

ANNEXURE – 1

DETAILED SCOPE OF WORK FOR PIPELINE LAYING

Scope of work summaries the requirement for Mobilization, installation, testing, Cleaning, End Connections, purging, pre-commissioning and commissioning of Natural Gas Pipeline and Pressure Regulating and Metering skids and their hook-up including Steel Pipeline maintenance job and associated civil work. The Scope of Work includes as a minimum, but not limited to, the following:

1. GENERAL:

1.1 SCOPE

This specification covers the minimum requirements for the various activities to be carried out by **CONTRACTOR** for the Construction and Modification of the Steel pipeline job.

The following is a broad description of activities, which shall be included as part of this contract, as a minimum.

All the activities required for **Pipeline Laying** and **Modification / Extension** as per the plan, including, but not limited to, the following:

- Issue & receipt of steel pipes and other materials from **GEL** designated store or on site delivered directly from vendor as the case may be.
- Supply of all consumables procured from approved vendor of **GEL** is under scope of **CONTRACTOR** as per the rates quoted in this tender or rates derived and mutually accepted from other works of similar nature.
- Storage, Handling and Transportation of Pipes, Fittings, other project job related material and equipment.
- Stacking, Grading and Marker installation along the RoW.
- Survey for utility identification.
- Procedure qualifications.
- Pipe stringing and alignment along the RoW.
- Excavation of trial pits / holes for utility identification and trenching.
- Protection of trench using Shoring, Step cut and Shuttering
- Welding and NDT including Radiography
- Field Joint Coating
- Pipeline laying through horizontal directional drilling (HDD) method and backfilling
- Hydro test, Cleaning, Swabbing and Pre-commissioning and Commissioning of Pipeline
- Restoration
- Spreading quarry spoil
- Supply and Installation of Paver Block
- RCC work for Road repairing
- Cold Field Bending / Induction Bending of Pipes
- Concrete Coating of Pipes
- Crossings by horizontal directional drilling (HDD)/ Thrust boring including cased crossing
- Hook up of pipeline at the battery limits, as per the requirements.
- Prefabrication & testing of valve assembly / DRS
- Installation of Valves, Insulation Joints and other equipment in the Pipeline
- Transportation, shifting, and Installation of DRS/CPRS
- Fabrication and Installation of Steel structures such as Supports, Cross Over, ladders etc, as per site requirement
- Civil work for construction of valve chambers and DRS/CPRS
- Liaise with authorities and local people during the execution and submit the NOC from the authorities after completion of work as per the condition of permission.

- Obtain working RoU for pipeline construction wherever required
- Preparation of documents / reports for each activity
- Supply of Casing Pipe as per **GEL** Specification.
- Implementation of **GEL** HSE policy, HSE Management System, Life Saver and guideline in the project
- Establish Camp at location for equipment, Material, civil labor and staff.
- Supply of Manpower, Machineries, Equipment and Consumables “Fit For Purpose”
- Certification of entire facilities and the resources (Machinery, tools and tackles, & equipment) by **GEL** “Fit For Purpose”
- Manpower deployed at the site, office, camp shall be medically fit
- Manpower deployed shall be trained in Basic safety, First aid and firefighting and shall be assessed for its knowledge and competency.
- Procure PPE’s as per the **GEL** approved specifications.
- Provide Fabricated Caution Board and the Barricades as per the **GEL** approved design.
- Preparations of detailed Risk register for Site Specific Risks along with Mitigation plan for entire pipeline route.
- Conduct (Daily) site specific risk assessment with mitigation plan as per **GEL** approved Formats.
- Entire mitigation plan shall be reviewed by TPI and approved by **GEL**
- Site specific risk and Mitigation plan for entire pipeline route
- Preparation and approvals of HSE Plan
- Preparation and approvals of Project execution Plan as per time line agreed while bidding
- Preparation and approval of resource deployment plan to complete the project in time
- Preparation and get approval of HSE permit as per the **GEL** PTW Matrix – Safe Working Practice.
- Conduct Tool Box talks with all involved man power at each location for each activity and maintain record.

2. SITE CAMP

CONTRACTOR shall hire a land / place near working site or in city as agreed b/w **GEL** and **CONTRACTOR** with adequate infrastructure at Camp with facilities such as power, water, and communication to commence execution of work at site (s), in accordance with the agreed time schedule of completion of work.

- Space for Parking of construction equipment,
- Space for Safety equipments
- Space for Storage of Line Pipes
- Space for Prefabrication of pipeline facilities
- Shed for **GEL** Supplied Material
- Shed for Storage of Chemicals / Diesels
- First aids facilities
- Room / Store for Consumable & tools tackles
- Site Office with table, chairs, cupboards, Computers for **CONTRACTOR**
- Dark Room for Viewing RT Films
- Providing separate camp for excavation worker away from the site camp
- Get all facilities approved by TPI & **GEL**

3. MOBILIZATION

3.1 The CONTRACTOR should mobilize adequate number of Manpower; Equipment's, Instruments, Tools and Tackles in accordance with the Contract scope of work and the time of completion of Job.

- All the equipments will be inspected, Make it "fit for use" and get it certified by TPIA & GEL as equipment pass port.
- Fabrication of Barricading, Caution Boards, and Barricading Tap will be made available as per GEL drawing, specifications.
- All the safety equipments shall have required inspection certificates and shall inspected / checked as per the GEL Formats before it used at site
- Storage of Chemical as per procedure approved by GEL.

3.2 PROTECTION OF WORKING SITE

CONTRACTOR shall protect the site by hard barricading at city area / public places or soft barricading like as Bamboo barricading /cone / caution tape at out skirts. The method of protection of work site shall be selected based on risk assessment and use of soft barricading shall be allowed considering the risk profile submitted by **CONTRACTOR**. Final decision of the type of barricading shall be decided by GEL EIC.

After completion of day time construction activities, an arrangement shall be done for flickering lights / warning lights of suitable size at suitable locations right from the first day of execution along the construction site in case of working at or near traffic movement so as to prevent any accident. The cost of the same shall be borne by the **CONTRACTOR**. Also, the same arrangement shall be continued in case of low light OR working during night time.

4. MATERIAL MANAGEMENT

SCOPE OF SUPPLY

4.1 MATERIALS TO BE SUPPLIED BY GEL AS FREE ISSUE

Carbon steel 3LPE / FBE coated pipe of API 5L PSL2 Grade B/X42/X52/X65, Valves, Fittings, Leak Clamp.

4.2 MATERIALS TO BE SUPPLIED BY CONTRACTOR

The procurement and supply, in sequence and at the appropriate time, of all materials (permanent and Temporary) and consumables required for completion of the WORK as defined in the scope of work and tender, shall be entirely the **CONTRACTOR's** responsibility. The materials to be supplied are, but not limited to the following:

- All material other than free issued material provided by GEL required for completion of project shall be supplied by **CONTRACTOR**.
- All materials, equipment, trailers for transportation, loading, unloading, stringing etc. for GEL's supplied material.
- All welding machines, lifting equipment, instruments, transporting vehicles and consumables for welding such as oxygen, acetylene, inert gases and all types of electrodes, filler wire, solder wire, brazing rods, flux etc. for welding/cutting and soldering purpose.
- All materials, equipment and instruments required for all types of tests such as radiography, Ultrasonic testing, magnetic particle and dye penetrate examination and any other tests as per requirement of GEL/GEL's Representative.
- All materials, equipment, instruments and consumables including primer calibrated pump required for external corrosion coating and concrete coating (where required) of field weld Joints.

