

TECHNICAL COMPLIANCE FORMAT (CONSTRUCTION)

(TENDER NO. B828-000-83-44-EP-T-9510)

**PROJECT : WATER PIPELINE FROM RUNDH (PH) TO
JHAGADIA PUMP HOUSE**

**OWNER : NOTIFIED AREA AUTHORITY (NAA) - GUJARAT
INDUSTRIAL DEVELOPMENT CORPORATION
JHAGADIA**

JOB NO. : B828

0	22.04.2024	ISSUED FOR BIDS	Bipin Chandra	P K Rai	ED(C)
Rev. No	Date	Purpose	Prepared by	Checked by	Approved by

Bidder must furnish answers/clarifications/confirmations of all the following queries and submit along with offer.

SL. NO.	COMMENT/QUERY	BIDDER'S CONFIRMATION/ANSWER
1.	Bidder to confirm that requirement of Health, Safety and Environment (HSE) as per specification 6-82-0001 are taken into consideration.	
2.	Bidder to confirm that required construction equipments to meet the contract schedule shall be mobilized by him without any time & cost implications.	
3.	Bidder to confirm that required construction personnel for supervision to meet the contract schedule shall be deployed by him without any time & cost implications.	
4.	Bidder to confirm that Construction Management of this job shall be done by him and shall not be sub-contracted to any other agency.	

Bidders Name	
Bidder's Signature and Stamp	

PROJECT EXECUTION AND ASSURANCE PLAN
CONSTRUCTION SUPERVISION AND MANAGEMENT BY PACKAGE CONTRACTOR

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CONSTRUCTION SUPERVISION AND MANAGEMENT

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APPENDIX - A QUALITY ASSURANCE AND QUALITY CONTROL MANAGEMENT DURING CONSTRUCTION

APPENDIX - B HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT DURING CONSTRUCTION

List of Attachments:

Attachment-I	Standard Specification for Health, Safety and Environment (HSE) Management	6-82-0001 , Rev 2
Attachment-II	Calibration Requirements of Monitoring and Measuring Devices at Construction Sites	7-82-0002, Rev 1
Attachment-III	Format for Observation on Quality Aspects (OQA)	B828-00-000-19-41-0001 F1
Attachment-IV	Format for Observation on Safety Aspects (OSA)	B828-00-000-19-41-0001 F2

1.0 GENERAL

- 1.1 The CONTRACTOR shall construct Pipeline Facilities in accordance with the requirements of the Technical Standards/ Specifications, with proven/good engineering practices and procedures. Such Facilities shall be safe, reliable and suitable for their intended purpose.
- 1.2 The CONTRACTOR shall provide all supervision, labour, construction equipments, tools & tackles, materials and consumables, temporary facilities, Construction utilities, Drinking Water, Restroom, washroom Facilities etc. and render all support services necessary for the construction.
- 1.3 The CONTRACTOR shall plan, execute, manage and control all the construction activities for the facilities forming a part of this contract.
- 1.4 The CONTRACTOR shall arrange insurance coverage for all the personnel engaged by him for the work as per statutory rules, regulations and local laws.
- 1.5 The CONTRACTOR shall insure all the materials and equipments against fire, flood, earthquake, theft, etc. as per SCC/ GCC brought for the job till the Pipeline Facilities are commissioned and handed over to the OWNER.
- 1.6 The CONTRACTOR to ensure mechanizing the construction activities to a great extent.
- 1.7 The CONTRACTOR is deemed to have full knowledge of the applicable laws and regulations, conditions of labour, local conditions, the site conditions, environmental aspects and shall comply with the requirements thereof.
- 1.8 The CONTRACTOR is required to organize and mobilize Construction Management Services in a systematic and sequential manner to ensure that the Plant installation is carried out in accordance with the approved engineering drawings, specifications, standards, QA/QC procedures etc. and its mechanical completion is achieved within targeted time schedule. Construction Management and Supervision is to be carried out by the CONTRACTOR himself by deploying persons on his rolls and this activity is not to be sub-contracted in any case.

For this purpose, the Contractor shall deploy a Construction Management Team headed by a qualified & experienced personnels at site. The Construction Management team shall include engineers/ specialists in QA/QC, Project Control (Planning, scheduling, monitoring), contracts, construction supervision, progress measurement/billing, safety, warehousing, purchasing etc.
- 1.9 The CONTRACTOR shall ensure delegation of adequate and sufficient powers (including financial) to the Head of his Construction Team for effective and smooth functioning of the construction management. HO support shall be provided to the Head of Construction Team at site during construction on all matters of project execution including the following:
 - Field engineering.
 - Vendor specialists required during construction.
 - Rectification/replacement of defective supplies, if any, noticed during construction.
 - Expediting replacement of imported items found short/damaged.
 - Required documentation for the material management & material inspection at site
 - Compilation and submission of Field Inspection documents in requisite copies as per contract
 - Documentation to meet Statutory requirements.
- 1.10 The construction supervision, co-ordination and management activities shall be carried out by the CONTRACTOR in accordance with the construction procedures developed and submitted by the CONTRACTOR and approved by Owner/PMC. CONTRACTOR shall prepare construction schedules within the framework of overall contract schedule and submit to Owner/PMC for approval. CONTRACTOR shall plan, execute, monitor and control construction activities as per

the approved construction schedule. The schedule so prepared shall be reviewed periodically and backlog if any related to availability of work front/ materials shall be brought to the notice of Engineer-in- Charge and corrective actions to be taken to meet the monthly/ overall Construction targets.

- 1.11 The entire test equipment deployed shall have valid test/calibration certificates traceable to relevant national/ international standards. Such material tests, for which testing facility at site is not established, shall be carried out by CONTRACTOR at testing laboratories approved by Owner/PMC at no extra cost. CONTRACTOR shall maintain the test records and the same shall be made available for review/ inspection of Owner/PMC. Further, Owner/PMC reserve the right to witness/ inspect testing at the laboratory at no extra cost to Owner/PMC.
- 1.12 Construction supervision and management functions to be performed by the CONTRACTOR shall include the following as key functions for effective execution, monitoring and control:
 - Planning, scheduling, monitoring & reporting.
 - Construction supervision, discipline wise.
 - Quality assurance and quality control, discipline wise.
 - Shipping, custom clearances, inland transportation, if applicable
 - Warehouse management and material control.
 - Field engineering/Purchase.
 - Health, Safety and Environment (HSE) Management
 - Enforcement of statutory rules/ regulations and Labour Laws
 - Personnel/administration/Industrial Relations
 - Billing and invoicing
 - Finance and Accounts
 - Security
- 1.13 Whenever the hookup is to be done, efforts shall be made by the CONTRACTOR to complete the work and restore the system expeditiously. If required the work shall be continued round the clock.

2.0 EXECUTION OF WORKS

The CONTRACTOR'S work during construction shall include but not be limited to the following:

- i. Prepare and submit all the Plans, Procedures and documents to Owner/PMC as specified in the contract.
- ii. Establish requisite site organization staffed by competent and experienced specialists, supervisors and inspectors.
- iii. Supervise, Coordinate and manage the activities performed at site by him and by his sub-contractors for execution of work and render all technical/specialist services.
- iv. Plan and schedule the construction work, monitor and take timely corrective action when required to adhere to approved execution schedule.
- v. Plan, allocate and mobilize required resources, manpower, and construction equipment/materials, commensurate with construction plan/schedule.
- vi. Provide all temporary facilities required for Construction including drinking water, lighting, office space, electronic transmission of drawings & documents, printing facilities, rest rooms, crèches, first-aid, fire protection system, toilets, canteen facilities, labour hutments, transport facilities for the workers and staff.
- vii. Prepare & implement Quality Control and Quality Assurance plan.
- viii. Prepare & implement Health, Safety & Environment (HSE) plan.

- ix. Report beforehand and take approval from Owner/PMC regarding use of any equipment and/or material not conforming to the contract, drawings and specifications.
- x. Execute and supervise all additional works and modification works as required or suggested by Owner/PMC as a part of approved change orders.
- xi. To organize and obtain all applicable clearances/approvals from statutory bodies/authorities, as required by the laws of land for the work executed at site shall be the responsibility of the Contractor under the contract.
- xii. Obtain approval of Owner/ PMC for Welding Procedure Specifications (WPS)/ Procedure Qualification Records (PQR) as required. Carry out inspection, non-destructive tests and analyze and certify acceptability of all welds and materials in accordance with specified Technical Standards. Carry out inspection and testing of incoming materials as per agreed procedures.
- xiii. Organize and conduct Weekly Project Review meeting related to site construction activities.
- xiv. Provide daily work progress reports and detailed weekly and monthly progress reports summarizing percentage completion of the work including status of drawings, materials and effects on approved schedule, areas of concern and corrective actions required thereof. Contractor shall also identify any foreseeable delays in any aspect of the WORK and take corrective actions to eliminate/minimize the effect on Overall Completion Schedule. All progress shall be quantified.
- xv. Take photographs and video recording of Project Construction Progress on regular basis and submit the same to Owner/PMC on monthly basis along with the Monthly Progress Report.
- xvi. Prepare and submit safety and labour relation procedures in line with all applicable codes, regulations and OWNER'S requirements.
- xvii. Supervise and monitor all safety and labour relation functions as per agreed procedures and applicable laws of the land and report to Owner immediately for any violations and injuries.
- xviii. Maintaining all the records generated during project execution up-to-date and made available to Owner/PMC whenever requested. These records shall be handed over to Owner on completion of the work at no extra cost to Owner.
- xix. Take all necessary precautions and required actions to protect construction work and materials from damage by local weather conditions and ongoing construction activities in the vicinity, theft and pilferage etc. till handing over of the pipeline to Owner.
- xx. Damages, if any, occurred to the existing facilities at the site during execution of the job shall be intimated to Owner / PMC immediately and the damages shall be rectified promptly without any extra cost to Owner.
- xxi. Prepare and submit to Owner/PMC the following daily reports for construction activities covering the following:
 - a. Weather
 - b. Manpower deployment category wise
 - c. Construction Equipments
 - d. Work Progress
- xxii. All material handling equipment, tools, tackles, hoisting and lifting equipments/ machineries should be subjected to required load test initially and then periodically, to ensure safe/stable operation.

- xxiii. Organize field engineering work, wherever required and ensure timely resolution of interface problems / site constraints in consultation with Owner/PMC.
- xxiv. Prepare and certify material reconciliation statement on completion of work to enable Owner to take over the surplus materials, as applicable.
- xxv. Organize the codification and handing over of surplus materials (as applicable) and spares/ tools and tackles to the Owner on completion of work.
- xxvi. Provide weekly/daily activity plan for site inspection.
- xxvii. Develop a mechanical completion program to facilitate sequential Pre-commissioning/Commissioning activities in a logical manner to meet the Overall Project Schedule.
- xxviii. Remove / demolish all temporary structures/ establishments/ facilities created by the Contractor / his sub-contractors during the execution of the work and restore the site to its original condition.

3.0 EXECUTION PLANS

CONTRACTOR shall submit Construction Execution Plan to Owner/PMC for review/approval during kick-off meeting. The Plan shall detail the execution methodology of the CONTRACTOR during construction phase of the PROJECT covering following aspects as minimum –

3.1 Construction Management Plan

CONTRACTOR shall submit Construction Management Plan to Owner/PMC for approval during kick-off meeting. The Plan shall detail the management methodology to be applied during the construction phase of the PROJECT, along with a list of procedures to be utilized in undertaking the work.

All reference procedures and detail work plans referred to in this document must be submitted for review and approval by Owner/PMC at least (4) four weeks in advance of actual commencement of the activity concerned.

3.2 Construction Execution Plan:

It shall include the following as minimum:

- 3.2.1 Contractor's manpower and man-hour histogram by major section and discipline and their manpower deployment schedule on monthly basis.
- 3.2.2 Major equipment mobilization plan on monthly basis with short description. CONTRACTOR to develop this plan with due consideration to maximize the mechanization of construction activities.

Other plans of Contractor and procedures to be submitted at least four (4) weeks/as stipulated in tender prior to start of respective activity at site, include the following as a minimum:

- a. Develop/ prepare construction execution plan/procedures and submit to Owner/ PMC for approval.
- b. Temporary facilities, etc.
- c. Barricading Plan, if applicable
- d. Excavation and underground work plan
- e. Monsoon counter measures and preparation
- f. Emergency Evacuation Procedure
- g. Schemes to carry out works in inclement weather

Contractor shall ensure that lay down area (as applicable) given to him shall be utilized optimally.

3.3 Sub-Contracting Plan

A minimum of the following activities shall be performed by the CONTRACTOR directly and shall not be subcontracted:

- a) Project Management
- b) Planning
- c) Procurement
- d) Construction Management
- e) Commissioning

If CONTRACTOR proposes to engage sub-contractor(s) for the execution of some of the activities at site, a preliminary sub-contracting plan along with the identified scope of work for each sub-contract shall be furnished by the CONTRACTOR to the Owner/PMC at the time of bid submission. However, the credentials of proposed Sub-contractor(s)'s shall be submitted by the CONTRACTOR on award of work, which shall be evaluated by Owner/PMC at SITE for acceptance. CONTRACTOR shall not be permitted to change the sub-contractor under any circumstances without prior approval of Owner/PMC. Non-compliance of the above shall be strictly dealt within relevant provision(s) of the contract.

The sub-contracting plan shall cover

- i) Sub-contracting philosophy and plan
- ii) List and scope of work of each subcontract
- iii) Subcontract administration plan
- iv) Organization chart of each sub-contractor.

The list and major scope of each subcontract shall not be changed from those of the CONTRACTOR'S plan unless specially approved by OWNER.

4.0 TEMPORARY FACILITIES

The CONTRACTOR shall arrange the following temporary facilities as the minimum (including for his sub-contractors also):

- i) Exact location of temporary work area, access and general layout inside the area.
- ii) Planning and description of the temporary facilities such as:
 - a. Identification of borrow earth area (if required)/excess earth dumping yards
 - b. Site office and Fabrication yards, Open storage area and Warehouse
 - c. Miscellaneous workshops including maintenance area for construction equipments.
 - d. Temporary roads including access road, fencing and gates
 - e. Security, watch & ward, security gates, etc.
 - f. Utility supply systems viz. Construction power with DG Sets, construction water, drinking water etc.
 - g. Area lighting
 - h. Fire fighting equipments
 - i. Drainage and Sanitation
 - j. Camp Accommodation/ Rest Rooms/ Dining rooms.
 - k. Radiography Source Pit
 - l. Mobile toilets.
 - m. Field Testing Laboratory

- n. Communication facilities viz. Telephone, Fax, E-mail, electronic transmission of drawings./ documents, etc.
- o. Hutments, transport, Pantry and Canteen for staff and workers.
- p. Vehicle parking area including construction equipments.
- q. First aid arrangement/ medical and health care facilities

CONTRACTOR shall develop the temporary facilities layout for approval of Owner/PMC.

5.0 CONSTRUCTION PLANNING, SCHEDULING, MONITORING & REPORTING

The CONTRACTOR shall be responsible for construction Planning, Scheduling, Monitoring and Reporting activities at site in line with the overall master schedule and details stipulated elsewhere in the document.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

The CONTRACTOR shall be responsible for ensuring quality of construction (including materials) carried out by him/his approved sub-contractors in accordance with the requirements given in Appendix-A for Quality Assurance / Quality Control (QA/QC) during construction including all documents referred therein.

