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Bhagyanagar Gas Ltd.

BHAGYANAGAR GAS LIMITED

(A JOINT VENTURE OF HPCL & GAIL)

BID DOCUMENT FOR

Tender for Hiring an Associate(s) for Route Survey for pipeline laying connecting the existing pipeline and Obtaining permissions along the route, as well as obstacle crossings en-route of proposed natural gas steel and MDPE P/L network from various government bodies in Hyderabad GA on Rate Contract basis

UNDER OPEN DOMESTIC COMPETITIVE BIDDING

Bid Document No.: 043-LEPL-BGL-001

VOLUME-II of II
TECHNICAL

Project Management Consultant:
Lyons Engineering Pvt. Ltd.

www.lyonsengineers.com

	CITY GAS DISTRIBUTION PROJECT	

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VOLUME-II of II

REV.	DATE	**Purpose**	PREP.	CHKD.	APPRV.
02	03.10.2022	Issued for BID	SR	SC	JR
01	12.09.2022	Issued for approval	SR	SC	JR
00	24.06.2022	Issued for BID	AM	SC	JR

Bhagyanagar Gas Ltd.

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SECTION V

SPECIAL CONDITIONS OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT

GENERAL INFORMATION: -

The special conditions of contract shall be read in conjunction with general condition of contract(**GCC**), Schedule of rates, scope of work and any other document forming part of contract, wherever Context So Requires. **GCC** is available at tender issuing office and same shall be referred to by Tendered. Notwithstanding, the subdivisions of the documents in to separate sections every part of each shall be deemed to be supplementary of every other part and shall be read with and into the Contract so for as it may be practicable to do so. Where any portion of the special conditions of the Contract (**SCC**) is repugnant to or at variance with any provisions of the **GCC** then provision of **SCC** Shall be deemed to override the provision of **GCC** only to the extent of each repugnance or variations. In case of any contradictions the Decision of the Engineer-I In-Charge will be final and binding on the Contractor.

1.0 SCOPE OF WORK

The scope of work is described separately at SECTION-8 of the bidding document. It is however, explicitly understood that the scope as described is not limiting, in so far as the responsibilities of the contractor are concerned and shall include, inter alia, carrying out any and all works and providing any or all facilities as are required to complete the work in all respect.

1.1DURATION OF CONTRACT / COMPLETION PERIOD:

The completion period of contract shall be 24 months from the date of Fax of Acceptance (FOA)/WO

The Scope awarded against a letter of intimation for Route Survey shall be completed within 8 weeks from the date of Letter of intimation. Draft report shall be submitted within 6 weeks and final report within 8 weeks from the date of intimation.

A joint programme of execution of work will be prepared by the Contractor in consultation with Engineer-in-charge. This programme will take into account the time of completion mentioned below.

1.2 Reconnaissance Survey for Steel Pipeline Route:

S.No	Activity	Time of completion from the date of LOA/LOI /Deliver Order
		Upto 25 Kms.
1.	Field work	5 days
2.	Submission of Draft Reports	5 days
3.	Submission of Final Survey Reports, Drawings, Maps, Data etc. after review from BGL	3 days

1.3 Detailed Steel/ MDPE Pipeline Route Survey:

S.No	Activity	Time of completion from the date of LOA/LOI /Deliver Order
		Upto 25 Kms.
1.	Detailed route survey	10 days
2.	Submission of Draft Reports	3 days
3.	Submission of Final Survey Reports, Drawings, Maps, Data etc. after review from BGL	5 days

1.4 Preparation of Base Map (including procurement, image processing, Digitisation)

S.No	Activity	Time of completion from the date of LOA/LOI /Deliver Order
		1 – 30 Km^2
1.	Procurement of High Resolution Satellite image	12 weeks
2.	Image processing, registration and digitization and preparation of base map	7 days
3.	Submission of Final Survey Reports, Drawings, Maps, Data etc. after review from BGL	1 week