- All materials, equipment, instruments and consumables required for repair of damaged Coating of line pipe.
- Casing pipes, insulators and end seals and materials for casing vents and drains as per Drawings, if applicable.
- All materials, equipment, instruments and consumables required for continuous concrete Coating / Concrete slabs for providing anti buoyancy to the pipeline, wherever required.
- All materials, equipment, instruments, temporary vehicles required for sand/soft soil padding around pipeline, PVC warning mat, select approved quality backfill, bank stabilization of water crossings, etc.
- All materials, consumables and equipment related to blasting of rock for excavating trench or grading the Right-of-Way.
- All equipment and material for excavation.
- Corrosion inhibitor for water used for hydrostatic testing, including water for testing.
- All pigs for cleaning, gauging, filling, dewatering and swabbing of the pipeline.
- All equipment, pumps, instruments, pipes, fittings and equipment, metallic blinds, temporary gaskets as required for filling, pressurizing and dewatering for hydrostatic testing, including pipe headers for air and hydro testing.
- All consumables, equipment (air compressors/air dryers of suitable capacity), instruments for drying of pipeline includes pigs as required.
- All primer and paints for painting above ground piping.
- All materials, equipment, instruments for lowering and back filling and tie-in of pipeline sections.
- All materials, equipment required for repair/restoration of pavements, roads, bunds, other structures affected/damaged by **CONTRACTOR**'s construction activities. Materials shall be equivalent/superior to those used for original construction of the facility.
- Bolts, nuts, washers, U bolts, clamps, clips, and gaskets for supports.
- Shims, wedges and packing plates (machined wherever required).
- All materials, equipment for civil and structural works, grouting etc.
- All safety tools/tackles/devices/apparatus/ equipment, etc. including ladders and scaffolding as required.
- All materials for corrosion protection of buried piping, pipe-fittings, valves, casing pipes, etc.
- PVC warning mat & Protection of pipeline for HT Line crossing, foreign pipeline crossing with PVC mat or RCC.
- All materials, equipment for all types of pipeline markers.
- Nitrogen gas if required, for filling in the pipeline system for preservation.
- All other materials not specifically listed herein, but required for the execution of the WORK.

4.3 Handling, Hauling & Storing of Materials

The **CONTRACTOR** shall exercise utmost care in handling line pipe and other materials. **CONTRACTOR** shall be fully responsible for all materials and their identification until such time that the pipes and other materials are installed in permanent installation. **CONTRACTOR** shall be fully responsible for arranging and paying for storage areas for the pipeline materials, however, method of storage shall be approved by **GEL/TPIA**.

CONTRACTOR shall check health of pipe and fittings for coating damage, thickness as per BoQ, Magnetization of pipes etc prior to issue from **GEL** stores. In case of any deviation, in technical requirements of material **CONTRACTOR** is required to inform EIC in writing and shall not accept the delivery unless same is approved by EIC. **CONTRACTOR** shall check marking of identification number and condition of material before receiving from **GEL** store and shall send Material Take Off report within two day after receiving material.

CONTRACTOR shall reimburse the **GEL** for the cost of replacement of all **GEL** supplied materials damaged during the period in which such materials are in the custody of the **CONTRACTOR**. It shall be **CONTRACTOR's** responsibility to unpack any packing for the materials supplied by **GEL**.

Completeness of the **EQUIPMENT** shall be the responsibility of the **CONTRACTOR**. Any equipment, fittings and accessories which may not be specifically mentioned in the specifications or drawings, but which are usual or necessary for the satisfactory functioning of the equipment (successful operation and functioning of the **EQUIPMENT** being **CONTRACTOR's** responsibility) shall be provided by **CONTRACTOR** without any extra cost.

The **CONTRACTOR** shall perform the necessary loading, unloading, hauling to points designated by the **GEL** and storing if necessary of the material furnished by **CONTRACTOR**. The **CONTRACTOR** shall exercise care in handling, hauling, storing and distribution of such materials in order to avoid damage or deterioration of these materials.

Materials excluding line pipe shall be stored in the sheltered storage. Such materials shall not be strung on the Right-of-way but shall be transported in conveyances for use only at the time of installation.

CONTRACTOR shall ensure that all Pipes & valves and whenever applicable, other materials are fitted with suitable end covers.

4.4 Material Reconciliation

CONTRACTOR shall submit account of material issued for job to be completed. **CONTRACTOR** shall return all the balance material at **GEL's** store along with the necessary documents. Any discrepancies, if found in material account then cost of the same shall be deducted from **CONTRACTOR's** final bill.

- a) **CONTRACTOR** shall submit account of material issued for job to be completed.
- **CONTRACTOR** shall submit material consumption statement on Monthly basis and on completion of each job order.
 - At the time of reconciliation **CONTRACTOR** shall return total balance material for each of the projects being executed (even within the same location) that is issued to him by **GEL** for execution of work at his cost.
 - **CONTRACTOR** shall return all the balance material at **GEL** designated store along with the necessary documents. Any discrepancies, if found in material / instruments, equipment (issued by **GEL**) shortage / damage then cost of the same shall be deducted from **CONTRACTOR's** final bill as per rate decided by **GEL**.

RECONCILIATION OF GEL SUPPLIED MATERIALS

Every month, the **CONTRACTOR** shall submit an account for all materials issued by **GEL** in the Performa prescribed by the EIC. On Completion of the work, the **CONTRACTOR** shall submit "Material Appropriation Statement" for all materials issued by the **GEL** in the Performa prescribed by the EIC.

- The percentage allowance shall be accounted on the basis of final weld book chainage for main pipeline and erected/approved fabrication drawings for station piping as mentioned below:

A. For underground pipeline network

All coated line pipes as per line pipe specifications enclosed elsewhere in the bidding document, shall be issued on linear measurement basis. Joints etc. shall be issued on number basis. All other piping materials shall be issued on number basis. All cut pieces of pipes measuring in length 4m to 9m, when returned to **GEL's** designated storage points after beveling, shall be considered as serviceable material and **GEL** reserves full rights to re-issue

the same to the **CONTRACTORS**. All cut pieces of pipes measuring less than 4m will be treated as wastage/scrap.

- For the purpose of accounting of coated line pipes following allowances shall be permitted (maximum permissible limit).
- Unaccountable wastage 0.10%
- Scrap (all cut pieces of pipes measuring less than 4m):0.3% (**CONTRACTOR** has to return scrap quantity to **GEL** during reconciliation of materials.
- Serviceable materials (all cut pieces of pipes measuring from 4m up to 9m): 0.5%
- Unaccountable wastage/scrap/serviceable material shall be at actual as per site assessment subject to maximum as stated above.

B. For above ground piping work

For the purpose of accounting of station piping, all cut pieces measuring in length of 1m and above when returned to **GEL**'s storage points after beveling, shall be treated as serviceable materials. All cut pieces of pipe measuring less than 1m will be treated as scrap.

For the purpose of station piping in case of free issued by GEL, following allowances shall be permitted (maximum permissible limit);

- i) **Unaccountable wastage 0.1%**
- ii) **Scrap (all cut pieces of pipes measuring less than 1m) 1.0%**
- iii) **Serviceable materials (all cut pieces of pipes measuring 1m and above) : 2%**

Unaccountable wastage/scrap/serviceable material shall be at actual as per site assessment subject to maximum as stated above.

- C. All unused material / scrap material shall be the property of the **GEL** and shall be returned by the **CONTRACTOR** category-wise at his cost to the **GEL**'s designated store. **All the serviceable materials when returned to GEL should have details of Heat No. on each of the steel pipe and pipe returned without the details of heat no. shall not be considered as return quantity and liable for recovery.** In case the **CONTRACTOR** fails to do so/ or exceeds the limits of allowances specified above for scrap/serviceable materials, then recovery for such quantities not returned by the **CONTRACTOR** will be done at the penal rate i.e. 125% of landed cost at the time of final bill/closing of contract by EIC. The recovery shall be affected from the **CONTRACTOR**'s bill(s) or from any other dues of the **CONTRACTOR** to the **GEL**.
Upper limit for return of serviceable materials shall not be applicable for the individual project having total steel laying length of 2.5kms and below.
- D. **CONTRACTOR** shall be responsible for the adjustment/ weightment /measurement of the surplus materials to be returned to the store. **CONTRACTOR** shall also be responsible for suitable segregation of returned materials into separate stacks of serviceable and scrap materials.
- E. Wherever certain material is covered under **CONTRACTOR**'s scope of supply whether part or in full or any item of work covered under wherever certain material is covered under SOR, no allowance towards wastage/scrap etc. shall be accounted for during execution stage.