7.0 WAREHOUSE MANAGEMENT & MATERIAL CONTROL

The CONTRACTOR shall construct/ build warehousing facilities (both covered and open) appropriate for storing materials required for the job. The facilities shall include proper lighting, fire protection system, office/rest rooms/toilets for warehouse personnel.

The CONTRACTOR shall be responsible for carrying out the Warehouse Management and Material Control in accordance with the approved warehousing procedure and material control procedure, which is to be submitted by the CONTRACTOR during kick-off meeting.

CONTRACTOR shall generate and issue following reports:

- Fortnightly statement of consignments in transit.
- Daily report of material received.
- Material receipt status and inventory status w.r.t. material delivery schedule
- Material Inspection Report with respect to materials received at site
- Report on Over/Short/Reject/Damage (OSRD) receipts against each consignment on receipt at warehouse.
- Weekly status of consignments, Material Receipt Report (MRRs)
- Monthly status of field purchase.
- Monthly status of over, short, reject & damage (OSRD) settlement.
- Monthly status of piping material MTO V/s Actual receipt.
- Daily Stock Position of Cement
- Any other report as desired by Owner/PMC.

8.0 FIELD ENGINEERING

CONTRACTOR shall be responsible for controlling and issue of technical drawings and documents, preparation of field sketches, field modifications, checking/preparation of as- built drawings, etc. CONTRACTOR should have adequate facilities for incorporating field changes, preparation of As-built drawings, Printing machines and Drawing & Document Control System.

9.0 FIELD TENDERING

CONTRACTOR shall be responsible for carrying out field tendering activities, as required from the site itself.

10.0 FIELD PURCHASE

CONTRACTOR shall be responsible for carrying out field purchase activities, as required.

Field Purchase items are restricted to those required for running and maintenance of the field offices, items required to expedite construction work and items found short, missing or damaged against the main order when received at the site. Any material purchased from field for usage in the project should have proper inspection certificate and should be purchased from Owner/PMC approved suppliers. If required by OWNER/ PMC, check testing of the material samples selected by Owner/PMC shall be carried out by CONTRACTOR without any extra commercial implication.

11.0 HEALTH, SAFETY AND ENVIRONMENT (HSE) MANAGEMENT

The CONTRACTOR shall be responsible for Health, Safety and Environment (HSE) Management at construction site for the construction activities to be carried out by the him/his approved sub-contractors in accordance with the requirements mentioned in Appendix-B for Health, Safety and Environment Management during construction.

12.0 HOUSE KEEPING

It is the responsibility of the CONTRACTOR to maintain general cleanliness and proper housekeeping at work site. CONTRACTOR shall organize disposal of excavated earth /garbage/ rubbish/scrap, etc. on day to day basis to identified disposal areas/safe areas and forward daily report for the same indicating the details of men and machinery deployed for the purpose; if asked by Owner/PMC.

13.0 INDUSTRIAL LABOUR RELATIONS

CONTRACTOR shall be responsible for industrial relation functions and implementation of labour laws at site. CONTRACTOR'S staff shall be suitably trained and experienced in Labour Relation functions so as to ensure a good relationship with labour and to prevent the occurrence of industrial disputes resulting in subsequent delays or work stoppages. In particular, CONTRACTOR shall maintain close liaison with Owner/PMC.

CONTRACTOR shall maintain proper liaison with Statutory Authorities and local bodies and shall be responsible to implement and observe all statutory laws at site. CONTRACTOR must have in his staff; a well experienced Labour Relation Officer, preferably from local area.

CONTRACTOR shall maintain the records of wages paid in a wage register etc. as applicable per statutory regulations.

CONTRACTOR shall report immediately to Owner/PMC any problems including labour disputes, fight, and work stoppages. A written report shall be submitted to Owner/PMC within 24 hours of the incident.

CONTRACTOR must submit a Labour Relation Plan including their sub-contractor(s) prior to the start of the work/within one month of award of the contract, whichever is earlier, mentioning as a minimum:

- A detailed estimate of the number of labour, both indirect and direct, sorted by craft.
- Outline recruiting plans for all manpower requirements.
- Identify personnel involved with labour relations and outline procedures to mitigate labour disputes & problems.
- Labour welfare plan

CONTRACTOR shall hold labour relations meeting twice a month with their work force as well as a separate meeting with the Owner.

14.0 CONSTRUCTION EQUIPMENTS

The Contractor is required to organize and mobilize the construction equipments and other tools/tackles in a sequential manner and ensure that plant installation is carried out in a mechanized manner to the extent possible and its mechanical completion is achieved within targeted time schedule.

Contractor shall deploy following construction equipment as per site requirement to the maximum extent –

- i. Cranes of different capacities required for erection/ handling of materials.
- ii. Trailers
- iii. X-ray and Gamma ray Radiography sources, as required
- iv. Ultrasonic testing machine, as required
- v. Hydraulic Excavators
- vi. Welding machines
- vii. Boring/ Pushing Machine
- viii. Concrete coating machine
- ix. DG sets
- x. Test Pumps
- xi. Gas and Mechanical cutting devices
- xii. Various inspection / measuring devices

The Contractor shall, without prejudice to his responsibility to execute and complete the work strictly as per the specifications and other laid down procedures, execute all the work by mechanizing the construction activities to the maximum extent by deploying all necessary construction equipments/machinery of adequate capacities and numbers.

For efficient working and maintenance of construction aids, Contractor shall establish and maintain crane yard / workshop equipped with regular maintenance facilities for various construction aids for carrying out routine field maintenance during performance of the contract. Temporary approach road wherever required for the movement of the Cranes and other vehicles for erection and transportation of material shall be properly planned and made by the Contractor. Weekly/fortnightly maintenance shall be planned in such a way that the same does not hamper the execution schedule.

Contractor shall submit the construction equipment deployment schedule at the time of kick off meeting. Daily construction equipment deployment report will also be submitted by the Contractor to Owner/PMC in the performa approved by Engineer In charge.

Contractor shall ensure the timely augmentation of the men, equipments and machinery depending upon the exigencies of the work to meet the overall project schedule and as per instructions of Owner/PMC.

15.0 CONSTRUCTION MANPOWER

The Contractor is required to organize and mobilize construction staff/ manpower in a sequential manner to ensure that the work is carried out in accordance with the construction schedule. Mobilization of construction staff should be such that the progress achieved in phased manner should match with the overall Project Schedule. Key Personnel i.e. Resident Construction Manager/ Site In-charge, QA/QC Engineer, Planning Engineer, Safety officer, Discipline Engineer for execution of job shall be deployed. Curriculum vitae of all key Construction Personnel shall be submitted to Owner/PMC for approval before deployment. Owner/PMC reserves the right to interview these personnel before their mobilization.

Contractor shall clearly indicate in his construction methodology whether work shall be done departmentally or by engaging sub-contractor or the combination of both. The works of all sub-contractors shall be managed by the construction staff of the main Contractor who shall perform the duties of construction management and shall administer, coordinate, and inspect the works of the sub-contractor(s) and be responsible for the Quality and timely completion of respective works. The Contractor shall establish the pre-requisites for successful completion of sub-contractor (s) work. However, by deploying the sub-contractor (s), as approved by Owner/PMC for any discipline, does not absolve the Contractor of his total responsibility under the subject contract.

The Contractor must note that in case of any sub-contractors' failure to execute the works as per standards/specifications/drawings and/or negligence & disobedience in carrying out any order or instruction of Owner/PMC, the same shall be viewed very seriously and any action as deemed fit in accordance with provision(s) of the contract shall be taken by Owner/PMC.

Contractor shall submit the construction manpower deployment schedule at the time of kick off meeting. Daily construction manpower deployment report shall also be submitted by the Contractor to Owner/PMC on approved format. Any additional manpower of any category required to be deployed during the actual execution of the work to meet the Project time schedule and as instructed by Owner/PMC, shall be mobilized by the Contractor within a reasonable time. Mobilization of such additional manpower by the Contractor shall not entitle him for any additional compensation at all.

All construction supervision, coordination and management activities shall be carried out by the Contractor in accordance with the construction procedures approved by Owner/PMC. Contractor shall prepare construction schedules based on the Overall Project Schedule and submit the same to Owner/PMC for approval.

16.0 INTERFACE WITH OTHER CONTRACTORS

CONTRACTOR shall ensure that his interface with other CONTRACTORS is smooth and cordial. In case of any dispute, Owner/PMC decision shall be binding.

Generally, the following interfaces may be present:

- CONTRACTOR shall allow movement of persons/ material/ equipment/ vehicles belonging to other CONTRACTORS or Owner/PMC through the roads constructed by him.
- CONTRACTOR shall not dump his earth, scrap or any material in other Contractors' area. He shall cooperate with Owner/PMC in maintaining good housekeeping.

APPENDIX - A

QUALITY ASSURANCE

AND

QUALITY CONTROL

DURING CONSTRUCTION PHASE

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1.0 SCOPE

This document shall be applicable to all construction works to be executed by CONTRACTOR.

2.0 RESPONSIBILITY

It is Contractor's prime responsibility to arrange/produce the product conforming to contract specifications and inspect all equipment, materials and works at various stages of execution as per the approved QA Plans. In addition, they have to coordinate directly with the Owner/PMC and other involved agencies to give adequate confidence that the activities are performed as per agreed ITPs and necessary documentation is available. Contractor shall deploy an exclusive team of Quality control Engineers and Supervisors for ensuring the quality of works executed at site on day to day basis. Verification by Owner/PMC or his representative at any stage shall not relieve CONTRACTOR of his responsibility towards quality of the product.

The CONTRACTOR shall comply with all statutory rules & regulations in force during execution of work and interface with such authorities as required.

3.0 METHODOLOGY

The management of construction quality control is divided into the following categories:-

- (1) Procurement of materials required for the construction work.
- (2) Execution of work
- (3) QA/QC Audits

3.1 PROCUREMENT OF MATERIALS REQUIRED FOR THE CONSTRUCTION WORK

The CONTRACTOR shall develop list(s) defining the items to be procured along with proposed Vendors for approval of the Owner/PMC. The vendor list shall be in line with the contract document. In case, no vendor list exists in the contract for a particular item, the CONTRACTOR shall propose a list of Vendors to Owner/PMC. CONTRACTOR has to satisfy himself with the capability of the vendor to deliver the product in time with quality before proposing him as a prospective vendor. CONTRACTOR shall submit the QA/QC plans for all major items and carry out their procurement in line with the approved plans. The CONTRACTOR can either provide his own adequate qualified staff for inspection or employ a separate third party inspection agency with prior approval to carry out these functions. Involvement of Owner/PMC in the quality control plan, if required, shall be defined during approval of the same.

3.2 EXECUTION OF WORK

- (i) The QA plans for execution shall be developed by the CONTRACTOR. OWNER/PMC's approval for the same shall be taken well before start of the work. The final Inspection & Test Plans (ITPs) and formats shall be developed by the CONTRACTOR as per contract specifications for approval by Owner/PMC before actually undertaking such activities. For the activities which are identified as Witness or Hold Point, specific inspection call shall be raised by the CONTRACTOR with Owner/PMC in the requisite format well in advance.

CONTRACTOR shall be completely responsible for management of approved quality plans and Owner/PMC involvement will be only of Surveillance in nature to randomly check the works at selective/critical junctures. Their role shall be to monitor that the CONTRACTOR is executing the quality plans as per the approved drawings, employing adequately qualified staff and other resources for various items of works. Any deviation to the specifications shall be brought to the notice of Owner/PMC in prescribed formats by CONTRACTOR for approval.

- (ii) It is likely that the CONTRACTOR may engage sub-contractor(s)/vendors for performance of the work. CONTRACTOR shall be responsible for ensuring the implementation of approved QA plan, contract specifications and contract conditions

through their sub-contractors to achieve the quality during all stages of construction. It shall be the responsibility of the CONTRACTOR to ensure proper coordination between his sub- contractor(s) and other agencies working at site.

The sub-contractor(s)/vendors selection shall be done after evaluation by the CONTRACTOR in line with contract requirements and shall be got approved by Owner/PMC before engaging them for the works.

(iii) Storage

All the materials procured shall be stored/stacked as per the standard norms and as recommended in various clauses of relevant codes and contract document. The storage of material shall be such as to avoid damage to life/properties (physical and chemical) of the materials. The storage shall not cause deterioration, rusting, mix-up etc. and hamper the other related works in any way. CONTRACTOR shall submit his detailed warehouse plan for Owner/PMC approval to manage the above in open/covered areas.

The materials susceptible to fire shall be kept away in a separate protected place.

In general, the materials shall be kept systematically in order of their class, batch number and identification number, so that they are accessible for the inspection by Owner/PMC whenever required and to avoid the mix up in those materials.

(iv) Use

The materials shall be stacked in such a way that the lot, which is procured first, will be consumed first. For materials which are having specific expiry date/ shelf life shall not be used beyond that date and shall be removed from site. Wherever there is any doubt about the change in properties of the materials, such materials shall be sent to reputed approved laboratory for testing and acceptance.

(v) Inspection

The CONTRACTOR shall be responsible for carrying out inspection of the materials brought at site and conducting tests/ checks (at site or in approved laboratories) at predefined frequencies as per contract. It is the responsibility of the CONTRACTOR to ensure that the materials used at site shall conform to relevant codes/ standards and Manufacturer Test Certificates are available for correlation as and when required. The CONTRACTOR shall maintain the records of all materials brought at site and tests conducted on them.

(vi) In process and final Inspection

CONTRACTOR shall be responsible to arrange verification of products during in- process and final inspection. Relevant checks and tests shall be arranged for the works performed and records maintained. Efforts shall be made to keep checks and controls in such a way that a non-conforming product is avoided. However, if in an isolated case, the tolerances are beyond the acceptable values given in the contract/execution drawings/codes, non-conformance resolution/Deviation permit need to be raised by the CONTRACTOR and got approved/resolved from Owner/PMC.

The CONTRACTOR shall arrange verification of ingredients used and validation of the software used at the batching plant(s). Owner/PMC reserve the right to inspect the working of batching plant including validation of the software used and calibration of measuring & monitoring devices any time. The CONTRACTOR shall ensure the quality of the concrete delivered by the transit mixers, as applicable and maintain verifiable records.

CONTRACTOR will carryout Inspection, Non-destructive Tests and analyze and certify acceptability of all welds, materials and works in accordance with specified technical standards/International standards and carryout inspection and testing of incoming materials as per agreed procedures.

- v) Any Observation on quality aspects, Owner/PMC shall raise observation in attached OQA format which has to be acknowledged & compliance to be done by the contractor within the agreed time period.
- vi) The CONTRACTOR shall follow the requirements given for control of monitoring and measuring devices (Refer Document no. 7-82-0002).

3.3 QA/QC AUDITS

During the execution of the works, CONTRACTOR shall carry out periodical Quality Audits at least quarterly in all areas of work. These audits will be conducted by a team of specialists in the respective areas. The auditors shall not be directly involved in the jobs being audited.

The CONTRACTOR shall prepare an Audit Plan and Procedure and submit the same to Owner/PMC for approval.

A copy of the Audit Report containing the findings of the Audit team will be submitted to Owner/PMC. After completion of rectification/modifications/corrective actions on the issues indicated in Audit Report, Compliance Report shall be submitted by the CONTRACTOR to Owner/PMC for review.

