditions of Contract, and Safety Personnel requirements with all prospective of bidders, although all this information is included in the bid.

Chief Safety Officer will discuss and give clarification as required by the bidder on OHS requirement for work as defined in Occupation Health & Safety Conditions of Contract in pre-bid meeting, Chief Safety Officer will also discuss past safety performance of bidder. Any deviations with respect to OHS requirements shall be closed before placing order by Techno Commercial Department.

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4.13.3 Mobilization Stage - Kick off Meeting & Work Start Clearance:

Contractor should attend pre-construction safety meeting before the contractor begins work. This may be included as part of the Project Kick off / Mobilization meeting. The meeting includes contractor representatives, Area Manager (representatives) from all disciplines, including safety.

- Contractor shall discuss the HSE Mobilization Plan including.
 - Site-specific HSE plan requirements Risk Analysis & Control Measures.
 - Legal & Other requirement under the BOCW Act & Rules. Deployment of OHS personnel
 - Deployment of OHC personnel / First aider etc. Procedure of Stage Wise Safety Clearance for Contractor
- Contractor shall submit Annexure-02 Contractor's mobilization & work start Clearance Form details along with following documents.
 - Safety Policy, ISO / OHSAS certification (if any), Safety Organization, Role & responsibilities Lifting machine / tools certification, Register of Personal Protective Equipment (PPEs), Deployment schedule of Competent persons (for First-aid, Electrical work, Lifting Machine, Crane, Hydra, JCB machine operation etc.), Medical fitness certification & medical facilities, - first-aid boxes, Ambulance (if agreed) etc. Induction training records, Fire extinguishers etc. at Mobilization stage.
 - To ensure the compliance of the provisions made under BOCW Act and Rules along with all others statutory provisions applicable to them.

4.14 ID Card and First day HSE Orientation

The Contractor shall ensure that all personnel working at the site receive an induction HSE training explaining the nature of the work, the hazards that may be encountered during the site work and the particular hazards attached to their own function within the operation as per Schedule: 01 First Day HSE Orientation training topics.

All personnel shall be issued a photo identity card duly signed by the authorized representative of the contractor and as per procedure laid down by Adani before they are engaged for work.

Contractor shall also issue personnel HSE handbook in a language known to the workers, which provides information on HSE and emergency procedures that all personnel working on contract are required to know and the need to follow. Contractor shall ensure that this is distributed and its content introduced to all personnel working at the site.

4.15 Contractor HSE organization

The Contractor's organization shall have a written HEALTH, SAFETY & ENVIRONMENT POLICY issued by the Chief Executive of the organization, appropriate to the scale and nature of the risks involved in the Contract works.

A copy of the POLICY shall be made available to the Owner at the time of the award of the Contract in evidence of the Contractor's commitment to management of employee's health and safety and compliance to statutory & regulatory requirements.

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All the Contractor's employees shall be familiar with the POLICY and their role and obligations in its implementation. The POLICY shall meet the relevant statutory and regulatory requirements and the requirements of the OWNER.

The POLICY shall periodically be reviewed for updating with respect to new and emerging legal and other requirements.

4.15.1 OHS Personnel

The Contractor shall appoint required OHS personnel (Safety Officers & Safety Supervisors) meeting statutory competence requirements, with a minimum qualification and experience of safety management in comparable contracts, approved by the Owner on the basis of his qualification and experience. The documentary evidence shall be submitted to HSE Manager and consent shall be taken to appoint.

- Contractor has to deploy 1 Qualified Safety Officer for every 500 workers and
- 1 Safety Supervisor for every 100 workers or
- 1 Safety Supervisor for every 50 workers – If Critical Nature of High Risk Works

4.15.2 Inadequate OHS personnel

If the Contractor fails to provide the minimum required manpower as illustrated above or fails to fill up vacancies created within 14 days, the same may be provided by the Owner at 1.5 times the actual cost to the Contractor's cost. (Any administrative expenses involved to provide this cover, e.g. newspaper advertisement or manpower consultant charges, etc., shall also be at the cost of the Contractor).

4.15.3 Qualification and Experience

The minimum educational qualification and the work experience are

- Safety Officers must be qualified as per Legal requirements made under BOCW Act & Rules and with minimum 3 to 5 years' of experience.
- Safety Supervisor should be a graduate with Diploma in Safety having minimum 3to4 years of experienced on project site.

4.15.4 Approval from Owner

All contractors must take consent for deployment of HSE Officer and HSE Supervisor from the HSE Manager before deployment.

- The name, address, educational qualification, work experience and health condition of each personnel deployed for HSE jobs shall be submitted to the Owner in the format prescribed for the purpose for comments and consent well before the start of the work.
- Only on consent by the Owner these personnel are authorized to work.
- In case any of the HSE personnel leaves the contractor site, the same shall be intimated to the Owner. The contractor shall recruit new personnel and fill up the vacancy within a week if required.
- Owner will monitor the strength of HSE Officer / Supervisor fortnightly physically and monthly in writing to ensure deployments are relevant to workforce strength of contractors.

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4.15.5 Conduct and Competency

The conduct and functions of the contractor's OHS personnel shall be monitored by the Owner. Any default or deficiency shall attract penalty as per details given under penalty clause mention in **APPENDIX: 02 Safety Violation Penalty**.

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 on the Works' HSE performance, the Owner shall remove that person from the site without any procedural formalities.

4.15.6 Responsibility of OHS personnel

All the works carried out by the contractor and his sub-contractors, the responsibility of ensuring the required OHS manpower lies with the main contractor only and also the minimum required manpower indicated by the Owner includes the sub-contractors' work also. It shall be the responsibility of the main contractor to provide required OHS manpower for all the works executed by all contractors. Necessary conditions shall be included in all sub- contract documents executed by the main contractor.

All the Awareness, promotional, motivational, educational -class room & practical training (working at height, Electrical panels/board arrangement, welding machines, working in confined space, usable tools & tackles, arranging-erecting of scaffoldings, etc.) and competitive programs given by the Owner shall be implemented in consultation with Project Manager or decided by the HSE Manager (Head Safety – Adani Transmission Limited) time to time.

4.15.7 Reporting of HSE personnel

All HSE personnel are to report to the HSE Manager, who shall report directly to the Project Manager. The Owner shall monitor adherence to this procedure at all times. In case of non-adherence penalty shall be levied as indicated in the penalty clause.

4.15.8 Prohibition of performance of other duties

No HSE personnel shall be required or permitted to do any work which is unconnected to, inconsistent with or detrimental to the performance of the HSE duties.

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5.0 HSE TRAINING AND SAFETY PROMOTION

5.1 HSE Training

Safety Training is an important factor in managing safety on construction sites. The behaviors of people at all levels of the contractor are critical for HSE performance.

- The contractor shall organize quality HSE training to engage Managers, Supervisors and Other personnel to improve safety performance. Minimum 2 days / year training to each employee shall be imparted.
- A class room with all required facilities should be arranged by contractor at site for imparting HSE training to the workforce. It should also contain all Personal Protective equipment (PPEs) & exhibition of posters along with Do's and Don'ts. Special physical arrangement of situations shall be made to impart special trainings on practical aspects of his works.
- The Contractor shall analyze the training requirements for all the employees and initiate a training program to demonstrate that all persons employed, including subcontractors, are suitably qualified, competent and fit.
- The contractor shall arrange behavior-based training programs for all the executives to identify recognize and eliminate unsafe act and unsafe conditions.
- The minimum Owner's requirement of training needs for various categories of employees are given in **Schedule 02: Content of HSE Training & Awareness**
- All contractors shall provide as a minimum the following types of training. The HSE Training shall be conducted as per prepared HSE Training Matrix.

5.1.1 Induction Training

Induction Training shall be given to all persons prior to permitting them to go to the worksite before making gate pass for entry.

- Contractors must ensure, that every worker has: a suitable induction; and any further information and training needed for the particular work. Further advice on training and competence is given by the Owner.
- Inductions are a way of providing workers with specific information about the particular risks associated with the site and the arrangements which have been put in place for their control. On non-notifiable sites, induction will need to be provided by the contractor or by arrangement with the main contractor on site.
- Induction is not intended to provide general health and safety training, but it should include a site-specific explanation as per **Schedule 01: First Day HSE Orientation - Induction Training Topics**

5.1.2 Job Specific Training:

Persons with hazardous tasks, such as Crane Operators, Slings and Plant/ equipment Operators, Electrician, Welder and Cutter, Vehicle drivers etc. should have training certificate from competent authority for relevant jobs based on the scope of work.

All vehicle drivers and operators shall be trained in defensive driving techniques, as may be provided by a State Government Licensing Authority or approved equivalent agency. All vehicle drivers shall also undergo refresher training once in 6 months.

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5.1.3 Regulatory Training:

Specific training is recommended in many act, rules & regulations in certain circumstances base on the scope of work the regulatory training needs are recommended shall be conducted for

- Hazard Communication CPR / First aid Emergency Response Respiratory protection
- Power-operated hand tools Gas welding and cutting Confined space entry
- Lock Out Tag Out Excavation / Trenching

5.1.4 On-the Job (Spot Practical Skill Development) Training

On the job training on safety issues, shall also be conducted with all foremen / workmen associated with these activities for relevant jobs based on the scope of work including

- Working at Heights, Safety in Scaffolding,
- Safety in Lifting and Shifting Crane safety,
- Welding safety, Electrical safety, Lock Out Tag Out
- Excavation / Trenching Safety Traffic safety etc.

5.1.5 Refresher Training

Refresher Training shall be conducted at least every three months to ensure that all workers on worksite are kept up to date with safety requirements on site.

All training that is carried out shall be formally recorded on dated and signed attendance records, with copies of the records being kept on the sites for inspection by the Owner's Representative / Safety Officer. Details of the respective training course program shall be produced, on demand or as per intervals prescribed, which include the following information:

SN	Type of Training	Who should participate	Trigger	Given By	Frequency
1	Induction Training	All new employees	First day at site	Agency Safety officer	One time
2	Job Specific Training	Competent Operator / Technician / Driver etc.	First day at site	Competent Person	Quarterly
3	Regulatory Training	Execution Crew	First day at site	Agency Safety Officer and Egnr. /Supervisor	Half Yearly
4	On Job Training	Execution Crew	Regularly	Agency Safety officer and Engr. /Supervisor	Regularly

5.2 HSE Promotion

5.2.1 Safety Awareness Programs:

The Contractors at each of their Project sites in the interests of promoting safety awareness amongst the workforce shall devise and implement practical Safety Promotion Programs in coordination with Adani Project HSE Plan.

The objective of these Safety Awareness Program schemes should be to inculcate and sustain safety culture amongst all employees working on project site and continually improve HSE performances and recognize and reward individuals who continually endeavor to work in a safe manner.

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Agency Safety & Execution team shall organize above Safety Awareness Programs in coordination with Adani Safety & execution team on regular basis at least once in a month on project location sites as per schedule of Adani Project HSE Plan and maintains record. Agency shall arrange suitable rewards for the competitors to encourage them publicly.

SN	Type of Training	Who should participate	Organized By	Frequency
1	Mass Tool Box Talk	Agency employees	Agency team in coordination with Adani	By Weekly
2	Safety Mela	Agency employees		Monthly
3	Safety Virus	All Agency employees		Monthly

5.2.2 Safety Award & Reward:

The Contractors at Project sites shall introduce Safety Award and Reward scheme in coordination with Adani Project team as per Project HSE Plan schedule.

Suggestions for such Safety Award and Reward / promotions may include such items as the issue of items of daily use as rewards to individuals for good safety performance.

Other safety award and safety incentive schemes should be considered.

5.2.3 HSE Communication:

The Contractor shall ensure full involvement of all his employees recognizing their right to consultation on health and safety matters. The supervisors of the various areas, in conjunction with the safety officers shall be responsible for ensuring employees' involvement through routine safety inspections, hazard and risk assessment in new and changed works and their control. The Contractor shall maintain appropriate operating procedures to guide these requirements

The contractor shall take every effort to communicate the Occupational Health & Safety management measures through regular Safety and Industrial Health Poster Campaigns / Billboards / Banners / Glow signs should be devised, with posters displaying safety and industrial health related issues being displayed around the worksites as part of the effort to raise Safety Awareness amongst the workforce.

- Posters should be in Hindi, English and other suitable regional language deemed appropriate.
- Posters / Billboards / Banners / Glow signs should be changed at least once a month to maintain their impact.

The contractor should follow Schedule 03 - Observe important days

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6.0 HSE INSPECTIONS AND FOLLOW UP ACTION

The Contractor shall maintain a procedure for HSE Inspections at routine intervals to provide assurance that the instituted safety procedures are in place to prevent deviations from established standards that could lead to a safety hazard and consequential risk.

The Contractor shall evolve and administer a system of conducting HSE inspections and other risk management analysis on a periodical basis as like regular, intermittent, weekly and monthly etc. with developed check lists specifically for these works.

HSE inspections program shall be Planned General Inspection, Routine Inspection, Specific Inspection, and Other Inspections as directed by the HSE Manager / Head safety.

6.1 Planned General Inspection

Planned general inspections are performed at predetermined intervals and it usually involves the representation from both Contractor and the Owner.

Inspections that will be classified under this inspection program are:

- Daily safety inspection by contractor site HSE team.
- Weekly safety inspection by construction supervisors (Contractors and Sub-contractors).
- Monthly contractor and sub-contractors site safety committee Inspection. Any other Inspection organized or type of inspection issued by the Owner shall be undertaken.

6.1.1 Routine Inspection

Routine inspections are often referring to the inspection of worksite, equipment, work activities performed by equipment operators and temporary structure erectors etc.

Inspections that will be classified under this inspection program are:

- Daily Inspection of plant and equipment by operator.
- Weekly Inspection of scaffold by scaffolding supervisor as per procedure.
- Monthly Inspection of electrical hand tools, electrical equipment, temporary electrical systems by competent electrical supervisor as per inspection procedure with specific checklist.
- Quarterly Inspection of access equipment, Fire extinguishers, Hand tools, civil equipment, mechanical equipment etc., by competent supervisor as per inspection procedure with specific checklist.
- Half-yearly inspection of lifting machines, lifting appliances, equipment and gears by Govt. approved competent person.

The list mentioned above is not exhaustive. Contractor may add additional categories. Contractors' Site HSE Manager will ensure that routine inspections are carried out periodically to all plants, equipment, powered tools and any other temporary structures that will pose a hazard to operators and workmen.

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6.1.2 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.

Commonly performed special inspection examples for construction site:

- Before a Heavy Lifting Operation.
- Before and after the entry of person into a Confined space.
- Before and after a Welding and Gas Cutting Operation. Before concreting by formwork erector.

The list mentioned above is not exhaustive. The contractor shall ensure that a competent supervisor inspects all high-risk processes and activities.

6.1.3 Other Inspection

- Mandatory Inspections by Govt.
- Departments Inspection by Project HSE management team

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.

6.2 Inspections by Contractor's Safety Supervisory Staff

The Contractor's Project Manager and supervisory staff are required to carry out periodical (as mutually agreed) site safety inspections and prepare reports of such inspections. Copies of the completed inspection reports shall be kept on site and available for inspection by the Owner's Representative.

The **frequency** of the inspections shall be determined by site activities and general conditions. However, the inspections should be conducted at a minimum of once a week. Where high-risk activities are being carried out inspections should be carried at least once daily.

The **inspection** reports should be discussed with the relevant Site Managers. These shall also be discussed with the sub-contractors and other levels of site management in the Site Safety Meetings.

For each Contract the Contractor shall prepare a comprehensive safety inspection checklist, as a requirement of the Safety Plan. This check-list can then be used for:

- Inspections by the Contractor's Safety Officers;
- Monitoring of the Contractors' safety inspections by the Site Safety Management Committee.

The Owner's Representative Staff may carry out site safety inspections, which shall be attended by the Contractors' Site Manager and Safety Manager.

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7.0 CONTRACTOR'S SITE HSE COMMITTEES

7.1 General

The objective of the HSE Committee is to promote a safe and healthy work environment for the project site by creating a strong awareness of environment safety & health and reducing or eliminating accidents, injuries, and illnesses throughout the completion of project work.

All employees should be able to participate in the making and monitoring of arrangements for safety and health at their place of work. The establishment of site Health safety and Environment committees in which employees and Contractor and sub-contractor management are represented can increase the involvement and commitment of employees. The Contractor shall set up such site safety committees to promote and monitor safety and health on their worksites. A copy of the agenda shall be forwarded to the Owner's Representative seven days prior to the meeting date, in order that they can decide if it is necessary for them to attend.

7.2 Composition and Functions of Contractor's Safety Committees

- The Contractor shall also appoint a HSE Committee comprising of the representatives from the various areas under the chairmanship of the Agency Project Head. The committee shall meet at periodic intervals to discuss the status and adequacy of the safety management, and any safety concerns of the employees.
- The committee shall also formulate and validate the safety procedures incorporating controls to prevent or mitigate hazards and risks before submission for approval.
- The minutes of the HSE Committee meeting shall be submitted to the OWNER.
- The Contractor's Safety Head / Safety Officer shall maintain the records of the meetings.

Site HSE committee shall be constituted within 14 days of award of contract and notification regarding the same shall be communicated to the members and employees. Function of HSE committee should be as follows;

- To monitor the adequacy of the Contractor's Site -HSE Plan and ensure its implementation;
- To monitor safety inspection reports; discuss detected unsafe practices and unsafe conditions, recommend remedial measures for their rectifications including first-aid medical and welfare facilities.
- To study accident statistics and trends so as to identify unsafe practices and conditions; identify probable causes of accident and to suggest remedial measures.
- To review the emergency and rescue procedures;
- Review the last safety committee meeting minutes and take follow up actions on minutes of meeting. and take action against persons / sub- contractors for non-compliance if any
- To bring to the notice of the Owner the hazards associated with use, handling and maintenance of the equipment
- To suggest measures for improving welfare amenities in the construction site and

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other miscellaneous aspect of safety, health and welfare in building or other construction work.

- To review safety promotional & awareness programs organized (like safety week, safety competition etc.

7.3 Co-contractors' participation

In case where more than one main Contractors are working together, the Owner shall instruct the other contractors to join for the monthly HSE committee meeting of the main contractor, so as to discuss and decide about the common provisions etc.

7.4 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

7.4.1 The agenda should broadly cover the following:

- Chairman's review / overview of site HSE performance / conditions.
- Previous month HSE statistics
- Incident and Accident Investigation / dangerous occurrence / near miss report
- Site HSE inspection
- Sub-contractors' HSE issues
- Report from Owner

7.4.2 The Membership of the committee should be as follows;

Chairman: Project Head (Contractor) The Contractor's most Senior Manager for the Contract.

Secretary: The Contractor's Safety Officer / Head

Members: Contractor's and Sub-contractor's management representatives and safety staff.

7.5 Minutes of the meeting

Minutes of the Site Safety Committee shall be sent to all members within two working days of the meeting preferably by mail followed by hardcopy. Safety Committee meeting minutes shall also be displayed on the notice board.

7.6 Disciplinary Action

The chairman shall inform the members of any outstanding issues in the meeting and in case of repeated offence / non-compliance by some members or others (co-contractors / sub- contractors) and propose suitable disciplinary action including provisions of monetary penalty as per the relevant contract clauses, the Owner shall ensure that the same is implemented.

7.7 Safety Review Meeting

The Owner shall conduct fortnightly **Safety Review Meeting** prior to safety committee meeting of contractor to review the safety conditions practiced at work areas by the Contractor

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8.0 ACCIDENTS REPORTING

'Accident' for the purpose of this para is defined as 'Undesired Event Giving Rise to Death, Ill-health, Injury, Damage or other Loss' and 'Incident' is defined as 'Event that gave rise to an Accident or had the Potential to lead to an Accident'. An accident where no ill health, injury, damage or other loss occurs is also referred to as 'Near-Miss'. Incident includes Near-Miss. The CONTRACTOR shall report orally, to the Owner regardless of their extent, duration and severity, immediately on occurrence of all accidents resulting in personal injury, property damage, fires, spills, or Near-misses.

8.1 Contractors Responsibility

All incidents, accidents and dangerous occurrences shall be report immediately to Owner and recorded, regardless of whether or not personnel injury occurs.

In case of an accident causing major injury, first-aid shall be administered and the injured worker shall be immediately transferred to a hospital or other place for medical treatment.

8.1.1 Reporting to Owner

The Owner and the Owner's Representative shall be notified by the quickest possible means, for example by telephone/ walky-talky of the following classifications of accidents and incidents and by subsequent written notification within twenty-four hours -by the Contractors in Accident and Incident Reporting Form.

- Fatal Accident
- Major Injury Accident (see definition in 3.1)
- Dangerous Occurrence (see definition in 3.1)
- Any Incident Involving a Member of the Public.
- Reports of all Accidents (fatal / injury), Incidents and Dangerous Occurrences shall also be sent within 24 hours as per format provided in the Owner's Project HSE Plan
- No accident / Dangerous Occurrences are exempted from reporting to the Owner.
- Any willful delay in verbal and written reporting to the Owner shall be imposed penalty as per relevant clause.
- The Site Safety Officer shall conduct in depth investigations into all fatal accidents, major injury accidents, incidents involving a member of the public, dangerous occurrences, and selected over two-day lost time injury accidents.
- Copies of these investigations shall be forwarded to the Owner's Representative within three days of the incident.

In addition to the above verbal and written reporting to the Owner and Police, as per Rule 210 of BOCWR, notice of any accident to a worker at the building or construction site that:

- Causes loss of life; or
- 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, or similar other means including special messenger within 4 hours in case of fatal accidents and 72 hours in case of other accidents, to:

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- Regional Labour Commissioner, where contractor has registered the firm.
- The board with which the worker involved was registered as a beneficiary;
- Director General and;
- The next of kin or other relative of the worker involved in the accident;

Further, notice of accident shall be sent in respect of an accident which

- causes loss of life; or
- disables the injured worker from work for more than 10 days to
 - The officer-in-charge of the nearest police station;
 - The District Magistrate or if the District Magistrate by order so desires to the Sub-Divisional Magistrate.

Where any accident causing disablement that subsequently results in death, notice in writing of such death, shall be sent to the authorities mentioned in clause above within 72 hours of such death.

8.2 Reportable Accidents

An accident shall also become reportable to the Owner's Representative if it causes incapacity for more than 24 hours of the accident. The Contractor must submit a report to the Owner's Representative.

The following information is required in reporting an accident to the Owner's Representative.

- Particulars of the Contractor or Sub-contractor employing the injured person;
- Particulars of the deceased or injured person: name, address, occupation, sex, and age;
- The date, cause or circumstances of the accident; and
- The nature of the injury, stating whether death or incapacity was caused by the injury.

8.3 Dangerous Occurrences

The Owner's Representative requires that all dangerous occurrences on site must be reported in writing to him within 24 hours, irrespective of whether there are casualties or not. The following information has to be provided:

- The time of the occurrence;
- Damage to any building, machinery or plant; and
- The circumstances in which the accident occurred.

If no one is injured, the above notification is sufficient. In the case of death or serious injury, the accident reporting procedure outlined in Clause 9.1.1 must also be followed.

In case of failure of launching girder, lifting appliance, loose gear, hoist or building and other construction work, machinery and transport equipment at a construction 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 Authorities;

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 & BOCWR.

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9.0 ACCIDENT INVESTIGATION

The Contractor shall submit the accident and incident report in writing to the Owner within 24 hours of its happening in the form as prescribed by the governing statute or in the absence of which, in the form prescribed by the Owner.

9.1 General

Investigations should 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. Accidents are rarely just the fault of the worker.

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 to prevent reoccurrence.

9.2 Recommended actions in 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 are recommended;

- Take photographs and make sketches
- Examine involved equipment, work piece or material and the surrounding conditions
- Interview the injured, eye-witnesses and other involved parties
- Consult expert opinion where necessary
- Identify the specific Contractor or Sub-contractor involved.