4.5 IDENTIFICATION OF PIPE

CONTRACTOR shall state pipe identification number on the top of pipe as given inside the pipe by pipe manufacturer for all pipes; **CONTRACTOR** shall also measure their length and state it on the pipes. Pipes to be bent shall be measured prior to bending. Identification (i.e. letter, number and length) shall be readable. All pipe identification numbers shall be recorded in respective progress report and pipe logbook.

Before a pipe length, pipe end, etc. is cut, the painted serial number shall be transferred by **CONTRACTOR** in the presence of **GEL**/TPIA to either side of the joint which is to be made by

cutting, and the changes shall be recorded in the above mentioned list stating the (new) length.

5. ROW CLEARING AND GRADING:

5.1 ROW MARKERS

Prior to clearing operations **CONTRACTOR** shall carry out following if require or instructed by **GEL**,

- **CONTRACTOR** to take photograph of entire stretch to keep records of original conditions.
- Install Benchmarks, Intersection Points and other required survey monuments.
- Stake markers in the centerline of the pipeline at distances of maximum 100 meters for straight-line sections.
- Stake two ROW markers at least at every 100 meters.
- Set out a reference line with respect to pipeline centerline at a convenient location.
- The **CONTRACTOR** is required to perform his construction activities within the width of RoW as provided by **GEL** for construction of pipeline. This shall include, as minimum but not limited to the following;
- Familiarization with all the requirements of applicable authority.
- Staking of row boundary as per alignment drawing and protection of monuments.
- Grading of Row motorable as required for proper installation of the pipeline.
- Construction of temporary bridge or culverts for moving the equipment and mentors.
- implementations of recommendations / instruction of the applicable authority mentioned in the permission
- Settlement of the entire row damage claims.
- preparation of activity reports

Any additional surveys or permissions required (for Working RoU / Space) and land/RoW acquisition for Pipeline Laying activity post issue of job order shall be carried out by the **CONTRACTOR** at his own cost.

For the laying of pipe line within city limit and industrial estate no specific ROW will be made available, **CONTRACTOR** shall use the roads available for general public for the construction purpose.

5.2 Right-of-Way

The route of Pipeline may run through various terrains with a restricted ROW of through or along cultivated fields, orchids, gardens, lawns, ditches, public roads, or obstacles distributary canal. The **CONTRACTOR** shall only use such width as made available plus extra land by private negotiation with his own cost and no extra cost to **GGL** and shall perform the work at such places in a manner to compliance **GEL** HSE requirements so as to avoid harm to people, assets and the structures damage by the construction of the pipeline.

6. Welding of line pipes:

Welding and laying of steel pipelines, fittings and insulating joints for gas pipeline in accordance with standard specifications. This shall include, as a minimum but not limited to the following:

- Electrode qualification, Welding Procedure Qualification for all the Group of Material includes approval of WPS, Perform Welding, conduct NDT, conduct destructive testing through approved laboratory,
- Loading, transporting, unloading, and stringing of line pipes along the pipeline route.
- Cleaning and Gauging of Line Pipe as per the approved Procedure.

- Supporting, grinding, gauging, clamping and fittings-up the pipeline sections.
- Welding, brushing, and cleaning of joints.
- Capped or plugging of open ends of the welded strings of pipes until the work is resumed.
- Nondestructive Testing of pipe joints and welding.
 - 100% DPT or UT for all the bevels prepared by gas cutting.
 - 100% Radiography or UT (if X-ray is Not Possible) of all the pipe and fittings Butt weld joints and MPT of all the Fillet Weld joints.
- Destructive Testing of Welding as recommended by GEL/ TPI
- Preparation of each stage of activity reports.

CONTRACTOR to refer “Specification for Pipeline Welding” mentioned in Annexure “Technical scope of work for Steel & PE Pipeline installation by HDD” attached with this document.

7. Field joints coating:

7.1 Field application of joint coating to the external surface of pipe in the girth weld area, fittings, Valves and repairing of damage portion of factory coating. This shall include, as a minimum but not limited to the following:

- Procurement of R-95 Liquid Epoxy Coating material from manufacturer with certification/ Heat shrink sleeve (HTLP 80) to be used for new pipeline extensions.
- Shot blasting of bare ends of pipeline joints and measures the surface roughness.
- Cleaning and brushing of damaged portion of factory coating.
- Application of Primer (if required).
- Applying coating by recommended methods as approved by manufacturer/TPIA.
- 100% Dry Thickness checking and Holiday testing of coated pipes and field joints by full circle spring.
- Peel testing of one joint for every 100 joints or a minimum 1 joint even if the number of joints is less than 100 of every day production.
- Preparation of activity reports.

CONTRACTOR to refer “Specification for Field joint coating” mentioned in Annexure “Technical scope of work for Steel & PE Pipeline installation by HDD” attached with this document.

8. Trenching:

8.1 Excavation of the pipeline trench on the surveyed route as per the alignment provided by GEL. This shall include, as a minimum but not limited to the following;

- Obtaining the clearance from various authorities.
- Study / Detections / Exposures of various underground utilities by cable locator survey/ trial pits and protection of the same.
- Marking of pipeline route (four-line marking) and excavation of trench to required dimension.
- Extra depth and width to protect the underground utilities & Safety of workers / technicians.
- Transportation of excavated soil at Dump yard (if enough space not available at site).
- Protection of trench as per the GEL Guideline. Soil shall be kept 200mm away from trench edges.
- Repair of any damages including damage to utilities to the satisfaction of Authority.
- Preparation of activity reports.
- Obtained NOC from concern authority

8.2 Tar cutting & soil handling/shifting

CONTRACTOR shall cut the tar/RCC/PCC surface using pneumatic /electrically operated breaker. The trench shall be further excavated using machine or manual means and spoil will be transported to a dump yard arranged by **CONTRACTOR** for the city laying or as per the direction of EIC.

8.3 Protection of Underground and Overhead Structures

CONTRACTOR shall obtain plans and full details of all existing and planned underground services, overhead lines from the **GEL** / concerned Authority having jurisdiction and shall ensure it by GPR survey whenever instructed by **GEL** or dig verifications/trial pits every 50 meters & follow these plans closely at all time during the performance of work.

CONTRACTOR will not be entitled to any other claims for any new obstacles (underground utilities, pipes and cables) during the course of work execution. **CONTRACTOR** shall repair at his own cost any damages caused to existing facilities. **CONTRACTOR** shall execute the work in such a manner that the said structures, utilities, pipelines etc. are not disturbed / damaged. Despite all precaution should damage to those utilities/ structure whether or not shown in the drawing,

- The **CONTRACTOR** must make repair or bear the cost of making good the same without delay to the satisfaction of the EIC and authority having jurisdiction.
- If **CONTRACTOR** fails to repair the damage in reasonable time (agreed by authority / **GEL**) **GEL** reserve the right to have repair executed at the cost of **CONTRACTOR**.
- Claims / Penalties notice received from authority shall be forwarded to **CONTRACTOR** by **GEL** for payment and receipt or NOC from authority shall be submitted to **GEL**.
- **CONTRACTOR** shall be liable for any damage occurring to, or resulting from damage to other pipelines, underground structures/utilities.
- In case the drawings are not available, **CONTRACTOR** shall dig out trial pits at no extra cost as per direction of **GEL**/TPIA to locate underground utilities.
- Where the pipeline crosses other underground utilities/structures, the **CONTRACTOR** shall manually excavate to a depth in such a manner that utilities/structures are located.
- Temporary under pinning or any other type of support or other protective devices necessary to keep the interfering structure intact shall be provided by the **CONTRACTOR** at his own cost and shall be of such design as to ensure against their possible failure.

9. LOWERING AND BACKFILLING:

9.1 Lowering shall start only after submission of section pipe-book Part -A and acceptance of the same for the section to be lowered. This shall include, as a minimum but not limited to the following;

- 100% Holiday Checking and repairing of Damage coating.
- Preparing of trench bed.
- Bedding & Padding of trenches where rock or Gravel or Hard Soil Encountered as per the approved procedures.
- Lowering of pipeline section with suitable equipment.
- Installation of "Goal Post" wherever there is overhead electrical cables/ lines.
- Transportation of Dump soil from Yard to Site for Backfilling and compacting, watering the excavated soil and crowning the trench.
- Disposal of excess soil in the City area at a designated place.
- Preparation of activity reports.
- Preparation of as Laid drawings mentioning reference measurements.

