GAIL (India) Limited

(A Govt. of India Undertaking)

PIPELINE FROM HANUMAN JUNCTION TO VCL

BID DOCUMENT
FOR
PIPELINE LAYING & TERMINAL WORKS

VOLUME – II OF II
(SCOPE OF WORK)

(BID DOCUMENT NO: 110330G/WGI/GAIL/01-R0)

OPEN DOMESTIC COMPETITIVE BIDDING

DELIVERS. EVOLVES.

WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS

ISSUED BY

jp kenny

jp kenny	**GAIL (INDIA) LIMITED** **PIPELINE FROM HANUMAN JUNCTION TO VCL**	GAIL

SCOPE OF WORK				**CLIENT JOB NO.**		-
				TOTAL SHEETS		23
DOCUMENT NO	11	0330G01	01	02	09	001

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REV.	**DATE**	**DESCRIPTION**	**PREP**	**CHKD**	**APPD**

CONTENTS

1. BRIEF DESCRIPTION OF THE PROJECT

M/s Gail India Limited intends to lay a pipeline from Hanuman Junction (Chainage 154KM) on Tatipaka-Lanco pipeline to VCL where check metering station is proposed to be located.

LAYING OF PIPELINE FROM HANUMAN JUNCION TO CMS AT VCL

i) Hot Tap Off point is considered at Hanuman Junction point (Chainage 154 Km) on Tatipaka-Lanco pipeline (18" X 204 Km).

ii) Laying of 8" X 45 Km (approx) long pipeline from Hanuman Junction (Tap off point) to VCL where Check Metering Station(CMS) is proposed.CMS will consist of 2-Stage Pressure Reduction system, and metering skid (PRMS) including scrubber, Wet Gas and Dry Gas filters & Gas Chromatograph, PRV with necessary relief valves, and associated piping.

iii) The total 45 kms of Pipeline shall be divided in two spreads (Ch 0.00 to Ch 22.00 in one spread and Ch 22.01 to Ch 45.00) & work to start simultaneously for both the spreads.

iv) Provision of pig launcher facility at Hanuman Junction (Dispatch Station) and pig receiver facility, CMS at VCL (Receiving Station) has been envisaged.

v) 6" spare tap-off at Hanuman Junction (Dispatch station) has been considered.

vi) 2 Numbers Sectionalizing valve stations (SVs) are proposed along 8" – 45 Km pipeline.

vii) Station works including Piping, Civil, Mechanical, Instrumentation, fire fighting and all associated jobs at Hanuman Junction, SV stations and Receiving station (VCL). In addition SCADA, Telecom at SV1 and CMS (at VCL) is considered.

viii) Condensate recovery, storage & handling system has been envisaged at CMS (Receiving Station). An underground Condensate storage tank of working capacity of 10 KL has been envisaged to store the condensate obtained from manual draining of Gas Scrubber and wet gas filters. The loading of condensate in tanker shall be carried out by motor driven pumps. The peak condensate recovery is expected to be 1.5KL/day at CMS.

ix) 6" tap-off for connectivity to customers from first stage PRMS at VCL (Receiving Station) has been considered.

x) Battery limit is from 8" hot Tap off with one ball valve at CH-154 at Hanuman Junction on Tatipaka Lanco Pipeline. The other side of the battery limit is 8" inlet flange of Gas scrubber of pressure reduction and metering skid at CMS. Refer respective P & Ids.

xi) Condensate storage tank and handling system at CMS shall be hooked up with the metering skid as indicated in P & Id.

2. GENERAL

PREAMBLE:

While working out the cost of items described against various item numbers in the SOR, the contractor should consider the following:

i. The number of crossings, Obstacles encountered at site may differ from that mentioned in SOR, alignment Drawings / Crossing Drawings.

ii. The width, depth, nature of crossings, obstacles may differ from one reported on alignment sheet and/or crossing drawings.

iii. Based on the above, the contractor shall determine the exact number, characteristics, depth, width, nature of crossings, obstacles etc based on site visit on any other evidences or material he may have.

It is mandatory for the bidder to visit and inspect site and get acquainted with the pipeline route, various crossings, location of HDD, general terrain, type of population at various locations enroute pipeline, climatic condition, storing space etc before submission of bid. It is to be clearly understood that owner shall not entertain any claim whatsoever at any stage on account of bidders non familiarisation of the site condition.
In the absence of any specifications covering any material, design of work(s) the same shall be performed/supplied/executed in accordance with standard engineering practice as per the instructions/direction of the EIC, which will be binding on the contractor.

SALIENT FEATURES:

Laying of 8”X45 Km (approx) long pipeline from Hanuman Junction (at Ch: 154 Km) on existing 18”X 204 Km Tatipaka-Lanco pipeline to Check Metering Station(CMS) without affecting the piggability of the existing 18” Tatipaka-Lanco pipeline. Hot tapping is proposed for connecting the main grid with Lingala-Kaikaluru network. This line will cater the shortfall of gas to existing customers and mitigating gas demands of new customers of 292000 SCMD at 29-30 Kg/cm^2.

i) MAJOR CROSSINGS:

Only major crossings details are listed below. The contractor shall make his own assessments from the alignment sheet, overall schematic diagram and/or site visit for exact no. of crossings.