Having gathered information, it is then necessary to make an Analysis of Incident

- Establish the chain of events leading to the accident or incident
- Find out at what stage the accident took place
- Consider all possible causes and the interaction of different factors that led up to the accident, and identify the most probable cause

The next stage is to proceed with the Follow-up Action

- Report on the findings and conclusions
- Formulate preventive measures to avoid recurrence
- Publicize the findings and the remedial actions taken

9.3 Owners' Independent Incident Investigation

In case of fatal/ dangerous occurrence the Owner shall also conduct independent investigation. Contractor and his staff shall extend necessary co- operation and testify about the accident.

The contractor shall take every effort to preserve the scene of accident till the Owner completes the investigation.

All persons summoned by the Owner in connection to witness recording shall obey the instructions without delay. Any willful suppression of information by any person shall be removed from the site immediately and / or punishable as per relevant clause.

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10.0 ACCIDENT STATISTICS AND HSE SUBMITTALS

10.1 Introduction

Accident data, if properly collected and analyzed, indicates trends, and can show where and how problems arise. Comprehensive accident information enables accident prevention efforts to be targeted at problem areas.

10.2 Collection of Accident Statistics

The procedures that apply for the reporting and collation of data in respect of accident statistics are set out below.

The Contractor shall submit a monthly written report to the Owner, which shall be due on the fifth workday of every month. The health and safety of all full time, part-time, permanent, temporary, contract employees and any outsourced employee undertaking any part of the Contract works shall be included in the safety report. The report shall include the total number of working hours for the month, the number of recordable accidents and the number of lost-time accidents.

10.3 Calculation of man-days lost - Construction Accident Statistics

When calculating the man-days lost for the Construction Accident Statistics Summary Sheet, the following applies: The number of man-days lost refers to the total number of man-days lost during the reported month due to:

- Non-fatal reportable accidents which happened within the reported month
- Non-fatal reportable accidents which occurred in previous months.

The day on which the reportable accident occurred should be excluded in calculating man-days lost but public holidays within the injured period should be counted.

10.4 HSE Submittals to the Owner

The contractor's HSE Management should send the following reports to the Owner

- Daily Reporting of total no of workmen (Manpower) Monthly HSE Report
- HSE Committee Meeting Minutes
- HSE Inspection Reports and activity reports HSE Audit Reports
- External HSE Audit
- Electrical or any other Safety Audit
- Air and Noise Quality monitoring report

The Contractor shall report the total number of workmen engaged in execution of the Works, including the employees of any subcontractor, to the Owner's Representative, by noon of the following day. Reports shall clearly indicate both day and night shift working, together with location and duties of all employees. This reporting shall be the primary duty of the Contractor's Safety Manager Reports may be submitted by email or as agreed with the Owner's Representative. The onus of confirming the receipt of the same by the Owner's Representative shall lie with the Contractor. If the information is not received in the manner required, penalty shall be levied as per relevant clause.

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11.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The Contractor shall ensure that his key personnel and safety personnel are trained to be competent in hazard identification, risk assessment and risk control processes. The Contractor shall on a routine basis identify, evaluate and control all health and safety risks especially in the hazardous work activities and also to validate the previous risk assessments. Elements such as hazard identification, evaluation of risks with existing control measures in place and estimate of tolerability of the residual risks shall be an ongoing process. Any additional/New control measures shall be designed based on this process on need basis.

The Contractor shall maintain a Hazard Identification and Risk Analysis (HIRA) pertaining to all his activities duly updated as detailed above. The HIRA manual shall be made available to the Owner during regular inspections and audits

11.1 General

The purpose of Hazard Identification and Risk Assessment is to identify all the significant hazards, which may occur during the construction phase, and to rank them according to their severity. Having ranked the risks by severity the Contractor shall then introduce measures to mitigate the effects of that risk.

Prior to the commencement of any potential High-Risk operations the Contractor shall conduct a detailed hazard analysis and risk assessment of the task and shall record his findings on appropriate worksheets. Examples of Hazard Identification and Risk Assessment worksheets SAF 013 may be found in List of Forms

The worksheets should then show what measures the Contractor is going to take to reduce the level of risk to acceptable levels.

11.2 Method Statements

As a result of the Hazard Identification and Risk Assessment detailed method statements shall need to be produced for medium and high risk activities including amongst others the following:

- Cranage of items in excess of 1 ton
- Erection of steel structures.
- Excavations deeper than 2m.
- Erection and loading of formwork
- Demolition.
- Inflammable materials – the use and storage
- Use and storage of explosives

A component part of the detailed method statement shall be the inclusion of the completed Hazard and Risk Worksheet as discussed in Clause 11.1 above.

Method Statements should be cross-referenced to the Contractor's Site Safety Plan.

A method statement should contain sufficient information to enable the task to be undertaken safely and should contain as a minimum the following information

- Introduction – A brief outline of the Task

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- Details of the Risks involved
- A step by step description of how the task is to be undertaken detailing
 - What needs to be done;
 - The order in which the task will be carried out;
 - What plant or equipment is required;
 - Who the task will be done by;
 - Who will supervise the task;
 - Where will the task take place;
 - When will the task take place;
 - The precautions which must be taken before the task is undertaken;
 - What to do if things go wrong;

11.3 Permits to Work

A Work permit (Permit-to-work) is a document, which specifies the work to be done, and the precautions to be taken. Work permit form is 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.

The Contractor shall develop a permit-to-work system, which is a formal written system used to control certain types of work that are potentially hazardous. A permit-to-work is a document, which specifies the work to be done, and the precautions to be taken. Permits-to-work 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.

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. Examples of high risk activities include but are not limited to:

- Working at Height - such as roofing works, steel erection
- Entry into Confined Spaces
- Electrical work / Lock Out Tag Out Working on Electrical Apparatus / Work in Close Proximity to Overhead Power lines and Telecommunication Cables
- Hot Work
- Excavation work to dig where underground services may be located
- Blasting work
- Work with Radioactive isotopes

The permit-to-work form must help communication between everyone involved. It should be designed by the Contractor issuing the permit, taking into account individual site conditions and requirements. Separate permit forms may be required for different tasks, such as hot work and entry into confined spaces, so that sufficient emphasis can be given to the particular hazards present and precautions required.

The permit to work form should contain:

- Clear identification of who may authorize particular jobs (and any limits to their

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authority);

- Clear identification of who is responsible for specifying the necessary precautions (e.g. isolation, emergency arrangements, etc.);
- A detailed description of the task clearly identifying the work to be done and the associated hazards;
- Plans and diagrams are used if appropriate to assist in the description of the work to be done, its location and limitations;
- Identity of the hazards and the precautions to be taken;
- Clear rules about how the job should be controlled or abandoned in the case of an Emergency;
- The time limitations should be stated;
- Job specific toolbox talk conducted by the supervisor

A Permit to Work authorization form shall be completed with the maximum duration period not exceeding one shift.

A copy of each Permit to Work shall be displayed, during its validity, in a conspicuous location in close proximity to the actual works location to which it applies.

The CONTRACTOR shall obtain written permissions from Owner before starting any work at site. The CONTRACTOR shall maintain a work permit procedure to limit the hazardous processes and high risks tasks to authorized personnel, who shall be informed of the job safety analysis and the job specific safety precautions, on issue of a work-permit. The work permit issued under the procedure shall be valid for a specified period and shall be issued only after all safety precautions are fulfilled and duly verified by the Safety Officers or the specialist who is authorized for safety certification as a prerequisite for issue of a work permit.

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12.0 EMERGENCY PREPAREDNESS PLANS

The Contractor shall prepare as required under Rule 36 of BOCW Act, an Emergency Response Plan for all work sites as a part of the Contractor SHE 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 communications arrangements, for dealing with all emergencies that could affect the Site. This include where applicable, injury, sickness, evacuation, fire, chemical spillage, severe weather and rescue from any situation like height, confined & excavations etc.

12.1 Emergency Situations

Every Contractor shall formulate an Emergency Preparedness Plan for each of his sites. These plans will address foreseeable emergencies that may arise during the construction activities. Examples of activities for which plans should be prepared include amongst other things:

- Fire and explosion.
- Collapse of building, sheds or structure etc.
- Gas leakage or spillage of dangerous goods or chemicals.
- Bomb threatening, criminal or terrorist attack
- Drowning of workers-An accident which results in death or major injury.
- A serious fire that threatens life.
- Floods, Earthquake, storms and other natural calamities
- Working at height- hanging of the person on safety belt/ fall arrester
- Landslides getting workers buried

An Emergency Preparedness plan should include details of the following; arrangements 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.

- The name, location and phone number of the Emergency Co-coordinator;
- Designated Personnel with locations and phone numbers;
- Details of the Emergency Response Team with locations & phone numbers;
- Functions of the Emergency Response Team;
- Resources for handling the emergencies
- The means of Escape;
- Communication with the Emergency Services;
 - Police
 - Fire Services
 - Ambulance and Hospital Services
- First-Aid Facilities;
- Site plans;
- Suppliers of emergency equipment such as sump pumps, lighting, Carnage, etc.

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Contractors shall require liaising with the local hospitals and fire stations for prompt attendance to the injured. The Contractor shall keep emergency vehicles on standby duty during all working hours for this purpose. The Contractor shall not resort to treating his injured employees (for the benefit of saving money) at government hospitals catering to the poor. These facilities do not generally provide the level of medical administration required by the SHE procedures, e.g. certification of medical fitness and category / nature of injuries

Copies of the emergency procedures and the Contractor's rescue organization should be displayed at each place of work and notice boards. This information should be reviewed and updated as often as is required, but at least once annually.

Drills should be arranged to test the efficiency in mobilizing the necessary personnel and equipment. These Drills should be carried out at least every three months.

Regular joint exercises between the Contractor's rescue teams and the Fire and Emergency Services should also be carried out for the major contracts.

It shall be the responsibility of the contractor to keep the Local Law & Order Authorities informed and seek urgent help, as the case may be, so as to mitigate the consequences of an emergency. The Contractor shall make prompt communication to Owner initially by telephone and followed by a written report.

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13.0 SAFETY SIGNAGE

13.1 Safety Signs

All safety signage that is displayed in and around the sites shall be in both Hindi and English and also in local language, examples of signs that shall be required shall include amongst others the following:

- Wear Safety Helmets.
- Permit to Work areas
- Wear Safety Footwear.
- Wear Hearing Protection.
- Wear Eye Protection.
- Danger Electricity.
- Danger Crane Overhead.
- Stop Look and Listen
- No Smoking.
- First Aid.
- No Entry signs
- Fire precautions.
- Emergency Exit from underground works
- Overhead work in progress

All safety signs shall comply with the internationally recognized Safety Colors as indicated below:

Blue : Mandatory.

Yellow : Danger.

Red : Prohibition.

Green : Safe Condition.

The contractor should follow

Schedule 04 - Displaying Safety Signage and Posters

The list indicated are the minimum requirements of the Owner and the contractor is encouraged to further the HSE communication activities by formulating suitable reward schemes for safety performers and any other activities, which deem fit for the purpose.

13.2 References

- IS 9457: 2005 Standard for Colors of Safety Signs IS 12349: 1988 Fire Protections - Safety Signs

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14.0 INDUSTRIAL HEALTH, AND WELFARE

14.1 Introduction

Hazards to Health on a construction site can arise from the use of a number of materials, substances and processes if they are not properly controlled. Some of the more serious risks are caused by the inhalation of dusts, fibers, toxic fumes, by the misuse of chemicals, lasers and radioactive isotopes. Excessive vibration and excessive noise can also cause ill health. Many man-days are lost as a result of dermatitis, bronchitis and rheumatism.

The Contractor shall be responsible for maintaining healthy working conditions for all his, and his subcontractors, workers. In particular, he shall pay attention to the effects of noise, dust, air pollution and the use of chemicals. If it is not possible to remove the cause of harm, then suitable and sufficient Personal Protective Equipment (PPE) should be provided to those workers who could be affected.

If the use of PPE is the only means of providing protection the Contractor shall ensure that all the workers affected are properly trained in the use of the PPE and that adequate supervision is provided to ensure its proper use.

14.2 Hazardous Substances

The CONTRACTOR shall prevent all injuries, illnesses and damage to property or the environment caused by any article or substance, which proves to be hazardous. The code of practices of construction and operation and maintenance and control procedures shall meet required statutory and regulatory requirements. Personnel shall be trained on use, handling, storage, disposal and emergency spillage procedures.

The CONTRACTOR shall detail and deploy operational controls to reduce hazardous wastes and their disposal as required by the statute 'Hazardous Waste (Management and handling) Rules 2000'. Oil wastes, used oils, soil and cotton soaked in oil consequent to handling operations, grease and many class of paints and asbestos sheets and gaskets are typical hazardous wastes.

The CONTRACTOR shall identify, contain and control all sources of radiation. Appropriate regulatory approvals shall be obtained before commencement of work involving radiation sources. Radiation protection advisors suitably qualified and experienced shall be appointed whose names shall be submitted to OWNER/CONSULTANT. Dosimetry and surveillance of personnel engaged in such work shall be maintained in accordance with regulatory requirements

The Contractor shall obtain Material Safety Data Sheets (MSDS) for all substances that are deemed to be hazardous to be used on site. Record of an inventory shall be kept of all such materials with the relevant MSDS and shall be available for inspection by the Owner's Representative who may require further MSDS's to be obtained.

The Contractor shall conduct an assessment of the substance in relation to its intended usage on site. Particular attention must be given to the actual location of usage as a substance, which is safe for use in the open air, may be extremely hazardous in a confined space. The results of all assessments shall be recorded and method statements produced. (**Schedule 06: Hazardous Substance Assessment**)

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The objective of the assessment is to establish what precautions and control measures shall be implemented in order that a safe system of work can be established for the use of the substance on site.

14.3 STORAGE OF HAZARDOUS MATERIALS

- Hazardous materials shall be stored on solid bases. Solid bases shall include compacted earth, pallets, concrete or asphalt platforms or paving. Hazardous materials shall be stored, stacked and secured to prevent toppling, spillage or other unintended dislodgement. Hazardous materials shall be stacked in such a manner that an observer standing in the aisle can read their labels and legend.
- Each hazardous material contained shall be identified by a legible or legend as per governing statute, code or regulation. The label shall identify the item, quantity and appropriate warnings.
- Hazardous materials which if brought in contact with each other could react or pose equal or greater hazard than either material stored alone shall be stored at a distance not lesser than twenty feet apart.
- Warnings shall be posted and maintained in a legible condition at all access points clearly defining the specific hazardous nature of the stored materials such as 'Corrosive', 'Flammable', 'Explosive', 'Oxidizing', 'Compressed Gas' or other hazardous nature.
- Where hazardous materials are unloaded in the CONTRACTOR's storage maintained at site in a semi-permanent installation, such installations shall be approved by relevant statutory bodies. Copies of licenses for storage shall be lodged with the OWNER. The containers and storage shall display quantities stored with name of the hazardous material and the UN hazard classification label in prescribed color code prominently painted in a conspicuous manner.
- The CONTRACTOR shall inspect the hazardous storages and installations on a daily basis and shall undertake any requisite preventive action necessary to avoid safety risks.

14.4 HEALTH HAZARDS & ENVIRONMENT CONTROL

The Contractor shall strive to exceed established minimum performance norms in waste and pollution control. All drains shall be identified as clean water and foul water to aid non-armful disposal.

14.4.1 Air Quality

- The Contractor shall take all necessary precautions to minimize fugitive dust emissions from operations involving excavation, grading, and clearing of land and disposal of waste. He shall not allow emissions of fugitive dust from any transport, handling, construction or storage activity
- The Contractor shall use construction equipment designed and equipped to minimize or control air pollution. He shall maintain evidence of such design and equipment and make these available for inspection by Owner.
- If after commencement of construction activity, Owner believes that the Contractor's equipment or methods of working are causing unacceptable air pollution impacts then these shall be inspected and remedial proposals shall be drawn up by the Contractor, submitted for review to the Owner and implemented.

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- In developing these remedial measures, the Contractor shall inspect and review all dust sources that may be contributing to air pollution. Remedial measures include use of additional / alternative equipment by the Contractor or maintenance / modification of existing equipment of the Contractor. In the event that approved remedial measures are not being implemented and serious impacts persist, the Owner may direct the Contractor to suspend work until the measures are implemented, as required under the Contract.
- Contractor's transport vehicles and other equipment shall conform to emission standards fixed by Statutory Agencies of Government of India or the State Government from time to time. The Contractor shall carry out periodical checks and undertake remedial measures including replacement, if required, so as to operate within permissible norms.
- The Contractor shall establish and maintain records of routine maintenance program for internal combustion engine powered vehicles and equipment used on this project. He shall keep records available for inspection by Owner.
- The Contractor shall cover loads of dust generating materials like debris and soil being transported from construction sites. All trucks carrying loose material should be covered and loaded with sufficient free-board to avoid spills through the tailboard or sideboards.
- The Contractor shall promptly transport all excavation disposal materials of whatever kind so as not to delay work on the project. Stockpiling of materials will only be allowed at sites designated by the Owner. The Contractor shall place excavation materials in the dumping/disposal areas.
- The temporary dumping areas shall be maintained by the Contractor all the times until excavate is re-utilized for backfilling or as directed by Owner. Dust control activities shall continue even during any work stoppage.
- The Contractor shall place material in a manner that will minimize dust production. Material shall be minimized each day and wetted, to minimize dust production. During dry weather, dust control methods must be used daily especially on windy, dry days to prevent any dust from blowing across the site perimeter.
- The Contractor shall water down construction sites as required suppressing dust, during handling of excavation soil or debris or during demolition. The Contractor will make water sprinklers, water supply and water delivering equipment available at any time that it is required for dust control use. Dust screens will be used, as feasible when additional dust control measures are needed especially where the work is near sensitive receptors.
- 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. At such facility, high-pressure water jets will be directed at the wheels of vehicles to remove all spoil and dirt.
- The Contractor shall design and implement his blasting techniques so as to minimize dust, noise, and vibration generation and prevention fly rock.
- Blasting technique should be consistent not only with nature and quantity of rock to be blasted but also the location of blasting.
- The contractor shall give preference to explosives with better environmental characteristics.

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- The Contractor shall protect structures, utilities, pavements roads and other facilities from disfiguration and damage as a result of his activities. Where this is not possible, the contractor shall restore the structures, utilities, pavements, roads and other facilities to their original or better, failing which the rectification/restoration work shall be carried out at the risk and cost of the contractor.
- The Contractor shall submit to the Owner an Air Monitoring and Control Plan under contract specific Site Environmental Plan to guide construction activity insofar as it relates to monitoring, controlling and mitigating air pollution.

14.4.2 Water Quality

- The Contractor shall comply with the Indian Government legislation and other State regulations in existence insofar as they relate to water pollution control and monitoring. A drainage system should be constructed at the commencement of the Works, to drain off all surface water from the work site into suitable drain outlet.
- The Contractor shall provide adequate precautions to ensure that no spoil or debris of any kind is pushed, washed, falls or deposited on land adjacent to the site perimeter including public roads or existing stream courses and drains within or adjacent to the site. In the event of any spoil or debris from construction works being deposited or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of the Owner.
- The Contractor shall ensure that earth, bentonite, chemicals and concrete agitator washings etc. are not deposited in the watercourses but are suitably collected and residue disposed-off in a manner approved by local authorities.
- All water and waste products (surface runoff and wastewater) arising on the site shall be collected and removed from the site via a suitable and properly designed temporary drainage system and disposed-off at a location and in a manner that will cause neither pollution nor nuisance.
- The Contractor shall discharge wastewater arising out of site office, canteen or toilet facilities constructed by him into sewers after obtaining prior approval of agency controlling the system. A drainage system shall be provided to drain wastewater into the sewerage system.
- Any mud slurry from drilling, tunneling, diaphragm wall construction or grouting etc. shall not be discharged into the drainage system unless treatment is carried out that will remove silt, mud particles, bentonite etc. The Contractor shall provide treatment facilities as necessary to prevent the discharge of contaminated water.
- The bentonite mixing, treatment and handling system shall be established by the contractor giving due regard to its environmental impacts. The disposal of redundant bentonite shall be carefully considered whether in bulk or liquid form. The disposal location will be advised and agreed with the relevant authorities.
- The Contractor shall take measures to prevent discharge of oil and grease during spillage from reaching drainage system or any water body. Oil removal / interceptors shall be provided to treat oil waste from workshop areas etc.
- The Contractor shall apply to the appropriate authority for installing bore wells for water supply at site.

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- Due to lowering of potable water supplies and subsequent contamination of ground water, the Contractor is not allowed to discharge water from the site without the approval of the Owner. Any water obtained from dewatering systems installed in the works must be either re-used for construction purposes and this water may subsequently be discharged to the drainage system or, if not re-used, recharged to the ground water at suitable aquifer levels. The Contractor must submit his proposals for approval of Owner, on his proposed locations of dewatering of excavation and collection of water for either construction re-use or recharge directly to aquifers. The Contractor's recharge proposals must be sufficient for recharging of the quantity of water remaining after deduction of water re-used for construction.

14.4.3 Noise

Industrial deafness is caused by over exposure to high levels of noise from plant, machinery or construction processes. Once a part of a person's hearing has been lost it can never be recovered. Deafness can also lead to further accidents on site with workers being unable to hear warnings and other instructions.

Workers should not be exposed to sound levels exceeding 90dB (A) unless they are wearing suitable hearing protectors, which effectively reduce the sound level at the user's ear to, or below, 90dB (A).

The Contractor shall carry out noise assessments to establish what noise levels his workers are being exposed to. If excessive noise levels above 90dB (A) are found, then the contractor shall introduce a noise control program to protect his workers.

Consideration should always be given first to reducing the noise level at source. Examples of noise reduction methods include;

- More efficient silencers on compressors and maintenance of exhaust systems;
- Fitting acoustic lining to machinery panels;
- Use of Acoustic screens and sheds to protect other workers;
- Using noise reduced tools;
- Sighting of noisy plant away from the workplace

Where it is not possible to reduce the noise level to which the worker is exposed the Contractor shall provide the workers with suitable and sufficient hearing protection to protect them. The Contractor shall ensure that all the workers affected are properly trained in the use of the Hearing Protection and that adequate supervision is provided to ensure its proper use.

14.4.4 Ventilation in Shafts, Tunnels & confined spaces

The Contractor shall ensure that workplaces are ventilated with at least prescribed amount of clean or cleaned fresh air of a suitable temperature, especially where toxic or irritating substances are present such as welding, vehicle exhaust fumes, irritating dusts, organic solvents or any other inimical atmosphere creating health hazards or safety.

The contractor shall assign a Competent Person to perform all air monitoring required to determine proper ventilation and quantitative measurement of potentially

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hazardous gases. The atmosphere in all confined spaces/ underground areas shall be tested quantitatively by the contractor for toxic gases, dust, vapor, mist, and fumes as often as necessary to ensure that prescribed limits given at 15.4.3 below are met. Quantitative tests for methane shall also be performed in order to determine whether an operation is potentially hazardous. For every test carried out the contractor shall maintain a record of the air quality the location, date, time, substances and amount monitored. These records shall be made available to the Owner's Representative on demand.

The ventilation system shall be adequate to maintain circulation of air in all parts of confined space/ tunnels and shafts and following conditions shall be taken care of.

Air shall be considered unfit for workmen to breathe if it contains any of the following:

- Less than 19.5% oxygen by volume.
- More than 0.005% carbon dioxide by volume.
- More than 0.01% carbon monoxide by volume.
- More than 0.001% hydrogen sulphide by volume.
- More than 0.005% oxides of nitrogen.
- More than 0.5% of methane at any place in the tunnel.
- More than 0.0002% of aldehyde.
- Any other poisonous gas in harmful amounts.

The Contractor will ensure the supply of fresh air to all confined space/ underground work areas in sufficient amount to prevent any harmful accumulation of dust, vapor or gases. The contractor shall provide at least 4.25 m³ of fresh air per minute per employee underground.

No inflammable materials or oil and grease shall be stored inside the confined space or near the tunnels or shafts and all combustible rubbish from the tunnel or shaft shall be promptly removed. A regular analysis of the gases inside the tunnel should be done with advance of the tunnel.

Tools made of light alloys (such as Al and Mg) are not to be used inside the tunnel. They may cause sparks.

Regular checking of gas at the faces shall be done before each shift. This should be carried out using a multi gas detector.