The completion time for Liasioning Activities shall be as per the table below

Sor Item No.	**Steel/ MDPE pipeline laying Permission / NOC for**	**Months**
3.1	Road cutting & Crossings from Major roads division; (GHMC,HMDA,HGCL, HRDCL, MEIL, NCC, KNR Constructions, MVR Constructions & BSCPL) upto 5 kms of Road stretch.(Steel with PE in same trench on other side of Road as per requirement)	1
3.2	Road Crossings from Major Road division, (GHMC, HMDA,HGCL, HRDCL, MEIL, NCC, KNR Constructions, MVR Constuctions & BSCPL). (Steel with/ without MDPE and or MDPE pipelines)	1
3.3	Road cutting including road Crossings from all Municipalities, panchayats & IALA upto 10 Kms of road stretch. (Steel/MDPE pipelines on one side and or on other side of roads as per requirement)	1
3.4	Road cutting including road crossings from R& B Division upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	2

3.5	Road cutting including road crossings from Cantonment Board upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	2
3.6	Road cutting including road crossings from Forest Department upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	2
3.7	Road cutting & Road crossings from State NH up to 10 Kms road length (including Metro Rail) ; (Steel with PE in same trench on one side & or with MDPE pipeline on other side of Road as per requirement)	2
3.8	Road cutting & road crossings from NHAI (intermittent MDPE Laying on one side, with crossings)	2
3.9	obtaining land permission to install DRS on NHAI Land	3
3.10	Obtaining the agreements/undertakings etc. of permissions already given and laid on NHAI.	4
3.11	Railway crossing permissions with laying inside Railway boundary	4
3.12	For installation of DRS on the land of GHMC or R&B, govt office complexes or along Road Right of way.	2
Note: The time will start from the date of intimation to the bidder in writing to obtain permission from Owner/Client		

Monthly/weekly programme will be drawn up by Engineer-in-charge jointly with the contractor based on requirement. The Contractor shall scrupulously adhere to these Targets/Programmed by deploying adequate personnel, in good time to achieve the targets set out in the weekly and monthly program. In all matters concerning the extent of targets set out in the weekly and achievements, the decision of the Engineer-in-charge shall be final and binding on the contractor.
If the contractor fails to achieve the targeted progress schedule of each month as mentioned in the bidding document, the owner at its option may terminate the contract as contractor's default and get the work completed from other sources at contractor's risk and cost.

Contractor shall give Daily Progress Report of work done on previous day in the Performa prescribed by EIC.

2.0 PRICE BASIS:

Bidders to quote on the basis of **FIRM** prices inclusive of all applicable taxes and duties as per scope of work defined above. No additional payment shall be admissible over and above the quoted price.

3.0 VALIDITY OF QUOTED RATES:

The rates quoted and accepted shall remain valid for the entire period of contract and no escalation whatsoever permissible after the award of contract.

4.0 INCOME TAX AND COPORATE TAX

4.0 Income Tax deductions shall be made from all payments made to the Contractor as per the rules and regulations in force in accordance with the Income Tax Act prevailing from time to time.

4.1 Corporate tax liability if any shall be on contractor's account.

5.0 STATUTORY VARIATION IN TAXES AND DUTIES

5.1 All duties, taxes, fees, charges, expenses, etc except where otherwise expressly provided in the contract, as may be levied/imposed in consequence of execution of the work or in relation there to or in connection there with as per Acts, Laws, Rules, Regulations in force shall be in the Contractor's account.

5.2 The base date for the purpose of statutory variation shall be the due date of submission of last price bid.

5.3 Regarding Service Tax and other CENVATABLE taxes if any, contractor shall submit CENVATABLE bills giving break up of tax amount, so that owner can avail the Cen vat benefits as per rule.