A) Road CROSSING

1. Chennai-Kota Road (NH-5)	Ch. 5.27
2. Tippanagunta Murram Road (SH-46)	Ch. 9.16
3. Rungaya Apparavupetta Road (SH-46)	Ch. 10.75
4. Chintalapudi road (NH-214)	Ch. 33.72

B) RAILWAY CROSSING

1. Vjaywada-Bhubaneshwar-South Central double track	Ch. 3.61
2. Gudivada Bhimavaran-broad gauge single track	Ch. 32.06

C) RIVER CROSSING

1. Bodimeru river Ch. 15.25

D) CANAL CROSSING

1. Kakulapadu main canal	Ch. 12.15
2. Aripirala canal	Ch. 16.5
3. Dosapadu canal	Ch. 19.5
4. Neharalli canal	Ch. 22.3
5. Chintala canal	Ch. 25.7
6. Gudivada canal	Ch. 27.1
7. Moturu canal	Ch. 31.6
8. Lellapudi canal	Ch. 33.7

E) FISH POND

1. Continuous fish pond with partition only from one pond to another starting from CH. 14.3 to Ch.15
2. Kankukollu fish pond 350 meter approx 3 No of pond.

ii) SECTIONALISING VALVE STATIONS:

Two Sectionalizing valve stations are considered on 8" -45 Km pipeline:

a) SV1 (Type-Remote Operated)-Ch. 9.2(Hold) near Gudivada-Nuzid Road (SH-46)
The location is near main approach road -SH-46.

b) SV2 (Type-Manual)-Ch. 21.2(Hold) near Nandivada-Tamirisa Road

3. SCOPE OF WORK-GENERAL

PIPELINE & ASSOCIATED WORKS

The work shall be completed conforming to technical specifications drawings data sheets as furnished in the tender and any other information provided by Owner/Owner's representative. The scope of work includes the following:

a) <u>Project Management including document control system:</u>

- Preparation of detailed project schedule
- Material Management Plan
- Planning & Scheduling
- Monitoring and Reporting of progress on each front of the project bi monthly basis
- Expediting and Monitoring of all procurement and construction activities with approved vendors / sub-contractors.

b) Detailed Engineering

- Owner has got the detailed survey carried out for the entire pipeline route. The plan and ground profile details to extent available are being furnished to the Bidder along with bid document. Contractor shall carry out any additional topographic survey required for local detours during execution of the project in a similar manner without any extra cost to the owner. However, laying and construction of entire pipeline including detoured portion shall be within the scope of contractor and governed by SOR of tender without any cost implication. Contractor shall be deemed to have considered such eventualities while formulating his bid. Pipeline route maps / alignment sheets showing the pipeline route are also enclosed with the bid package.
- Alignment Sheets, Major crossing drawing, terminal plot plan and piping GA drawings for Despatch/Receiving & SV stations are included in the Bid. These drawings are indicative only and are furnished to enable Bidder to estimate the quantum of work and to quote a firm price for the work.
- Collection of data at site and carrying out residual engineering for pipeline system including terminals and crossings in accordance with design basis, codes & standards and project specifications contained in this bid package. Requirements of Indian Standards and Codes shall be complied with wherever applicable.
- Route survey for verification of all crossings alignment and to verify existing utilities.
- Geological, Hydrological and Topographical, Soil Investigation survey if required has to be carried out by bidder without any additional cost implications to owner.
- Design for anti-buoyancy measures.
- Design of HDD crossings
- Hydro test Plan.
- Preparation of pipeline construction drawing such as alignment sheets for detour portion if required, crossing details, As built plot layout,P&Id,Isometric for the whole utilities across the pipeline, Piping general arrangement drawings (GADs) for dispatch & receipt terminal, all consumer terminals, SV stations, Tap-off Point including pipe supports. The typical drawings for the station layouts attached along with the bid package shall be considered as basis for developing the final layouts. The owner shall hand over typical piping drawings for other installations to successful bidder for reference and development of GA drawings. All drawings / methodology shall be subject to review and approval by Owner/Owner's representative.
- Carrying out Material Take Off for the entire pipeline system including those materials supplied by Company if any and all piping at all terminals.
- Obtaining the NOC for all construction works and all documents thereof.
- Carry out engineering for major crossings
- Residual engineering pertain to station works including civil, structure, control room, guard room, boundary wall, instrumentation, CP and electrical etc is in contractor's scope.

- Fire fighting system design-CO2 flooding system
- Fire and Gas detection system
- Foundation platform for condensate recovery system metering skid & pressure reduction skids
- Installation of Pig Launching / receiving facilities
- As built drawings/documents of all the systems including pipe book
- Operation and Maintenance manual of equipment supplied.
- The design shall take into consideration all stipulations, practices followed by various authorities for all types of crossings and specifically all the factors that are agreed upon between Company and state / local authorities as per agreements reached as a part of permissions for various crossings. Contractor shall provide all design data / drawings / calculations as required for statutory clearances including obtaining necessary approvals.

c) <u>Inspection & quality control</u>

- Ensuring adequate quality assurance and control including stage wise inspection, testing and certification.
- Appoint an independent TPIA for supply of material (Other than free issue) from Owner / Consultant vendor list. The TPIA appointed by bidder shall be common for inspection of complete scope of supply. All inspection reports shall be submitted for owner's review/approval. All materials like valves, piping, fittings, and valves shall be supplied with 3.2 certificates.
- Carryout proper documentation of inspection and quality assurance programme for all equipment and bulk materials duly approved by OWNER. CONTRACTOR shall maintain an accurate and traceable listing of procurement records for the location, quality and character of all permanent materials in the Project.
- CONTRACTOR shall immediately report to the OWNER of any change, which will affect material quality, and recommend any necessary corrective actions to be taken.

d) <u>Procurement & Supply</u>

- CONTRACTOR shall procure and supply all the materials other than OWNER supplied materials, required for permanent installation of pipeline and terminals in sequence and at appropriate time. All equipment, materials, components etc. shall be suitable for the intended service and shall be procured from approved vendor list. CONTRACTOR shall obtain Owner's prior written approval for inclusion of new vendor. Equipments requiring specialized maintenance or operation shall be avoided as far as possible. Equipment offered shall be field proven.
- CONTRACTOR shall procure all materials, components, equipment, consumable etc. required for successful completion of the pipeline system. CONTRACTOR shall also procure and supply spares required for pre-commissioning and commissioning / start up as recommended for all items supplied by him as per specifications provide in the bid package. Where no specifications

available in the contract, the same shall be prepared by CONTRACTOR based on the piping material specification and shall be subject to Owner's approval.