9.2 INSTALLATION OF WARNING TAPE

Warning tape shall be installed above the pipeline, where pipeline is laid with open cut / excavation, at 500mm above pipeline top, along the entire stretch of Pipeline, during backfilling. Warning Tape shall be as per **GEL** Specification.

9.3 SOIL SHORTAGE (Wherever Required)

If due to unforeseen circumstances, during backfilling and compacting there is not enough soil to fill the trench properly, or to install crown height as stipulated, **CONTRACTOR** shall supply the necessary backfill material at **CONTRACTOR**'s cost. This soil brought from outside shall be backfilled before the top - soil cover is replaced.

10. TIE-IN JOINTS:

The un-coated sections of pipeline at various locations to be tied in after section are coated, lowered and backfilled. This shall include, as a minimum but not limited to the following;

- Preparing trench to the require depth and width for preparing and welding of tie-ins at straight, bends, sags, and crossing.
- Protection of trench from collapse by adequate shoring, shuttering and Making the tie-ins pit in "V" Shape or Step cut.
- Cutting, Beveling and fitting of tie-in joints.
- Nondestructive Testing DP, UT, X RAY.
- 2 NDT test for golden joints.
- Joint coatings and holiday testing.
- Civil Work if required.
- Back filling, Watering and Soil Compacting.
- Preparation of activity reports.

11. CONCRETE COATING (Whenever Required):

Supply of all materials and consumables and application of concrete coating on line pipe before welding at site, and field joint concrete coating (Grouting), at locations identified by **GEL**/TPIA. This shall include, as a minimum but not limited to the following:

- Supply of all materials and consumables required for concrete coating of line pipe and field joints.
- Concrete coating of line Pipe with minimum 50-mm thickness & Sulfate Resistance Cement of Gr. M20 concrete mixture, on line pipe before welding at site.
- Curing of entire Concrete Coating to required days.
- Field joint concrete coating (Grouting), for pipeline sections identified by **GEL**.
- Preparation of activity reports.

CONTRACTOR to refer "Specification for Concrete coating" mentioned in Annexure- "Technical scope of work for Steel & PE Pipeline installation by HDD" attached with this document.

12. CROSSING BY OPEN CUT

- 12.1 The pipeline under construction may pass above or below the existing buried facilities and /or Canals/Roads. For all crossings CONTRACTOR shall seek and obtain prior approval from GEL to lay the pipeline. Type of crossing shall be such that a minimum depth of cover is as**

required in the drawing and specifications. This shall include, as a minimum but not limited to the following:

- Obtaining clearance from various authorities. On obtaining the permission coordinating with the authorities for execution of work. Obtaining and submission of NOC from applicable authorities.
- Soil inspection and preparation of "CONSTRUCTION DRAWINGS".
- Trenching of pits to required depth and width.
- Protection of trench from collapsing with Shoring, shuttering OR "V" Shape OR Step Cuts as per the specification approved by GEL.
- Arranging temporary installations and Diversions to ensuring effective functioning of watercourses and Road with required Safety precautions (Caution Board, Barricading, Flashing lights, Traffic Control).
- Supply of material, machinery equipment and manpower required for the job approved by Authority and GEL.
- Supply and installation of consumable like Insulators, end seals, PE and neoprene rubber sheets, civil structure.
- Supply, application and testing of concrete coating on coated pipes.
- Horizontal and vertical bending of pipes.
- Installation of carrier pipe including welding, pre-test, post-testing, and laying across the crossing with proper depth and compaction of trench and hook-up to main line at ends, back filling and restoration as to original state.
- Prepared As laid drawing and to get it signed by GEL and obtain NOC from authority.
- Preparation of activity reports.
- Preparation of as laid drawing mentioning reference measurements
- **CONTRACTOR** to refer "Specification for Casing Insulator & End seals" mentioned in Annexure document "Technical scope of work for Steel & PE Pipeline installation by HDD" attached with this document.

12.2 GEL reserves the right to demand from the CONTRACTOR for individual crossings, a separate pretest and /or a detailed report for approval, containing,

- Time Period
- Working method with equipment
- Test procedure
- Calculations of temporary works

13. LAYING AND CROSSING BY HDD:

CONTRACTOR have to prepare and get approval of proposed bore profile indicating depth, existing utility and pulling calculation prior to start HDD operation. Design of HDD parameters shall be such that a minimum depth of cover is as required in the specifications. Specification of HDD machine / equipment, manpower, equipment calibration as well as HDD work is to be done as per the GEL Guideline.

For detailed scope **CONTRACTOR** to refer Technical scope of work for Steel & PE Pipeline installation by HDD attached as Annexure.

The laying shall meet all the requirements of the Drawings/Specifications. This shall include, as a minimum but not limited to the following:

- Obtaining clearance from various authorities. Crossing plan intimation to authorities prior to start the work. Obtaining and submission of NOC from applicable authorities.
- Obtaining additional land / working ROU if required for preparation and execution of HDD work at no extra cost to GEL.
- Carry out Soil inspection and all necessary surveys required for crossing by HDD.
- Ensure Underground utilities by GPR survey whenever instructed by GEL.

- Carry out all engineering, design and calculations required for carrying out HDD, Installation of pipeline, and completion of crossing as per the specifications. The engineering, design and calculation shall be approved by TPIA.
- Preparing plan for Safe Disposal of Mud and submit NOC from the land owner for disposal of Mud and Bentonite.
- Preparation of "CONSTRUCTION DRAWINGS" indicating all the existing underground utilities with the entire dimension like Size, Depth, Distance. The same shall be approved by TPIA prior to execution of work. Submission of drawing to authorities for proposed crossing section.
- Supply of Compatible required material, machinery, equipment, manpower and consumables required for carrying out the job.
- Trenching of entry and exit boring pits to required depth and width.
- Follow the approved GEL Guidelines of HDD work
- Arranging temporary installations and diversions to ensuring effective functioning of watercourses, Normal Traffic,
- Mobilization and demobilization at Site
- Supply and installation of consumable like insulators, end seals, PE and neoprene rubber sheets, civil structure
- String preparation including welding, weld-repair and re-test, radiography, pre-hydro testing and coating of field Joints.
- Horizontal and vertical bending of pipes if required.
- Drilling and complete work for the River, Canal, Drain, Road, laying including all additional drilled length as per the requirement.
- Installation of pipeline below the River, Canal, Drain, Road by HDD to the correct profile as per approved drawings and specifications, post installation hydrostatic test including leak-detection, repair and re-test and repair of defects.
- Hook-up to main line at either ends.
- Restoration and clean-up.
- Supply fabrication and construction of protective fencing as required.
- Prepared As laid drawing and other records get it sign off by Authority and Obtain NOC.
- Preparation of activity reports

The scope intends to define the nature of the works to be performed by a **CONTRACTOR** for the design and the construction of a Gas pipeline laying & crossing using the HDD method (Horizontal Directional Drilling).

The **CONTRACTOR's** Scope of Work shall consist, but not limited to the following. However, all such works, which are not indicated here below but are otherwise required to complete the WORK in all respects shall form part of **CONTRACTOR's** Scope of Work. Further, the scope indicated below shall be read in conjunction with the schedule of rates, specifications. **CONTRACTOR** shall determine the exact number, characteristics, depth, width, nature of crossing/obstacles, etc. based on site visit or any other evidences or materials he may have etc. It is understood that for the below mentioned Scope of Work all the relevant equipment / machineries, testing instruments of work and manpower shall be supplied by **CONTRACTOR**, except otherwise specified.

The mission of the **CONTRACTOR** shall include all the required tasks necessary to build a gas pipeline string across a major obstacle using the HDD method.

