GUJARAT GAS

TECHNICAL SCOPE FOR PE LAYING & DOMESTIC/ COMMERCIAL/ NON-COMMERCIAL/ NDEC/ INDUSTRIAL PNG INSTALLATIONS

(PART-1)

DOCUMENT NO.: GGL/TS/PE-PNG-PROJECTS/2020

Bidder's seal & sign

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1.0 INTRODUCTION

Gujarat Gas Limited (GGL) *(hereinafter also referred as "owner"/ "buyer")* is a GSPC Group Company, a Government of Gujarat undertaking and currently is India's largest City Gas Distribution Company with its presence spread across 41 districts in the state of Gujarat, Rajasthan, Madhya Pradesh, Haryana, Punjab, Maharashtra and Union Territory of Dadra & Nagar Haveli. GGL is committed to develop eco-friendly infrastructure and transportation fuel for public service in its operating areas as awarded by PNGRB from time to time.

This section of the document summarizes the technical requirements and the specifications for laying and/or installation, testing & commissioning of PE pipeline and installation, testing & commissioning of above ground PNG Connections for Domestic, Commercial, Non-Commercial, NDEC, Industrial Customers and any other type of Customer at various operation areas of GGL.

This specification shall be read in conjunction with the Special Condition of Contract, General Conditions of Contract, Specification of Work, Drawing and any other documents forming part of this contract wherever the context so requires. Notwithstanding the sub-division of the documents into these separate sections and volumes every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.

Where any portion of the General Condition of Contract is repugnant, to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears, the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Condition of Contract and shall to the extent of such repugnancy, or variations, prevail.

Wherever it is mentioned in the specifications that the CONTRACTOR shall perform certain work or provide certain facilities, it is understood that the CONTRACTOR shall do so at his cost and the VALUE OF CONTRACT shall be deemed to have included cost of such performance and provisions, so mentioned.

It will be Contractor's responsibility to bring to the notice of Engineer-in-charge any irreconcilable conflict in the contract documents before starting the work(s) or making the supply with reference which the conflict exists.

The detailed scope of work by the Bidder covers supply of materials excluding materials as mentioned in the note below, excavation, lowering, laying, jointing, inspection, testing, pre-commissioning, commissioning and performance testing along with all associated works like barricading including service lines and transition fittings pertaining to complete above ground PNG (GI) connections at Domestic/ Commercial/ Non-Commercial/ NDEC/ Industrial Customer premises, totally conforming to the Technical Specifications, Drawings, Data sheets and other information provided in this document.

Note: Bidder shall supply all the materials needed for PE Construction and PNG Installations excluding PE Pipes of size 32 mm dia. and above, PE Ball Valves, Service Regulators, Domestic Meter, Domestic Regulator, Isolation Ball Valves, Appliance Valves, Wire Braided Rubber Hose, Valve Chamber FRP Cover with Frame, Anaconda.

2.0 DEFINITIONS

OWNER/ CLIENT	Gujarat Gas Ltd. (GGL)
TPIA	Third Party Inspection Agency to be appointed by GGL
QAP	Quality Assurance Plan
EIC	Engineer–in–Charge
VENDOR	The person(s), firm, company, organization from whom Client/ Contractor procures materials
CONTRACTOR	The person, firm or company to whom the Work Order is addressed
SDR	Standard Dimension Ratio it is the ratio of nominal OD to nominal wall thickness of PE pipe as define in IS-14885, with latest edition
TRENCH LESS	Such method of construction that does not need an open trench
CONSUMER METER	A meter that measures gas delivered to a consumer at the consumer's premises
ELECTRO FUSION JOINT	A joint made in thermoplastic piping by passing the current through the electrical coil provided in the fitting and heating the parts sufficiently to permit adequate flow and fusion of the materials between the two surfaces put in contact
CPRS, DRS, DPRC	It receives gas from steel distribution line and carries out filtration, pressure reduction from 1.5 barg to 5 barg and dispatches to PE distribution network
DOMESTIC CUSTOMER CONNECTION	Consist of regulator, meter, GI/ copper pipeline and wire braided rubber tube. Gas flow downstream of regulator at 21-24 mbar and consumed at hot plate
COMMERCIAL CUSTOMER CONNECTION	Consist of regulator, meter, GI/ copper pipeline and wire braided rubber tube. Gas flow downstream of regulator at 75-100 mbar and consumed at hot plate
NON-COMMERCIAL CUSTOMER CONNECTION	Non-profit making organization or a religious or charitable trust / institution
NDEC CONNECTION	Non-Domestic Exempted Category

INDUSTRIAL CUSTOMER CONNECTION	Consist of filter, regulator, meter, PE/ CS pipeline and consumed at Gas equipment like boiler, furnace, etc.
TRANSITION BOX/ SERVICE REGULATOR	Receives gas from downstream of DPRC/DRS/CPRS through PE network and supply at 110 mbar pressure gas to downstream PE network after pressure reduction
ODORISING UNIT/ FACILITY	Adequate odour/ smell is imparted to piped natural gas by continuous dozing controlled quantity of odorant chemical, in the flowing gas supply
IMS	Integrity Management System comprising of ISO 9001:2015, ISO 14001:2015 and ISO 18001:2007
PERSONAL PROTECTION EQUIPMENTS (PPE)	For personal protection during normal and critical jobs
FIRE EXTINGUISHERS	For extinguishing fire accident during routine job
SIGNAGE/ CAUTION/ INFORMATION BOARDS AND MOBILE PHONES/ WIRELESS SETS	For display of information/ caution, quick and effective transmission of information
COMPUTER SYSTEM/ PRINTER/ LOG BOOKS	For record/ reports/as-built drawings and daily progress report
PNG	Natural Gas produced from Gas wells, Gas condensate wells or Oil wells and the residue Gas remaining after conditioning being metered, regulated/ controlled, odorized & distributed through pipelines for various applications, i.e. for Domestic, Commercial, Non-Commercial, NDEC, Industrial etc…as a Fuel
EQUIPMENT	Gas Transmission Pipelines (Steel), Distribution mains (PE), City Gate Station, DRS/ CPRS, Transition Box/ service regulator, GI Installations, Meter/ Regulators, Safety/ Regulating/ Control valves & associated facilities includes Flow Meter, Filters, Odourizer and accessories owned by OWNER for PNG distribution
SAFETY PROCEDURES	The Procedures, Direction, Guidelines and Measures as communicated from time to time by OWNER to the CONTRACTOR for safe/ reliable handling, distribution & usage of PNG
VEHICLE	A Light Motor Vehicle (Cars & Three Wheelers) and Heavy Motor Vehicle (Bus) as defined under the Motor Vehicle Act, 1988

HSE	Health, Safety, Environment
TR UNIT	Transformer Rectifier Unit
MDPE	Medium Density Polyethylene
CP	Cathodic Protection
TLP	Test Lead Point
QAP	Quality Assurance Plan
SOP	Standard Operating Procedure
CPAR	Contractor Performance Assessment Review

3.0 GENERAL

3.1 Post selection and awarding of **CONTRACT**, **GGL** shall arrange a kick-off meeting with **CONTRACTOR** where **GGL** team members Contract Owner (CO), Contract Holder (CH) & HSE representative) will discuss on QHSE Management aspects/ plan and requirements in order to make sure that **CONTRACTOR** and their team are fully understanding the expectation of **GGL**. During the meeting, QHSE Management Plan shall be discussed and agreed between **GGL & CONTRACTOR**.

3.2 **CONTRACTOR** shall ensure that all tools, tackles, equipment, machineries & instruments are adequately deployed and are 'Fit for Purpose'. Pre mobilization checks/ inspection shall be carried out by **GGL** team for the same before the start of work.

3.3 **GGL** emphasizes on the importance of the Health and Fitness of all staff/ work force deployed at **GGL** work sites. Contractor/ Service provider shall adhere to medical check-up as per the GGL Health check-up matrix (as applicable)

3.4 A proper HSE orientation and training will be organized by GGL for the **CONTRACTOR** workforce before the start of work; under no circumstances should the **CONTRACTOR** commence the work unless they have undergone the HSE training (as applicable)

3.5 **CONTRACTOR** shall ensure that all their staff/ work force is provided required Personal Protective Equipment (PPEs) as per GGL PPE matrix (as applicable)

3.6 **CONTRACTOR** shall ensure all required emergency arrangements like Medical treatment, FIRST AID box and Firefighting equipment (as applicable)

3.7 **CONTRACTOR** shall be required to mobilize the resources within 30 days post written intimation given by GGL Engineer In charge. In case where CONTRACTOR is already mobilized on site and a fresh/ renewal/ call out order contract is issued just to ensure continuity of the work then there is no separate Mobilization required and all associated clause/ terms related to initial/ first mobilization shall not be applicable.

3.8 GGL will be conducting regular performance reviews through system of Contractor Performance Assessment Review (CPAR) throughout the tenure of the contract, under which, CPAR score for the month will be determined and signed off jointly by GGL and CONTRACTOR (Refer clause 4.4 and 5.4 of this tender document).

3.9 It will be mandatory for the CONTRACTOR or its authorized representative to attend all the CPAR meetings and sign off the Minutes of Meeting with CPAR score.

3.10 Contractors who got less than 55% CPAR Score in 4 successive months-

1. Will not be given any additional work for 3 months. During this period contractor can execute orders already placed on them and demonstrate improvement. In case if the balance job to be executed by the contractor is not have enough then he can be considered based on the improvements shown while executing balance job.
2. Contractor will be put on suspension for the balance contract period if-
    - He could not resume work after 3 months by demonstrating improvements
    - Could not meet CPAR requirements of the contract on resumption.
3. Contractor who is on suspension -
    - Will be allowed to complete the work on hand till next project milestone. However, in case if contractor is not able to perform till next project milestone or not allowed to work due to irregularities then no payment will be made for the partial work done.
    - Will be suspended from working in any of the GGL locations.

3.11 Pending Work of non-performing contractor will be allotted to all the contractors in line with the mutually agreed capacity of the contractor (Based on written declaration by contractor on the capacity) and also got 65% CPAR in all the previous 3 months.

NOTE:

1. GGL reserves the right to make any modifications in the Clause No. 3.10.3 depending upon the site conditions and project requirements.

2. GGL reserves the right for continuous review & change in Contractor Performance Assessment and Review (CPAR) procedure and same shall be applicable on bidder.

4.0 SCOPE OF WORK - PE LAYING

4.1 PE LAYING

The main scope of this Specification comprises of laying of underground Polyethylene (PE100) main pipelines and service pipeline. The scope covers all the activities associated with the supply, laying, testing and commissioning of PE main pipelines and service pipelines of different sizes ranging from 20mm up to 160mm OD in new & existing gas charged areas.

This technical specification defines the basic guidelines to develop suitable construction methodology for carrying out different activities listed out in the schedule of rates of this tender.

Compliance with these specifications and/ or approval of any of the Contractor's documents shall in no case relieve the Contractor of his contractual obligations.

Generally, the following shall constitute the Contractor's scope of work & as per GGL Procedure for PE Pipeline construction, but not limited to:

4.1.1 Laying of Medium/ Low pressure PE 100 Pipeline with proper road reinstatement downstream of DRS/ Service Regulator (SR) to various streets/societies extension of the existing network shall be executed as per schematic (planned) drawing approved by Owner's representative.

4.1.2 Day to day coordination with concerned authorities i.e. Municipality, Nagarpalika, Panchayat office, R&B and others for smooth working and approval for optimum route as per ROU at site from concerned authorities shall be in the scope of contractor. Also, Contractor shall not sign/ execute any agreement and/or undertaking of any such documents which amounts to be undertaken by Owner and which shall only be signed and executed by Owner.

4.1.3 Liaison with the concerned authorities during execution of the job, obtaining NOC from concerned authorities once the work is completed, liaison with concerned authorities for getting back/Refund of Bank Guarantee/security deposits made to the agencies for laying of the pipelines. Till the NOC from authorities, after restoration, is obtained and submitted to GGL, GGL reserves the right to withholds equivalent amount of security deposit (if it exceeds the retention money billing amount of contractor).

4.1.4 Obtaining clearances, co-ordination, liaison and arrangement for statutory inspection and approval shall be the contractor's responsibility, inspection and acceptance of the work by statutory authority shall not relieve the contractor from any of these responsibilities under this contract.

4.1.5 Any change/additions required to be made to meet the requirements of statutory authorities, shall be carried out by Contractor, within the contract price and with no additional cost to Owner.

4.1.6 Contractor has to ensure the backfill, watering, compaction and carryout a temporary reinstatement of all premises after completion of PE laying work immediately.

4.1.7 Work on major crossings like River/ Major Water Canal/ National Highway/ Railway lines etc. can be done only after specific instruction from GGL. In case if work is done through steel pipeline both ends of steel pipeline with PE pipes shall be connected through transition fittings under this tender terms and conditions.

4.1.8 Receipt of free issue materials from the owner's stores in GA. In case GGL does not have store in awarded GA, Contractor is required to get the material issued from GGL nearby GA Store. Receiving, loading, transportation, unloading, proper storing, stacking, identification shall be in Contractor's scope.

4.1.9 Provision and maintenance of proper store by the contractor near to the work area. Also, ensure proper stacking, providing security and insurance cover during storage and handing over the balance free issue materials to Owner during reconciliation.

4.1.10 Construction & commissioning of PE 100 pipeline in downstream of District Regulating Station (DRS) up to Domestic/ Commercial/ Non-Commercial/ NDEC/ Industrial customer premises including installation of PE ball valves & Service Regulators (SR).

- District Regulating Station (DRS) is an interface between steel pipeline network and Medium pressure PE pipeline network used to reduce inlet pressure of up to 49.0 bar(g) to an outlet pressure of 1.5 to 5.0 bar(g).
- Service Regulator (SR) is interface between Medium pressure and Low pressure PE pipeline network used to reduce inlet pressure of 1.5 to 5.0 bar(g) to an outlet pressure of 110 mbar(g).

4.1.11 Making trial pits to determine the underground utilities/services such as existing pipelines, Cables (Electrical/Communication), Conduits, U/G drainage, Sewers, tunnels, Subway foundations etc. for deciding optimum feasible route and depths for laying the pipelines based on the route plans indicated by Owner. The Contractor will obtain and submit all available information regarding the existence and location of other underground utilities to the Site Engineer in advance to decide

excavation route for laying of PE pipeline. However, trial pits at a suitable distance of 30 meters or as per instruction of engineer in charge should be excavated based on site requirement for identification of utilities. The trial pits shall be excavated to minimum depth of 250mm deeper than the trench depth so as to locate any utilities present in the trench and shall be properly backfilled accordance with Owners specification. Restoration of the abandoned trial pits and trenches shall be the contractor's responsibility. No payments shall be made for such type of works. Also, there will be no additional payments in respect of abandoned trenches and expenses incurred because of insufficient of inadequate trail holes, or any associated lost time or delays

4.1.12 All excavated trenches/ pits shall be backfilled properly before leaving the site at day end i.e. there shall not be any open trenches/ pits left open during night time or may be left open as per instruction of Engineer –in-charge with hard barricade protection.

4.1.13 Contractor shall take utmost care to avoid damages to underground utilities. Additional protection shall be provided for utilities like pipe, cable, etc. on main roads. In case of occurrence of any such incident, it has to be rectified to the satisfaction of concerned authority of utility immediately by contractor within quoted rates, failing which Owner will get it done at risk & cost to the contractor and suitable penalty shall be applicable.

4.1.14 The scope of work and technical requirements associated with PE pipe laying in different types of earth surfaces are as follows:

- Pipe laying in unmade surface of any type,
    - Normal soil and grassed areas
    - Rocky area.
- Pipe laying in a made up surface, it includes taking up of a hard surface of any type i.e. metal, asphalt/ tarmac, concrete etc.

4.1.15 Installation of Safety/warning Signs and barricading of the entire route to be trenched. Pits to be similarly barricaded along with warning signs and caution boards. Hard barricade to be ensured on main road where heavy vehicular traffic movement is present. Up to 100 Meters of hard barricade is within the scope of contract. For any additional length used with prior approval from EIC, will be paid extra to contractor as per the SOR.

4.1.16 To excavate trenches as per specifications with stable slopes and with minimum disturbance to above ground/underground services/installations. Soil shall be kept 300 mm away from the trench edges. It should be ensured that trenches should not collapse due to water and soil till placement of pipes.

4.1.17 All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for Owner's supplied materials is in contractor scope.

4.1.18 Trenching, sand bedding, PE pipe laying, electro-fusion jointing, sand padding, warning tape laying, backfilling & restoration, flushing/ pigging, testing, route marker installation, nitrogen purging, commissioning of PE pipeline and submission of as laid drawing in hard copy as well as AutoCAD duly approved by TPI and Owner's representative.

4.1.19 Uncoiling/stringing the PE pipes of required sizes (i.e. 160, 125, 90, 63, 32 & 20 mm) pipes into trenches as per approved procedure.

4.1.20 Joining the pipe ends with fittings & valves by approved bar coded electro-fusion techniques only as per Tender Specification.

4.1.21 Installation of electrofusion fittings like elbow, tees, reducers, couplers, tapping saddles, transition fittings, valves etc., including valve pits.

4.1.22 Hook up of PE pipeline with Valve chamber/ Service Regulator module etc. as per specification and to the satisfaction of EIC. The rate for Installation of Valve Chamber includes all excavation, backfill, reinstatement and other civil work required for installing PE Valve Chamber and making connections of the inlet and outlet pipe work with proper alignment.

4.1.23 Laying pipelines by any methodology including trenchless technology methods with or without casing pipes as per specifications and as directed by EIC.

4.1.24 Supply and Inspection of good quality half/ full hume pipes (This is applicable to contract where they are not meeting a criteria of tender requirement), other materials and, fittings are in the scope of contractors as per the provisions of tender.

4.1.25 Back filling, watering and proper compaction using, sand or Pano or excavated earth or borrowed earth. Sand or excavated earth or borrowed earth should be properly sieved before usage cleaning of all unserviceable materials, debris, excess earth etc. to designated disposal area.

4.1.26 Carrying out pneumatic testing and purging of laid PE pipeline. Providing all consumable including nitrogen, tools & tackles, instruments, manpower and other related accessories for carrying out the testing of pipes.

4.1.27 The testing, purging and commissioning of pipeline network has to be done to Owner's requirements. Pressure testing will be carried out either with compressed air or nitrogen, and no other test medium may be used. Compressed air or Nitrogen cylinders shall be provided by the contractor. Nitrogen shall be supplied in cylinders with proper identification and traceability, tested and certified and fitted with regulators, hoses and connections that are in good working condition and rated at minimum 200bar and meeting required parameters. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures due to faulty workmanship or negligence on the part of the Contractor.

4.1.28 Purity of Nitrogen as per the company approved procedure shall be ensured. O2 % shall be checked prior to use and it shall not be more than 2%.

4.1.29 Supply & Installation of RCC route marker as per the GGL drawing enclosed with technical scope at interval of 100 Meter distance along the route of laid pipeline and at both sides of crossing or as per the direction of the EIC/Owner's representative. And same should be incorporated in as built drawings. Network should be provided with route markers along the roads parallel as well as at beginning of branch pipeline for route identifications.

4.1.30 Construction, Supply, fabrication & Installation of RCC route marker, Pole marker with foundations and valve chamber pole markers etc. as per tender specifications and the directions of the EIC/Owner's representative.

4.1.31 Construction, Supply, fabrication & Installation of valve chamber excluding supply of frame and FRP cover of valve chamber by the contractor.

4.1.32 Commissioning of gas, in the tested PE Line shall be done as per the GGL approved procedure.

4.1.33 Tie-in of the PE Medium pressure pipeline 1.5 to 5.0 bar-g with the DRS by using transition fittings.

4.1.34 Installation of Service Regulator as per Owner specifications and drawing including construction/ fabrication of installation arrangement.

The Contractor rate shall include for

- All excavation, backfilling, reinstatement and other work required to install the SR module and make connections of the inlet and outlet pipe to the appropriate PE pipeline with electrofusion fittings. The rates of fusion of PE Pipes, Valves, Fitting should also include in PE laying rate.
- The supply of any construction material such as cement, sand, metal grit, bricks etc. required for completing the installation including labour as per approved drawing and specification of Owner.
- Installation, testing and commissioning of the SR module.

4.1.35 Returning surplus free issue material to Owner stores after obtaining clearance from TPIA/ Owner, reconciliation of free issue materials.

4.1.36 Rectification of defects arising due to poor workmanship during defect liability period of pipelines/installations handed over to Owner.

4.1.37 Provision of the safe signing, cordoning and barricading shall be done for excavated trench as per the Owners specification. Failure to comply with this to the requirement of Owner will result in imposing applicable penalties/ suspension of work until appropriate arrangement for protecting excavation is made available or till the time as is deemed fit by the owner.

4.1.38 The Contractor shall ensure removal and disposal of all waste materials and packaging. Pipe short pieces and pipe off cuts from the free issue material shall be returned to the Owner store and reconciled against the pipe issued.

4.1.39 The Contractor shall supply all necessary pumping equipment and power sources to de-water trenches and excavations as required by Owner.

4.1.40 Maintaining the PE network till the commissioning and handing over the network to O&M.

4.1.41 Handing over the completed works to Owner for further operations.

4.1.42 Preparation and submission of all documents As-built drawings, details of crossings and utilities, PE job cards duly certified by TPIA, EIC for main/ service lines and deviation statements on completion/commissioning of work by way of drawing, sketches and tables in soft & hard copies.

4.1.43 Following activities are also in Contractor's Scope:

- Carry out joint technical feasibility survey for requests received.
- Contractor shall submit the documents, which include but not limited to the following:
  - Approved technical deviation, if any.
  - Material reconciliation report.
  - As laid Auto Cad drawing (2 Nos. Hard copy and Soft copy in editable mode) Material test certificate of contractor supplied materials.
  - Satisfaction certificate/ NOC from concerned authority for reinstatement.
  - GGL approved formats duly filled for PE pipeline laying and PNG installations as per the GGL procedures

The above job scope mentioned shall be covered under the rate quoted for PE laying

4.1.44 Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/ safety/statutory of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to OWNER.

4.2 MATERIAL, MANPOWER, EQUIPMENT AND MACHINERY

4.2.1 Material to be Supplied by Owner as Free Issue

4.2.1.1 Unless otherwise specified, Owner will supply following materials such as PE - pipes, PE valves, FRP Frame with cover for valve chamber & service Regulators. All materials other than mentioned below shall be supplied by contractor as per attached technical specification to complete the laying of gas main pipelines and service pipelines.

- PE – 100 Pipes.

Sr. No.	PE Pipe Size	SDR	Straight/ Coil Length in Meter
1	160mm Dia.	17.6	12.0 M (Straight)
2	125mm Dia.	17.6	50.0 M (Coil) & 12.0 M (Straight)
3	90mm Dia.	17.6	100.0 M (Coil)
4	63mm Dia.	11	100.0 M (Coil)
5	32mm Dia.	11	200.0 M (Coil)

- PE Ball Valves :160mm, 125mm, 90mm and 63mm
- Service Regulators Module
- Industrial Metering Skid
- Domestic Meter
- Domestic Regulator
- Commercial Meter and Regulator
- Brass Isolation Valve
- Appliance valve (Gas Tap) for domestic connection
- Wire braided rubber hose
- Module with Domestic Meter and Regulator Module (Ground Mounted Skid)
- Corrugated flexible SS Metal hose assembly (Anaconda)
- FRP Cover with frame for PE valve chamber
- Blind meter adaptor

4.2.1.2 Receipt of above mentioned free issue materials from the owner's designated stores, loading, transportation, unloading at project site. Proper storing, stacking, identification shall be in contractor's scope of works.

4.2.1.3 Providing security and insurance of free issue material before installation, during execution of job and commissioning of pipelines including transportation of materials to site shall be in contractor's scope of works.

4.2.1.4 Material reconciliation statement of free issue material duly certified by Owner's representative shall be submitted to Owner along with RA bill and as per GGL requirement.

4.2.1.5 The free issue material shall not be procured from any other source by contractor.

4.2.2 Material to be Supplied by the CONTRACTOR:

4.2.2.1 The supply of bought out items shall be strictly as per relevant GGL tender Specifications and from GGL approved vendors only.

4.2.2.2 Contractor has to submit required samples from their supplied materials to GGL EIC/representative for destructive (laboratory) testing as per GGL procedure.

4.2.2.3 Following materials shall be supplied by the contractor but not limited to:

- PE-100 Electro fusion Fittings (All type and sizes of required fittings)
- Precast RCC Chamber for PE valve installation
- RCC Hume Pipe with collar/ Half Round
- Warning Mats
- Various type route markers, Caution board and other markers as per GGL specification and drawing

4.2.2.4 All materials shall be handled safely and stored properly in a permanent, covered, lockable store/ ware house preferably near site in such a manner as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat, oxidization effect or by contact with any sharp objects or chemicals. The PE pipes and fittings shall be stored in covered storage to protect material from sunshine, rain etc.

4.2.2.5 The Contractor shall procure material from approved vendors only mentioned in this document. Final inspection at Contractors stores shall be carried out by Owner representative/ Third Party Inspection Agency duly appointed by Owner.

4.2.2.6 Contractor should ensure that any material which are procured by them to be inspected prior to dispatch from contractor store to site for installation by Owner representative/ Third Party Inspection Agency as per the test certificate of materials provided by manufacturer.

4.2.2.7 Owning to the technical requirements or otherwise, Owner reserves the right to amend/ vary/ modify the material requirement and/or specification at any time during the period of the Contract. The financial implication, if any, would be mutually discussed and agreed for which Contractor would fully Co-operate with Owner.

4.2.2.8 Owner has provided the specification for the material in the scope of the Contractor for procurement and use. However, in case, due to omission or otherwise, any specification is not provided, the Contractor would approach the Owner and obtain approved specifications in writing prior to the actual procurement and use of the material. It may be noted that considering the safety aspect, Owner would approve the specification of all material to be used for the execution of the contract.

4.2.2.9 Backfilling material

The Contractor shall be responsible to arrange the supply of fine sand for padding as per GGL trench drawing, free from any impurities like clay, mica, and soft flaky pieces, as per the instructions of EIC/Owner's representative. For supply of fine sand in trench no separate charges are payable and is included in PE laying rates. Also, supply and filling of sand in Valve Chambers and Service Regulators as per the instructions of EIC¸ is not separately payable.

4.2.2.10 In case specified trench depths are not achieved & if directed by Engineer-In Charge with necessary approval from respective GA Head and Contractor has to provide concrete casing pipes/ slabs or cement concrete, without any cost implication to Owner.

4.2.2.11 Other Materials: The Contractor shall supply the following items wherever required:

- All materials required for framework, trench support and temporary trench crossings if required as per site conditions.
- All sign boards, barricades, tin sheets, lighting arrangement and protective equipment.
- All minor items not mentioned in the Contract but necessary for the satisfactory completion and performance of the Work under this Contract.
- Material required for installation of valve chambers.
- Precast/ brick chamber for installation of PE network valve
- Half/ Full Round Hume pipes. Permanent markers (Refer enclosed drawings)

4.2.2.12 Manpower

The Contractor shall provide skilled manpower as per enclosed Annexure-5 necessary for the proper execution of the Work and site management as defined in tender document.

4.2.2.13 Equipment, Machinery & Tools

This will include but is not limited to the list of specialized items included in Annexure - 1.

4.2.2.14 All vehicular type machinery shall be in good working order, with all required legal documents including insurance and shall not cause spillage of oil or grease. To avoid damage to paved surfaces, the Contractor will provide pads of timber or thick rubber under the hydraulic feet or outriggers of machinery.

4.2.2.15 Contractor must also have to arrange his own equipment for restoration work like water tanker for proper compaction of backfilled trenches

4.2.2.16 Hydraulic/ pneumatic Rock breaking machine with proper safety features to eliminate the hazard to operators and nearby lives due to uncontrolled movement of debris due to breaking of rock. Manual operated rock breaking machine shall not be used.

4.2.2.17 Cutting and Removal of Tar

- Whenever it is permitted by Authorities and/or GGL authority to open cut a tar road for pipeline laying, contractor shall remove the tar in accordance with the restrictions and requirements of the authorities having jurisdiction thereof or as directed by GGL. Cutting of Tar surface shall be done using power driven road cutter machine which includes following:

    1. Cutting of both edge of trench with cutter

2. Breaking of Tar
3. Removal of debris, slabs from the cut trench
4. Dispose the cut material/ debris to safe location.

- Throughout the period of execution of such works, contractor shall provide and use warning signs, traffic lights or lanterns, barricades, fencing, watchman, etc. as required by the local authorities having jurisdiction and/or GGL.
- Trench shall be restored as per the GGL requirement after the pipeline is installed. Excess soil (up to 4"above the road level-or as suggested by GGL Engineer) on the trench after backfilling, shall be removed by Contractor at his own cost and, shall be unloaded on the location shown by authority/ GGL representatives.

4.2.2.18 In case there is non-availability of approved equipment's, tools and tackles during the work at site, suitable penalties, as per special terms and conditions of the contract, will be levied and deducted from the running bills.

4.2.2.19 Competency & Training

The term competency is synonyms to capability, ability. Similarly, the training is the teaching, giving guidance, instructions and exercises, either in classroom, or in-plant, by oration, written test or simulation is carried out to develop the competency. Thus both the terms are interrelated. Every job in a business is carried out to get some specific end result, in scheduled time with safety and quality requirements. Hence the Contractor shall employ resources who is to perform this job must have certain qualifying requirements in terms of qualification. Knowledge, skill, behaviour to achieve the job end results. New recruitments for proposed job/ duty, should be trained, educated, tested, certified and made and declared competent to perform the job effectively, in scheduled time with safety, quality and statutory compliances. Competency training and test should be regularly conducted. The training may be in-house or out-house and it starts with the induction, for new recruits, and refresher or need based training for existing work force, to check, maintain their competency level. The training may be in class room for understanding theory and in plant training or simulation for practical purpose. Competency training needs for resources are identified and provided as per Gujarat Gas requirements. Charges for Training which will be provided by GGL through outsourced agencies shall be debited to contractor.

Training frequency and training matrix is enclosed with this document.

4.2.2.20 Acquisition, Receipt & Storage of Materials

- The Contractor shall collect all materials from GGL stores during working hours by complying with all documentation procedures laid down and as directed by the EIC. The Contractor shall carry pipe in such a manner as to preclude damage during transportation and handling. PE pipes supplied in straight lengths may be carried in straight pipe racks.
- Stake height of the PE pipes stored in Contractor storage location should not cross height specified in IS 14885.
- The Contractor shall at the time of receipt of material physically examine all materials and notify the EIC immediately of any damage or defect noticed by the Contractor. The EIC shall duly note any damage or defect in a site instruction book and both parties shall countersign the entry. Any damage not so recorded will be deemed not to have existed at the time of receipt of material by

the Contractor and the cost of repair or replacement or rectification shall be borne by the Contractor.

- Any material once issued from GGL store, if found in non-working condition at site shall be brought to the notice of EIC with Goods Issue Note reference in writing and after subsequent approval shall return defective material in GGL stores as instructed by EIC.
- Contractor shall ensure the consumption of free issue material on first in first out (FIFO) basis considering the warranty of free issued material. If contractor starts using second lot of material before completely consuming the first lot of free issue material lying in contractor store, then GGL will debit cost of material for those defective material returned after warranty period.
- Contractor should return the unused or defective material to GGL store within specified time else the material will not be reconciled and amount of the same will be deducted from bills. The contractor shall ensure that no defective material shall be returned to store at the time of closure of contract. The format for defective materials returning to stores will be made available by EIC.
- The Contractor shall maintain log book at their respective stores stating issue and availability of free issue material at any given day. Further, it is mandatory for the contractor to submit inventory details of free issue and purchased materials on monthly basis to Owner's representative as per the approved format of the owner. The inventory details shall be in correlation with the Daily progress chart and material reconciliation sheet.

4.3 ORGANIZATION STRUCTURE

4.3.1 Contractor shall designate Project Manager/ Coordinator who will be responsible to interact with EIC/TPIA and authorized to attend review meetings, receive material, authorized to sign documents, claims and receive payments etc. Contractor shall employ a Project Manager/ Coordinator on his company roll.

4.3.2 The Project Manager/ Coordinator authorised by contractor must have qualification of BE Mechanical/ Diploma in Mech. Engineer with min. one/ three years of work experience respectively in gas pipeline job. He shall be single point contact for all the works and must represent company in the review meetings.

4.3.3 All construction work will be carried out as per direction of EIC, and EIC will be the primary point of contact between the contractor and Owner on site. All work will be issued and sanctioned through the EIC. Contractor shall ensure that technical quality standards are adhered to during work execution is carried out cost effectively and a good customer and public image is maintained for Owner.

4.3.4 The contractor will deploy his own supervisors as directed by site engineers/EIC. These personnel will be reporting to the EIC for monitoring construction standards and for ensuring that all technical requirements are met for the job being carried out. The contractor's supervisor(s) shall have day-to-day liaison with the Site Engineer, and will provide the Site Engineer with technical reports and audits, and other management information as is required on work progress and construction quality standards.