- Store management for contractor supply items as well as free issue materials if any including receipt, preserving the material in good condition, issue of material to construction site, reconciling / handling over surplus material to OWNER for OWNER supplied items at Owners store (Contractor shall arrange space for temporary storage (open & covered) for storage of materials, if required).
- Submit periodic manufacturing progress reports highlighting hold ups and slippages, if any, to OWNER and take remedial measures.
- Interact with authorities such as Sales Tax Octroi, Excise, and Customs etc. as necessary and arrange for transportation of the materials under his scope of supply to site.
- All purchase requisitions including purchase orders, design, drawings and data sheets shall be approved by OWNER / Owner's Representative.
- Compliance with vendors and supplier's instructions and recommendations for transportation, handling, installation & commissioning.
- As built drawing after completion of site work prior to installation, Erection and Testing Project Closed out.
- Mandatory spares

The items to be supplied by the contractor shall be broadly, but not limited to as follows:

1. Ball, Globe, check, plug valves for all sizes
2. Assorted Station pipes and other piping materials
3. Fittings and flanges for all sizes
4. Transition pieces for station piping.
5. Long radius bends (Free issue line pipe will be provided by owner)
6. Special coating for Underground valves, pipes, fittings for terminal stations which should withstand -29 deg C to 65 deg C.
7. Casing Insulators.
8. Insulation joints
9. Jelly / Bentonite filling with uncoated casing pipe.
10. Joint coating material
11. End Seals/blanks/caps
12. Studs, Bolts nuts, gaskets and all related hardware.

13. Fire and Gas detection system.

14. Fire Fighting system-Co2 flooding system

15. Civil/structural materials, doors/windows, false ceilings etc.

16. Sand Buckets, extinguishers etc. as specified in the RFP document

17. All electrical equipment, cables, fittings, panels etc. as applicable.

18. UPS, Batteries, as applicable

19. Instrumentation system including all field instruments, instrumentation valves, fittings, tubing, control panel, instrumentation cables, control panel, sensors, JB'S ,control panel equipment etc. as applicable.

20. OFC, jointing closure along with HDPE conduit and warning mat. Warning mat shall be anti rodent type width 1000 mm & thickness 1 mm.

21. Supply of special tools and tackles, consumables, manpower and special instruments /equipment needed for calibration, erection, commissioning and completeness of the total system.

22. TCP,PCP of Pipeline

23. Platform/foundation for custody transfer metering skid

24. Supply and installation of Split Tee Lock-o- ring type

25. Any other item required to complete the job as per SOR and tender specifications

e) Storage of Materials

- If required, lease land for storage of material and maintain a store for storage of all supply items and Owner supplied free issue material.
- Proper store management including receipt, inspection, storage, warehousing, loading /unloading of material. Contractor should preserve the material in good condition and necessary sheds/storage area shall be arranged.

f) Construction, Installation, Erection & Testing

- Carry out construction as per "Issued for Construction" drawings, procedures, specification and applicable codes and standards. Any changes at site shall need prior approval form the OWNER and revision of drawings.
- "Receiving and Taking over" of all owner supplied free issue materials from the designated place(s) of issue, transportation including loading, unloading, handling, including arranging all necessary intermediate storage area(s) there of as required till the permanent installation of materials.
- Delivery and handling of material at site.

- Construction planning and monitoring.
- Liasoning and coordination with all statutory authorities having jurisdiction during the actual execution of work. Contractor shall also coordinate and use his best endeavours to carry out the construction of pipeline with the general permission provided by client.
- Obtain no objection certificates (NOC) from authorities, land owners or any other statutory body.
- Mobilizing adequate machinery, manpower, tools, tackles, consumables etc for construction.
- Arrange and take possession of any additional land required for construction purposes.
- Clearing and grading of ROU and station plots
- Stringing, welding and lowering of main pipeline.
- Hot Tapping.
- Earthwork such as excavation, trenching for all depths and all types of soil, rock blasting and back filling including bottom/top padding as per specification.
- Procurement, Supply & Laying of HDPE conduit and OFC cable along the pipeline.
- To ensure adequate quality control, stage wise inspection and testing during construction work at site.
- Carry out NDT as specified in the tender along with selection of production joints and carrying out the relevant tests as specified in the bid document.
- Concrete coating wherever required.
- Cold field bends wherever required.
- Site restoration and marking out. Restoration to be done by contractor as per original condition and to the satisfaction of designated authority/owner/farmer and NOC to be obtained to this effect.
- Hydro-testing, cleaning, swabbing and drying of pipeline system including supply of materials, consumables, tools and tackles, equipment/machineries and manpower.
- Gauging
- Carry out HDD crossing as specified in the SOR and tender document.
- Installation of TCP and PCP(Temporary cathodic protection and Permanent cathodic protection)
- Fabrication of station piping and pipe supports, construction and installation. Installation of free issue material like Custody Transfer Metering skid including unloading, condensate recovery system, Launcher & Receiver.
- Land and site development work for stations including earth filling wherever required.

- Civil works for stations including RCC approach road wherever required.
- Installation of Electrical equipments like MEDB, UPS, Distribution boards, lighting fixtures, etc.
- Laying and termination of all instrumentation cable from local instrument/JB to control panel, control panel to UPS panel and all other interconnections as required.
- Mounting/Installation of all field sensors for fire and gas detection system and other accessories related to F&G system.
- Hook up / tie-in of pipeline and piping system with terminal facilities.
- Idle time preservation of the pipeline (if required) for the specified period by filling with nitrogen to a positive pressure of 0.5 bar (g) including supply of nitrogen etc. as required.
- All incidental and associated works and any other works not specifically listed there in but are required to be carried out to complete entire work related to pipelines and terminals.

g) <u>Pre-Commissioning & Commissioning</u>

- Drying as per specifications.
- Geometric / calliper pigging (EGP) including bend radius, angle identification and XYZ co-ordinate for total pipeline.
- Pre-Commissioning of complete system including Custody Transfer Metering skid.
- Commissioning of Pipeline system including supply of materials (temporary, permanent or consumables), tools and tackles (including special tools & tackles) and manpower.
- Performance acceptance as per bid specifications.