Motive power other than electric, shall not be used without prior authorization from the Owner's representative. No petrol engines shall be used underground. Diesel engines shall not be used underground unless equipped with a filter that will remove all carbon monoxide and oxides of nitrogen. Such filters shall be tested by the Contractor's chief mechanic and more frequently by the plant operator.

14.4.5 Vibration Level

In locations where the alignment is close to historical / heritage structures, the contractor shall prepare a monitoring scheme prior to construction at such locations. This scheme for monitoring vibration level at such historical / heritage sites shall be submitted to Owner for his approval. This scheme shall include:

- Monitoring requirements for vibrations at regular intervals throughout the

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construction period.

- Pre-construction structural integrity inspections of historic and sensitive structures in project activity.
- Information dissemination about the construction method, probable effects, quality control measures and precautions to be used.
- The vibration level limits at work sites adjacent to the alignment shall conform to the permitted values.

14.4.6 Illumination

The Contractor shall provide lighting natural or artificial to enable work Processes are carried out safely. Artificial lighting shall be adequate especially in the nights and emergencies. The lumen levels shall meet the statutory requirements

The contractor shall take every effort to illuminate the work site as per the Owner's requirement illustrated in Schedule 05: Minimum Illumination Level

14.4.7 Radiation

The use of radioactive substances and radiating apparatus shall comply with the Govt. regulatory requirements and all subsidiary legislation

An operation involving ionizing radiation shall only be carried out after having been reviewed without objection by the Owner's representative and shall be carried out in accordance with a method statement.

Each area containing irradiated apparatus shall have warning notices and barriers, as required by the Regulations, conspicuously posted at or near the area.

Radioactive substances will be stored, used or disposed shall be strictly in accordance with the Govt. Enactments.

The contractor shall ensure that all site personnel and members of the public are not exposed to radiation.

14.4.8 Waste

The CONTRACTOR shall ensure that he has sufficient waste bins that are identified for different wastes and maintained in clearly demarcated areas. Wastes with oily or other ignitable materials such as oily cotton wastes and hand gloves shall be stored separately with covers to prevent fires and shall be made of metal. Different wastes shall be segregated and stored separately and disposed-off. These shall be emptied at routine intervals to prevent that they do not overflow with wastes.

The contractor is required to develop, institute and maintain a Waste Management Program (WMP) during the construction of the project, which may include,

- Identification of disposal sites.
- Identification of quantities to be excavated and disposed off.
- Identification of split between waste and inert material
- Identification of amounts intended to be stored temporarily on site location of storage.
- Identification of intended transport means and route.
- Obtaining permission, where required, for disposal.

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Such a mechanism is intended to ensure that the designation of areas for the segregation and temporary storage of reusable and recyclable materials are incorporate into the WMP. The WMP should be prepared and submitted to the Engineer for approval.

The Contractor shall handle waste in a manner that ensures they are held securely without loss or leakage thus minimizing potential for pollution. The Contractor shall maintain and clean waste storage areas regularly.

The Contractor shall remove waste in a timely manner and disposed off at landfill sites after obtaining approval of AILL for its disposal.

Burning of wastes is prohibited. The Contractor shall not burn debris or vegetation or construction waste on the site but remove it in accordance with standard procedure.

The Contractor shall make arrangement to dispose of metal scrap and other saleable waste to authorized dealer and make available to the Owner on request, records of such sales.

14.4.9 Hazardous Waste Management

If encountered or generated as a result of Contractor's activity, then waste classified as hazardous under the "Hazardous Wastes (Management & Handling) Rules, 1989, amendments 2000, 2003" shall be disposed off in a manner in compliance with the procedure given in the rules under the aforesaid act.

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.

The contractor shall identify the nature and quantity of hazardous waste generated as a result of his activities and shall follow regulations established by the State Pollution Control Board along with a map showing the location of storage area.

Outside the storage area, the contractor shall place a 'display board', which will display quantity and nature of hazardous waste, on date. Hazardous Waste needs to be stored in a secure place.

It shall be the responsibility of the contractor to ensure that hazardous wastes are stored, based on the composition, in a manner suitable for handling, storage and transport. The labeling and packaging is required to be easily visible and be able to withstand physical conditions and climatic factors.

The contractor shall approach only Authorized Recyclers of Hazardous Waste for disposal of Hazardous Waste, under intimation to the Owner.

Submittal of all environment related documents and records pertaining to monitoring and trend analysis on key parameters such as but not limited to consumption / efficient use of resources such as energy, water, material such as cement, fly ash, iron and steel, recycle/reuse of waste etc. that shall have demonstrated continual improvement in the implementation of Environmental Management System. Failure to do so the Owner shall impose appropriate penalty as indicated under penalty clause.

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14.5 WELFARE MEASURES

The Contractor shall provide welfare facilities to ensure a high standard of cleanliness for all activities and rest. The Contractor shall provide facilities for his employees such as ablutions, toilets change rooms, kitchens and cafeterias etc. adequate and in a clean and hygienic state

14.5.1 Toilets (Latrine and Urinal Accommodation)

- The Contractors shall ensure that an adequate number of toilets are made available at the work sites with the ratio being no less than one toilet for every 50 workers or part thereof.
 - The contractor shall provide one latrine seat for every 20 workers up to 100 workers and thereafter one for every additional 50 workers. In addition, one urinal accommodation shall be provided for every 100 workers.
 - When women are employed, separate latrine and urinals accommodation shall be provided on the same scale as mentioned above.
 - Latrine and urinals shall be provided as per Section 33 of BOCWA and maintained as per Rule 243 of BOCWR and shall also comply with the requirements of public health authorities
- The toilets shall have adequate water supply and be kept in a clean and tidy condition at all times.
 - Moving sites
 - In case of works like track laying the zone of work is constantly moving at elevated level or at underground level. In such cases mobile toilets with proper facility to drain the sewage shall be provided at reasonably accessible distance.
 - In case if the contractor fails to provide required number of urinals and latrines or fail to maintain it as per the requirements of Public Health laws, the Owner shall have the right to provide/maintain through renowned external agencies like "Sulabh" at the cost of the contractor.

14.5.2 Drinking Water

- The Contractors shall ensure that effective arrangements are made to provide and maintain at suitable points a sufficient supply of wholesome drinking water.
- As per Section 32 of BOCWA the contractor shall make in every worksite, effective arrangements to provide sufficient supply of wholesome drinking water with minimum quantity of 5 liters per workman per day. Quality of the drinking water shall conform to the requirements of national standards on Public Health.
- While locating these drinking water facilities due care shall be taken so that these are easily accessible within a distance of 200m from the place of work for all workers at all location of work sites.
- All such points shall be legibly marked "Drinking Water" in Hindi, English and local language and no such point shall be situated within six meters of any washing place, urinal or latrine.

14.5.3 Canteen

In every workplace wherein not less than 250 workers are ordinarily employed the

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contractor shall provide an adequate canteen conforming to Section 37 of BOCWA, Rule 244 of BOCWR and as stipulated in Rule 247 of BOCWR the changes for food stuff shall be based on 'no profit no loss' basis. The price list of all items shall be conspicuously displayed in such canteen.

14.5.4 Serving of tea and snacks at the workplace

As per Rule 246 of BOCWR, at a building or other construction work where a workplace is situated at a distance of more than 200 m from the canteen provided under Rule 244(1) of BOCWR, the contractor employing building works shall make suitable arrangement for serving tea and light refreshment to such building works at such place.

14.5.5 Labor Accommodation

The contractor shall provide free of charges as near as possible, temporary living accommodation to all workers conforming to provisions of Section 34 of BOCWA. These accommodations shall have cooking place, bathing, washing and lavatory facilities

14.5.6 Creche

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 yrs., conforming to the provisions of Section 35 of BOCWA.

14.5.7 Lifting and Carrying of Excessive Weights

All contractors shall ensure that no worker lifts by hand or carries overhead or over his back or shoulders any material, article, tool or appliances exceeding in weight the maximum limits set out below unless aided by another worker or a mechanical device.

Adult – Male 55kg, Adult – Female 30kg

14.5.8 Manual Handling and Ergonomics

The Contractor shall have procedures to identify risks involved in manual handling operation and tasks. The Contractor shall ensure appropriate training to prevent any possible injury. Full use of mechanical aids shall be made to avoid risks arising out of such manual handling. Employees shall be adequately trained on such manual tasks and related safety precautions to reduce the risk of injury to personnel engaged in such work.

Premises and House-keeping Orderly Workplace

The Contractor shall maintain a well-managed safe working place in sound clean condition. The Contractor shall ensure that there is a place for everything and everything in its place so that optimum use is made of valuable floor space with commensurate cleanliness and reduced handling time. He shall ensure that his entire infrastructure including temporary and semi-temporary buildings are kept clean and good repair.

14.5.9 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002

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15.0 WORKING AT HEIGHT

15.1 General

Working at height is the largest single cause of serious accidents in the construction industry and therefore the Contractor shall carry out risk assessments for all work where workers or materials can fall more than two meters.

Where work is being carried out above areas where there is public access such as roads footpaths etc. particular care must be taken to ensure that no materials can fall from the working area.

Edge protection shall be provided at all leading edges or openings where workers or materials can fall more than two meters. Edge protection shall meet the minimum standard of;

- A main guardrail at least 1 meter above the edge
- A toe board at least 200 mm high; and
- An intermediate guard rail or other barrier so that there is no gap more than 470 mm.

15.2 Use of Scaffolds

All scaffolds should be erected and dismantled by workmen who are thoroughly experienced in the erection and dismantling of scaffolding.

All scaffolds should be inspected by a competent person at least every three days after erection and the results of inspections recorded and the records shall be kept available for checking by the Owner's Representative.

Tags shall be fitted to all scaffolds to show whether they are safe for use or not. All Safe for Use tags shall be signed by a senior site engineer from the contractor.

All scaffolds shall be constructed of sound materials free from patent defect.

The following measures shall be taken;

- The scaffold shall be constructed for the correct use (Light or Heavy Duty)
- Securely fixed to existing structures or adequately buttressed;
- The use of barrels, boxes, loose tiles or other unsuitable material shall not be used as Supports for working platforms;
- All working platforms shall be fully boarded;
- All working platforms shall have guard rails at one-meter height and shall also have an intermediate rail at half height;
- All working platforms shall be provided with toe boards;
- All working platforms shall be kept free of unnecessary obstruction or rubbish
- Secure ladder access shall be provided;

15.3 Use of Ladders

All ladders shall be of sound construction and shall be free from patent defect.

Ladders should be checked weekly and defective ladders shall be promptly and properly repaired or replaced.

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Ladders shall not be used as working platforms but may be used for work of short duration of up to thirty minutes.

Metal ladders shall not be used near or adjacent to overhead power lines unless they have been certified dead under a permit to work system.

Ladders shall;

- Be secured at the top or footed at the bottom to prevent slippage;
- Not be used if any rung is missing;
- Not be used for any other purpose than to provide access;
- Be set at an angle of seventy-five degrees unless designed for vertical access;
- All vertical ladders shall be fitted with hoops to prevent falls;

The Contractor shall advise his workmen to take the following precautions while using ladders:

- While ascending or descending, face the ladder. Use both hands for holding.
- Do not climb higher than the third rung from top on straight or extension- ladders and second rung from top on set ladders.
- Step-ladders shall be fully open before use.
- Sliding down a ladder shall be prohibited.
- Make shift ladders such as clear fastened across a single rail and short ladders spliced together shall never be used.
- Ladders shall be kept free from dirt and grease.
- Defective ladders shall be removed from use.
- Ladders shall not be left un-attended unless these are securely anchored at top and bottom.
- While using ladders, shoes shall not be greasy, muddy or otherwise slippery
- Ladder shall not be used during severe windy conditions

15.4 Safety Harnesses / Fall Arresters

Where it is not possible to provide a safe working platform then the use of safety harnesses may be considered. If safety harnesses are used, they should be of the full body type and secure anchorage points shall be provided and used. Workers must be instructed in the proper use of harnesses.

15.5 Falling Object Protection

Where work is in progress in elevated areas, barricades, barrier tapes, signs and such entry restriction devices shall be used to keep area below clear of personnel to prevent injury due to falling objects. If work is required in the area below elevated work area, it shall be scheduled at a time different from elevated works. The workmen below shall be protected from falling objects by the debris net or a catch platform with an adequate toe board to prevent material from falling off. Use of safety net for elevated works shall be considered in the work permits where appropriate. Where a lift is made above a working area, the area below the path of the lift shall be cleared of personnel during the lift and barricaded and guarded to prevent entry of persons generally in conformity with IS 4912, IS 11972 and IS 13416 for protective barriers in and around building and preventive measures against safety hazards in work places and safety

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requirements for floor and, wall opening, railings and toe-boards.

15.6 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapters: XV and XIX
- Indian Standards;
- IS 3696 (Part 1): 1987 Safety Code for Scaffolds and Ladders, Part 1, Scaffolds IS 3696 (Part 2): 1991 Safety Code for Scaffolds and Ladders, Part 2, Ladders
- IS 13416 (Part 1):1992 Recommendations for preventive measures against hazards in the workplace, Part 1, falling material hazards protection
- IS 13416 (Part 2):1992 Recommendations for preventive measures against hazards in the workplace, Part 2, fall protection
- British Standards
- BS EN 354: 1993: Personal protective equipment against falls from a height. Lanyards
- BS EN 355: 1993: Personal protective equipment against falls from a height. Energy absorbers
- BS EN 358: 1993: Personal equipment for work positioning and prevention of falls from a height. Work positioning systems
- BS EN 360: 1993: Personal protective equipment against falls from a height. Retractable type fall arresters
- BS EN 361: 1993: Personal protective equipment against falls from a height. Full body harnesses
- BS EN 362: 1993: Personal protective equipment against falls from a height. Connectors
- BS EN 363: 1993: Personal protective equipment against falls from a height. Fall arrest systems
- BS EN 364: 1993: Personal protective equipment against falls from a height. Test methods
- BS EN 365: 1993: Personal protective equipment against falls from a height. General requirements for instructions for use and for marking
- BS EN 795: 1997: Protection against falls from a height. Anchor devices. Requirement and testing

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16.0 EXCAVATIONS

16.1 General

Excavation is one of the important phases of any construction activity. Due to insufficient attention to the safety aspects it frequently becomes the cause of many accidents. Contractors are therefore required to plan and execute all excavations in a safe manner.

The contractor shall ensure that all excavations are supervised by workers with thorough knowledge and experience of excavation work.

The integrity of the excavation and the support system shall be inspected prior to the commencement of any works on a daily basis with the results of the inspections being formally recorded. All such records shall be kept available for inspection by the Owner's Representative.

Where there is the possibility of any ingress of water then pumping sumps shall be established with pumps being readily available for use and additional ladders placed for use in the event of an emergency evacuation.

16.2 Planning

The correct planning of excavations is essential for safety and before digging any excavations Contractors should plan against the following;

- Collapse of the sides;
- Materials falling onto people working in the excavation;
- People and vehicles falling into the excavation;
- People being struck by plant;
- Undermining nearby structures;
- Contact with underground services;
- Fumes; and
- Make sure the necessary equipment needed such as trench sheets, props, etc. are available on site before work starts.

16.3 General Precautions

The following precautions should be observed;

- Prevent the sides and the ends from collapsing by battering them to a safe angle or supporting them with timber, sheeting or proprietary support systems.
- Do not go into unsupported excavations.
- Never work ahead of the support.
- Remember that even work in shallow trenches can be dangerous. You may need to provide support if the work involves bending or kneeling in the trench.
- Do not store spoil or other materials within 1.5 meter of the sides of excavations. The spoil may fall into the excavation and the extra loading will make the sides more prone to collapse.
- Make sure the edges of the excavation are protected against falling materials. Provide toe boards where necessary.
- Wear a hard hat when working in excavations.

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- Take steps to prevent people falling into excavations. If the excavation is 2 m or more deep, provide substantial barriers, e.g. guard rails and toe boards.
- Keep vehicles away from excavations wherever possible. Use brightly painted baulks or barriers where necessary.
- Where vehicles have to tip materials into excavations, use stop blocks to prevent them from over-running. Remember that the sides of the excavation may need extra support.

16.4 Undermining nearby structures

The following precautions should be taken to prevent the undermining of nearby structures;

- Make sure excavations do not affect the footings of scaffolds or the foundations of nearby structures. Walls may have very shallow foundations, which can be undermined by even small trenches.
- Decide if the structure needs temporary support before digging starts. Surveys of the foundations and the advice of a structural engineer may be needed.

16.5 Avoiding underground services

The following precautions should be taken to avoid underground services;

- Look around for obvious signs of underground services, e.g. valve covers or patching of the road surface.
- Use locators to trace any services. Mark the ground accordingly.
- Make sure that the person supervising excavation work has service plans and knows how to use them. Everyone carrying out the work should know about safe digging practices and emergency procedures.
- Operate a "Permit to Dig" system.

16.6 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: XIII
- Indian Standards
- IS 3764: 1992 Excavation Work – Code of Safety
- IS 13430: 1992 Safety during additional construction to existing buildings – Code of Practice.
- IS 2314: 1986 Steel Sheet Piling sections
- IS 5121: 1969 Safety Code for Piling and Other Deep Foundations

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17.0 LIFTING OPERATIONS

17.1 Lifting Appliances:

The Contractor shall ensure that all lifting appliances, including synchronized mobile jacks, pit jacks, mobile cranes, tower cranes, gantry cranes, launching beams and lorry mounted cranes, prior to being allowed to work on site shall have available for inspection by the Owner's Representative a current Certificate of Inspection issued by a Competent Person approved by the Owner.

All movable lifting appliances with a lifting capacity of more than one ton shall, where practicable, be fitted with Automatic Safe Load Indicators and Audible Warning Devices which shall be kept in an operable condition at all times the lifting appliance is in use. Checks should be made to ensure that the Automatic Safe Load Indicator is properly calibrated and is functioning properly.

All lifting appliances shall be maintained in accordance with the manufacturer's instructions and shall be subject to a regular preventative maintenance program.

All lifting appliances shall be inspected every three months by a third party competent person approved by the Owner. Certificates of Inspection shall be available with the lifting appliance and a copy shall also be sent to the Owner's Representative.

The operators of lifting appliances shall conduct daily inspections of their respective lifting appliances with the results of the inspections being recorded and kept available for inspection by the Owner's Representative.

The Contractor shall ensure that only thoroughly trained and experienced persons aged twenty-one years and over are allowed to operate lifting appliances.

17.2 Lifting Gear:

Lifting Gear includes chain slings, rope slings, or similar gear and a ring, link, hook, plate clamp, shackle, swivel or eye bolt.

The Contractor shall ensure that all lifting gear shall be in good condition and shall be tested and certified every six months, with the Safe Working Load being stamped or clearly displayed upon it. Records of test shall be kept available for inspection by the Owner's Representative.

All lifting gear shall be visually inspected before any use and if any defects are found then it shall be removed from site or dismantled / disabled in order to ensure that it is not used in a defective state.

All lifting gear shall be properly stored and not left lying on the ground where it could be damaged or used in an unsafe manner.

17.3 Lifting Operations:

The Contractor shall ensure that during the course of any lifting operations the following minimum requirements shall be followed:

- All lifting operations shall be under the control of a competent "Lifting Supervisor" appointed by the contractor.
- Only thoroughly trained and experienced crane drivers shall be allowed to operate

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cranes.

- Only thoroughly trained and experienced slingers and riggers shall be allowed to sling loads and give directions to crane operators.
- A standard code of hand signals shall be adopted for controlling the movements of the crane and both the driver and the signaler shall be thoroughly familiar with the signals.
- The driver of the crane shall respond to signals from only the appointed signaler but shall obey the stop signal at any time no matter who gives it.
- Before commencing any lifting operations, the ground conditions on which the crane is to stand shall be investigated in order to ensure that the load bearing capabilities are adequate.
- The weight of the load must be known to the crane driver and the slinger/rigger before lifting commences.
- No loads are to be slewed over public areas without stopping pedestrians and vehicles first.
- No unauthorized persons are allowed into the lifting zone.
- No person is allowed to ride the hook of the crane or the loads being lifted.
- Any areas where a minimum clearance of six hundred millimeters from the rear of the slewing Kent-ledge of the crane cannot be achieved and where persons could be trapped against obstacles then a fence shall be erected to prevent access.
- All crane hooks shall be fitted with an operable safety catch.
- Wherever practicable all loads shall have tag-lines attached in order to ensure that the load can be controlled at all times.
- Provision shall be made to ensure that the lifting slings or chains can be safely removed from the loads once they have been landed.
- All lifted loads and stacked materials shall be left in a secure and stable condition at all times.
- Whenever working close to isolated overhead power-lines the lifting appliances shall be grounded to earth as a secondary precaution against accidental energization.

17.4 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: VII
- Indian Standards
- IS 807: 1976 Code of Practice for the design, manufacture and testing of cranes
- IS 7293: 1974 Safety Code for working with Construction Machinery
- IS 13583: 1993 Code of Practice for training of Crane Drivers Part 1 General
- British Standards
- BS 7121: Code of practice for safe use of cranes
- BS 7262: 1990: Specification for automatic safe load indicators

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18.0 WORK IN CONFINED SPACES

18.1 General

The term 'confined space' has two defining features. Firstly, it is a place which is substantially (though not always entirely) enclosed and, secondly, there will be a reasonably foreseeable risk of serious injury from hazardous substances or conditions within the space or nearby.

Some confined spaces are fairly easy to identify, for example, closed tanks and sewers. Others are less obvious but may be equally dangerous, for example closed and unventilated or inadequately ventilated rooms and silos, ducts, culverts, tunnels, boreholes, bored piles, manholes, shafts, excavations, sumps, inspection pits, cofferdams, and building voids.

18.2 The hazards

The most likely hazards are as follows:

- Flammable Substances and Oxygen Enrichment;
- Toxic Gas, Fume or Vapor;
- Oxygen deficiency;
- The Ingress or Presence of Liquids;
- Presence of Excessive Heat,
- Excessive Humidity.

18.3 Entry Procedures

Contractors will ensure that no work will be undertaken in Confined Spaces unless a Permit to Work, see Clause 12.3, has been prepared and issued.

Only persons who have been thoroughly trained, experienced and are physically fit shall be allowed to work in Confined Spaces.

Persons with any of the following medical conditions shall not be allowed to work in confined spaces:

- A history of fits, blackouts or fainting attacks,
- A history of heart disease or disorder,
- High blood pressure,
- Asthma bronchitis, or shortness of breath on exertion,
- Deafness
- Menier's disease or disease involving giddiness or loss of balance,
- Claustrophobia or nervous or mental disorder,
- Back pain or joint trouble that would limit mobility in confined spaces,
- Deformity or disease of the lower limbs limiting movement.
- Chronic skin disease,
- Serious defects in eye sight or lack of sense of smell, etc.

No smoking shall be allowed in or within 2 meters of the opening to any confined space and suitable warning signs shall be positioned.

Before any confined space work commences the following equipment shall be

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available for use:

- Multi Gas Monitor; or other suitable gas monitoring equipment.
- Sufficient sets of Self Contained Breathing Apparatus to enable rescue to be carried out;
- Full Body Type Harness for each worker;
- Tripod and Lifeline Hoist Rope; for work in situations where a vertical exit from the confined space is required.
- Flame-proof lighting. (Hand lamps not more than 24 volts.);
- Resuscitation Equipment;
- Ventilation Equipment.

The persons involved in the confined space working operations shall need to be thoroughly trained and certified as being competent in the use of the above detailed item of equipment.

18.4 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: XIII
- Indian Standards
- IS 11972: 1987 - Code of Practice for safety precautions taken before entering into Sewerage system

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19.0 ELECTRICITY

The CONTRACTOR shall provide only such equipment for work that is electrically safe to work. The CONTRACTOR shall have a procedure to identify and record all his electrical equipment in a register, with provisions to record his periodic inspections of such equipment. Inspection shall cover cables, extension leads, all electrical equipment drawing power from socket outlet. He shall identify and maintain in good working order all electrical installations such as distribution panels and major switchgear ensuring safe accessibility. A clear area shall be maintained around panels and switchgears. The installed equipment shall be periodically inspected by qualified personnel to ensure their continued safe operating condition. Inspection shall include earth polarity checks, continuity checks and earth resistance checks. The CONTRACTOR shall ensure use of flameproof and explosion proof switchgears and lighting fittings where required as per governing codes.