4.3.5 The contractor's supervisor shall have mobile phones to ensure that they can be contacted at all times. The contractor will also nominate one person who can be contacted if necessary in odd hours, for the duration of the works. The contractor's supervisor will have access to transport at all times to allow them to visit sites and attend meetings with Owner. The normal day-to-day issue of work

instructions, communication will be between EIC and the contractor's supervisor and the Site Engineer.

4.3.6 Contractor shall maintain Office and Material Store in their allotted location, with following facilities:

- Telephone, Mobile Phones, Fax machines, Printers/Scanning/Xerox machines, Computers with internet facility.
- CONTRACTOR shall provide Tablet for updation of technical work in GGL SAP system at his own cost. OWNER will provide SAP application. The minimum requirement of tablet and Accessories is mentioned as under
    - Screen Size of the tablet should be minimum 7."
    - Tablet should be provided with Back Cover.
    - Tablet should be provided with Screen Guard.
    - It should be operated on Android or IOS Platform.
    - It Should support
        - Apple iOS versions 10.x, 11.x
        - Android versions (Tablet) 6.x, 7.x"

On award of the contract, the contractor shall establish and submit documentary evidence for above, which will be verified by the owner before award of the work order.

4.4 PROGRESS OF WORK

The contractor shall proceed with the work under the contract with due expedition and without delay. The EIC may direct in what order and at what time, the various stages or parts of the work under the Contract shall be performed.

Contractor has to regularly submit at his own cost the following reports in agreed formats and frequency by owner.

- Daily Activity Report (Daily progress/ planning as per the GGL approved format shall be submitted to Engineer In charge daily morning)
- Testing reports.
- Equipment and Manpower deployment status report (Monthly).
- Material Consumption & Inventory report. (Monthly).
- Material Reconciliation reports (Along with every RA bill).
- Approved Deviation statements (as and when required).
- Waste collection and disposal report on monthly basis

OWNER will conduct review of contractor performance in respect to quantitative and qualitative at regular interval (CPAR) as per GGL standard practice.

4.5 APPROVALS & PERMISSIONS FOR PIPELINE LAYING

4.5.1 Owner shall obtain permissions from statutory bodies for laying of pipelines. Statutory bodies in this case are CPWD, PWD, NHAI, R&B, Forest, Irrigation, Urban Development Authorities, Statutory

Authorities, Indian Railways, Municipality, Nagarpalika, Panchayat office and any other Government/ Private Agencies who maintains the public lands and accord permissions for laying of the utilities.

4.5.2 Contractor shall ensure that the road restoration to the minimum against the work to be carried out immediately to ensure the backfill, watering, compaction and carryout a temporary reinstatement of all premises of statutory authorities work such as road, railway etc after completion of PE laying and jointing work.

4.5.3 However, GGL will pay the road restoration/ Departmental charges/ security deposit/ Bank guarantees for getting the clearances to concern statutory bodies.

4.5.4 It is the contractor's responsibility to inform and co-ordinate with the concerned local authorities and also with other utility agencies before and after the commencement of work at site. To ensure smooth execution of the work on a day-do-day basis, the contractor has to liaison with respective authorities. The contractor shall plan and ensure that work taken up under a single permission shall be completed within the stipulated time period and permission revalidation process is avoided. No separate liaison charges are liable to GGL for permission revalidation cases.

4.5.5 It is the responsibility of the contractor to obtain "No Objection Certificate" (NOC) from land owing agencies/ Statutory bodies after completion of the restoration to their satisfaction and Liaising with them for refund of the security deposit/ bank guarantees submitted by GGL for obtaining permissions on production of documentary evidence.

4.5.6 The contractor shall coordinate with the relevant authorities for execution of job in line with approvals/ the proposed pipeline route drawings. The inspection of work by statutory authorities shall be the responsibility of the contractor without any extra cost to GGL.

4.5.7 In case contractor delays laying of pipeline work under a single permission, the work or part of work may be offloaded to some other contractor on his risk and cost.

4.5.8 Any minor change/ addition in construction specifications required to be made to meet the requirements of the statutory authorities shall be carried out by the contractor without any extra cost to GGL. If any major changes required for meeting statutory requirements, then work to be executed at mutually agreed rate. The inspection and acceptance of the work by statutory authorities shall however, not absolve the contract from any of his responsibilities under this contract.

Particular Instruction to CONTRACTOR

4.6 In principle all statutory permissions from all concerned shall be obtained by GGL. However, all activities related to liaison, co-ordination etc. with all concerned authorities needed to achieve the work as per schedule will be under CONTRACTOR's scope including taking work permit/digging permit before commencement of work. CONTRACTOR shall also inform and seek necessary permission from the local traffic police or any other concerned government/private agencies before commencement of trenching work.

The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, Tender specifications, Owner's Engineering Standards; relevant Oil Indian Safety Directorate (OISD) norms, PNGRB Regulations(T4S), ASME B31.8-Gas Transmission and Distribution Piping Systems and Gujarat Gas procedures/ Guidelines/ SOPs being released time to time.

Should the contractor find any discrepancy, ambiguity or conflict in or between any of the Standards and the contract documents, then this should be promptly referred to the Engineer-in-Charge (EIC) for his decision, which shall be considered binding on the contractor.

4.7 QUALITY OF WORK

All works carried out under this contract shall confirm to applicable standards, codes of practice, construction procedures and other technical requirements as defined in the technical specifications.

The manpower deployed on the respective activities shall be adequately trained & shall have necessary skills to execute/ supervise the work as defined by GGL. However, the assessment on the qualification of the personnel shall match the qualification given in guidelines for qualification be at the discretion of EIC.

PE welders shall be registered with GGL and shall be trained by GGL approved agency and other skilled personnel shall be approved by Owner's representative and identification cards shall be issued to them. Only personnel who matches the qualification and are approved by GGL shall be allowed to execute the critical activities like Electro fusion jointing of PE Pipes & Fittings and plumbing work of GI pipes.

4.8 SAFETY

4.8.1 The Contractor shall conform to the safety requirements outlined in Technical scope in the tender document, GGL Permit to work system and other HSE guidelines/ procedures being released time to time. In addition, the Contractor shall observe safe working practices in the storage and handling of cleaning fluids, flammable fluids, etc, and ensure smoking or naked flames are not permitted in the site.

4.8.2 Trench walls shall be battered with sufficient slope in order to minimize a trench collapse. Where there is a danger of an earth slide or collapse, the trench shall remain open for the minimum time possible with proper barricading. The Contractor is to ensure that no person enters a trench, which is of a depth of 1.5 meters or greater, unless the trench has adequate shoring or the sides are battered to such an extent as to prevent a trench collapse.

4.8.3 The Contractor shall also protect all work sites with warning signs, barricades and night lighting. The Contractor shall inspect all fenced excavations daily, and maintain them in good order.

4.8.4 The Contractor shall provide PPE's like helmets, safety shoes, etc. to the labour as mentioned in tender document which are necessary for safe working practice and is approved by HSE officer on site.

4.8.5 Any accident causing injury to any person or damage to property or equipment shall be reported to the EIC and the cost of repair/ replacement of the damage equipment shall be borne by the contractor. Where the EIC determines that the work is being performed by Contractor in an unsafe manner, he may suspend the Work until corrective action is taken by the Contractor.

4.8.6 Manual boring has to be executed with fully insulated boring tool and electrical gloves, as per the GGL specifications and job should be executed on receipt of work permit in line with the GGL guidelines.

4.9 SITE SURVEY

Contractor shall carry out site survey for identification of underground utilities, foreign pipelines, planning of crossings, and location of valve chamber and Service Regulator before starting execution of job.

4.9.1 Main lines

The final alignment of mainlines will be worked out at site in consultations with the Owner's representatives after route survey and trial pits, at contractor cost. Any change in routing from the issued drawings due to site constraint will be notified to EIC & his specific written approval in deviation format shall be obtained before carrying out the job.

4.9.2 Service lines

- EIC/ Third Party Inspection Agency and the contractor will conduct a joint survey at each probable premise/ housing colony/ pockets/ area to be supplied with gas. The survey record will note customer's detailed potential gas supply points, proposed regulator positions and estimates of material quantities. The contractor's representatives will make sketch of the agreed pipe routes.
- The contractor will be responsible for contacting the customer and making the necessary arrangements for access and appointments to carry out the work.
- Contractor shall record the job executed in PE job cards and maintain the same till safe handing over to EIC. Duly certified Xerox copy of the PE job card is to be maintained by contractor till the bill payment process is completed.

4.10 STRUCTURES, SERVICES AND OTHER PROPERTY

4.10.1 Location of Underground Utilities

The contractor shall locate all buried utility pipes, underground cables, water mains and other obstructions intersecting or adjacent to the Works, and shall make available the necessary labour to expose and record the depth of cover over all obstructions in advance of excavation. This shall be done far enough in advance of excavation to facilitate gradual change in grade or position found necessary to clear any obstructions.

In addition, the contractor shall excavate trial pits as necessary to determine the pipe route. The number of trial pits will be agreed with the Site Engineer in advance of any excavation. In any event, trial pits shall be made at intervals of a maximum of 30 meters or as per instruction of engineer in charge based on site requirement. Restoration of the abandoned trial pits and trenches shall be the contractor's responsibility. No payments shall be made for such type of works. The trial pits shall be excavated to minimum depth of 250mm more than the trench depth so as to locate any utilities present in the trench.

It is contractor's responsibility to interact with other utility agencies regarding their existing utilities and finalise the route along with these agencies and Owner/ Owner's representative.

4.10.2 Protection of Structures and Utilities

The Contractor shall at his own cost ensure supports and protections of all buildings, walls, fences or other structures and all utilities e.g. Electrical cables, Telephone Cables, Water pipelines, Sewer pipelines etc., and property which may be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular type of operations or work. Special care shall be taken while laying of pipelines near the trees/ street light poles.

The CONTRACTOR shall remain at all times liable to OWNER for any loss or damage caused to any building plant, machine, installations of OWNER/ Consumers due to carelessness, negligence, inexperienced act of default of the CONTRACTOR, his agents, representative or employees. OWNER shall be the sole judge as regards the quantum of loss or damage caused to any utility, building plant, machine, installations, Gas loss due damage on pipeline and the said amount shall be deducted from the amount payable hereunder to the CONTRACTOR the cost of repairs or the amount of loss or damages.

4.10.3 Interference with Traffic, Street Drainage and General Public

- The Work shall be executed in such a manner so as to cause a minimum inconvenience to public at large, usage of public or private roads, lanes, thoroughfares, walkways, rights-of use or passages through which the Works are to be executed. The trench shall be backfilled, compacted, levelled and extra soil shall be removed immediately after laying of pipeline to avoid public inconvenience. Closure of roads etc. shall not be permitted without the approval of the EIC.
- The Contractor shall comply with all local Authorities requirements to traffic and keep roads open to traffic and maintain access to and within any private property.
- Wherever the pipe route crosses driveways, access tracks or entrances to private properties the Contractor shall give the owner, occupier or relevant authority at least 24 hours prior notice of intended commencement of excavation and shall be restricted to pass through.
- The Contractor shall not use a private driveway, access track or entrance without the prior approval of the EIC in any circumstance.
- The Contractor shall provide suitable access wherever necessary in the form of temporary bridges, culverts, flumes, etc. of a size and type approved by the EIC.
- The Contractor shall comply with all relevant road Laws. Where limits and/or speed limits have been placed in the vicinity of the Works, the Contractor shall provide for the necessary movement of plant and equipment in accordance with the requirements of the relevant authority.
- The Contractor shall not obstruct any drainage pipes or channels in any road but shall divert them wherever necessary and use all proper measures to provide for the free passage of water.
- The contractor shall conduct his operation at all times, with a view to minimize noise and other objectionable nuisances (e.g. oil leakage) as far as practicable.
- The Contractor shall handover the completed works after proper cleaning of the site.

4.11 HANDLING OF PIPES AND COMPONENTS BEFORE AND DURING LAYING

HANDLING OF PIPES OR PIPELINES

It is compulsory:

- To take the necessary precautions to prevent damage during the loading, transportation, unloading and various other operations involving the handling of pipes and fittings;
- To stack the pipes on a flat surface and to support and clamp them sufficiently during transport;
- To organize the movement of the pipes so that the pipe or the ends of it do not drag across the ground.

It is prohibited:

- To roll pipes across the ground or the road surface;
- To lift up or move pipes or pipelines with cables, chains or other hard or squeezing ropes;
- To bring the pipes into contact with a naked flame, oil or bituminous products.

Any pipe which is temporarily left alongside the trench shall always be protected against water ingress and the introduction of impurities by means of temporary cap. Particular attention shall be made to this temporary cap while the pipe is laid in the trench. The temporary cap shall be designed in such a way that they can be easily mounted and removed.

The ends of pipes temporarily left behind in the trench shall be temporarily caped so as to prevent water or mud to penetrate even if the trench is completely filled with water. To do this, appropriate caps may be used.

The presence of water or impurities in the pipe shall be considered as a serious fault by the contractor and the contractor shall flush/ pigging to clean the pipeline, at his own expenses, until the water, dirt or any other impurity has been removed to satisfaction of EIC.

4.12 TRENCHING

The schematic drawing with the details of trench is enclosed in the tender Drawings.

The Contractor shall perform the excavation works so as to enable the pipe to be laid in conformity with the levels, depths, slopes, curves, dimensions and instructions shown in the Drawings, Specifications or as otherwise directed by the EIC.

While trenching, care shall be taken to ensure that all underground structures and utilities are disturbed to the minimum. Suitable crossing shall be provided and maintained over the ROU wherever necessary to permit general public, property owners or his tenants to cross or move stock or equipment from side of the trench or another.

Trenching shall be made with sufficient slopes on sides in order to minimize collapsing of the trench. On slopes wherever there is danger of landslides, the pipeline trench shall be maintained open only for the time strictly necessary.

Owner may require excavation by hand, local route and detouring and limiting the period of execution of the works. Before trench cuts through water table, work should be executed in phased manner with due care taken in order to ensure soil stability.

Contractor shall ensure that Pick axe or crow bar used for manual excavation shall be non-conductive.

The Contractor shall ensure that trench bottom is maintained in the square form as far as possible, with equipment, so as to avoid/minimize the hand grading at the bottom of the trench. The Contractor shall do all such handwork in the trench as required to free the bottom of trench from loose rock, pebbles and to trim protruding roots the bottom and sidewalls of the trench.

Tar cutting and Soil handling/Shifting (Wherever Required)

CONTRACTOR shall cut the tar/RCC/PCC surface using power driven road cutter or pneumatic/ Hydraulic operated breaker or by JCB as per the site requirement and as per instruction of local authority/ GGL Engineer. The trench shall be further excavated using machine or manual means and spoil will be transported to a dump yard arranged by **CONTRACTOR**. **CONTRACTOR** shall inform engineer in charge before starting of above activity.

4.12.1 Depth of Trench

The minimum depth of cover shall be measured from top of pipe to the top of undisturbed surface of the soil or top of the graded working strip or top of road or top of rail whichever is lower.

In case of crossing of water bodies the minimum depth shall be measured from the top of the pipe to the bottom of lowest Scour level across the water body.

The depth of the trench will be such as to provide minimum cover as stipulated below:

Sr. No.	Pipe Dia. (OD)	Minimum Trench width	Minimum Cover in normal area laying	Trench Depth
1	20 mm	320 mm	1000 mm	1150mm
2	32 mm	330 mm		1150 mm
3	63mm	360 mm		1200 mm
4	90 mm	390 mm		1200 mm
5	125 mm	425 mm		1250 mm
6	160 mm	460 mm	1200 mm	1500 mm

Any increase from the trench width specified will not alter the unit rates of PE laying.

The minimum depth & width may be greater than as mentioned above as may be required by EIC/ Government/ Public authorities under jurisdictions/ underground utilities/ structure etc. The Contractor shall perform such work, according to the requirement of concerned authorities and without extra compensation.

Also, in case of Drains/Culverts/Utilities crossing through open cut where excavation cut is more than 1.5m, the extra excavation is inclusive in the laying rates. No separate payment is chargeable for extra excavation and it includes backfilling as well. Other works executed for ensuring anti buoyancy will be paid separately as is finalised by EIC. Contractor should execute such special jobs only on receipt of confirmed work order with applicable rates.

In case, the trench depth could not be achieved due to practical problems with top cover less than 1000 mm but greater than 600 mm due to site constraint and the same is demonstrated, EIC after examining thoroughly and considering the codes and standards may allow the contractor to provide suitable protection by way of Hume pipes with collar/ half round and PCC without any extra cost to owner with due approval from the GA Head.

However, approval of less covers shall be given in writing by EIC and duly approved by third party inspection agency with due approval of GA Head of GGL, to contractor with applicable additional protection if any like full/half round Hume pipe supplied by contractor, should be installed at no extra cost to the owner.

4.12.2 Width of Trench

The trench shall be wide enough to provide bedding around the pipe as specified in guidelines and to prevent damage to the pipe inside the trench. Unless otherwise directed by the EIC and the

minimum distance from the inside edge of the trench wall to the outside of the pipe shall be as per the Drawing enclosed in tender.

4.12.3 Trench Base

The trench bottom shall be cut or trimmed to provide a uniform bedding for the pipe and shall be free from stones, metal, wood, vegetation, clods of earth or other debris before placement of the pipe.

In case trenching is excavated in rocky terrain, a bedding of soft soil or sand shall be provided in the trench base to the satisfaction of EIC.

Hard Rock:

Hard rock is defined as trench material with a single piece of rock, dimension exceeding 1.0 m in any direction, and requires cutting by use of Hydraulically/ pneumatically Operated machine shall be considered as hard rock.

Additional applicable rates shall be payable for hard rock excavation as per line item of SOR over and above the pipeline laying rates

Excavation through soil mixed with small boulders that have been used for a road base will not be considered as hard rock for the purpose of payment.

4.12.4 Clearances

The following clearances shall be maintained between the external wall of the gas pipe and the external surface of other underground assets/utilities in the vicinity of the Works.

- Minimum 500 mm where the gas pipe crosses other assets/utilities, etc., for electric cables, the clearance. However, 150mm minimum gap with special protection may be acceptable based on approval of EIC by providing additional protection such as RCC Hume pipe, RCC half Round sleeve or PVC Sheet etc with no extra payment to be paid to contractor
- Minimum 500mm distance in horizontal direction shall be maintained where the gas pipes (MP & LP) are on a same trench or similar alignment to the other assets/utilities. If not possible to lay pipelines side by side, meeting above guidelines then laying in both pipes in same trench shall not be done.
- When two PE pipeline (MP & LP) shall be laid in same trench then MP pipeline has to be laid at Road side and LP pipeline is to be laid at extreme side of the road.

However, approval of lesser gap shall be given in writing by EIC and duly approved by third party inspection agency with consent of GA head, GGL at no extra cost to the owner.

4.12.5 Under Ground Interferences

The Contractor shall locate and manually expose all underground facilities if any during trenching. Safety barriers shall be erected along the trench to prevent any damages or accident. On locations where pipeline is laid under the existing facilities and near the approaches of the crossing, the trench shall be gradually deepened to avoid sharp bends.

All sewers, drains, ditches and other natural waterways encountered while trenching shall be maintained open and functional by providing proper temporary installations if required. Suitable dewatering pumps shall be deployed to dewater with no additional cost to Owner, if required.

Whenever it is permitted by Authorities and/or Owner to open cut paved road crossing, or where the line is routed within the road pavement, the Contractor shall remove the paving in accordance with the restrictions and requirements of the authorities having jurisdiction thereof as directed by Owner. After laying the pipeline, backfilling shall be immediately performed and all the areas affected by the excavation works shall be temporarily restored. Contractor has to ensure the backfill, watering, compaction of all premises of statutory authorities and private premises after completion of PE laying work done immediately.

In case of damage to any of above referred structures/utilities, the Contractor shall be responsible for repairs/replacement at his own cost, which shall be carried out to the satisfaction of concerned authorities, resident and Owner.

4.12.6 Others

- Throughout the period of execution of excavation work, the Contractor shall provide and use warning signs/warning boards, proper barricading and cordoning prior to starting of excavation. Contractor shall also provide traffic lights or lanterns, fencing, etc. as required by the local authorities' jurisdiction and/or Owner at both ends of trench and shall also ensure the removal of the same after completion of work from the site.
- The Contractor shall perform the proper line/ chuna making prior to excavation of trench as per the GGL specification.
- The contractor shall ensure the deposition/ storage of excavated soil keep away from the trench at least 300 mm from the trench edge to avoid collapse of trench and also ensure the Crossover plates of adequate width and length at society entrance or places where people crossover the trench.
- For all roads, paths, walkways etc. Which are open-cut, the Contractor shall provide temporary diversions properly constructed to allow the passage of normal traffic with the minimum inconvenience and interruptions.
- Under cutting of trench is not permitted in any conditions of ground or terrains.
- The Contractor shall excavate to additional depth at all the points where the contour of the earth may require extra depth, or where as deep trenches is required at the approaches to crossings of roadways, railroads, rivers, streams, drainage and ditches without any extra cost implication to Owner.
- The trench shall be cut to a grade that will provide a firm, uniform and continuous support for the pipe.
- The Contractor shall take conducive measures to ensure the protection of underground utilities as per the instructions of Owner or relevant authorities.
- Where the pipeline crosses underground utilities/structures, Contractor shall first manually excavate to a depth and in such a manner that the utilities/structures are located, then proceed with the conventional methods.
- The locations, where the pipeline has to be laid more or less parallel to an existing pipeline cable and/or other utilities in the Right-of-way the Contractor shall perform the work to the satisfaction of the Owner of the existing pipeline/cable/utility. In such locations, the Contractor shall perform work in such a way that even under the worst weather and flooding conditions, the existing

pipeline/utilities remain stable and shall neither become undermined nor have the tendency to slide towards the trench.

4.12.7 Bedding & Filling

- The Contractor shall ensure that the pipe when placed in the trench is supported and surrounded by a bed of sand, which shall be stone free in order to ensure no damage occurs to the pipe.
- The Bedding of fine sand shall be placed to a minimum thickness of 100 mm at below of pipe and 100 mm at top of pipe.
- In case of rocky terrain bedding of fine sand shall be placed to a minimum thickness of 150mm below of pipe and 100 mm at top of pipe.
- Unless directed by the EIC the quantity of bedding and filling fine sand shall confirm specifications. There shall be no void space in the bedding and filling of fine sand around the pipe.

4.13 LAYING

Main line

CONTRACTOR shall intimate well in advance before laying of pipe to TPI/ EIC. Laying of PE pipelines shall be commenced only after ensuring proper dimensions and clean surface of the trench and after clearance from TPIA/EIC. The trench bottom shall be free from the presence of cuts, stones, roots, debris, stakes, rock and any other material, which could lead of deep, scratches/tearing of the pipe wall. After ensuring above and sand bedding of trench bottom, the PE pipe coil shall be uncoiled smoothly through proper equipment's/care inside the trench ensuring no damage to pipe coil during laying. Special care shall be taken to ensure that the uncoiling is properly controlled and cannot hit persons nearby the work area. Also, the area, where the pipe is to be uncoiled, shall be made free of sharp objects.

CONTRACTOR shall examine Pipe bore/ inside of pipe for cleanliness prior to lining up and all extraneous matter shall be removed and the extreme end shall be capped before laying.

Contractors shall ensure open ends of pipe placed in the trench shall be securely capped or plugged to prevent the ingress of water or any foreign material as this could cause a future blockage of pipe or regulator malfunction due to dust, etc.

In case trench is flooded with water due to damage of utilities or due to rain, dewatering shall be carried out prior to laying of pipe. No laying shall be allowed if the trench is not completely de watered.

Direction change, turning of PE piping shall be made by welding PE EF fittings. However, use of elbows for change in direction shall be minimized and natural bending of PE pipes shall be used wherever possible and as per instruction given by TPIA/EIC.

Minimum radius of curvature shall be maintained as given below-

SDR	With joint	Without joint
11	15D	25D
17.6	15D	45D

All drains/ culverts/ nala should be crossed below the bed level and PE pipe to be laid through RCC/PCC/ Hume pipe, provided by contractor, unless and until specific approval is obtained from Site Engineer in writing.

PE pipes shall be laid at a centre of trench with a minimum clearance of 150 mm from both the wall of trench unless otherwise agreed with the Site Engineer for proper padding of soft soil/sand etc. as per requirement.

Contractors shall ensure adequate cleared spacing at PE insertion point to avoid difficulty in PE insertion/ laying, in case of open cuts and moling, where two pipes are to be laid parallel in same trench or same pits.

Valves shall be installed at locations directed by the EIC and joined with PE pipes by electro fusion techniques. After installation of PE Valve, valve chamber to be constructed as per the approved specification and drawing of GGL.

Rough sketches of AS-Built Drawings with details of depth, length, offsets from fixed references, other utility crossings, fittings, sizes of the casing pipe used for the pipeline shall be prepared on daily basis and to be submitted to EIC.

Activities partially completed during tenure of current contract will be paid as per the prevailing SOR applicable for achieved milestone. Balance work executed against new contract attended by same contractor or other contractor will be paid as per the respective line item new contract.

4.14 JOINTING OF PE PIPE BY ELETROFUSION FITTINGS

The procedure for jointing of PE pipes and fittings as mentioned below.

Only bar-coded electro-fusion machine (Automatically Readable) of GGL approved manufacturer that can read the bar code of the fittings automatically shall be used for joining of the PE pipes/fittings. Manual feeding Electro-fusion machines are not acceptable for jointing purpose. The contractor has to submit the calibration certificate of Electro Fusion machine with bar coded control unit at the time of start of work and at fixed intervals as per the instructions of Owner. Contractor shall ensure that the machines are always available at site.

A. Taking power connection form electric poles, connections without written permission from the concerned authorities or residential premises is strictly prohibited. Only electro fusion fitting of approved manufacturer shall be used for PE jointing.

B. CONTRACTOR shall arrange all the tools required for Electro-fusion welding, as specified below:

Cutting	:	Pipe Cutter for Pipe Cutting
Marking	:	Permanent type Marker
Scrapping	:	Scrapper with sharp edge blade
Degreasing/ Cleaning	:	Isopropyl Alcohol and Lint Free Tissue Paper for Degreasing and cleaning
Clamping	:	Pipe Alignment clamp/Top load clamp of required size
Welding	:	Electro-fusion Machine with Voltage stabilizer, Generator Set 5 KVA and all Electrical accessories in working condition,

The Contractor shall ensure that polyethylene pipe is only cut with proper plastic pipe-cutting tool. Before fusion is attempted, the contractor shall remove the oxidised surface of the pipe using Scrapper before inserting into the electro-fusion coupler. No fusion shall be allowed without clamping device and the proper cutting tools.

The contractor has to supply all the consumables required for carrying fusion of the joints (like tissue paper, napkin, isopropyl alcohol etc.).

C. After fusion is completed, Pipe alignment clamp used for coupler & top load clamp used for saddle shall be kept in position till the cooling time mentioned on the fitting is over.

D. Contractor site supervisor shall prepare welding joint report as per the approved format. Welding joint report shall be submitted to EIC for verification before pneumatic testing of the particular site. Joint numbers shall be written on each joint with the help of permanent marker pen after cooling of the joint

If, upon inspection, the EIC determines a joint is defective, Contractor shall remove the joint by an approved method. The cost of replacing joint shall be borne by the Contractor including the cost of pipe and fittings removed.

Jointing of PE pipes shall be as per Owners technical specification. Jointing shall be carried out by electro fusion method only.

E. Electro fusion unit input supply is to be from a nominal 240V generator, which is normally of approximately 5kVA capacity. The nominal output of the generator is to be 240V + 15%, - 10% between no load and full load. Control boxes are to include safety devices to prevent excessive voltages being present at the control box output. The safety device shall operate in less than 0.5 s.

Note that extension leads are not to be used on the control box outlet connections.

WARNING: Control boxes are not intrinsically safe and must therefore not be taken into the trench.

F. The contractor has to submit the calibration certificate of Electro Fusion machine with bar coded control unit at the time of start of work and at fixed intervals as per the instructions of Owner. Contractor shall ensure that the machines are always available at site. No stoppage of work due to the non-availability of machines shall be allowed.

G. For electro-fusion jointing, the contractor shall bring own tools, tackles and equipments including DIESEL GENERATOR SET with/ RCCB having an adequate capacity of power required for electro fusion machine.

H. Contractor shall also arrange double insulated cables, Industrial power board with 3- pin plug, proper earthing of equipments etc. Contractor shall ensure that bare cable without proper plug shall never be used by their manpower at any site for any purpose.

I. Failure in arrangement of tools, tackles and equipments in time shall be penalized as per SCC of tender.

J. Only registered, qualified and certified welder shall be allowed to make joints on the PE pipeline. Welder shall carry ID card issued by the approved welder training agency on site. Welder shall not be allowed to make a joint in case if he is not carrying the ID card on site. Any new welder shall be registered first with GGL and shall get training with GGL approved training program at contractor's expense.

4.14.1 Electro Fusion Jointing Method/ Procedure

a. Ensure there is sufficient space to permit access to the jointing area in the pit/trench.

b. Check that the pipe ends to be jointed are cut at right angle or square to the axis of the pipe by using proper pipe cutters and any burrs removed. PE pipe cutting with Hacksaw blade will not be allowed in any case.

c. Check visually that the pipe/fitting surface is free of defects such as cuts, abrasion etc. and wipe pipe ends using clean lint-free material to remove traces of dirt or mud or grease etc. up to at least 100 mm length. Avoid using excessive ovalized pipes. Ovality of the pipes to be removed by using Re-round tool.

d. Mark the area over which the oxidized pipe surface is to be removed, i.e. In excess of the insertion depth, on each pipe to be joined by placing the EF fitting of the bagged fitting alongside the pipe end. Trace a line round the circumference at the appropriate distance from the end of the pipe using a felt tip pen or an indelible marker pen or similar. The scraping area must be 10mm larger than the insertion depth of the fittings.

e. Remove the oxidized surface from the pipe by scraping.

f. AVOID ABSOLUTELY other scraping equipment such as abrasive paper, rasp, emery wheels, saw blades etc. other than Mechanical/Manual scrapper.

g. A mechanical scraper could be used however; there is a considerable risk that the end preparation will not be adequate with the use of such a tool, so extra care shall be taken during scrapping with mechanical scrapper.

h. Before inserting the PE pipe into the PE fitting, clean the scraped surface using isopropyl alcohol to remove the dust.

i. Remove the fitting from its packing and clean the scraped area of the pipe surface and the bore of the fitting with a disposable or tissues wipe impregnated with isopropyl alcohol. Ensure the prepared surfaces are completely dry before proceeding.

j. Note that the prepared pipe surface should not be touched by hand**.**

k. The aligning clamp must be used for all types and sizes of EF fittings to be joined which protects, during the electro fusion and the subsequent cooling, mechanical stresses on the jointing.

l. Top loading clamp shall be used for holding the tapping tee saddle during the fusion cycle. In some cases, if the manufacturer's procedure for holding the fitting is provided, then the same should be followed during the fusion cycle.

m. In case of EF coupler jointing, sign a mark using an indelible pen on the two ends to be welded corresponding to the depth of insertion, in general equal to half length of the coupler.

n. Insert the coupler on both pipes up to marking and fasten the pipe into the aligning clamp.

o. Connect the electro fusion control box input leads to the generator.

p. Check that the reset stop button, if fitted on the control box, is in the correct mode.

q. Check that there is sufficient fuel for the generator to finish the joint. Start the generator and check that it is functioning correctly.

r. Switch on the control box, Connect the control box output leads to the fitting terminals and check that they have been fully inserted and proceed with the set-up of the jointing parameters, strictly following the instructions of the fusion unit.

s. Press the start button on the control box and check that the heating cycle is proceeding as indicated on the display.

t. When the fusion cycle is completed, verify the fusion indicators coming out. The fusion indicators are located near the terminal connection of the fitting. If there is no apparent move in the melt indicators, the joint should be cut out and a fresh joint made (See note below).

u. If a satisfactory joint has been made, the joint is to be left in the clamps for the cooling time specified on the fitting or the automatic control box. Cooling, in order to avoid possible stresses on the jointing, strictly respect the cooling time indicated on the bar-code and do not remove aligning clamp of the fittings. In no case artificial cooling by placing wet cloth or sprinkling of water be allowed.

Note 1: Bar coded EF units are available which obviate the need to enter the fusion time. Manually feeding of fusion time in EF unit shall not be allowed.

Note 2: Gloves and goggles should be worn during the Fusion process.

Note 3: If there is an accidental interruption during the joining cycle, operation can only be repeated after the Electro fusion joint has totally cooled (min. 1 hour). This operation can be done only once.