h) <u>Project Close out</u>

- Submission of all as built documentation, inspection reports, purchase orders, material reconciliation report, NDT records both in soft and hard copy duly approved by Owner/Owner's representative.
- Submission of all NOC's from landowners, statutory authorities and agencies having jurisdiction.
- Submission of relevant documents, manuals, test certificates of all the items supplied by contractor for the execution of the complete scope of work.
- Submission of operational acceptance report including all the documents, test certificates etc.
- Contractor shall close out the project as defined below:

i) If Contractor completes pre-commissioning and gas is not available up to 2(Two) months, Contractor will be issued provisional completion certificate. However, the owner reserves the right to ask the contractor to mobilize manpower to commission the facilities within 6(six) months from the date of pre-commissioning.

ii) If contractor completes pre-commissioning and gas is not made available within 6(six) months from the date of pre-commissioning, the contract is deemed closed subject to completion of punch points and completion of contract.

iii) In case the gas is made available immediately upon precommissioning, in that case the contract shall be closed within 2(two) months from the date of operational acceptance.

i) Routing of pipeline in restricted ROW.

Since majority of pipeline is running parallel to roads, the contractor shall lay the pipeline in restricted ROW only without disturbing normal traffic.

j) Owner's Obligation.

- Land for various stations.
- General permission from authorities for laying of pipeline.

k) Free Issue Supply by Owner.

Unless otherwise mentioned in the tender, Owner will not supply any material to contractor as free issue except for the following items as listed below:

1) Coated line pipes 8" API5L Gr X 56 PSL2, 6.4mm wall thickness

2) Custody Transfer Metering skids along with scrubber and filter

3) Pig launcher & Pig Receiver

4) Condensate recovery system along with underground condensate collection drum

Receipt, Handling, Storage, Erection and Commissioning of such free issue material are in the contractor's scope of work.

l) Project Completion Schedule.

The Contractor shall ensure that the entire scope of work shall be completed within a period of 6 (Six) months including Mechanical completion, drying, testing and commissioning from the date of Fax of Acceptance, unless such schedule has been revised in accordance with the provisions of the Contract.

Disclaimer

The lengths of the pipeline / quantities of various items mentioned in the tender are indicative only. Contractor / Bidder has to verify and confirm the same on its own based on tender specification, Drawings and actual site conditions. No extra claim in this regard shall be entertained by owner.

4.0 SCOPE OF WORK-DETAILED

PIPELINE LAYING WORKS

- "Receiving and Taking-over" as defined in the specifications stacking in the yards / dump site and stringing of pipes in Right-of-use (ROU), including arranging all necessary intermediate storage area(s) required there till the pipes are installed in permanent installation.

- Transportation of pipes from the designated dumpsite to designated ROU/ROW for stringing.

- Dump site location (Gudiwada).

- Carrying out inspection of OWNER supplied materials if any at the time of receiving and taking-over.

- For pipes where cutting out involves more than 25 mm from pipe ends, ultrasonic inspection shall be carried out at pipe ends as per relevant clause of line pipe specification enclosed with the tender including supply of all equipments. Contractor shall take prior approval from Company for the agency engaged for carrying out ultrasonic inspection.

- Loading, unloading, handling stacking, storing and transportation to workshop / work site of all materials that may be used for the construction of pipeline system supplied by Client/Contractor at their designated stack yard /dump site /store.

- The contractor shall notify the owner the probable date of commencement of work at ROU site at least two (2) weeks in advance to enable the owner to arrange handing over of the ROU / site on the date requested. Should contractor fail in such notification, the owner shall not be liable for any claim by contractor, of whatsoever nature, for delay in the available of a ROU / site.

- Mobilizing and providing all equipments, manpower (skilled and unskilled), consumables and other resource etc. as required for the execution of complete work and thereafter demobilizing the same upon completion of work.

- Contractor shall mobilize the machinery and manpower as defined in the tender document. Each contractor shall be responsible for the entire scope of work of individual part including commissioning and gas in and shall mobilize the equipment and manpower accordingly.

- ROU acquisition / permission of laying the pipeline shall be responsibility of Owner. Obtaining all necessary approvals and work permits from concerned local authorities and respective Owner's having jurisdiction, as applicable for performing the work including shifting / relocation and restoration of telephone / electrical poles and underground pipes, hand pump and other utilities etc. as required by local authorities and as directed by OWNER shall be responsibility of contractor.

- Contractor has to make all liasoning work required for obtaining permission etc during construction and also obtain the no objection/final clearance certificate from the local/statutory

authorities after completion of pipe laying work and restoration of utilities, ROU, Road, Pavement, Drain, Footpath etc. at his own cost. However if any statutory fees is required to be deposited to the authorities, owner shall reimburse the same upon contractors submission of proper receipt.

- Staking, clearing, grading, fencing of Right-of-Use (ROU) as required, trenching to all depths in all types of soil including soft, hard rock, controlled rock blasting / rock blasting by special techniques, chiselling or otherwise cutting etc. to a width to also accommodate the cable conduit as per relevant standards, drawings, specification etc. Transportation of coated pipes to ROU along the route, stringing, aligning, bending, welding, NDT including radiography by X-ray and ultrasonic inspection, field weld joint coating including supply of all materials, protective coating of long radius bends including supply of all materials, protective coating of long radius bends if applicable including supply of materials as per specification sand padding, laying and lowering of the pipeline, back filling, slope breakers as required, carrying out rail, road, canal, utility and submerged minor and major water course crossings including installation of carrier pipe inside casing pipe at cased crossing wherever required, bank stabilization of water course crossing as required, crossing of river / canal by conventional method and arranging all additional temporary land / area required for construction purposes. Supply and installation of anti buoyancy measures viz. continuous concrete coating, saddle weights, extra cover etc. on pipeline as shown in approved drawings and as directed by OWNER, installation of supports wherever required, supply of select backfill material as required, clean-up, pigging, flushing, gauging, hydrostatic testing with quantity of inhibitor as required, dewatering with the additive, at required dosage, swabbing, pre-commissioning and commissioning of complete pipeline system, including all associated works as per relevant specifications, standards and approved drawings.