19.1 General

The Contractor shall nominate a representative whose name and qualifications shall be submitted in writing to the Owner's Representative for review not later than 4 weeks before the appointment and who shall be solely responsible for ensuring the safety of all temporary electrical equipment on Site. The Contractor shall not install or operate any temporary Site electrical systems until this representative is appointed and has commenced duties.

The name and contact telephone number of the representative having been reviewed without objection by the Owner's Representative shall be displayed at the main distribution board for the temporary electrical supply so that he can be contacted in case of an emergency.

The Contractor shall submit schematic diagrams and the details of the equipment for all temporary electrical installations, and these diagrams together with the temporary electrical equipment shall be submitted to the Owner's Representative for review.

All electrical installation work on Site shall be carried out in accordance with the requirements laid down in the Specification. All work shall be supervised or executed by qualified and suitably categorized electricians.

All Temporary Electrical Site installations and distribution systems shall as a minimum meet IP55 standards and be in accordance with: -

- Indian Electrical Regulations;
- The Power Companies' Supply Rules;
- BS 7671 Requirements for electrical installation, the IEE Wiring Regulations (16th Edition);
- BS 7375 Distribution of Electricity on Construction and Building Sites;
- BS 4363 Distribution Assemblies for Electricity Supplies for Construction and Building Sites; and
- BS 6164 Safety in Tunneling in the Construction Industry.

Approved earth leakage relays or an alternative safety device to relevant IS and International codes shall be used on all portable electrical hand tools. Where possible

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low-voltage electric power supply shall be used for hand tools, earth leakage units shall protect electrical installations in workshops, kitchens, cafeterias, first-aid rooms, laboratories and offices. Record of regular checks shall be maintained. The CONTRACTOR shall comply with 'Code of Practice for Earthing' as per IS 3043

19.2 Design Considerations

Distribution equipment utilized within the temporary electrical distribution system shall incorporate the following features: -

- Flexibility in application for repeated use;
- Suitability for transport and storage;
- Robust construction to resist moisture and damage; and
- Safety in use.

All cabling shall be run at high level whenever possible and firmly secured to ensure it does not present a hazard or obstruction to people and equipment.

The installation on Site shall allow convenient access to authorized and competent operatives to work on the apparatus contained within.

19.3 Distribution of supply

The Site mains voltage shall be as the Electricity Utility supplies, 415V 3-phase 4-wire system.

- Single-phase voltage shall be as the Electricity Utility supplies, 240V supply.
- Reduced voltages shall conform to BS 7375.

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

- Fixed plant - 415V 3 phase, 4 wire;
- Movable plant fed by trailing cable - 415V 3 phase, 4 wire;
- Installations in Site buildings - 240V 1 phase;
- Fixed flood lighting - 240V 1 phase;
- Portable and hand held tools – 240, 1 phase;
- Site lighting - 240V 1 phase; and
- Portable hand-lamps in confined space (general use) - 24V

Protection shall be provided for all main and sub-circuits against excess current, 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.

Earthing and bonding shall be provided for all electrical installations and equipment to prevent the possibility of dangerous voltage rises and for mankind safety.

Safety rubber matting of appropriate voltage rating conforming to IS 5424 entitled 'Rubber Mats for Electrical Purposes' shall be provided in front of all switchgears and power distribution panels for the safety of personnel operating such equipment

The CONTRACTOR shall arrange displaying signage under Indian Electricity Act 1910, such as:

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- Danger notices as per IS 2551 in conspicuous places on all low, medium and High voltages as per Rule 35.
- Instruction of restoration of persons suffering from electric shock in English & local languages as per Rule 44 in switchgear rooms, substations and places where electricity is used and
- Notice prohibiting unauthorized entry in areas where electrical apparatus is being used.

Only plugs and fittings of the weatherproof type shall be used and they should be color coded in accordance with the internationally recognized standards for example as detailed as follows:

- 110 volts Yellow.
- 240 volts Blue.
- 415 volts Red.

19.4 Cables

All power cables providing construction power to various construction machinery and the connectors shall be in safe and sound condition. Cables shall be routed through cable trays supported on appropriately designed structures, duly clamped, secured and identified. Road crossing cables shall be laid in conduits buried at least 600 mm below the surface to prevent damage due to vehicular traffic. All cables shall be off the floor to avoid damage or tripping hazard. Cables shall be terminated at the switchgear and sockets in a workman like manner to prevent loose contacts and flashover. Only safety receptacles shall be used for providing power connection to hand-tools. All switches and distribution boards shall be clearly marked. All electrical distribution and panel wiring diagrams shall be available with the electrical maintenance personnel. The CONTRACTOR shall maintain a safe electrical isolation/lockout procedure.

Cables shall be selected after full consideration of the conditions to which they will be exposed and the duties for which they are required. For supply cables up to 3.3kV the cable armoring shall be used as the earth return in conditions where the cable is continuously extended and not subject to continuous movement after installation.

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:

- BS 6708 flexible cables for use at mines and quarries;
- BS 6007 rubber insulated cables for electric power and lighting; and
- BS 6500 insulated flexible cords and cables.

19.5 Maintenance

Strict maintenance and weekly 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 Owner's Representative details of his maintenance schedule and maintenance works record.

All portable electrical appliances shall be permanently numbered (scarf tag labels or

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similar) and a record kept of the date of issue, date of the last inspection carried out and the recommended inspection period.

Portable power tools rated for above 50 V supply and hand lamps rated for above 24 V supply shall not be used at site. An armoured cable with a 3 pin plug, properly earthed shall be provided between the CONTRACTOR's DG set and step down transformer. All power supply and distribution boards shall have canopy for protection and all the distribution boards shall be earthed securely. All supply points shall have proper plug and socket.

19.6 Energy distribution installations

The CONTRACTOR shall ensure lighting circuits are not used for hand-tools. No electrical equipment shall be overloaded. Tools and test equipment used on electrical systems shall be insulated

- Where necessary to prevent danger, energy distribution installations shall be suitably located, checked and clearly indicated.
- Where there is a risk from electric power cables—
 - a) they shall be directed away from the area of risk; or
 - b) the power shall be isolated and, where necessary, earthed; or
 - c) if it is not reasonably practicable to comply with paragraph (a) or (b) suitable warning notices shall be provided
- No construction work which is liable to create a risk to health or safety from an underground service, or from damage to or disturbance of it, shall be carried out unless suitable and sufficient steps (including any steps required by this regulation) have been taken to prevent such risk, so far as is reasonably practicable.
- No power should be supplied unless ELCBs are installed in a booth and a distribution board is made available. Regular test with proper testing equipment is required and maintained.

19.7 References

Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: VI

- Indian Electrical Regulations;
- BS EN 60529 Degrees of protection provided by enclosures (IP Code)
- The Power Companies' Supply Rules;
- BS 7671 Requirements for electrical installation the IEE Wiring Regulations (16th Edition);
- BS 7375 Distribution of Electricity on Construction and Building Sites;
- BS 4363 Distribution Assemblies for Electricity Supplies for Construction and Building Sites; and

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20.0 WELDING AND CUTTING

20.1 General

Contractors shall ensure that all welding, cutting and gouging are carried out in such a way that the risks are kept at a minimum. There will be some circumstances when Permits to Work will need to be issued, such as

- Working in confined spaces;
- Welding over areas where others are working;
- Working in areas with increased fire risks or hazardous environments;

All equipment must be in good condition, properly installed and routinely inspected by a competent person, and records must be kept available for inspection by the Owner's Representative.

Flexible hoses, cables and connections must be free from damage or risk of damage in service. Cables and hoses shall have adequate current carrying capacity.

Welders shall wear the correct personal protective equipment which includes the following;

- Face and eye protection with correct grade of shield;
- Gauntlet gloves;
- Safety footwear
- Welders apron or fire retardant overalls;
- The atmosphere in the vicinity of work must be known to be safe to breathe and free from flammable gases.

Adequate ventilation and fume extraction must be provided and used as required by the risk assessment and especially in enclosed areas and pits.

Surfaces to be heated by the process must be cleaned of contaminants that may be degraded by heat or give off noxious fumes (e.g. paints, plastics, zinc coating).

All moveable flammable materials must be removed from the vicinity of work and fireproof covers placed over all flammable materials that cannot be removed.

During all welding the work piece and any access equipment must be safely secured.

20.2 Oxy-fuel Gas Processes

- Handle cylinders carefully, keep outside enclosed areas and secure in an upright position. Keep oxygen cylinders away from fuel gas cylinders where possible.
- Flash back arresters shall be fitted to both the fuel gas and oxygen cylinders;
- Non return valves shall be fitted to the torch or cutting torch;
- Ensure screwed fittings and hoses are correct and keep screwed and sealed surfaces free of contaminants, such as oil and grease.
- Close cylinder valves when flame is extinguished.
- Ensure any vessel, drum or tank that has contained flammable or toxic substances has been properly cleaned and inspected before subjecting it to hot work.
- Checks for gas leaks should be carried out using soapy water.
- Remove all torches from enclosed areas when not in use.

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- Suitable fire extinguisher to be available at all places where hot work is being carried out.
- Use firewatchers if there is a possibility of ignition unobserved by the operator.

20.3 Arc Cutting, Gouging and Welding Processes

- Connect the welding current return cable to the work piece close to the arc point or to a well electrically conductive support in good contact with the work piece. Also, connect the work piece or the support structure to separate earth terminal.
- Take precautions against the risk of increased fume hazards when welding with chrome containing fluxed consumables or high current metal inert gas (MIG) or tungsten inert gas (TIG) processes.
- Avoid being in contact with water or wet floors when welding. Use duckboards or rubber protection.
- Provide screens to limit exposure of others to glare from arcs.
- Use the correct eye and face protection with the correct filter glass.
- Use a low voltage open circuit relay device if welding with alternating current in constricted or damp places.
- Only qualified welders shall be employed at the work site. The Contractor shall organize the qualifying test at site for his welders and the Owner shall approve the welders.
- For welding work generator sets shall be used instead of AC transformer sets. AC transformer sets are banned for welding jobs inside vessels.
- The Contractor shall get his welding sets certified by the Owner before starting work. A copy of the certificates shall be displayed on respective welding sets.
- Cables in good condition and insulated holders only shall be used. Welding set body shall be properly earthed.
- A charged fire extinguisher of CO2 type shall be carried with each welding set. The Contractor shall keep Halon or equivalent type fire extinguishers near hot jobs.
- The welder shall not use a building structure, pipeline or railway track etc. as a return path of the current. Adequately rated circuit breaker shall be provided in the power circuit for human protection on all power supply points

20.4 References

- IS 818: 1961 Code of Practice for safety and health requirements in electric, gas welding and cutting operations
- IS 1179: 1967 Specification for equipment for eye and face protection during welding
- IS 5983: 1967 Specification for protective filters for welding, cutting and similar operations.
- IS 13416 (Part 5): 1994 Preventative measures against hazards at workplaces – Recommendations Part 5 Fire Protection
- BS EN 166: 1996: Personal eye-protection. Specifications
- BS EN 169: 1992: Specification for filters for personal eye protection equipment used in welding and similar operations
- BS EN 175: 1997: Personal protection. Equipment for eye and face protection during welding and allied processes

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21.0 COMPRESSED GASES

Compressed gas cylinders shall be stored and secured in the upright position at safe distances from shielded from welding and cutting operations. Compressed gas cylinders in storage shall be shut off and torches, hose and manifolds removed and capped. Cylinders shall be periodically checked for leakages. Storage shall meet requirements of Gas Cylinder Rules 2004. Compressed gas storages shall be provided with safety relief valves, Safety valves and rupture disc to protect them overpressures, appropriately designed to ensure their continued availability in the face of process changes

21.1 Storage

The Contractor shall ensure that all compressed gases, such as oxygen and fuel gases, are stored in a safe manner in keeping with the following requirements.

When not in use compressed gas cylinders should preferably be stored in the open air in a well ventilated area at ground level on a firm level surface at least 3m away from any cellars, drains, excavations or other hollows where vapor may collect. There should be good access to the area, which should be kept clean and clear of combustible material, including wood, packing materials and vegetation. If any protection is provided to prevent cylinders being exposed to the weather, it should be of non-combustible material and should not inhibit ventilation. The area should not be close to any source of heat.

If storage in the open air is not reasonably practicable, compressed cylinders must be stored in adequately ventilated storerooms. The storeroom must be constructed of non-combustible material.

Liquefied Petroleum Gas (LPG) cylinders should be stored separately from oxygen cylinders, other flammable liquids, oxidizing materials such as sodium chlorate, and toxic or corrosive substances. Such materials should be kept at least 3 meters away from LPG cylinders.

It is important that the valves of "empty" cylinders are kept closed as well as those of full cylinders and that plugs, shrouds and caps are kept in place on all cylinders. This is necessary not only to prevent the escape of any residual compressed gas into the atmosphere but also to ensure that air is not sucked into the cylinder to form an explosive mixture inside it. All cylinders should be stored with their valves uppermost.

The storage area should be enclosed by a fence approximately 2 meters in height. The fence should be made of non-combustible material and should not inhibit natural ventilation, particularly at low level - a wire mesh fence is particularly suitable for this purpose. The fence should have at least two means of exit, which should not be adjacent to each other. The gates should open outwards and not be self-locking. Both exits should be unlocked when persons are within the storage compound.

On sites where only small quantities of compressed gas are stored (i.e. less than 300 kg) and it is practicable neither to provide an open air storage compound nor a properly constructed storage building cylinders may be kept in a lockable wire cage in a safe place in the open air. Only one exit will be necessary providing there is no risk of a person being trapped in the enclosure. The cage should be clearly marked "Highly

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Flammable and notices prohibiting smoking and naked lights should be displayed.

Suitable portable first aid fire extinguishers shall be positioned in close proximity to the storage area for use in an emergency.

21.2 Handling Compressed Gas cylinders

Cylinders should be handled with care and wherever practicable moved on specially designed trolleys. The valve on a cylinder should not be used for lifting or to lever the cylinder into position. Damage to the valve can result in highly dangerous situations following the escape of gas. For the same reason throwing or dropping cylinders should be prohibited as in such circumstances damage to the valve is even more likely.

Before connecting any cylinder or container of compressed gas to equipment it is essential that all fires, flames or other sources of ignition in the vicinity, including cigarettes and pilot lights, are extinguished. Where practicable cylinders should be changed in the open air. The cylinder should be examined and any damaged or faulty cylinder should NOT be used. No attempt should be made to rectify any fault or damage.

If a cylinder is found to be leaking and the leak cannot be stopped, the cylinder should be carefully removed to a well-ventilated open space free from sources of ignition. It should be left with the leak, usually at the valve, uppermost, marked faulty and notices displayed prohibiting smoking or other naked lights. General access should be prevented by barriers or otherwise. The supplier of the cylinder should be informed immediately.

21.3 Regulators

Regulators should be suitable for the gas and pressure in use. Checks for leaks at the regulator nuts should be made only by using soapy water. In the event of a defect or any damage to a regulator, no attempt should be made to repair it. Such repairs should only be carried out by specialists.

21.4 Hoses

Flexible tubing should only be used for final connections to appliances. Flexible hoses should comply with BS 3212, BS 5120 or other nationally recognized standard. They should be additionally protected or of steel braid reinforced construction wherever they might be subject to damage by abrasion and so sited that they are not exposed to excessive heat. The length of hoses should be kept as short as practicable

21.5 Training and Instruction

Many accidents involving compressed gas are due to ignorance of simple basic precautions. It is essential that all persons using compressed gas are suitably instructed about the hazards and the precautions to be taken in its use.

21.6 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: VI
- **Indian Standards:** IS 2190: 1979 Code of Practice for the selection installation and maintenance of portable first aid fire extinguishers.

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22.0 MECHANICAL SAFETY

22.1 General

The Contractor shall ensure that all his equipment and machinery are safe to use while in motion or working. Operators shall have received training or instruction on operation of the machinery and the regulatory requirements. The Contractor shall have adequate procedure to ensure the stability and securing of his working machinery during operation. He shall restrict repair and maintenance of the machinery to trained personnel and maintain records of repairs and maintenance. The equipment shall have appropriately designed means of isolating from sources of energy and shall have emergency stop control, which is easily accessible. All controls shall be clearly and uniformly marked. All operation controls, interlocks, sensing devices and guards on tools and equipment shall be functional and their status shall be regularly checked and recorded.

The Contractor shall provide only good quality hand tools and ensure control of condition, storage, routine inspection and use of such hand-tools. Unsafe tools such as with cracked or broken handles, mushroomed chisels and punches, worn screwdrivers, hardened hammerheads; power tools with unsafe resistance to earth or without safety guards shall be prohibited.

The Contractor shall submit a valid Test Certificate to the Owner, from approved certifying authorities for all of his lifting gear and hoists, slings, chains, wire ropes, hooks, chain-pulley blocks, winches, hoists and cranes etc. before commencing work. These certificates shall be available at site in the Contractor's office for inspection as and when required.

All safety ladders, scaffolding and such access equipment shall meet requirements of IS 3696 and IS 4014 and such standards as the Owner may stipulate. The safety work permits shall be issued only after ensuring that all safety requirements of access equipment are complied with.

The Contractor shall ensure safety of all those concerned with lifting and those who may be affected by material hoisting, lifting and handling using various mechanical aids. All lifting equipment such as cranes, hoists, lifting shackles, hooks chains and links shall be designed as per appropriate International codes of construction. Operators shall have been trained in operation and maintenance of such equipment besides training on standard hand signals to be employed during the hoisting and lifting operations. Safe Working Loads (SWL) shall be marked on equipment prominently. SWL shall be evidenced to have been established by test procedures in accordance with acceptable codes of practices.

The Contractor shall ensure at all times that his workers do not lie down or sleep under or around any machine, equipment, vessel or vehicle in his work area. Riding on construction equipment, forklifts and cranes shall be prohibited.

Pressurized gas and air systems shall be maintained safe in good working order and shall meet the requirements of the applicable laws and codes. The safety relief valves, safety appurtenances and isolation systems shall be compliant with safety code of practices. Any statutory register of pressure vessel records and the code of practices

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shall be subject to periodic auditing by the Owner.

Pressure and leak testing of equipment shall be carried out hydraulically. However, in special cases where pneumatic testing is specified, written approval shall be obtained from the Owner before starting work. Under no circumstance gases other than nitrogen, carbon dioxide, air or steam shall be used for testing. In case nitrogen or carbon dioxide is used for testing, the equipment shall be adequately ventilated and gas tested to ensure oxygen content of 21% before permitting a worker to enter the equipment.

The areas of highly dangerous activities like hoisting, lifting and rock blasting, and radiation, shall be appropriately barricaded to protect personnel and machinery and guided by work permit discipline. Emergency plans shall cater to emergencies arising out of such activities.

Signs, barricades, barrier tapes and warning or entry restriction devices or accessories shall be provided to minimize work related risks of accidents and injuries. Signage shall meet all regulatory requirements such as under The Building and other construction workers Act 1996, Factory Act 1948, Manufacture, Storage, Import of Hazardous Chemicals Rules under Environmental Protection Act 1986, Indian Explosives Act 1984 and Gas Cylinder Rules 2004 and Indian Electricity Act 1910 and Rules thereof and any other safety requirements of the Owner.

The Contractor shall execute the work in a manner causing the least possible interference with the business of the Owner, or with the work of any other Contractor who may be engaged on the premises and shall at all times co- operate with the other Contractors working at site.

22.2 Machinery

22.2.1 Machinery Fencing

The Contractor shall ensure that all gears, revolving shafts, flywheels, couplings and other dangerous parts of machinery shall be effectively guarded unless they are so constructed, installed or placed as to be safe as if they were guarded. Fencing of dangerous parts of machinery shall not be removed while the machinery is in use or in motion. If the fencing is required to be removed for maintenance purposes it shall be replaced before the machine is taken into use.

22.2.2 Maintenance

- The Contractor shall ensure that all machinery used on site is in safe condition and is properly maintained and repaired by duly authorized, thoroughly trained and experienced persons.
- No repair to machinery shall be carried out whilst it is in motion.
- Maintenance records shall be kept available for inspection by the Owner's Representative.

22.2.3 Air Receivers

- All Air receivers shall be fitted with a pressure relief valve and shall have the safe working pressure clearly marked upon them.

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- Every air receiver shall be subject to an annual test, which shall be carried out by a duly authorized person. The results of all tests shall be recorded and the records shall be kept available for inspection by the Owner's Representative.
- The connection couplers on compressed airlines shall be securely fixed together and have safety chains or be wired at the joints in order to ensure that the joints do not come apart when charged with compressed air.

22.2.4 Woodworking Machines

- All woodworking machines shall be fitted with guards and devices;
 - Top Guard;
 - Riving Knife;
 - Guards to protect all drive belts etc.;
 - An emergency stop switch easily accessible by the operator;
 - A push stick;
- Woodworking machines shall be operated only by thoroughly trained and experienced operators.

22.2.5 Abrasive Wheels

- All Abrasive wheel machines shall be fitted with appropriate guards which shall be kept in place at all times the machine is in use.
- All abrasive wheel machines shall have the spindle speed clearly marked upon them in revolutions per minute.
- Only thoroughly trained and experienced persons are allowed to change the wheels on the machines. Wheels must have inspected and ring tested before mounting to ensure that wheels are free from cracks or defects.
- Safety Goggles or Face shields must be worn when grinding or cutting with abrasive wheels.

22.3 Stacking and Storage

The Contractor shall ensure stacked material is bonded on a stable and level footing capable of carrying the mass of the stack. Adequate clearances shall be provided between the sides of the stack and top to facilitate unimpeded access to service equipment like overhead wiring, cranes, forklifts and firefighting equipment, and hoses. Circular items shall be sufficiently choked with wedges not with odd bits of materials. Free-standing stacks of gunny bags and sacks such as cement bags shall be stacked to prescribed safe-stack heights with layers formed for stable bonding, preventing slippage causing accidents. Stacking against walls shall not be permissible.

The Contractor shall maintain the premises and surrounding areas in clean and clear manner with safe access and egress. There shall be sufficient and adequate storage racks, shelving, bins and pallets and material handling equipment to stack his construction materials such as pipes structural and construction enabling materials.

22.4 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: X
- IS 7293: 1974 Safety Code for Working with Construction Machinery

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23.0 HEAVY PLANT/ EQUIPMENT OPERATIONS

23.1 General

- The contractor shall ensure that only safe and well-maintained plant and equipment shall be allowed to operate on any of the sites.
- All operators of heavy plant such as, earth movers, piling rigs, etc. shall be medically fit, over eighteen years of age and be thoroughly trained and experienced to operate the equipment.
- No unauthorized person shall be permitted to ride on plant.
- The operators shall conduct daily inspections of their respective items of plant with the results of these inspections being recorded and the records kept available for inspection by the Owner's Representative.
- All mobile heavy plant shall be equipped with at least one 5kg Dry Powder Fire Extinguisher, carried at a suitable position so as to ensure its easy availability.
- Whenever heavy plant is operating in congested areas, thoroughly trained and experienced banks men shall be deployed to control the plant and personnel movement and interface.
- Any waste engine oil and filters following any on site servicing and maintenance shall be removed from the sites and disposed of in an environmentally conscious manner at authorized disposal locations.
- All drums of fuel oil shall be stored on drip trays or the fuel shall be kept in bunded bulk storage fuel tanks, with quantities stored being kept to a minimum.
- The storage areas shall have dry powder fire extinguishers positioned in close proximity to their location for use in an emergency.

23.2 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: X
- IS 7293: 1974 Safety Code for Working with Construction Machinery
- IS 2190: 1979 Code of Practice for the selection, installation and maintenance of portable first aid fire extinguishers.

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24.0 BLASTING OPERATIONS

24.1 Authorization for Blasting

The Contractor shall ensure that all blasting operations will only be permitted following consultations with the relevant authorities and subsequent issuing of the permission to blast permits. The Owner's Representative must also give his consent in writing before any blasting operations take place.