Over and above the Contractor's Internal QA/QC Audits outlined above, Owner/PMC shall also reserve the right to conduct QA/QC audits at the frequency decided by them. CONTRACTOR shall participate and provide full support to the Audit Team and furnish all documents/reports/records as desired by the Audit Team. The CONTRACTOR shall take all actions required to comply with the findings of the Audit Report and issue regular Compliance Reports for the same to Owner/PMC till all the findings of the Audit Report are fully complied.

In case major Non conformities are observed during execution of the works, Owner/PMC reserve the right to appoint an independent person/Third Party Agency to conduct QA/QC Systems Audit for full/part of the facilities being executed by the CONTRACTOR. This audit will be in addition to the audits described above and may be carried out intermittently/continuously for all or part of the facilities being executed by the CONTRACTOR. CONTRACTOR shall bear the total cost of such audits and shall participate & provide full support to the Audit Team and ensure compliance of the audit observations.

4.0 DOCUMENTATION AND RECORDS

All the necessary documentation & records shall be maintained by CONTRACTOR till completion of project and handed over to Owner/PMC in requisite copies as a part of completion documents. Wherever Owner/PMC personnel were directly involved particularly in witness and hold point, the copies of the records shall also be provided to personnel on completing inspection of those activities. The documentation & records shall include the following as a minimum but not limited to:

- i) Approved Quality Assurance Plan
- ii) Approved Inspection and Test Plans
- iii) Inspection and test documents covering
 - a) Manufacturer Test Certificate
 - b) Material Receipt Report including Inspection Release Note, if applicable and Site Inspection and acceptance Report on quality and quantity of material
 - c) Site test/laboratory test Report reviewed by CONTRACTOR for acceptance vis-à-vis to contract/code requirements for materials at warehouse.
 - d) In process Verification reports of CONTRACTOR representative and OWNER/PMC as applicable
 - e) Final verification report including any test checks done for compliance
 - f) As-built vis-à-vis to contract/drawings including tolerances
 - g) As-built for erection

- h) Non conformance resolution raised by CONTRACTOR/OWNER/ PMC
- i) Concession/Deviation approval by Owner/PMC
- j) Change order approval by Owner/PMC incase there is variation from contract
- k) QA/QC Audit Reports and compliance Reports thereof
- l) Mechanical Completion formats

APPENDIX-B

**HEALTH, SAFETY AND
ENVIRONMENT (HSE) MANAGEMENT
DURING CONSTRUCTION**

GENERAL REQUIREMENTS

- 1.0 Specification for Health, Safety and Environment (HSE) Management (Spec. No. 6-82-0001) is required to be followed by CONTRACTOR during Construction Phase at site.
- 2.0 CONTRACTOR shall have a documented HSE policy to cover commitment of the organization to ensure Health, Safety and Environment aspects in the line of operation.
- 3.0 It is the responsibility of the CONTRACTOR to ensure that safe construction procedures are complied with. CONTRACTOR will also ensure that adequate First Aid medical facilities with trained personnel/ nurse (male) to administer First Aid with shed/ Bunker are available are available on round o Clock basis for emergency purpose and that safety practices as per the approved safety procedure are followed by his sub-contractors also.

CONTRACTOR to ensure safety measures at the minimum like:

- a) The use of safety gadgets, viz. safety goggles, helmets, safety shoes, etc.
- b) Barricading of crane movement areas / Radiography areas
- c) Proper earthing of equipments.
- d) Proper shoring / strutting of Excavated Areas, as applicable.
- e) Cylinders of inflammable gases to be stacked upright.
- f) Storing of cylinders like Oxygen/argon/acetylene etc. requires PESO approval. Agency has to obtain necessary approvals from PESO and their guidelines to be followed.

To assist in the development of an effective safety program, a safety checklist for various jobs shall be developed by the CONTRACTOR and the same shall be adhered to by the Contractor's Site-In-charge.

The responsibilities of the CONTRACTOR will include but not limited to:

- Coordination and supervision of the details of the job safety program.
- Initiation of accident reporting, investigation and follow-up actions.
- Preparation of periodic accident summaries.
- Periodic Accident Analysis Reports
- Tallying safety inspection of the job and submission of summary inspection report to OWNER/PMC.
- Check the fitness of cranes and other hoisting equipments on periodic basis and submit to Owner/PMC valid/latest test certificates of tackles used for lifting.
- Submission of any other report required by Owner/ PMC.
- Conduct HSE Audit at predefined frequencies and assist OWNER/CONSULTANT/TPI during conductance of their HSE Audits.
- Ensure closure of NCs observed during the above audits.

All contract workman to be provided with color coded Safety Suits with contractor name and logo.

- 4.0 Any Observation on Safety aspects, Owner/PMC shall raise observation in attached OSA format, which has to be acknowledged & compliance to be done by the contractor within the agreed time period.

Attachment-I

निर्माण स्थल पर स्वास्थ्य, सुरक्षा एवं पर्यावरण प्रबंधन हेतु मानक विनिर्देश

STANDARD SPECIFICATION FOR HEALTH, SAFETY & ENVIRONMENTAL MANAGEMENT AT CONSTRUCTION SITES

2	18/04/2023	REVISED & UPDATED	BT	RK	JPV	SM
1	07/06/2022	REVISED & UPDATED	BT	RK	JPV	SM
0	23/12/2020	REVISED & UPDATED	BT	RK	AKK	S Mazumdar
Rev. No.	Date	Purpose	Prepared by	Checked by	Standards Committee Convenor	Standards Bureau Chairman
Approved by						

Abbreviations:

AERB	:	Atomic Energy Regulatory Board
ANSI	:	American National Standards Institute
BARC	:	Bhabha Atomic Research Centre
BS	:	British Standard
BOCW	:	Building and other construction workers
BOO/BOOT	:	Build, Own, Operate/Build, Own, Operate, Transfer
EIL	:	Engineers India Limited
EIC	:	Engineer In charge
ELCB	:	Earth Leakage Circuit Breaker
EPC	:	Engineering, Procurement and Construction
EPCC	:	Engineering, Procurement, Construction and Commissioning
ESI	:	Employee State Insurance
GCC	:	General Conditions of Contract
GM	:	General Manager
GTAW	:	Gas Tungsten Arc Welding
HOD	:	Head of Department
HSE	:	Health, Safety & Environment
HIRAC	:	Hazard, Identification Risk Assessment & Control
HMV	:	Heavy Motor Vehicle
HV	:	High Voltage
IS	:	Indian Standard
ISO	:	International Organization for Standardization
IE	:	Indian Electricity
LTI	:	Lost Time Injuries
LMV	:	Light Motor Vehicle
LOTO	:	Lock Out & Tag Out
LPG	:	Liquefied Petroleum Gas
LSTK	:	Lump Sum Turn Key
MV	:	Medium Voltage
OH&S	:	Occupational Health and Safety
OISD	:	Oil Industry Safety Directorate
PPE	:	Personal Protective Equipment
PUC	:	Pollution Under Control
RC	:	Registration Certificate
RCCB	:	Residual Current Circuit Breaker
RCM	:	Resident Construction Manager or Site-in-Charge, as applicable
SCC	:	Special Conditions of Contract
SLI	:	Safe Load Indicator
SWL	:	Safe Working Load
TPI	:	Third Party Inspection
TBT	:	Tool Box Talks

Construction Standards Committee

Convenor: Sh John Paul V, ED(Construction)

Members: Sh.Janak Kishore, ED (Projects)
Sh.Biswajit Mandal, CGM (SCM)
Sh. Udayan Chakravarty, Sr.GM (Piping)
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1.0 SCOPE

This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied by Contractors/Vendors including their sub-contractors/sub vendors during construction.

This specification is not intended to replace the necessary professional judgment needed to design & implement an effective HSE system for construction activities and the contractor is expected to fulfill HSE requirements in this specification as a minimum. It is expected that contractor shall implement best HSE practices beyond whatever are mentioned in this specification.

Requirements stipulated in this specification shall supplement the requirements of HSE Management given in relevant Act(s)/ Legislations, General Conditions of Contract (GCC), Special Conditions of Contract (SCC) and Job (Technical) Specifications. Where different documents stipulate different requirements, the most stringent shall apply.

2.0 REFERENCES

The document should be read in conjunction with following:

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Building and other construction workers Act, (Refer Appendix-D)
- Indian Factories Act, (Refer Appendix-D)
- Job (Technical) specifications
- Relevant International/ National Codes (refer Appendix-A for standards/codes on HSE)
- Relevant State & National Statutory requirements.
- Operating Manuals Recommendation of Manufacturer of various construction Machineries
- Occupation Health and Safety Management System (OHSAS 18001:2007/ISO 45001) and Environmental Management System (ISO 14001:2015)

3.0 REQUIREMENTS OF HEALTH, SAFETY & ENVIRONMENTAL (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY BIDDERS

3.1 Management Responsibility

3.1.1 HSE Policy & Objectives

The Contractor should have a documented and duly approved HSE policy & objectives to demonstrate commitment of their organization to ensure health, safety and environmental aspects in their line of operations.

The Contractor's senior management shall provide strong visible leadership and continuously demonstrate commitment to develop, operate and maintain, review and continually improve a HSE culture at site which empowers individuals to take responsibility for their safety and embrace and accept nothing but responsible HSE behaviour.

Contractor shall refer in clause No. 3.3.23 for Key Performance Indicator (KPI).

3.1.2 Management System

The HSE management system of the Contractor shall cover the HSE requirements & commitments to fulfill them, including but not limited to what have been specified under clauses 1.0 and 2.0 above. The Contractor shall obtain the approval of its site specific HSE Plan from EIL/ Owner prior to commencement of any site works. Corporate as well as Site management of the Contractor shall ensure compliance of their HSE Plan at work sites in its entirety in true spirit.

3.1.3 Indemnification

Contractor shall indemnify & hold harmless, Owner/EIL & their representatives, free from any and all liabilities arising out of non-fulfillment of HSE requirements or its consequences.

3.1.4 Deployment & Qualifications of Safety Personnel

The Contractor shall designate/deploy various categories of HSE personnel at site as indicated below insufficient number. In no case, deployment of safety Supervisor / Safety Steward shall substitute deployment of Safety Officer / Safety Engineer what is indicated in relevant statute of BOCW Act i.e. deployment of safety officer/Safety Engineer is compulsory at project site. The Safety supervisors, Safety stewards/Observer etc. would facilitate the HSE tasks at grass root level for construction sites and shall assist Safety Officer /Engineers.

Contractor shall appoint safety personnel as given below for every work shift:

- (i) Safety Observer/Steward: Contractor shall depute one Safety Observer/Steward for every 100 workers or part thereof
- (ii) Safety Supervisor: In addition to above(i), contractor shall depute one Safety Supervisor for every 250 workers or part thereof
- (iii) Safety Engineer: In addition to above (i&ii), one safety engineer/ officer for every 1000 workers or part thereof.

Contractor shall intimate/obtain prior permission from EIC before demobilizing any safety personnel. The Contractor shall mobilize suitable safety personnel as replacement.

a) Safety Steward/Observer

As a minimum, he shall possess class XII pass certificate and trained in fire-fighting as well as in safety/occupational health related subjects, with minimum two year of practical experience in construction work environment and should have adequate knowledge of the local language spoken by majority of the workers at the construction site.

b) Safety Supervisor

As a minimum, he shall possess a recognized graduation Degree in Science (with Physics & Chemistry) or a Diploma in Engg. Or Tech. with minimum Two years of practical experience in construction work environment and should possess requisite skills to deal with construction safety & fire related day-to-day issues.

c) Safety Officer / Safety Engineer

Safety Officer/Engineer should possess following qualification & experience:

- (i) Recognized degree in any branch of Engg. or Tech. or Architecture with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than two years, **or** possessing recognized diploma in any branch of Engg. or Tech with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than five years.
- (ii) Recognized degree or one year diploma in Industrial safety (from any Indian Institutes recognized by AICTE or State Council of Tech. Education of any Indian State/Union territory) with at least one paper in construction safety (as an elective subject).
- (iii) Preferably have adequate knowledge of the language spoken by majority of the workers at the construction site.

Alternately

- (i) Person possessing Graduation Degree in Science with Physics **or** Chemistry and degree or one year diploma in Industrial Safety (from any Indian institutes recognized by AICTE or State Council of Tech. Education of any Indian State/ Union Territory) with practical experience of working in a building, plant or other construction works (as Safety Officer, in line with Indian Factories Act, 1948) for a period of not less than five years, may be considered as Safety Officer.

d) HSE In-Charge

In case there is more than one Safety Officer at any project construction site, one of them, who is senior most by experience (in HSE discipline), may be designated as HSE In-Charge. Duties & responsibilities of such person shall be commensurate with that of relevant statute and primarily to coordinate with top management of EIL/Client and contractors.

In case the statutory requirements i.e. State or Central Acts and / or Rules as applicable like the Building and Other Construction Workers' Regulation of Employment and Conditions of Service- Act, 1996 or State Rules (wherever notified), the Factories Act, 1948 or Rules (wherever notified), etc. are more stringent than above clarifications, the same shall be followed.

Contractors shall ensure physical availability of safety personnel at the place of specific work location, where Hot Work Permit is required/granted. No work shall be started at any of the project sites until above safety personnel & concerned Site Engineer of Contractor are physically deployed at site. The Contractor shall submit a HSE Organogram clearly indicating the lines of responsibility and reporting system and elaborate the responsibilities of safety personnel in their HSE Plan.

Upon fulfilling the basic requirement of qualification and relevant experiences, the performance of contractor HSE personnel's is to be monitored.

The good performing contractor's HSE personnel at site shall be rewarded upon assessment of performance by EIL/Owner. The non-performing HSE personnel shall be counselled by EIL/Owner & suitable action may be taken for suspension from site for 3-6 days. Contractor shall arrange training for non performing HSE personnel.

HSE In -Charge of the contractor shall be given the status at par with the other heads of department and shall report to Head of Project.

The Contractor shall verify & authenticate credentials of such safety personnel and furnish Bio-Data/Resume/Curriculum Vitae of the safety personnel as above for EIL/Owner's approval, at least 1 month before the mobilization. The Contractor, whenever required, shall arrange submission of original testimonials/certificates of their Safety personnel, to EIL/Owner (for verification/scrutiny, etc.)

Imposition/ Realization of penalty shall not absolve the Contractor from his/her responsibility of deploying competent safety officer at site.

Adequate planning and deployment of safety personnel shall be ensured by the Contractor so that field activities do not get affected because of non-deployment of competent & qualified safety personnel in appropriate numbers.