These tasks can be summarized as follow (non-limited):

- The **CONTRACTOR** shall provide and pay for all labour, materials, tools, equipment machinery, water, electricity, utilities, transportation and installation of other facilities and services necessary for the proper execution and completion of the works. The **CONTRACTOR** shall be fully in charge with the dismantling and eventually the repatriation of the equipment etc...
- The **CONTRACTOR** shall pay any duty tax, load and unload port duties, temporary import taxes etc... for all the equipment mentioned above.

- The **CONTRACTOR** shall be fully responsible for all means, methods, techniques, sequences and procedures and for the co-ordination of all operations of the work under contract.
- **CONTRACTOR** shall verify accurately the data provided and proceed to all additional tests or surveys (Topographic - Hydrological - Geological - etc.) he feels necessary to implement its works.
- The **CONTRACTOR** shall perform all engineering activities that are needed to complete the basic documentation provided by the **GEL**; in particular, it shall not neglect to proceed to all engineering - detailed engineering - stress calculations - etc. as necessary.
- The **CONTRACTOR** is deemed to have considered and accepted all the risks involved in his task.
- The **CONTRACTOR** shall make all necessary arrangements for the hiring of the labour (local or not) and care for their payment. He will take care of all the expenses relating to accommodation, transportation and subsistence for the staff.
- The work will be supervised by competent staff who speaks at least the official language of the concerned country.
- The **CONTRACTOR** will execute all the required tasks including the welding of the pipeline by qualified welders specified in the contract and in conformity with the relevant codes and standards.
- Due attention of the **CONTRACTOR** is drawn to the absolute necessity to keep detailed trace of all equipment subjected to pressurized gas.
- Supplies
- Except otherwise stated in the list of free issue material, all balance material will be supplied by **CONTRACTOR**.
- The **CONTRACTOR** will provide all the necessary consumable to build the pipeline.
- During the works, the **CONTRACTOR** must procure and maintain the installation and equipment which are necessary for the functioning of the workshop and additional equipment.
- The **CONTRACTOR** shall make all the necessary arrangements to cater for an uninterrupted supply of fuel, lubricant, electricity, water, telephone, etc... during the work.

Site location

The exact location of the work site as well as the access road will be specified in the bid document

Geographical Co-ordinates

The local official system of co-ordinates that is in force in the concerned country will be used for all activities related to survey, drawings, alignment sheet, geographical information, measurements, etc...

14. HYDROSTATIC TESTING:

Each pipeline component is tested after construction and before being placed in operation to demonstrate that it does not leak. Hydrostatic test shall commence only after mechanical completion. However, Pre /Post hydro testing shall be carried out for all major crossings as per **GEL** instruction. This shall include, as a minimum but not limited to the following;

- Cleaning of pipeline
- Water filling with corrosion inhibitor.
- Temperature stabilization.
- Pressurization for air volume calculation plotting.
- Mechanical testing (Strength testing) for 24 Hrs.
- Line depressurization and dewatering.
- Tightness testing (Leak proof test) for section having flange, ferule, threaded connection) only done by Air for 2.00 hrs hold period using DWT/PG.

- Pipeline depressurization and dewatering at designated / approved location.
- Preparation of each stage of activity reports

CONTRACTOR to refer “Specification for Pipeline Hydro test” mentioned in Annexure- “Technical scope of work for Steel & PE Pipeline installation by HDD” attached with this document.

15. DRYING AND PURGING OF PIPELINE

After acceptance of hydrostatic test by **GEL/TPIA**, Section is de-watered, followed by swabbing operation, carried out by propelling foam pigs with dry air from the outlet of drying unit to standards of cleanliness and Pneumatic testing as well as dryness to be done as per approved procedure and the satisfaction of **GEL/TPIA**. This shall include, as a minimum but not limited to the following;

- Swabbing and cleaning of pipeline.
- Drying off the Pipeline.
- Closing of all the Open ends.
- Preparation of activity reports

CONTRACTOR to refer “Specification for Swabbing & Drying” mentioned in Annexure- “Technical scope of work for Steel & PE Pipeline installation by HDD” attached with this document.

16. SPECIAL INSTALLATION:

CONTRACTOR shall do all work necessary at each of the installations to provide facilities, which are complete in all respects and ready for operations.

Without limiting the generality thereon, the work required to complete the installations shall, where applicable, include all site surveys, site preparation, filling, grading, fencing, foundations, installation of block valves, side valves, pipe work, pipe supports, pressure gauges, mechanical facilities, civil work, painting, installation of all electrical equipment's, and fixtures, piping, valves and fittings; mount all instruments and make all piping and electronic connections, etc.

Special installations are installed after successfully completion of hydrostatic test like isolation valve, Insulating joints, valve chamber and Pig trap

- Pre fabrication of special installation at camp site or at work shop.
- NDT of all the joints.
- Pre hydrostatic testing of entire assembly.
- Transportation of special installations at site.
- Special installations are installed in the pipeline as per the drawing issued for construction.
- NDT of all the golden joints.
- Preparation of activities reports.
- Extension / Modification of casing pipe and associated services

17. HOOK UP:

All works required for hook-up of the pipeline at the battery limits. This includes Hook-up of the Pipeline with existing Installations, as per the requirement. The work involves above ground / underground installation including supply / furnishing of all man-power, tools, tackles, equipment and consumable as required for carrying out the work. This shall include, as a minimum but not limited to the following;

- Obtaining all statutory clearances, approvals and permissions for the works as per **GEL** PTW Matrix.
- Supply of all consumables, materials & equipment (except **GEL** supplied materials) and manpower required for the work.
- Welding, fabrication, installation, erection, Joint Coating, supports, epoxy painting, / trenching, Laying, Backfilling, restoration, hydro-test and pneumatic test, purging with nitrogen, pre-commissioning & commissioning of Hook-Up assembly.
- Fabrication & installation of Underground and Above Ground pipes, fittings, Insulating Joints etc with adequate & appropriate pipeline supports.
- Supply, fabrication and installations of steel structures and supports, if required.
- Surface preparation / cleaning and painting of above Ground Pipes, and providing proper corrosion resistant coating to all underground pipelines, fittings etc. including supply of such coating as approved by **GEL**/TPIA, where applicable.
- Painting of all steel structures and supports installed for the Hook-up, where ever applicable.
- Preparation of each stage of activity reports.
- Construction of other auxiliary and appurtenances as required, providing facilities, which are completed and ready for operation.

The golden joints for hooks shall be minimized. Only good performing qualified welder shall be use for golden joints. Golden joints shall be double NDT tested and certified by TPIA. Golden joints shall be identified / highlighted in pipe book.

18. TRANSPORTATION, SHIFTING AND INSTALLATION OF DRS/DPRS/IPRS/CPRS/IMS /DPRC:

The fabrication, installation and Civil work shall be carried out by **CONTRACTOR** as per the approved construction drawing to the satisfaction of the TPI/**GEL** This shall include all the works required for transportation of the pre-fabricated DRS/DPRS/IPRS/CPRS/IMS /DPRC module, Construction of foundation or Underground Chamber for DPRC and installation and hook-up of the DRS/DPRS/IPRS/CPRS/IMS and DPRC (in the Chamber), along with supply / furnishing of all man-power, equipment and consumable as required, for carrying out the work. This will include as a minimum, but not limited to, the following:

- Obtaining all approvals and permissions for the work (as required).
- Supply of all consumables, materials & equipment (except **GEL** supplied materials), tools and tackles and manpower required for the works.
- Approvals of all the lifting tools & tackles and the equipments duly certified by Chartered engineer.
- Loading, unloading and transportation of prefabricated DRS/DPRS/IPRS/CPRS/IMS /DPRC module and associated accessories, as required.
- Construction of the foundation for DRS/DPRS/IPRS/CPRS/IMS and Underground Chamber at the designated location, including all excavation and Civil Work, piling and RCC structures and Testing required for preparation of Valve Chamber, as per **GEL** requirement.
- Installation of the above ground DRS/DPRS/IPRS/CPRS/IMS and Underground DPRC module, at its designated location, and Hook up with the Pipeline, as required.
- All welding, fabrication of Spool pieces, erection, supports, Joint Coating, epoxy painting, material movement etc. required for successful completion of the above work.
- Supply, fabrication and installations of steel supports, as required.
- Painting and Touch- up on all piping, fittings, valves and steel structures, as required.
- Restoration and Clean-up of the site.
- Preparation of activity reports