- Welding of all **Golden Tie**-in joints including tie-in joints and bends on either side of water body crossing / with adjoining pipeline installed by others / other facilities as required, cutting of test header, rebevelling and tie-in with adjacent pipeline segments. The welding shall be mainly semi automatic/ manual type and contractor shall follow the technical specifications as defined in the tender document.

- Field weld joint coating shall be by heat shrink sleeve / other suitable material as per specification enclosed with bid package compatible of pipe coating material.

- Carrying out corrosion coating of Long Radius (LR) bends if any. Coating shall be carried out by heat shrink sleeve / other suitable material as per specification enclosed with bid package for field joint coating.

- Supply and Installation of casing pipes (by open cut / jacking / boring) assembly, including supply of all material viz. casing pipe, casing insulators and end seal, vents and drains etc. complete, at cased crossings as per the drawings / specifications enclosed with bid package.

- Cased crossings shall be installed at locations indicated in alignment sheets. The number of crossing indicated in alignment sheets / crossing drgs. is subjected to change based on engineering, construction and statutory requirements or the requirements of the authority having jurisdiction over a utility crossing.

- All works / provisions including installation of slope breakers to be provided in the trench in areas where slope is more than 1 in 10.

- Sand / soft soil padding around pipe wherever required in areas where trenching has been done in rock including supply of sand / soft soil. The thickness of sand / soft soil padding at the bottom of pipe shall be 300mm in rocky areas.

- Installation of all inline / online instruments / valves / insulation joints / appurtenances etc. as per requirements of approved drawings.

- Providing 300-micron high built abrasive resistant epoxy on the external surface of 6" CS conduits meant for OFC (in crossings) wherever required.

- Indian Railways shall approve the crossing drawing for railway crossings and construction shall be carried out accordingly. The Contractor shall make these drawings available at appropriate time during the execution of the project. Pipeline at railway crossings shall be provided with a casing pipe. The railway crossing shall comply with the requirements of API 1102 and Indian Railway regulations.

- Contractor shall firm the method of crossing of roads such as open cut / boring up in consultation with concerned authorities and Company. The Contractor shall also take due care to identify and take due precautions so as not to disturb or damage the utilities like cables, water lines and other structures.

- Crossings of rivers / streams / canals by conventional method:

i. No damage should be caused to any irrigation sources, while laying the pipeline through canal crossings.

ii. The flood banks of the River / Canal should be brought to the original condition, if they are damaged while the laying of the pipeline. Stabilization of banks shall be carried out as per requirements of concerned authorities.

iii. In general the top of the pipeline shall be taken at least 2.5 meter below the scour level of river crossing. The top of pipeline shall be at least 1.5m to 2.0m below the drain / canal bed unless specified other wise. The minimum cover requirements shall be as defined in drawings/ technical specifications as defined in the bid document.

iv. Pre-construction survey, preparation of the detailed construction methodology / plan and time etc. shall have to be finalized by Contractor in consultation with concerned authorities having jurisdiction over canals / rivers. Company shall provide assistance by providing introductory letters.

v. Pre-construction surveys, preparation of detailed construction method statement and calculations for Owner's approval.

vi. Surveys like Geo-technical, Hydrological and Topographical for pipeline route, Station plots, Rail and Road crossing etc and water crossings.

vii. Site preparation, arranging required land for setting up of string fabrication yard and obtaining necessary permissions from concerned authorities.

viii. Preparation of pipeline Launch way, continuous concrete coating of pipes, repair of damages to corrosion and concrete coating, string preparation, field welding, NDT including radiography, pre-test for completed strings, corrosion and concrete coating of field joints, trenching, laying at approved depth, stabilization of banks, post installation hydro-test, capping, providing and installing of markers, etc.

ix. The major canals with lining / perennial canals need to be crossed by HDD / boring / trenchless technology method only.

- Contractor shall cross the road / canal etc. by HDD/ trench less method at locations as directed by Owner / Consultant as per crossings survey drawing enclosed with tender. Before start of HDD, the contractor shall ascertain by pre-construction survey all underground obstacles namely electrical / telecommunication cable, foreign pipeline water line, drain / sewerage line and prepare crossing profile drawings showing all elevation & levels. The contractor shall also ascertain the type of soil & their terrain whether rocky or normal by way of trial pit etc. before start of job. The contractor shall submit procedure; profile drawing with complete design calculations of HDD as per requirement of ASME B31.8 / OISD norms and safety requirement that pipe is not under stress during and after crossing for Owner / Consultant's approval prior to start the execution of work.

- Contractor shall ensure all safety norms regarding distances from end point or from bottom of crossing and also ensure that external coating of pipe is not damaged during pulling & handling of pipe for crossing. For field joint coating in pipeline string made for HDD, special type of heat shrink sleeve shall be used as per specification enclosed with the tender. For line pipe coating repair, special type of high shear strength repair patch material shall be used which characteristic shall be same or equivalent as original wrap round heat shrink sleeve used in pipeline string for HDD crossing.

- The contractor shall ensure that no any underground existing utilities / pipelines / cable etc. is damaged. It shall be responsibility of contractor to compensate any loss or damage while crossing. Contractor shall arrange all statutory permission from concerned authority before start of job. Contractor shall deploy only GAIL/ JPK approved HDD agency and approval of agency shall be sought before deploying HDD agency.

- Where the pipeline route passes through forest / plantation areas, Contractor shall clear only the minimum width required for laying the pipeline as per Owner approved procedure for pipeline construction. Number of trees / plants to be felled down shall be restricted to a minimum.