3.1.5 Implementation, Inspection/Monitoring

- a) The Contractor shall be fully responsible for planning, reporting, implementing and monitoring all HSE requirements and compliance of all laws & statutory requirements.
- b) The Contractor shall also ensure that the HSE requirements are clearly understood & implemented conscientiously by their site personnel at all levels at site.
- c) The Contractor shall ensure physical presence of their field engineers / supervisors, during the continuation of their contract works / site activities including all material transportation activities. Physical absence of experienced field engineers / supervisors of Contractor at critical work spot during the course of work may invite halting / stoppage of work.
- d) The Contractor shall regularly review inspection report internally and implement all practical steps / actions for improving the status continuously.
- e) Contractor skilled workmen like riggers, scaffold erectors, welders, crane operators etc. should have sufficient past experience and skill on the relevant job.
- f) The Contractor shall ensure important safety checks right from beginning of works at every work site locations and to this effect format No. HSE-10 "Daily Safety Check List" shall be prepared by field engineer & duly checked by safety personnel for conformance.
- g) The Contractor shall carry out inspection to identify various unsafe conditions of work sites/machinery/equipment's as well as unsafe acts on the part of workmen/supervisor/engineer while carrying out different project related works.
- h) Adequate records for all inspections shall be maintained by the Contractor and the same shall be furnished to EIL/Owner, whenever sought.
- i) To demonstrate involvement/commitment of site management of Contractor, at least one Monthly Safety Walk through in a month shall be carried out by Contractor's head of site (along with his area manager/field engineers) and a report shall be furnished to EIL/Owner as per format No: HSE-1" Safety walk through report" followed by compliance for unsatisfactory remarks.
- j) As a general practice lifting tools/tackles, machinery, accessories etc. shall be inspected, tested and examined by competent person (approved by concerned State authorities) before being used at site and also at periodical interval (e.g. during replacement, extension, modification, elongation/reduction of machine/parts, etc.) as per relevant statutes. Hydraulic Mobile Crane, cranes, lifting machinery, mobile equipment's/ machinery/ vehicles, etc. shall be inspected regularly by only competent / experienced personnel at site and requisite records for such inspections shall be maintained by contractor. Contractor shall also maintain records of maintenance of all other site machinery (e.g. generators, rectifiers, compressors, cutters, etc.) & portable tools/equipment's being used at project related works (e.g. drills, abrasive wheels, punches, chisels, spanners, etc.). The Contractor shall not make use of arbitrarily fabricated 'derricks' at project site for lifting/ lowering of construction materials.
- k) Site facilities /temporary. installations, e.g. batching plant, cement godown, DG-room, temporary electrical panels/distribution boards, shot-blasting booth, fabrication yards, etc. and site welfare facilities, like labour colonies, canteen/pantry, rest-shelters, motor cycle/bicycle-shed, First-aid centers, urinals/toilets, etc. should be periodically inspected by Contractor (preferably utilizing HR/Admin. personnel to inspect site welfare facilities) and records to be maintained.

3.1.6 Behaviour Based Safety

- a) The contractor shall develop a system to implement Behavior-Based Safety (BBS) through which work groups can identify, measure and change the behaviors of employees and workers towards construction safety aspects.
- b) The BBS process shall include the following:
 - Identify the behaviors critical to achieve required safety performance.
 - Communicate the behaviors and how they are performed correctly by all
 - Observe the work force and record safe/at risk behaviors. Intervene with workers to give positive reinforcement when unsafe behaviors are observed. Provide coaching/correction when at risk behaviors are observed
 - Collect and record observation data
 - Summarize and analyze observation data
 - Communicate observation data and analysis results to all employees
 - Provide recognition or celebrate when safe behavior improvements occur
 - Change behaviors to be observed or change activators or change consequences as appropriate.
 - Communicate any changes to workforce
- c) Contractor through its own HSE committee shall implement the above process.
- d) The necessary procedures and Monthly reporting formats shall be developed by the contractor for approval by EIL/Owner.
- e) The HSE committee of contractor shall observe individual's behavior for safe practices adapted for utilization/execution of work for followings a minimum:-
 - PPE
 - Tools & equipment's
 - Hazard Identification & control
 - House keeping
 - Confined space entry
 - Hot works
 - Excavation
 - Loading & unloading
 - Work at height
 - Stacking & storage
 - Ergonomics
- f) EIL/Owner and Contractor's site staff at all levels shall monitor the behavior of contractor employees that create and/or contribute to the unsafe situations at work place.
- g) Contractor shall arrange Behavior Based safety (BBS) training of their employees at site on yearly basis.

3.1.7 Awareness and Motivation

- a) The Contractor shall promote and develop awareness on Health, Safety and Environmental protection among all personnel working for the Contractor.
- b) The contractor shall display safety statistics board at all prominent location. Also shall provide dedicated notice board for displaying of safety alerts or any other safety related notices for awareness site workforces.
- c) Regular awareness programs and fabrication shop/work site meetings at least on monthly basis shall be arranged on HSE activities to cover hazards/risks involved in various operations during construction.
- d) Contractor's workmen & supervisory staff shall participate in common Tool Box Meeting as & when organized/required at site to avoid any incident/accident or occupational disease arising out of multidisciplinary jobs/activities being performed by various contracting agencies in the same location at different elevation.

- e) Contractor to motivate & encourage the workmen & supervisory staff by issuing/ awarding them with tokens/ gifts/ mementos/ monetary incentives/ certificates etc. The motivational program shall be organized on regular basis.
- f) Contractor shall assess & recognize the behavioral change of its site engineers / supervisors periodically and constantly motivate / encourage them to implement HSE practices at project works
- g) Life Saving Rules (refer Appendix-I for details) are to be displayed at prominent location of site.

3.1.8 Fire Prevention & First-Aid

The Contractor shall deploy First aider & suitable First-aid measures such as First Aid Box (Refer Appendix-B for details), stand-by Emergency Vehicle. Additionally separate ambulance with trained personnel/male or female nurse to administer First Aid shall be provided by the Contractor beyond deployment of 500 workmen during day/night working hours.

- a) The Contractor shall arrange installation of fire protection measures such as adequate number of steel buckets with sand & water and adequate number of appropriate portable fire extinguishers (Refer Appendix-C for details) to the satisfaction of EIL/Owner.
- b) The Contractor shall arrange EMERGENCY MOCK DRILL like fire, bomb threat, gas leakage, earth quake, etc. at each site at least once in three months, involving site workmen and site supervisory personnel & engineers. The Contractor shall maintain record of such mock drills at project site.
- c) The contractor shall require to tie-up with the hospitals located in the neighborhood for attending medical emergency.

3.1.9 Documentation

The Contractor shall evolve a comprehensive, planned and documented system covering the following as a minimum for implementation and monitoring of the HSE requirements and the same shall be submitted for approval by owner/EIL.

- HSE Organogram
- Site specific HSE Plan
- Safety Procedures, forms and Checklist. Indicative list of HSE procedures is attached as Appendix :H
- Inspections and Test Plan
- Risk Assessment & HIRAC for critical works.
- HIRAC Register as per Format no: HSE-19 to identify, assess, analyze & mitigate the construction hazards& incorporate relevant control measures before actually executing site works.
- Environmental Aspect Impact Register as per Format no: HSE-18 (identify, assess, analyze & mitigate the environmental impact & incorporate relevant control measures).
- Legal Register to identify and comply to all applicable HSE related legal requirements.

The monitoring for implementation shall be done by regular inspections and compliance of the observations thereof. The Contractor shall get similar HSE requirements implemented at his sub-contractor(s) work site/office, if applicable. However, compliance of HSE requirements shall be the responsibility of the Contractor. Any review/approval by EIL/Owner shall not absolve contractor of his responsibility/liability in relation to fulfilling all HSE requirements.

3.1.10 Audit

Safety Audit shall be conducted at initial stage by EIL/Owner to understand the readiness to start the job after mobilization of contractor's RCM at site& Suitable action shall be taken by contractor to comply the audit observation(s).

The Contractor shall submit an Audit Plan to EIL/Owner indicating the type of audits covering following as minimum:

- a) Internal HSE audits regularly on six monthly basis by engaging internal qualified auditors (viz. safety officers/Construction personnel having 5years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001 certification). However, minimum two internal HSE audit will have to be conducted irrespective of time period of the contract.
- b) External HSE audits regularly on yearly basis by engaging authorized auditing agencies (viz. National Safety Council etc.) or qualified external auditors (viz safety officers/Construction personnel having 10years experience in construction safety and Lead Auditor Course: OHSAS 18001/ISO 45001 certification). However, minimum one external HSE audit will have to be conducted irrespective of time period of the contract.
- c) EIL/Owner may participate in Opening and closing meeting of external audits and provide inputs to the external auditor. Outcome of external audit shall be discussed during HSE Meeting with EIL/Owner.

All HSE shortfalls/ non-conformances on HSE matters brought out during review/audit, shall be resolved forthwith (generally within a week) by Contractor & compliance report shall be submitted to EIL/Owner.

In addition to above audits by contractor, the contractor's work shall be subjected to HSE audit by EIL/Owner at any point of time during the pendency of contract. The Contractor shall take all actions required to comply with the findings of the Audit Report and issue regular Compliance Reports for the same to OWNER/ EIL till all the findings of the Audit Report are fully complied.

Failure to carry-out HSE Audits & its compliance (internal & external) by Contractor, shall invite penalization.

3.1.11 Meetings

- i. The Contractor shall ensure participation of his top most executive at site (viz. Resident Construction Manager / Resident Engineer/ Project Manager / Site-in-Charge) along with safety officer in Safety Committee/HSE Committee meetings arranged by EIL/Owner usually on monthly basis or as and when called for. In case Contractor's top most executive at site is not in a position to attend such meeting, he shall inform EIL/Owner in writing before the commencement of such meeting indicating reasons of his absence and nominate his representative – failure to do so may invite very stringent penalization against the specific Contractor, as deemed fit as per Contract. The obligation of compliance of any observations during the meeting shall be always time bound. The Contractor shall always assist EIL/Owner to achieve the targets set by them on HSE management during the project implementation.
- ii. In addition, the Contractor shall also arrange internal HSE meetings chaired by his top most executive at site on fortnightly basis and maintain records. Such internal HSE meetings shall essentially be attended by field engineers / supervisors including safety personnel of the Contractor and its associates. Records of such internal HSE meetings shall be maintained by the Contractor for review by EIL/Owner or for any HSE Audits.
- iii. Agenda of internal HSE meeting should broadly cover: -
 - a) Confirmation of record notes /minutes of previous meeting
 - b) Discussion on outstanding subjects of previous points / subjects, if any
 - c) Incidents / Accidents (of all types) at project site, if any
 - d) Current topics related to site activities / subjects of discussion
 - e) House keeping
 - f) Behavioral Safety
 - g) Information / views / deliberations of members / site sub-contractors
 - h) Report from Owner / Client
 - i) Status of Safety awareness, Induction programs & Training programs

The time frame for such HSE meeting shall be religiously maintained by one and all.

3.1.12 Intoxicating drinks & drugs and smoking

- The Contractor shall ensure that his staff members & workers (permanent as well casual) shall not be in a state of intoxication during working hours and shall abide by any law relating to consumption & possession of intoxicating drinks or drugs in force.
- The Contractor shall not allow any workman to commence any work at any locations of project activity who is/are influenced / effected with the intake of alcohol, drugs or any other intoxicating items being consumed prior to start of work or working day.
- Awareness about local laws on this issue shall form part of the Induction Training and compulsory work-site discipline.
- The Contractor shall ensure that all personnel working for him comply with "No-Smoking" requirements of the Owner as notified from time to time. Cigarettes, lighters, auto ignition tools or appliances as well as intoxicating drugs, dry tobacco powder, etc. shall not be allowed inside the project / plant complex.
- Smoking shall be permitted only inside smoking booths, if any, exclusively designated & authorized by the Owner/EIL.

3.1.13 Penalty

The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliances and also for repeated failure in implementation of any of the HSE provisions, EIL/Owner may impose stoppage of work without any cost & time implication to the Owner and/or impose a suitable penalty.

The amount of penalty to be levied against defaulted Contractor shall be up to a cumulative limit of

2.0% (Two percent) of the contract value for Item Rate or Composite contracts with an overall ceiling of 1,00,00,000(Rupees One Crore).

0.5% (Zero decimal five percent) of the contract value for LSTK, OBE, EPC,BOO/BOOT, EPCC or Package contracts with an overall ceiling of 10,00,00,000(Rupees Ten Crores.)

This penalty shall be in addition to all other penalties specified elsewhere in the contract. The decision of imposing stop-work-instruction and imposition of penalty shall rest with EIL/Owner. The same shall be binding on the Contractor. Imposition of penalty does not make the Contractor eligible to continue the work in unsafe manner.

The amount of penalty applicable for the Contractor on different types of HSE violations is specified below:

Sl. No.	Violation of HSE Norms	Penalty Amount
1.	For not using personal protective equipment like Helmet, Safety Shoes, and other safety gadgets as applicable as per nature of work.	Rs.500/- per day/Item / Person
2.	Working without Work Permit/Clearance	Rs.20,000/- per occasion
3	Execution of work without deployment of requisite field engineer / supervisor at work spot	Rs.5,000/- per violation per day
4.	Unsafe electrical practices (not installing ELCB, using poor joints of cables, using naked wire without top plug into socket, laying wire/cables on the roads, electrical jobs by incompetent person, etc.)	Rs.10,000/- per item per day



Sl. No.	Violation of HSE Norms	Penalty Amount
5.	Working at height without full body harness, using non-standard/ rejected scaffolding and not arranging fall protection arrangement as required, like hand-rails, life-lines, Safety Nets etc.	Rs.10,000/- per case per day
6.	Unsafe handling of compressed gas cylinders (No trolley, jubilee clips double gauge regulator, and not keeping cylinders vertical during storage/handling, not using safety cap of cylinder).	Rs.1,000/- per item per day
7.	Use of domestic LPG for cutting purpose / not using flash back arresters on both the hoses/tubes on both ends.	Rs.5,000/-per occasion
8.	No fencing/barricading of excavated areas / trenches.	Rs.5,000/- per occasion
9.	Not providing shoring/strutting/proper slope and not keeping the excavated earth at least 1.5M away from excavated area.	Rs.5,000/-per occasion
10.	Non display of scaffold tags, caution boards on erected scaffolds.	Rs.1,000/- per occasion per day
11.	Traffic rules violations like over speeding of vehicles, rash driving, talking on mobile phones during vehicle driving, wrong parking, not using seat belts, vehicles not fitted with reverse horn / warning alarms / flicker lamps during foggy weather.	Rs.3,000/-per occasion per day
12.	Absence of Contractor's RCM/SIC or his nominated representative (prior approval must be taken for each meeting for nomination) from site HSE meetings whenever called by EIL/Owner& failure to nominate his immediate deputy for such HSE meetings.	Rs.10,000/- per meeting
13.	Failure to maintain HSE records by Contractor Safety personnel, in line with approved HSE Plan/Procedures/Contract specifications.	Rs.10,000/- per month
14.	Failure to conduct daily site safety inspection (by Contractor's Site Engineer & safety officer), internal HSE meeting, internal HSE Awareness/Motivation Program and Site HSE Training at predefined frequencies (as approved in HSE Plan).	Rs.10,000/- per occasion
15.	Failure to fill online/submit the monthly HSE report by 5 th of subsequent month to Engineer-in-Charge/ Owner	Rs10,000/-per occasion and Rs.1,000/-per day of further delay
16.	Poor House Keeping	Rs.5,000 /- per occasion per subject
17.	Failure to report & follow-up accident (including Near Miss) reporting system within specific time-frame.	Rs.20,000/- per occasion
18.	Degradation of environment (not confining toxic spills, spilling oil/lubricants onto ground)	Rs.10,000/- per occasion

Sl. No.	Violation of HSE Norms	Penalty Amount
19.	Not medically examining the workers before allowing them to work at height / to work in confined space / to work in shot-blasting / to work for painting / to work in bitumen or asphalt works, not providing ear muffs while allowing them to work in noise polluted areas, made them to work in air polluted areas without respiratory protective devices, etc.	Rs.5,000/- per occasion per worker
20.	Violation of any other safety condition as per job HSE plan / work permit and HSE conditions of contract (e.g.using crowbar on cable trenches, improper welding booth, not keeping fire extinguisher ready at hot work site, unsafe rigging practices, non-availability of First-Aid box at site, not providing dead man handle switch for blasting, whiplash arrestor for the compressor line, not using hood with respiratory devices by blaster for shot/grit blasting, etc.)	Rs.5,000/- per occasion
21.	Penalty for non-deployment of ambulance in case of man-power more than 500 or not providing dedicated emergency vehicle in case of man-power less than 500.	Rs.3,000 per day
22.	Failure to carry-out Safety audit in time (internal & external),close-out of identified shortfalls of Observations of Safety Aspects(OSA),etc.	Rs.20,000/- per occasion (for internal audit &OSA). Rs.30,000/-per occasion for external audit
23.	Carrying out sand blasting instead of grit/shot blasting	Rs.50,000/- per day
24.	Failure to deploy adequately qualified and competent Safety Officer	Rs.10,000/- per day per Officer
25.	Utilization of Hydraulic Mobile Crane /back-hoe loader for material shifting or any other unauthorized /unsafe lifting works	Rs.25,000/- per occasion
26.	Any Fatal Accident	Rs.10,00,000/-per fatality
27.	Any violation not covered above	To be decided by EIL/Owner.