All blasting shall be conducted under the direct supervision of a Licensed Shot fired.

24.2 Risk Assessment and Method Statements

The Contractor shall produce a detailed hazard and risk assessment and an in depth method statement for amongst others the following elements:

- Type of explosives to be used.
- Anticipated effects of vibration on nearby structures.
- Blasting patterns.
- Delivery of the explosives.
- Transportation and storage of explosives on site.
- Drilling and charging of holes.
- Warning sirens.
- Measurement of Vibration
- Provision of sentries.
- Use of blast screens.
- ALL CLEAR.
- Ventilation following blasting.
- Atmosphere monitoring.
- Procedure for miss-fires.

24.3 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002
- IS 4081: 1986 Safety Codes for Blasting and related Drilling Operations
- BS 5607: 1988 Code of Practice for the safe use of explosives in the construction industry.

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25.0 DEMOLITION

25.1 General

- The Contractor shall ensure that all demolition works shall be carried out in a controlled manner under the management of experienced and competent supervision.
- Prior to any demolition commencing, a survey shall be conducted to identify if there are any hazardous materials present, for example the presence of materials such as asbestos and lead.
- If any hazardous materials are found, then consideration shall be given as to whether they shall need to be removed by a Specialist Agency or Sub- contractor prior to the main demolition works commencing.
- Before the demolition commences all relevant notifications will need to be given to the local authorities and media.
- Measures for protection to the public shall be required to be put into place in order to give protection from any possible falling debris and dust generation.
- All power supplies and services shall be disconnected before any demolition work commences.

25.2 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: XII
- IS 4130: 1991 Demolition of Buildings – Code of Safety
- IS 13416 (Part 3):1994 Recommendations for preventive measures against hazards in the workplace, Part 3, Disposal of Debris

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26.0 FALSEWORK / FORMWORK

26.1 General

- The contractor shall ensure that all false work / formwork has been properly designed and is suitable for the purpose.
- All designed false work / formwork shall be erected in strict accordance to the design.
- Prior to the loading and subsequent striking of false work / formwork, permission shall be obtained from the Contractor's Designer and Engineer who shall both inspect and sign off on the structure in person.
- Adequate provision shall be made on the working platforms for the concrete placement operations, these shall include locations for vibrators and the unobstructed movement of personnel controlling the rubber hose during the concrete pumping operations or the concrete skips during any skipping operations.
- The Contractor should use the following checklist to check that false work / formwork is being used safely;
 - Have the design and the supports for shuttering and false work / formwork been checked?
 - Is it being erected safely from steps or proper platforms?
 - Are the props plumb and properly set out?
 - Are the bases and ground conditions adequate for the loads?
 - Are the correct pins used in the props?
 - Are the timbers in good condition?
 - Is it inspected by a competent person against the agreed design before permission is given to pour concrete?

26.2 References

- **Building and Other Construction Workers** (Regulation of Employment and Conditions of Service) **Rules 2002** Chapter: XVII

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27.0 PILING AND DIAPHRAGM WALLS

27.1 General

The contractor shall prepare safe systems of work and method statements for all work concerned with piling and diaphragm walls. He shall take the following points into consideration.

Any excavated piles or panels shall not be left unattended, unless they are adequately fenced around to prevent accidental entry into the immediate vicinity of the pile or panel.

Because of the use of heavy plant and equipment in generally congested work areas then trained banks men shall be deployed to control the movement of the plant and personnel interface.

All lifting operations shall be conducted in accordance with the requirements as detailed in Clause 18 Lifting Operations.

Calcium Oxide shall not be used for stabilizing the excavated spoil as it is an acute irritant, unless an agreed method statement has been produced.

A method statement shall be produced by the Contractor, which details the process for grab retrieval in the event of a grab becoming detached during the course of a pile or panel excavation.

A method statement shall be produced by the Contractor, which details the process for stop end recovery.

Wheel washing facilities shall be available on the sites for washing down the spoil removal trucks and the concrete delivery vehicles.

Bentonite and polymer storage tanks shall be bunded around to retain any unintentional and uncontrolled spillage.

The contractor shall submit to the Owner's Representative, for approval, proposals for the treatment of Bentonite slurry and its subsequent disposal.

No Bentonite spillage shall be allowed on any roads. 28.1.12 Regular site cleaning shall be carried out at all work-sites.

28.1.13 The Contractor as part of his Emergency Plans shall develop procedures for the collapse of piles and diaphragm walls.

27.2 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: XXIII and XI
- IS 5121: 1969 Safety Code for Piling and other Deep Foundations
- IS 8989: 1978 Safety Code for the Erection of Concrete Framed Structures

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28.0 WORK ADJACENT TO LIVE RAILWAYS AND ROADWAYS

28.1 Work Adjacent To Live Roadways

Whenever work is to be conducted in close proximity to the live railways then the following measures shall need to be addressed:

- The rules provided for in the Railway's manual shall be followed.
- No persons are allowed to encroach onto the railway unless specific authority has been given by the Owner.
- Adequate protection in accordance with the railway owner's requirements shall be followed. (Provision of Block Inspectors, Flagmen and Lookouts)
- All persons shall wear high visibility clothing at all times.
- Any induction training requirements of the railway owner shall be strictly observed.

28.2 Work Adjacent To Live Roadways

Whenever working adjacent to any live roadways then the following aspects shall be considered.

- Close liaison with the Police and Municipal Authorities.
- Production of an agreed traffic management scheme in accordance with the local traffic laws (Barriers, signs, lights and road markings). This shall include adequate provision for pedestrians.
- The provision and wearing of high visibility clothing by all personnel engaged in the activities.
- Traffic Marshals shall be appointed and deployed to ensure that all road movement is carried out safely.

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29.0 PERSONAL PROTECTIVE EQUIPMENT

29.1 General

The Contractor shall at all times keep and maintain an adequate supply of suitable personnel protective equipment which shall be readily available for use at all times on the sites, and would include amongst others the following items:

- Safety Helmets.
- Hearing Protection.
- Respiratory Protection.
- Eye Protection.
- Protective Gloves.
- Safety Footwear.
- High Visibility Clothing to BS EN 471 Class 3 standard

All sites shall be designated as HARD HAT and SAFETY BOOTS SITES and as such an adequate supply of safety helmets and safety boots shall be kept available for use by all staff, workers and authorized visitors to the sites.

If the Contractor fails to provide the personnel Protective Equipment, the same may be provided by the Owner at the rate of 1.5 times the actual cost to the Contractor and the cost will be deducted from the Contractor's RA Bills.

The Contractor shall remove from the site any worker who consistently refuses to wear the appropriate personal protective equipment.

29.2 PERSONNEL SAFEGUARDING

29.2.1 Head Protection

The Contractor shall comply with requirements of IS 2925. Hard hats shall be used and worn where a hazard of falling or flying objects exist. Safety Helmets (Hard hats) intended for use by visitors shall have replaceable paper lining.

29.2.2 Eye and Face Protection

Eye protection shall be worn during all operations by operators and people in the vicinity, where there is a danger of flying particles of metal such as generated during use of hand tools such as chisels, grinding, welding and cutting lathe work on brass and cast iron acid and alkali splash, high pressure jet cleaning or insulation removal from heights using high pressure jets. The Contractor shall meet the requirements of IS 8520 entitled 'Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.

29.2.3 Footwear

Safety shoes, boots and gumboots fitted with steel toe-caps of approved quality conforming to prescribed Indian or international standards. Wearing of unsafe safety shoes such as jogging shoes, tennis shoes, slippers and sandal etc. are prohibited. The Contractor shall meet the requirements of IS 10667 Entitled 'Guide for Selection of Industrial Safety Equipment for Protection of Foot and Leg.

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29.2.4 Hand Protection

The Contractor shall provide appropriate hand gloves as per IS 8807 entitled 'Guide for Selection of Industrial Safety Equipment for Protection of Arms and Hands' to prevent injuries to hands during work. The CONTRACTOR shall maintain appropriate inventory of gloves for different applications like acid and alkali handling, general-purpose work gloves and asbestos or heat resistant hand gloves etc.

29.2.5 Hearing Protection

The Contractor shall ensure reasonable precautions are taken to avoid injury to the hearing of the employees. All noise levels shall be controlled within 85 dBA. The Contractor shall identify noise areas where noise levels exceed prescribed safe level for arranging for appropriate engineering revision. Where this is not feasible, appropriate earplugs / earmuffs or protectors shall be provided to workmen ensuring these are worn by those exposed to noise levels beyond safe levels. Periodic hearing acuity tests shall be conducted on such persons exposed to high noise levels to ensure that they do not suffer any hearing impairment as per requirements of IS 8520.

29.2.6 Respiratory Protection

The Contractor shall maintain where appropriate, procedures for training and use of Self-Contained Breathing Apparatus (SCBA). The SCBA shall be provided together with lifelines and rescue teams to safeguard personnel working in areas where gases such as carbon monoxide, methane chlorine and such life endangering atmospheres are present.

The Contractor shall meet requirements of IS 9623 for 'Selection, Use and Maintenance of Respiratory Protective Devices'. The CONTRACTOR shall have trained adequate number of personnel including the identified firefighting teams, hose teams and SAs in the use of the SCBA.

The Contractor shall use the periodic safety drills to demonstrate, train and establish competence of personnel in the use of SCBA.

29.2.7 Fall Protection - Safety Harness or Fall Arrest

The Contractor shall provide safety harness or means of restraint such as safety belts, harness and lifelines etc. to workmen engaged to work in heights such as open-sided floors, open-sided scaffoldings, floor and roof openings, overhead construction works of various nature etc. where there is a falling hazard of 1.8 meter or above.

Storage, issue, wearing and maintenance of safety harness shall be under strict supervision and records shall be maintained. All fall arrests shall consist of full-body harnesses, lanyards with shock absorbers, lifelines, rope grab, safety nets, crawling ladders and associated hardware.

Two alternate lanyards shall be used to facilitate tying off at a new location before disconnecting from the previous location. Practices for safety harnesses and fall arrests shall conform to IS 4912, IS 11972 and IS 8519 or equivalent international codes.

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29.2.8 Protective Clothing

The Contractor shall prevent hazards of loose clothes worn by workmen getting caught in moving machine parts. Loose and thin garments such as dhoti and pajamas are prohibited.

While the Contractor shall ensure that all workmen wear long sleeved shirts, jackets or the like with the sleeves rolled down and secured at the cuff, long pants/ trousers extending up to the top of the safety shoes so as to prevent injuries caused by contact with heat, cold abrasive and sharp surfaces shall be strictly enforced.

Such protective clothing shall be mandatory in hazardous areas especially during start-up operations involving hot, inflammable, and other chemical hazards, furnaces and Boilers and such fired equipment and asphalting plants. Personnel exposed to acids and alkalis hot fluids and steam during such operations shall be provided with appropriate heat or corrosion resistant clothing.

The Contractor shall meet the requirements of IS 8990 entitled 'Maintenance and Care of Industrial Safety Clothing'

In case of any Night working / Dark areas, it will be mandatory to wear florescent jacket.

29.3 Dress code for Ladies Worker

The Contractor has to strictly follow the below Dress Code Specification guideline on project site. This Dress code applies to all employees and to all Contractors with contracts tendered where the adherence to this code has been specified as mandatory.

Purpose: The Dress code is intended to protect female workers / employees at all work location of project sites from any possible Hazards related to Loose Clothing.

- This Dress code shall be uniformly applied to all location covering all power projects / stations / transmission lines.

This Dress code shall be applicable uniformly for all female workers / employees working at projects / stations / transmission line premises.

- As a first preference use of full pants and regular fit half / full shirt will be promoted.
- Sleeves have to be buttoned up and shirt has to be in (In shirt).
- Hairs have to be tied up and placed inside the Helmet.
- Normal safety shoes are to be used with this Dress code.
- Female workers can be allowed at par with other male workers at all project location with the use of these dress codes.
- For each Female workers / employees who insist on coming in traditional dress of Saree / Salwar suit, it will be mandatory to wear a **Full Sleeve Cotton Coat / Apron** of any color, fully buttoned up (example like a doctor's coat / apron).
- In any case, it will be ensured that loose hairs, loose dupatta, loose muffler etc. are not allowed & Use of normal PPE is followed.
- In case of any Night working / Dark areas, it will be mandatory to wear florescent jacket.
- This is applicable with immediate effect from first day of work.

29.4 PPE Matrix

Activity	Type of Protection						
	Head	Foot	Hand	Eye	Ear	Body	Respirator y
Mandatory PPEs for Site	Safety Helmet	Safety Shoes	Gloves	-	-	Reflective Jacket	-
Gas Welding/ Cutting	Safety Helmet	Safety Shoes	Leather Gloves	Welding Goggle	-	Boiler Suit	Supplied Air Mask/Hood / Self Contained Breathing Apparatus (Confined Space)
Electric Welding arc	Helmet Mounted Welder's Shield	Safety Shoes	Leather Gloves	Helmet Mounted Welder's Shield	-	Boiler Suit, Leather Gloves	
Rigging	Safety Helmet	Safety Shoes	Cotton Gloves	Safety Goggle	-	Reflective Jacket	-
Lathe Operations	Safety Helmet	Safety Shoes	Leather Gloves	Safety Goggle	Ear plug	Reflective Jacket	-
Working at Height	Safety Helmet	Safety Shoes	-	-	-	Full Body Harness	-
Grinding / Chipping	Safety Helmet	Safety Shoes	Cotton Gloves	Safety Goggle / Face shield	Ear plug	Boiler Suit	-
Working in High Noise area	Safety Helmet	Safety Shoes	-	-	Ear plug / Ear muff	Reflective Jacket	-
Handling of Cement /Concrete	Safety Helmet	Gumboot	Rubber Gloves	Safety Goggle	-	Reflective Jacket	Dust mask
Blasting	Safety Helmet	Safety Shoes	Cotton Gloves	Safety Goggle	Ear plug	Reflective Jacket	-
Excavation	Safety Helmet	Gumboot	Cotton Gloves	Safety Goggle	Ear plug	Reflective Jacket	-
Chemical Handling	Safety Helmet	Safety Shoes	PVC Gloves	Chemical Splash Goggles	-	PVC Apron	-

29.5 Technical Specifications of PPEs

PPE	Application	Standards	Specifications	Recommendation
 Helmet	General-Industrial	IS 2925, ISO 3873, EN 397, ANSI Z 89.1, EN 14052	- Material: High density Polymer - Proof tested at 2000 Volts - Provided with Side Slots for fitting face and hearing accessories - Extended Nape for extra impact protection to the user's neck. - Manual type adjustment to suit most head sizes - Removable Adjustable Chin-Strap and Cup for universal adjustment. Chin Cup Made	3M Karam Kawach(RH-K-04) Shree green (GS-18)

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			of a resilient foam / soft PVC material encased within a pliable coating • Helmet comes with inside either PVC fitting or ratchet fitting	
	Firefighters	EN 443	• Flame retardant high temperature resistant copolymer plastic • Long-term resistance to 140°C/ 30 min, 250°C/ 15 min • Polycarbonate anti-scratch and anti-fog coated visor • Removable neck protector made of genuine leather- (optional alu- carbon-fiber) • Interior shock absorber made of polyurethane foam • Integrated adjustment system (ranging from 52 - 62cm) • Interior ventilating channels enable safe and comfortable work • Luminescent and reflective tapes visible from both sides aid in all conditions • Flame retardant cotton chinstrap - tested to prevent skin irritations • Ready to use with a full face mask	3M Karam
	Electrical work	ANSI Z89.1 Class E (Electrical) Hard Hats	• Material: High density Polymer • Proof-tested at 20,000 volts • Reduce the danger of contact with higher voltage conductors • Provided with Side Slots for fitting face and hearing accessories • Extended Nape for extra impact protection to the user's neck. • Manual type adjustment to suit most head sizes • Removable Adjustable Chin-Strap for universal adjustment • Helmet comes with inside either PVC fitting or ratchet fitting	3M Karam Kawach

 Safety Goggles	General-Industrial	IS 2553, EN 166 (property) ANSI Z 87.1	- Body: PVC - Lens: Polycarbonate Elastic - Headband: Polyester Covered Rubber Thread Headband - Fittings: Acetal - Color Shied: White and Black - Lens and body offer protection against medium energy high speed particles at 120 m/s (270mph) and protection against high-speed particles at extremes of temperature - The optical qualities of the lens comply with the requirements of optical class 1 (highest) - The body offers protection against large dust particles, liquid droplets and molten metal - This version of the goggle is available with a lens that has anti-mist properties	Karam 3M Honeywell Udogyi(U-90)
	Chemical Handling	ANSI Z87.1, CSA Z94.3	- Lens should have ellipsoidal lens that extends the viewing range further, even peripherally - Goggles should not be bulky and should have a contoured, low profile design - Goggles should have a soft PVC shroud that gently hugs the face and is indirect vented to allow cooling air flow and help prevent fogging and exclusive Dx coating to give the features of anti-fogging, scratch resistant, anti-static and resistant to most chemicals.	Karam 3M Honeywell
	Oxy Fuel Cutting	EN 170 (UV filter), EN172	- Optical class – 1. - UV & IR protection. - Scratch resistant hard coat on outside. - Ergonomic design with safety aspects. - Spectacle safety cord to be provided for each spectacle.	Karam 3M Honeywell
 Face Shield	Firefighters	EN 14458	- Knitted Sock Hood should be comfortable to wear which offers superior resistance to high temperature and direct flame contact. - The hood should be washable or dry cleaned and should be able to worn over a	3M Honeywell

			breathing face mask or under a fire man helmet. The Knitted Hoods should be made of Double/Single Layered Fabric	
	Chemical Handling	ANSI Z87.1, CSA Z94.3	- Chemical splash protective goggle with polycarbonate lens. - Soft vinyl frame unique ventilation system. - Full 160° deg. Meaningful, peripheral vision. - For protection against chemical splash. - Impact and dust. - Designed to be worn over numbered spectacles UEE 160 - Approved by CLI.	3M Honeywell
	Welding	IS 1179, EN 175 (Welding), ISO 4850	- Designed to worn with Helmets - Flip type front window with clear and DIN glass - Lens IS: 5983:1971(Welding filter Lens 13A, 11A, 4A) - Lens shall be made wholly of glass - Free from optical defects. - Two chest straps for adjustment.	3M Honeywell
	Grinding	IS 8521, EN 141, EN 166 (property) ANSI Z 87.1	- Protections against high-speed impact (120 m/s) at extreme temperature, penetration, splash of liquids and heat. 99.9 % UV protection. - Best optical quality (highest ranking at the tests of spherical refractive power, astigmatic refractive power, prismatic refractive power, and light diffusion). - Protective films on both sides (prevent damages and scratches during transportation). - Edges fitted with aluminum beading for easy adjustment to face contour.	3M Honeywell
 Hearing	Ear Muff Activity exceeding noise level 85dBA-TLV-TWA	EN 352-1	- Designed to provide High dB attenuation with extra thick protective Ear Cups. - Plastic Head Band Folds for dust free storage in pocket or a bay. - Provided with soft foam pads for extra comfort. - Soft cushioned pads for good seal against	Karam 3M Honeywell

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 Respiratory			noise. Recommended Use: Medium to Heavy Industrial Applications.	
	Ear Plug Activity exceeding noise level 85dBA-TLV-TWA	EN 352-2	- One size fits all Ear Canals. One size fits all Ear Canals. - Made up of Non- Irritant and Allergy-free material. - Uncorded in bright orange color. - Easy to insert correctly due to their tapered shape and moderate slow expansion rate. - Corded in Fluorescent Orange color. - Also available in nylon & cotton cord.	Karam 3M Honeywell Udoygi(EP-01)
	Self-containing breathing apparatus (SCBA)	EN 13794	- The BA set shall contain air cylinder, back plate, facemask, lung demand regulator, pressure reducing valve, Pressure Gauges, hoses, carrying case, etc. - The minimum duration of use of the set shall not be less than 45 minutes. - The set shall be sufficiently robust to withstand the rough use at the time of an emergency call. - The design of the set shall be such that there is no protruding parts or sharp edges likely to be caught on projections in narrow passages. - The finish of the set shall be such that any part, which is likely to come in contact with the wearer, shall be free from sharp edges and shall meet the demands of the Professional Fire Service.	Dräger Firefighter MSA 3M
	Welding, grinding, housekeeping nose mask (Simple filtering devices)	IS 5983, EN 149 (N 95 or FFPII)	- Filtering half mask for protection against particles. - Filtering efficiency FFP1. - Double elastic head band. - Adjustable nose clip. - Welded at the edges to avoid open layers. - Compatible with goggles. - Light weight construction. - Provide low breathing resistance. - Outside Colors preferred – grey/ yellow. - Flat fold design.	3M and Equivalent

	Activity involving RCF-Reinforced Ceramic Fibers	EN149 (type FFP3) Or EN1827 (type FMP3);	- Exhalation valve reduces moisture and heat build up - Filtering efficiency FFP3. - Double elastic head band. - Adjustable nose clip. - Welded at the edges to avoid open layers. - Compatible with goggles. - Light weight construction. - Provide low breathing resistance. - Outside Colors preferred – white. - Flat fold design.	3M and Equivalent
	Half or quarter masks for using against gases and gases/particulates	EN 405 (gas)	- Twin filter system, "click-fit" fittings. - Elastic sliding one-piece harness. - Kraton body®, preformed. - Universal size. - White color. - Features an elastomeric face seal with a single particulate (P2), organic vapor (A1) or combination (A1P2) filter - Replaceable filter cartridges or discard when exhausted	3M and Equivalent
	Full Facepiece Continuous Flow-Air supplied	EN 14594	- Weight 1.16kg - Operating Temp 34 - 71.1 Degrees Celsius - Warning Does not protect against gases and vapors that poison through the skin - Compatibility With a range of common air sources	3M Honeywell
	Filter for using against gases and gases/particulates	EN 143 (particles filter) EN 14387 (gas filter) (A,B,E,K etc.) EN 148-1	- With collapse resistant double shell construction made to withstand hot and humid conditions, fringe seal avoids open layer around the edges. - Latex free synthetic rubber head strap, Contour design ensures the compatibility of glasses/goggles and reduces fogging, - Soft close-cell nose foam and adjustable nosepiece ensures custom shape and increase the worker comfort and acceptance. - For protection against non-toxic harmful solid and liquid in concentrations up to 4 x OEL or 4 x APF, such as calcium carbonate, china clay, cement, cellulose, sulfur,	3M and Equivalent

			cotton, flour, carbon, ferrous metals, vegetable oils and soft wood.	
 Body Protection	General	ISO 13982-1 EN 13034 EN ISO 11612 (Heat protection) ISO 11611 (welding)	- Material for the Boiler Suit: Cotton thick drill cloth having maximum cotton content and finished weight of around 240 grams per square meter - The fabric / cloth of the Boiler Suit shall have a suitable approval / test certificate for Flame Resistance / Heat Resistance. - Copy of the certificate to be sent along with the offer One piece full body length cover all full sleeve suit, shall be suitable for six feet tall healthy person - Boiler Suit shall be provided with collar. - Boiler Suit shall be doubly stitched at seams and reinforced at stress points. - Boiler Suit shall be provided with two numbers of double stitched front pockets at the chest and two cross pockets in the pant area. - Boiler Suit shall be provided with full sleeves and cuff of the sleeves shall be provided with elastic. - The Boiler Suit shall have elastic around waist. - Full length nonmetallic two way zipper up to dividing portion of leg, the zip covered with Velcro strip.	
	Firefighters	EN 469	- Certification from the Brand owner of all the 3 layers of raw material / fabrics used in the Fire Suit confirming that they have been procured from genuine sources to be furnished for bulk supplies Orders. - Outer layer should be made of 100% meta-aramid or a blend of meta-aramid and para-aramid having a property of anti-static effect too. - Middle layer (Moisture Barrier) should be made of meta-aramid laminated to	