Note 4: If the fusion cycle terminates before completion of the countdown, check for faults as indicated by the control box warning lights and check that there is adequate fuel in the generator. DO NOT attempt a second fusion cycle within one hour/ cooling of joint at Ambient Temperature of the first attempt.

RECORDS

Records of appropriate servicing and calibration certificate of Electro fusion unit shall be kept at site along with traceability of the master instrument.

4.14.2 Training

It is necessary that operators, inspection and supervisory personnel acquire the skills of electro fusion fitting fusion. Necessary training should be carried out by a qualified instructor with the objective of enabling participants to;

- Understand the principles of electro fusion fitting jointing
- Identify pipe and appropriate fitting markings
- Carry out pre-jointing machine and equipment checks
- Make satisfactory electro fusion fitting joints from pipes and fittings of different sizes
- Inspect for and identify joints of acceptable quality

Note that only registered, qualified and certified welder of GGL shall be allowed to make joints on the PE pipeline. Welder shall carry ID card issued by the approved welder training agency on site and allowed to perform welding joints upto pipe dia certified by training agency. Welder shall not be allowed to make a joint in case if he is not carrying the ID card on site. Any new welder shall be

registered first with GGL and shall get training with GGL approved training program at contractor's expense.

Top loading clamp shall be used for holding the tapping tee saddle during the fusion cycle. In some cases, if the manufacturer's procedure for holding the fitting is provided, then the same should be followed during the fusion cycle.

4.14.3 Squeeze-off

a. To control the gas flow a special tool may be used to squeeze the pipe walls together. Hydraulic squeezing tools are used to supply necessary force to compress the pipe walls for sizes 125 or 90 mm and above. Manual squeezing tools can be used for squeezing 90mm or below PE pipes.

b. As will be seen the squeeze-off equipment comprises two bars to apply pressure to the outside of the pipe. The bars are brought together, either manually or hydraulically, squeezing the pipe material together until a seal is formed where the upper and lower walls meet.

c. The hydraulic squeeze off tool should have a locking to prevent accidental release of pressure during operation. All squeeze-off machines should be fitted with check plate or stops to avoid over compression of the pipe.

d. Where the pipe walls are compressed the polyethylene pipe will be severely deformed in the regions of maximum compression. The pipe will eventually regain its original shape after squeezing but there will be some reduction in the pressure bearing properties.

e. A complete stop may not always be obtainable because of wrinkling of the inside of the pipe. If a complete stop is required, then a second squeeze can be used. A second squeeze-off distance should be a minimum of three pipe diameters and right angles to the initial squeeze.

f. While not essential it would be good practice to fit a reinforcing stainless steel band/ do not squeeze again adhesive tape around the pipe upon the completion of a squeezing operation.

g. Special squeeze-off sticker should be wrapped on pipe after completion of operation prior to backfilling. Placement of such tape/ mat will facilitate to avoid another squeezing at the same place in future.

4.15 BACKFILLING

4.15.1 Trenches excavated during the day shall be backfilled by evening before workmen leave the site unless, otherwise as approved by the Owner Engineer In charge.

4.15.2 Backfilling shall be done after ensuring that appurtenance have been properly fitted and the pipe is following the trench profile at the required depth that will provide the required cover and has a bed which is free of extraneous material and which allows the pipe to rest smoothly and evenly. The Contractor shall supply all necessary pumping equipment and power sources to de-water trenches and excavations as required by Owner at no extra cost.

4.15.3 Prior to backfilling it should be ensured that the trench is filled with fine sand around the pipe as per the specification given in this document and soft graded soil layer up to 500 mm to be backfilled above layer of sand immediately after lowering where required.

4.15.4 The surplus material shall be neatly crowned directly over trench and adjacent excavated areas on both sides of the trench to such a height which will provide adequately for future settlement of the trench. Contractor shall be responsible for remedial work at no extra cost to Company. Surplus

material, including rock left from this operation shall be disposed off to the satisfaction of landowner or authority having jurisdiction at no extra cost to Owner.

4.15.5 When the trench has been dug through driveways or roads, all backfilling shall be executed with sand/suitable material in layers as approved by Owner's representative and shall be thoroughly compacted. Special compaction methods as specified may be adopted. All costs incurred there upon shall be borne by the Contractor.

4.15.6 The Contractor shall ensure laying of PE Warning Mat 250 mm wide and 300 Micron thick, approved marking and colour of Owner, shall be placed on PE pipeline in the trench after backfill of the trench up to a height of 500 mm on the top of the PE Pipes. The warning mat is to be unrolled centrally over the pipe section and thereafter further backfilling will commence.

4.15.7 Backfilling activity shall include watering and proper compaction of backfilled soil by jumping jack compactor, wherever required as per instruction of EIC; Proper crowning of not more than 150mm shall be done

4.15.8 Electro-fusion of joints is to be undertaken immediately after lowering and the activity shall not be kept pending for lack of Electro-fusion jointing. The backfilling shall be considered complete only after the jointing of pipes.

4.15.9 All the excavated material that could be used during the Restoration process shall be stacked and kept separately and properly

4.15.10 Contractor has to ensure the backfill, watering, compaction and carryout a temporary reinstatement of all premises of statutory authorities work such as Road, Railway etc immediately after completion of PE Laying and jointing work.

4.15.11 During random inspections if back filling is not found to be as per the specifications, the Contractor will have to re-open the trench and rectify the back filling as per the Owner specification without any additional charge.

4.15.12 Debris and other surplus material shall be removed immediately after the back filling.

4.16 MAJOR CROSSING

Major crossings like River/ Water Canal/ National Highway/ Four lane state Highway, Railway lines etc. shall be done through only steel pipeline as decided by Owner or owner's representative and is not in scope of contract of PE laying & PNG installation or not covered in this tender. However, both ends of steel pipeline with PE pipes shall be connected through transition fittings by the contractor under this tender terms and conditions with no additional cost to Owner.

4.17 TRENCHLESS LAYING (MANUAL BORING/ HDD/ AUGER BORING)

Manual Boring and HDD are to be considered as methods of trenchless laying and are payable under line items of SOR. Contractor to follow GGL procedure/ guidelines for execution as directed by EIC.

MANUAL BORING

- The Manual boring shall be carried out as per the requirement specified by Owner's representative and approved procedures
- The contractor has to arrange sets of manual boring tools as per the approved specification/drawing of GGL. No boring tools other than the approved one shall be allowed at site.

- Contractor shall plan manual boring work well in advance with detailed drawing to be prepared and submitted to EIC for approval. Contractor shall carry out assessment of risk involved at particular site and also submit mitigation plan to EIC for approval prior to manual boring.
- The contractor has to carry out survey of the underground utilities before going for the Molling to avoid any damage to other utilities
- Contractor shall submit check list along with rough sketch showing location for proposed boring pit, boring route and other utilities, if any within the boring route with details of each utility listed in consultation with society officials/ individual house owner in case of a ground connection to EIC for approval.
- Contractor shall co-ordinate with Local municipal authorities, electricity departments & other underground utility operators and intimate them with detail drawing of proposed boring site. If possible, a joint site visit along with the concern officials may be arranged so as to avoid damage/accidents.
- Contractor shall obtain Work permit before manual boring/ HDD activity from EIC.
- Final depth of the boring shall be arrived based upon location of all other underground utilities enrooting the boring path and maintaining safe distance of Minimum 500 mm from the deepest existing utility.
- In case of electrical cable on the route of boring path, electrical supply, if possible, shall be cut off during boring operation in coordination with local electrical utility company
- Maximum length of boring at one stretch shall not exceed 5 Meters to the extent possible. In case boring length is more than 5-meter Contractor shall follow GGL procedure/ guidelines instructed by GGL EIC.
- Contractor shall ensure proper tools & tackles, PPE's listed below to be provided to labour at site. Fire extinguisher & all other safety precaution shall be provided by the contractor at site prior to starting of the work.
    - Hand gloves rated at min 33 KVA and to be tested annually.
    - Gum boots
    - Helmet
    - Boring tool must be electrical shock proof
- Contractor shall ensure that only one man at a time shall excavate in a confined space. A second man shall to watch & be alert for any emergency handling. Contractor shall ensure that execution of manual boring work is under continues supervision by their experience supervisor till completion of work.
- Contractor shall ensure that boring pit shall be properly cordoned at all times till completion of work
- Availability of First Aid box shall be ensured at all boring sites.
- Contractor shall ensure that after completion of Moling/boring the hole and boring pit shall be properly compacted/ filled with soil by watering as approved procedure and the boring pits and others work shall be restored immediately after completion of work to the satisfaction of EIC.
- Contractor shall ensure that boring pit is large enough to work in comfort till completion of work.

- If there is water seepage into the bore of pipe manholes, Manual boring shall not be done on that location
- If the ground is unstable, Contractor shall provide timber to support the boring pit for saving it from collapse. If the excavation is 1.5 Meter. deep or greater the boring pit must be timbered irrespective of depth. In either case of alternative to timbering is to better the sides of the excavation. Contractor shall ensure that labours performing boring are well trained in the use of tools, use of PPE's. Safety & boring procedure shall be informed/ conveyed by contractor in presence of GGL EIC and records of such training of boring work shall be available with the contractor for auditing by GGL officials, as and when required.
- Contractor shall ensure that, Manual boring must be executed only during day light. Boring work in the night is strictly prohibited.
- PE pipe may be laid by manual boring technique by prior approval of Site Engineer. Provision of manual boring tool shall be in the scope of contractor and the same shall be as per approved drawing/ specification of Owner.
- Manual boring rate will not applicable for intermediate open cut excavation.
- In case of depth of excavation is more than 1.5 meter, additional compliance to be ensured as per GGL Lifesaver/ procedures

HDD (Horizontal Directional Drilling)

HDD is a two stage process; the first stage consists of drilling a small diameter pilot hole along a designated direction path. The second stage involves enlarging this pilot hole to a diameter that will accommodate the casing/ carrier pipe and pulling casing/ carrier pipe back into the enlarged hole.

Contractor to submit following documents prior to commencement of work for GGL/ TPA approval

i. Time Schedule
ii. Manpower deployment
iii. Equipment "Fit for Purpose" certificate
iv. Bore plan
v. Marking of other utilities

Equipment of adequate size and capability to install the product, and include the equipment manufacturer's information for all power equipment used in the installation.

The means for centring the cutting head inside the borehole.

PROCEDURE FOR HDD

The work under crossings shall include necessary clearing, grading and trenching to required depths and widths, welding of casing (when required) and carrier pipes, lowering-in, back filling, clean-up, restoration to the original condition and further strengthening and protective works, testing, installation of assemblies, insulators, end seals, and temporary works such as sheet pilling, bridges, etc.

The work shall be carried out in accordance with the approved drawings and job standards, as per GGL procedure/ guidelines for execution as directed by EIC. directed by GGL and to the satisfaction

Bidder's seal & sign

of GGL/TPA and the authorities having jurisdiction over the facility crossed. The work carried out for road and railroad crossings shall meet the minimum requirements for carrying out HDD.

Before the installation work of crossings is started, the CONTRACTOR shall provide suitable barricades, temporary bridge/bypass work with railing, if required by GGL/TPA for safety of traffic. Adequate traffic warning signals and/or traffic lights and suitable diversions shall be provided as directed by GGL/TPA/Authority having jurisdiction over these areas. Such diversions shall not cross the pipeline where it has already been installed, unless proper safeguarding at GGL/TPA's opinion is ensured.

Prior approval from the statutory authorities shall be obtained to lay the pipeline across the highway/ road.

Well pointing arrangements shall be made during boring in all wet areas, without any additional cost.

Entry and exit pit preparation with proper shoring and shuttering and lowering of boring machine in entry pit with using of proper lifting equipment as directed by GGL/TPA.

A two-inch pilot hole shall first be attempted to determine if rock will prevent the installation of casing/carrier pipe. If the pilot hole is successfully made, then final bore shall be made.

After the completion of pilot hole depending on the drilled, cuttings and actual soil encountered during the pilot hole, combination of cutters/ reamers will be used to large the holes.

Final bore shall be minimum 2" higher than the diameter of casing/ carrier pipe to be installed.

Final bore shall be smooth and free from sharp edge and shall be straight without any curvature for smooth insertion of carrier pipe.

Prior approval from GGL/TPA shall be obtained for insertion of carrier pipe.

Carrier pipe end shall be protected with proper arrangement as directed by GGL/TPA before insertion of carrier pipe to prevent entering of dust, mud, soil etc. in carrier pipe.

Carrier pipe to be inserted in such a way so that external surface of carrier pipe remains free from any scratches or damages.

Fine soil/sand shall be filled at both entry and exit point of bore to the possible extent as directed by GGL/ TPA post insertion of carrier pipe.

AUGER BORING WITHOUT JACK

The overall work scope shall include but not limited to, boring and jacking/ Auguring pits and equipment, shoring and shuttering of trench, supply and installation of steel casing pipe, installation of the carrier pipe with or without casings, miscellaneous appurtenances to complete the entire work as directed by engineer-in-charge and restoration. Scope includes supply part of all machinery, equipment, labour needed for execution of job.

Boring and jacking/ Auguring operations shall be performed within the right-of-way/ ROU.

The equipment used in boring and jacking/ Auguring shall be of adequate capacity and in satisfactory working condition for safe operation. Only experienced workmen in boring and jacking/ Auguring operations shall be used in executing the Work.

Provide all safety equipment and professional services required for ensuring health and safety of the general public at large and of personnel involved in execution of job in accordance with the GGL HSE Policy.

To conduct site specific risk assessment and mitigate the risk prior to execution of job.

Take all necessary measures to protect surrounding public and private property, adjacent buildings, roads, drives, sidewalks, drains, sewers, utilities, trees and structures etc. from damage due to execution of job. Responsibility and payment for correction of such damage shall be sole responsibility of Contractor.

All statutory clearances as required from various authorities having jurisdiction thereof viz. PWD, Forest, Railways, Irrigation, Traffic, Police, P & T, Electricity Board and GIDC etc. shall be obtained by GGL and will be handed over to contractor for execution of the job. Contractor shall co-ordinate with concerned authorities throughout the execution of work.

Contractor shall obtain NOC from the concerned authorities on completion of job against the permission issued by them.

Contractor shall carry out utility identification and co-ordination with utility agencies prior to execute the job. In case of any utility damage contractor shall have to repair at his own cost.

Highways, Main-Roads and Railroads and their verges and banks of water crossings are not allowed to be used for loading, unloading or stacking of materials and/or equipment. For secondary roads, such loading/ unloading is permitted only after prior approval from the concerned authorities. CONTRACTOR is not allowed to close or divert roads or watercourses without prior approval from the GGL/TPA and the concerned authorities. CONTRACTOR shall never unnecessarily hamper the users of the roads, railroads, buried services and/or watercourses. The water flow shall not be obstructed in any way.

All Civil and Mechanical works associated with or incidental to the installation of pipeline crossings shall be carried out in accordance with the approved procedures/ requirement issued from time to time by concern authority issued the permission.

For each crossing, CONTRACTOR shall submit and obtain approval of GGL/TPA for the followings but not limited to:

- Time Schedule
- Working method with equipment
- Test procedure
- Manpower deployment
- Calculations of temporary works
- Such details shall be provided without additional cost to GGL.

Carrier pipe length to be installed in all crossing shall be tested prior to lowering. The section of the pipeline for the crossings shall be tested as a single string. Test pressure shall be as per GGL Specification. Test section shall be visually examined for leaks/ defects, etc.

The scope of work includes following:

- The work under crossings shall include necessary clearing, grading and trenching to required depths and widths, welding of casing (when required) and carrier pipes, lowering-in, back filling, clean-up,

restoration to the original condition and further strengthening and protective works, testing, installation of assemblies, insulators, end seals, and temporary works such as sheet pilling, bridges, etc.

- The work shall be carried out in accordance with the approved drawings and job standards, as directed by GGL/TPA and to the satisfaction of GGL/TPA and the authorities having jurisdiction over the facility crossed. The work carried out for road and railroad crossings shall meet the minimum requirements of API RP 1102, latest edition.
- Before the installation work of crossings is started, the CONTRACTOR shall provide suitable barricades, temporary bridge/bypass work with railing if required by GGL/TPA for safety of traffic. Adequate traffic warning signals and/or traffic lights and suitable diversions shall be provided as directed by GGL/TPA/Authority having jurisdiction over these areas. Such diversions shall not cross the pipeline where it has already been installed, unless proper safeguarding at GGL/TPA's opinion is ensured.
- Prior approval from the statutory authorities shall be obtained to lay the pipeline across the highway/ road.
- Well pointing arrangements shall be made during boring in all wet areas, without any additional cost.
- Entry and exit pit preparation with proper shoring and shuttering and lowering of boring machine in entry pit with using of proper lifting equipment as directed by GGL/TPA.
- A two-inch auger pilot hole shall first be attempted to determine if rock will prevent the installation of carrier pipe. If the pilot hole is successfully made, then final bore shall be made.
- Final bore shall be minimum 2" higher than the diameter of casing/ carrier pipe to be installed.
- Final bore shall be smooth and free from sharp edge and shall be straight without any curvature for smooth insertion of carrier pipe.
- Prior approval from GGL/TPA shall be obtained for insertion of carrier pipe.
- Carrier pipe end shall be protected with proper arrangement as directed by GGL/TPA before insertion of carrier pipe to prevent entering of dust, mud, soil etc. in carrier pipe.
- Carrier pipe to be inserted in such a way so that external surface of carrier pipe remains free from any scratches or damages.
- Fine soil/sand shall be filled at both entry and exit point of bore to the possible extent as directed by GGL/ TPA post insertion of carrier pipe.

4.18 RESTORATION

Wherever the restoration to the original surface condition is in the scope of Owner or concerned local or statutory Authorities, all roads and footpaths (including roads and footpaths inside colonies) shall be temporary restored and Contractor has to ensure the Backfill, Watering, Compaction and Temporary Reinstatement work of all premises of statutory authorities such as Road, Railway etc. Immediately after completion of PE Laying and jointing work.

Wherever the restoration to the original surface condition is in the scope of contractor, the same shall be restored to its original condition as directed by EIC and to the satisfaction of Owner's EIC/ Owner's representation. To retard curing of the installed concrete, wet sackcloth is to be placed on the finished surface and kept damp for a period of 7 days.

Where slabs and blocks are to be restored, the level of the compacted sub-base is to be adjusted according to the slab/block thickness. The slabs or blocks should be laid on moist bedding material, which should be graded sand, mortar or mortar mix. The slabs or blocks should be tapped into position to ensure they do not rock after lying. The restored slabs or blocks should match the surrounding surface levels. Joint widths should match the existing conditions, and be filled with a dry or wet mix of mortar.

Where permanent surface restoration cannot be completed immediately, the Contractor shall provide and maintain a suitable temporary running surface for vehicular traffic and pedestrians. The Contractor will be responsible for the maintenance of all restoration carried out for the duration of the Contract guarantee period.

The Contractor is to ensure the restoration work is properly supervised and that the material used is suitable for the purpose and properly compacted. Where the required standards are not achieved, the Contractor will be required to restore the defective work.

Contractor has to obtain the No Objection Certificate (NOC) from the concerned local authorities after completion of the temporary or permanent restoration work. The restoration specification specified in the tender is only a typical specification and the contractor has to carry out restoration as per the latest version concerned local or statutory Authorities like R&B/ NHIA/ SH/ RAILWAY/ Nagarpalika/ Panchayat etc. specification to its temporary or original condition and also to the entire satisfaction of landowner (Private/ Public).

4.19 INSTALLATION OF BRICK

Installation of brick layer above the PE pipeline inside the customer premise for Farm house/ Bungalow shall be carried out by the contractor.

4.20 TESTING

- Pressure testing shall be carried out either with compressed air (free from oil and greases) or nitrogen and no other test medium shall be used. Compressed air or Nitrogen gas shall be provided by Contractor for testing purposes and is to be included in the laying rates. Nitrogen shall be supplied in labelled, tested and certified cylinders and complete with all necessary regulators, hoses and connections which shall be in good order and working condition. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures, where this is the result of faulty workmanship or negligence on the part of the Contractor.
- For both main & service pipeline laying, the Contractor shall perform progressive pressure testing & pneumatic testing to ensure no leaks in long lengths of pipe.
- Schematic drawing of PE network to be tested shall be prepared with clearly marked pressurisation point, venting point, PE Valves Location.
- Prior to pressure testing of PE network, proper flushing shall be done with Compressed air or Nitrogen for the entire PE network to the satisfaction of EIC by the contractor and get approval from Owner representative
- The pneumatic test pressure shall be 100 Psig (7 barg), and there shall be no unaccountable pressure loss during the test period. The holding period of test section is as below.
- For PE pipeline network of length greater than 1 KM at least 24 hrs after pressure stabilization period of 30 minutes.

- For PE pipeline network of length shorter than 1 KM at least 4 hrs after pressure stabilization period of 30 minutes.
- There shall be no pressure drop and measure of pressure unchanged during the test in pressure gauge.
- Contractor shall ensure following before starting of pneumatic testing.
  - Tested hoses at required pressure and clamps to be used.
  - Area of testing to be away from populated area or sand bags to be kept around so that in case of accident it acts as barriers.
  - If compressed air is being used for pneumatic testing contractor, shall ensure that compressor of appropriate capacity is being used.
  - If Nitrogen is being used for pneumatic testing, Contractor shall ensure industrial nitrogen purity by checking oxygen % in the cylinder as per GGL guidelines.
  - Contractor shall ensure that testing section of PE pipeline is completely isolated positively.
  - Measuring instruments shall have been calibrated and their accuracy and sensitivity confirmed before the start of testing, where in calibrated pressure gauges of suitable range shall be supplied & used for testing by the contractor.
  - The range of pressure gauge is minimum 1.5 times of test pressure and least count of gauge should be 0.1 Kg/cm2.
  - The pressure gauges shall be calibrated from time to time as desired by EIC.
  - All testing shall be witnessed and approved by the EIC or his delegated representative. Tie-in joints may be tested at working pressure following commissioning.
  - The testing shall include, but not limited to the provision of consumable and Non consumable materials, tools, tackles and equipments, Personal Safety Equipment, Fire Extinguisher, Adaptor, Polyethylene connecting pipe etc.

4.21 PURGING

Purging shall be carried out in accordance with the principles defined in the American Gas Association publication “Purging Principles and Practice”.

The Contractor shall also provide nitrogen required for purging as per the direction of EIC. Nitrogen shall be supplied in labelled, tested and certified cylinders and completed with all necessary regulators, hoses and connections, which shall be in good and working condition. No separate payment shall be paid for supplying Nitrogen cylinders for purging and is included in the laying rates.

Prior to use of nitrogen cylinder, Contractor shall ensure industrial nitrogen purity by checking oxygen % in the cylinder as per GGL guidelines

In addition, the Contractor shall submit purging plan and get approval from Owner/ Owner representative before commencing any purging work. The Plan shall include, but not limited to the provision of the following materials and equipment: Personal Safety Equipment, Fire Extinguisher, Purging Adaptor, Purge stack with flame trap and gas sampling point, Gas sampling equipment (may be gas leak detector), squeeze -off tool, etc.

The Plan shall also include the purging process along with detail on the sequence of events. The process is to also specifically mention the need to lay a wet cloth over the PE main and in contact with the ground, to disperse static electricity during the purging work.

A purge stack with flame trap shall be used when purging services. Care shall be taken to ensure that the purge outlet is so located that vent gas cannot drift into buildings.

4.22 INSTALLATION OF SERVICE REGULATOR (SR) MODULE

Location for Installation of service regulator shall be decided by EIC

Contractor shall ensure that the Service Regulator module is installed and supported on a bed of firmly compacted soil as per the drawing provided in this document.

The scope of work and technical requirements associated with the Installation of Service Regulator Module of inlet pressure 1.5 to 5.0 bar-g and Outlet pressure 110 mbar-g supplied by Owner are as follows:

- The SR module shall be a complete pre-fabricated unit including all valves, fittings, test points and ancillary fittings.
- The SR module supplied by Owner shall be pre-tested and ready for installation by Owner and frame mounted with housing or canopy.
- Contractor shall carry out all the necessary excavation/ breaking of surface (Tar/ RCC) etc. For Installation of Service regulator module as per the foundation drawing/specification attached with tender document.
- Installation of Service Regulator should be in such a position that Flow direction of Service Regulator and gas flow in pipeline is in the same direction while connecting upstream and downstream of PE network.
- Contractor shall ensure that usage of 90 degree EF elbow, Coupler for hook-up of the Service Regulator for 63mm and above size pipeline.
- Contractor shall apply Golden yellow colour on foundation of Service Regulator
- Contractor shall connect inlet and outlet of service regulator module by appropriate EF fitting with transition fitting of SR module.
- Contractor shall carry out functional testing of service regulator and carry out leak test prior to commissioning of service regulator as per instruction of EIC
- Contractor shall carry out leak test of all the joints of Service Regulator module with soap solution during commissioning as per the instruction of EIC.
- Installation of bollard as directed by EIC

SELECTION OF LOCATION FOR INSTALLATION OF SERVICE REGULATOR:

Location selection for Service Regulator is very significant activity for safe and uninterrupted gas supply to Domestic customers. EIC will decide and intimate the installation location of Service Regulator module to Contractor. However, the guidelines for selection of location for installation of Service Regulator module is as per the below.

Wherever possible location is to be selected inside the premises immediately after entering into premises i.e. Apartment premises, Society premises etc. However, in most of the cases it is not

possible to install Service Regulator besides the main/sub/internal road. To select the location for installation of Service Regulator, following criteria needs to be considered.

Location to be avoided:

- Water logged area
- In front of Entry/ Exit of building/ Shop etc.
- Garbage collection centre/point

INSTALLATION & TESTING OF SERVICE REGULATOR

- Pre-commissioning testing for performance of safety devices i.e. UPSO, OPSO, and Relief valve, which is integral part of Service Regulator shall be done.
- The set pressure of Service Regulator for different features are as per the below.
  - Set Pressure : 100 – 110 mbar
  - UPSO : 40 – 60 mbar
  - OPSO : 145-175 mbar
- All electro fusion joints (SR Hook up joints) shall be checked with soap solution before commissioning of Service Regulator.

COMMISSIONING OF SERVICE REGULATOR

- Ensure all installation and pre-commissioning activities as mentioned above are completed.
- Inlet and Outlet valves shall be kept in closed position.
- Gas in upto inlet valve of Service Regulator by opening of Valve/squeeze tool.
- Leak test shall be carried out upto upstream of inlet valve.
- If no leakages found, open inlet valve of Service Regulator and ensure no leakages upto outlet isolation valve.
- Monitor Outlet pressure of Service Regulator upto 5.0 minutes before opening outlet valve.
- Ensure positive lock-up pressure (to confirm no leakages or open end during commissioning) in downstream network before opening outlet valve
- Ensure that not a single domestic connection has been connected through downstream of the network which is to be commissioned.
- Release lock up pressure before opening outlet valve of SR and by keeping inlet valve closed.

  Slowly open inlet valve first and subsequently outlet valve of Service regulator to allow Gas – in the downstream network

4.23 INSTALLATION OF PD METER AND REGULTOR MODULE (FARM HOUSE/ BUNGALOW)

Location for Installation of PD meter and regulator skid shall be decided by EIC. Skid with PD meter and regulator to be installed at farm house/ independent houses or bungalows where the distance from the entry gate of the premises to kitchen is greater than 30 meters

Contractor shall ensure that the skid is installed and supported on a bed of firmly compacted soil as per the drawing provided in this document.

The scope of work and technical requirements associated with the Installation of skid of inlet pressure 100 mbar-g to 5.0 bar-g and Outlet pressure 21 mbar-g supplied by Owner are as follows:

- The skid shall be a complete pre-fabricated unit, including all valves, fittings, test points and ancillary fittings.
- The skid supplied by Owner shall be pre-tested and ready for installation by Owner and frame mounted with housing or canopy.
- Contractor shall carry out all the necessary excavation/ breaking of surface (Tar/ RCC) etc. For Installation of Skid as per the foundation drawing/specification attached with tender document.
- Installation of skid should be in such a position that Flow direction of Regulator and gas flow in pipeline is in the same direction while connecting upstream and downstream of PE network.
- Contractor shall ensure that usage of 90 degree EF elbow, Coupler for hook-up of the skid for 63mm and above size pipeline.
- Contractor shall apply Golden yellow colour on foundation of Skid
- Contractor shall connect inlet and outlet of skid by appropriate EF fitting with transition fitting of Skid.
- Contractor shall carry out functional testing of Skid and carry out leak test prior to commissioning of Skid as per instruction of EIC
- Contractor shall carry out leak test of all the joints of Skid with soap solution during commissioning as per the instruction of EIC.

SELECTION OF LOCATION FOR INSTALLATION OF SKID:

Location selection for Skid is very significant activity for safe and uninterrupted gas supply to Domestic customer. EIC will decide and intimate the installation location of Skid to Contractor. However, the guidelines for selection of location for installation of Skid is as per the below.

Wherever possible, Location is to be selected inside the premises immediately after entering into premises i.e. farm house, bungalow etc. To select the location for installation of Skid, following criteria needs to be considered.

Location to be avoided:

- Water logged area
- In front of Entry/ Exit of Farm house/ bungalow etc.
- Garbage collection centre/point

INSTALLATION & TESTING OF MODULE

- Pre-commissioning testing for performance of safety devices i.e. UPSO, OPSO, and Relief valve, which is integral part of Regulator shall be done.
- All electro fusion joints (Skid Hook up joints) shall be checked with soap solution before commissioning.

COMMISSIONING OF SKID

- Ensure all installation and pre-commissioning activities as mentioned above are completed.

- Inlet and Outlet valves shall be kept in closed position.
- Gas in up to inlet valve of Regulator by opening of Valve/squeeze tool.
- Leak test shall be carried out up to upstream of inlet valve.
- If no leakages found, open inlet valve of Skid and ensure no leakages up to outlet isolation valve.
- Monitor Outlet pressure of Skid up to 5.0 minutes before opening outlet valve.
- Ensure positive lock-up pressure (to confirm no leakages or open end during commissioning) in downstream network before opening outlet valve
- Ensure that not a single domestic connection has been connected through downstream of the network which is to be commissioned.
- Release lock up pressure before opening outlet valve of Skid and by keeping inlet valve closed.

  Slowly open inlet valve first and subsequently outlet valve of regulator to allow Gas – in the downstream network

4.24 INSTALLATION OF PE VALVE & CHAMBER

PE VALVE

The location for installation of PE valve shall be proposed by contractor and decided by EIC and shall be installed at every 1.0 km. on PE Medium Pressure network.

Pre cast valve chambers (RCC)/ Brick shall be constructed as per drawing given in the tender. Prior approval shall be taken from the Owner/ Owner's representative for Pre Cast/ Brick of valve chambers as per enclosed tender drawing before start of production, without any extra cost to owner.

The PE Ball valve shall be supported on a bed of firmly compacted soil and construction of Valve chamber shall be as per drawing given in the tender.

Payment for the construction of valve chamber shall be as per tender terms & conditions. The installation of the valve chambers shall be taken up immediately after installation of valve, before commissioning of the pipeline network.

Materials for pre-cast/ brick Valve chamber with FRP cover

FRP Cover with frame shall be free issued by GGL and supply of pre-cast/ Brick chamber is under scope of contractor.

Workmanship

- The excavation work shall be done at a location decided by Engineer-in-Charge. All care shall be taken not to damage existing facilities and surface of construction shall be restored to its original state. Approved quality of sand shall be filled below pipeline without disturbing the laid pipe and the valve shall be supported on a bed of firmly compacted soil by using fine sand. Care for proper rammed shall be taken so that pipe/ PE Valves firmly place.
- PCC shall be placed below the pipe and pre cast/Brick valve chamber as indicated in the applicable standard drawing of pre-cast/ Brick valve. Once PCC is set then Pre Cast valve chamber shall be installed/ placed to cover the PE Valves. Care shall be taken during

installation/Construction of valve chamber to protect PE Pipes as well as PE valves. Fine sand shall be filled in the valve chamber as per instruction of Owner EIC.

- The supply of sand is included in the rates of supply and installation of valve chamber. No separate payment shall be made against supply of Fine sand required for installation of valve chamber.
- Supply and installation of Valve chamber excluding frame and FRP cover of valve chamber for PE valve installation.
- Surrounding area to be properly cleared and restored its original conditions and to satisfactory of Owner or Owner's representative.