- Clean-up and restoration of ROW and other conveniences like road, rail, canals, cultivable land etc. to original conditions as per specification and drawings to the entire satisfaction of OWNER

and / or authorities having jurisdiction over the same, including disposal of surplus construction materials to a location identified by CONTRACTOR approved by local authority without causing any disturbance to environment, location and to the entire satisfaction of OWNER.

- Upon restoration of ROU the Contractor shall furnish documentary evidence in support of acceptance of he same duly signed by land Owner without any extra cost.

- Carrying out Electronic Geometric/calliper pigging (EGP) for 8" -45 km pipeline including supply of all types of pigs, pig locating and tracking device, spares, consumables, manpower etc. as per specification enclosed with bid / contract document.

- Carrying out repair of all defects found during Geometric/calliper pigging including locating, digging, cutting, welding, NDT etc.

- Carrying out cleaning, flushing, swabbing (as applicable), dewatering, testing and pre-commissioning of pipeline and associated facilities at Dispatch Station, Sectionalizing Valve Stations, Tap-off and Receipt Station up to the respective battery limits. Locating all major and minor leaks during hydro testing if any.

- Repair of any leaks / burst occurring during testing of main pipeline.

- Tie- in with the pipeline at rail, road and other crossings including cutting of test headers as required and tie-in with terminal piping & with existing facilities as applicable.

- Installation of carrier pipe in canal / road (NH / Express Highway) / railway crossings by boring / HDD / Trench less method, as directed by Company. Contractor to note that the minimum elastic bend radius (R=21 D minimum) to be adopted, shall be as per pipeline engineering design basis enclosed with the tender. In areas where 21D bends are not feasible suitable 6D bends shall be adopted.

- Obtaining hot work permits from Company / concerned authorities having jurisdiction there of to work within existing and operating terminals including strictly complying with all stipulations / conditions recommendation of the concerned authorities and providing all safety appliances, gas detector, fire screens required during execution of the work as per the direction of Company / Engineer –in-Charge. Coordinating all activities with Company for movement of men and material from and to existing and operating terminals shall be the responsibility of the contractor.

- All incidental and associated works not specifically listed herein but are required to be carried out to complete entire work related to pipelines and the associated facilities and making the entire pipeline system ready for operation.

- The contractor shall be responsible for taking over of the material and subsequent handling, hauling, transportation to the actual work site(s) / fabrication yards(s) and storage & safe keeping of the materials.

- The Contractor shall inspect all Company supplied free issue materials at the time of taking over form the Company and defects noticed, if any, shall be brought to the notice of Company / Company representative and jointly recorded. Once the material has been taken over by the Contractor, all the responsibility for safe keeping of the materials and repair of damage / defects to pipe & pipe coating shall rest with the Contractor.

- Removal of dents in bevels less than 1 mm in depth shall be carried out by Contractor ahead of welding in the field at no extra cost to Company.

- Pipe off cut

The contractor shall keep a detailed inventory of the pipes received, per type of pipe & a note of their location. The contractor shall provide summary of the above to the owner.
The pipes off-cut can still be used in the life time of the contract. Before the end of leak test the contractor shall provide the owner with an inventory of the surplus pipes.
The term" surplus pipe" defined as "Any pipe that can immediately be reused (undeformed, numbered, coating & is in good condition) bearing individual pipe number, stamp of the recognized inspection agency, origin, type & length".
Only complete lengths of pipe element will be taken back by the owner. All other pipe surplus is the responsibility of contractor. Before termination of leak tests the contractor will draw up a final account of the pipes & transmit to owner as per following settlement formula.

Settlement Formula

X = Tr – (Tp + Tc + Cr + Lr)

Where,

Tr = Length of the pipes delivered & accepted on the working sites and issued to contractor.
Tp = Length of the pipes effectively laid.
Tc = Permitted loss (=0.3% of effective length of the pipe laid)
Cr = Length of the returnable pipe (2m & above)
Lr = Length of defective pipes element rejected for reasons which are not attributable to Contractor.
X = Length involved to the contractor.

- **Returnable minimum length of pipe:**

Minimum length of pipe to be returned shall not be less than 2m. All pipe elements shall bear the individual pipe number, stamp of the recognized inspection agency, original type and length.

- **Returning the Surplus Material**

Only the material supplied by the owner as free issue material should be returned in good conditions and while returning, should be accompanied by all needful certificatory. If the free issue material is damaged or misused by the contractor, he will be charged twice the cost of the material. The contractor shall be solely responsible for any damage or misuse of the material supplied by him and no extra compensation either by way of time or cost shall be admissible.

- On completion of the work contractor shall submit to the company, an account for the material issued to the Contractor in the Performa prescribed by Engineer – in –Charge.

In addition to above, the detailed scope of work for packages pertaining to Civil, Structural, Mechanical, Electrical, Instrumentation, Cathodic Protection & final documentation of Pipeline System is detailed in the tender document.

It shall be the sole responsibility of the bidder / contractor to interface all such works so as to make the total pipeline system operational as intended.
All such works which are not indicated here but otherwise required to complete the work in all respect in accordance with the specifications, drawings & other requirements of bid package shall also form part of Bidder's / Contractor's scope of work.

5. ELECTRICAL

5.1 SCOPE OF WORK (ELECTRICAL)

The scope of work shall include residual engineering, supply, installation, field inspection, testing, pre-commissioning and commissioning of all electrical installation including all equipment / items but not limited to the following.

A) DESPATCH TERMINAL AT HANUMAN JUNCTION

Supply, installation, testing and commissioning of 4 meter high light poles along with CFL fixture powered from suitable size of battery and solar panels controlled by solar charge regulator. The battery shall be supplied as a part of the lantern in a weather proof enclosure. The battery shall also withstand ambient temperature & site condition. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during residual engineering.

Supply, installation, testing and commissioning of solar electric power system (including suitable size of battery and solar panel controlled by solar charge regulator) for lighting of guard room along with CFL lamps. The battery shall be supplied as a part of the system in a weather proof enclosure. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during residual engineering.