Note: Penalty amount deducted from the contractor shall be utilized by owner/EIC for the promotion of the safety during the currency of the project.

The Contractor shall make his field engineers/supervisors fully aware of the fact that they keep track with the site workmen for their behavior and compliance of various HSE requirements. Safety lapses / defects of project construction site shall be attributable to the concerned job supervisor / engineer of the Contractor, (who remains directly responsible for safely executing field works). For repeated HSE violations, concerned job supervisor / engineer shall be reprimanded or appropriate action, as deemed fit, shall be initiated (with information to EIL & Owner) by the concerned Contractor.

Contractor shall initiate verbal warning shall be given to the worker/employee during his first HSE violation. A written warning shall be issued on second violation and specific training shall be arranged / provided by the Contractor to enhance HSE awareness/skill including feedback on the mistakes/ flaws. Any further violation of HSE stipulations by the erring individuals shall call

for his forthright debar from the specific construction site. A record of warnings for each worker/employee shall be maintained by the Contractor, like by punching their cards / Gate passes or by displaying their names at the Project entry gate. Warnings, penalizations, appreciations etc. shall be discussed in HSE Committee meetings by site Head of the Contractor.

3.1.14 Accident/ Incident investigation

All accidents/incidents shall be informed to EIL/Owner at least telephonically by Contractor immediately and in writing within 24 hours on Format No. HSE-2 as applicable, by Contractor. Thereafter, a Supplementary Accident/Incident investigation Report on Format No. HSE-3 shall be submitted to EIL/Owner within 72 hours. Near Miss incident(s), Dangerous accidents/incident shall also be reported on Format No. HSE-4 within 24 hours. The accident/incident shall be investigated by a team of Contractor's senior Site personnel (involving Site-in-Charge or at least by his deputy) for establishing root-cause and recommending corrective & preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to EIL/Owner. Owner/EIL shall have the liberty to independently investigate such occurrences and the Contractor shall extend all necessary help and cooperation in this regard. EIL/Owner shall have the right to share the content of this report with the outside world.

3.2 House Keeping

The Contractor shall ensure that a high degree of housekeeping is maintained and shall ensure inter-alia; the followings:

- a) All surplus earth and debris are removed/disposed-off from the working areas to designated location(s).
- b) Unused/surplus cables, steel items and steel scrap lying scattered at different places within the working areas are removed to identify location(s).
- c) All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).
- d) Roads shall be kept clear and materials like pipes, steel, sand, boulders, concrete, chips and bricks etc. shall not be allowed on the roads to obstruct free movement of men & machineries.
- e) Fabricated steel structural, pipes & piping materials shall be stacked properly.
- f) Water logging on roads shall not be allowed.
- g) No parking of trucks/trolleys, cranes and trailers etc. shall be allowed on roads, which may obstruct the traffic movement.
- h) Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.
- i) Protective measures to be ensured with projected rebar by suitable means.
- j) Trucks carrying sand, earth and pulverized materials etc. shall be covered while moving within the plant area/ or these materials shall be transported with top surface wet.
- k) The contractor shall ensure that the atmosphere in plant area and on roads is free from particulate matter like dust, sand, etc. by keeping the top surface wet for ease in breathing.
- l) At least two exits for any unit area shall be assured at all times – same arrangement is preferable for digging pits/ trench excavation/ elevated work platforms/ confined spaces etc.
- m) Welding cables and the power cable must be segregated and properly stored and used. The same shall be laid away from the area of movement and shall be free from obstruction.
- n) Upkeep/cleaning of site to be carried out on regular basis by the contractor. Contractor shall earmark the area for waste/scrap disposal and ensure that all waste/scrap arising out of the day's work is properly disposed to the earmarked area.
- o) Hazardous waste shall be segregated and shall be kept separately at designated place.
- p) Contractor shall present the status of housekeeping in HSE meeting.

The Contractor shall carry-out regular checks (minimum one per fortnight) as per format No. HSE-11 for maintaining high standard of housekeeping and maintain records for the same. The Contractor shall provide supervisor for housekeeping exclusively for management of day-to-day housekeeping activities.

3.3 HSE Measures

3.3.1 Construction Hazards

The Contractor shall ensure identification of all Occupational Health, Safety & Environmental hazards in the type of work he is going to undertake and enlist mitigation measures. Contractor shall carry out HIRAC specifically for high risk jobs/critical jobs like

- a) Working at height (+2.0 Mts height) for cold (incl. colour washing, painting, insulation etc.) & hot works.
- b) Work in confined space,
- c) Deep excavations & trench cutting (depth > 2.0 mts.)
- d) Operation & Maintenance of Batching Plant.
- e) Shuttering / concreting (in single or multiple pour) for columns, parapets & roofs.
- f) Erection & maintenance of Tower Crane.
- g) Erection of structural steel members / roof-trusses / pipes at height more than 2.0 Mts. with or without crane.
- h) Erection of pipes (full length or fabricated) at height more than 2.0 Mts. height with Crane of 100T capacity.
- i) All lifts using 100T Crane plus mechanical pulling.
- j) All lifts using two cranes in unison (Tandem Lifting).
- k) Any lift exceeding 80% capacity of the lifting equipment's (Hydraulic Mobile Crane, crane etc.).
- l) Laying of pipes (isolated or fabricated) in deep narrow trenches – manually or mechanically.
- m) Maintenance of crane / extension or reduction of crane-boom on roads or in yards.
- n) Erection of any item at >2.0 Mts. height using 100T crane or of higher capacity
- o) Hydrostatic test of pipes, vessels & columns and water-flushing.
- p) Radiography jobs (in-plant & open field)
- q) Work in Live Electrical installations / circuits
- r) Handling of explosives & Blasting operations
- s) Demolishing/ dismantling activities
- t) Welding/ gas cutting jobs at height (+2.0 Mts.)
- u) Lifting/placing roof-girders at height(+2.0 Mts.)
- v) Lifting & laying of metallic / non-metallic sheet over roof/structures.
- w) Lifting of pipes, gratings, equipment's/vessels at heights (+2.0 Mts.) with & without using cranes
- x) Calibration of equipment, instruments and functional tests at yards / work-sites.
- y) Operability test of Pump, Motors (after coupling) & Compressors.
- z) Cold or Hot works inside Confined Space.
- aa) Transportation & shifting of ODC consignments into project areas.
- bb) Working in "Charged/Live" elect. Panels
- cc) Stress Relieving works (Electrically or by Gas-burners).
- dd) Pneumatic Tests
- ee) Card board blasting
- ff) Grit Blasting activity
- gg) Catalyst loading/unloading
- hh) Erection/dismantling of scaffolding
- ii) Chemical cleaning

The necessary HSE measures devised shall be put in place, prior to start of an activity & also shall be maintained during the course of works, by the Contractor. Copies of such HIRAC shall be kept available at work sites by the Contractor to enable all concerned carrying out checks / verification.

A list of typical construction hazards along with their effects & preventive measures is given in **Appendix-E**.

3.3.2 Accessibility

- h) The Contractor shall provide safe means of access (in sufficient numbers) & efficient exit to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen and EIL/Owner.
- i) The Contractor shall implement use of all measures including use of "life line", "fall-arresters", "retractable fall arresters", "safety nets" etc. during the course of using all safe accesses & exits, so that in no case any individual remains at risk of slip & fall during their travel.
- j) A ladder or step-ladder must have a level and firm footing, in case of use of fixed ladders, sufficient foot hold and hand hold to be provided.
- k) The access to operating plant / project complex shall be strictly regulated. Any person or vehicle entering such complex shall undergo identification check, as per the procedures in force / requirement of EIL/Owner.
- l) Accessibility to 'confined space' shall be governed by specific system / regulation, as established at project site.

3.3.3 Personal Protective Equipment (PPEs)

- a) The Contractor workmen shall be permitted entry inside the project premises only with proper PPEs.
- b) The Contractor shall ensure that all their staff, workers and visitors including their sub-contractor(s) have been issued (records to be kept) & wear appropriate PPEs like nape strap type safety helmets preferably with head & sweat band with ¾" cotton chin strap (made of industrial HDPE), High ankle safety shoes with steel toe cap and antiskid sole, Coverall, full body harness (CE marked and conforming to EN361), protective goggles, gloves, ear muffs, respiratory protective devices, etc. All these gadgets shall conform to applicable IS Specifications/CE or other applicable international standards. The Contractor shall implement a regular regime of inspecting physical conditions of the PPEs being issued / used by the workmen of their own & also its sub-agencies and the damaged / unserviceable PPEs shall be replaced forthwith.
- c) Owner/EIL may issue a comprehensive color scheme for helmets to be used by various agencies. The Contractor shall follow the scheme issued by the owner/EIL and shall choose colour other than white (for Owner) or blue (for EIL). All HSE personnel shall preferably wear dark green band on their helmet or green color safety helmet so that workmen can approach them for guidance during emergencies. HSE personnel shall preferably wear such dresses with fluorescent stripes, which are noticeable during night, when light falls on them.
- d) Florescent jackets with respective company logo to be worn by the contractor workmen with different color coding for categories like supervisor and workmen.
- e) Workers required using or handling alkalies, acid or other similar corrosive substance at site shall be provided with appropriate protective equipment, in accordance with MSDS.
- f) For shot blasting, the usage of protective face shield and helmets, gauntlet and protective clothing is mandatory. Such protective clothing should conform relevant IS Specification.
- g) For off-shore jobs/contracts, contractor shall provide PPEs (new) of all types to EIL & Owner's personnel, at his (contractor's) cost. All personnel shall wear life jacket at all time.
- h) An indicative list of HSE standards/codes is given under **Appendix-A**.

- i) Contractor shall ensure procurement & usage of following safety equipment's/ accessories (conforming to applicable IS mark / CE standard) by their staff, workmen & visitors including their subcontractors all through the span of project construction / pre-commissioning/ Commissioning:-
 - i. PPEs (Helmet with company name/logo, Safety Goggles, Coverall, Ear-muff, Face Shield, Hand Gloves, High Ankle Safety Shoes, Gum Boot etc.)
 - ii. Barricading tape / warning signs
 - iii. Rechargeable Safety torch (flame-proof)
 - iv. Safety nets (with tie-chords)
 - v. Fall arresters
 - vi. Emergency Man-basket/rescue kit for height works
 - vii. Portable ladders (varying lengths)
 - viii. Life-lines (steel wire-rope, dia. not less than 8.0 mm)
 - ix. Full body double lanyard Safety harness with Rebar/ladder hook or scaffolding hook.
 - x. Lanyard
 - xi. Karabiner
 - xii. Retractable fall arresters (various length)
 - xiii. Portable fire extinguishers (DCP type) – 5 kg&10 kg capacity
 - xiv. Portable Multi Gas detector
 - xv. Sound level meter
 - xvi. Digital lux meter
 - xvii. Fire hoses & flow nozzles
 - xviii. Fire blankets/ Fire retardant cloth (with eyelets)
 - xix. Flame retardant/Flame resistant coverall-based on hazard identification & risk assessment, if required.

3.3.4 Working at height

- a) The Contractor shall issue permit for working (PFW) at height after verifying and certifying the checkpoints as specified in the attached permit (Format No. HSE-6). He shall also undertake to ensure compliance to the conditions of the permit during the currency of the permit including adherence of personal protective equipment's. Contractor's Safety Officer shall verify compliance status of the items of permit document after implementation of action is completed by Contractor's execution / field engineers at work site. HIRAC for specific works at height duly commented by EIL/Owner, shall be kept attached with particular Permit for Work (PFW) at site for ready reference & follow-up.
- b) Such PFW shall be initially issued for one single shift or expected duration of normal work and extended further for balance duration, if required. EIL/Owner can devise block-permit system at any specific area, in consultation with project specific HSE Committee to specify the time-period of validity of such PFW or its renewal. This permit shall be applicable in areas where specific clearance from Owner's operation Deptt./Safety Deptt. is not required. EIL / Owner's field Engineers/Safety Officers/Area Coordinators may verify and counter sign this permit (as an evidence of verification) during the execution of the job.
- c) All personnel shall be medically examined & certified by registered doctor, confirming their 'medical fitness(Vertigo or epilepsy must be covered under test report)for working at height. Contractor shall develop the model for conducting vertigo test. The fitness examination shall be done once in six months. Sticker for "PASS FOR HEIGHT WORK" shall be pasted on the safety helmet of the site personnel.
- d) In case work is undertaken without taking sufficient precautions as given in the permit, EIL/Owner Engineers may exercise their authority to cancel such permit and stop the work till satisfactory compliance/rectification is arranged made. Contractors are expected to maintain a register for issuance of permit and extensions thereof including preserving the

- used permits for verification during audits etc.
- e) The Contractor shall arrange (at his cost) and ensure use of Fall Arrester Systems by his workers. Fall arresters are to be used while climbing/descending tall structures or vessels / columns etc. These arresters should lock automatically against the anchorage line, restricting free fall of the user. The device is to be provided with a double security opening system to ensure safe attachment or release of the user at any point of rope. In order to avoid shock, the system should be capable of keeping the person in vertical position in case of a fall. All the fall arrest systems should be cleaned after use and stored in a clean & dry area. Defective Safety Harness, lanyards & life line must be discarded from workplace and record to be maintained.
 - f) The Contractor shall ensure that Full body harnesses with double lanyards conforming EN361 and having authorized CE marking is used by all personnel while working at height. The lanyards and life lines should have enough tensile strength to take the load of the worker in case of a fall. One end of the lanyard shall be firmly tied with the harnesses and the other end with life line. The harness should be capable of keeping the workman vertical in case of a fall, enabling him to rescue himself.
 - g) The Contractor shall provide Roof Top Walk Ladders for carrying out activities on sloping roofs in order to reduce the chances of slippages and falls.
 - h) The Contractor shall ensure that a proper Safety Net System is used wherever the hazard of fall from height is present. The safety net, preferably a knotted one with mesh ropes conforming to IS 5175/ ISO 1140 shall have a border rope & tie cord of minimum 12mm dia. The Safety Net shall be located not more than 6.0 meters below the working surface extending on either side upto. sufficient margin to arrest fall of persons working at different heights.
 - i) In case of accidental fall of person on such Safety Net, the bottom most portion of Safety Net should not touch any structure, object or ground.
 - j) Grade separators shall be provided in Pipe-rack/Tech-structures to arrest falling objects like welding spatters, welding rods, nuts, bolts, tools etc. and to facilitate U/G and A/G works simultaneously.
 - k) Beam Clamps may be used for construction of localized temporary working platforms sheds for welding booths etc. at height in all types of steel structure due to faster installation and requirement of less scaffolding materials.
 - l) Hanging Platform, manufactured by Standard HSE equipment vendors must be encouraged for painting of Buildings etc.
 - m) All the tools used at height (like spanner, screw driver etc.) shall be provided with securing arrangement like back-pack/waist pouch to prevent accidental slippage from worker hand.
 - n) The Contractor shall install temporary lightening arrester in tall structures during construction to save human life and to avoid damage to equipment's & machineries. During the possibility of a thunderstorm, all the work at height where a person can be exposed to lightning shall be stopped.
 - o) To the extent possible use Roller arrangement to shift overhead pipes from one end to other in Pipe Racks Area.
 - p) Providing of steel scaffold stair tower system with landings at regular intervals as and when required for height work.
 - q) The Contractor shall ensure positive isolation while working at different levels like in the pipe rack areas. The working platforms with toe boards & hand rails shall be sufficiently strong & shall have sufficient space to hold the workmen and tools & tackles including the equipment's required for executing the job. Such working platforms shall have mid-rails, to enable people work safely in sitting posture.