4.25 MARKERS

- Markers shall be installed as per the GGL guideline, drawing as instructed by EIC
- The details written on marker shall be as per GGL specification.
- Markers shall be fabricated, supplied and installed on the ROU at regular intervals as per the instructions of the EIC immediately after laying of the Pipeline. The installation of the type of the Marker shall be decided by the EIC depending on the site condition. The contractor shall also ensure that a sample of all type of markers shall be inspected and approved by Owner/ Owner representative before shipment of the lot at site and prior to installation at the site. The inspection of all types of markers shall be carried out lot wise.
- RCC Markers shall be painted before installation as per the approved procedure. Whereas the Pole marker (Markers with foundation) are to be supplied with powder coated Golden Yellow paint. The supply of the paint and application as per the specification is in contractor's scope. Payment shall be done as per relevant line item of SOR. Contractor shall obtain the approval lot wise & before installation at site from the Owner or Owner's representative.
- Supply & Installation of RCC route marker as per the GGL drawing enclosed with technical scope at interval of 100 Meter distance along the route of laid pipeline and at both sides of crossing or as per the direction of the EIC/Owner's representative. And same should be incorporated in as built drawings. Network should be provided with route markers along the roads parallel as well as at beginning of branch pipeline for route identifications.
- The artwork is typical for all the markers with Owner's logo on it. The contractor must take prior approval for the artwork from EIC before installation of Markers. The lot wise approval shall be attached with bills.

4.26 COMMISSIONING

Contractor shall provide the required personnel, Vehicles, labour, supervision, tools, equipment, instruments and technical assistance for performance tests, Pre commissioning and commissioning activities as per requirement/ satisfaction of Owner/Owner's representative in line with GGL procedure/ guideline

Major activities to be ensured during commissioning are given below;

- Commissioning activity shall be commenced only after receiving valid work permit from EIC at site. GGL EIC of PE work shall check the same before starting of PE network.

- Overall schematic drawing of section/ AS BUILT drawing shall be prepared with clearly marked Venting, Elevation, PE Valves Location, End caps by the contractor and get approval from Owner/Owner representative prior to the start of commissioning of PE network.
- Prior to the start of commissioning of PE networks, the following shall be ensured.
  - Proper flushing, Hydro testing & Pneumatic testing record of proposed section for commissioning of PE network
  - Proper venting location/ point
  - Proper barricading and warning sign board at venting/ PE valve location
  - Availability & Installation of Calibrated pressure gauge
  - Availability of calibrated EF jointing machine, DG Set etc. with RCCB
  - Ensure availability of calibrated methane detector
  - Ensure availability of additional Squeeze tools for emergency
  - Ensure the traffic controlled by man and diversion at the time of Gas In
- It shall be checked and ensured that the positive pressure in the PE network is equal to the pressure maintained/locked after testing of PE network.
- It shall be ensured that venting is minimum 3 meters above the ground level by crack opening of valve during commissioning of PE network until two successive readings confirm same concentration of gas by methane detector.
- Monitor surrounding areas for checking Natural Gas LEL to avoid fire/ accident in vicinity during commissioning of PE network.

4.27 STANDARD OF WORK

All work carried out under this contract shall be to standards, codes of practice construction procedures and other technical requirements as defined in the technical specifications. The manpower deployed on the respective work shall be adequately trained and shall have necessary skills to execute/supervise the work. However, the assessment on the qualification of the personal shall be at the discretion of EIC.

Fusion Operators and other skilled personnel like plumbers, conversion techniques shall be approved by Owner's representative. Simultaneously Identification Cards duly signed by Owner's representative shall be issued to them, GGL logo should not be used in ID cards. The contractor shall maintain proper record for the identification cards issued to their workers.

4.28 RECORDING (AS-BUILT DRAWINGS)

As –Built drawing shall be provided in standard template provided by GGL with all required information's. The following points shall be taken care to the preparation of as built drawings.

a) As laid drawings should be in the scale of 1:200/ or any other suitable scale and shall be submitted in an A-0 sheet. The drawings shall be in layers according the AUTOCAD features category.

b) Pipeline feature shall be shown as a continuous line, breaks only at joints, fittings, valves, tee point, etc. Diameter, Pipe material, length, and location of pipeline whether on the road or footpath, should be clearly indicated.

c) Distance of pipeline from a permanent property/structure should be provided at least for every 20 metres. If there is a change in alignment/ orientation and offset distances etc. Of the pipeline in between the above said 20 Meter, the same shall be clearly mentioned in the as laid. Gas objects (off valves, tees, elbows, couplers, transition fittings etc.) shall be shown as block objects (which form a single node to connect) with respect to Owner symbols/ legend. As laid drawings shall be as per the approved legends provided by EIC.

d) Details & offset distances from other utilities present (e.g. BSNL/ MTNL etc.) should be given in as laid drawing. If there is any change in depth of the pipeline, the same shall be clearly marked with details in the as laid drawings. The details (material, size &. Length) of additional protection provided to pipeline shall also be clearly indicated.

e) Manual boring/ HDD or any other major crossing shall be highlighted

f) Details of the PE stop off valves & other fittings used (i.e. tees, elbows, couplers, transition fittings, etc.) should be shown with adequate information orientation & Offsets from permanent structures in the immediate vicinity.

g) Technical deviations (if any) should be provided with reference to the buildings permanent structures around, and the same should be cited clearly with all the relevant details, including separate sketches/Blowups/ sectioned drawings/ exploded view.

h) Total as laid-length (size wise), bill of materials should be mentioned in each sheet.

i) Specific remark should be provided where sufficient depth is not maintained.

j) Complete details of nala crossings should be shown in a separate sketch.

k) Names of roads, major landmarks and buildings should be mentioned appropriately for reference.

l) Proper Chainage shall be mentioned on all the drawings to be referred with continuation reference.

m) Direction of gas flow shall be indicated in each of the drawings.

n) Location and type of marker shall be incorporated in network as-built drawing.

o) Text on the as laid drawing should be clearly visible.

p) Land base features shown on the drawing shall match the exact distance as they were on real ground with respect to scale (1:200).

q) As laid drawings shall be duly signed & stamped by area Owner or Owner's representative.

r) The details shall be prepared in standard format using MAP INFO/AUTOCAD MAP and submitted in CD RAM. Contractor shall also make the item wise material consumption report for the respective areas in a soft copy and to be submitted along with the as-built drawings

s) Refer attached templates for preparation of as-built drawings.

The Contractor will be required to submit the computerized- Auto Cad version as laid drawings for PE pipe network duly certified by Site Engineer/ TPIA appointed by Owner. The As laid drawing

should include sufficient details for location of PE pipe line with respect to permanent structures, pipeline section length including surrounding utilities details.

4.29 CIVIL WORKS

The contractor has to supply adequate materials and skilled manpower for the completion of all the civil works. The contractor shall also ensure that the work is carried out as per the details mentioned in the Schedule of rates.

Special care shall be taken at the time of labours working in depths/lifting of the skids by hydras/ cranes considering all the safety guidelines.

The contractor has to ensure that sample of the all the materials shall be inspected and approved by EIC before carrying out installation or erection work. The contractor has to submit the test certificates for all the materials to be used at the site. The construction shall be carried out strictly as per the drawings provided by the GGL. The contractor shall ensure extra/ surplus materials shall be immediately removed from the site after completion of the job. Separate payments shall be made as per the line item of SOR.

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INSTALLATION OF PNG DOMESTIC/ COMMERCIAL/ NON-COMMERCIAL/ NDEC/ INDUSTRIAL CONNECTIONS

5.0 SCOPE OF WORK – INSTALLATION OF PNG CONNECTION

5.1 GI PIPING & FITTINGS FOR CONNECTIONS

Generally, the following shall constitute the Contractor's scope of work but not limited to:

5.1.1 Prior to commencing any work on site, contractor shall obtain the permission for work from the concerned authority/ house owner and EIC.

5.1.2 Above ground GI (Galvanized Iron) pipe installation at Domestic/ Commercial/ Non-Commercial/ NDEC/ Industrial customer premises and conversion of burner in case of Domestic connection as per the guidelines/specification given in this document

5.1.3 Tap-off from PE service/main PE pipe line (Ground Connection), Installation of GI pipes, transition fittings to connect Domestic/ Commercial/ Non-Commercial/ NDEC/ Industrial connection.

5.1.4 Day to day coordination with concerned authority's/ Society secretary/ House owner for smooth working at site. Also, Contractor shall not sign/ execute any agreement and/or undertaking of any such documents which amounts to be undertaken by Owner and which shall only be signed and executed by Owner

5.1.5 Selection of route with the GGL representative

5.1.6 Transportation, loading, unloading of Owner's supplied materials from Owner's designated stores to contractors store and then at site is in contractor scope.

5.1.7 Tapping from existing charged PE network up to Transition fitting including EF joint of various PE fittings, Trenching, boring, restoration, fitting of RCC guard including sand filling up to TF joint & cementing on both sides. RCC guard should be installed to cover PE pipe so that threaded joint of TF should be visible for external leak inspection. Minimum one third length of RCC guard should be below the finished floor level. Supply and Installation of powder coated GI pipes between transition fittings to customer's kitchen appliances including BSPT threading on GI pipes, supply and application of TEFLON tape on threads to join fittings like elbows, tees, brass adaptors, anaconda, regulators, meters, appliance & isolation valves etc. for leak proof installations, as per laid procedures and specification including clamping. Job includes drilling of holes in Brick/ RCC structure for wall piece installation (PVC sleeve as per GGL specifications used for wall crossing of GI pipe) Colour touch up to be done on installed GI pipes after testing of the entire connection.

5.1.8 Supply of GI clamps and necessary screw and nuts for installation of GI pipes as per the specification given in this document. Conversion of all types of LPG stove to NG based appliances & to take customers Sign on Job card.

5.1.9 Demonstration to the Customer regarding safe usage of Natural Gas, Guidance on Do's and Don'ts in case of leakage, safety and maintenance related aspects of NG based appliances and installations.

5.1.10 Pneumatic testing and commissioning of the GI installations, Installation of meters etc. as per specification and hand over the same to Owner/Customer to the entire satisfaction. Leak test of entire connection with MMT and record in job card.

5.1.11 Dismantling of scaffolding/temporary structures and cleaning and restoration of the site to its original condition.

5.1.12 Restoration of walls (cementing on brick holes), flooring and other damages during execution of the above ground installation work

5.1.13 Any other activities which are not mentioned/covered explicitly above, but otherwise required for satisfactory completion of the installation works shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to Owner.

5.1.14 All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for Owner's supplied materials is in contractor scope.

5.1.15 Receipt of Free issue materials from Owner's stores, loading, and transportation, unloading at project site proper storing, stacking and identification.

5.1.16 Provision and maintenance of proper store by the contractor near to the work area. Also ensure proper stacking, providing security, and insurance cover during storage and handing over the balance free issue materials to Owner.

5.1.17 The Contractor shall ensure removal and disposal of all waste materials and packaging as mentioned in this document.

5.1.18 The Contractor shall supply all necessary equipment and power sources to execute the work.

5.1.19 The testing, purging and commissioning of installation has to be done to Owner's requirements. Pressure testing shall be carried out with air/nitrogen, and no other test medium may be used. Nitrogen cylinders shall be provided by the contractor. Nitrogen shall be supplied in labelled, tested and certified cylinders, and complete with all necessary regulators, hoses and connections which shall be in good order and working condition. No extra payment will be made for any delays incurred, or repair or rectification work found necessary as a result of test failures, where this is the result of faulty workmanship or negligence on the part of the Contractor.

5.1.20 Handing over the completed works to Owner for their operation/use purposes.

5.1.21 Maintaining the PNG installation till the commissioning and hand over to O&M

5.1.22 Returning surplus material to Owner stores after obtaining clearance from TPI/Owner, reconciliation of free issue material/consumables.

5.1.23 Rectification of defects arising due to poor workmanship during defect liability period of service lines/installations handed over to Owner.

5.1.24 Test certificates of all contractor procured materials shall be submitted to TPI/Owner's representative for their record.

5.1.25 Any other activities not mentioned/covered explicitly above, but otherwise required for satisfactory completion/operation/safety/statutory/maintenance of the works as per instruction of EIC shall also be covered under the Scope of work and has to be completed by the Contractor within specified schedule at no extra cost to OWNER

5.2 MATERIAL, MANPOWER, EQUIPMENT AND MACHINERY

5.2.1 Material to be supplied as a free issue material

5.2.1.1 Owner will supply only following materials. Other than mentioned below shall be supplied by contractor as per attached technical specification to complete the laying of service pipelines and Dom./ Com. PNG connections.

- Domestic/ Commercial - Meter/ Industrial Metering skid.
- Domestic/ Commercial - Gas Pressure Regulator

- Brass Isolation Valve & Appliance Valve (Gas Tap)
- Wire braided rubber hose
- Corrugated flexible SS Metal hose assembly (Anaconda)

5.2.1.2 Material reconciliation statement of free issue material duly certified by Owner's representative shall be submitted to Owner on monthly basis along with RA bill.

5.2.1.3 The free issue material shall not be procured from any other source by contractor.

5.2.2 Material to be supplied by the contractor:

5.2.2.1 The supply of items as indicated in SOR shall be strictly as per relevant Technical Specifications enclosed with the Tender and as per guidelines of various clauses of SCC and SOR.

5.2.2.2 Following materials shall be supplied by the contractor scope of work but not limited to:

- 20 mm OD PE -100 Pipe, SDR – 9
- Powder coated ½" NB or 1" NB GI pipes
- Powder coated ½" NB or 1" NB GI fittings & Nipple
- Inlet/outlet brass adaptor for Meter/ Regulator with NRV
- Clamp required for fixing of Steel reinforced rubber hose
- Powder coated MS Pipe Clamp with Screw and Nuts.
- RCC Guard.
- PE to GI Transition fittings.
- PVC Hole sleeves
- Nozzle for Burner conversion
- Required all consumables like PTFE tape, roul plugs, cutting fluid, etc.

5.2.2.3 All materials shall be handled safely and stored properly in a permanent, covered, lockable store/ ware house preferably near site in such a manner as to prevent any damage to the materials from scratching, gouging, indentation, excessive heat, oxidization effect or by contact with any sharp objects or chemicals. The PE/GI pipes and fittings shall be stored in covered storage to protect material from sunshine, rain etc. The Contractor shall procure material from approved vendors only mentioned in this document. Final inspection at Contractors stores shall be carried out by Owner representative/ TPI duly appointed by Owner.

5.2.2.4 Contractor should ensure that any material which are procured by them to be inspected prior to dispatch from contractor store to site for installation by Owner representative/ TPI as per the test certificate of materials provided by manufacturer.

5.2.2.5 Owning to the technical requirements or otherwise, Owner reserves the right to amend/ vary/ modify the material requirement and/or specification at any time during the period of the Contract. The financial implication, if any, would be mutually discussed and agreed for which Contractor would fully Co-operate with Owner.

5.2.2.6 Owner has provided the specification for the material in the scope of the Contractor for procurement and use. However, in case, due to omission or otherwise, any specification is not

provided, the Contractor shall approach the Owner and obtain approved specifications in writing prior to the actual procurement and use of the material. It may be noted that considering the safety aspect, Owner would approve the specification of all material to be used for the execution of the contract.

5.2.2.7 Contractor has to submit required samples from their supplied materials to GGL EIC/representative for destructive (laboratory) testing as per GGL procedure.

5.2.3 Equipment & machinery to be supplied by contractor

5.2.3.1 The Contractor shall provide labour, tools (such as Hammer, Drilling machine, Piston Drill, PE/GI Pipe Cutters, Dies for BSPT threading, Pipe wrenches, spanners, conversion kits,.) in specified numbers. This will include but not limited to list of specialised tools and tackles indicated in Annexure # 6.

5.2.3.2 Special tools shall be required at site for carrying out drilling work in walls other than Brick or RCC (Ex. Granite, Marble, Wooden, Glass Cutting etc.)

5.2.3.3 The contractor has to ensure the availability of DG sets for continuous power supply. In case the power supply is taken from societies, individual residents, contractor shall settle the claims raised by the electricity providers if any without cost implication to OWNER. In case contractor doesn't settle the claims for using the electricity from societies/individual residents, on demand by the providers, OWNER will settle the claims and the same will be deducted from the contractor's bills. The progress of work shall not hamper due to non-availability of power supply.

5.2.3.4 The contractor has to submit the valid calibration certificate for Pressure gauges.

5.2.3.5 Contractor shall submit the manufacturer test certificate/ lab test certificate for all items procured by him for verification/approval before commencing the execution.

5.2.3.6 No hiring of equipments, tools and tackles by the contractors is allowed at the site. In case, any contractor is found in possession of tools and tackles not enlisted as per annexure #6, penalty will be levied as per SCC which shall be deducted from the running bill and EIC may stop the work.

5.2.4 Plant and Equipment

All vehicular type machinery shall be in good working condition and shall not cause spillage of oil or grease. To avoid damage to paved surfaces, the contractor will provide pads of timber or thick rubber under the hydraulic feet or outriggers of machinery.

5.2.5 Sealant, Grout

The contractor shall be responsible to arrange the supply of any consumable sealant or ready mix grout material required for restoration of holes. The sealant/grout supplied by the contractor shall be compatible with the area to be restored/ rectified. No separate payment for the supply of sealant and grout shall be made to the contractor.

5.2.6 Clamps, Roul Plugs, Screws and Nozzles etc.

The Clamps, Brackets for meter, Roul Plugs, Screws, Nozzles, etc. shall be approved lot-wise by EIC prior to installation. Re-drilling (Simmering) in existing appliance (burners) nozzles is strictly not permitted. The quality of materials procured shall be approved as directed by EIC.

5.2.7 Consumables Items

Special Consumables such as Teflon Tapes shall be supplied by the contractor and are included in installation rates.

These consumables shall be of reputed make companies and required grades/class as per the vendor list given in this document.

5.2.8 Other Materials

The contractor shall supply the following items wherever required:

All materials required for work,

- BSPT threading, pipe jointing, testing etc.
- All signs, barricades, lights and protective equipment.
- All material required for working at higher floor levels (i.e., scaffolding, Ladder, safety helmet and PETZL Supplied safety harness etc.). No other safety harness other than PETZL shall be allowed at site.
- All paints for touch-up works of GI Pipes and fittings, required are to be supplied by the contractor and are included for within the rates.
- All items not expressly mentioned in the contract but which are necessary for the satisfactory completion and performance of the work under this contract.

5.2.9 Acquisition, Receipt and Storage of Materials

The Contractor shall collect Free Issue materials as mention above from Owner's designated stores near to the site or GGL Office as advised by the EIC.

The contractor shall carry out assessment of material required for GI installation in allocated area. After approval from Owner, contractor shall place order for purchasing Bought out items to anyone of approved vendors as per the list attached in the tender document. The contractor shall also ensure that these materials shall be as per QAP enclosed in the tender. The inspection of these materials shall be carried out by Owner appointed third party inspection agency/ EIC. It is contractor's responsibility for providing relevant test certificates for verification at their own respective store.

Any other activity not mentioned/ covered, explicitly, but otherwise required for satisfactory completion/ operation/ safety/ statutory/ maintenance of works shall also be covered under scope of work and has to be completed by contractor within specified schedule at no extra cost to Owner. The Contractor shall carry free issue material in such a manner as to prevent damage during transportation and handling.

The Contractor shall be required to submit inventory details of materials every month along with RA Bill as per instruction of Engineer in charge.

The Contractor shall maintain log book at their respective stores stating issue and availability of free issue material at any given day. Further, it is mandatory for the contractor to submit inventory details of free issue and purchased materials on monthly basis to Owner's representative as per the approved format of the owner. The inventory details shall be in correlation with the Daily progress chart and material reconciliation sheet.

5.3 ISSUE OF WORK INSTRUCTIONS

5.3.1 The contractor will be required to carry out GI installation in the areas where PE network commissioned/laying is under progress. A general scheme of distribution to domestic consumer is indicated in drawing given in tender for reference. It may vary in case of individual and multi storied flats.

5.3.2 The schedule of items of GI installations have been described in brief and shall be held to be completed in all respect including safety requirements as per PTS of HSE, tests, inspection, QA/QC works, enabling and sundry works. The payment shall be made against completed and measured works only. No extra works whatsoever shall be considered in execution of these items.

5.4 PROGRESS OF WORK

The contractor shall proceed with the work under the contract with due expedition and without delay.

Contractor shall assess the material requirement of the allotted area and submit the schedule plan for execution & purchasing before start of actual work.

The EIC may direct in what order and at what time the various stages or parts of the work under the contract shall be performed.

Contractor has to regularly submit at his own cost the following reports in agreed formats and frequency by owner.

- Daily Activity Report (Daily progress/ planning as per the GGL format shall be submitted to Engineer-In-Charge daily morning.
- testing reports,
- Equipment and Manpower deployment status report (Monthly)
- Material Consumption & Inventory report. (monthly)
- Material Reconciliation reports (Along with every RA bill)
- Approved Deviation statements (as and when required),
- Waste collection and disposal report on monthly basis

OWNER will conduct review of contractor performance in respect to quantitative and qualitative at regular interval (CPAR) as per GGL standard practice.

5.5 WORK SHEETS

5.5.1 The quantities of GI pipe and other details will be incorporated in JOB cards. The job card shall be signed by TPIA/ EIC and customer at his premises

5.5.2 If JOB card submitted are illegible, incomplete or incorrectly booked they will be returned to the contractor.

5.6 PERMISSIONS/ APPROVALS

5.6.1 Contractor shall be responsible for obtaining permissions from society management, individual residents and any other concerned authority, if required, for completion of the work. Contractor must take the prior appointment from the residents for carrying out the work.

5.6.2 All the contractor manpower shall carry and wear identity card during approach or execution of works at customers issued by contractor.

5.6.3 It is the contractor's responsibility to inform and co-ordinate with the concerned local authorities and also with other utility agencies before and after the commencement of work at site. To ensure smooth execution of the work on a day-do-day basis, the contractor has to liaison with respective authorities. The contractor shall plan and ensure that work taken up under a single permission shall be completed within the stipulated time period and permission revalidation process is avoided. No separate liaison charges are liable to GGL for permission revalidation cases.

5.6.4 It is the responsibility of the contractor to obtain "No Objection Certificate" (NOC) from land owing agencies/Statutory bodies after completion of the restoration to their satisfaction and Liaisoning with them for refund of the security deposit/ bank guarantees submitted by GGL for obtaining permissions on production of documentary evidence.

5.6.5 The contractor shall coordinate with the relevant authorities for execution of job in line with approvals/ the proposed pipeline route drawings. The inspection of work by statutory authorities shall be the responsibility of the contractor without any extra cost to GGL.

5.6.6 In case contractor delays laying of pipeline/installation work, the work or part of work may be offloaded to some other contractor on his risk and cost.

5.6.7 Any change/ addition in construction specifications required to be made to meet the requirements of the statutory authorities shall be carried out by the contractor without any extra cost to GGL. The inspection and acceptance of the work by statutory authorities shall however, not absolve the contract from any of his responsibilities under this contract

5.6.8 The CONTRACTOR shall work in close consultation/coordination with the EIC.

5.6.9 The contractor shall not sign/execute any agreement and/or undertaking on any such documents which amounts to be undertaken by Owner. The same shall only be signed and executed by Owner; however, the contractors shall also liaison and coordinate for the same.

5.6.10 The necessary coordination, liaison and arrangements for inspection and approval shall be the contractor's responsibility. Inspection and acceptance of the work by authority shall not relieve the contractor from any of these responsibilities under this contract. The contractor shall plan the execution of work in such a manner so that all the registered customers are attended in phased manner. However, it is the contractor's responsibility to fix a firm appointment with the consumer for carrying out the work.

5.6.11 A log book/job card for such appointments with Consumer/any other agencies shall be maintained and the schedule/appointment once taken shall be adhered to by the contractor. TPIA/EIC shall review the records every week. The contractor shall submit the detailed list of RFC/Conversions and balance work on Registrations at least once a week as per approved format.

5.6.12 The contractor is also required to obtain a "Labour License" from the Assistant Labour Commissioner of respective Administration/Central Govt and others if any.

5.6.13 It will be the contractor's responsibility to familiarise himself and comply with, any other local rules, regulations or statutory requirements applicable to the work.

5.6.14 The contractor has to take responsibility of the actions of supervisors, plumbers and helpers provided by him.

5.7 REFERENCE SPECIFICATION, CODES AND STANDARDS

5.7.1 The contractor shall carry out the work in accordance with the requirement of latest relevant applicable standards, Tender specifications, Owner's Engineering Standards; relevant Oil Indian Safety Directorate (OISD) norms, PNGRB Regulations (T4S) for CGD, ASME B31.8-Gas Transmission and Distribution Piping Systems.

5.7.2 If the contractor finds any discrepancy, ambiguity or conflict in between any of the Standards and the contract documents, then this should be promptly referred to the EIC for his decision, which shall be considered binding on the contractor.

5.8 RIGHT-OF-USE SURVEY AND MARKING

5.8.1 The route of the pipeline to be installed shall be decided with consent of the consumer and Site Engineer/EIC. Contractor must ensure that the plumbers/workers/supervisors/ working at site shall have proper identity cards prior to entering the premises of the consumer.

5.8.2 No temporary or permanent deposit of any kind of material resulting from the work shall be permitted in the approach or any other position, which might hinder the passage and/ or natural water drainage, or any area where there is objection from consumer.

5.8.3 The contractor shall obtain necessary permissions from land Owners and tenants and shall be responsible for all damages caused by the construction and use of such approaches, pavements, gardens, rooms, walls, roof etc., at no extra cost to Owner.

5.8.4 Owner/TPIA and the contractor at each premises or housing colony to be supplied with PNG will conduct a joint survey. The survey record will note Customer details, the potential gas supply points and proposed meter positions and estimates of material quantities. The contractor's representatives will make as sketch of the agreed pipe routes.

5.8.5 The contractor will be responsible for contacting the Customer and making the necessary arrangements for access and appointments to carry out the work. Owner will not be responsible for any time lost due to failed appointments or disputes with Customer.

5.8.6 The contractor shall confine its operations within limits of the Right in use. The contractor shall restore any damage to property or utility.

5.8.7 The contractor shall also carry out all necessary preparatory work if needed to permit the passage of men and equipment. Lights, Curbs, signs shall be provided wherever and/or required by the Owner necessary for safety of public.

For Route Selection for GI pipe installation by the contractor as well as Owner's engineer following shall be considered:

A. FOR WORKING AT HEIGHT (FOR STEEL/ G.I. RISER INSTALLATION)

- Work shall be carried out as per GGL **Guideline for working at height (HSE-G-07)**
- The work to be carried out at height (generally 6 Ft above ground level) any location is evaluated for potential injury due to fall of a person or fall of object from height and compliance requirements are identified as applicable.
- Prior to start of the job at height, joint site visit is carried out with Owner's representative for following purpose:
  - Carry out Site Specific Risk assessment (SSRA)

- Select the G.I Riser installation site for safe execution, identify control measures considering site condition
- Ensure safe distance from G.I Riser to nearby overhead HT electrical cables. In case, safe distance is not maintained, Riser installation work shall not be executed and intimation to Owner's representative in writing.

- Obtain Permit to Work (PTW) prior to execution
- Use Inspected, Tested & Certified "Fit for Use" Rope access system (PETZL equipment)
- Ensure availability of permanent fixed structure for perfect anchoring of fall arrest harness at top of the building
- Ensure deployment of medically fit, competent & authorised plumber team at site Level 1 WAH certified by OEM
- Ensure presence of presence of level 2 certified rescuer with rescue set in presence of level 3 certified supervisor.
- Ensure proper cordoning of working area, control unauthorized access and keep personnel & public clear of the working area using warning signs and barriers.

B. FOR LATERAL INSTALLATION/ CUSTOMER PREMISE (G I PIPE)

- Pipe shall not be installed on un-plastered wall or in the house under construction or in an unventilated void space.
- Route shall be selected so that maximum length of the pipeline shall be installed outside and of the shortest possible length.
- It shall be with minimum change of directions and minimum no of threaded joints.
- It shall have maximum two Points in the single kitchen for gas stove only.
- Compound gate or doors and windows inside the house shall not hit the Gas pipeline, if no alternative route found, installs proper pipe protection guard.
- G.I. pipe installation should be a minimum 300mm away from heat source and Electrical installations. If it is not possible for G.I. installation, then suitable protection should be given.

  If the G.I. pipe installation is carried out inside cupboards, there should be a provision for adequate ventilation like louvers/holes in cupboard doors and also avoid threaded joints inside.

POSITIONING OF VALVES, REGULATOR & METER

RISER ISOLATION VALVE:

- For apartments, one riser isolation valve shall be provided at a height of 2 meter from the ground level.
- Customer wise individual main isolation valve shall be installed.

METER REGULATOR:

- Regulator shall be installed in such a way that it reduces the length of H.P. Line (Max. pressure 0.1 Bar) to minimum possible.

- Wherever possible meter Regulator shall always be installed outside residence and at a convenient height.

GAS METER:

- It is advisable to install Gas Meter in such a way that it shall be protected from direct rain or waterfall on the meter. Location of the Gas meter shall be decided during the route selection.
- Meter shall be installed at convenient height so that it is easy for the meter reader to take correct readings.
- The meter shall never be positioned very near to Electric Line/installation. A minimum distance of 300 mm shall be maintained.
- Brass Meter adaptor and Brass regulator connector shall be used as per approved GGL specification and drawing.

APPLIANCE VALVE (GAS TAP):

- The position of the appliance valve shall be convenient to operate and it shall keep the rubber tube at a safe distance from the heat source.
- The orientation and distance from cooking platform/ground shall be maintained in such a way that the Bending Radius of the Rubber Tube shall be more than 100mm.
- Appliance valve shall be installed in ventilated space and the lever of appliance valve shall not foul with the wall during the on-off operation.

GI PIPE CUTTING & THREADING

- After site and route clearance, the measurements for pipe cutting shall be taken and pipes shall be cut accurately as per the required lengths.
- If the length of pipes is not correct, the threaded joints come under heavy stresses, which may ultimately cause gas leakage.
- The Pipe ends to be threaded must be cut at right angle by using proper pipe cutters.
- Installed piping threaded connections/ joints shall be tightened in such a way that all the joints shall be free from heavy stresses and misalignments due to incorrect pipe length.
- The condition of thread die and pipe vice jaws shall be checked regularly and shall be free from defects.
- BSP taper thread dies to be used for threading and shall be checked with “GO” and “NOGO” gauge.
- Cutting fluids (oils) shall be used while thread cutting.
- Threaded pipes shall be handled carefully so that the threaded oily portion shall be free from dust, mud, water and any damage due to impact of any object.
- Cutting burrs on the pipe shall be removed from the edges. The edges shall be straight and free from Knife-edge formation.
- Cutting chips and other waste shall be collected and disposed-off as per GGL IMS guidelines.

STEEL/ G.I. PIPE RISER & DOMESTIC INSTALLATION

- Working at height should be avoided if weather conditions could endanger health and safety of personnel.

- Ensure that risks from falling objects (Drill machine, spanners, screw drivers, clamps etc.,) are properly controlled.
- Teflon tapes shall be wrapped on threaded portion of the pipe with minimum three overlaps. The Teflon tap should be of approved make.
- The no of clamps shall be adequate. The pipeline portion containing the Regulator and Meter, either horizontal or vertical, shall have clamps on both side of the regulator and meter. Clamps shall be fitted in such a way that they do not create misalignment of pipes.
- The clamp shall be installed by drilling 6 mm hole in plastered wall and screwed using rowel plug.
- Distance between two clamps shall not be more than 1.0 meter.
- Clamps shall be installed in a straight line and shall be parallel to each other.
- The clamps shall be fixed properly on the walls and should grip pipe in position.
- For wall crossing, drill the hole with the help of electrical drilling machine in such a way that plaster and tiles shall not be damaged. It shall be ensured that there is no concealed wiring or any other fitting on the opposite side of the wall for a particular location of drilling
  - Self-adhesive anti-corrosive tape shall be wrapped on the pipe with 50% overlap.
  - Casing sleeve shall be installed in wall for wall crossing.
- Alignment of the pipeline shall be maintained.
- Wherever compound gate, house door or window may hit the G.I. pipe, protection clamp shall be installed to protect the pipe.
- Concealed piping shall not be done.
- All the pipes shall run on walls with clamps. Pipe should not be overhung and shall not be installed without pipe clamp.
- Wherever powder coating is peeled off during fitting and tightening of the pipe, touch up shall be done after the installation is completed by two coats of approved paint.
- Prior to installation all pipes and fittings shall be checked internally to ensure that they are free from any obstruction.
- PE to GI (transition fitting) threaded joint shall be provided above ground.
- PE pipe length should be 1.5 Meters in transition fitting.
- For idle point/future point only Hollow Hex. Plug to be used. **NO GI/RUBBER CAP TO BE ALLOWED.**

FIXING OF HOLLOW HEX PLUG (HHP)

- In the case when customer paid for extra connection and GGL included in job order for future provision of additional points for Burner in kitchen or for Geyser for water heating purpose, then coupling and GI Hollow hex plug shall be installed to prevent probable leakage which may happen through appliance valve due to tempering or mishandling of appliance valve.
- All future installations/ idle points shall be connected with coupling and HHP only.
- Normal Hex plug shall not be used for future installations/ idle points. It shall be as per drawing given in tender.

- In case of builder ownership/ Customer having no appliance (burner) - Hollow hex plug need to be installed after doing MMT of whole connection.