19. TRANSPORTATION, SHIFTING AND INSTALLATION OF SKIDS:

This will involve carrying out the following activities, if required:

- Transportation of Pre-Fabricated Skids and/ or Assemblies. (Including PRIs, Metering Installations, Filters, and Headers etc.)
- Installation of the above Skid and / or pre-fabricated assembly, at the proposed location.
- Pneumatic and leak test of entire skid.
- Hook up between the Skid / assembly and the Pipeline.
- This shall include all the works required for transportation of the Skid / pre-fabricates assembly, and for installation and hook-up of the same, at their designated locations, along with supply / furnishing of all man-power, equipment and consumable as required, for carrying out the work. This will include as a minimum, but not limited to, the following:
 - Obtaining all approvals and permit for the work (as required).
 - Supply of all consumables, materials & equipment (except **GEL** supplied materials), tools and tackles and manpower required for the works.
 - Approvals of all the lifting tools & tackles and the equipment's, duly certified by Chartered engineer.
 - Loading, unloading and transportation of Skid / prefabricated assembly as required.
 - Installation of the above mentioned Skid / assembly, at their designated locations, and Hook up with the Pipeline, as required.
 - All welding, fabrication, erection, supports, Joint Coating, epoxy painting, material movement etc. required for successful completion of the above works.
 - Supply, fabrication and installations of steel supports, as required.
 - Painting and Touch- up on all piping, fittings, valves, supports and steel structures, as required.
 - Restoration and Clean-up of the site.
 - Preparation of activity reports.

20. INSTALLATION OF VALVES AND VALVE CHAMBERS:

After satisfactory completion of hydro test of pipeline, valves and valve stations (including civil work) shall be installed to the satisfaction of the **GEL**. This shall include all the works required for storage, transportation, handling and installation of Isolation Valves, at the designated locations, along the Pipeline, including supply / furnishing of all man-power, equipment and consumable as required, for carrying out the work. This will include as a minimum, but not limited to, the following:

- Obtaining all approvals and permissions (Permits) for the work (as required).
- Supply of all consumables, materials & equipment (except **GEL** supplied materials), tools and tackles and manpower required for the works.
- Transportation, Storage, Loading, unloading and Handling of Valves and associated accessories supplied by **GEL** (ex-stock material).
- Prefabrication, NDT and testing of valve assembly at work shop or at fabrication yard (not allowed at site).
- Approvals of all the lifting tools & tackles and the equipments duly certified by Chartered eng.
- Construction of the Valve Chambers at the designated locations along the pipeline, including all excavation and Civil Work, piling and RCC structures and Testing as required for the Valve Chamber. **CONTRACTOR** to refer typical Civil chamber drawing attached as Annexure.
- Installation of the Valves at site as per alignment sheet and Hook up with the Pipeline, as required.
- All welding, fabrication of spools, erection, supports, Joint Coating, epoxy painting, material movement etc. required for successful completion of the above works.
- Supply, fabrication and installations of steel supports, as required.
- Painting and Touch- up on all piping, fittings, valves and steel structures, as required.

- Restoration and Clean-up of the site.
- Preparation of activity reports.

21. ABOVE GROUND PIPING WORK:

All works required for installation and commissioning of above ground piping, for connectivity to existing Installations. This includes Prefabrications, welding, pre hydrostatic testing, installation, pneumatic testing and commissioning of above ground piping, as per the approved design, including supply / furnishing of all man-power, equipment and consumable as required for carrying out the work. This shall include, as a minimum but not limited to the following:

- Supply of all consumables, materials & equipment (except pipes & Fittings, which will be supplied by the **GEL**), tools and tackles and competent manpower required for the work.
- Removal of coating and surface cleaning of Pipes/fittings by shot-blasting.
- Surface preparation and Painting of all above ground Piping and providing proper corrosion resistant coating to all piping, fittings and valves installed, including supply of such paint and coating, as approved by **GEL/TPIA**
- Application of primer paint for all the shot blasted surface to prevent the corrosion.
- Pre fabrication of under ground pipe spools and NDT of welded joints. Pre Hydrostatic testing of the entire prefabricated pipe spool.
- Erection of Pre-fabricated Pipe spool to it's position as per shown in the Plant drawing including all the valves, Filters, Headers, PRI, Metering and the supports.
- Conducting Pneumatic testing of entire system including all the fittings provided for Mechanical, Instrumentation and Metering functions.
- End connection with existing pipeline / system.
- Conducting Pre-commissioning checks, attending all the Punch points, purging & commissioning of above-ground piping.
- Installation of Piping on racks and supports, where required, as per the design, and testing, pre-commissioning & commissioning of the same.
- Installation of Valves in the piping, wherever required, as per the approved design, and testing of the same.
- Painting, touch-up of supports & steel structures, if required.
- Preparation of each stage of activity reports.
- Detailed scope of station piping is as mentioned in annexure

22. FABRICATION AND STRUCTURAL WORK:

All structural works required for installation and commissioning of above ground piping as per the requirement, including fabrication and installation of Pipe racks, access platforms and supporting structures where required. The work involves fabrication and installation of Structural supports for the pipe-work, including supply / furnishing of all man-power, material, equipment and consumable as required for carrying out the work. This shall include, as a minimum but not limited to the following;

- Obtaining all approvals and permissions for the works (wherever required).
- Preparing the fabrication drawing in AutoCAD as directed by **GEL** / TPI with all the dimensions and Material specification and to get the same approved.
- Supply of all consumables, materials & equipment, tools & tackles, manpower and machinery required for the work.
- Welding, fabrication, erection, supports, painting, testing, installation of all structural work, including pipeline racks, access platforms, supports, ladders, cross overs etc. as per the approved design / drawing.
- Surface cleaning by shot blasting and painting of all the above mentioned steel structures, and providing proper corrosion resistant coating, including supply of such coating as approved by **GEL/TPIA**

- Preparation of Fabrication and Installations reports.

23. RESTORATION:

Restoration of the entire site used for the construction of pipeline. This shall include, as a minimum but not limited to the following:

- Collecting, loading, transporting and unloading of surplus and defective materials to **GEL**.
- Collecting, Recording as per ISO 14001, Deposits and disposal of all the waste.
- Removal of all the temporary structures installed.
- Repairing of road, bridge, canal bank, private property, all fence, banks, boundary stones, Under Ground utilities etc.
- Compaction and Removal of surplus soil.
- Supply of necessary back fill materials.
- Plantation of plant sapling during construction.
- Construction and Installation of Breakers.
- Obtaining “NO OBJECTION” Certificates from Owner/Authority/Owners of Land (Farmers).

24. MARKERS:

The scope includes Fabrication and installation of markers along the pipeline route. The locations of markers as indicated in the approved drawings shall be treated for guidance purpose only. The exact location of the markers shall be based on “AS BUILT” chainage and directed by **GEL**. This shall include, as a minimum but not limited to the following;

- Supply of Materials.
- Fabrication and installation of Markers as per the standard drawings.
- Painting of Markers with required instructions.
- Preparing of Installation Reports.

25. PRE-COMMISSIONING AND COMMISSIONING ASSISTANCE

CONTRACTOR shall carry out all pre-commissioning works including checks, dewatering, swabbing etc. and make the pipeline ready for commissioning. **CONTRACTOR** shall supply all equipments, man power, materials and consumables required for commissioning work and perform all associated works for providing assistance to **GEL** for successful completion of Commissioning work. This shall include, as a minimum but not limited to the following;

- Pre-commissioning Checks, dewatering, swabbing flushing and inertisation, leak check etc. of the Pipeline.
- Supply of all material, machinery, equipment (including compressor), manpower and consumables (including bi-directional and foam pigs) required for the commissioning.
- Provide assistance to **GEL** for Commissioning work.
- Preparing of activity Reports

26. HOT TAP ASSISTANCE:

CONTRACTOR shall provide complete assistance for Hot-Tap Work to be carried out as per the requirement. The **CONTRACTOR** shall supply all equipments; man power, materials and consumables required for Hot-Tap work and perform all associated works for providing assistance to **GEL** for successful completion of work. This shall include, as a minimum but not limited to the following;

- Receipt of Hot Tap fittings with TC, Transportation, Storage, Fitting at Site / location in presence of Hot Tap **CONTRACTOR**, material reconciliation.