3.3.5 Scaffoldings & Barricading

- a) Suitable steel scaffoldings only shall be provided to workmen for all works that cannot be safely done from the ground or from solid construction except such short period work that

can be safely done using ladders or certified (by 3rd party competent person) man-basket. When a ladder is used, an extra workman shall always be engaged for holding the ladder. The ladder shall be inspected before use for cracked or split stiles, missing, broken, loose or damaged rungs & splinters. The ladder shall be of adequate length to enable it to extend to at least 1.0m above the landing place or working point. Metallic ladders shall be only used as access.

- b) The Contractor shall ensure that the scaffolds used during construction activities shall be strong enough to take the designed load. Main Contractor shall always furnish duly approved construction-design details of scaffold & SWL (from competent designers) free of charge, before they are being installed/ constructed at site. Owner/EIL reserves the right to ask the Contractor to submit certification and or design calculations from his Head Office/ Design/Engineering expert regarding load carrying capacity of the scaffoldings. All steel tubing, couplers and fittings used for scaffolding shall conform to IS 3696 or an acceptable equivalent. Only metallic scaffold boards shall be allowed to use. Steel tubes shall be free from cracks, splits. Surface flaws & other defects. All couplers & fittings shall be properly oiled and maintained. Nuts shall have a free running fit on their bolts. Bolts with worn or damaged thread shall be replaced.
- c) All scaffolds shall be inspected by a competent Scaffolding Inspector (person with scaffolding related experience in construction field and having a training of scaffolding supervisor from a institute/agency like National Safety Council etc.). He shall paste a GREEN tag (duly signed by competent Scaffolding Inspector) on each scaffold found safe and a RED tag (duly signed by competent Scaffolding Inspector) on each scaffold found unsafe. Scaffolds with GREEN tag only shall be permitted to be used and Scaffolds with RED ones shall immediately be made inaccessible. Work being found continuing on scaffolds with RED tag shall be considered unauthorized work by Contractor and may invite penalization from EIL/Owner. For every 120-125 m² /m³ area / volume or its parts thereof minimum one TAG shall be provided.
- d) The Contractor shall ensure positive barricading (indicative as well as protective) of the excavated, radiography, heavy lift, high pressure hydrostatic & pneumatic testing and other such areas. Sufficient warning signs shall be displayed along the barricading areas.
- e) Scaffolding shall be constructed using foot seals or base plates only. Base plates shall be used below each standard on surface. Sole plate of timber shall be used beneath the base plate to achieve greater load distribution.

3.3.6 Electrical installations

- a) All electrical installations/ connections shall be carried out as per the provisions of latest revision of following codes/standards, in addition to the requirements of Statutory Authorities and IE/applicable international rules& regulations:
 - OISD STD 173 : Fire prevention & protection system for electrical installations
 - SP 30 (BIS) : National Electric Code
- b) All electrical installations shall be approved by the concerned statutory authorities.
- c) All temporary electrical installations / facilities shall be regularly checked by the licensed/competent electricians of the Contractor and appropriate records shall be maintained in format no: HSE-12" Inspection of temporary electrical booth/installation at project construction site". Such inspection records are to be made available to EIL/Owner, whenever asked for.

3.3.6.1 The Contractor shall meet the following requirements:

- a. Shall make Single Line Diagram (SLD) for providing connection to each equipment's & machinery and the same (duly approved by EIL/Owner) shall be pasted on the front face of DBs (distribution boards) or JBs (Junction boxes) at every site. (A typical Switch Board Sketch is attached as Appendix -G)
 - b. Ensure that electrical systems and equipment including tools & tackles used during construction phase are properly selected, installed, used and maintained as per provisions of the latest revision of the Indian Electrical/ applicable international regulations.
 - c. Shall deploy qualified & licensed electricians for proper & safe installation and for regular inspection of construction power distribution system/points including their earthing. A copy of the license shall be submitted to EIL / Owner for records. Availability of at least one competent (ITI qualified) / licensed electrician (by State Elec. authorities) shall be ensured at site round the clock to attend to the normal/emergency jobs.
 - d. All switchboards / welding machines shall be kept in well-ventilated & covered shed/ with rain shed protection. The shed shall be elevated from the existing ground level to avoid water logging inside the shed. Installation of electrical switch board must be done taking care of the prevention of shock and safety of machine.
 - e. No flammable materials shall be used for constructing the shed. Also flammable materials shall not be stored in and around electrical equipment / switchboard. Adequate clearances and operational space shall be provided around the equipment.
 - f. Fire extinguishers and insulating mats shall be provided in all power distribution centers.
 - g. Temporary electrical equipment shall not be employed in hazardous area without obtaining safety permit.
 - h. Proper housekeeping shall be done around the electrical installations.
 - i. All temporary installations shall be tested before energizing, to ensure proper earthing, bonding, suitability of protection system, adequacy of feeders/cables etc.
 - j. All welders shall use hand gloves irrespective of holder voltage.
 - k. Multilingual (Hindi, English and local language) caution boards, shock treatment charts and instruction plate containing location of isolation point for incoming supply, name & telephone No. of contact person in emergency shall be provided in substations and near all distribution boards / local panels.
 - l. ELCB tester /test meter shall be used for testing the ELCBs operation. ELCBs testing shall be carried out by using ELCB tester on monthly basis but in specific cases like heavy rain as decided by owner/EIC. Record of the testing shall be maintained.
 - m. Regular inspection of all installations at least once in a month. (Ref. Format HSE-12).
- 3.3.6.2 The following features shall also be ensured for all electrical installations during construction phase by the contractor:
- a. Each installation shall have a main switch with a protective device, installed in an enclosure adjacent to the metering point. The operating height of the main switch shall not exceed 1.5 M. The main switch shall be connected to the point of supply by means of armoured cable.

- b. The outgoing feeders shall be double or triple pole switches with fuses / MCBs. Loads in a three phase circuit shall be balanced as far as possible and load on neutral should not exceed 20% of load in the phase.
- c. The installation shall be adequately protected against overload, short circuit and earth leakage by the use of suitable protective devices. Fuses wherever used shall be HRC type. Use of rewirable fuses shall be strictly prohibited. ELCB/RCCB (Residual Current Circuit Breaker) must be fitted with all Electrical installation. The earth leakage devices shall have an operating current not exceeding 30 mA.
- d. All connections to the hand tools / welding receptacles shall be taken through proper switches, sockets and plugs.
- e. All single phase sockets shall be minimum 3 pin type only. All unused sockets shall be provided with socket caps.
- f. Only 3 core (P+N+E) overall sheathed flexible cables with minimum conductor size of 1.5 mm² copper shall be used for all single phase hand tools.
- g. Only metallic distribution boxes with double earthing shall be used at site. No wooden boxes shall be used.
- h. All power cables shall be terminated with compression type cable glands. Tinned copper lugs shall be used for multi-strand wires / cables.
- i. Cables shall be free from any insulation damage.
- j. Minimum depth of cable trench shall be 750 mm for MV & control cables and 900 mm for HV cables. These cables shall be laid over a sand layer and covered with sand, brick & soil for ensuring mechanical protection. Cables shall not be laid in waterlogged area as far as practicable. Cable route markers shall be provided at every 25 M of buried trench route.

When laid above ground, cables shall be properly cleated or supported on rigid poles of atleast 2.1 M high. Minimum head clearance of 6 meters shall be provided at road crossings.
- k. Underground road crossings for cables shall be avoided to the extent feasible. In any case no underground power cable shall be allowed to cross the roads without pipe sleeve.
- l. All cable joints shall be done with proper jointing kit. No taped/temporary joints shall be used.
- m. An independent earthing facility should preferably be established within the temporary installation premises. All appliances and equipment shall be adequately earthed. In case of armored cables, the armour shall be bonded to the earthing system. IS: 3043 Code for earthing practices shall be followed at project site.
- n. All cables(green colour) and wire rope used for earth connections shall be terminated through tinned copper lugs.
- o. In case of local earthing, earth electrodes shall be buried near the supply point and earth continuity wire shall be connected to local earth plate for further distribution to various appliances. All insulated wires for earth connection shall have insulation of green colour. Periodical check tests of all electrodes should be carried out and record shall be maintained of such checks.

- p. Separate core shall be provided for neutral. Earth / Structures shall not be used as a neutral in any case.
- q. ON/OFF position of all switches shall be clearly designated / painted for easy isolation in emergency.

3.3.7 Welding/ Grinding/Gas cutting

- a) Contractor shall ensure that flash back arrestors conforming to BS:6158 or equivalent are installed on all gas cylinders as well as at the torch end of the gas hose, while in use.
- b) All cylinders shall be mounted on trolleys and provided with a closing key. Empty & filled-up gas cylinders shall be stored separately with TAG, protecting them from direct sun or rain. Minimum 2 nos. of Portable DCP type fire extinguishers (10 kg) shall be maintained at the gas cylinder stores. Stacking & storing of compressed gas cylinders shall be arranged away from DG set, hot works, Elect. Panels / Elec. boards, etc.
- c) The burner and the hose placed downstream of pressure reducer shall be equipped with Flash Back Arrestor/Non Return Valve device.
- d) The hoses for acetylene and oxygen cylinders must be of different colours. Their connections to cylinders and burners shall be made with a safety collar.
- e) At end of work, the cylinders in use shall be closed and hoses depressurized.
- f) Cutting of metals using gases, other than oxygen & acetylene, shall require written concurrence from Owner.
- g) Grinding activity shall not be carried out in confined spaces without a valid work permit.
- h) All grinding/cutting machines shall be guarded and fitted with Dead-Man switch and this shall not be bypassed any time.
- i) All welding/grinding machines shall have effective earthing at least at distinctly isolated two points.
- j) In order to help maintain good housekeeping, and to reduce fire hazard, live electrode bits shall be contained safely and shall not be thrown directly on the ground.
- k) The hoses of Acetylene and Oxygen shall be kept free from entanglement & away from common pathways / walkways and preferably be hanged overhead in such a manner which can avoid contact with cranes, Hydraulic Mobile Crane or other mobile construction machinery.
- l) Hot spatters shall be contained / restricted appropriately (by making use of effective fire-retardant cloth/fabric) and their flying-off as well as chance of contact with near-by flammable materials shall be stopped. The Fire retardant blanket shall be woven from ceramic yarn with eyelets.
- m) The Contractor shall arrange adequate systems & practices for accumulation / collection of metal & other scraps and remnant electrodes and their safe disposal at regular interval so as to maintain the fabrication and other areas satisfactorily clean & tidy.
- n) All gas cylinders must have a cylinder cap on at all times when not in use.

3.3.8 Ergonomics and tools & tackles

- a) The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health. Competency of the crane operator to be thoroughly checked prior to engaging in crane operation.
- b) All lifting tools, tackles, equipment, trailers, trucks/dumpers, accessories including cranes shall be tested periodically by statutory/competent authority for their condition and load carrying capacity. Valid test & fitness certificates from the applicable authority shall be submitted to Owner/EIL for their review/acceptance before the lifting tools, tackles,

- equipment, trailers, trucks/dumpers, accessories and cranes are used. Third party inspection certificate is mandatory for all lifting tools & tackles before put into use.
- Load testing of Cranes by competent person must be made mandatory after each modification/alteration of crane configuration/change in boom length. All heavy equipment's including cranes must be maintained in good condition & record of such maintenance shall be maintained. Routine preventive maintenance of the crane to be carried out & record to be maintained for such preventive maintenance. Healthiness of the crane to be checked by Crane Expert on regular basis as per manufacturer guidelines.
 - HIRAC/JSA for assembly/dismantling activity of the crane to be submitted for approval of EIC.
 - No one should stand/work below the mast & boom of the crane. Mast of the crane should not be used for unintended lifts.
 - Mast of the crane to be kept in right position during dismantling activity of the crane.
 - Log book of all crane to be maintained.
 - Only authorized person shall be allowed to give signal to the operator.
 - Lifting/Loading/Unloading activities shall be carried out by the trained riggers under supervision of rigging Foreman.
 - Prior to marching/movement of the crane, obstructions free access/route to be ensured.
 - Skilled Technician to be engaged for AC gas checking and refilling of refrigerant and should follow the safe operating procedure for cranes.
 - Manufacturer's instructions to be followed without any deviation.
 - The contractor shall not be allowed to use defective equipment or tools not adhering to safety norms.
 - Adequate capacity of Chain pulley blocks with valid TPI certificate to be used for lifting/lowering/dragging/erection of piping material.
 - Colour coding system for lifting tools & tackles shall be followed on quarterly basis for a particular colour as mentioned below:

Period	Colour Code
January, February, March	Blue
April, May, June	Yellow
July, August, September	Green
October, November, December	Orange
For Quarantine (Unsafe Tools & Tackles)	Red

Contractor shall arrange non-sparking tools for project construction works in operating plant areas / hydrocarbon prone areas.

- Wherever required the Contractor shall make use of Elevated Work Platforms (EWP) or Aerial Work Platforms (mobile or stationary) to avoid ergonomical risks and workmen shall be debarred to board such elevated platform during the course of their shifting / transportation.
- Contractor shall ensure installation of Safe Load Indicator (SLI) on all cranes (while in use) to minimize overloading risk. SLI shall have capability to continuously monitor and display the load on the hook, and automatically compare it with the rated crane capacity at the operating condition of the crane. The system shall also provide visual and audible warnings at set capacity levels to alert the operator in case of violations.
- The contractor shall be responsible for safe operations of different equipments mobilized and used by him at the workplace like transport vehicles, Tower Crane, engines, cranes, mobile ladders, scaffoldings, work tools, etc. Strictly avoid standing close to Hydraulic Mobile Crane/vehicles tyres during operation.
- The contractor shall deploy cranes in good working condition of maximum allowable years of service from the year of manufacture as specified below: -
20 years for cranes of 50 MT & below capacity, 25 years for 51 MT to 100 MT, 30 years for cranes above 101 MT.