INSTALLATION OF GEYSER CONNECTION IN BATHROOM

- Install water heater (Geyser) and appliance valve outside bathroom in fully ventilated space like terrace/ balcony/ passageways/ Open veranda with adequately protected from the weather
- Ensure all geyser points is outside the bathroom & capped with GI plug/ cap if geyser is not available during commissioning of connection

INSTALLATION OF VALVES, REGULATOR & METER

- Installation of domestic meters with associated inlet and outlet connections (GI/Brass fittings), on the wall in new & existing gas charged areas.
- The contractor shall supply angle brackets. A sketch of the brackets is referred from the enclosed drawing for reference. It is required that one sample of each type of bracket is approved before the work is started.
- Firmly secure the meters on the wall with good quality roul Plugs, screws etc. In case the roul Plugs are not holding then wooden blocks or other fixing arrangements like cement etc. to be used for proper grouting.
- The Meter installation will be preferred in open/ventilated space so as to prevent Gas accumulation and easy dispensation of gas to atmosphere in case of any smell/leakage of gas. The Meter installations will not be provided in any fixed enclosures, cabinets (below or above the slab) or confined space in the customer premises.
- The contractor shall ensure that GI installations and rubber hoses shall not be exposed to direct heat of Gas burners. The installation should have minimum clearance of about 1 meter from electric point mains & switches. Minimum distance between Appliance Valve & Gas Burners shall be 0.3 Meters. The isolation valves shall be installed after entering the customer premises/kitchen but before the meter installation.

The following shall be taken care during installation of Valves, Regulator & Meter

- Meter control valves, Meter regulator and Gas meter shall be protected from the over tightening of the thread.
- Valves, Meter regulator and Gas meter shall be installed with the clamps on both sides. As far as possible hex nipple shall not be used for connecting. Both side threaded 3” to 8” long pipe nipple shall be used.
- Gas meter, regulator and installed piping shall be aligned properly.
- Flow direction of the gas meter shall be checked before installation.
- Flat rubber washer shall be checked and ensure at inlet and out let of the adaptor joint to the meter.
- Pipe nipple shall be installed between elbow and regulator to avoid direct load of line or riser on regulator and a clamp must be provided on the pipe nipple.
- The above activities along with restoration of the area to original shall be carried out to the complete satisfaction of consumer and EIC.

GROUND CONNECTION

- **It shall be done as per PE installation PTS**
- Pretested Certified 20mm PE pipe shall be used.
- RCC guard should be provided where A/G & U/G piping join each other.
- Cementing shall be done on both side of RCC guard
- Sand filling shall be done in RCC guard

CONVERSION OF BURNER

- All the appliance valve and riser isolation valve shall be kept in closed position.
- Ensure that meter and regulator adaptor shall be leak proof.
- Open the burner knob and remove the plug from the hot plate.
- Clean the simmer hole and Make the simmer hole of 0.6 mm with the help of simmer drill.
- At the time of drilling the hole, ensure that it should not be inclined and Remove the dust from plug. After greasing, plug and knob should be properly positioned at their original position.
- Remove the burner from hot plate and clean it. Open the existing jet (LPG) and replace it with suitable jet for sufficient flame and complete combustion of NG.
- Place the burner on its original position and connect the nozzle with appliance valve using new flexible and braided SURAKSHA rubber hose.
- The length of rubber hose shall not exceed 1.0 Meter.
- Both the ends of the rubber hose shall be clamped by metallic clamps on the nozzle.
- Check all the joints with soap solution and ensure that the flame colour should be blue.

ONLINE TAPPING FROM RISER/ HORIZONTAL COMMON HEADER GI PIPELINE

Following Guideline shall be followed during on line tapping from commissioned GI Riser or Horizontal Common header.

- Hot Work permit shall be issued by GGL, as per PTW matrix. It shall be ensured that all required tools and tackles and consumables are available at site.
- It shall be intimated to all affected customers prior to isolation of Riser supply and isolate their main isolation valve.
- It shall be ensured to Closed/ complete isolation of main control valve and proper tagging shall be done for closing.
- Keep one person near Main isolation valve to ensure no one will operate the valve during on line tapping work.
- Proper PPE shall be used for on-line tapping.
- End plug from where taping shall be done to be removed slowly till complete venting of Natural Gas from Riser pipe line.
- After complete venting of Natural Gas from Riser pipeline, check with soap solution to ensure no passing of Natural Gas from Main isolation valve.

- Ensure complete fitting of GI pipe up to individual main isolation valve. If further GI installation up to meter and appliance valve is not planned on same day, then fix hollow hex plug. Ensure no leakage/valve passing before starting balance work of the connection.
- Open main isolation valve and carry out leak check with soap solution of newly fitted GI pipeline.
- After ensuring no leakage, open individual main isolation valve and ensure proper gas supply to the customers and ensure no open end is left before leaving the site.

5.9 PROTECTION OF STRUCTURES AND UTILITIES

The contractor shall at his own cost, support and protect all buildings, walls, fences or other structures and all utilities and property which may, unless so protected, be damaged as a result of the execution of the works. He shall also comply with the requirements in the specification relating to protective measures applicable to particular operations or kind of work.

While colour touch up, contractor must take care of the consumer premises while carrying out the job such as spillage on floor, walls, ceilings, such shades etc. If the same does occur, the contractor has to immediately make things to original.

5.10 GI INSTALLATION

The GI service pipe installation work includes all work necessary to connect from the PE/GI transition fitting on the down-stream of the PE service line, to the Customers appliance, including the installation of regulator, valves, fittings, meters, clamps etc. The contractor shall be required to provide all equipment, tools and materials necessary to execute the work in an efficient and effective manner. Along with ladders, scaffolding pipe, BSPT dies, tripods, vices, fittings and Teflon tape, drills for concrete and other masonry, drills for timber, Granite, Marble Stones and laminated surfaces inside Customers property, bending tools, clamps, sleeves to facilitate the pipe passing through floors and walls, paint for marking etc.

All GI risers at the outside of buildings shall be fully supported to carry the weight of piping. The riser shall be installed in a vertical line form its point of support to its highest point with a minimum of changes in direction. The threading of GI pipe shall be BSPT for installation of riser or working at height, only PETZL made safety harness shall be used with a prior work permit duly issued by Owners representative as per guidelines of GGL.

Contractor has to supply different types/sizes of powder coated clamps (Mild Steel) for fixing GI pipes as per the enclosed drawing and specifications in this document. The contractor shall get approval from EIC for every fresh lot of the clamps, and other consumables, prior to start of installation. The detailed cross sectional of Powder coated GI Pipe Clamps are as per tender Drawings.

All riser and lateral pipe shall be clamped to the building at intervals not exceeding 1.0 Meter Maximum distance between clamps shall be 1.0 Meter when pipe goes to the straight, if any tee or fittings lies in between the pipe then clamp shall be placed 150 mm far away from centre line of fittings at every sides. The joints/ fittings of the GI installation shall be painted only after carrying out testing of the installation.

Pipe shall be entered into building above ground and remain in a ventilated location. The location for entry shall be such that it can be easily routed to the usage points by the shortest practicable route.

PNG JOB CARD

PNG Job card as per approved format of Owner or Owner representation shall be prepared duly signed by Contractor, Customer & Third Party Inspector and to be submitted to GGL immediately on completion of conversion.

For Ground connections 03 references of tapping from network shall be taken as per standard template provide by GGL

Soft copy of Installation drawing shall be provided by contractor in standard template provided by GGL

5.11 TESTING OF GI INSTALLATION

5.11.1 Before carrying out the pneumatic test of the GI installation; testing assembly, air foot pump with pressure gauge/ manometer shall be checked its calibration and proper functioning.

5.11.2 Before pneumatic testing of the installed connection spacing between two clamps, tightening of the clamps thread joints, alignments of the whole piping shall be checked. Valve shall be kept in open position and the appliance valve shall be kept in close position.

5.11.3 Ensure Meter and Regulator is not installed during PPT. Proper Meter spool piece shall be installed during PPT (No flexible hose to be allowed).

5.11.4 Ensure during the testing, air should reach up to the appliance valve. After completion of testing, pressurized air shall be released from appliance valve only.

5.11.5 Calibrated pressure gauge shall be used having the range up to 1.5 times of test pressure and least count of gauge should be 0.1 Kg/cm2

5.11.6 Position of the pointer of the pressure gauge shall not be marked with the marker pen on the glass. It should be recorded in the test recorded during Pneumatic testing of GI Installation.

5.11.7 After pressurization of the whole piping section shall be checked for the leakage with the help of soap solution.

5.11.8 The testing of GI riser pipes up to regulator shall be done with the isolation valve in open condition and open end plugged.

5.11.9 The GI pipe shall be painted with one coat prior to installation in riser, however the ends/joints shall be painted only after carrying out testing of the installation.

5.11.10 Type of testing, test pressure and test duration as per the below:

Sr. No.	Type of Testing	Test Pressure	Test Duration
1	Pipe Pneumatic Test (PPT)	3.5 Kg/Cm2	30 Minutes
2	Manometer Test (MMT)	Gas Pressure	15 Minutes
3	Riser PPT	3.5 Kg/Cm2	1.0 Hrs.

5.11.11 The contractor shall supply the Calibrated Pressure Gauges/ Manometer/ Diaphragm Gauges of suitable range for testing of GI Installations. The calibration certificate shall be submitted before the start of the execution work.

5.11.12 The pressure gauges shall be calibrated from time-to-time as desired by EIC but positively once in every One Year

5.11.13 The details of testing shall be properly recorded in the GI cards.

5.12 INSPECTION

Contractor shall have to ensure the manufacturer/ vendor monogram on accepted GI fittings during receipt of materials.

The contractor to the entire satisfaction of EIC before proceeding further shall rectify any defect noticed during the various stages of inspection. Irrespective of the inspection, repair and approval at intermediate stages of work, contractor shall be responsible for rectification/ replacement of defective materials found during final inspection/guarantee period/defect liability period as defined in general condition of contract.

5.13 PURGING & COMMISSIONING

The rate for purging & commissioning shall be included in the GI installations.

Contractor shall ensure that the outlet is so located that vent gas cannot drift into buildings.

Contractor shall perform the commissioning of the GI installation as follows:

- Ensure the method of purging is such that no pockets of air are left in any part of the Customer's piping.
- Ensure that all appliance connections are gas tight, all appliance gas valves are turned off and there are no open ends.
- Where possible, select an appliance with an open burner to commence the purge i.e., a hotplate burner.
- Ensure the area is well ventilated, and free from ignition sources.
- Ensure branches that do not have any appliance connected are fitted with a plug or cap.
- Turn on one burner control valve until the presence of gas is detected. A change in the audible tone and smell is a good indication that gas is at the burner. Let the gas flow for a few seconds longer, then turn off and allow sufficient time for any accumulated gas to disperse.
- Turn on one gas control valve again and keep a continuous flame at the burner until the gas is light and the flame is stable.
- Continue to purge until gas is available at other appliances.

5.14 CONVERSION OF DOMESTIC APPLIANCES

Contractor shall perform the conversion of Domestic Appliance as follows.

- The changing of nozzles and associated controls in accordance with manufactures instructions for both domestic and imported burners/ovens/grills/hotplate.
- The changing of old appliance connection Reinforced rubber hoses and nozzles and re-greasing taps as necessary.
- The contractor shall supply and fix the Reinforced rubber hoses with clamp at both sides at the time of conversions.
- The contractor has to supply all types of nozzles/jets required for Indian made burners.

- Cleaning and performing minor maintenance of appliances.
- Testing for gas escapes, soundness and performance of appliances.
- Instructing the Customer for safe use of natural gas and for fixing of safety and conversion labels.
- Contractor must attend the complaints regarding appliances, leakage, fire etc. till the total area is handed over to Owner's operation and maintenance.
- All consumables (Nozzles, greases etc.) are in contractor's scope.
- Changing or repairing of any items damaged during conversion.

5.15 RESTORATION

5.15.1 Contractor has to restore the area wherever he has carried out drilling, clamping etc. to its original condition to the satisfaction of the consumer and to ensure no passage to the premises and seepage.

5.15.2 Wherever any items of the consumer are damaged/broken during working, the same will be rectified or replaced to the total satisfaction of the consumer.

5.15.3 The contractor will be responsible for the maintenance of all restoration carried out, for the duration of the contract guarantee period.

5.15.4 The contractor is to ensure the restoration work is properly supervised, and that the material used is suitable for the purpose. Wherever the required standards are not achieved the contractor will be required to replace the defective reinstatement work.

5.16 SUBMISSION OF FINAL RECORDS

Contractor shall submit three sets of Job card duly singed by TPIA, Customer and EIC in hard & soft copy.

Contractor shall submit soft copy of Installation drawing with 3 reference of Ground connection (tapping from network) in standard template provided by GGL

5.17 DOCUMENTS OF PRECEDENCE

Where any portion of the GTS is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of GTS of contract. If there is no variance or repugnance between GTS and PTS both clauses shall be applicable.

5.18 RECONCILIATION OF OWNER SUPPLIED MATERIAL (ALL FREE ISSUE MATERIAL)

5.18.1.1 The Contractor is responsible for completing the "Material Used statement" for job completed. This record will be used for the reconciliation of material at the end of the job/ contract/ as directed by Owner.

5.18.1.2 It is mandatory that the contractor is required to undertake and submit inventory details of free issue and purchased materials on monthly basis to Owner/ Owner's representative as per the approved format of the owner along with RA bill. The inventory details shall be in correlation with the Daily progress and material reconciliation sheet.

5.18.1.3 After the final reconciliation is carried out as per time lines directed by Owner, the variances in materials issued against materials used and returned, will be assessed. All unused, scrap materials and salvageable materials shall be the property of the Owner and shall be returned by the Contractor category-wise at his cost to the Owner's designated store yard (s). In case the Contractor fails to do so or exceeds the limits of allowances specified below for scrap materials,

then recovery for such quantities not returned as well as returned in excess of permitted limit by the Contractor will be done at the penal rate i.e. 120 (One Hundred Twenty) % of landed cost and shall be effected from the Contractor's bill (s) or from any other dues of the Contractor to the Owner. Contractor shall be responsible for the adjustment and measurement of the surplus/ scrap materials to be returned to the store. Contractor shall also be responsible for suitable segregation of returned materials into separate stacks of unused, serviceable and scrap materials. Wherever certain material is covered under Contractor's scope of supply whether part or in full for any item of work covered under SOR, no allowance towards wastage/ scrap etc. shall be accounted for during execution stage.

Sr. No	Item	Scrap Allowance
1	PE Pipes	0.5% (Less than 2 Meter Length) of total length of the respective size commissioned.
2	Equipments which unit of measurement is in number inclusive but not limited to PE Ball valves, Service regulator module, Gas meter, Regulator, Isolation & Appliance valves, Steel Reinforced Rubber Hose	0%

5.18.2 Material consumption will be recorded on location basis. Material issued from the GGL stores shall be consumed, recorded and returned using the same GGL item code.

5.18.3 Any payments due to the Contractor may be withheld to cover these charges.

5.18.4 All materials, part lengths of pipe and other partly used items are the property of GGL and must be returned to the stores with the appropriate documentation so that they can be considered as part of the material reconciliation.

6.0 HSE (HEALTH, SAFETY AND ENVIRONMENTAL)

Following System in terms of HSE (Health, Safety and Environmental) Shall be followed & complied by Contractors.

6.1 HEALTH, SAFETY AND ENVIRONMENTAL ASPECTS (HSE)

6.1.1 Scope/ General Specific to the Bidder

6.1.1.1 This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied with by the BIDDER throughout the tenure of the contract by stipulating the relevant Act(s)/ legislations and technical specifications.

6.1.1.2 The safety policy and guideline is prepared to direct & appraise BIDDER's personnel about the safety aspects involve in the job. The document deals with basic rules to be followed therein. However, BIDDER shall comply the HSE plan that addresses the HSE risks specific through mobilization, execution and demobilization at each location, where the work to be performed (Office, Factory, Fabrication Yard, Construction Site, inside the House, Kitchen (customer premises), Vessel, etc.), and the management of controls to eliminate/ reduce or mitigate these risks.

6.1.1.3 OWNER reserves the right at all the time to audit and review the BIDDER's facilities, services, and/ or performance of its activities in respect to the compliance of his HSE plan.

6.1.1.4 OWNER reserves the right to suspend the work or any part thereof, if BIDDER does not comply with HSE policy. Before any work is suspended OWNER shall liaise with BIDDER to allow him the opportunity to rectify any non-conformances within an acceptable timescale. BIDDER may at any

time suspend the work for HSE reasons; in such event, however, he shall immediately inform OWNER in writing of those reasons, and details of actions taken.

6.1.2 Leadership & Accountability

a. It is OWNER's policy to protect the health, safety and security of its employees, to minimize the risk to the public from them and to protect the natural environment. BIDDER shall ensure that all his employees are briefed in, understood and strictly adhere to the OWNER's policies and directives on Health, Safety and Environmental aspects.

b. BIDDER shall demonstrate leadership and commitment through actively participating in all aspects of HSE, supporting open dialogue and by allocating sufficient resources.

c. BIDDER shall ensure that HSE responsibilities, authorities, accountabilities and competencies are clearly defined, documented, communicated and exercised at all levels.

d. BIDDER shall ensure that individual and team contributions to HSE performance are recognized and considered during performance appraisals. Also, shall set clear goals, objectives and targets and performance are evaluated against them.

6.1.3 Organization, Responsibilities, Resources and Documentation

a. Organization

BIDDER shall provide sufficient and appropriate manpower and supervision in his organization; with clear responsibilities and reporting structure to ensure that HSE performance is not compromised.

b. Employee Orientation Program

- BIDDER shall provide, for all his personnel involved in the work, an orientation training program to the site and all requirements of the HSE plan.
- BIDDER shall ensure that no individual works unless he has been fully inducted.

c. HSE Competence Requirements

BIDDER shall ensure that his personnel are;

- Medically, physically and mentally fit to carry out the duties to which they are assigned in respect of the work for all hazardous jobs as informed by GGL. Medical fitness test shall be done by contractor of his workforce & reports shall be submitted to GGL HSE team.
- Aged eighteen years or above.
- Technically competent and experienced in the tasks assigned to them.

d. HSE Training

BIDDER shall be responsible for, and implement, competency based HSE training of his personnel as may be organized/ advised from time to time. Training if not given by contractor shall be done by GGL and actual amount of training cost will be deducted from his bills.

e. HSE Promotion and Awareness

BIDDER shall establish a mechanism for communication and feedback of HSE issues and performance among his personnel on the site and to OWNER's representatives.

f. HSE Communication

- BIDDER, where applicable, ensure before commencing operations pursuant to the contract that all companies, organizations and communities that could potentially be affected by such operations have been notified. At the work site, BIDDER shall also ensure that effective toolbox talks are undertaken.
- Where applicable, BIDDER's arrangement for emergency communications shall be integrated with the requirements of the work.

g. HSE Meetings Program

BIDDER shall establish an effective structure and schedule for HSE meetings involving all personnel assigned to the work, to promote communication and involvement in HSE matters. Contractor shall be responsible to attend all HSE meeting s without fail.

h. HSE Legislation

BIDDER shall comply with, and shall be able to demonstrate compliance with;

- Relevant and applicable Health, Safety, Environmental legislation for all places, where work is performed,
- OWNER's Policy, Procedures and Standards,
- BIDDER's corporate and project specific policies and procedures.
- Contractor shall abide by the statutory & legal compliance matrix which shall be handed over to him during the execution of the job by GGL HSE Team/ Owner's Representative.

6.1.4 Evaluation & Risk Management

a. BIDDER shall ensure that, for all activities, a documented risk assessment procedure and risk register is in place and operating. This risk assessment procedure shall be suitable and sufficient to appropriately assess the health, safety and environmental risks involved. A copy shall be issued to the OWNER.

b. BIDDER shall be responsible for ensuring timely delivery of the risk assessment of all activities, covered in the scope of work, in order to meet the work schedule, the OWNER HSE plan and regulatory requirements.

6.1.5 Planning & Procedures

a. HSE Procedures

- BIDDER shall provide written HSE procedures to cover hazardous operations. Method statements in case of major erection, construction and O&M work to be prepared in advance and approval obtained from the Owner or Owner Representative. These will be available to all personnel in their working language. A copy shall be provided to the OWNER.
- BIDDER shall abide by the OWNER permit to work system at sites.
- As GGL would be getting certified for ISO 14001 & OHSAS Standard, contractor shall be liable/ responsible to abide by its requirement

b. Emergency Response Procedures

- BIDDER shall be responsible for the establishment and implementation of emergency procedures related to the work. BIDDER shall consult with OWNER to ensure appropriate interface with the procedures.
- BIDDER shall submit OWNER, within 30 days from the date of commencement of contract, the details of its provisions and procedures for proposed actions in the event of;
  - An incident involving serious injury or death to any member of the team.
  - A major incident involving third party equipment.
  - Any release of chemicals or hydrocarbons to the local environment.
- BIDDER shall ensure competency of his personnel in its emergency response procedures through a programme of drills and testing and shall submit the report to OWNER.
- BIDDER shall participate in an emergency response exercise, whenever required.

c. Equipment & Inspection

OWNER shall at any time during the tenure of the contract conduct the audit for all the tools, appliances, machines, vehicles, equipments, etc for their safe working condition includes documents. Also, BIDDER shall ensure that they should be used only by authorized and competent persons and inspected periodically.

Prior start of job, Contractor shall offer his equipment/ tool/ tackles for inspection to GGL HSE Team.

d. Environment

- BIDDER shall protect environmental resources by applying best available techniques not entailing excessive cost, to preferably eliminate or minimize any direct or indirect impact from operations.
- BIDDER shall ensure that all activities are planned in a manner that will not create unnecessary danger, disturbance or effects on the environment or to other users.
- BIDDER shall minimize nuisance, disturbance or interference to the community, their activities, and other users of the environment.
- BIDDER shall unless otherwise directed by OWNER, avoid conducting activities in protected areas or where there is an unacceptable risk of damage to sensitive environmental resources.
- BIDDER shall ensure that fishing, hunting and gathering of flora and fauna or any other environmental resources are strictly prohibited within the area impacted by the work.
- BIDDER shall where applicable be responsible for restoration of any land used or affected by BIDDER's activities under the Contract (Restoration of top soil in case of major excavation jobs is a must). This will include removal of BIDDER's equipment, surplus materials and waste to the satisfaction of OWNER's representative.
- BIDDER shall coordinate & carry out the disposal of any waste (Hazardous or otherwise) produced or occurring as a consequence of its operations pursuant to the contract, all such disposals shall be in accordance with all legislation, OWNER's norms and best practices, whether that shall be for hazardous waste or non-hazardous waste. BIDDER shall ensure that all necessary approvals or licenses are obtained and that any subcontractors utilized for this purpose fully

comply with such requirements. BIDDER shall record & provide OWNER with a copy of each waste transfer/ disposal report/ note.

- For meeting the environmental requirements as per ISO 14000, BIDDER have to collect all Hazardous waste like cut PE pieces, PE pipe plastic packing material, PE fittings packing plastic bags, GI Pipe thread cutting burrs and submit it to GGL stores and record the quantity received.
- BIDDER shall prepare & notify OWNER in writing of the method for managing disposal of all hazardous waste and gain approval therefore before commencing such disposal. The water de-watered from the valve pits shall not be discharged hitherto and thitherto. Used transformer oil shall be collected in a container and submitted to OWNER's stores.
- Vehicles used for transportation of materials/ manpower have to be PUC certified.

6.1.6 Implementation & Performance Monitoring

a. General

- BIDDER shall establish an HSE performance monitoring programme and provide reports as per MIS to OWNER. Contractor shall submit monthly report as per GGL guide line
- BIDDER shall report all incidents in accordance with the requirements.
- BIDDER shall provide a report of fatal accident, Lost Time Injuries (LTI), Restricted Work Day Cases (RWDC), Medical Treatment Cases (MTC), Medical Evacuations, First Aid Cases (FAC), Near Miss Reports and Frequency of Hazardous Occurrence (numbers of hazardous situations without details) for the entire work, if required by OWNER from time to time.
- We shall, where applicable, maintain a waste/ disposal log book.

b. Incident Investigation

- BIDDER should report all incident or near miss etc. to GGL at site.
- BIDDER shall interface with OWNER's Incident Investigation and Reporting requirements.
- BIDDER shall document and report immediately to OWNER for any incidents or event, which could have led to environmental damage, uncontrolled release or hydrocarbons, breaches or potential breaches of environmental regulations or complaint from local groups, organizations including enforcement agencies or individuals.

6.1.7 Auditing & Review

a. BIDDER shall establish a schedule for HSE audit/ inspection for its activities & submit to OWNER.

b. BIDDER shall provide all input and support as OWNER deems necessary to ensure all HSE activities that OWNER's initiates are successfully carried out and the actions arising are closed out to OWNER's satisfaction. OWNER's personnel shall be available for interview as part of audits and reviews.

c. Before commencement of the work, OWNER may conduct an audit to satisfy itself of BIDDER's arrangements regarding Health, Safety and environmental aspects. BIDDER shall co-operate fully with the audit team and rectify/ correct any agreed deficiency observed without undue delay and in any event before work commences.

d. BIDDER shall submit/ provide a report on HSE performance during the contract, as part of the contract close-out documentation.

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6.2 Instructions/ Guidelines

Following recommended safe practices/ instructions should be observed when performing operations and maintenance activities;

6.2.1 Work Permit/ Cold Permit (GGL permit to work & Minimum supervision Guide line)

Prior to starting the work, BIDDER must have a valid work permit issued by authorization entity of GGL;

- Either in the form of an order or work assignment supplemented by written work permits of the OWNER for operations in natural gas stations/site.
- Or in the form of an order or work assignment for work at or in the vicinity of existing installations and pressurised pipelines, which are not located in natural gas stations.
- OWNER's work permit must be issued/ obtained for a well-defined working area and to be requested prior to commencing the work. All special instructions stipulated in the permits must be strictly observed.
- Contractor shall submit list of competent persons who shall be responsible to receive the permits.

Carrying out work without a valid work permit or outside the working area as described in the permit will be considered as a serious breach of the safety rules.

6.2.2 Hot Permit

Prior to starting work with a naked flame, BIDDER must ensure, if/ Hot work permit in areas, where the risks of fire and explosion cannot be ruled out/ likely hood or having severe consequences;

a. Either in the form of a written permit issued by the OWNER for work with a naked flame in operational natural gas stations/ sites.

b. Or in the form of continuous supervision by OWNER's representative for work with a naked flame at or in the vicinity of an underground pressurised gas pipeline/ station.

c. Prior to obtaining a fire permit, BIDDER must have at least a valid work permit.

d. Work with a naked flame is defined as,

- All welding, grinding and cutting work by electrical or thermal means. All work with burners for, among other things, cladding or pre-heating of welds.
- All work with electrical hand tools which are not explosion-proof.
- In general, all work whereby a naked flame or a spark may be created.
- All machines or vehicles with an internal combustion engine.
- OWNER's fire work permits are issued for a clearly defined working area and must be requested and renewed daily. All particular instructions stipulated in the permit must be strictly followed.
- The issuance of a fire work permit does not preclude the need for a ban on smoking.
- Performance of work with a naked flame without a valid fire permit or outside the working area as described in the permit will be considered as a serious breach of the safety rules.

- BIDDER must in all cases install essential and suitable fire-fighting equipment in the immediate vicinity of the works, when work with a naked flame is being carried out.

6.2.3 Ban On Alcohol and Drugs

Employees must not bring on to site or consume any liquid substance containing narcotics substances or alcohol beverages between the hours of starting and finishing work and must not drive a company vehicle, if affected by alcohol or drugs. A total ban on alcoholic beverages and drugs applies on all sites belonging to OWNER. Non-observance of the ban on alcohol & drugs shall be considered as serious breach of safety rules and will result in the immediate expulsion of the person enlisted from their job.

6.2.4 Ban On Smoking

Smoking is strictly prohibited at any of OWNER's facilities or vehicles. Smoking is also prohibited within a work site (i.e. within public warning signs), including the right of way. Specific site conditions and rules must be always observed and due recognition given to any gas leak. Non-observance of the ban on smoking at work site shall be considered as serious breach of safety rules.

6.2.5 Speed Limits for Vehicle On/ Near Worksite

As per applicable statutory/ Safety requirement.

6.2.6 Safety Torches

Only approved/ fire proof/ intrinsically safe torches shall be used for pipeline patrolling/ gas leakage survey/ any operation & maintenance related activities.

6.2.7 Two-Way Radios/ Wireless Phones

Two-way Radios should be left turned on during all normal operations. However, if there is a significant gas leak in the vicinity, the user shall remove the radio to a safe location.

Note: intrinsically safe walkie-talkies can be used within stations.

Mobile Phones shall not be used within the Stations or within the vicinity of a live gas operation.

6.2.8 Incidents/ Accidents

a. All accidents involving injury to a person or damage to property must be reported immediately to the OWNER's representative, within specified time limits/ norms.

b. Incidents involving an unusual occurrence, failure of a procedure or equipment must also be reported. Any apparent fault in a safety system or equipment must be reported even if the incident was not considered significant at that time.

6.2.9 Checking for Leaks

a. Checking for leaks may only be carried out visually, by use of a gas detector or with soapy water. Naked flames must never be used/ allowed to locate gas leaks. The natural gas in the transmission pipeline/ system does not contain odorant and can therefore not be detected by smell.

b. Before removing plugs, caps or blind flanges from vents, drains and other connections, etc., ensure all necessary valves are closed.

c. Care must be taken when removing plugs or caps from vents, drains and other connections, etc., in case there is a build-up of pressure behind it.

6.2.10 Precautions to be taken before gas venting (Contractor to follow GGL venting, purging & commissioning procedure for all GAS works)

a. Before venting of gas from a section, the isolation of the section should be confirmed and the all isolation valves involved should be greased and roused to prevent minor passing of the valve.

b. Ensure that no source of ignition like overhead live electrical cables, sparks, etc…are not present at least within 15 Meters. radius. Depressurising should be confirmed by opening another vent (if any) or pressure gauge, if fitted. No smoking or open flame should be ensured in vicinity of the nearby area.

c. The vent pipe should be of proper length (minimum 3 Meters.) for the protection to person operating valves in the chamber and for easy dissipation. Wind direction & velocity should be ensured & monitored continuously.

d. Venting area should be cordoned off and person with adequate PPE's (Methnometer/ Pulsecometer) should be posted at the cordoned boundary in down wind direction to monitor the percentage of methane in the atmosphere, which should not concentrate as per specified limit/ range or increase more than 2.0%. If indicates more than 2.0 % then venting should be stopped intermittently to give more time for gas dispersion.

e. Gas venting should be stopped intermittently when the vehicle passes near the spot, while venting operation is being done on traffic roads.

f. Whenever NG is required to be vented, the venting shall be done in a controlled manner as specified by the engineer in-charge to ensure minimal release of the gas to the atmosphere.

6.2.11 Human Failures

The major factors of human failures reasonable for an accident are the following;

a. NEGATIVE OR INDIFFERENT ATTITUDE: This is the neglect or carelessness by a person towards considering and eliminating all major and minor factors leading to an unsafe condition or unsafe act. The negative or different attitude of a person may be the result of overconfidence & lack of safety awareness.

b. LACK OF SKILL: If a person doing a job is not having the required skill for performing that job; it can be lead to an accident. Hence selecting the best skilled person for particular job is a must.

c. LACK OF KNOWLEDGE: the person doing a job is expected to have enough knowledge of the job and safe condition to be preserved while performing that job.

6.2.12 Bypassing Safety Equipment

No person shall interfere with, remove, displace or render ineffective any safeguard, safety device, personal protective equipment or any other appliance provided for health and safety purposes, except when necessary as part of an approved maintenance or repair procedure.

6.3 Protective Measures

Personnel performing any gas or health hazardous operation must wear Safety Helmets, Safety/ Gum Shoes, Approved Clothing, Protective Footwear and Safety Goggles, Safety Harness, Ear Protection, Nose Masks, Hand Gloves, Breathing Apparatus, High visibility vest or reflective bands on coverall, Safety Guard/ Belt/ Fall Arrester, Face Shield, Special Equipment for Hazardous/ Unusual

activity, etc…in adequate numbers & suitably. Personnel must observe the safety rules for on-site and off-site operations as well.

It is mandatory requirement for contractor to follow and compliance of the PPE matrix enclosed with this document.