- Supply of all required machinery, equipment, skilled and unskilled manpower, tools and tackles and consumables required for the hot-tap work. (Excludes Hot Tap machinery and it's auxiliaries).
- Preparing the Hot-Tap site, including excavation, Shuttering, Slopping, Scaffolding, Dewatering, PCC Work for wet surface, Emergency exit, cleaning and barricading of the surrounding area.
- Excavation and protection of working pit along with provision of safe entry and exit, supply of
 1. 2 welding generator along with helpers.
 2. hydra crane for loading unloading along with competent operator and cleaner,
 3. Fitter and Helper for fitting of Hot tap fittings.
 4. Water pressurization pump along with gauges for hydrostatic testing of Hot tap fitting
 5. Nitrogen for pneumatic testing of Hot Tap Machine assembly.
 6. Riggers for lifting, installation, loading and unloading of Hot tap Machines and associated equipments, tools tackles.
 7. Manpower for deployment at emergency isolation valve.
 8. Supply of welding consumable along with oven.
- Removal of coating, cleaning of pipeline and checking of Pipe wall thickness.
- Assisting in Fitting of Hot Tap Fittings and equipment, including loading/unloading as required.
- Deputation of person for emergency isolation, connecting end with existing pipeline by cutting, grinding, welding, NDT, repairing, opening of isolated valve, Pressurization and leakage checking of all the joints.
- Provide assistance to Hot Tap **CONTRACTOR** for Hot- Tapping activity.
- Cleaning and restoration of the area after completion of Hot-Tap activity.
- Preparing of activity Reports.

27. LPT / LDT / Leak Survey on Distribution / Service Lines

Frequency of LPT/LDT of network based on the AOMP of **GEL**. Typical scope of work as per approved **GEL** procedure for carrying out LPT/ LDT but not limited to, is given herewith below. In case dispute between requirements stated hereinafter and approved **GEL** procedure, **GEL** approved procedure shall prevail.

- On receipt of O&M contract, **CONTRACTOR** shall take specification / detail of distribution network, as-built drawings, testing reports and other construction records from **GEL**.
- **CONTRACTOR**/ his representative shall visit site along with drawings and related staff members of **GEL** to make themselves aware about route, type of construction, special crossings if any, size of pipeline and other design aspects considered during construction.
- **CONTRACTOR** shall take As built drawings / schematic etc. of network from **GEL** in soft copy and shall be updated regularly with repairs / modifications carried out over the period.
- **CONTRACTOR** shall identify Emergency and interconnection valve chambers in consultation with **GEL** as per requirement of flow curtailment / emergency stoppage of Gas supply. One copy of same is handed over to control room for information and coordination.
- Emergency vehicle shall be equipped with all necessary valve keys to operate valves, pipe piece for leverage, leak clamps, tools tackles and consumables to handle the gas leak or fire emergency on gas network
- **CONTRACTOR** shall divide the total network route in sub-route / section as per the instruction of **GEL** EIC such that total network can be checked for leakages as per the predefined periodicity.

- Based on the findings of Lock Pressure Test, Leak Detection Test activities will be executed, **CONTRACTOR** shall plan necessary actions in consultation with **GEL** and same shall be implemented / executed to maintain the overall safety and integrity of network.
- Leakage survey to be done as per AOMP / O&M manual of **GEL**
- Leakage survey, using suitable gas detection apparatus, shall be conducted as on whole network as per AOMP and the results have to be recorded.
- Report of the leak survey in both hard and soft forms in the prescribed format have to be submitted to **GEL** In-charge for taking further action as is needed.
- Leak survey to be conducted in general in whole CGD. Additional survey if any needed in the area surrounding schools, hospitals. Temples, malls and community installations will be carried out as advised by **GEL** Engineer-In-charge i.e. Pre Holi survey of all locations & Pre Diwali survey as per EIC instruction.
- Leak survey also includes checking of the atmosphere at utility manholes, other collection points and at openings (cracks) in pavement.
- In case if **CONTRACTOR**'s representative observed damage of any of the assets / Equipment like damage to valve chamber or valve, DRS, Odorant system etc., he shall inform the EIC immediately and monitor the same till corrective action is taken.
- In addition to the leak survey, the team members shall inspect pipeline at critical sections / locations / chainage, such as rail crossing, waterways, road crossing, etc., in order to ensure good, no leaks condition. Any factors which may affect the safe / uninterrupted operation of gas distribution system have to be logged in the log book and also should be informed to EIC for ensuring effective monitoring.
- **CONTRACTOR** shall depute adequate manpower for ensuring the leak survey activity is executed as per the schedule. By considering the criticality of the activity, any backlog due to reasons whatsoever will be viewed as a serious breach of contract. Repeated non-compliance may force the **GEL** to terminate the contract and put the vendor on holiday.
- Leakage survey, and leakage investigation and action should be carried out as specified in ASME B 31.8, together with procedures for the pinpointing of leaks and other useful / proven techniques

Activity Steps for Leak Survey

- To prepare annual and monthly leak survey plan for covering the whole network in line with the AOMP for actual execution.
- For planned Leak Survey, to decide the network leak survey area and frequency based on the past experience and records, post LPT data, criticality of network, activities carried out by other utilities
- To identify the person and train / educate them for network geography, effective leak survey procedure, emergency communication for heavy leakage and preparing report & record
- To carry out emergency leak survey, for attending smell complaints and for the section / network vulnerable to damage due to sudden development of activities by other utilities.
- To ensure that the gas detector with at least 1% LEL least count is working, calibrated & with fully charged batteries. To keep the spare batteries depending on the job to be carried out
- To wear PPEs like safety shoes, cotton dress, reflective jacket and I-card and ensure your personal safety from vehicle and building under construction, electrical installation, stray animal like dog.
- Following activities need to be executed for Lock Pressure Test:
 - **CONTRACTOR** shall divide the total network route in sub-route / section as per the instruction of **GEL** EIC such that total network can be checked for leakages as per the predefined periodicity.
 - Check for the creation and schedule of the Maintenance Order in SAP for the Section of the network to be tested.

- Provide Pressure gauges on the downstream vent line of the upstream Ball Valve for checking the drop in pressure during LPT (Lock Pressure Test).
- Isolate the section from the upstream / downstream network by closing both the valves and allow pressure to stabilise.
- Record the pressure observed on the pressure gauge and time at which the pressure is observed in the format issued by **GEL**.
- Keep the isolated section under observation as per instruction of EIC. For any section, minimum one-hour steady pressure is accepted as no leak and every hour pressure observed will be recorded.
- If leak is observed during Lock Pressure Test, then
 - Sub divide long sections into smaller sections and check for leakage of each sub section thru LPT by closing the isolation valves of upstream and downstream sections.
 - On identifying the subsection that has leakage more than the allowed limit as per **GEL** policy, cordon the area and attend to it for repairing it immediately.
 - Carry out leak survey by walking with gas detector by keeping probe just 2" above the ground along the pipeline route as per as-built drawing -following markers, valve chambers and landmarks marked in drawings.
 - To observe / hear the detector findings carefully and record the same.
 - To monitor the gas leak in drainage manhole or other such chambers / vaults.
 - To record the leak % and area / location
 - In case of gas leakage, cordon the area and attend to it for repairing it immediately
 - Conduct LPT once again on the repaired section and confirm 'No Leak' of the section repaired.
 - To switch off the gas detector when not in use and ensure the security of detector.
 - To prepare survey report in standard format.

28. Terminal Piping

CONTRACTOR shall carry out terminal piping fabrication work, NDT, supply of all materials other than **GEL** scope of supply materials and equipments, surface preparation, painting, structural work, installation, testing and commissioning of all Terminal piping work, as a minimum shall include but not limited to the followings.