- v. In general Man basket shall not be lifted by Hydraulic Mobile Crane. Generally Crane shall be used for lifting the man basket.
- vi. Tower Crane, Crane, Hydraulic Mobile Crane or equivalent, Hydraulic Rig & Boom Lift shall be inspected on fortnightly basis as per Format No. HSE-20, HSE-21, HSE-22, HSE-23 & HSE-24.
- vii. The Contractor shall arrange periodical training for the operators of Hydraulic Mobile Crane, crane, excavator, mobile machinery, Tower Crane, etc. at site by utilizing services from renowned manufacturers.
- viii. Hydraulic Mobile Crane or equivalent having steering control mechanism shall be permitted at construction site only for the purpose of loading/unloading. However, continuous rigger availability during marching of hydraulic crane at site shall be ensured by contractor.

3.3.9 Occupational Health

- a) The contractor shall identify all operations that can adversely affect the health of its workers and issue & implement mitigation measures.
- b) For surface cleaning operations, sand blasting shall not be permitted even if not explicitly stated elsewhere in the contract.
- c) To eliminate radiation hazard, Tungsten electrodes used for Gas Tungsten Arc Welding shall not contain Thorium.
- d) Appropriate respiratory protective devices(hood with respiratory devices) shall be used to protect workmen from inhalation of air borne contaminants like silica, asbestos, gases, fumes, etc.
- e) Workmen shall be made aware of correct methods for lifting, carrying, pushing & pulling of heavy loads. Wherever possible, manual handling shall be replaced by mechanical lifting equipment's.
- f) Fuelling of construction equipments/Diesel Generator set shall be carried out by hand operated pump.
- g) In view of the congested working environment and associated hazards, deployment of manpower/machineries shall be in staggered manner keeping adequate safe distance between two adjacent work spot.
- h) For jobs like drilling/demolishing/dismantling/steam blowing/cardboard blasting etc. where noise pollution exceeds the specified limit of 85decibels, ear muffs shall be provided to the workers. The Noise level monitoring record shall be maintained.
- i) To avoid work related upper limb disorders (WRULD) and backaches, Display Screen Equipments' workplace stations shall be carefully designed & used with proper sitting postures. Power driven hand-held tools shall be maintained in good working condition to minimize their vibrating effects and personnel using these tools shall be taught how to operate them safely & how to maintain good blood circulation in hands.
- j) The Contractor shall arrange health check-up(by registered medical practitioner) for all the workers at the time of induction. Health check may have to be repeated if the nature of duty assigned to him is changed necessitating health check or doubt arises about his wellness. EIL/Owner reserves the right to ask the contractor to submit medical test reports. Regular health check-ups are mandatory for the workers assigned with Welding, Radiography, Blasting, Painting, Heavy Lift and Height (>2m) jobs. All the health check-ups shall be conducted by registered Medical practitioner and records are to be maintained by the Contractor.
- k) The Contractor shall arrange Medical Camps at regular intervals at work sites and labor colonies to assess health condition of workers.

- l) The Contractor shall ensure vaccination of all the workers including their families, during the course of entire project span.

3.3.10 Hazardous substances

- a) Hazardous, inflammable and/or toxic materials such as solvent coating, thinners, anti-termite solutions, water proofing materials shall be stored in appropriate containers preferably with lids having spillage catchment trays and shall be stored in a good ventilated area. These containers shall be labeled with the name of the materials highlighting the hazards associated with its use and necessary precautions to be taken. Respective MSDS (Material Safety Data Sheet) shall be made available at site & may be referred whenever problem arises.
- b) Where contact or exposure of hazardous materials are likely to exceed the specified limit or otherwise have harmful effects, appropriate personal protective Equipment's such as gloves, goggles/face-shields, aprons, chemical resistant clothing, respirator, etc. shall be used.
- c) The work place shall be checked prior to start of activities to identify the location, type and condition of any asbestos materials which could be disturbed during the work. In case asbestos material is detected, usage of appropriate PPEs by all personnel shall be ensured and the matter shall be reported immediately to EIL/ Owner.

3.3.11 Slips, trips & falls

- a) The contractor shall establish a regular cleaning and basic housekeeping programme that covers all aspects of the workplace to help minimize the risk of slips, trips & falls. The contractor shall take positive measures like keeping the work area tidy, storing waste in suitable containers & harmful items separately, keeping passages, stairways, entrances & exits especially emergency ones clear, cleaning up spillages immediately and replacing damaged carpet/ floor tiles, mats & rugs at once to avoid slips, trips & falls.
- b) Grating removal permit system should be implemented during construction phase. So that after permanent gratings are installed on platforms and tech structure floors; removal of any gratings for whatever purpose (including for lifting piping material etc.) is required to be sanctioned by signed permit by HSE officers of both contractor and Engineer-in-charge. The spot where gratings are removed shall be hard-barricaded during course of work. The removed gratings shall be re-installed immediately after completion of work or at the time of cessation of work every day whichever is earlier and the permit shall be closed on daily basis. A register shall be maintained for recording all the grating removal permits and their closure shall be monitored on daily basis.

3.3.12 Radiation exposure

- a) All personnel exposed to physical agents such as ionizing & non-ionizing radiation, including ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.
- b) For Open Field Radiography works, requirements of Bhabha Atomic Research Centre (BARC)/ Atomic Energy Regulatory Board (AERB) shall be followed.
- c) The Contractor shall implement an effective system of control (as described in the AERB regulations) at site for handling radiography-sources & for avoiding its misuse & theft.
- d) The contractor shall generate the Format No: HSE-8 "Permit for radiation work" before start of work.
- e) In case the radiography work has to be carried out at day time, suitable methodology to be used so that other works, people are not affected.

3.3.13 Explosives/Blasting operations

- a) Blasting operations shall be carried out as per latest Explosive Rules (Indian/ International) with prior permission. The Contractor shall obtain license from Chief Controller of Explosives (CCoE) for collection, transportation, storage of explosives as well as for carrying out blasting operations.
- b) The Contractor shall prepare exclusive method statement (in cognizance with statutory requirements) for rock blasting works & diffusing unfired explosives, if any, at project site before carrying out actual task. Nowhere blasting shall be carried out by the Contractor or its agency without the involvement of competent supervisor and licensed blaster.

3.3.14 Demolition/ Dismantling

- a) The contractor shall adhere to safe demolishing/ dismantling practices at all stages of work to guard against unsafe working practices.
- b) The contractor shall disconnect service lines (power, gas supply, water, etc.)/ make alternate arrangements prior to start of work and restore them, if required as directed by EIL/ Owner at no extra cost.
- c) Before carrying out any demolition/dismantling work, the contractor shall take prior approval of EIL/Owner and generate the Format No.HSE-9. For revamp jobs in operating plants where location of underground utilities is not known with certainty, the contractor shall depute an experienced engineer for supervision and shall make adequate arrangements for Fire-fighting & First-Aid during the execution of these activities.
- d) The Contractor shall arrange approved HIRAC/ Method Statement for the specific demolition / dismantling task and corresponding action plan commensurate with hazards / risks associated therein. In no case any activity related to demolition / dismantling shall be carried out by the Contractor without engaging own supervision / field engineer.

3.3.15 Road Safety

- a) The Contractor shall ensure adequately planned road transport safety management system.
- b) The vehicles shall be fitted with reverse warning alarms & flashing lights / fog-lights and usage of seat belts shall be ensured.
- c) The Contractor shall also ensure a separate pedestrian route for safety of the workers and comply with all traffic rules & regulations, including maintaining speed limit of 20 KMPH or indicated by owner for all types of vehicles / mobile machinery. The maximum allowable speed shall be adhered to.
- d) In case of an alert or emergency, the Contractor must arrange clearance of all the routes, roads, access. The Contractor shall deploy sufficient number of traffic controllers at project site routes / roads/ accesses, to alert reversing movement of vehicles & machinery as well as pedestrians. Experienced drivers/operators with valid driving license (LMV/HMV) shall be allowed to drive/operate the vehicles/equipment's. The Contractor shall maintain copy of PUC, RC and Insurance etc. for all the vehicles/equipment's.
- e) Dumpers, Tippers, etc. shall not be allowed to carry workers within the plant area and also to & from the labour colony to & from project sites.
- f) Hydraulic Mobile Crane or equivalent shall only be allowed for handling (loading/unloading) the materials at fabrication/ storage yards and in no case shall be allowed to transport the materials over project / plant roads.
- g) The Contractor shall not deploy any such mobile machinery / Equipment's, which do not have competent operator and / or experienced banks-man/signal-man. Such machinery/equipment's shall have effective limit-switches, reverse-alarm, front & rear-end lights etc. and shall be maintained in good working order.
- h) The Contractor shall not carry-out maintenance of vehicles / mobile machinery occupying space on project / plant roads and shall always arrange close supervision for such works.

- i) For pipeline jobs, the contractor shall submit a comprehensive plan covering transportation, loading / unloading of pipes, movement of side booms, movement of vehicles on the ROW, etc.
- j) Height barrier/Restriction to be provided on both side of the HT lines, if required.
- k) Contractor's shall arrange /install visible road signs, diversion boards, caution boards, etc. on project roads for safe movement of men and machinery.

3.3.16 Welfare measures

Contractor shall, at the minimum, ensure the following facilities at work sites:

- a) A crèche at site where 10 or more female workers are having children below the age of 6 years.
- b) Adequately ventilated / illuminated rooms at labour camps & its hygienic up-keeping.
- c) Reasonable canteen facilities at site and in labour camps at appropriate location depending upon site conditions. Contractor shall make use of "industrial" variety of LPG cylinder & satisfactory illumination at the canteens. Necessary arrangement for efficient disposal of wastes from canteens & urinals /toilets shall also be made and regular review shall be made to maintain the ambience satisfactorily hygienic & shall also comply with all applicable statutory requirements.
- d) Adequately lighted & ventilated Rest rooms at site (separate for male workers and female workers).
- e) Provision for suitable mobile toilets to be made available by Contractor for remote/scattered job locations.
- f) Urinals, Toilets, drinking water, washing facilities, adequate lighting at site and labour camps, commensurate with applicable Laws/ Legislation.
- g) The contractor shall ensure the test report of drinking water.
- h) The contractor at periodic interval shall arrange to prevent mosquito breeding by fumigation/spraying of insecticides at workplace/fabrication yard.

3.3.17 Environment Protection

Contractor shall ensure proper storage and utilization methodology of materials that are detrimental to the environment. Where required, Contractor shall ensure that only the environment friendly materials are selected and emphasize on recycling of waste materials, such as metals, plastics, glass, paper, oil & solvents. The waste that cannot be minimized, reused or recovered shall be stored and disposed of safely. In no way, toxic spills shall be allowed to percolate into the ground. The contractor shall not use the empty areas for dumping the wastes.

The contractor shall ensure availability of stack emission test report of DG set. Monitoring of air quality emission of DG stack shall be carried out on yearly basis. However, air quality emission shall be monitored first time on commissioning of DG Set.

Contractor to submit Environmental Aspect Impact Register detailing the list of activities in his scope, the respective environmental impact and the actions taken to minimize the impact. Environmental Aspect Impact Register to be prepared as per Format HSE-18 and to be updated and maintained till job completion. Environmental Aspect Impact Register of the contractor shall be reviewed by EIL/Owner on half-yearly basis.

The contractor shall strive to conserve energy and water wherever feasible.

The contractor shall ensure dust free environment at workplace by sprinkling water on the ground at frequent intervals. The air quality parameters for dust, poisonous gases, toxic releases,

harmful radiations, etc. shall be checked by the contractor on daily basis and whenever need arises.

The contractor shall not be allowed to discharge chemicals, oil, silt, sewage, sullage and other waste materials directly into the controlled waters like surface drains, streams, rivers, ponds. A discharge plan suggesting the methods of treating the waste before discharging shall be submitted to EIL/Owner for approval.

For pipeline jobs, top soil shall be stacked separately while making ROW through fields. This fertile soil shall be placed back on top after backfilling.

For offshore construction barges, arrangements shall be made for safe disposal of human, food & other wastes and applicable laws in this regard shall be followed.

3.3.18 Rules & Regulations

All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials, substances and wastes. Contractor shall not dump, release or otherwise discharge or disposes off any such materials without the express authorization of EIL/Owner. An indicative list of Statutory Acts & Rules relating to HSE is given under Appendix-D.

3.3.19 Weather Protection

Contractor shall take appropriate measures to protect workers from severe storms, rain, solar radiations, poisonous gases, dust, etc. by ensuring proper usage of PPEs like Sun glasses, Sun screen lotions, respirators, dust masks, etc. and rearranging/ planning the construction activities to suit the weather conditions. Effective arrangement (without creating inconvenience to project facilities & permanent installations) for protecting workmen from hailstorm, drizzle in the form of temporary shelter shall be made at site.

3.3.20 Communication

All persons deployed at the work site shall have access to effective means of communication so that any untoward incident can be reported immediately and assistance sought by them.

All health & safety information shall be communicated in a simple & clear language easily understood by the local workforce.

For information to all, typical subjects that should be communicated are: -

Inside the company (Top to down)

- a. Quality Policy
- b. HSE Policy contents
- c. Environment Policy
- d. HSE Objectives
- e. Safety Cardinal Rules
- f. HSE Target – reached or missed
- g. Praises & Warnings to personnel for HSE Management
- h. Safety Walk Through Reports and safety defects / shortfalls (by management)
- i. HSE Audit results
- j. Revised Statutory Health & Safety provisions, if any
- k. H & S publicity
- l. Suggestions

Inside the Company (Bottom to up)

- a. Complaints
- b. Compliances on safety defects / shortfalls
- c. Suggestions
- d. Proposals for changes & improvements
- e. HSE Reports (including near-miss reports)

3.3.21 Confined Space Entry

The contractor shall generate a work permit (Format No. HSE -7) before entering a confined space. People, who are permitted to enter into confined space, must be medically examined & certified by registered doctor, confirming their 'medical fitness for working in confined space'. All necessary precautions mentioned therein shall be adhered to. An attendant shall be positioned outside a confined space for extending help during an emergency. Effective communication shall be maintained between personnel in confined space and outside by combination of visual/voice or portable radio. Compressed gas cylinders shall not be taken into confined space. Entry Register for confined space to be maintained with the name and time of entry/exit. All appropriate PPEs and air quality parameters shall be checked before entering a confined space. It shall be ensured that the piping of the equipment which has to be opened is pressure- free by checking that blinds are in place, vents are open and volume is drained. Inside confined space works, only electrical facilities / installations of 24V shall be permitted. Contractor shall ensure usage of safe & suitable arrangement of oxygen supply for individual workmen (during the course of work in confined space), if oxygen concentration is found to be less than 19.5% (v/v) there. All persons must be made aware of the risk associated with Nitrogen & all precautionary measures shall be taken when vessel/sphere/pipelines etc. are being purged with nitrogen. Rescue arrangement must be readily available at workplace to fulfill requirement of the emergency situation.