6.3.1 Ignition Sources

Match boxes, cigarette lighters, calculators, cameras or other sparking devices must not be carried on for all facilities (refer Table - 1 given below);

TABLE – 1

SOURCES OF IGNITION

Sr. No.	Ignition Source	Precautions
1.	Internal combustion engines of buses, cars, tractors, digging and combustion equipment, portable pumps, generators, welding equipment, etc…	Only diesel powered internal combustion equipment to be used in the vicinity of an escape of gas and the following precautions are recommended; Fit a spark arrestor to the engine exhaust. Do not operate the engine starter in a gaseous atmosphere. **Generally, vehicles should not be taken near to an escape of gas.**
2.	Passing motorists or pedestrians carelessly throwing lighted matches boxes, cigars or cigarettes into the work area, and pedestrians smoking in the work area	Properly display warning signs and place barricades around the work area to prevent such an occurrence. If necessary divert traffic and/ or place a watchman to warn pedestrians against smoking in the area.
3.	Cigarettes, cigars, pipes, match, open fires	Do not allow smoking, match boxes, cigarette lighters and open fire, in the hazardous work area.
4.	Sparks from hand tools, removal of manhole covers, etc…	Work carefully, removing sources of such sparking (stone, paving blocks, etc...) from the work area as job progresses. Use proper tools when removing manhole covers. Use tools carefully to avoid glancing blows on minerals and concrete. Area to be dampened and maintained damp. Grinders and friction cutting tools shall not be used in the presence of live gas.

5.	Sparks from electrical switches, relays, telephones, electric motors, power generation, cameras, and calculators, mobile phones	In potentially explosive atmosphere, do not operate any electrical device. If a switch is on do not switch off, unless there is no other quick means of isolating a sparking device such as an electric motor.
6.	Stray electrical currents on main or service when damaged of cut ends of pipe are separated	Never cut or separate ends of pipe unless proper bonding is done with jumper leads across the point of separation.
7.	Static electricity	Where gas is escaping from a plastic pipe, wet down the plastic pipe and surrounding work area. Discharge static charge by grounding metal main on service pipe. Discharge the static charge on the person by touching an earlier state, or alternatively provide protection by wearing rubber gloves. Avoid impingement of gas stream on clothing.
8.	Traffic lighting control boxes, power cables, railway and telephone cables, etc…	Request appropriate authority to temporarily disconnect, or shut down, if these structures are causing a hazardous situation.
9.	Appliance pilot lights	Shut off service valves.
10.	Welding torches, arc welding, and heater torch	This equipment is not to be used until the area has been declared safe.
11.	Lighting, lanterns, flashing lights	Only suitable equipment should be used in a hazardous area.
12.	Other potential ignition sources inside structures, building, and confined areas	Request appropriate Authority to temporarily disconnect or shut down, and take other action as necessary.

6.4 First Aid

Information Support Services/ Hospitals/ Doctors/ First Aid

a. BIDDER must include in his HSE plan a detailed list with the particulars of the eye specialists, general practitioners and hospitals nearest to the site.

b. Prior to the start of the work, BIDDER must agree with these persons and services on the fastest ways to treat emergency cases.

Bidder's seal & sign

c. At least one competent first aider must be available at site. This person must be easily accessible through an efficient communication channel of which the particulars are included in the list of support services.

d. All OWNER's/ BIDDER's vehicles and worksites shall be provided with a first-aid kit with content as per the below table. The kits are to be kept clean and properly stocked as per the prescription and nature of business at BIDDER's cost/ risk. A record must be kept of all injuries, no matter, how minor. All injuries must be reported to the OWNER's representative without delay in the below format.

6.5 Fire Safety

a. BIDDER must ensure the installation and maintenance of adequate equipments, material and devices for fire-fighting. However, periodic refilling, testing & calibration of such equipments owned by OWNER shall be carried out at his cost & risk.

b. On each site, there must be sufficient fire-fighting equipment, both in the central construction site installations and on the site itself. Particularly in places, where work is being carried out with an increased fire hazard, such as welding and grinding work, cladding work or the use of inflammable products, particular attention must be given to installing fire-fighting equipment beforehand.

c. All fire-fighting equipment must be in good condition and must always bear a valid inspection stamp. Any fire-fighting equipment that fails to meet these conditions must be removed immediately from the site. The approval of fire-fighting equipment is to be renewed each year, unless otherwise indicated by the Recognised Inspection Organisation.

d. All fire-fighting equipment must always be located at immediately accessible place in case of incident. The storage of material and equipment or the parking of vehicles or placing of installations in front of fire-fighting equipment is therefore strictly forbidden.

e. All vehicles shall be fitted with an approved (and regularly serviced) fire extinguisher. Fire extinguishers are located at OWNER's strategic points. All personnel must ensure that they have access to a suitable fire extinguisher before beginning an operation. All personnel must be familiar with the use/ operation of firefighting equipment. No vehicle must be allowed in vicinity of the hazardous area, and if so, suitable spark/ flame arrester must be ensured.

f. In fire-hazard areas, all detonation sources must be avoided, unless, specifically agreed by OWNER and/ or its representative, the use of radios, cameras and video cameras is expressly forbidden.

g. At the end of work, the site must be checked for possible fire-hazard situations.

h. BIDDER shall ensure that a trained firefighting personnel is available at site.

6.6 Scaffoldings/ Ladders

a. Before using any scaffoldings/ ladders, BIDDER must submit a copy of the valid inspection certificate. Scaffoldings/ ladders to be built on the site must be inspected by the Recognised Inspection Organisation prior to use on the construction site and at the cost of the BIDDER. They must also be checked periodically in conformity with the prevailing regulations; a copy of the inspection report must be submitted to the OWNER without any remarks.

b. All scaffoldings must be checked by the BIDDER for their stability before they are used. At least once a week the scaffolding must be checked by a qualified representative of the BIDDER.

c. Mobile scaffoldings must be anchored before they can be used. Moving mobile scaffoldings is strictly forbidden if any persons, material or equipment are present on the scaffolding.

d. Scaffoldings must not be constructed in the vicinity of electrical installations; they must be properly earthed prior to use.

6.7 Construction/ O&M Site

a. The construction site plan must be included in the HSE plan and must contain at least an overview of the access roads, traffic direction and parking lots and the location of utility pipelines, first-aid unit, stores, site offices, canteens and sanitary installations.

b. Such structures may only be installed on the construction site in accordance with the provisions of the construction site plan.

c. For storing large quantities of fuel, gas bottles and small hazardous waste, a permit must be obtained from the competent authorities.

d. BIDDER must place the legally provided health installations in conformity with the prevailing norms at the disposal of his personnel and maintain them daily. Meals may only be eaten in buildings specially provided for this purpose.

6.8 Warning Signs (Contractor to follow GGL's Standard on warning signs and information norms)

Site must have a warning sign at entrances, exits and at any crossings with public, main/ private roads, premises, stations, etc…, bearing the words "ENTRY STRICTLY PROHIBITED/ RESTRICTED" or "NO ENTRY", "NO SMOKING", "ASSEMBLY POINTS", "NO PARKING", "WORK IN PROGRESS", "NO OPEN/ NAKED FLAMES", etc…. Wherever practically possible, BIDDER must fence-off/ cordon-off the site with a physical enclosure, where necessary with entrances that can be locked, such as at the natural gas stations/ chambers/ sites and isolation valve chambers.

6.9 Access Roads and Escape Roads

a. Construction site must be provided with a sufficient number of access roads and escape roads. Each physically enclosed site must have at least two diagonally opposed entrances and exits.

b. The access roads and escape roads must remain completely free and adequately accessible under all circumstances. Therefore, any storage of materials or parking of vehicles in these areas is strictly forbidden.

6.10 Means of Communication

Site must have sufficient means of communication to allow the OWNER and/ or support services to be immediately informed in case of incident.

6.11 Lighting/ Illumination

If works have to be carried out under circumstances of insufficient daylight, such as during overtime or in winter, BIDDER must furnish and maintain the required adequate lighting on the site in conformity with the prevailing legislation (Lighting should be intrinsically safe, flame proof type).

6.12 Stability of Equipment

All equipments such as site sheds, material containers, generators, distribution cabinets, dewatering pumps, welding machines, electrical equipments/ installations, etc… must always be erected in such a way as to ensure maximum stability.

6.13 Noise Pollution of Equipment

a. All construction machines, including welding units, compressors and generators must comply with the prevailing enforced standards (db level monitoring) on measures to fight noise pollution caused by equipments/ machines.

b. For this reason, in the vicinity of residential centres, machines will be used that are connected to the electrical mains.

6.14 Signposting and Pegging-Out

a. BIDDER must submit in his HSE plan a copy of the signposting plan approved by the local authorities.

b. Work may only start after following approval by the OWNER and/ or its representative of the signposting plan and after installation of the signposts described in the plan.

c. BIDDER is responsible for the installation and the maintenance of these signposts throughout the duration of the works as well as for all damage and problems arising directly or indirectly from shortcomings in the signposting. The approval by the OWNER of the signposting plan does not in any way diminish the BIDDER's responsibility.

d. BIDDER must place a sign at each local signpost with the particulars of the person responsible who must be reachable 24 hours a day. This sign must be placed in the direction of traffic and preferably at the end of the working area.

6.15 Monitoring of Site

BIDDER must guarantee the monitoring of the construction site 24 hours a day in order to be able to intervene immediately and efficiently in any situation which may arise. During pipeline works, he must put together an emergency team and keep them at the ready with sufficient resources/ material to be able to attend any emergency/ problems.

6.16 Cleanliness/ Housekeeping

a. BIDDER shall ensure the discharge of the various waste waters in accordance with the prevailing norms.

b. BIDDER shall upkeep & maintains the facility of Toilets, Offices/ Premises, Stations, Sites, Water storage tanks, etc…in hygiene condition on daily basis.

c. Depending on the type of waste materials (household waste, industrial waste, small hazardous waste, etc...), BIDDER shall submit the documentary proof for the removal of these materials to an authorised/ recognised dumping/ disposal site in accordance with the prevailing norms.

d. The disposal/ dumping of waste materials of any kind in the trenches/ working pit is strictly prohibited. All environmental pollution must be prevented and BIDDER will take all the measures necessary to avoid polluting the soil, the air and the water in accordance with the stipulations of the prevailing norms.

e. BIDDER shall be responsible for the cleanliness of any public and private roads, which become soiled because of the work. They must at all times be free of obstacles and hindrances.

f. All damages and costs resulting either directly or indirectly from the non-observance of these stipulations, or failure to observe them sufficiently, shall be borne by the BIDDER.

6.17 Excavation Work

6.17.1 Pegging-Off, Trial Trenches and Soundings

Prior to starting excavation works, a detailed investigation must be carried out into the possible existence of underground installations/ utilities, etc... This investigation must be carried out taking into account surface indications, available plans, soundings of the subsoil and manual excavation of trial trenches.

6.17.2 Type, Condition, Nature and Equipment of Machines

Each excavation machine brought to the site must,

- Be suitable for the work envisaged,
- Be in impeccable condition,
- Have the correct size/ capacity for the work to be performed,
- Be fitted with the necessary equipment to make the use of the machine as safe as possible.

In order to reduce to a minimum risk of damage to BIDDER's/ OWNER's property, the capacity of the machines for operation in the vicinity of the installations must be limited according to the mechanical strength of the installation.

6.17.3 Machine Operators

a. BIDDER should ensure that all machine operators have sufficient knowledge, experience and ability to be able to drive/ perform on the machines/ equipments safely & efficiently.

b. If the OWNER deems that the operator of an excavation machine/ equipment does not have the necessary abilities, BIDDER must, upon simple request by the OWNER, assign the person in question to another task or, where necessary, remove him from the site. The OWNER's representatives do not need to justify their decision in the matter.

6.17.4 Minimum Distance to The Working Pits

a. Prior to the excavation of pits and trenches, a safe distance must always be maintained between the edge of the excavation and the support surfaces of the machine. This distance must be adjusted to the stability of the subsoil and must, under optimum conditions, be at least equal to the depth of the excavation.

b. BIDDER is fully responsible for observing the instructions and the evaluation of the prevailing conditions. Any deviations from this rule may only be permitted if the BIDDER can prove safety by means of the necessary calculations.

c. Contractor shall follow the GGL's standard for excavation safety norms.

6.17.5 Margin to Existing Installations

Mechanical excavation up to a safe/ appropriate distance from existing installations during excavations in the vicinity of such installations is only permitted after determining the exact position by means of soundings. Any excavations within the distance must be carried out entirely manually.

Exceptions to this rule may be made when;

- OWNER has given his explicit approval,
- The capacity of the machine is suited to the mechanical strength of the OWNER installation,
- The machine is equipped with a non-toothed shovel,
- The excavation machine is accompanied by a labourer in the trench or pit,

- For each excavation of a layer manual soundings are carried out,
- There is continuous supervision by OWNER's representative.

Any non-observance of these rules will be considered as a serious breach of the safety instructions and will result in the immediate exclusion of the persons concerned.

6.17.6 Support and Enclosure of Existing Installations

Existing installations that become visible during the performance of the excavations must be properly supported and enclosed for the entire duration of the works in order to avoid sagging or damage.

6.18 Working Pits and Trenches

6.18.1 Shoring Up and Forming Banks

a. Earthworks, both for raising and excavating, must be carried out in such a way that collapsing is prevented.

b. The stability of the pit or trench walls should be ensured by installing a bank profile or shoring, as the excavation work demands. A construction drawing with calculations shall be submitted to the OWNER and/ or its representative upon simple request.

c. The condition of the walls and any shoring must be checked on a daily basis, in any case on every occasion before work activities begin in the pit or the trench.

d. Suitable materials must be used for the shoring of walls with regard to both mechanical strength and resistance to seepage. The use of compressed fibre plates is strictly forbidden for the shoring of excavation walls.

e. It is also strictly forbidden to use the trestles of the shoring walls for hanging or supporting equipment or material.

6.18.2 Opportunities for Escape

a. Any excavation of a pit or trench with a depth of more than 1.5 metres and in which work will be carried out should be provided with a sufficient number of ladders to offer the personnel working in the excavation the possibility of rapid evacuation.

b. In working pits and trenches that are deeper than 4 metres, no work may be carried out without continuous supervision from outside the pit or trench. In these cases, continuous measurement of oxygen levels and harmful substances is required.

6.18.3 Minimum Dimensions of Working Pits

Each pit, in which people have to work, will comply with the minimum dimensions defined in the OWNER's Particular Technical Specifications. As a thumb rule, pit size shall be 800 mm X 600 mm X 1200 mm for work up to 1200 mm depth.

6.18.4 Pegs and Railings

a. Throughout the work, excavation openings will be screened off by means of pegs and black/ yellow warning tape, railings or covering plates around the edges to warn or protect personnel.

b. Also, strong railings will be erected on the edges of working pits with a depth of more than 1.5 metres and in all hazardous areas and maintained in good condition.

6.18.5 Sand Buffer for Working Pits on Main Roads

a. In the event that digging work is carried out on or next to the main roads and on private roads, a sand buffer shall be placed in the direction of the traffic prior to the digging work so that no vehicle can fall into the pit.

b. This sand buffer can be made either with excavated material or with imported sand that is then used as backfill.

6.18.6 Catwalks Over Pits and Trenches

a. BIDDER shall install the necessary catwalks in all places where people have to cross over the excavations. The strength of these walkways must be calculated in accordance with the loads they will be used to carry and will be equipped with regulation railings.

b. In places, where work will not be performed immediately, pits and trenches will be solidly screened off with strong fences or, better still, covered over with plates that are of sufficient strength.

c. BIDDER shall submit the necessary calculations for the stability and strength of these catwalks and covering plates upon simple request by the OWNER and/ or its representative.

6.18.7 Water Evacuation and Working Floor

Any excavation, in which, people will be working should be kept dry and provided with a working floor of sufficient hardness. Where necessary, dewatering equipment will be set in place for this purpose and the working floors may be covered with gravel or wooden boards. BIDDER shall ensure that rainwater and water coming from the dewatering equipment is removed according to regulations and that no erosion is caused thereby.

6.19 Electricity

6.19.1 Inspection

a. Every electrical installation on the site, including generators, distribution cabinets, etc…, will be inspected on site by a Recognised Inspection Organisation, before it is brought into service. Any defect must be reported immediately.

b. BIDDER will attach a copy of the inspection report to his HSE plan and hand it over to the OWNER and/ or its representative.

6.19.2 Cables and Connections

a. Distribution panels must remain closed at all times during use. The connection to distribution panels may only be made using approved and waterproof plugs.

b. The electrical cables for connection to the various users of site electricity shall be in impeccable condition and shall be protected in a sufficient manner. In places where traffic must run over the connecting cables, they must be buried with a protective sleeve. The same rules apply for the connections of the cables. Furthermore, they must be watertight.

c. All connections must be at least suitable for use in humid conditions.

6.19.3 Earthing

a. Both the central electrical site installation and any stand-alone generators will be fitted with proper earthing of which the earthing resistance will be checked before use as well as periodically.

b. Metal site sheds and material containers will each be properly earthed to rule out the possibility of the structure becoming live.

c. The central electrical site installation will be equipped with a suitable earth switch with circuit-breaker. Also, the pipeline to be earthed to prevent the static effect.

6.19.4 Electrical Tools

a. Electrical hand-tools must conform to the stipulations of the regulations of the prevailing norms, be in impeccable condition and be suitable for the work to be carried out. They must be properly earthed or double-insulated.

b. Welding transformers, generators, machine must be equipped with a power limiter that will guarantee the prescribed safety current.

c. In closed areas, tunnels, deep construction pits and damp crawling spaces, only tools with safety current may be used.

d. Only explosion-proof electrical equipment shall be used in classified hazardous area. BIDDER shall ensure to adhere to the hazardous area classifications.

6.19.5 Protection Against Electrical Hazards (RGB enabled boards must for site electric supply)

Followings are some of the keys for protection against electrical hazards such as Insulations Ground Wires, Fuses and Circuit Breakers, Double Insulated Tools, Ground Fault Circuit Interrupter, Recognition of Hazardous Situations and Preventive Maintenance;

a. Fire may arise from faulty or over load electrical installation or as a result of accidental short circuits. Result flash over may ignite combustible material.

b. The above dangers can be prevented in respect of electrical system by paying attention to the following points;

- Proper design including current specifications of all components.
- Correct installation, Recognition of Hazardous situations.
- Correct use including preventive maintenance.

6.20 Hoisting Work (For all lifting work a lifting plan is must as per GGL requirement)

6.20.1 Hoisting Gear and Hoisting Material

a. All machines brought to the site and which can be used as hoisting gear must be provided with a valid certificate (Third party Inspection) of approval. If no certificate is available, BIDDER will have an inspection carried out before bringing the machine onto the site. All certificates of approval for machines on the site will be listed by the BIDDER in his HSE plan.

b. Each hoisting device must be suitable for the work to be carried out, both as regards the type and the characteristics. Hoisting devices must be properly maintained and exhibit no obvious defects.

c. Hoisting equipment such as hoisting straps, chains, steel ropes, hooks and clamps must be suitable for the work to be carried out, as regards both the type and the characteristics. Furthermore, all hoisting equipment must bear a valid inspection stamp, be in impeccable condition and exhibit no obvious defects. The inspection certificates for the hoisting equipment will also be listed in the HSE plan.

d. When hoisting work is being carried out, special attention will be paid to the placing and stabilisation of the hoisting gear. If a hoisting device is provided with stabilising feet, these must be used for every hoisting operation. If the stability of the subsoil is insufficient, supporting feet or plates will be used to ensure the safe installation of the hoisting devices.

e. Hoisting buckets will always be used for hoisting loose materials and gas cylinders. The hoisting of persons will only be permitted by means of an approved hoisting cage. All hoisting equipment will be stored in a clean, dry place immediately after use.

6.20.2 Personnel and Organisation

a. All personnel involved in carrying out hoisting work - in particular the operators of the hoisting gear and the riggers - must be properly trained to carry out this work in a manner that is efficient and safe. Crane operators must be in possession of a certificate of qualification issued by an authorised institution.

b. For large and difficult loads, such as loads with an awkward shape, a hoisting plan will be drawn up before carrying out the hoisting operation. This hoisting plan will define the centre of gravity of the construction and the hoisting equipment to be used.

c. For very large loads a calculation will be submitted upon simple request by the OWNER and/ or its representative.

d. Wherever necessary, such as in hoisting operations in existing installations above ground, the load must be guided by one or more persons and the circuit along which the load may be moved will be determined beforehand in consultation with the OWNER and/ or its representative.

e. During hoisting, no-one may stand under the load-bearing arm or the load itself.

f. Moving a load with more than one crane is only permitted after permission has been obtained from the OWNER and provided a hoisting plan has been submitted.

6.21 Material Storage and Handling

6.21.1 General

a. A clear storage plan will be drawn up in advance, both for the central site equipment and the storage areas along the perimeter of the site. For storage areas along public or private roads, this plan must be approved beforehand by the parties involved.

b. BIDDER is responsible for drawing up and adhering to these storage plans. He will ensure that the storage areas are always left in a clean and orderly condition and that they are clearly marked out and signposted.

c. All materials must be stacked in a stable manner and protected against the weather.

6.21.2 Hazardous Products

a. All hazardous products such as Gases, Odorant, Fuels, Paints and Poisonous and aggressive products will be stored in clearly separated areas and provided with leakage trays as required. The storage of such products will be specially indicated on the building site plan listed in the HSE plan. A copy of the safety and health cards (MSDS) for the products used must be attached to the HSE plan.

b. Gas Cylinders should be stored separately on a firm base and provided with a suitable protective cover over the connector tap during storage and transport. They may never be left unattended or laid flat on the ground. Cylinder shall be handled with trolleys with properly.

c. Products must never be siphoned over into Cylinders/ Bottles/ Vessels/ Canisters that were originally used for foodstuffs.

d. All products on the sites must be labelled according to regulations. Each label must describe the properties and risks of the relevant product, the precautionary measures to be taken and the actions to be taken in case of accident (MSDS).

e. When storing hazardous products, sufficient and suitable fire-fighting equipment must be on hand. The location of this fire-fighting equipment must be such that it can be used immediately in the event of an incident.

f. The storage of hazardous products must have arranged in such a way that the various products can easily be isolated.

g. Relevant/ necessary statutory approvals should be obtained for the storage, removal/ handling, transfer/ transportation, disposal, etc…in accordance with the prevailing norms.

h. In works, where harmful or poisonous vapours are released/ generated, measures must be taken to remove them efficiently.

6.21.3 Waste management

a. BIDDER shall coordinate & carry out the disposal of any waste (Hazardous or otherwise) produced or occurring as a consequence of its operations pursuant to the contract, all such disposals shall be in accordance with all legislation, OWNER's norms and best practices, whether that shall be for hazardous waste or non-hazardous waste. BIDDER shall ensure that all necessary approvals or licenses are obtained and that any subcontractors utilized for this purpose fully comply with such requirements. BIDDER shall record & provide OWNER with a copy of each waste transfer/ disposal report/ note.

b. For meeting the environmental requirements as per ISO 14000, BIDDER has to

- Return all PE cut pieces to GGL stores and maintain certified records of the same
- Return all GI pipes and fittings, wire braided rubber tubes dismantled from customer's premises to GGL stores and maintain certified records of the same
- Plastic packing materials, GI thread cutting burrs, used oil/ diesel, cotton waste contaminated with used oil, other consumables and other hazardous waste has to be disposed of by BIDDER through agency authorised to handle such waste with supporting documents and submit the supporting documents to GGL for records
- Bentonite if used for HDD shall ensure proper disposal as per vendor specification. Bentonite slurry and returns from the drilled hole shall be disposed off in the mud pit to be excavated at site. Bentonite to be used does not contain any constituents hazardous to the environment
- Non-hazardous waste generated out of free issue materials has to be returned to GGL stores and other non-hazardous waste has to be disposed off to authorised scrap dealers. Supporting documents to be submitted to GGL

6.21.4 Handling of Hazardous Materials

c. All personnel must be familiar with the Material Safety Data Sheet (MSDS) for a particular material like odorant (Ethyl Mercaptan) before handling the same.

d. Container should be kept tightly closed and stored in well ventilated cool & dark area. To prevent, the physical damage to the container protective container shall be used.

e. The person handling the hazardous material like Ethyl Mercaptan should wear suitable & adequate personnel protective equipment (PPE's) such as rubber gloves, filter respirator guard, plain goggles & self-contained breathing apparatus, etc…

6.22 Acetylene Welding and Cutting Equipment, Butane and Propane Burners

a. The welding vehicles for acetylene welding and cutting equipment must be constructed and set up in a stable manner. The oxygen and fuel gas cylinders will be placed vertically or at an angle of at least 35° during use. They must be mounted on a stable trolley.

b. Gas cylinders for butane or propane burners and for heating devices for site sheds must be set up in a stable manner. They will be properly secured to prevent them from tipping over.

c. Any installation for acetylene welding and cutting must be equipped with a sufficient number of blow-back protection devices. These devices should preferably be located as close as possible to the tools.

d. The gas hoses and manometers must be in impeccable condition and of the correct type. They will always be protected against damage and immediately stored again after use.

e. After use, the cylinders should be closed and the pressure shall be released from the hoses. When working with a naked flame, adequate/ suitable fire extinguishers must be available on site as per work permit. Proper & necessary caution should be marked. After completion of work, housekeeping should be carried out at site.

6.23 Compressed Air/ Gas Installations

6.23.1 Equipment

All Compressed Air/ Gas Equipments, such as Compressors, Hoses, Couplings, Tools/Tackles, etc…will be kept in impeccable condition. Equipment with visible defects or which is unsuitable/ non-compatible for the work will be immediately replaced.

6.23.2 Use

Only authorised personnel may use Compressed Air/ Gas Equipments. After use, the pressure will be released from each installations/ equipments.

6.24 Radioactive Sources

6.24.1 Use

Only personnel from the Recognised Inspection Organisation are authorised to use or transport radioactive sources for testing purposes.

6.24.2 Warning Signs

When transporting or storing such sources, standardised warning signs must be posted in the vehicle or in the storage room. These signs must be removed when there are no longer any radioactive sources in the vehicle or in the storage premises.

6.24.3 Marking Out of the Test Area

The areas where radioactive sources are being used must be clearly marked out by means of yellow/ black warning tape and standardised pictograms with the words "No Entry - Radiation Hazard".

6.24.4 Safety Guard at the Test Area

Throughout the duration of testing with radioactive sources, a safety guard will be posted, in addition to the warning signs. The decisions and orders of these safety guards must be strictly adhered to at all times.

6.25 Pressure Tests

6.25.1 Inspection of Test Equipment

All the equipments to be used for carrying out pressure tests, such as hoses, couplings, testing heads, etc…, will be inspected in advance by a Recognised Inspection Organisation. A copy of the inspection certificates shall be enclosed with the HSE plan by the BIDDER.

6.25.2 Marking Out and Screening Off the Test Area

a. The areas, where pressure tests are to be carried out will be clearly marked out by means of black/ yellow warning tape and a warning sign with the words "No Entry - Installation under Pressure".

b. Where possible, the areas where the likelihood of pressure escaping is highest will be screened off by means of boards/ plates or an earthen wall. While tests are being carried out on pipelines/ cylinders or vessels/ installations/ equipments, all activities at and in the vicinity of the same will be brought to a halt.

6.25.3 Presence of Personnel

All the personnel, who are not strictly needed for carrying out pressure tests, will be evacuated from the test area. The personnel responsible for monitoring the pressure tests will be responsible for refusing admittance to the test area to unauthorised persons.

6.26 Personnel Behaviour

a. Every person working on the site must behave correctly and with the necessary courtesy towards his colleagues, employees of other contracting parties/ subcontractors, representatives of the OWNER and third parties. Any improper conduct may be restrained by the OWNER by removing the persons involved from the site.

b. All unsafe situations and actions must immediately be reported to the OWNER and/ or BIDDER. The instructions given by OWNER's representative must be complied with strictly and immediately.

c. The use of the available means of protection is compulsory and must be strictly adhered to at all times.

d. It is forbidden to operate the existing installations of the OWNER or of third parties; such operations may only be carried out only by authorised persons.

e. Entry into existing installations/ premises/ sites owned by the OWNER or third parties is completely forbidden unless this is strictly necessary for carrying out work and the permission of the OWNER has been secured.

6.27 Safety Precautions for Gas Distribution/ O&M

6.27.1 General/ Industrial Safety

a. Human beings and all living creatures have an in-built consciousness of safety. This consciousness tempts them to protect themselves from accidents in general life. The level of this consciousness varies from person to person and creature to creature. This variation has much effect on the causes

and number of accidents. Usually, this consciousness is being used incidentally when we face any unexpected physical trouble in general life.

b. Apart from the general consciousness of safety, a planned programme is required to preserve and upgrade the safe conditions and safe activities at Industries. This is because, here the human beings have to work with machines, materials and environment, which involve different type of risks and hazards which are not common in general life. This planned programme of safety recommends the type/ quality of man, machines/ materials to be used, working/ operating procedures, condition to be observed, precautions to be taken and methods of handling emergencies. This programme also covers training on these wide areas, to develop the employees to operate the Industry in ultimate Safety. The result of this programme is termed as Industrial Safety.

6.27.2 Safety Precautions While Doing Jobs in Valve Chambers/ Pits

a. Leak Test/ Cleaning/ Painting

- Extra care to be taken while lifting the sleepers from chamber.
- Detect Gas leak (if any) in the chamber, before starting any activity in the chamber/ making entry in the chamber.
- Do not start any job, if there is any gas leakage in the chamber. Arrest/ Repair the leak first and check again by the detector/soap solution.
- In no case smoking and naked flames shall be allowed near the open valve chamber.
- Minimum one person must be posted outside the chamber for keeping watch inside the chamber.
- Open valve chamber must be cordoned off and warning sign boards placed.
- Keep contact with wireless communication with nearest Control Room.
- Before closing valve chamber, do final check inside the chamber. Do not leave paper rag and other combustible.

b. Demolishing of Valve Chamber & Removal of Valve Assembly for Live Network

Demolishing

- Install caution boards at both sides of valve chamber at safe distance of minimum 5 Meters. each from valve chamber.
- Locate Fire Extinguishers at a suitable place with a trained person, to operate on emergency.
- Shift the chamber covers to a distant and suitable place.
- Check the inside of valve chamber for any sharp materials or creatures. Pump our water, if there in water inside.
- Take care test and ensure no leakage.
- Clean/ remove all unwanted materials from 2 Meters. surroundings of the valve chamber.
- Only one worker should get inside the chamber at a time, to break the chamber. Pipe valve to be protected and should be covered.

- Break the walls from inside the chamber to outside so that the bricks would not fall inside and bit/ damage the valve assembly.
- The bricks nearer to the pipeline should be taken out one by one to avoid any damage to the pipeline.
- Remove all the broken materials from the chamber and surroundings.
- If the concrete/ cement floor of the chamber is required to be broken, it should be done only after isolating and venting out NG from the pipelines section.

Removal

- Isolate the section including the valve assembly by closing nearest isolation valves or squeezing at nearest point.
- Vent out NG from the section using vent pipes after ensuring no source of fire at the surroundings. Take case of traffic/ vehicles.
- In case of MS network, do purging with Nitrogen/ inert gases and ensure the Methane content is less than 2%.

6.27.3 Safe Route Selection Procedure for U/G Pipeline Work

a. The Safety and life of a gas distribution network is highly depending upon the selection of the route of the network. A proper route selection;

- Facilitates easy laying of the pipeline,
- Eliminates hazardous areas/ identifies the type of protection to be provided.
- Minimizes the changes of damage to pipeline by other U/G utility agencies.
- Confirm proper location of valves/ venting/ LPT & Maintenance can be safe and unpopulated area.

b. Following are some of the guidelines for route selection of U/G pipeline network;

- A visual survey of the alternative route should be made and note down all apparent physical obstacles, natural or constructed, that may affect the conduct or the work.
- Details should be obtained from concerned agency/ ROU holder that may affect the conduct of the work.
- Local authorities should be contacted to obtain any available information on the construction of adjacent buildings and other structures and future planning/ proposals. Account must be taken of any stray current that may exist in the vicinity.
- Wherever possible the route should be chosen so as to avoid locations where the proposed pipelines could be subjected to abnormal mechanical loading or other adverse condition which may lead to accelerated deterioration.

c. Avoid laying in the following areas;

- Areas already congested with underground plant/ utilities.
- In proximity to unstable structures or walls retaining material above the ground level.
- Areas, where there has been recent infill especially within the last two years.

- Ground liable to subsidence or side slip.
- Areas of known or suspected corrosion activity.

d. Following additional care should be taken for laying;

- If the pipes are laid in areas, where future maintenance would result in no damage to structures or plant of third party.
- Main pipes should be laid as far away from a building as is practicable and in any event not closer that would subject the pipes to structure loads from the building.
- Ensure that branch lines dedicated to direct supply to customers are preferably routed in land for public use.
- Trial pit may be necessary, particularly at road crossings, culverts and bridges to prove the route and the type of ground.
- Special drawings will be required for certain crossing e.g. Culverts, bridges, etc.
- A plan of the proposed route of the main must be prepared. Design of the pipe size should be considering future extensions.
- Use proper pipes which has proper diameter and thickness.
- Lay pipes in open areas so that in case of gas leakages it would easily disperse in the atmosphere.
- Ensure no source of ignition close to the pipeline from surrounding
- Location of isolation valves should be in unpopulated/ isolated areas and be at a reasonable distance from the roads, so that it would not be damaged by vehicles and maintenance/ testing jobs could be carried out safely.
- Take care that isolation valves should not be in parking areas and just under electrical cable/ nearby electrical installations like transformer, etc.