28.1 Fabrication

- Fabrication of all spool pieces and piping shall be carried out as per approved detail drawing, ASME Section IX and ASME B 31.3.
- Fabrication /supply of mechanical support as per **GELs** approved typical drawing for support. Final drawing shall be provided at the time of actual execution of work. The dimension of support may vary and suit as per site condition.

28.2 Welding

WPS / PQR: Welder & Procedure shall be qualified as per API 1104 And ASME Section IX.

Welding Material: Specification for Welding Electrodes and filler materials shall be as per ASME Section - II, Part - C.

Welding: Welding shall be carried out as per API 1104 and ASME Section IX.

28.3 Non Destructive Testing (NDT)

Non Destructive Testing shall be carried out, as per API 1104 and ASME Section - V. All butt weld joints shall be 100 % radiography and UT tested. All fillet joint shall be die penetration and MPT tested.

28.4 Surface Preparation

Surface preparation shall be carried only at the outer most surface of the pipe, fittings, and spool pieces associated assembly for above ground piping. Surface shall be prepared for all above specified as per SIS - 055900 or SSPC - VIS -I whichever is suitable. The minimum requirement for surface finish shall be comparable to the SA 2 ½.

28.5 Painting

All the above ground piping assembly shall be painted after satisfactory preparation and cleaning of surface.

28.5.1 Primary coat with Zinc rich primer

- After surface preparation primary coat by Zinc rich primer shall be applied on the surface.
- Mixing ratio shall be 3:1 (Base: Accelerator).
- Primer shall be equally distributed on the surface area using spray gun to achieve DFT as demonstrated in procedure qualification.
- After 60 min. DFT (Dry Film thickness) shall be checked by coat gauge and it should be within 25-40 microns.

28.5.2 Intermediate Coat (Polyamide)

- Intermediate Coat shall be applied only after drying of the primer coat.
- Intermediate Coat (Polyamide) shall be applied on surface area using spray gun.
- Mixing ratio shall be 4:1 (Base: Accelerator).
- After 3 hrs. DFT shall be checked and it should be within 75-100 microns.

28.5.3 Top Coat (Polyurethane):

- 2 Top coat shall be applied only after drying of Intermediate coat.
- Top coat (Polyurethane) shall be applied on surface area using air less spray gun.
- Mixing ration shall be 4:1 (Base: Accelerator)
- Hand brush / roller shall be used for small areas.
- After 3 hrs. DFT shall be checked and for each coat it should be 30-40 microns.

28.6 Coating and Wrapping

Coating and Wrapping of the entire underground drain pipeline shall be carried out as per IS 10221.

28.7 Installation and Erection

After completion of welding, all the assembly erected with necessary mechanical supports and painting shall be carried out. The piping, valves, equipment shall be installed as per **GEL** approved Isometric drawing. Mechanical support along with 'U' clamp for related assembly shall be supplied / fabricated and installed as per **GEL** approved typical & layout drawing for support. In case of any change, the successful **CONTRACTOR** shall have to take necessary approval of TPIA or site ENGINEER.

Installation of assemblies shall be followed as per ASME B 31.3.

28.8 Hydro testing

All the above ground piping, associated assembly shall be hydrostatically tested at 1.5 time of design pressure after mechanical completion of the facility to a complete satisfaction of TPIA

or site ENGINEER. Corrosion inhibitor shall be added in water before water filling in to the piping.

The above ground sections shall be tested hydrostatically as per the standard ASME B 31.3 During hydrostatic testing the system, the test result shall be recorded in presence of TPI and site ENGINEER.

28.9 Drying and Cleaning

After satisfactory result of hydrostatic test, the piping system and facility shall be cleaned by compressed air

28.10 Pneumatic Testing

The entire system shall be pneumatically tested at 1.1 of operating pressure with help of nitrogen to check the leakage from threaded and flange joints for 2 hrs.

28.11 Purging

The entire system shall be purged with the help of N2 gas. Acceptance of N2 purging shall be maximum 2 % of oxygen. Purity certificate of N2 must be produced and purity (99.99%) shall be checked prior to use as per EIC instructions.

28.12 Commissioning

The **CONTRACTOR** shall provide assistance in terms of tools & tackles and skilled / unskilled manpower to **GEL** for successful commissioning of existing facility. The details of the same shall be provided before commissioning.

All care has been taken to make this Bid exhaustive and simple, **CONTRACTOR** shall review and sought any clarification / clarity regarding the scope during technical discussion. It is **CONTRACTORS'** responsibility to clarify any non-clarity, ambiguity, inclusion or deletion in the scope of work before any commercial discussion.

28.13 Documentation

Successful **CONTRACTOR** shall be submitted all reports, information as per the "Scope of Work" and "Specification of Work" which shall include as minimum but not limited to the followings:

- Three sets of as-build drawing in compact disk and tracing on Garware polyester films.
- Daily / Weekly progress Report
- Mechanical completion report
- HS&E Report
- Hydrostatic test report
- Pneumatic test report
- Purging report
- Test certificates of all Material supplied by the **CONTRACTOR**

29. STEPS OF CARRYING OUT HYDROTEST OF FILTERS AT CGS/PRS

➤ **Dismantling of filter assembly**

- Erect scaffold based on site situation for filter top flange/QOC maintenance. And certification of the same.
- Close the Upstream and Downstream Isolation valve of filter/KOD as required for isolation of filter. If the gas is passing in closed position of valve, then greasing to be done before execution.
- Drain/Vent the gas by opening on of drain valve/Vent Valve. Check for concentration of gas at monitoring point, Ensure gas concentration at monitoring point shall be under acceptable limit.

- Continuous monitoring of CH₄ (%) while venting especially in the direction of wind. During process ensure LEL < 40% from 3 feet of monitoring point.
- Unscrew the studs in up streams and down streams flanges of filters and installation of blind or reverse the spectacle blind if provision is given and tighten the studs.
- Dismantle DP gauge, drain line, Vent Line, SRV (Safety relief valve) from filter and installation of blind.
- Open swivel top flange/QOC (Quick opening closure) and remove cartridge of filters.

➤ **Water filling and pressurization**

- Fill the water using hand pump. Hose certificate of pump to be checked before execution.
- Chlorine free water shall be used for hydro test.
- The filters shall be filled in full from bottom and ensured that there is no air pocket left by providing vent pipe 2 m from filter top.
- Only calibrated pressure gauges and temperature gauges shall be used. Test certificate to be ensured on site.
- Pressurization shall be done in the presence of the GEL/ TPIA.
- Pressure shall be applied by means of a suitable test pump, which shall not be connected to a system until ready to test. Pressurization is 1.5 times of design pressure.
- Start increase pressure by using hand pump. Pressure rise for single stroke of pump to be checked for increase in pressure. Increase the pressure accordingly. Does not increase pressure more than 10 bar at once. Stabilization period for vessel is 5 min after each pressure rise.
- Pressurize the filter to 50 % of hydro test pressure and depressurize the filter, Fill the water again to 75% and depressurize again. Then pressurize to final hydro test pressure.
- An authorize operator shall attend to the pump constantly, during the test.
- At every 10 bar, pressure drop shall be checked before increasing pressure to next stage. If pressure drop occurs, check for leakage from all flanges and joints Etc. and rectify it.
- Once desired pressure is achieved, Disconnect pump from filter assembly. Holding period will be 1 hour to 4 hour based on TPI requirement for continuous processing unit.
- Care shall be taken that maximum test pressure should not have exceeded. And if exceeded than bleed off the water up to the test pressure collected the bleed off water quantity and record the same.
- Not down the pressure and temperature reading at every 10 minutes and note down, if pressure increases because of the ambient temperature rise, bleed the same.
- External/Internal Inspection and Ultrasonic inspection to be done by third party.

➤ **Acceptance**

- Hydrostatic test shall be considered as positive if no abrupt drop in the pressure is observed through the test duration, except for a change due to temperature effects as per the applicable specifications. (Refer Report of examinations or test of pressure vessel or plant)

➤ **Installation of filter assembly**

- Release the pressure in the filter and drain the water. Gradual or intermittent release of pressure shall be ensured to prevent any abnormal water hammer effect on filters.