3.3.22 Heavy Lifts

- a) The contractor shall submit detailed rigging study/ plan for EIL/ Owner approval prior to lifting equipment requiring a crane of approx. 100 MT capacity or more due to constraints of its dimensions, location of foundation height, approach & weight.
- b) Contractor shall generate the format no. HSE-15 "Permit for heavy lift/critical erection"
- c) The Safe Working Load (SWL) and manufacturer's serial numbers shall be clearly marked on the slings and the lifting gears, either by tagging, stamping, engraving or embossing.
- d) Prior to actual lifting activities, contractor shall check the validity of the crane inspection certificate issued by statutory/ competent authority. This requirement shall also apply to all rigging equipment's utilized for the job.
- e) The contractor shall, at all times, be responsible for all rigging activities.
- f) The Contractor shall ensure medical fitness of all workmen who are engaged / involved in erection of equipment's, vessels etc. and such fitness checks shall be carried-out every six months interval with the help of a registered medical practitioner & record shall be maintained
- g) Adequate safety measures such as positive barricading, usage of appropriate PPEs, permit to work, etc. shall be taken during all heavy or critical lifts.
- h) Ground condition should be suitable to sustain the Ground Bearing Load of the Crane with full load condition.
- i) For lifting any material (irrespective of shape, size or volume), at any height, it is always advisable to prepare a Plan of Erection (PoE) taking into consideration hazards & risks associated therein – this can enable people to put their own experiences of various natures & side-by-side establish a practical method for risk-free erection / lifts. The contractor shall

prepare PoE & shall document the same, when risks are identified as “medium” or “high” and the same shall be approved by its competent / qualified engineer.

3.3.23 Key Performance Indicators

The contractor shall measure an activity in both leading & trailing indicators for statistical and performance measurement. The activities pertaining to key performance indicators are covered in Monthly HSE Report (Format No. HSE-5). The contractor shall try to achieve a statistically fair record and strive for its continual improvement.

Leading Indicators viz:-

- Number of Safety Inductions carried-out at site (for workmen & staff members)
- Number of HSE inspections carried out
- Number of “Safety Walk Through” carried-out by site-head.
- Number of HSE shortfalls / lapses identified per contractor & closed-out in time.
- Number of Safety Meetings conducted (in-house / with contractors)
- Number of HSE Audits made (internal & external) vis-à-vis non conformances raised
- Number of HSE Awareness / Motivational program conducted by contractors
- Number of HSE Trainings conducted at site for supervisors & workmen
- Study of Near miss case reported
- Encouragements / Awards / Recognitions to workmen, job supervisors & field engineers.
- Suggestions for improvement

Trailing Indicators viz:-

- Calculation of HSE statistics viz frequency rate, severity rate, LTA free man hours etc.
- Analysis of incidents / accidents (nature, severity, types etc.)
- Study of Incident / Accident with respect to :-
 - Variety
 - Period of the year / project span
 - Timings of the incident / accident
 - Age profile of victims
 - Body parts involved
 - Penalty levied for causing incident / accident

3.3.24 Unsuitable Land Conditions

Contractor shall take appropriate measures and necessary work permits/clearances if work is to be done in or around marshy areas, river crossings, mountains, monuments, etc. The Contractor shall make right assessment and take all necessary action for developing work areas to make them safe & suitable for crane operations or other vehicular movement before carrying out any project related activity / operation. Contractor shall take all necessary actions to make the surroundings of its site establishments (site office, stores, lay-down area etc.) work-worthy safe and secure.

3.3.25 Under Water Inspection

Contractor shall ensure that boats and other means used for transportation, surveying & investigation works shall be certified seaworthy by a recognized classification society. It shall be equipped with all life saving devices like life jackets, adequate fire protection arrangement and shall possess communication facilities like cellular phones, wireless, walkie-talkie. All divers used for seabed surveys, underwater inspections shall have required authorized license, suitable life-saving kit. Number of hours of work by divers shall be limited as per regulations. EIL/ Owner shall have the right to inspect the boat and scrutinize documents in this regard.

3.3.26 Excavation

The Contractor shall obtain permission from competent authorities prior to excavation wherever required.

The Contractor shall locate the position of buried utilities (water line, cable route, etc.) by referring to project / plant drawing / in consultation with EIL/Owner. The Contractor shall start digging manually to locate the exact position of buried utilities & thereafter use mechanical means.

In case of non-availability of sufficient data/drawings, underground services i.e. underground cable/ pipe shall be checked by cable detector/pipe locator by the contractor.

The Contractor shall keep soil heaps at least 1.5 M away from edge or a distance equal to depth of pit (whichever is more)

All excavated pits greater than 10 Sq.M plan area and depth more than 1.5M shall have at least two access routes for ingress and egress. Also, additional access routes shall be provided such that distance between any two access routes shall not be more than 20M.

The Contractor shall maintain sufficient "angle of repose" during excavation – shall also provide slope or suitable bench as decided by EIL / Owner.

The Contractor shall arrange "battering" or "benching" wherever required for preventing collapse of edge of excavations.

Avoid vertical wall of less than 2mtrs between two adjacent deep excavated pit/area. Further deep excavation should not be kept open for a longer duration.

The Contractor shall identify & arrange de-watering pump or well-point system to prevent earth collapse due to heavy rain / influx of underground water.

The Contractor shall arrange protective fencing/hard barricading with warning signal around excavated pits, trenches, etc. along with minimum 2 (two) entries, exits / escape ladders.

The Contractor must avoid "underpinning" / under-cutting to prevent collapse of chunk of earth during excavation.

The Contractor shall use "stoppers" to prevent over-run of vehicle wheels at the edge of excavated pits / trenches. Vehicles movement should be restricted to minimum three meters away from the excavated pit.

The Contractor shall arrange strengthening of "shoring" & "strutting" proactively to avoid collapse of earth / edges due to vehicular movement in close proximity of excavated areas / pits/ trenches, etc.

3.4 Tool Box Talks (TBT)

Contractor shall conduct daily TBT with workers prior to start of work and shall maintain proper record of the meeting. A suggested format is given below. The Job specific TBT is to be conducted by the immediate supervisor of the workers.

The Contractor shall conduct TBT before start of every morning or evening shift or night shift activities, for alerting the workers on specific hazards and their appropriate dos & don'ts. The Contractor shall provide sufficient rests to the site workmen and their foremen to avert fatigue & thereby endangering their lives during the course of site works.

TOOLBOX TALK RECORDING SHEET

Date & Time		
Work Location		
Subject (Nature of work)		
Presenter		
Hazards involved		
Precautions to be taken		
Worker's Name	Signature	Section
Remarks, in any		

The topics during TBT shall include

- Hazards related to work assigned on that day and precautions to be taken.
- Any forthcoming HSE hazards/events/instruction/orders, etc.

The above record can be kept in local language, which workers can read. These records shall be made available to EIL/ Owner whenever demanded.

3.5 Training & Induction Programme

- Initial induction of workers into Construction oriented activities and appraising them about the methodology of works and how to carry-out safely and the same should not be inter mixed with Tool Box Talks or HSE Training. In this regard careful action should be made& maintained for imparting HSE induction to every individual, irrespective of his task/designation/level of employment, whereas, HSE Training should be imparted to specific person/group of people who are to carry-out that specific task more than once – for example, Riggers must be trained for working at heights, welders must be trained for work in confined space, fitters/carpenters, mesons must be trained for work at heights, etc. Contractor shall arrange suitable facilities (e.g training room/place, audio visual facilities etc.) for organizing such training on HSE.
- Contractor shall conduct Safety induction programme on HSE for all his workers and maintain records. Sticker for “Safety Induction” shall be pasted on the safety helmet of the site personnel. The Gate Pass shall be issued only to those workers who successfully qualify the Safety induction programme. Contractor to conduct effective safety induction program at work site by making efforts to arrange Video film/Virtual Reality (VR) technology pertaining to the escape routes, assembly points, risks involved in the event of an emergency etc while imparting safety induction.
- The Contractor brief the visitors about the HSE precautions which are required to be taken before their proceeding to site and make necessary arrangements to issue appropriate PPEs like Aprons, hard hats, ear-plugs, goggles & safety shoes etc., to his visitors. The Contractor shall always maintain relevant acknowledgement from visitor on providing him brief information on HSE actions.
- Contractor shall submit job specific training schedule for approval of EIL/Owner & ensure that all his personnel possess appropriate training to carry out the assigned job safely. The training should be imparted in a language understood by them and should specifically be trained about
 - Potential hazards to which they may be exposed at their workplace

- Measures available for prevention and elimination of these hazards

The topics during training shall cover, at the minimum: -

- Why safety should be considered during work - explanation
 - Education about hazards and precautions required
 - Employees' duties & responsibilities
 - Emergency and evacuation plan
 - HSE requirements during project activities
 - Fire fighting and First-Aid
 - Use of PPEs
 - Occupational health issues – dos & don'ts
 - Local laws on intoxicating drinks, drugs, smoking in force
 - Common environmental subjects – lighting, ventilation, vibration, smoke/fumes etc.
- e) Records of the training shall be kept and submitted to EIL/ Owner.
- f) The Contractor shall make regular program for conducting Safety Training on various topics related to various activities & their safe-guarding utilizing experienced persons / outside agency / faculty. A program for Safety Training (indicative list as per Appendix –F) shall be furnished by the Contractor in its HSE Plan.
- g) For offshore and jetty jobs, contractor shall ensure that all personnel deployed have undergone a structured sea survival training including use of lifeboats, basket landing, use of radio communication etc. from an agency acceptable to Owner/EIL.

3.6 ADDITIONAL SAFETY REQUIREMENTS FOR WORKING INSIDE A RUNNING PLANT

As a minimum, the contractor shall ensure adherence to following safety requirements while working in or in the close vicinity of an operating plant:

- a) Contractor shall obtain permits for Hot work, Cold work, Excavation and Confined Space from Owner in the prescribed format.
- b) The contractor shall monitor record and compile list of his workers entering the operational plant/unit each day and ensure & record their return after completing the job.
- c) Contractor's workers and staff members shall use designated entrances and proceed by designated routes to work areas only assigned to them. The workers shall not be allowed to enter units' area, tanks area, pump rooms, etc. without work authorization permit.
- d) Work activities shall be planned in such a way so as to minimize the disruption of other activities being carried out in an operational plant/unit and activities of other contractors.
- e) The contractor shall submit a list of all chemicals/toxic substances that are intended to be used at site and shall take prior approval of the Owner.
- f) Specific training on working in a hydrocarbon plant shall be imparted to the work force and mock drills shall be carried out for Rescue operations/First-Aid measures.
- g) Proper barricading/cordoning of the operational units/plants shall be done before starting the construction activities. No unauthorized person shall be allowed to trespass. The height and overall design of the barricading structure shall be finalized in consultation with the Owner and shall be got approved from the Owner.
- h) Care shall be taken to prevent hitting underground facilities such as electrical cables, hydrocarbon piping during execution of work.

- i) Barricading with water curtain shall be arranged in specific/critical areas where hydrocarbon vapors are likely to be present such as near horton spheres or tanks. Positioning of fire tenders (from owner) shall also be ensured during execution of critical activities.
- j) Emergency evacuation plan shall be worked out and all workmen shall be apprised about evacuation routes. Mock drill operations may also be conducted.
- k) Flammable gas test shall be conducted prior to any hot work using appropriate measuring instruments. Sewers, drains, vents or any other gas escaping points shall be covered with flame retardant tarpaulin.
- l) Respiratory devices shall be kept handy while working in confined zones where there is a danger of inhalation of poisonous gases. Constant monitoring of presence of Gas/Hydrocarbon shall be done.
- m) Clearance shall be obtained from all parties before starting hot tapping, patchwork on live lines and work on corroded tank roof.
- n) Positive isolation of line/equipment by blinding for welding/cutting/grinding shall be done. Closing of valve will not be considered sufficient for isolation.
- o) Welding spatters shall be contained properly by using fire retardant blanket and in no case shall be allowed to fall on the ground containing oil. Similar care shall be taken during cutting operations. Fire watcher to be deployed to ensure the same.
- p) The vehicles, cranes, engines, etc. shall be fitted with spark arresters on the exhaust pipe and got it approved from Safety Department of the Owner.
- q) Plant air should not be used to clean any part of the body or clothing or use to blow off dirt on the floor.
- r) Gas detectors should be installed in gas leakage prone areas as per requirement of Owner's plant operation personnel.
- s) Flame proof electrical distribution board, plug and socket shall be used for electrical appliances.
- t) Experienced full time safety personnel shall be exclusively deployed to monitor safety aspects in running plants.

3.7 Self-Assessment and Enhancement

The contractor shall develop a method of check & balance through self-assessment & enhancement techniques and shall explore the opportunities for continual improvement in the HSE system.

3.8 HSE Promotion

The contractor shall encourage his workforce to promote HSE efforts at workplace by way of organizing workshops/seminars/training programs, celebrating HSE awareness weeks & National Safety Day, conducting quizzes & essay competitions, distributing pamphlets, posters & material on HSE, providing incentives for maintaining good HSE practices and granting incentives/ bonus for completing the job without any lost time accident.

3.9 Lock Out and Tag Out (LOTO) for Isolation of Energy Source

- a) Contractor shall follow the LOTO/Isolation procedure of owner for all energy source isolations installed/under purview by /of owner i.e. "Brown field"
- b) For all the other energy source (not under purview of client/owner) i.e. "Green field" Contractor shall develop a system to ensure the isolation of equipments, pipelines, Vessel, electrical panels from the energy source covering following as minimum:-

- Identification of all energy source viz electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radiation and other forms of stored or kinetic energy.
 - Establishing the energy isolation devices viz manually operated electrical circuit breakers, disconnection switches, blind flanges, etc.
 - Installation of Lock Out devices for preventing the inadvertent release of stored energy and Tag Out devices ("Danger", "Do Not operate" or Do not Remove" tags) to indicate that testing, maintenance or servicing is underway and the device cannot be operated until the tag out device is removed.
 - Lock Out and Tag out log book
 - Permit for isolation and de-isolation of energy source as per format No.: HSE-16
 - Availability of competent persons like experienced operators at substations, pump house, units etc. supervisors etc.
- c) Contractor shall ensure that all the sources are locked out and tagged properly before giving clearance to start the job.
- d) After the completion of job, contractor shall ensure all tools and tackles are removed and nobody is present in the working area and signing on LOTO log book.
- e) Only on confirmation of above the contractor will remove their lock and tag from the isolation points and give instructions for energizing the same. Only the person carrying out the task shall himself carry the key for the lock in /Lock out.

4.0 DETAILS OF HSE MANAGEMENT SYSTEM BY CONTRACTOR

4.1 On Award of Contract

The Contractor shall submit a comprehensive Health, Safety and Environmental Plan or programme for approval by EIL/Owner prior to start of work. The Contractor shall participate in the pre-start meeting with EIL/Owner to finalize HSE Plans which shall including the following:

- HSE policy & Objectives
- Job procedure to be followed by the Contractor for construction activities including handling of equipment's, scaffolding, electric installations, etc. describing the risks involved, actions to be taken and methodology for monitoring each activity. Indicative list of procedures is enclosed as Annexure-H
- EIL/Owner review/audit requirement.
- Organization structure along with responsibility and authority, on HSE activities.
- Administrative & disciplinary steps involving implementation of HSE requirements
- Emergency evacuation plan/ procedures for site and labour camps
- Procedures for reporting & investigation of accidents and near misses.
- HSE Inspection
- HSE Training programme at project site
- HSE Awareness program at project site
- Reference to Rules, Regulations and statutory requirements.
- HIRAC
- Environment Aspect Impact Register
- Legal Register
- HSE documentation viz reporting, analysis & record keeping.

4.2 During Job Execution

Contractor shall implement approved Health, Safety and Environment management plan or programme including but not limited to as brought out under para 3.0. Contractor shall also ensure:

- a) to arrange workmen compensation insurance, registration under ESI Act, third party liability insurance, registration under BOCW Act etc., as applicable.