			Expanded PTFE Membrane or any other aramid laminated to Expanded PTFE Tape. • Inner Thermal Barrier should be made of felt meta-aramid / para-aramid fabric laminated to inherent light weight fabric. • The thread should be inherent fire Resistant having high strength either met aramid / para-aramid. • Retro-reflective tapes should be used in the construction of both jacket & trouser. • Reinforcement fabric should be inherent para-aramid, water proof coated on the para-aramid fabric.	
	Welding & Grinding	IS 6153 (Protective Leather clothing)	• Dimension: 1070 mm (length) X 600 mm (width) • Material of Apron: Leather. • Material of thread used for stitching leather : KEVLAR thread • Sustenance temperature: 150 Degree C. • Thickness of leather: 1.5 to 2.5 mm. • Apron shall be of single leather without any stitch in-between	
	Painting & Chemical Handling	EN 943-2 EN 13034 EN 14605	• Multi-layer composite fabric featuring multiple barrier and tie layers to enable an effective and tough high barrier to hazardous chemicals • Seam type- Stitched and PE taped for superior protection and strength. • Reinforced knee-pads for comfort and durability. • Design features for double zip / storm flap front fastening for improved protection and quick and easy donning and removal.	
	Arc Flash Suit	IEC 61482-2	• All layers of are made of inherently flame resistance material. • Garments used for FR suit must be sewn with inherently flame resistance threads. • The FR garment label has to show the lowest ATPV or Class if different panels on the garment are used. ATPV rating is 10 cal/cm2 • The FR suit offered should be compatible to wear with hood, gloves etc.	Honeywell

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 Hands			The FR garment should be of flame retardant, antistatic, rip stop fabric.	
	Material Handling	EN 471 ISO 20471 high visibility warning clothing	- High visibility vest of Orange/green color. - Super-lightweight high visibility vest with reflective tape offers day and night visibility. - Breathing perforated cloth mesh allows air and moisture through, enabling the vest to be worn over clothing in any weather. - Universal one-size-fits-all design features adjustable elastic bands for comfort & Fit. - Hemmed edges for durability and neatness.	
	Hand Sleeves Welding & Chips cleaning	IS 8807	- Dimension: 470 mm (length) - Material of Hand sleeve: Leather. - Material of thread used for stitching leather : KEVLAR thread - Sustenance temperature: 150 Degree C. - Thickness of leather: 1.5 to 2.5 mm.	3M Honeywell
	Hand Gloves Chemical Handling	EN 374	- Supported PVC gloves with sand finish. 100% cotton interlock lining. - Single dipped, gauntlet.	Karam 3M Honeywell
	Hand Gloves Manual Handling	IS 6994 IS 2573 EN 420 EN 388 (Mechanical Risks)	- Good quality grain/ split leather on palm side - Cotton/ canvas inside lining - Canvas/ Denim back with leather reinforcement - Canvas safety cuff - Elastic tensioner for secure fit.	3M Honeywell
	Hand Gloves Welding	IS 1179 EN 12477	- Material – Heat Treated leather - Resistance to heat contact-100o C - The split leather treated against the heat brings an excellent resistance to fire and convective heat. - The Kevlar® thread assembly ensures sturdy seams with respect to the heat and	Karam 3M Honeywell

			wear as well as better thermal insulation.	
	Hand Gloves Grinding	EN 388 (Mechanical Risks)	- Seamless liner from Japanese automatic knitting machines provides an evenly tensioned surface for excellent fit and dexterity - Low lint gloves as its made from 100% Polyester yarn - Economical protection for good grip, dexterity and comfort - The polyurethane coating offers good tear and abrasion resistance. - Ergonomic fit and conforms to hand shape	Karam 3M Honeywell Kawach
	Hand Gloves Electrical	IS 4770 EN 6093 (High Voltage) NFPA 70 E Selection as per hazard category	- Insulated Rubber Hand Gloves shall be manufactured and tested up to 10000 Volts & Working potential up to 1100 Volts in accordance with the relevant standard. - Insulated Rubber Hand Gloves of superior quality - Rubber hand gloves shall be of soft quality, seamless latex, shock proof and manufactured & tested - Hand gloves shall be made from natural or synthetic rubber by dipping process. - There should be no joints in the gloves. - Hand Gloves shall have a smooth surface and both inner & outer surfaces shall be free from visual defects like patches, blisters, porosity, embedded, foreign matter or other physical defects. - The hand gloves shall be of Cream color only. - The hand gloves shall be of gauntlet type and cuff edges shall be finished with a roll or rubber re-enforcing strip. - The hand gloves shall be of curve finger type.	Karam 3M Honeywell
	Hand Gloves for Activity involving Thermal	IS 8807 EN 407 (Heat and Flame)	- Material – Heat Treated leather - Resistance to heat contact-100o C - The split leather treated against the heat brings an excellent resistance to fire and convective heat.	Karam 3M Honeywell

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			The Kevlar® thread assembly ensures sturdy seams with respect to the heat and wear as well as better thermal insulation.	
	Hand Gloves Firefighters	EN 659	- Yellow water repellent cowhide grain leather glove - Gunn cut, winged thumb, gauntlet typeHand lined with Kevlar®/ cotton jersey - Water repellent grain leather yoke at the base of thumb and middle finger - Veins protection - Split leather cuff - Velcro strap - Stitch with Kevlar® thread	Karam 3M Honeywell
	 Foot	Leg guard Welding	ISO 20349 EN407	- Premium Quality cow leather (1.5 mm thickness) - Materials for best comfort and protection
	Safety Shoes Electrical	EN 50321 (Electrical Hazard) shoes meeting ASTM F 2413	- FRP toe or Composite toe cap - Ideal for personnel who have to regularly enter and exit high voltages areas - Single piece injection molded construction with integral molded fastener ensures there are no seams or mounting/fastener holes to leak - No metal fasteners or components used in the construction - Two button fasteners allow adjustment for different calf sizes - Slip resistant sole in blue dielectric compound - Fuel and oil resistant sole	Udoygi Kawach 3M Honeywell Allen Copper
	Safety Shoes for firefighters	EN 15090 EN 13287	- Steel Toe cap, - Flame retarding Upper, Steel Mild Sole (CSA Class-1), - Electrical Shock Resistant, , - Heat and Oil Resistant Anti-Slip Sole, Ozone / UV resistant, - Heavy canvas lining, - Sponge cushion Insole, - Ankle Protection, - Heel Tendon Protection,	Karam 3M Honeywell Kawach

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 Fall Protection			- Metatarsal Protection, - Shin Protection and 100% waterproof - Boots highly resistant to chemicals	
	Safety Shoes General-Industrial	IS 583 IS 1989 ISO 20345 (Impact value 200J) Protection level: S3 ANSI Z 41.1	- High quality breathable Leather, - Unique Shock absorption Impact system for minimum leg and back fatigue, - Dual density Polyurethane sole for enhanced (Comfort and Durability), - Special Injection molded construction for better strength, - Cleaned Out-sole design for a firm grip - Oil resistant, antistatic and anti-slippery sole - Dual Density polyurethane sole for enhanced comfort and durability - Unique shock-Absorption impact system which provides minimum leg and back fatigue	Karam Udoygi(UD03 Sporty) Liberty(Warrior) Bata Kawach(K-222) Shree green(SP-12)
	Full Body Harness for Work At Height	IS 3521 EN 361	- Belt type: - Harness must be made by Nylon or Polyester webbing, - one dorsal attached D ring, - Adjustable thigh, shoulder and chest straps, - all metal element to be of non-corroding alloys , Zinc plated still /Aluminum	Karam 3M Udoygi(UB-104)
	Rescue device	EN 1496 Rescue Equipment - Rescue Lifting devices	- Material: Aluminum Alloy, light in weight & durable. - Can be used for both ascent and descent on a single rope. - It is also equipped with a unique Self Braking System which initiates the brake as soon as the handle is released or clasped too tightly. - It is provided with a safe locking eye which prevents the rope from sliding out, when operating as a Descender. - Equipped with Polymer coated cover for comfort & ease during descent. - Net weight : 440gm - Finish : Colored, Anodized	Karam 3M Udoygi

	Lanyards	EN 354, EN 355 Lanyards (including lanyard absorber) + Carabiner+ Hook	- Lanyard: - One side karabiner self-locking and other side scaffold hook. - Polyamide rope with energy absorber, 2 M length	Karam 3M Udoygi(RL-22)
	Energy absorbers	EN 355	- Width & Made of – 12mm Twisted Polyamide Rope - Length – Relaxed Length 1.5m, 1.8m & expanded length 2.0m.	Karam 3M Udoygi(RL-22)
	Descender kit	EN 341 Type 2 Class B EN 12841	- Material: Aluminum Alloy, light in weight & durable. - Can be used for both ascent and descent on a single rope. - It is also equipped with a unique Self Braking System which initiates the brake as soon as the handle is released or clasped too tightly. - It is provided with a safe locking eye which prevents the rope from sliding out, when operating as a Descender. - Equipped with Polymer coated cover for comfort & ease during descent. - Net weight : 440gm - Finish : Colored, Anodized	Karam 3M Honeywell
	Work Positioning Belt	EN 358:1999	- Wide comfort pad to provide lumbar support for long working hours - Fully Adjustable - Width of Back pad: 21 centimeter - Two Lateral D-Rings for Work Positioning - Tool holding webbing loops - Rings for tool holders, bolt bags, etc.	Karam 3M Honeywell Udoygi(PL-03)
	Retractable type fall arresters	EN 360	- Galvanized Steel Openable Rope Grab for Fiber Rope, - Steel Screw Locking Karabiner, - Anchorage Line made of Polyamide Twisted - Rope of diameter 14mm to 16mm - Rope Has colored tracer yarn which loses its color in due course of time, to show that the rope is now unfit for further use	Karam 3M Udoygi

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 Eye	Eye Wash Station General-Industrial	ANSI Z358.1-2014	- Minimum flow for plumbed and portable Eyewash units is .4 GPM at 30 PSI. - Units must be capable of delivering a minimum of 15 minutes of flushing fluid. - Eyewash units shall be capable of being activated in 1 second or less. - Stay open ball valves must be used to accommodate for hands-free rinsing. - Flushing fluid must be provided to both eyes simultaneously. - Dust caps or dust covers must be installed to protect the unit from contaminants. - Spray heads must be positioned between 33" and 45" from the floor. - Spray heads must be positioned at least 6" from the wall or nearest obstruction.	Unicare :Udyogi Euronics
	Water Fire extinguisher	IS 15683:2006	- Fire Extinguisher made out 1.5 mm thickness mild steel of IS 513 Grade - ISI make fire Extinguisher - Aluminum syphon pipe - Brass forged Valve - Inside and outside of extinguisher body shall be coated with epoxy powder - ISI make discharge pipe - Gas cartridge ISI make	Kanex Safex Fire Warrior
	DCP Fire extinguisher	IS 15683:2006	- Fire Extinguisher made out 1.5 mm thickness mild steel of IS 513 Grade - ISI make fire Extinguisher - Aluminum syphon pipe - Brass forged Valve - Sodium Bi Carbonate with ISI make and Certificate - Inside and outside of extinguisher body shall be coated with epoxy powder - ISI make discharge pipe - Gas cartridge ISI make	Kanex Safex Fire Warrior
	CO2 Fire extinguisher	IS 15683:2006	- Seamless cylinder confirming BIS-7285 with ISI make. - ISI make fire Extinguisher - Aluminum syphon pipe - CCEO/PESO certified - Filled with CO2 Gas confirming IS-15222	Kanex Safex Fire Warrior

			Plastic horn with manufacture's certificate	
	Mechanical foam Fire extinguisher	IS 15683:2006	- Fire Extinguisher made out 1.5 mm thickness mild steel of IS 513 Grade - ISI make fire Extinguisher - Aluminum syphon pipe - Brass forged Valve - AFFF refill with ISI make - Inside and outside of extinguisher body shall be coated with epoxy powder - ISI make discharge pipe - Gas cartridge ISI make	Kanex Safex Fire Warrior
 Electrical Safety	Discharge Rod - 66kv Class Discharge Rod	ERDA Test Certificate	- Total section : 3 section - Total length/ Assembled length: 15 Feet - Length of each section : 5 Feet - Material : FRP Pultruded - Surface: Smooth and Glossy - Design: Telescopic - Locking : Push Button Type - Insulator: Bottom section provided with safe guard - Surface coat: EPOXY Coating 80 to 100 Micron - HV TEST: 460 kVP (for 66kv Class Discharge Rod), - Glass content: 65% - Top & Bottom section Diameter: 38mm - Cover: Canvas Type - Earthing: Heavy Duty Die cast Aluminum Earthing for 50mm Dia. Conductor - Grounding Clamp: Heavy Duty Aluminum Die cast grounding "C" Clamp.	
	Non-contact High Voltage Detector	EN 61326-1, EN 61000-4-2	- Protection class : IP65 3 LED indicators in a circle for easier viewing in any directions (360° LED indication). 8 voltage settings : 240V, 2kV, 6kV, 11kV, 22kV, 33kV, 132kV, 275kV - High bright LED visual indication. - Sound indication. - Power source: 1.5V "C" type battery × 3	Kusam-Meco DHEN Areva

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			• High impact nylon casing. • Non-contact work by proximity. • Compatible with most hot sticks. • Lightweight, robust & compact. • Suitable for indoor and outdoor use. • Easy access to batteries.	
 First Aid	First Aid Box	ANSI Z 308-2015	• First aid box made of Iron with vinyl coating, • Dimension of box is 30cmX25cmX7.5cm. • First aid box contain • Crepe Bandage 6cm, • Adhesive bandage regular, • Adhesive bandage Round 25mm, • Pain Relief Gel 30gm, • Povidone Iodine Ointment 20gm, • Antiseptic Liquid 50ml, • Absorbent Cotton I.P. 15gm, • Microporous Surgical tape • Gauze Swab, • Roller Gauze 7.5cm*4mtrs, • A pair of Scissors (Small), • Rose water	

29.6 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter: VI
- Indian Standards
- IS 2925: 1984 Specification for Industrial Safety Helmets.
- IS 1179: 1967 Specification for equipment for eye and face protection during welding.
- IS 6994 Standard for Industrial Gloves
- British Standards
- BS EN 166: 1996: Personal eye-protection. Specifications
- BS EN 169: 1992: Specification for filters for personal eye protection equipment used in welding and similar operations
- BS EN 175: 1997: Personal protection. Equipment for eye and face protection during welding and allied processes
- BS EN 352: Hearing protectors.
- Safety requirements and testing 352-1: 1993:

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- Ear muffs 1993:
- Ear plugs 1997:
- Earmuffs attached to an industrial safety helmet BS EN 345: Safety footwear for professional use
- BS EN 471 High visibility clothing

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30.0 FIRST-AID & MEDICAL FACILITIES

30.1 Physical fitness of workmen

- The contractor shall ensure that his employees / workmen subject themselves to such medical examination as required under the law (BOCW Rules) or under the contract provision and keep a record of the same.
- The contractor shall not permit any employee / workmen to enter the work area prior to physical fitness certificate as prescribed in under the law (BOCW Rules)
- The contractor shall not permit any employee / workmen to enter the work area in influence of alcohol or any drugs.

30.2 Medical Examination

The contractor shall arrange a medical examination of all his employees including his subcontractor employees employed as drivers, operators of lifting appliances and transport equipment before employing, after illness or injury, if it appears that the illness or injury might have affected his fitness and, thereafter, once in every two years up to the age of 40 and once in a year, thereafter.

- The Contractor shall maintain the confidential records of medical examination or the physician authorized by the Owner.
- No building or other construction worker is charged for the medical examination and the cost of such examination is borne by contractor employing such building worker.
- The medical examination shall include:
 - Full medical and occupational history.
 - Clinical examination with particular reference to
 - General Physique:
 - Vision: Total visual performance using standard ORTHORATOR like Titmus Vision Tester should be estimated and suitability for placement ascertained in accordance with the prescribed job standards.
 - Hearing: Persons with normal must be able to hear a forced whisper at twenty-four feet. Persons using hearing aids must be able to hear a warning shout under noisy working conditions.
 - Breathing: Peak flow rate using standard peak flow meter and the average peak flow rate determined out of these readings of the test performed. The results recorded at pre-placement medical examination could be used as a standard for the same individual at the same altitude for reference during subsequent examination.
 - Upper Limbs: - Adequate arm function and grip
 - Spine: Adequately flexible for the job concerned. Lower Limbs: - Adequate leg and foot concerned.
 - General: Mental alertness and stability with good eye, hand and foot coordination.
 - Any other tests which the examining doctor considers necessary

If the contractor fails to get the medical examination conducted as mentioned above, the Owner will have the right to get the same conducted by through an agency with

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intimation to the contractor and deduct the cost and overhead charges.

30.3 Occupational Health Centre

Where required by the CONTRACT, the CONTRACTOR shall establish and maintain an Occupational Health Centre where hazardous Processes are involved such as working at height, roof work, steel work, working above or below water, demolition and confined space etc.

The Occupational Health Centre shall be served by a full time medical officer holding a medical degree in allopathic medicine with a minimum of five-year experience in Occupational Health/Medicine. A nurse, one dresser/compounder and one sweeper-cum-ward boy who will all be available during entire construction operation during the day shall assist the medical officer. One additional Medical Officer shall be posted for every additional thousand Construction workmen along with the team of nurse, compounder and ward boy.

The Occupational Health Centre shall be capable of undertaking emergency care services or emergency treatment facilities which shall include emergency life-saving aids and appliances to handle head and spinal injuries, severe fractures, snake bites, burns of all nature, electric shocks, cases of asphyxiation and such other severe injuries as could be reasonably anticipated at the facilities and shall meet provisions of any governing statute.

The contractor shall ensure at a construction site an occupational health centre, mobile or static is provided and maintained in good order. Services and facilities as per the scale lay down in Schedule X of BOCWR. A construction medical officer appointed in an occupational health centre possesses the qualification as laid down in Schedule XI of BOCWR.

Required Medical Staff shall be in attendance at all times when work is being undertaken on the project site.

30.4 Ambulance Room

(Applicable to Contractors engaged for main plant civil work, construction of chimney and structural fabrication and erection work)

The Contractor shall establish an **Ambulance Room** (First Aid Room), in accordance with the Owner's Requirements, at each of his principal work areas. If during the life of the contract the Contractor's principal work area moves from one location to another, the Contractor shall be required to move his First Aid Room.

If the Contractor operates more than one principal work area, he will be required to have **Ambulance Room** (First Aid Room) at each of his principal work areas.

The Ambulance Room (First Aid Room)

- A treatment room fitted with two treatment couches,
- A hand wash basin with running water;
- Lockable cupboards to contain sufficient medical supplies;
- Bed.

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- Six Chairs with footrests
- Desk and chair.
- Six Stretchers (Which can be lifted and lowered by a crane.)
- Pillows and blankets.
- Refuse containers.
- Medical dressings. (Bandages, plasters, antiseptic wipes.)
- Eye irrigation sterile solution.
- Paper towels.
- Disposable gloves.

The **Ambulance Room** (first-aid Room) shall be provided with air conditioning and shall be kept in a clean and tidy state at all times.

30.5 Medical Staff

(Applicable to Contractors engaged for main plant civil work, construction of chimney and structural fabrication and erection work)

A qualified First Aider shall be in attendance at the first aid base during all times when work is being undertaken on the site.

30.6 Ambulance

(Applicable to Contractors engaged for main plant civil work, construction of chimney and structural fabrication and erection work)

A fully equipped ambulance and driver shall be provided at the **Ambulance Room** (first aid Room) during all working hours. The ambulance shall be equipped with emergency life support equipment suitable for application in construction site accidents.

30.7 First Aid Boxes

The Contractor shall make available first-aiders, first-aid boxes and or first-aid stations as per statutory requirements. The persons holding current certificates of competency of recognized institutions in prescribed numbers as per any governing statute and in the absence of such regulatory requirement a minimum of two first-aiders for each area of work for every hundred workmen. First-aiders' names shall be prominently displayed.

The first-aid refresher training shall be provided at least once in a year and all employees shall be encouraged to undergo first-aid training. A record shall be kept of all first aid treatments with particulars of treatment and personnel providing the treatment

The first-aid boxes shall display contents of medical and medicinal articles with quantity maintained, which shall be in accordance with governing statute. Nominated first-aiders shall replenish stock promptly.

Portable first aid boxes will be maintained fully equipped at each local site offices and work locations where 20 or more persons work at a time. The contractor shall ensure one First-aid box for 100 workers at a construction site

Every First-aid box is distinctly marked "First-aid" and is equipped with the articles specified in Schedule III of BOCWR.

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In each site office and location one employee, suitably trained in first aid, should be available at all working hours for the purpose of attending to emergencies.

30.8 Alcohol and Drugs Prevention and Control

The Contractor is encouraged to have a 'Substance Abuse Program', and pre-employment drug testing. Drinking during working hours shall be strictly prohibited. The Contractor shall promote through poster and other publicity, awareness on abuse of substances such as alcohol and such depressant drugs that slows the activity of brain and spinal cord on abusive usage endangering the safety and health of users and others affected by their work.

The contractor shall ensure at all times that no employee is working under the influence of alcohol / drugs which are punishable under Govt. regulations.

Smoking at public worksites by any employee is also prohibited as per Govt. regulations.

30.9 Prevention of Mosquito Breeding

Measures shall be taken to prevent mosquito breeding at site. The measures to be taken shall include:

- 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.
- Still waters shall be treated at least once every week with oil in order to prevent mosquito breeding.
- 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.
- Water storage tanks shall be provided.

Posters in both Hindi and English, which draw attention to the dangers of permitting mosquito breeding, shall be displayed prominently on the site.

The contractor at periodic interval shall arrange to prevent mosquito breeding by fumigation / spraying of insecticides. Most effective insecticides shall include SOLFAC WP 10 or Bay text, etc.

30.10 References

- **Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002** Chapter XXIV

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31.0 FIRE PRECAUTIONS

31.1 General Requirements

Where the Owner maintains the fire protection equipment, the Contractor shall comply with the Owner's fire regulations, warning signals and procedures. The Contractor shall arrange to train his personnel meeting the prescribed qualifying competence needs, in requisite numbers in the operation of such fire protection equipment and systems.

Risk assessments shall be carried out to identify potentially vulnerable areas to provide sufficient quantities of correct type of extinguishers and ancillary equipment to deal with various types of fire hazards.

Where required under the Contract the Contractor shall provide appropriate type of extinguishers close to areas of fire hazard but not too close they are cut off from use during a fire. Water based extinguishers shall not be positioned close to or used on electrical equipment.

Extinguishers shall be marked/labelled and recorded with location particulars in a register. These shall be inspected at monthly intervals to ensure they are in operable sound condition. There shall be a systematic plan for servicing, repairing and recharging fire extinguishers and for recording such dates on the register and equipment.

The location of firefighting equipment shall quickly and easily be identifiable especially in emergencies in a conspicuous manner painted as high as possible to identify the location of the extinguisher to prevent it from being obscured by machinery and goods stacked in front and to return the equipment to its location after emergency use in other locations. In order to ensure this, 'Keep Clear' area shall be demarcated and maintained. Location plans of extinguishers and Fire-fighting equipment shall be prominently displayed when desired by the Owner.

Safety Officer / Supervisors shall be trained on firefighting techniques who shall co-ordinate and control fire protection and prevention programs.

Where required under the Contract, the Contractor shall maintain alarm systems powered by mains and by battery for back-up. Where required under the Contract, emergency lighting shall be provided to aid evacuation in poor lighting conditions following the alarm. The alarm system shall be made known to all employees. When the Owner extends these facilities for use by the Contractor, he shall provide appropriate training to his personnel in the use of such emergency facilities and duties.

A clear written procedure for action in the event of fire should be produced. Fire teams and hose teams shall be identified and their responsibilities during emergencies shall be detailed in writing. Personnel shall be trained on the fire duties and use of fire-fighting equipment. Regular drills shall be conducted to test procedures and to validate them. Fire instructions and emergency procedures shall be displayed throughout the premises. Emergency response procedures are detailed under Emergency Management Plan.

A means of escape shall be provided in all work areas and storages and maintained

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and kept free from obstruction. All exits shall be clearly marked and kept unlocked whilst the premises are in use. Escape routes shall be protected from fire.