Supply, installation, testing and commissioning of earthing pit & earthing system for A/G pipeline, gate & fencing.

B) SV Station (SV-1):

Design, Supply, installation, testing and commissioning of solar system and associated equipment, i.e. photo voltaic solar panels with mounting accessories, solar power controller with daily load demand of 800 watt with 24V DC output, DC-DC converter Ni-Cd battery(72 hours back up) set with Battery Charger (battery charger shall be hybrid type i.e., battery shall be capable of charging from Solar system as well as from SEB power), stand and its accessories, junction boxes, cable glands and interconnecting cables between various panels etc.

Design, Supply, Installation, testing and commissioning of 24V, 100A DC switchboard in single front, non-drawout, compartmentalized execution.

Coordination/ Liasioning with SEB/Power supply Co. for drawing 11kV grid power source upto the 2-pole terminating structure at the battery limit of the terminal including necessary survey. Erection, testing and commissioning of 11kV transmission line on 1/2 pole structure including insulators, clamps, hardware, anchors, ACSR conductor, Earth wire, separate earthing system, any other miscellaneous material as required, civil works viz. foundation etc.

Installation, testing and commissioning of 11kV, 2-pole terminating structure including complete with isolator with earth switch (with mechanical locking facility), gang operated drop out fuse, lightning arrestor, insulators, 11/0.433KV, ONAN transformer (Rating as per transformer data sheet attached with tender spec.), cable connector box suitable for terminating 1.1kV grade LT cable, termination arrangement for overhead ACSR conductor etc.

The above work shall be carried out as per specifications of SEBs /Power supply Co. & various standards, Electrical code, Indian Electricity Rule and applicable standard engineering practice.
The Contractor shall engage a locally available SEB/Power Supply Company approved sub contractor for the works related to laying of 11kV overhead transmission line.

Note:- Contractor shall also quote for unit rates for supply of above required material including Transformer etc. for 11 KV overhead line addition/deletion. The same shall be utilized for final bill payment purpose.

Design, Supply, installation, testing and commissioning of 415V, TPN Main Electrical Distribution Board (MEDB) for indoor/outdoor lighting and 1/2 No. split A/C in Telecom/SCADA room. Grid power shall be provided for this MEDB. Electronic type Energy meter provided at the incomer shall be installed in consultation with state electricity board.

Supply, laying & termination of all LT power and control cables, laid in concrete-lined trenches, buried cable trenches, pipes, road crossings, pipe-racks etc. Also supply and installation of GI pipes, Cable-trays and accessories, cable markers, identifier tags, GI saddles, saddle bars and all other associated accessories for cable-laying.

Supply, installation, connection, testing and commissioning of flameproof as well as safe area type electrical items viz. push-button control stations, junction boxes etc. (as applicable).

Supply, installation, testing and commissioning of all equipment/ material for lighting system for all indoor/outdoor areas including all lighting system equipment/ material (lighting fixtures complete with lamps, lighting poles, lighting and power panels, switches, sockets, wiring (for switches/sockets/receptacles, exhaust fan, air conditioning in indoor areas), conduit to be laid in the concrete slab/ other civil construction etc.) in safe and hazardous area. Light fixture shall be selected by considering operation & maintenance point of view.

Supply, installation of all earthing and lightning protection system material & testing and commissioning of complete earthing and lightning protection system of the pipeline facilities viz. Electrical control room and outdoor facilities (flanges earthing loop, fencing, gate, poles etc.) for pipeline including earthing pits, earth electrodes, markers for earth electrodes, earthing strips, grounding conductor of various sizes, earth plates etc. Nuts, bolts used for earthing are of brass. One no. suitable plate shall be installed near each earth pit by stating pit no., due date, test date, test values etc.

Supply and installation of safety equipment in the sub-station, like shock treatment charts, caution boards, first aid equipment, rubber mats, sand bucket etc.

Contractor to note that all cable glands and lugs shall be supplied along with equipment to be supplied by contractor. No separate payment shall be admissible for same. Further contractor to note that weatherproof double compression nickel plated brass cable glands shall be provided for equipment located in safe area, whereas for flameproof equipment flameproof and weatherproof double compression nickel plated brass cable glands shall be provided. For equipments located in indoor safe area, single compression type nickel plated brass cable glands shall be provided.

All the associated accessories, special tools/tackles and commissioning spares and services for the equipments covered in above clauses shall be included.

Fabrication and supply of MS frames, perforated GI plate, MS chequered plates as per spec for covering unused openings of cable trenches, supports, canopies and brackets for miscellaneous electrical equipments, including welding, supply of bolts, nuts(brass) etc. for mounting, and other necessary supplies, all inclusive of painting as specified.

Only estimated quantities are indicated in SOR. Unit rates quoted against each SOR item shall be applicable for any addition and deletion.

Supply, installation, testing and commissioning of 4 meter high light poles along with CFL fixture powered from suitable size of battery and solar panels controlled by solar charge regulator. The battery shall be supplied as a part of the lantern in a weather proof enclosure. The battery shall also withstand ambient temperature & site condition. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during detailed residual engineering.

Supply, installation, testing and commissioning of solar electric power system (including suitable size of battery and solar panel controlled by solar charge regulator) for lighting of guard room along with CFL lamps. The battery shall be supplied as a part of the system in a weather proof enclosure. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during detailed residual engineering.

Other items as required for the completeness and satisfactory operation of the complete electrical system/facilities within the specified battery limits.

C) SV Station (SV-2):

Supply, installation, testing and commissioning of 4 meter high light poles along with CFL fixture powered from suitable size of battery and solar panels controlled by solar charge regulator. The battery shall be supplied as a part of the lantern in a weather proof enclosure. The battery shall also withstand ambient temperature & site condition. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during detailed residual engineering.

Supply, installation, testing and commissioning of solar electric power system (including suitable size of battery and solar panel controlled by solar charge regulator) for lighting of guard room along with CFL lamps. The battery shall be supplied as a part of the system in a weather proof enclosure. The system shall be sized considering battery back-up period of 72 hours. The capacity sizing calculations shall be subject to owner/WGK review during detailed residual engineering.