6.27.4 Safety in Commissioning/ Charging Industry/ Commercial

Safety checks/ precautions to be observed before and during commissioning of Gas inside an Industry are as follows:

a. Ensure that all items like pipes, valves, fittings are of standard Quality supplied/ certified by OWNER. Also, ensure approval of PRS & its installation/ equipments including vent line prior to commissioning.

b. Ensure that standard fabrication, welding inspection and installation methods are followed.

c. Check the layout of gas train and equipment/ valves used in gas train.

d. Check the electrical items used in gas train are of flame proof type.

e. After pre-commissioning check, all pipeline section/ equipment should be Nitrogen purged to minimize the Oxygen percentage below 2.

f. After successful purging, charge the pipeline and equipment in following sequence;

- Gas charging in the supply line.
- Gas charging in PRS.

- Gas charging in Internal Piping.
- Gas charging in Gas train/ Burner.

g. Before charging the burner, take dry-run of the burner, i.e. switch on the burner without gas and check the sequence controller as well as flame failure safety interlocks.

6.27.5 Precaution Before Doing Hot Work On Gas Line

a. Ensure that a work permit is taken for the job to be executed well in advance.

b. Ensure all Safety Equipments adequate & suitable Fire Extinguishers, Personnel Protective Equipments, etc…are available at the site of work.

c. Establish wireless/ telecommunication with the control room before starting the job.

d. Grease the main Isolation valve at Valve chamber/ Metering platform before job.

e. Pre-purge the section for hot work with nitrogen and check methane percentage at any of the tapping point/ pressure gauge point with suitable analyser/ detector, it should be zero.

f. Repeat the pre-purge operation if methane percentage is detected until zero percentage is achieved.

g. Do the actual gas cutting/ welding work on the line once zero methane percentage is achieved.

h. Use Personal Protective Equipments while doing the Gas Venting, Cutting, Welding and Grinding Operations.

i. After finishing of the job test pipeline section with Nitrogen at recommended test pressure with soap solution and lock pressure test.

j. After confirmation of testing, Post purging of the section should be done and Oxygen percentage should be checked at the farthest point which be minimum 2%.

k. Before charging NG following pre-commissioning checks should be done;

- Inspection of the job done.
- Ensure all drain valves, Pressure gauge tapings are in closed condition.
- All tools tackles & equipment not required should be removed from the site.
- All activities should be stopped.
- Only required personnel should be present at the site.
- Inform all concerned before charging NG in the section including control room.
- While recharging, always crack & gradual open the inlet valves.
- Vent the gas from all farthest points to remove Nitrogen percent if present. Check that Methane percentage is more than 5%.

6.27.6 Safety Guideline for Plumbing Installation

a. Route Selection

- Underground Tapping Line.
- Location of tapping saddle should be at a free place away from other utilities, electric posts, septic tanks etc.

- Length of U/G piping in customers' premises should be as minimum as possible. The U/G pipeline should not cross any U/G tanks or open trenches.
- Riser pipe should be provided on a wall having enough space to install valves, Pressure regulator, Meter etc.
- In parking area/ boundary wall A/G piping should be avoided or minimized.
- Height of the A/G horizontal pipe should be in such a way that children cannot use it for climbing or jumping.
- Wherever possible; initial rise/ elevation to the piping should be given inside the boundary wall to avoid any vehicular accident/ foul play by outsiders.
- Pipeline routing should be in such a way that door/ window/ any similar moving parts should not hit the gas pipe, valve, meter and regulator.
- Ensure that electric cables do not come in physical contact with gas line. It is recommended to keep a minimum distance of 1.5 feet between gas pipeline and electrical lights, cables/ installation.
- Isolation/ Control valves, meter, regulator and any other joint should not be provided nearest to electric lights, switch boards etc. install single pipes without joints as a minimum distance of 1.5 feet at these points.
- Location of gas tap should be at enough distance from the hot plates/ burners so that the gas tap & rubber tube does not get heated up.
- Gas tape should be at convenient height not less than 4 feet. In special cases, if the gas taps are to be installed further below an extra isolation/ control valve should be provided on the tapping pipe. Gas taps should not be provided in closed cabinets.
- Individual control valve should be installed for each connection outside the house at a height of 6 feet. For apartments one main control valve should be installed at a convenient height on the main riser pipe; in addition to individual valves.

b. Installation

- RCC guard should be provided where A/G & U/G piping join each other.
- Clamping should be provided at both sides of gas meter.
- Proper & firm supports should be provided for riser and branches to avoid direct load on fittings, valves, regulators, etc.
- Minimize the number of joints as much as possible inside the house.
- Avoid the A/G gas pipe crossing other pipelines, wires, etc.
- Pipeline should not be installed hanging between pillars of any projections on walls.
- No gas tap should be left without connecting to a burner. In such cases the gas point should be kept closed by and hollow hex plug.

c. Ground Connection

- Pressure test for A/G installation to be confirmed before giving ground connection.

- Do the ground connection after charging of PE network.
- Before ground connection; check all plumbing installation. Entire installation should be completed up to gas tap with proper supporting work.
- All extra gas taps should be plugged with hollow hex plug.
- Soap solution test of the Ground Connection should be done up to Saddle/ Tee joint.

d. Testing

- Only inspected/ calibrated Pressure Gauges should be used.
- Pump cylinder to be dismantled and line should be plugged after achieving required pressure. At farthest end i.e. at gas tap; pressure to be checked and confirmed for at least 1 hrs. All joints should be checked with soap solution.

e. Conversion

- Pressure test report to be confirmed.
- Uncompleted work should be checked (i.e. any open ends, gas taps, plugs, etc.)
- Soap solution test to be carried out, after removing spool piece & installation of meter, regulator, unions, connectors, etc.
- Do not charge if there is any leakage.
- All wall openings & supports should be well completed before conversion.

6.27.7 Conditions to Be Observed Prior to Start Work On Gas Installation

a. All required sizes of valve keys, wheels are available and placed nearest to their application place.

b. Minimum 2 nos. suitable (DCP) Fire Extinguishers should be available at each site.

c. Continuous wireless communication between site and control room and between sites must be established, immediately on reaching the sites and before staring any activity.

d. No smoking should be done in the 15 Meters. radius of site.

e. Only intrinsically safe/ flame proof/ explosion proof electrical equipments/ items should be used.

f. No source of ignition/ spark should be present within 15 Meters. radius of site.

g. Check wind direction and position the diesel fired/ electrical items accordingly keep it 15 Meters. away from the site.

h. Wherever possible work should be done during the slack hours of traffic and gas consumption.

i. Measuring instruments must be in good working condition (Oxygen Analysers, Gas Detectors, Gas Surveyor, Flame Ionization Detector, etc…)

j. Use calibrated Pressure gauges only.

k. Only 24 volt D.C. supply is to be used for transmitter calibration work.

l. For Venting out gas locate/ choose safe place considering;

- Open ventilated place available.
- Overhead Electrical Wires/ Installations.

- Vehicular Traffic.
- No smoking zone – non populated area.
- Always vent – Gas at height by providing minimum 3 Meters. long pipe to vent pipe.

6.27.8 Guideline for Working in Confined Space

a. Definitions

In general industry terms a confined space means a space in any vat, vessel, tank, container, silo, valve pit/ chamber, trenches, odorant storage, receptacle, underground sewer, shaft, well, tunnel or other similar enclosed or partly enclosed structures, when the space is;

- Intended or likely to be entered by any person, and
- Has a limited or restricted entry and exit, and
- Intended to be at normal atmospheric pressure while a person is in that space, and
- Contains, or is intended to contain, an atmosphere that has a harmful level of contaminants or an unsafe oxygen level.

b. In terms of gas distribution, defined spaces may include regulator or valve pit, meter rooms, trenches or excavations, odorant facility, drainage or other pits of other utilities.

c. Hazards in Confined Spaces

A hazard is a potential source of harm or injury. A risk is the likelihood of being affected by a particular hazard. Thus "hazard" and "risk" have different meanings. Hazards encountered in confined spaces include oxygen deficiency, oxygen enrichment, flammable gases, toxic gases, noise, dust, smoke, fumes, heat stress, and mechanical hazards.

Oxygen - Deficiency or Enrichment

- The minimum oxygen content in air should be 19.5% by volume under normal atmospheric pressure. The usual oxygen level in outdoor air is 20.9%.
- Oxygen enrichment, greater than 23.5%, is associates with increased fire hazards in that lower than usual concentrations of flammable gases or other combustible materials will burn because of the higher oxygen level.

Flammable Gases

- The presence of a flammable gas in concentrations between its lower (LEL) and upper (LEL) explosive limits can produce a potentially explosive atmosphere. A source of ignition, such as a flame or spark can cause an atmosphere to explode causing injury, death and property damage.
- Other flammable gases and vapors include petrol, kerosene, ammonia, benzene, toluene and xylene. There are hundreds of other compounds which could be included in this list.

Toxic Gases

Exposure to toxic gases can result in widespread effects ranging from local irritation of the airways and eyes through to wide ranging effects throughout the body including death. The following provides information about two commonly found toxic gases;

Carbon Monoxide, is a colorless, odorless gas which is impossible to detect by the normal senses. It is a product of incomplete combustion. This can be in an internal combustion engine, whether

petrol, diesel or LPG, such as chain saws, motor mowers, or petrol driven pumps, etc. Nearly all fires produce some carbon monoxide. Carbon monoxide inactivates the oxygen carrying compound of the blood preventing sufficient oxygen reaching the brain. It takes about three to five minutes for an Oxygen starved brain to suffer irreversible damage and death results in about ten minutes.

Hydrogen Sulphide, commonly known as "rotten egg gas" for an obvious reason, results from the action of microbes in a variety of conditions, e.g. in sewage and rotting animal and vegetable matter. While hydrogen Sulphide is easily recognized by its smell, anyone exposed to even low levels of the gas will soon develop "olfactory fatigue".

This means that although it is still present in the air the sense of smell becomes less sensitive. This could result in death if the concentration suddenly increases to a toxic level, as the person exposed will not notice this increase. Hydrogen Sulphide may irritate the eyes and airways and affect many body functions.

Dust, smoke and fume

Some dusts, once they become airborne, can result in an explosive atmosphere but this is not common in confined spaces. Airborne dust, also referred to as particulates, is measured in milligrams per cubic meter ($mg/m^{3)}$ of air sampled. Dust has a health consideration as well. Breathing of dust particles, depending upon the material from which they came and their size can cause any or a combination of;

- Pneumoconiosis
- Emphysema
- Silicosis asbestosis

6.27.9 Precautions for Geyser

Installation

The balance flue type gas geyser is the safest one, but as it is not available in India and it will take some time to develop the same. We can continue using flue type gas geyser safely by taking following precautions;

- Install gas geyser outside bathroom only.

Four Steps for Safe Operation of a Gas Geyser

- First open the gas tap.
- Ignite the pilot flame-either with inbuilt ignition system or with a match-stick.
- Observe the pilot flame and make sure it is stable.
- Lastly open the water valve.

Never Open Water Valve Prior to Opening of a Gas Tap

- This will open the main gas regulator, resulting in to gas coming out of the geyser combustion chamber, which may cause fire flames outside the combustion area of geyser. And in this condition, if ignition is delayed by any reason, then good amount of gas may accumulate in the bathroom, which may cause explosion.

- Never encourage children to operate the geyser; gas tap should be located at 6" height, beyond the reach of children.
- Never keep clothes and hair loose, while operating geysers, and never operate geysers, very closely.

6.27.10 Others

a. **VENTILATION:** Before installing the gas connection/ gas geyser, adequate & proper (cross) ventilation should be ensured. Generally, a standard bathroom, kitchen does not comprise any cross ventilation. Hence, all the installation must be carried out based on the OWNER's/ statutory norms. Since, the natural gas replaces the air contains oxygen very quickly & so oxygen required for human being deficits, cause human fatality, too. Also, it the likely hood of fire & explosion increases. Every person working on the site must behave correctly and with the necessary courtesy towards his colleagues, employees of other contracting parties/ subcontractors, representatives of the OWNER and third parties. Any improper conduct may be restrained by the OWNER by removing the persons involved from the site. Also, in the bathroom, there are chances of producing Carbon dioxides & monoxides from geyser & human taking bath therein, which are also having potential hazards of an accident.

b. **ROAD SAFETY:** Considering, Indian road conditions & human tendency, road safety is required during performing the work on the main roads, pipeline routes, patrolling, monitoring, complaint attendance, emergency call, etc…Defensive driving plays major role in this issue, hence, driver should be well trained, accountable towards the specified responsibility, having valid licence for the particular vehicle, renewal from time to time, should be trained for hazardous goods transportation (TREM CARD is required in such cases). Emergency Vehicle should be given utmost importance in terms of operability, statutory aspects, maintenance, spark arrestor (exhaust muffler), etc…The work to be carried out in dark/ night hours should also be given substantial importance by following best engineering practices. **Length of vehicle should be such that material being transported from stores to site like PE pipes/ GI pipes shall not extend beyond the vehicle**

6.28 DOCUMENTS OF PRECEDENCE

Where any portion of the GTS is repugnant or variance with any provisions of the PTS, unless a different intention appears, the provision(s) of PTS shall be deemed to govern the provision(s) of GTS of contract. If there is no variance or repugnance between GTS and PTS both clauses shall be applicable.

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

7.0 PENALTIES

7.1.1.1 The following critical parameter describes the system performance and service level expectations and requirements during the Implementation phase of contract. The service level includes target performance measures, unacceptable measures and the related penalties for not meeting required service levels.

PENALTY MATRIX

Sr. No.	Parameter	Service level Agreement	Penalty
1	Non-compliance to material – use of substandard material	All the Material shall be used as per the GGL specification and Quality plan.	In addition to corrective actions by contractor at his own cost, Rs. 3,000 will be levied per instance.
2	CPAR Score	Monthly CPAR score ≥55%	1. First instance warning letter to be issued. 2. Penalty of Rs. 5,000 to be deducted after 3 months from the date of warning letter issued if there no improvement within 3 months and still monthly CPAR score < 55% in this period. 3. Penalty of Rs. 10,000 to be deducted for every month after fourth month from the date of warning letter issued, if there is no improvement in forth month and still monthly CPAR score < 55%. 4. GGL may take actions, , as deemed fit, as per the contract if there is no improvement after six months from the date of warning letter issued
3	HSE Compliance	LTI (Loss Time Injury)	Rs. 20,000/ incident
		Non deployment of HSE Engineer	Rs. 100 per day
		Un authorised work (where permit to work is not applicable & work is executed without approval of EIC)	Rs. 5,000/ incident
		Work without Permit to work/ Work Authorisation	Rs. 500/ incident
		Non-compliance - Deployment of manpower with Safety Training Card (STC)	Rs. 500/ incident
		Non-compliance - PPEs	Rs. 100/ incident
4	Leakages in the	Each connection shall leak proof	Rs. 500 per leakage Instance or actual amount credited to customer if observes leakage

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	connection		during the guaranteed period & customer asked for rebate (one year from NG commissioning)
5	New connection: Noncompliance of commissioning within timelines	Commissioning within 60 days for workable Dom. Connection & other as per defined SLA from the date of Job order or submission of site visit report for non-workable connection within 10 days. Penalty should be deducted on quarterly basis.	Rs. 100 per connection
6	Damage to GGL Network	No damage to GGL network	Cost of actual gas volume loss and repair cost will be deducted from monthly bill of contractor considering existing GGL commercial rate of NG and existing O&M rate for repair.
7	Initial mobilization:	Penalty against delay in mobilization: Due to delay in mobilization of Manpower/ Equipment/ Tools & Tackles: Within 30 days from the date of kick off meeting	0.5% of the basic contract value per week, up to maximum of 2% of the basic contract value will be deducted from the EMD/ Bank Guarantee submitted by the BIDDER or from the RA bills submitted subsequent to start of the work or outstanding from payment pending within GGL

***LTI (Loss time Injury)**

7.1.1.2 A disabling Occupational Injury which results from a work related activity or from a single instantaneous exposure in the work environment and that results in a person being unfit for work beyond the day of the incident. Where the injured party returns to work on the following day but subsequently has to take time off as a result of the injury this shall count as a Lost Time Injury.

ANNEXURE-1 MINIMUM TOOLS, EQUIPMENTS & RESOURCES REQUIREMENT

Minimum Tools, Equipment's & Resources to be made available by the Contractor per project area as per requirement

Sr. No.	Equipment Details
1	Automated Electro Fusion Machine
2	Voltage Stabilizer
3	Generator (5.5 KVA)
4	Moling Equipment (for all sizes)
5	HDD Machines & Equipment (for all types & sizes) as per requirement
6	Squeeze Tools (Manual)
7	Squeeze Tools (Hydraulic)
8	Rotary Peelers
9	Pipe Scrapers
10	Tapping Tools/ Allen Keys
11	Pipe Cutter (Round)
12	Pipe Cutter (Guillotine)
13	Pipe Alignment Clamps (All sizes)
14	Joining Clamps for Coupler (All sizes)
15	Joining Clamps for Saddle (All sizes)
16	Pipe Straightener
17	Re-rounding Tools (All sizes)
18	Mechanical Compactor
19	Jumping Jack Compactor (as per requirement)
20	Roller (as per requirement)
21	Calibrated Pressure Gauges (0-10 Bar)*
22	Temperature Gauge

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23	Water Tankers (as per requirement)
24	Dewatering Pump
25	Vehicle, Mobile phones etc.
26	Fencing pins and tapes, and Warning notices as per Specification

NOTE: * ALL PRESSURE GAUGES AND INSTRUMENTS SHALL BE CALIBRATED AT EVERY ONE YEAR

ANNEXURE-2 CONTRACTOR OFFICE SETS UP PER PROJECT AREA

Sr. No.	Details	Remarks
1	Personal Computers	With internet and e-mail facility
2	A3 Printers	
3	Landline telephone connection	-
4	Fax machine	-
5	Mobile phones	To all project managers, engineers, Liaisoning officers
6	Vehicle	Transportation of Supervisors, Engineers, technicians, light materials etc.

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ANNEXURE-3 MINIMUM QUALIFICATION & EXPERIENCE REQUIRED FOR THE MANPOWER

Minimum Qualification & Experience required for the manpower to be deployed by the Contractor shall be as given below-

Sr. No.	Post	Minimum Qualification & Experience
1	Project engineer/ Manager	B. E. (Mech.) with minimum 1 year Experience or DIPLOMA (Mech.) with minimum 3 years' Experience * (Please refer the details of required experience)
2	PE Supervisor (MP & LP)	ITI OR 2 years' experience of GGL
3	PE technician/ Welder (MP &LP)	Minimum 10th standard and having at least 1 year relevant experience.
4	Liaison, planning. QA-QC officer	Diploma/Degree in engineering with 2 years' experience in construction or ITI/12th pass with 3 years relevant experience
5	Safety officer	Degree/Diploma in engineering with 1 years' experience in construction. OR Diploma in industrial safety (Fresher or experienced)
6	Draftsman	ITI draftsman (Proficient in Auto CAD) or minimum 10th passed and certified Proficient in Auto CAD
7	Store keeper	Graduate/ 12th Pass
8	Assistant to store keeper	Graduate/ 12th Pass
9	Engineer	Diploma with 3 years' experience

Note:-

1. Appointed candidates by the contractor shall be interviewed by the Owner. Owner's representative reserves the right to retain the candidate if found suitable.
2. Contractor manpower mentioned above shall undergo all relevant safety and technical competency training as per "Training applicability matrix" (enclosed with this tender document) prior to deployment at site.

Contractor to deploy above mentioned manpower (as applicable) at site having valid Safety Training Card (STC) Project Manager

- The project manager (PM) plays a very crucial role in the execution of the contract. He should have the requisite qualification and experience as stipulated in the contract i.e. B. E. (Mech.) with minimum 1-year Experience and DIPLOMA (Mech.) with minimum 3 years' Experience, preferably in City Gas Distribution industry.

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- The contractor at his beginning of the project shall forward list of candidates for Owner approval. The initial screening of the candidate and forwarding list of persons, who prime facie meet the criteria, to Owner standard and contractor's responsibility.
- It is very well understood that a contractor Project Manager is a very important role and the position shall be filled with Owner concurrence only. Owner will not accept, repeat not accept, substandard persons.
- It is very well understood that the contractor has read the tender requirement & scanned the market for the remuneration to be paid for such a person as per market condition and also taken into account the specialized focus in a multi task environment.
- The main job responsibility envisaged are but not limited to:
    - He is the overall in charge of the project and single point contact point for Owner.
    - He shall be exclusively for the project & will not be assigned any other responsibility.
    - He should coordinate & lead a team of safety engineer, MP engineer, LP engineer, GI engineer, Finance, Stores, Purchase, Liaison & lead them towards achieving the overall project target.
    - He should coordinate with statuary authorities for permissions/ settlement, etc.
    - He should lead the team from front for meeting Owner HSE standard
    - He should prepare project plan for allotted area with Owner covering targets in all major activities like Marketing, MP, LP, GI, conversion, etc.
    - He should prepare monthly plan which shall be upsized/downsized depending upon how the project progresses. The plan should cover costing like overhead, budget, cash flow, billing, material reconciliation, etc.
    - He should maintain a day to day coordination with Owner informing about the targets & their achievements.
    - He should overall control his team of engineers, mukadams, staff, etc.
    - He should day to day chase his teams of Engineers: site technicians etc & solve day to day Problems-leading the team towards achieving the target.
    - He should execute the drawings, customer complaints, material reconciliation, etc.
    - He should control the material availability order, chase vendors.
    - He should manage cash flow of the project so that the project does not suffer for want of funds.
    - Raising of timely bills is a must for achieving this.
    - He should attend and come prepared for the project review meeting as per the schedule drawn by Owner.
    - He should carry out efficiently any other job which is within the sphere of the project activity.

ANNEXURE-4 DAILY ACTIVITY/PROGRESS REPORT

Typical Daily Activity Report (Daily Progress/ Planning) which shall be submitted to Engineer-In-Charge daily morning by contractor

GUJARAT GAS	PE LAYING REPORT (DAILY)	DOC NO : REV. NO.: EFF. DATE :

GA: **City / Town / Village :**
DATE : **Site Location :-**

NAME OF CONTRACOR :

DESCRIPTION	AREA	COIL NO	PIPE DIA					
			32 MM	63 MM	90 MM	125 MM	160 MM	Total
MANUAL EXCAVATION (IN MTR.)								
MECHANICAL EXCAVATION (IN MTR.)								
LAYING (IN MTR.)								
OPEN CUT (IN MTR.)								
HDD (IN MTR.)								
MANUAL BORING (IN MTR.)								
BACKFILLING (IN MTR.)								
VALVE CHAMBERS (IN NOS.)								
MARKER INSTALLED (IN NOS.)								
PNUEMATIC TESTING (IN METERS)								
COMMISSIONING (IN MTR.)								

BRICK PAVING IN MTR.		
PCC ON TRENCH		
TRENCH DEPTH (IN MM)		
TRENCH WIDTH (IN MM)		
PIPELINE TOP COVER (IN MM)		
SAND BEDDING (IN MM)		
SAND PADDING (IN MM)		
ADDITIONAL EXCAVATION IN CUM.		
WARNING TAPE LAYING LENGTH IN MTR. (200 MICRON)		
WARNING TAPE DEPTH (IN MM)		
RCC/PCC CUTTING IN MTR./C.M.		
RCC/PCC BREAKING IN MTR.		
HUME PIPE IN MTR.		
HALF ROUND USED IN MTR.		
FITTINGS USED	**SIZE**	**QTY.**

REMARKS :

	CONTRACTOR :	TPIA :	GGL
NAME			
SIGN			
DATE			

To be printed on back side

Rough Sketch

Note: Specify EF fittings with coordinates

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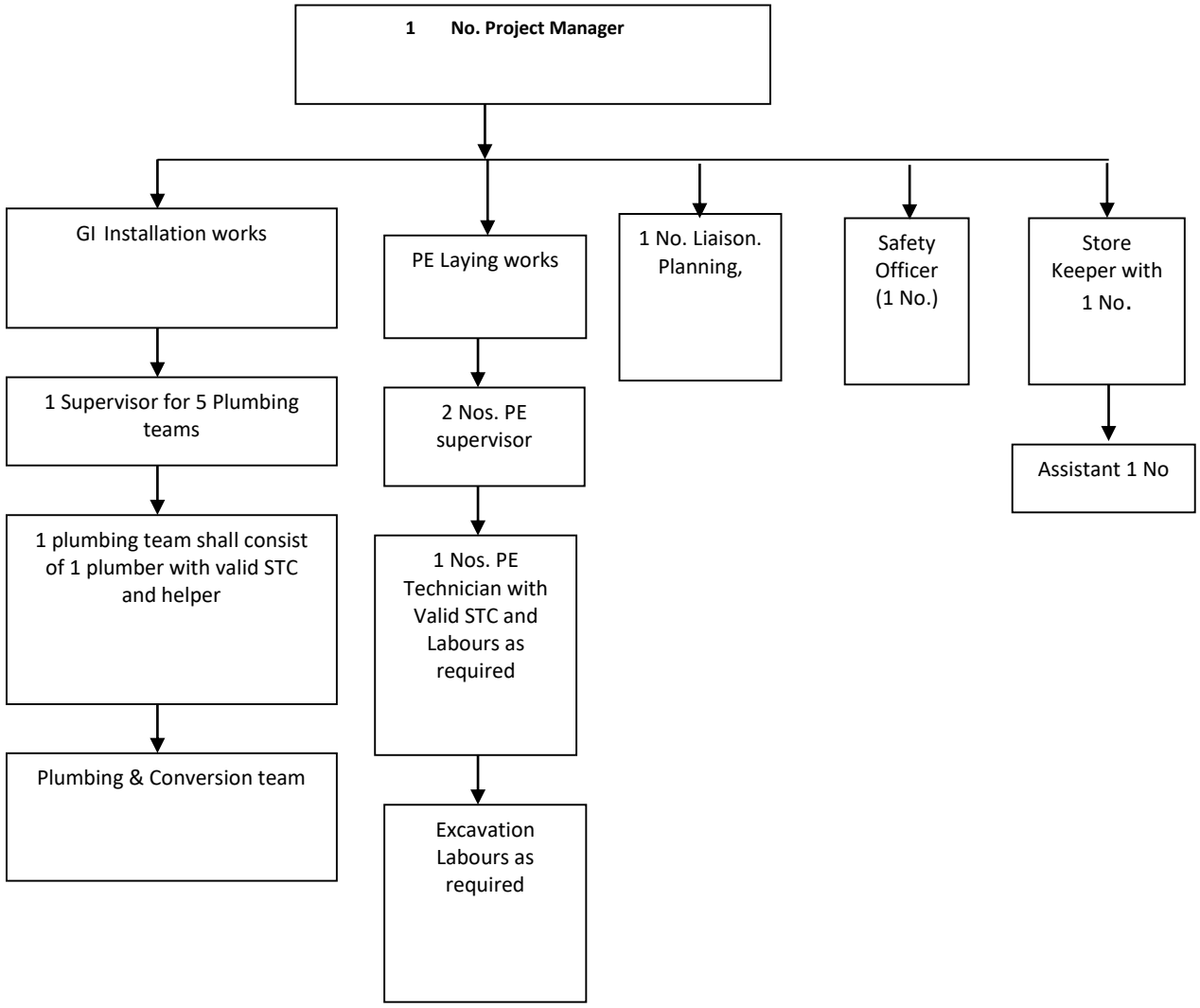
ANNEXURE-5 MANPOWER & OTHER RESOURCES TO BE DEPLOYED BY ONE CONTRACTOR PER PROJECT AREA



Note:-

1) Above shown manpower details are typical. However, EIC and Contractor has to mutually decide actual nos. of manpower requirement based on site/target requirement.
2) Each contractor will have to maintain one site offices (min 200 sq. ft. area to suit the geographical location of the whole project area).
3) Site office will have at least One PC with printers & e-mail facility, one no. land line telephone in working condition.
4) Project manager, engineers, supervisor and other staff members shall have mobile phones for communication.
5) The minimum qualification criteria for manpower shall be as per attached Annexure - 3.
6) Contractor shall ensure to deploy adequate supervisor for PE Laying & GI Installation works to comply/ witness critical activities that are being executed simultaneously in a city as per tender specification requirement or Owner's Instructions.