The Contractor shall be responsible for supplying and maintaining adequate fire precaution facilities on all his sites. The following minimum standards should be adhered to.

The Contractor shall ensure that specially trained personnel are available to deal with fires due to electrical causes, gas explosions etc.

A good standard of housekeeping shall be maintained at all times on the sites.

No accumulations of rubbish shall be allowed to gather.

Combustible scrap and other construction debris should be disposed off site on a regular basis. If scrap is to be burnt on site, the burning site should be specified and located at a distance no less than 12 meters from any construction work or any other combustible material.

Signage shall be erected at prominent positions showing the correct use of portable first aid fire extinguishers.

Emergency plans and Fire Evacuation plans shall be prepared and issued. Mock drills should be held on a regular basis to ensure the effectiveness of the arrangements.

31.2 Fire Fighting Equipment

At various locations around the site clearly visible fire points shall be established for use in an emergency and each fire point should have available as a minimum the following type of equipment:

- Dry Powder Extinguisher.
- Water Type Extinguisher.
- Bucket of Sand.

Recharging of fire extinguishers and their proper maintenance should be ensured and as a minimum should meet Indian National Standards

Sufficient number of fire hoses with branch pipes should be provided at site so that the fire can be controlled until the arrival of the Fire Brigade.

The contractor shall need to give consideration to the provision of adequate firefighting arrangements within the underground and tunneling operations including the provision of Fire Service compatible hose connections and emergency lighting.

The Telephone Number of the local fire brigade should be prominently displayed near each telephone on site.

Supervisors and workmen at the site should be trained in the use of firefighting equipment provided at the site.

First-aid firefighting equipment shall be placed on platforms or in cabinets in such a way that their bottom is 750 mm above the floor level. Fire buckets shall be placed on hooks attached to a suitable stand or wall in such a way that their bottom is 750 mm above the floor level. Such equipment if placed outside the building, shall be under sheds or covers.

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31.3 Storage of Flammable Liquids and Explosive Materials

The Contractor shall secure flammable and or explosive materials against accidental ignition.

Storage facilities for flammable liquids such as petrol, diesel kerosene and lubricants as well as the quantities stored shall meet the legal and statutory requirements. These shall be stored in approved fire-resistant rooms with a sump of sufficient volume to contain any spillage.

The electrical fittings shall be flame-proof and on a strict maintenance schedule. Containers shall be appropriately bonded in receptacles into which low flash point fuel is decanted.

All flammable liquids shall be kept in a secure fire resistant store protected from electrical sparks welding sparks open flames and smoking. E.g. Shed made of metal sheets with lock and key arrangements.

Only such amounts of flammable liquids should be issued as are required for immediate use. Can for carrying flammable liquid should be leak proof and properly stoppered and clearly marked "FLAMMABLE LIQUID".

Rags soaked in paints, kerosene and other flammable liquids should be disposed of daily under supervision. Large quantities of such rags should not be allowed to accumulate.

All Diesel fuel storage tanks shall be with bund wall around in order to control any spillage or leakage that may occur.

"NO SMOKING" signs shall be prominently displayed at all areas where flammable materials are stored.

31.4 When a Hot work permit is issued, the Contractor shall ensure:

- Obtain prior permission from Owner. The permit shall be renewed on day to day basis.
- Identification of combustibles such as paper, cardboard and wood and moving away from area where hot work is undertaken using open flame or electric arc.
- Determination that flammable vapors and liquids are not present
- Protection of floor and wall openings to keep out sparks
- Determination that sprinkler and hydrant and other installed fire systems are functional.
- Establishing a fire-watch with fully loaded extinguishers or charged water- hoses throughout the operation and 30 minutes after completion of operation.
- Adequate ventilation for welders, by means of natural air movement local exhaust ventilators or air-line respirators as required.
- Workmen performing the task are adequately briefed on job safety analysis, hazards and risks and the safeguards against risks.
- The Contractor shall ensure purging of piping and equipment to make it totally safe before carrying out any hot work
- Smoking is strictly prohibited in work areas except at designated locations. Smoking areas shall be identified with sign board at strategic locations showing:

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○ 'SMOKING IS PERMITTED IN THIS LOCATION ONLY'

- At permitted locations, cigarette ash or butts shall be disposed-off only in ash trays provided.
- No combustible material shall be stored on or near any source of heat like hot pipes, welding or gas. Before leaving the place of work or the Contractor's sheds, the Contractor's workmen shall ensure that no material or item that could start a fire is left at site. Special attention shall be paid to collection and disposal of oil soaked cotton waste or rags. On no account are these to be dropped into corners, pushed below equipment or left hanging on pipes.
- Gas cylinders shall be used in a safe manner. These shall not be dropped from heights or dragged on the floor. Trolley with rubber rimmed wheels shall be used for transporting gas cylinders within the site. Acetylene cylinders shall be kept in upright position. Oxygen cylinders shall not be kept near inflammable materials like oil etc.
- Tarpaulins shall not be used in the vicinity of welding and gas cutting jobs.
- The Contractor's supervisor, of the rank of a foreman or equivalent shall examine the arrangements made for hot work before commencement of work and shall satisfy him-self that all reasonable safety precautions have been taken.
- The Contractor shall return the hot work permit after completion of welding work.

31.5 References

- Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Rules 2002 Chapter VI
- IS 13416 (Part 5): 1994 Preventative measures against hazards at workplaces Recommendations Part 5 Fire Protection
- IS 1646: 1982 Code of Practice for fire safety of buildings (general): Electrical Installations
- IS 2190: 1979 Code of practice for selection installation and maintenance of portable first aid fire extinguishers
- IS 12349: 1988 Fire Protection – Safety Signs
- Also Part IV of National Building Code of India: 1983
- Model Rules under the Factories Act, 1948 (Corrected up to 01-03-2019)

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32.0 SITE PERIMETER HOARDING

32.1 General

The Contractor is required to keep the site as safe and secure as possible at all times, this includes the erection of site perimeter Hoarding which shall also deter trespassers both adult and children alike.

The Contractor shall provide securely erected fence around the perimeter of the site, with agreed and guarded access and egress points for both personnel and vehicles.

At each entrance to the site the Contractor shall erect a large billboard warning all persons who enter the site that they are required to wear the appropriate Personal Protective Clothing and that no unauthorized access is allowed.

Wherever the fence runs adjacent to the highway with no buffer-zones then the fence shall have traffic warning lights duly affixed to it.

Wherever the fence borders on pedestrian footpaths lighting shall be provided to illuminate the pedestrian routes. The positioning of the fence-line shall not reduce the width of the pedestrian footpath to less than 900 mm in order to be able to accommodate disabled persons in wheelchairs.

Site perimeter fencing shall be washed at least once a month and repainted at least annually.

The site fencing shall need to be inspected on a regular basis in order to ensure that the integrity of the fencing is maintained at all times as far as is practicable.

32.2 References

- IS 13430: 1992 Safety during Additional Construction and Alteration to Existing Buildings - Code of Practice
- IS 9457 Standard for Colours of safety signs

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33.0 TRAFFIC MANAGEMENT

33.1 General

The contractor shall ensure that all traffic management schemes shall be in accordance with the agreed schemes following consultation with the Local Traffic Police and the Metropolitan and other Authorities in charge of the area.

Adequate and clear warning signs shall be displayed at appropriate distances before the commencement of the site workings. In addition, prior warning shall be given concerning the location of the approaching site entry and exit points.

Site vehicles exiting the site shall observe caution and follow traffic rules / speed limit at all times.

Regular inspections of the traffic management schemes shall be conducted by the Contractors in both the daytime and night time hours with the results of these inspections being recorded.

33.2 Vehicle Control

Traffic Controllers shall be available for directing vehicles that are exiting the sites directly onto the live carriageways. Any vehicles entering the sites must have reverse horn and also that are required to execute reversing maneuvers shall do so under the strict control of a trained and designated banksman.

33.3 Others

- Only well maintained and registered vehicles shall be allowed to be used for the removal of excavated spoil from the sites.
- All drivers shall be medically fit and in possession of a valid driving license.
- No vehicles, which are overloaded, shall be allowed to leave the site.
- Any vehicles leaving the sites carrying loads which are liable to produce airborne contaminants shall prior to leaving the site securely sheet the load over.
- Vehicles exiting the site directly onto the live carriageway shall do so under the control of the clearly identified Traffic Controller.
- Any vehicles that are required to reverse whilst on the site shall do so under the control of a trained banksman.
- Any spoil that is removed from the work-sites shall be disposed of only at authorized dumping sites.

33.4 TRAFFIC ROUTES AND AISLES

The Contractor shall arrange to separate pedestrian and vehicular including material handling equipment traffic wherever possible and maintain the routes clear of obstruction. To ensure safety of user's clear painted demarcation is encouraged as a discipline to be enforced

33.5 References

- IS 4130: 1991 Demolition of Buildings – Code of Safety
- IS 13416 (Part 3):1994 Recommendations for preventive measures against hazards in the workplace, Part 3, Disposal of Debris.

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34.0 HSE AUDIT

The Contractor shall undertake periodic safety audits to confirm through investigative methods the effectiveness of the measures set out in the POLICY. In order to be effective such safety audit shall be comprehensively covering all aspects detailed in this specification to ensure effective loss- control / accident prevention program. Safety audits shall take into account the safety inspection records, remedial measures and effectiveness of the safety program.

Effectiveness of safety program shall be based on the Contractor's effective hazard identification and risk assessment processes for design of operation control procedures and on the safety statistics. Audit reports and preventive actions and safety improvement programs shall be submitted to the Owner.

The Owner shall retain their right to audit the Contractor's Safety Management System either directly by their employees or his nominated representatives for its effectiveness

The purpose and scope of HSE audit is to assess potential risk, liabilities and the degree of compliance of HSE Plan and its supplementary procedures and programs against applicable and current HSE legislation regulations and requirements of the Owner.

Project Director holds the ultimate responsibility in ensuring implementation of HSE audit program during the construction work.

34.1 Monthly Audit (Safety Performance Evaluation)

Monthly Audit (Safety Performance Evaluation) will be performed once in a month. A team consisting of Engineer-in-charge & Head of Department will conduct this, based on a predesigned score-rating format. The details of the pre-designed monthly audit score rating formats are given in the Project HSE Plan.

34.2 Monthly Electrical Safety Audit

A team comprising of contractor's engineer and Owner's representative shall conduct monthly electrical safety audit covering the following and submit the report to Owner.

- Electrical accidents investigation findings and remedy. Adequacy of power generation and power requirements. Power distribution and transmission system in place.
- Updated electrical single line diagram showing the current condition of power source and distribution including the IP44 DBs arrangement.
- Electrical protection devices – selection, installation and maintenance (RCB & MCB) etc.
- Earth or ground connection and earth pit maintenance details. Education and training of electrical personnel undertaken.
- Routine electrical inspection details. Electrical maintenance system and register.
- Name plate details of major electrical equipment. Classified zones in the site, if any.

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34.3 External HSE Audit

External HSE audits are to be conducted once in a year by external agencies competent & qualified auditors (Approved by Central Labor Institute, Ministry of Labor Govt. Of India) with the prior approval of the Owner.

Areas of competence of Audit team

Practical understanding of BOCW Act and Rules, 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 management.

Audit shall be conducted as per the guidelines of ISO, ILO, and national standards. Audit report shall also be presented as per the above formats.

External HSE audit shall be conducted on a yearly basis

34.4 Conformity Report & Action by Owner

- 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 Owner with a copy to the contractor.
- 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 Owner with a copy to the contractor.
- In case of non-conformity of items mentioned by auditor, the Owner shall take necessary steps including stoppage of work and or imposing any penalty for getting the item implemented.

34.5 Failure of contractor to conduct External OHS Audit

If the contractor fails to conduct the external HSE audit in a timely manner, the Owner may arrange for this to be conducted by others, at the cost of the Contractor.

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35.0 WORK ADJACENT TO WATER

- Where in the course of construction work any person is liable to fall into water or other liquid with a risk of drowning, suitable and sufficient steps shall be taken—
 - to prevent, so far as is reasonably practicable, such person from so falling;
 - to minimize the risk of drowning in the event of such a fall; and
 - to ensure that suitable rescue equipment is provided, maintained and, when necessary, used so that such person may be promptly rescued in the event of such a fall.
- Suitable and sufficient steps shall be taken to ensure the safe transport of any person conveyed by water to or from any place of work.

36.0 VISITORS TO SITE

All visitors to site shall report to the Contractors site offices where they shall be issued with appropriate Personal Protective Equipment if they are to go out onto the site work areas. Any visitors going out to the site work areas shall be accompanied at all times by a member of the site personnel.

37.0 CRITICAL LIFT PLAN

Critical lift plan shall be prepared and followed in case of 1) Lifts using more than one crane 2) Lifts greater than 75% of the cranes capacity 3) Lifts performed during wind speed between 20 and 30 mph (If wind speed exceeds 30 mph, do not attempt lift) 4) Lifting of critical equipment,

- REVIEW THE OEM MANUAL AND DRAWINGS - Determine the weights, rigging requirements, cable lengths, and load levelling equipment, special devices, & special precautions. Verify weight via shipping weight when available – never guess weight.
- ASSESS THE ENVIRONMENT-Equipment configuration, crane access points, possible obstructions, power lines, other contractor work in proximity of proposed lift(s), location of staging areas, lighting, mud/soil stability, wind, rain, etc.
 - FORMALIZE THE PLAN- Develop a formal lift plan addressing each of the findings of steps 1 & 2. Provide a brief diagram illustrating specifics.
 - DETERMINE FITNESS / READINESS - Verify qualifications of personnel (certified crane operator, experienced signalman, etc.), assign responsibilities, verify that all rigging equipment/materials are current with required certifications. Execute a test run (no load) of the crane to verify: swing, radius, angles and boom extension.
 - Schedule the lift to assure that there is sufficient time to perform the lift safely without interruption and or conflict.
 - PRE-LIFT BRIEFING Hold a formal briefing with all participants to assure that all personnel understand the sequence of the lift and their respective responsibilities,
 - Load weight, Centre of gravity, and accurate rigging is used.
 - Communication system between signalman and operator is clear and accurate
 - EXECUTE LIFT - After confirming that all previous items have been accomplished, execute lift only under direct supervision of Site Engineer receiving the PTW.

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APPENDIX NO: 01

Safety, Welfare and Occupational Health Requirements as per BOCW Act 1996 and BOCW Central Rules 1998

(This list has been prepared in chronological order with primary importance to Section of Act and secondary to Rules)

S - Refers Relevant **S**ections in BOCWA

R - Refers Relevant **R**ules in BOCWR

C - Refers Relevant **C**hapter No. in BOCWR

SR. No.	Items	BOCW Act Section	Central BOCWR Rules	Form No and Schedule
1	Registration of Establishment	S - 7	R - 23 to 27	
2	Display of Registration Certification at Workplace	S - 7	R - 26 (5)	
3	Hours of work	S - 28	R - 234 to 237	
4	Weekly rest and payment at rest		R - 235	
5	Night shift		R - 236	
6	Maintenance of workers registers and records	S - 30	R - 238	
7	Notice of commencement and completion	S - 46	R - 239	
8	Register of persons employed as building workers		R - 240	
9	Muster roll and Wages Register		R - 241 (1) (a)	XVI & XVII
10	Register of overtime	S - 28 & 29	R - 241 (1)	XXII
11	Register of Damage or Loss		R - 241 (1) (a)	XIX, XX, & XXI
12	Issue of wages book		R - 241 (2) (a)	XXIII
13	Service certificate for each workers		R - 241(2) (b)	XXIV
14	Display an abstract of BOCWA and BOCWR		R - 241(5)	
15	Annual return		R - 242;	XXV
16	Drinking water	S - 32		
17	Latrines and Urinals	S - 33	R - 243	
18	Accommodation	S - 34		
19	Crèches	S - 35		
20	First-aid boxes	S - 36	R - 231	Schedule III
21	Canteens	S - 37	R - 244	
22	Food stuff and other items served in the canteens		R - 245	
23	Supply of tea and snacks in work place		R - 246	
24	Food charges on no loss no profit basis		R - 247	
25	Payment of wages		R - 248	
26	Display of notice of wages regarding		R - 249	
27	Safety committee	S - 38	R - 208	
28	Safety officer	S - 38	R - 209	Schedule VIII
29	Reporting of accidents and dangerous occurrences	S - 39	R - 210	
30	Procedure for inquiry in to the causes of accidents		R - 211	
31	Responsibility of Owner	S - 44	R - 5	
32	Responsibility of Architect, Project engineer & Designer		R - 6	
33	Responsibility of workmen		R - 8	
34	Responsibility for payment of wages & compensation	S - 45		
35	Penalties and Procedures	S - 47 & 55		
36	Excessive noise, vibration etc.		R - 34	
37	Fire Protection		R - 35	

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SR. No.	Items	BOCW Act Section	Central BOCWR Rules	Form No and Schedule
38	Emergency action plan		R - 36	
39	Fencing of motors		R - 37	
40	Lifting of carrying of excessive weight		R - 38	
41	Health, Safety and Environmental Policy		R - 39	
42	Dangerous and Harmful Environment		R - 40	
43	Overhead protection		R - 41	
44	Slipping, Tripping, Cutting, Drowning & Falling Hazards		R - 42	
45	Dust, Gases, Fumes, etc.		R - 43	
46	Corrosive substance		R - 49	
47	Eye Protection		R - 45	
48	Head Protection and other protection apparel		R - 46 & 54	
49	Electrical Hazards		R - 47	
50	Vehicular traffic		R - 48	
51	Stability of structure		R - 49	
52	Illumination		R - 50 & 124	
53	Stacking of materials		R - 51	
54	Disposal of debris		R - 52	
55	Numbering and marking of floors		R - 53	
56	Lifting appliances and gears	C - VII	R - 55 to 81	
57	Runways and Ramps	C - VIII	R - 82 to 85	
58	Working on or adjacent to water	C - IX	R - 86 & 87	
59	Transport and earthmoving equipments	C - X	R - 88 to 95	
60	Concrete work	C - XI	R - 96 to 107	
61	Demolition	C - XII	R - 108 to 118	
62	Excavation and Tunneling works	C - XIII	R - 119 to 168	
63	Ventilation		R - 153	
64	Construction, repair and maintenance of step roof	C - XIV	R - 169 to 171	
65	Ladders and Step ladders	C - XV	R - 172 to 174	
66	Catch platform & hoardings, chutes, safety belts & nuts	C - XVI	R - 175 to 180	
67	Structural frame and formworks	C - XVII	R - 181 to 185	
68	Stacking and unstacking	C - XVIII	R - 186 & 187	
69	Scaffold	C - XIX	R - 188 & 205	
70	Cofferdams and Caissons	C - XX	R - 206 & 211	
71	Explosives	C - XXI	R - 212 & 213	
72	Piling	C - XXII	R - 214 & 222	
73	Medical Examination for construction worker, Crane operation and Transport vehicle drivers		R - 81; R - 223(a)(iii)	Schedule XII
74	Medical examination for occupational health hazards		R - 223(a)(iv)	
75	Charging of workers for medical Examination		R - 223(b)	
76	Occupational health centers and medical officers		R - 225	Schedule X & XI
77	Ambulance van & room		R - 226 & 227	Schedule IV & V
78	Stretchers		R - 228	
79	Occupational health service for building workers		R - 229	
80	Medical examination for occupational health hazards		R - 223(a)(iv)	
81	Emergency care services and emergency treatment		R - 232	
82	Panel of experts and agencies		Central Rule 250	
83	Power of inspectors		Central Rule 251	

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APPENDIX NO: 02

Safety Violation Penalties

SN	Topic	Safety Violation	Financial Penalties (Non -refundable)
1	HSE Organization	Not complying with the minimum manpower requirements as mentioned in BOCW rules.	Rs. 50,000 or 5% of the contract value, whichever is less, per month for first month and Rs. 100000 or 5% of the contract value, whichever is less, for subsequent months.
		Not filling up the vacancies created due to HSE personnel leaving the contractor within 14 days.	Rs. 50,000 or 5% of the contract value, whichever is less, per month for first month and Rs. 1,00,000 or 5% of the contract value whichever is less for subsequent months.
		Disobedience / Improper conduct of any HSE personnel.	Rs. 10,000 for first violation and Rs.20,000 for subsequent violations
2	HSE committee	Failed to formulate HSE committee as per BOCW rules or conduct HSE Committee meeting for any month.	Rs. 20,000 for the first violation and Rs. 50,000 or 5% of the contract value whichever is less for the subsequent violations
		Contractor and Sub-contractor representatives not attending HSE Committee meetings.	Rs. 5000 to the contractor of the member who had not attended the meeting for first violation & Rs.10000 for subsequent violations.
		Failed to conduct Site inspection before conducting HSE Committee meeting.	Rs. 5,000 for first violation and Rs. 10,000 for subsequent violations
		Failed to send HSE Committee Meeting minutes or Agenda to Owner in time as mutually agreed.	
3	HSE Training	Induction training, Refresher training not given or Tool-box talk not conducted as per schedule	Rs. 5,000 for first violation on and Rs. 10,000 for subsequent violations
4	HSE Inspection	Not complying with the requirements as mentioned in HSE plan	Rs. 10,000 for first violation and Rs. 20,000 for subsequent violations.
5	HSE audit	Internal Audit Not conducted as per Site HSE Plan Report not sent to Owner.	For item Rs. 5,000 for first violation and Rs. 10,000 for subsequent violations.
6	Injury and Incidence reporting	Fatal accidents	Rs. 15,00,000 or 5% of the contract value, whichever is less, for first fatality, Rs. 20,00,000 or 5% of the contract value, whichever is less, for second and their after Owner may at its discretion impose appropriate penalty or may terminate / reject the contract at the risk and cost of the contractor.
		Grievous Injury, such as loss of limb or a loss of more than twenty one (21) man-days	Indian Rupees Five Lakhs (INR 5,00,000) or five percent (5%) of the SO Price, whichever is less, for the first grievously injured person; and Indian Rupees Seven Lakhs (INR 7,00,000) or five percent (5%) of the SO Price, whichever is less, for every subsequent grievously injured

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SN	Topic	Safety Violation	Financial Penalties (Non -refundable)
			person. For the purpose of levying these damages, "grievous injury" shall have the meaning ascribed to the term in the Employee's Compensation Act, 1923.
		Dangerous Occurrence	Rs.1,00,000 or 5% of the contract value, whichever is less, for first violation and Rs.2,00,000 or 5% of the contract value, whichever is less, for subsequent violations
		Any Incident Involving injury to a Member of the Public	Rs.50,000 or 5% of the contract value whichever is less for first violation and Rs.1,00,000 or 5 % of the contract value whichever is less for subsequent violations
7	Emergency preparedness Plan	Non-compliance ERP clause	Rs.25000 for each non-compliance of the clauses
8	Housekeeping	Housekeeping maintenance register not properly maintained up to date.	Rs. 5,000 per single violation Compounded to a maximum of Rs. 20,000 at any single instance
		Surrounding areas of drinking water tanks / taps not hygienically cleaned / maintained.	
		Office, stores, toilet / urinals not properly cleaned and maintained	
		Required dustbins at appropriate places not provided / not cleaned	
		Stairways, gangways, passageways blocked	
		Lumber with protruding nails left as such	
		Openings unprotected	
		Excavated earth not removed within a reasonable time	
		Truck tires are not cleaned	
		Vehicles / equipments parked / placed on roads obstructing free flow of traffic.	
		Unused surplus cables / steel scraps lying scattered.	
		Wooden scraps, empty wooden cable drums lying scattered	
		Water stagnation lead to mosquito breeding	
		Non-compliance of any observation given by representative of Owner	
9	Working at Height / Ladders and Scaffolds	Non-compliance of scaffolding	Indian Rupees Five Thousand Only (INR 5000/-) per violation with a ceiling of Indian Rupees One Lakh Only (INR 1,00,000/-) per contract exceeding which the Employer can terminate the Contract.
10	Excavation, Tunneling and confined space	Non-adherence of any of the provisions mentioned in the BOCW rules and Project	Indian Rupees Five Thousand Only (INR 5000/-) per violation with a ceiling of Indian Rupees One Lakh Only (INR 1,00,000/-) per