Supply, installation, testing and commissioning of earthing pit & earthing system for A/G pipeline, gate & fencing.

D) **Receiving Station at VCL(Vennar Ceramics Ltd.):-**

Design, Supply, installation, testing and commissioning of 415V, TPN Main Electrical Distribution Board (MEDB) for indoor/outdoor lighting and Split A/C in Telecom/SCADA room. Grid power shall be provided for this EDB. Electronic type Energy meter provided at the incomer shall be installed in consultation with state electricity board.

Design, Supply, Installation, testing and commissioning of 5 KVA 230V, 50Hz, Parallel Redundant UPS with static voltage stabilizer for bypass supply along with Ni-Cd batteries (along with Battery Charger, stand and its accessories, junction boxes, cable glands and interconnecting cables between UPS, batteries, battery charger) with 24 hrs battery back-up(2 nos. battery bank each of 12 hrs. capacity), separate module of UPSDB with incoming/outgoing feeders as per specification.

Supply, laying & termination of all LT power and control cables, laid in concrete-lined trenches, buried cable trenches, pipes, road crossings, pipe-racks etc. Also supply and installation of GI pipes, Cable-trays and accessories, cable markers, identifier tags, GI saddles, saddle bars and all other associated accessories for cable-laying.

Supply, installation, connection, testing and commissioning of flameproof as well as safe area type electrical items viz. push-button control stations, junction boxes etc. (as applicable).

Supply, installation, testing and commissioning of all equipment/ material for lighting system for all indoor/outdoor areas including all lighting system equipment/ material (lighting fixtures complete with lamps, lighting poles, lighting and power panels, switches, sockets, wiring (for switches/sockets/receptacles, exhaust fan, air conditioning in indoor areas), conduit to be laid in the concrete slab/ other civil construction etc.) in safe and hazardous area.

Supply, installation of all earthing and lightning protection system material & testing and commissioning of complete earthing and lightning protection system of the pipeline facilities viz. Electrical control room and outdoor facilities (flanges earthing loop, fencing, gate, poles etc.) for pipeline including earthing pits, earth electrodes, markers for earth electrodes, earthing strips, grounding conductor of various sizes, earth plates etc. Nuts, bolts used for earthing are of brass. One no. suitable plate shall be installed near each earth pit by stating pit no., due date, test date, test values etc.

Supply and installation of safety equipment in the sub-station, like shock treatment charts, caution boards, first aid equipment, rubber mats, sand bucket etc.

Contractor to note that all cable glands and lugs shall be supplied along with equipment to be supplied by contractor. No separate payment shall be admissible for same. Further contractor to note that weatherproof double compression nickel plated brass cable glands shall be provided for equipment located in safe area, whereas for flameproof equipment flameproof and weatherproof double compression nickel plated brass cable glands shall be provided. For equipments located in indoor safe area, single compression type nickel plated brass cable glands shall be provided.

All the associated accessories, special tools/tackles and commissioning spares and services for the equipments covered in above clauses shall be included.

Fabrication and supply of MS frames, perforated GI plate, MS chequered plates as per spec for covering unused openings of cable trenches, supports, canopies and brackets for miscellaneous electrical equipments, including welding, supply of brass bolts, nuts etc. for mounting, and other necessary supplies, all inclusive of painting as specified.

Only estimated quantities are indicated in SOR. Unit rates quoted against each SOR item shall be applicable for any addition and deletion.

Other items as required for the completeness and satisfactory operation of the complete electrical system/facilities within the specified battery limits.

5.2 OTHER MISCELLANEOUS WORKS

Preparation of buried cable trenches including excavation, back filling, compacting, providing of brick protection by second-class bricks, spreading of fine river sand, including all supplies.

The scope of work under this contract shall be inclusive of breaking of walls and floors, and chipping of concrete foundations necessary for the installation of equipment, materials, and making good of the same.

The job includes repairing of all civil works damaged during installation of electrical facilities.

Sealing of openings made in the walls / floors for cable trays, cables etc. suitably using acceptable practice and standards.

Miscellaneous works (civil works, co-ordination, etc.): All related civil works shall be included in the scope of the contractor

5.3 STATUTORY APPROVAL OF WORKS

The submission of application on behalf of the owner to Electrical Inspector along with copies of required certificate complete in all respects shall be done by the contractor well ahead of time so that the actual commissioning of equipment are not delayed for want of approval by the Inspector/CEA. The Contractor shall arrange for final inspection of the electrical installation at all stations by the Electrical Inspector and necessary coordination and liaison work in this respect shall be the responsibility of the Contractor. However, any fee paid to the electrical inspectorate, etc. in this regard shall be reimbursed by the Owner on submission of bills along with documentary evidence.

The Inspection and acceptance of the work as above shall not absolve the Contractor from any of his responsibilities under this contract. Obtaining clearance for energizing the complete electrical facilities covered under this tender, and approval of installation and drawings from the Chief Electrical Inspectorate/CEA/SEB/Power Supply Company shall be the responsibility of the contractor. The statutory approval also includes equipments installed or commissioned by others within the battery limit. This is for the purpose of obtaining a comprehensive approval in one go.

5.4 OWNER'S SCOPE OF SUPPLY

No electrical equipment will be free issued by the owner to the contractor.

NOTES:-

Contractor to note that the exact cable routing shall be decided at site based on actual site conditions. Exact cable quantities/sizes shall be based on actual measured route lengths at site/load by Contractor in coordination with Engineer-in-Charge/Client. Contractor shall ensure that there is no surplus or shortage of cables at site and procure cables accordingly. Contractor shall note that payment for supply of cables shall be made as per actual laid cables at site.

6. SCOPE OF WORK INSTRUMENTATION

Refer Volume II of II (Instrumentation).

7. SCOPE OF WORK CIVIL

Refer Volume II of II (Civil, Structure & Architecture).