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ANNEXURE-6 TOOLS & EQUIPMENT TO BE PROVIDED BY CONTRACTOR FOR GI INSTALLATION WORK

S.N0.	HAND TOOLS DESCRIPTION	PER TECHNICIAN	PER TEAM
1	Pipe wrench 250 mm		
2	Pipe wrench 350 mm		
3	Pipe wrench 450 mm		
4	Adjustable spanner 50 mm		
5	Adjustable spanner 150 mm		
6	Adjustable spanner 250 mm		
7	Set of combination spanner 3/16”-11/4” AF		
8	Set of combination spanners 5mm - 30mm		
9	Large tool boxes		
10	Set flat-headed screw drivers		
11	Set Philips screw drivers		
12	Small hammer		
13	Combination pliers/mole grips		
14	Set of files		
15	Drill bits for 1” pipe		
16	Stocks and dies for BSPT threading ½”, ¾”, GI Pipe		
17	Hand drill 3/8” chuck		
18	Portable electric drill 240V, heavy duty and double insulated		
19	Spare blades		
20	Battery powered torches		
21	Measuring tape 30 m		
22	Wire brush		
23	Portable pipe vice & tripod		

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24	Set steel twist drills 0.5-2.0 mm (for appliance conversion)		
25	Set steel twist drills 1mm-10mm		
26	Set masonry drills 1mm-10mm		
27	Graphite based grease		
28	Lubricating oil		
29	Hand cleaner		
30	GI Pipe Cutters ½" Power Generator 2.5 KVA Pressure Gauge (0-10 bar) Pressure Gauge (0-4 bar) Diaphragm Gauge (0-400 m bar) Manometer (0-150 m bar)		
32	Automatic Thread cutting machine (Optional)		
33	GI Pipe Cutter		
27	MMT meter		

NOTE: * ALL PRESSURE GAUGES AND INSTRUMENTS SHALL BE CALIBRATED AT EVERY ONE YEAR

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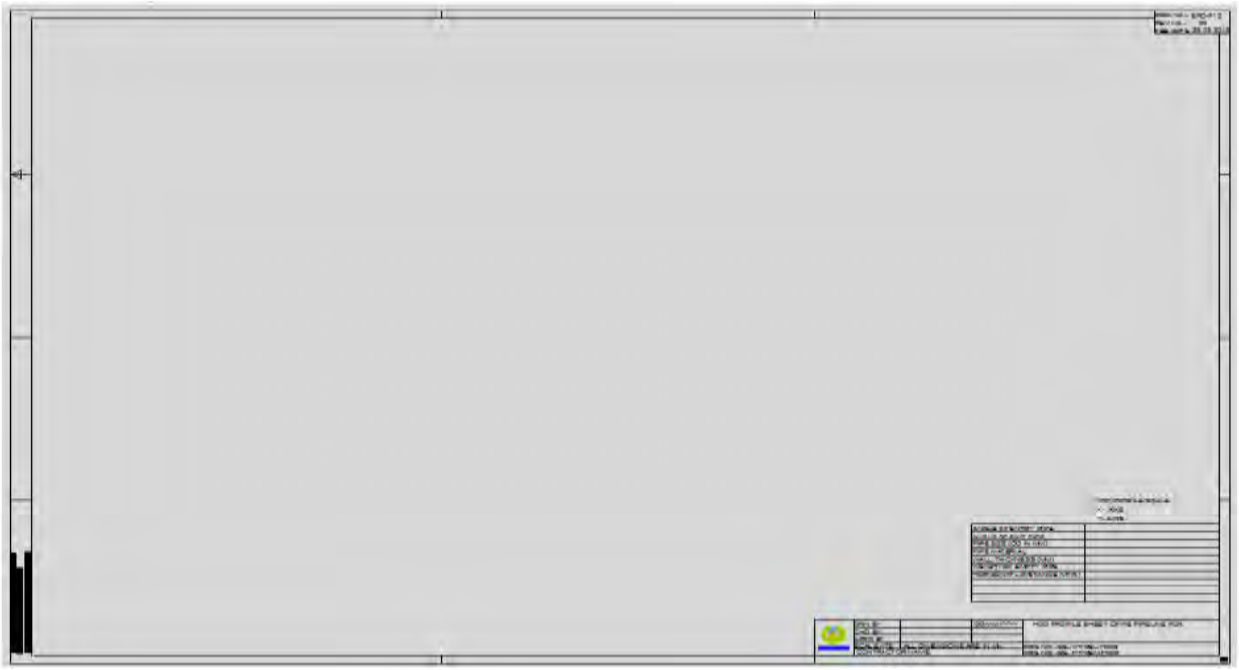
ANNEXURE-7 FORMATS FOR SUBMISSION OF AS-BUILT DRAWINGS

All as-built drawings shall be submitted in GGL as-built formats as per the GGL guideline and template given below-

a) Distribution Mains

b) HDD Profiles



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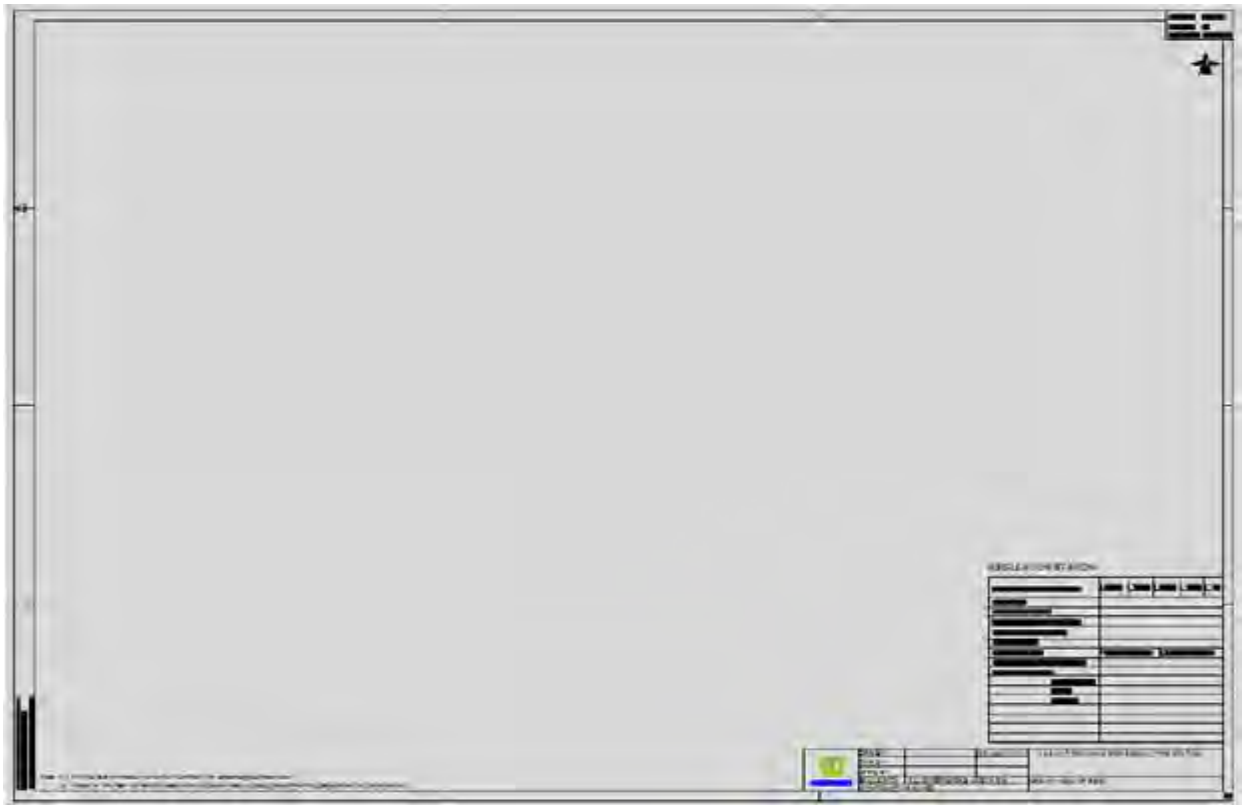
c) Regulator Station



d) Valve Chamber

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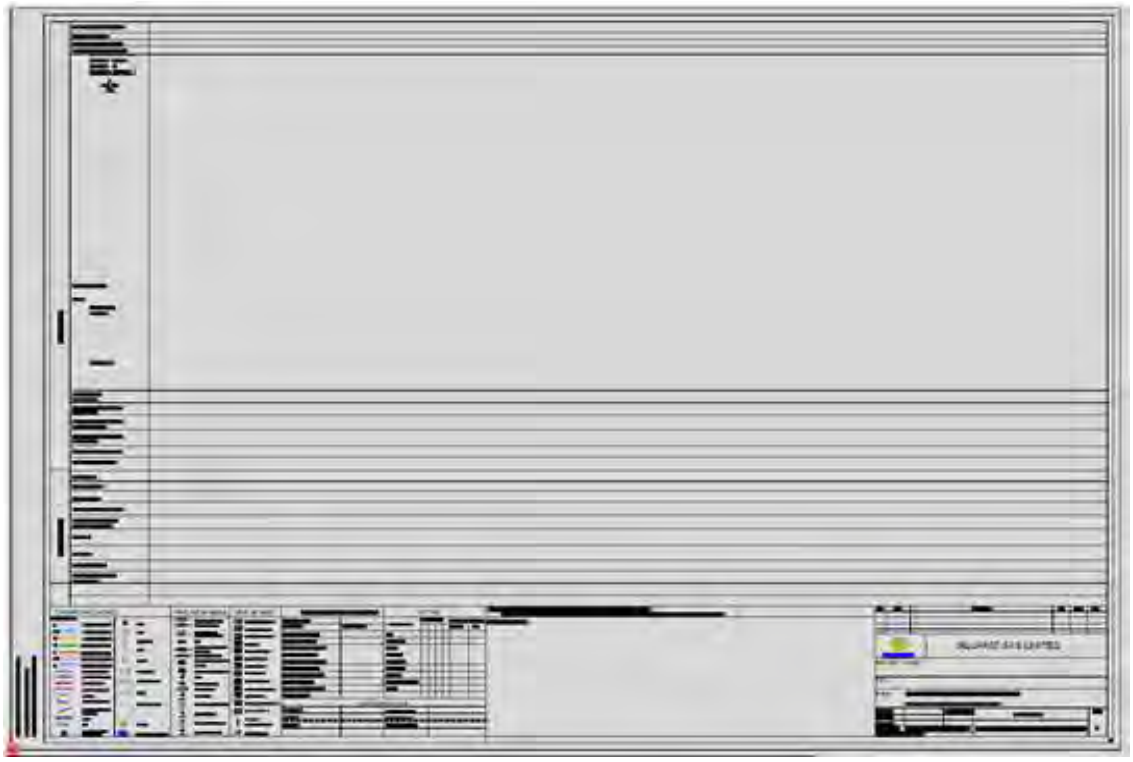
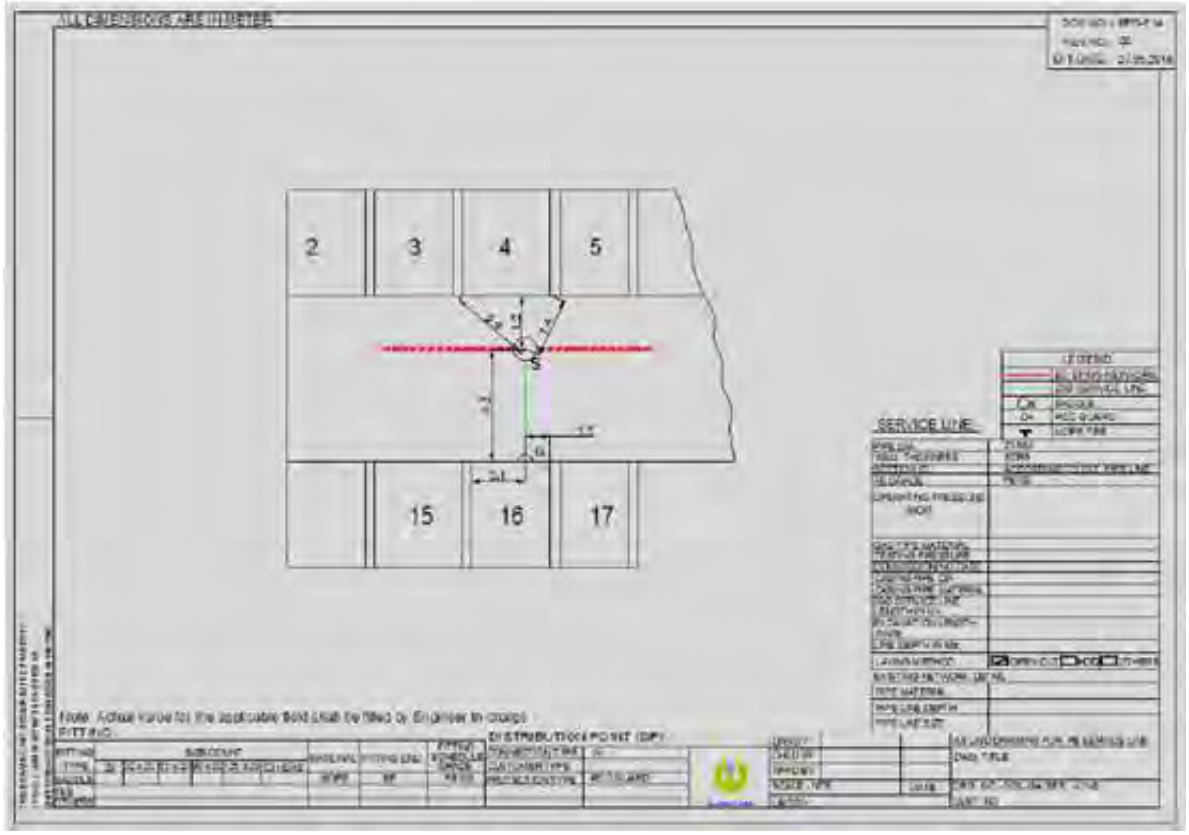
e) As-built Alignment Sheet



f) Service Lines



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ANNEXURE-8 FORMATS OF REPORTS

a) Area wise PE Laying Report

GUJARAT GAS	Area / Site wise PE Laying Report	Doc. No.: CON-F-09 Page No.: Page 1 of 1 Rev No.:00 Eff. Date: 01/12/2017

Zone / GA :		WO No.:	
City / Town / Village :		RA Bill No. :	
Area / Site Location :		Bill Date :	
Name of the Contractor :			

Date	Back Filling Report No	Area	Pocket/ Village Name	Ø32 mm								Ø63 mm								Ø90 mm								Ø125 mm								Ø160 mm								Total							
				Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braking	Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braki	Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braking	Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braking	Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braking	Open Cut	Boaring	Total Length	RCC Braking	Half Round	PCC on Tren	Hume Pipe	Rock Braking
			Total																																															

Certification by:	Contractor		Gujarat Gas		
	Prepared By			Witness/Verified By (Site Engineer)	Certified By (Engineer In Charge)
Signature : Name : Designation : Date :					

Bidder's seal & sign

b) HDD Pilot Drill Path Log:

GUJARAT GAS	HDD Pilot Drill Path Log	Doc.No.: CON-F-10 Rev. No.: 0 Effective Date: 01/12/2017

Location: ..... **Date:** .....

Name of Contractor: ..... **Supervisor Name:** .....

Pipe Dia: .....

Pipe Batch No.: .....

Drg. No.: .....

Rod No.	Pitch (%)	Angle (Degree)	Depth (Mtr)	Rod No.	Pitch (%)	Angle (Degree)	Depth (Mtr)
0				28			
1				29			
2				30			
3				31			
4				32			
5				33			
6				34			
7				35			
8				36			
9				37			
10				38			
11				39			
12				40			
13				41			
14				42			
15				43			
16				44			
17				45			
18				46			
19				47			
20				48			
21				49			
22				50			
23				51			
24				52			
25				53			
26				54			
27				55			

Remarks:

	Contractor	TPI	GGL Incharge
Date			
Name			
Sign			

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c) Electro-Fusion Joint Inspection Report:

GUJARAT GAS	Electro-Fusion Joint Inspection Report	Doc. No.: CON-F-11
		Page No.: Page 1 of 1
		Rev No.:00
		Eff. Date: 01/12/2017

Zone / GA :		**Report Date :**	
City / Town / Village :		**Report No. :**	
Area / Site Location :		**TPIA :**	
Name of the Contractor :			

EF Machine Details

Make		Model No.	
Machine Sr. No.		Calibration Certificate Dt.	
Last Calibration Dt.		Calibration Due Dt.	

Sr. No.	Location	Pipe O.D.	Pipe Fitting Detail			Joint No	Welder Name & Training Validity Dt.	Heating Time Sec.	Cooling Time Min.	Visual Observation
			Make	Description	Batch No./ Lot No.					
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
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20										
21										
22										
23										
24										
25										

Certification by:	Contractor	Gujarat Gas	
	Prepared By	Witnessed By (TPI)	Verified By (Site Engineer)
Signature : **Name :** **Designation :** **Date :**			

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d) Installation Report for PE Valves & Service Regulator Module:

GUJARAT GAS	**Installation Report for PE Valves & Service Regulators**	Doc. No.: CON-F-12	
		Page No.: Page 1 of 1	
		Rev No.:00	
		Eff. Date: 01/12/2017	
Zone / GA :		**WO No.:**	
City / Town / Village :		**RA Bill No. :**	
Area / Site Location :		**Bill Date :**	
Name of the Contractor :		**Report date & No.**	

Valve Chamber Installation & Commissioning Details

Sr.	Vavle Size	Make	Location of Installation	Leak Detection Test	Chamber Construction (Ok / Not Ok)	Valve Number

Service Regulator Installation & Commissioning Details

Sr.	Service Reg. Size	Make	Location of Installation	Leak Detection Test	Foundation (Ok / Not Ok)	Service Regulator Number

Remarks				
Certification by:	**Contractor**	**Gujarat Gas**		
	Prepared By	**Witnessed By (TPI)**	**Verified By (Site Engineer)**	**Certified By (Engineer In Charge)**
Signature : **Name :** **Designation :** **Date :**				

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e) Cleaning, Flushing & Pneumatic Testing Report:

GUJARAT GAS	Cleaning, Flushing & Pneumatic Testing Report (PE Pipeline)			Doc. No.: CON-F-13
				Page No.: Page 1 of 1
				Rev No.:00
				Eff. Date: 01/12/2017

Zone / GA :	**PTW Nos & Dates**	Test Medium	**AIR**	**Report Date :**	
City / Town / Village :		Pressure Guage Range	**0 to 10 barg**	**Report No. :**	
Area / Site Location :		Test Pressure		**TPIA :**	
Section:		Pressure Guage No.			
Name of the Contractor :		Calibration Dt.			
		Calibration Due Dt.			
		Holding Duration			

Sr. No.	Area / Location	PE Laying Length (Mtrs)						Cleaning & Flushing Date	Result Ok / Not Ok
		Ø32	Ø63	Ø90	Ø125	Ø160	Total		
	Total								

Pressure Monitoring Data

Sr. No	Time	Pressure (Bar g)	Signature

Remarks			
Certification by:	**Contractor**	**Gujarat Gas**	
	Prepared By	**Witnessed By (TPI)**	**Verified By (Site Engineer)**
Signature : **Name :** **Designation :** **Date :**			

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f) Nitrogen Purging & Commissioning Report (PE Pipeline):

GUJARAT GAS	**Nitrogen Purging & Commissioning Report (PE Pipeline)**	Doc. No.: CON-F-14
		Page No.: Page 1 of 1
		Rev No.:00
		Eff. Date: 01/12/2017

GA :		Report Date :	
City / Town / Village :		Report No. :	
Area / Site Location :		TPIA :	
Name of the Contractor :		Intimation No.	

Pipeline Length (Meters)						
Pipe Dia.	Ø32	Ø63	Ø90	Ø125	Ø160	Total
Length in Meters						

PTW No. & Date :			
DPRC No.	:	Drg. No. of commissioned section	:
Feeder No.	:	Ref. Drg no. for tap-off/extension Locati	:
Leak Surveyor S. No.	:	Leak Surveyor Calibration Due Date	:

Purging & Commissionig Details

Sr.	Location of Purging Point	% O2 (Requirement : <2%)	% Methane (Reqirement : >90%)	Leak Test at Final Joints Locations	Remarks
1					

Attachments: As-laid drawings
PE Network Testing Report

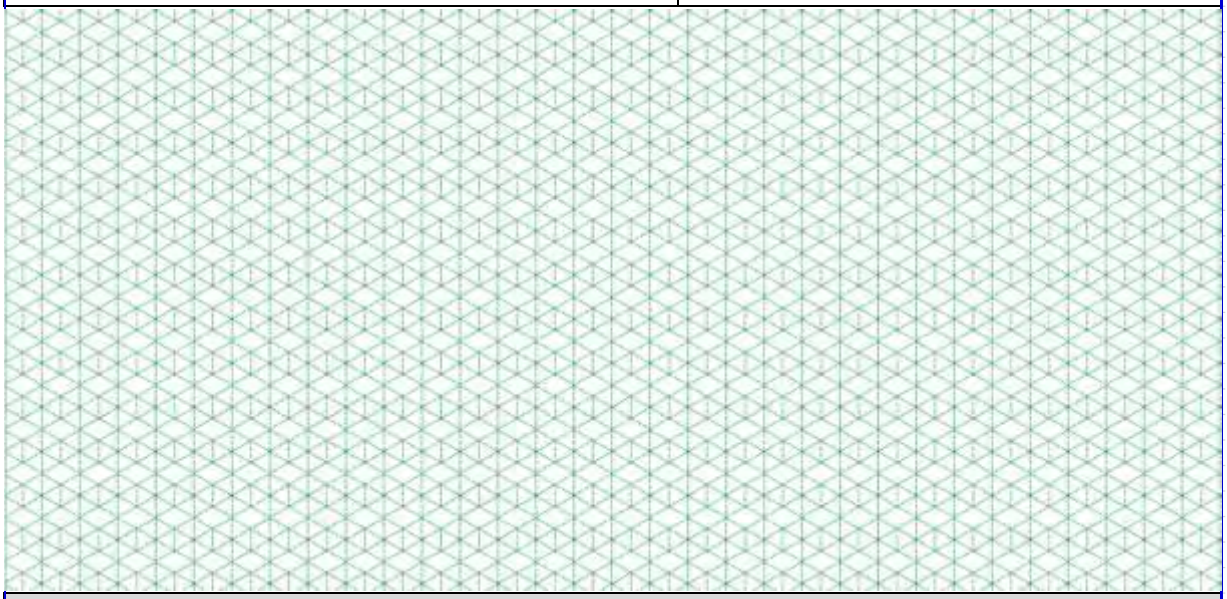
Certification by:	Contractor	Gujarat Gas	
	Prepared By	Witnessed By (TPI)	Verified By (Site Engineer)
Signature : Name : Designation : Date :			

Bidder's seal & sign

g) PNG Job Card:

GUJARAT GAS	**PNG JOB CARD**	Doc. No. : CON-F-17 Page No.: Page 1 of 2 Rev. No. : 0 Eff. Date: 01/12/2017

Application No.	:	**Project / Location**	: .....
Service Order No.	:	**Premise Type**	: .....
Customer Name	:	**DRS & SR No.**	: .....
Address	:	**Installation Date**	: .....
	:	**Testing Date**	: .....
Phone No.	:	**Conversion Date**	: .....
Connection Type	:	**Initial Meter Reading**	: .....
Contractor Name	:	**Meter No.**	: .....



BILL OF MATERIAL

Sr.	Description	Qty.	Sr.	Description	Qty.	Kitchen Point	Geyser Point	Extra KP
1	**Total 1/2" GI Pipe Length (Mtrs.)**		5	**Gas Tap**				
	a. RCC Guard/TAP to Main Isolation Valve		6	**Rubber Tube**				
	b. Main Isolation Valve to Meter		7	**End Plug**				
	c. Metering to Kitchen		8	**1" GI Pipe for Riser/Header (Mtrs.)**		**STATUS (Put √)**	**COMM.**	**CONV.**
	d. Geyser Point		9	**1/2" GI Pipe for Riser/Header (Mtrs.)**				
	e. Extra Kitchen Point		10	**1" GI Pipe for Common Approach (Mtrs.)**		**Remarks/Comments**		
2	**20mm/32mm PE Open Cut (Mtrs.)**		11	**1/2" GI Pipe for Common Approach (Mtrs.)**				
3	**20mm/32mm Manual Boring (Mtrs.)**		12	**Regulator Type : HP ( )/LP( )**				
4	**Main Isolation Valve/Riser Isolation Valve**		13	**Meter Type : Left Inlet ( )/Right Inlet( )**				

ગ્રાહક સંમતિ તથા કનવર્ઝન પ્રમાણપત્ર

કંપની દ્વારા એલ.પી.જી. માંથી નેચરલ ગેસ (NG) કનવર્ઝન કરવામાં આવેલ છે જે નીચે જણાવેલ મુદ્દાઓ બરાબર.....

૧. ગેસ સ્ટવની નોઝલની સાઈઝ ગેસના પોઈન્ટની નજીક આપની જરૂરીયાત મુજબની ..... (છે/નથી)
૨. જેટલા ગેસના પોઈન્ટ છે તેટલી રબર ટયુબ મળી ..... (છે/નથી)
૩. કનવર્ઝન કરતી વખતે ગ્રીસીંગ કરેલ ..... (છે/નથી)
૪. ગેસ સ્ટવની કુલેમ બરાબર ..... (છે/નથી)
૫. ગેસ સ્ટવમાંથી બદલી કરેલ એલ.પી.જી. ના જેટ આપને પરત કરવામાં આવ્યા ..... (છે/નથી)
૬. કનવર્ઝન કરવા આવેલ વ્યકિતનું વર્તન સંતોષકારક ..... (છે/નથી)
૭. ગેસ સ્ટવનો નોબ મીનીમન પર લાવતા ગેસની કુલેમ ચાલુ રહે ..... (છે/નથી)
૮. મીટર રીડીંગ આપની હાજરીમાં લીધેલુ અને બરાબર જણાવેલ ..... (છે/નથી)
૯. પી.એન.જી. સુરક્ષા સલામતી માર્ગદર્શિકા મળેલ તેમજ માહિતી આપેલ (છે/નથી)
૧૦. ગ્રાહક કનવર્ઝન માટે તૈયાર ..... (છે/નથી)
૧૧. અન્ય વિગતો .....

જે દિવસે ગેસનો પુરવઠો ગ્રાહકનાં રહેઠાણમાં ચાલુ થશે તે દિવસથી જ બીલીંગ ચાલુ થઈ જશે અને ગ્રાહકે વધુમાં વધુ 30 દિવસની અંદર ગેસનાં ચુલાનું કનવર્ઝન કરાવી લેવાનું રહેશે. ત્યારબાદ ગેસ પુરવઠો ચાલુ કરવાની ચિંતાનો વાર્ષ ગ્રાહકે અલગથી આપવાનો રહેશે જે અમો (ગ્રાહક) ને માન્ય રહેશે.

હું/અમો પ્રમાણીત કરીએ છીએ કે આ ગેસ કનેકશનના રૂટ, ફીટીંગ તથા કનવર્ઝન ગુજરાત ગેસના નિયમોનુસાર અને અમારી જરૂરીયાત પ્રમાણે સંતોષકારક રીતે પૂર્ણ થયેલ છે.

I/We hereby certify that, the entire gas connection viz. route selection, installation and conversion has been undertaken as per Gujarat Gas policy, our requirements and to my/our satisfaction.

ગ્રાહકનું નામ **સહી / તારીખ** **ગ્રાહક/ગ્રાહક વતી સહી કરનારનું નામ**

(CONTRACTOR) (TPI) (GUJARAT GAS)

Bidder's seal & sign

GUJARAT GAS	**IN-PROCESS INSPECTION, TESTING, COMMISSIONING & CONVERSION REPORT**	Doc. No. : CON-F-17 Page No.: Page 2 of 2 Rev. No. : 0 Eff. Date: 01/12/2017

Application No. : **Meter No. :**

Customer Name :

HSE COMPLIANCE / REMARKS

1. Overall Safety provisions at site :				
2. Nearmiss/Incident took place, if any with brief details :				
3. Required Permit details :				
4. SSRA (Site Specific Risk Assesment) done & found :	**Ok:**	**Not Ok:**	**Remarks:**	**HSE:** / **EIC/SE:**

GI PLUMBING CHECKLIST & COMPLIANCE					**PIPE PNEUMATIC TESTING REPORT (PPT)**		
SR.	**INSPECTION POINTS**	**YES**	**NO**	**REMARKS**	Testing Medium		Air
1	Proper alignment of GI pipe & 1 Mtr. distance between two clamps maintained.				Pressure Gauge Calibration Details		
2	PVC Sleeve with Anticorrosive Tape & restoration of hole (In case of wall crossing).				**Details**	**Pressure-Kg/Cm^2**	**Date/Time**
3	Installation of Isolation Valve (IV).				**Initial**		
4	Height of Isolation Valve (5 ft. to 6 ft.).						
5	Meter clearance from wall (2 cms) & spool used.						
6	Height & safe location of Meter (5 ft. to 6 ft.).			**Position: (IN) / (OUT)**	**Final**		
7	RCC Guard properly mounted with cementing & sand filling.						
8	300 mm clearance maintained from Electrical line & sleeve provided.						
9	Geyser Point installation as per policy & undertaking received. Geyser position inside/outside bathroom.	**OUT ( ) / IN ( ) Cross ventillation checked by & sign :**					
10	NRV installed in Meter downstream.				**Duration-Minutes**		
11	Route clearance & NOC (for Soc./Apt.) obtained.			**Attached / Uploaded**			
For Riser/Header Installation		**Riser/Header No.:**			**Test Result**		
12	Riser/Header Alignment, Clamping, etc.						
13	Ensure PtW (WAH, GC, Online Tapping), certified PETZEL & Technican on job.				**Overall Remarks post PPT:**		
14	Union/Tapping Tee installed as required.						
15	Main Control Valve installed on Riser/Header.						

COMMENTS & SIGN:

(CONTRACTOR) **(TPI)** **(GUJARAT GAS)**

GROUND CONNECTION CHECKLIST (PE) & COMPLIANCE					**GROUND CONNECTION TESTING REPORT (GC)**	
SR.	**INSPECTION POINTS**	**YES**	**NO**	**REMARKS**	**Date:**	
1	PE laying as per Gujarat Gas Guidelines.				**Pre-Tested Coil Report No.:**	
2	Deviation taken for 20mm PE laying, specify (if Yes).				**EF Joint:**	
3	Laying of PE service line up to Transition Fitting including sand filling at required depth.				**GC Joint No.:**	

COMMENTS & SIGN:

(CONTRACTOR) **(TPI)** **(GUJARAT GAS)**

MANOMETER TESTING (MMT) CHECKLIST & COMPLIANCE					**MANOMETER TESTING REPORT (MMT)**		
SR.	**INSPECTION POINTS**	**YES**	**NO**	**REMARKS**	Testing Medium		Natural Gas
1	Colour Touch-up.				Manometer Calibration Details		
2	Installation of NG Meter, Regulator, NRV adaptor at meter outlet, Gas Tap & Rubber Tube.				**Records**	**Pressure-mbar**	**Date/Time**
3	Installation of RCC Guard, Alignment/Mounting with Stenciling, Sand filling & Cementing.				**Initial**		
4	Installation Gas Tap/End plug.				**Final**		
5	Leak detection of all Joints, Meter & Regulator for ZERO leakage.				**Duration-Minutes**		
6	Installation of Flexible Rubber Tube (Suraksha, 1.0 Mtr. Length) with Gas Stove.				**Test Result**		
	Rubber Tube: Make -		**Mfg. Date / Year -**		**Expiry Date / Year -**		

COMMENTS & SIGN:

(CONTRACTOR) **(TPI)** **(GUJARAT GAS)**

NG CONVERSION CHECKLIST & COMPLIANCE					**NG CONVERSION COMPLETION REPORT**	
SR.	**INSPECTION POINTS**	**YES**	**NO**	**REMARKS**		
1	Emergency sticker installed on NG Meter.				NG Pressure at Appliance/Burner (MMWC/mbar)	
2	Information given to Customer about Safety & Services.					

COMMENTS & SIGN:

(CONTRACTOR) **(TPI)** **(GUJARAT GAS)**

Bidder's seal & sign

h) Labour Compliance Checklist

Annexure – III Compliance checklist to be submitted along with monthly bills

General Details :

Name of Contractor:		PO Number :	
Vendor Code :		Invoice Number :	
Nature of Work : (As per PO terms)		Period of Work : (As per invoice)	
Name of Engineer In-charge (GGL) :		Location/GA :	

Labour License Details :

License Number :		License Date :	
		License Expiry Date :	

Employees' Compensation Policy Details :

WC Policy Number & Date :	
Policy Valid Up to :	Numbers of employees' covered :
First Bill : YES ☐ / No ☐	Terminal/Last Bill : YES ☐ / No ☐
PF Code :	ESI Code :

Register Details : (Tick mark)

Month	No. of Employee	Previous Month Register & Challan							Remarks
		Attendance Register	Wage Register	Salary Payment Proof	PF Challan & ECR Copy	ESI Challan & ECR Copy	PF/ESI U/T on LH with exempted employee details	CESS (BOCW)	

Sign. & Seal [Contractor]		Verification & Sign. [Contract Owner/ Engineer In-charge]	
Date :		Date :	

*Wherever PO terms specify different practice then prescribed above, the PO terms will prevail.

Bidder's seal & sign

i) Compliance list

List of Documents /Forms / Registers to be maintained and submitted by contractor along with monthly bill under various labour laws as applicable.

Sr. No.	*Particulars*	*Frequency*
1	Valid Labour License under the CLRA Act, 1970 - if workmen is 20 or more	ONE-TIME (Last updated)
2	BOCW Registration	
3	PF Registration	
4	ESI Registration	
5	EC Policy under the Employees' Compensation Act (Renewal copy on expiry – If work is continue)	
6	PF challan & ECR copy - Previous Month	Monthly Basis
7	ESI Challans & ECR copy - Previous Month	
8	CESS Challan	
9	Form no. 16 Muster roll under CL (R&A) Act – Previous Month	
10	Form No. 17/18 Register of wages/ Muster cum Reg. of wages under CL (R&A) Act – Previous Month	
11	Undertaking, if PF/ESI or Both challan(s) is common with exempted employees' details.	
12	Salary payment thru' bank – With valid "Salary Transfer Proof" - Previous Month	

Bidder's seal & sign

j) Form A (Register of Workmen)

[See rule 2(1)]
FORM A
FORMAT OF EMPLOYEE REGISTER

Name of the Establishment :_____, Name of Owner :_____, LIN_____

Sl. No.	Employee Code	Name	Surname	Gender	Father's/Spouse Name	Date of Birth#	Nationality	Education Level	Date of Joining	Designation	Category Address *(HS/S/SS/US)	Type of Employment	Mobile	UAN	PAN	ESI IP	LWF	AADHAR	Bank A/c No.	Bank	Branch (IFSC)	Present Address	Permanent	Service Book No.	Date of Exit	Reason for Exit	Mark of Identification	Photo	Specimen Signature /Thumb Impression	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

k) Form B (Format for Wage Register)

FORM B
FORMAT FOR WAGE REGISTER

Rate of Minimum Wages and since the date : 01.04.2017								
	Highly Skilled		Skilled		Semi-Skilled		Un-Skilled	
Minimum Basic + DA	Area A	710	Area A	653	Area A	593	Area A	536
DA	Area B	653	Area B	593	Area B	506	Area B	448
Overtime	Area C	593	Area C	506	Area C	420	Area C	359

Name of the Establishment: **Name of Owner:** LIN:

Wage Period From To (Monthly)

S.No	Sl. No. in Employee Register	Name	Rate of Wage	No. of Days worked	Overtime hours worked	Basic + DA	Arrear Basic	DA	Payments Overtime	HRA	Others	Total	Deduction								Net Payment	Employer Share PF Welfare Board	Receipt By Employee / Bank Transaction ID	Date of Payment	Remarks
													PF	ESIC	PT	Income Tax	Insurance	Others	LWF	Total					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

l) Form C (Format of Register of Loan/Recoveries)

FORM C
FORMAT OF REGISTER OF LOAN/RECOVERIES

Name of Eastablishment : _____ . LIN : _____

S. No. in Employee register	Name	Recovery Type (Damage/loss/fine /advance/loans)	Particulars	Date of damage/Loss*	Amount	Whether show cause issued	Explanation hard in presence of*	Number of instalments	First Month/Year	Last Month/ Year	Date of Complete Recovery	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13

Nil for the month of July'2017

Bidder's seal & sign

m) Form D (Format of Attendance Register)

FORM D

FORMAT OF ATTENDANCE REGISTER

Name of the Establishment: **Name of Owner:** **LIN:**

Wage Period From **To**

S.No	Sl. No. in Employee Register	Name	Place of work*	Date																															Summary No. of Days	Remarks No. of Hours	**Signature of Register Keeper
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
				IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT	IN OUT			
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Relay and *Place of work in case of Mines only (Underground / Opencast / Surface)

In case an employee is not present the following to be entered: (**"R"** for Rest / **"L"** for Paid Leave / **"A"** for Absent / "**O**" for Weekly off / **"C"** for establishment closed)

** Not necessary in case of E Form maintenance