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SN	Topic	Safety Violation	Financial Penalties (Non -refundable)
		HSE Plan.	contract exceeding which the Employer can terminate the Contract.
		Excavated material not stored as mentioned in the technical specification	
		Metal ladders and staircases or ramps not provided for safe access to and egress	
		Trench and excavation not protected against falling of person by suitable measures	
		Not shoring the excavation	
11	Lifting appliances and gear	Non-adherence of any of the provisions mentioned in the BOCW rules and Project HSE Plan.	Rs. 10,000 per single violation Compounded to a maximum of Rs.1,00,000 or 5% of contract value, whichever is less, at any single instance
12	Lifting operation	Non-adherence of any of the provisions mentioned in the BOCW rules and Project HSE Plan.	Rs. 10,000 for first violation and Rs.1,00,000 5% of the contract value, whichever is less, for subsequent violations
13	Site Electrical safety	Non-compliance of electrical norms in HSE plan or electrical rules obligation	Indian Rupees Five Thousand Only (INR 5000/-) per violation with a ceiling of Indian Rupees One Lakh Only (INR 1,00,000/-) per contract exceeding which the Employer can terminate the Contract.
		Exposed electric lines fermentative damage and circuits in the workplace	
		Inserting of wires directly into the socket	
		Improper grounding for the electrical appliances	
		Electrical cables running on the ground	
14	Gas Cutting	Using Gas cylinder of Wrong colour code	Rs.5,000 per single violation Compounded to a maximum of Rs.20,000 at any single instance
		Cylinders not stored in upright position	
		Flash back arrester, non-return valve and regulator not present or not in working condition	
		Fail to put cylinders in a cylinder trolley	
		Damaged hose and fail to use hose clamps	
		Using domestic LPG cylinders	
		Fail to store cylinder 6.6m away from fire prone materials	
		Fire extinguisher not placed in the vicinity during cutting operation	
15	Welding	Voltmeter and Ammeter not working.	Rs.5,000 per single violation Compounded to a maximum of Rs.20,000 at any single instance
		Non-availability of separate switch in the transformer	

SN	Topic	Safety Violation	Financial Penalties (Non -refundable)
		Improper grounding and return path	
		Damaged and bare openings in the welding cable	
		Damaged holder	
		Fire extinguisher not placed in the Vicinity during welding operation	
16	Fire precaution	Smoking and open flames in fire prone area	Rs.5,000 per single violation Compounded to a maximum of Rs.25,000 at any single instance.
		Using more than 24V portable electrical appliances in the confined space area	
		Not proper ventilation in cylinder storage area	
		Absence of fire extinguishers	
		Fire extinguishers not refilled once in a year or after use	
		Fire extinguisher placed in a not easily accessible location	
17	PPE	Not wearing / using necessary Personnel Protective equipment required for the Job or kept it elsewhere	Indian Rupees One Thousand Only (INR 1000/-) per violation.
		PPE - Using wrong type Wrong colour helmet or without logo Using for other operation	
		Not using Full Body Harness or Fall arrestor and/or Full Body Harness not anchored	Indian Rupees Five Thousand Only (INR 5000/-) per violation with a ceiling of Indian Rupees One Lakh Only (INR 1,00,000/-) per contract exceeding which the Employer can terminate the Contract.
		PPE - Not conforming to BIS standard or damaged	
18	Traffic Management	Over loading of vehicles or Unfit drivers or operators or Unlicensed vehicles or Absence of reversing alarm or Power / hand brakes not in working condition	Rs.5,000 per first violation and Rs.10,000 for subsequent violations
		Mishandling / Splashing of material on roads / non-cleaning of tires of dumpers and transit mixers etc.	Rs.1,000 per first violation and Rs.2,000 for subsequent violations
		Non-cleaning of tires of dumpers and transit mixers before leaving the site and thereby creating a traffic safety hazard to road users	
19	Occupational Health	Violation of any clause as described in BOCW act & rules	Rs.5,000 per single violation Compounded to a maximum of Rs.25,000 at any single instance.
		Dust control measures at sites not practiced	
20	Labour Welfare measures	Violation of any clause as described in BOCW act & rules	Rs. 10,000 per single violation Compounded to a maximum of Rs. 50,000 at any single instance
21	Work Place Monitoring	Spillage from vehicles not arrests	Rs.1,000 per single violation Compounded to a maximum of Rs.10,000 at any single instance
		Noise monitoring not practiced	
		Improper disposal of debris /	

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SN	Topic	Safety Violation	Financial Penalties (Non -refundable)
		residues	

Note: Any deduction arising out of above shall have prior approval from the HSE Manager and Construction Manager.

APPENDIX NO: 03

Contractor score card (safety performance) sheet

SN.	Parameter	Safety parameters	Options	Scale	Weightage %	Score
1	Incidence rate	Number of injuries as a proportion of the number of workmen deployed Incidence Rate = (No. of injuries X 1000)/ Average no. of workmen	0 0 to 50 > 50	4 2 0	20	.8
2	Accidents	Have there been any fatal accidents or serious/ permanent disabilities	Yes No	0 4	30	1.2
3	Safety Organization & Resources	Adherence to safety organization and resources norms: Qualified Safety Officers as per norm Experienced Safety Supervisors as per norm All necessary PPE's provided All tool/ equipment color coding as per norm	All 4 Yes 2-3 Yes 0 or 1 Yes	4 2 0	20	.8
4	Non Conformances	No. of NCs open beyond target date during the performance period (NC's include safety observations, Compliances, Letters / Notices)	None/ Zero Open 1-4 >4	4 2 0	20	.8
5	Safety Awareness Programs and Committee Meetings	Safety Programs and Committee Meetings % of Employees covered by organized Safety Awareness Programs such as induction training, Mass Tool Box Talk, Safety Mela, Safety Virus programs, Mock Drills, etc. No. of Safety committee meetings attended	Attended all Meetings & > 90 % Employees covered Partial adherence Attended <50% meetings and < 50 % employees covered	4 2 0	10	.4
TOTAL					100	4

Note:

- Total man hours worked shall be verified by HR department on the basis of daily man hours work report submitted by contractor on regular basis to the HR department.
- Contractor score card (safety performance) shall be evaluated every quarterly by project team.

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Annexure – 1 PRE BID CONTRACTOR OHS QUALIFICATION EVALUATION FORM (Contractors has to complete all Sections Questions)

[Please refer **Annexure-A: Checklist for Contractor Pre-Qualification** of Contractor Safety Management Standard, Group safety.]

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Annexure – 2 CONTRACTOR MOBILISATION & WORK START CLEARANCE FORM

Name of Contractor	M/s	Date: __/__/__		
Site Name:	Order Number:			
Description of Work:				
Type Of Work:	Mechanical - Electrical- Civil - Others -			
Name of Engineer In Charge	Name of Contractor Safety Officer / Supervisor:			
Mobil. No.:	Mobile No.:			
REQUIREMENT CHECK		YES	NO	N/A
1. ISO / IMS / IS / any other - Certification - copy submitted				
2. Safety Policy - copy submitted				
3. Organization – Role and Responsibility - document submitted				
4. Project specific HSE Plan along with HIRA / JSA Safe job procedure - submitted				
5. Safety Officer / Supervisor deployment - as applicable				
6. Manpower trade training record / certificate – attached				
7. Valid Insurance Policy - copy attached				
8. Employee wise PPE issued and issue register available				
9. Other special PPE available as required for work				
10. Portable Power tool List available – Checked and found satisfactory				
11. Lifting tool -verification as per list satisfactory				
12. Assess Equipment - Ladders, Scaffold-verification as per list satisfactory				
13. Welding machine- gas cutting set checked and found satisfactory –				
14. Gas cylinder brought in by contractor – Satisfactory				
15. Gate safety induction as per list of employee completed				
16. Part – II Safety Induction as per list of employee completed				
17. Employee Qualification, Training and driving license requirement checked and verified as per employee list				
18. First-aid Box - as necessary and agreed				
19. Emergency vehicle and Ambulance - as agreed				
20. Employee medical check and fitness certificate for all employee				
21. Qualified First-aiders (having valid certificate)				
22. Qualified Doctor tied up:				
• Others if any		•	•	•
1. Contractor Commitment: 2. We agree to abide by company safety rules and maintain above arrangement for the period of contract. 3. Authorized Person of <u>Contractor</u> : 4. Signature : _____ Name Person Name : _____ Designation : _____ _____ Place : _____ 5. Date : _____				
Signature of Site- In-Charge (Contractor)		Signature of Engineer In-Charge		
Name		Name		
Date		Date		
"Work Start Clearance Certificate"				
We have checked and verified the OHS requirement and compliances submitted as above for M/s__against				

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Work Order No _____ for the work area__of _____Plant site on Date:____/____/____Allowed to start the work from Date: ____/____/ with following exception

Exception (If Any): 1.

2.

Signature Head of Department		Department (Name)	
Designation:		Date:	

Annexure – 3 Contractor OHS Performance Certificate

(Applicable to all class of contractors)

Name of the Contractor	
Name of the Client	
Contract Nos.	
Contract Period	From: To:

Contractor OHS performance on various attributes for the entire contract is as under:

Sr. No.	Attributes	Max. Points	Marks Obtained
A	Leading Attribute		
1	Compliance of PPE's	10	
2	Housekeeping	05	
3	Workman discipline & HSE System compliances	05	
4	Drive towards control of misuse & wastage	05	
5	Participation in HSE related programs	05	
6	Non repetition of Non-conformity	05	
7	Initiation and implementation of corrective actions within target date and time.	05	
8	HSE education and follow up	05	
9	Reporting and information	05	
	Total - A	50	
B	Lagging Attribute		
	Accidents - Fatal _____nos. LTI _____nos. above Medical Treatment Case _____	20	
	Financial Penalties Rs. ____	20	
	Man days Loss _____days.	10	
	Total - A	50	
	Overall Rating (A+B)	100	

Note:

5 mark deduction on LTI

10 Man Days Lost to be considered for deduction of full marks

Engineer-in-charge

Site Safety Head

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Schedule 01: First Day HSE Orientation - Induction Training Topics

- Safety Policy - Senior management commitment to health and safety; The outline of the project;
- The individual's immediate line manager and any other key personnel;
- Any site-specific health and safety risks, (for example in relation to access, transport, site contamination, hazardous substances and manual handling);
- Control measures on the site, including: Site Safety rules, Permit-to-work systems, Traffic routes,
- Induction training should include at least the following
- General safety awareness - Scope of work, Names of personnel responsible for site safety and health. First aid facilities
- Emergency procedures
 - Reporting emergencies, incidents and unsafe conditions
 - Emergency evacuation plan, Safety Assembly Points, Emergency exists etc.
- Use of personal protective equipment
 - Proper use of personal protective equipment (PPE)
 - Work practices by which a worker can minimize risk from hazards
- Specific site hazards
 - Safety, health and other hazards at the site
 - Review of all activities on site and related HIRA
 - Safe use of engineering controls and equipment on site etc.
- Managing health and safety in construction
- Health and Safety Information
 - Information about the individual's responsibilities for health and safety. Representatives of employee safety,
 - Safety committees; Security arrangements, Hearing protection zones,
 - Arrangements for personal protective equipment, including what is needed, where to find it and how to use it,
 - Arrangements for housekeeping and materials storage, Facilities available, including welfare facilities,
 - Emergency procedures, - including fire precautions, the action to take in the event of a fire, escape routes, assembly points, responsible people and the safe use of any fire-fighting equipment; arrangements for first aid; arrangements for reporting accidents and other incidents; details of any planned training, such as 'toolbox' talks; arrangements for consulting and involving workers in health and safety, including the identity and role of any: appointed worker representatives,
- Duties of the Contractors Brief outline of the responsibilities of the Contractor,
- Employee's Duties Brief outline of responsibilities of employee under law
- Explanation of how new employees fit into the Contractor's plan for accident prevention.

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Schedule 02: Content of HSE Training & Awareness

1. The Law and Safety Statutory Requirement Appropriate regulations, Duties of Owner and employee	2. Policy and Administration - Effect of incentive on accident prevention - Human relations Consultation - Safety Officer: duties, aims, objectives
3. Safety and the Supervisor Safety and efficient production go together Accidents affect morale and public relations	4. Principles of Accident Prevention Attitudes of management, supervision and operations Methods of achieving safe operations
5. Site Inspection - The role of management Hazard Identification Procedure Records results, Follow-up procedures & Feedback	6. Human Behavior - Motivating Individual Behavior - Environmental effects - Techniques of persuasion
7. Site Housekeeping, - Relationship of site housekeeping to accident - Site access, - Equipment storage - Materials handling & Material stacking	8. Health Medical examination occurrence, Sanitation and welfare Protective clothing, First Aid / CPR
9. Personal Protective Equipment – Eye, face, hands, feet and legs Respiratory protective equipment Protection against ionizing radiation	10. Equipment – Accidents related to moving parts of machinery Appreciation of principles of guarding Importance of regular maintenance
11. Transportation - Transport to and from site - Hazard connected with site transport Competent drivers - Dumpers Tipping trucks - Movement near excavations	12. Electricity - Appreciation of electrical hazards Power tools - Arc welding - Low voltage system - Lighting and power system on sites ELCB, RRCB, - Grounding/Ground fault circuit interrupters (GFCIs)
13. Oxygen and Acetylene Equipment Cylinder storage and maintenance Condition and maintenance of valves, regulators, and gauges Condition and maintenance of valves, pressures	14. Excavations - Method of shoring Precautions while shoring - Precautions at edge of excavations Removal of shoring - Sheet steel piling
15. Working platforms, Ladders, and Scaffolding Hazards connected with the use of ladders Licensing, certification and training required Type of scaffold Overloading Work on roofs Fragile material Openings in walls and floors Use of safety belts and nets	16. Cranes and other Lifting Machines - Maintenance and inspection for operation of cranes Slinging methods & Signaling Access to crane(s) Maintenance and examination Ground conditions - Hazards and accident prevention methods connected with the use of cranes / heavy equipments. - Crane Lift Plan for all lifts
17. Lifting Tackle, Slings - single and multi-legged Safe working loads (SWLs) Safety hooks and eyebolts Cause of failure Maintenance and examination	18. Communications - Effective methods of communication (particular interest to non-English speaking workers) Method and preparation of reports - Safety committees Safety meeting
19. Fire Prevention and Control Principle causes determining fire Understanding fire chemistry Firefighting equipment Firefighting training.	20. Manual Handling - Body posture and procedure for lifting, pushing, pulling, dragging, sitting and walking Ergonomics - Stretching exercises

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Schedule 03: DAYS TO BE OBSERVED FOR CREATING HSE 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
7th April	World Health Day
14th April	Fire Safety Day
April 18 to 22	Earth Week
20th April	Earth Day
20th April	Noise Awareness Day
28th April	ILO World Day for Safety and Health at Work
May 1 to 7	Emergency Preparedness Week
5th June	World Environmental Day
12th June	World Day against Child Labours
9th July	Occupational Health Day
17th October	World Trauma Day
1st December	World AIDS Day

Schedule 04: HSE Communication (Posters/Signage's)

The minimum requirements for HSE Communication (Posters / Signage's) are categorized in the following groups:

Contract Value (Initial awarded value of contract)	Group
Up to 10 Cr	A
Up to 25 Cr	B
Up to 50 Cr	C
More than 50 Cr	D

Every contractor falling into the above groups shall prepare a HSE Communication Plan as a part of site specific HSE Plan and shall include the following minimum requirement of Posters / Signage's / Video as applicable.

- In case readymade posters are available in any of the category from National Safety Council, Loss Prevention Association of India 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 the above are to be detailed in the HSE Plan and get an approval from the Employer before displaying the posters.

(A) SAFETY POSTERS

Safety Posters that are to be displayed in and around the sites at prominent locations of workforce and shall be in Hindi, English and also in local language,

1. Size of Posters

SN	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

2. Minimum Posters to be display

Sr. No	SHE Poster Title	Minimum No. of concepts in each title	HSE Visual required			
			Group A Contract	Group B Contract	Group C Contract	Group D Contract
1	Safety Culture	5	Each 10	Each 20	Each 50	Each 75
2	Daily Safety Oath & Policy		Each 25	Each 50	Each 75	Each 100
3	Emergency Management Plan	5	Each 25	Each 50	Each 75	Each 100
4	Working at Heights Ladder, Stairway, Scaffold etc.	5	Each 25	Each 50	Each 75	Each 100
5	Site Electricity	5	Each 25	Each 50	Each 75	Each 100
6	Fire and Explosion	5	Each 25	Each 50	Each 75	Each 100
7	Crane Safety	5	Each 25	Each 50	Each 75	Each 100
8	Slings & Rigging	10	Each 25	Each 50	Each 75	Each 100
9	Excavation	5	Each 25	Each 50	Each 75	Each 100
10	Occupational Health (Mosquito Control, HIV awareness, Dust, Noise Control, etc.)	10	Each 25	Each 50	Each 75	Each 100
11	First – Aid	3	Each 25	Each 50	Each 75	Each 100
12	Labor Welfare (Min Wages, Child labor, Sign in Muster, In case of accidents-what to do?)	5	Each 25	Each 50	Each 75	Each 100

(B) SAFETY SIGNAGES

All safety signage that is displayed in and around the sites shall be in both Hindi and English and also in local language, examples of signs that shall be required shall include amongst others the following:

1. Size of Signage's

SN	Item	Size
1	Safety Signage's	Small : 12"x6" Big : 24" x 12"
2	Road Traffic Sign Boards	Strictly as per Indian Road Congress (IRC) specifications

All safety signs shall comply with the Indian Standard as indicated below

SN	Type of Signage	Colour
1	Mandatory	Blue
2	Danger	Yellow
3	Prohibition	Red
4	Safe Conditions	Green

Indian Standards – IS 9457 Standard for Colours of Safety Signs IS 12349: 1988
Fire Protections - Safety Signs

2. Minimum Signage's to be display

Sr. No	SHE Poster Title	Minimum No. of concepts in each title	HSE Visual required			
			Group A Contract	Group B Contract	Group C Contract	Group D Contract
1	Mandatory PPE Usage					
a)	Display the messages like PPE ZONE, NO PPE ZONE, etc.	5	Each 25	Each 50	Each 75	Each 100
b)	Helmet, Wear Safety Helmet	5	Each 25	Each 50	Each 75	Each 100
c)	Footwear Wear Safety Shoes	5	Each 25	Each 50	Each 75	Each 100
d)	Face & Ear Protection Wear Eye Protection Wear Hearing Protection	5	Each 25	Each 50	Each 75	Each 100
e)	Fall Protection Wear Full Body Harness	5	Each 25	Each 50	Each 75	Each 100
f)	Night Protection Wear reflective Jacket	5	(Where required)			
g)	Fire Protection No Smoking Emergency Exit	5	(Where required)			
h)	Other Protection Permit to Work areas Danger Electricity. Danger Crane Overhead Stop Look and Listen First Aid. No Entry signs work in progress	5	(Where required)			
2	WORKING AT HEIGHT Scaffold Signage's like SAFE, UNSAFE, FIT FOR USE, AVOID USE etc.	5 types made of metal sheet to be mounted at different location	Each 25	Each 50	Each 75	Each 100
3	Traffic Safety Signage's (Speed limit, safe crossing etc.)	5	Each 25	Each 50	Each 75	Each 100

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Schedule 05: Minimum Illumination Level

SN	Facility or Function	Luminance lx (lm/ft ²)
1	Administrative areas (Offices, Meeting rooms, etc.)	540 (50)
2	Construction areas	
	General indoor	55 (5)
	General outdoor	33 (3)
	Tunnel and General underground work areas	55 (5)
3	Access ways - exit ways, walkways, ladders, stairs etc.	110 (10)
4	Maintenance / Operating areas / shops	
	vehicle maintenance shop	325 (30)
	carpentry shop	110 (10)
	outdoors field maintenance area	55 (5)
	refueling area, outdoors	55 (5)
	shops, fine details work	540 (50)
	shops, medium detail work	325 (30)
	welding shop	325 (30)
5	Mechanical / Electrical equipment rooms	110 (10)
6	Hoists, Elevators, (freight and passenger)	215 (20)
7	Warehouses and storage rooms/area	
	indoor stockroom, active/bulk storage	110 (10)
	indoor rack storage	270 (25)
	outdoor storage	33 (3)
8	Health Centers and First aid stations and infirmaries	325 (30)
9	Toilets, wash and dressing rooms	110 (10)
10	Work areas – General (not listed above)	325 (30)
11	Parking areas	33 (3)
12	Visitor areas	215 (20)
13	Laboratories	325 (30)

Schedule 06: Hazardous Substance Assessment

HAZARDOUS SUBSTANCES ASSESSMENT (for use on project site)	
Name of Agency :	Contract No :
Generally Assessed - For use outside or in well ventilated areas	Y / N
Others Specific assessments required	Y / N

SN	Hazardous Material	Used Y/N	SN	Hazardous Material	Used Y/N	SN	Hazardous Material	Used Y/N
1	Cement		21	Contact Solvents		41	Butyl Mastic Sealants	
2	Lime		22	Liquid Petroleum Gas		42	Acrylic Sealants	
3	Plaster		23	Diesel / Gas Oil		43	Mastic Primers	
4	Aertex		24	Engine Oils		44	Mastic Solvents	
5	Sand		25	Hydraulic Oils		45	Hot Mastic Sealants	
6	Aggregates		26	Shutter Oils		46	Bitumastics	
7	Plasticizers		27	Greases		47		
8	Retarders		28	Pipe Lubricants		48		
9	Rapid Hardeners		29	Paints / Primers		49		
10	Coloring / Mortar		30	Paint Solvents		50		
11	Curing Agents		31	Brush Cleaners		51		
12	Rapid		32	Epoxy Mortars		52		
13	Softwoods		33	Epoxy Adhesives		53		
14	Hardwoods		34	Epoxy Sealants		54		
15	Fiberboards		35	Epoxy Primers		55		
16	Bleaches		36	Epoxy Solvents		56		
17	Brick Cleaner		37	Epoxy Cleaners		57		
18	Concrete Cleaner		38	Elastomeric Sealants		58		
19	Coated Road Stone		39	Elastomeric Primers		59		
20	Contact Adhesives		40	Elastomeric Solvents		60		

Note: To be completed at Commencement and Revised Periodically and Updated as required

Signature
Head of Agency

Signature
HSE Manager (ADANI)

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Schedule 07: EXAMPLES OF TOOL BOX TALKS

The purpose of the following Toolbox Talks is give guidance on the subject matter to be covered during the talk. The talk should be given to groups of workers no greater than twenty in number by their supervisor. Each talk should last between ten and fifteen minutes. An attendance sheet of each talk should be kept showing who presented the session, the workers who attended, and the duration.

The following list shows the subjects that can be covered, but not limited to:

- Personal Points (listed below)
- Personal Protective Equipment - Unsafe clothing, footwear, eye protection
- Manual Handling
- Hand Tools - Defective equipment
- Machinery / Equipment Guarding
- Ladders
- Cartridge Tools
- Compressed Air
- Oxygen
- Compressed gas Cylinders
- Drilling Machines
- Pre-permit activation job specific toolbox talk
- Excavation
- Electrical safety - Defective electrical equipment etc.
- Situational awareness
- Improper ventilation
- Unsafe use and storage of hazardous substances
- Unsafe design or construction
- Other topics - Horseplay or practical jokes, Careless attitudes, Taking unnecessary risks etc.

(NAME OF OWNER)	TOOL BOX TALK NO 1
PERSONAL POINTS	
Never take chances. Carry out the instructions you have been given. If you do not know or understand -Ask. If you see on unsafe condition - Rectify it or report it. If you have an accident, make sure you report it and get it properly attended to. Obey all safety signs and rules. Do not distract others or "horseplay" around Only operate plant and equipment that you are authorized to. Never operate machinery unless all the guards are inplace. Always wear the protective clothing and equipment that you have been provided with. Keep your work place clean and tidy. Look after your tools, don't leave them on the ground where they can be damaged or where people can fall over them.	