6.0 PAYMENT TERMS:

The payment for the subject work will be paid as follows: -

For SOR items 1.1a, 1.1b, 1.2a, 1.3, 1.4	
50%	On completion of field work and submission & approval of Draft report and drawings.
30%	On submission & approval of final report and Drawings.
20%	On Completion of entire works in all respect and its acceptance by BGL
For SOR item 2	
60%	Upon submission of Map View Satellite image with all documents
40%	On completion of entire works in all respect & its acceptance by BGL
For SOR items 3.1 to 3.9, 3.12	
60%	Upon completion of site visit with concerned government public body officials, & obtaining demand note for making payment, submission of Payment to authorities with all documentation.
40%	Upon obtaining final permission from the public body including signed agreement, undertakings, and submission to BGL
For SOR items 3.10	
100%	Obtaining the agreements/undertakings etc. of permissions already given and laid on NHAI.
For SOR items 3.11	

20%	Submission of application and conducting Field inspection , submitting feasibility, and initial application processing charges by railways, Proposal to be forwarded to CBE office by DEN (Divisional Engineer)
20%	Approval on Design Drawing by CBE office.
20%	Obtaining Demand note for way leave charges.
20%	Submitting Payment, clearance from CRS and carrying out agreement. Submitting agreement copy.
20%	Obtain final permission, submit all documents.

7.0 REJECTION OF TENDER:

BGL reserves the right to accept or reject the tender and to waive irregularities and formalities at its own discretion. Any attempt for canvassing shall debar the tender resulting in summarily rejection of the tender

8.0 CONTRACT PERFORMANCE SECURITY:

The successful bidder within 30 workings days of award of work has to submit a contract performance bank guarantee as per the format enclosed/DD for a 10% of Contract/work order value valid till 2 months (DLP Period) beyond the completion schedule.

9.0 CONTRACT AGREEMENT:

The bidder has to execute a contract agreement within 15 working days of the award of the work as per the format enclosed.

10.0 PRICE REDUCTION SCHEDULE (PRS): AS per GCC.

11.0 Bidder should have PF or ESIC, PAN and Service Tax Registration number in its name.

12.0 PREAMBLE TO SCHEDULE OF RATES**:**

1 The schedule of rate shall be read with all other sections with this bidding document.
2 The contractor is deemed to have studied Scope of work, SCC & specifications and details of works to be done within the time schedule and should have acquainted himself of the condition prevailing at site.
3 The quantities given in the Schedule of Rates are indicative, tentative and approximate. Actual quantities may vary during execution of works against various items.
4 All costs and expenses for mobilization, equipment, transport and personnel to complete the fieldwork and preparation of Detailed Survey Report within the stipulated time schedule shall be included in the item rate for survey work.
5 The payments of works shall be made against quantities actually executed. Contractor shall get all quantities executed duly certified by the Engineer-in-charge

during the course of execution of works. Certified copies of measurements shall form the part of the invoice.

6 The schedule of payment shall be as per SOR and payment terms & conditions of contract.

7 The present applicable rate of service tax is @15%.

8 The prices must be quoted in Indian Rupees. All payments will be made against invoice in Indian rupees only.

SECTION – VI

SCOPE OF WORK

1.0 PROJECT DESCRIPTION

M/s Bhagyanagar Gas Ltd. is a joint venture of GAIL (India) Limited & HPCL Ltd. BGL has been setup to implement City Gas Distribution Networks at different geographical areas in the country. Presently BGL is expanding the City Gas Distribution Networks to supply natural gas to various Domestic, Commercial, Industrial and Automobile Consumers in Geographical Area (GA) of Hyderabad.

The detailed route survey for laying of the pipeline to connect the potential consumers in the areas of existing pipeline network enrouting the Steel/MDPE pipeline in the proposed areas and to obtain permissions from respective road owning and other authorities for laying the gas pipelines. In order to get the route survey for the proposed pipelines and for liaisoning purpose, M/s Bhagyanagar Gas Ltd (BGL) intends to award a Contract for carrying out detailed route survey along the existing pipelines to connect the potential consumers for Hyderabad GA.

The pipeline route shall be studied by the contractor for its optimization, considering min. possible length of pipeline route, minimization of obstacle crossings and avoiding topographical and other constraints.

2.0 OBJECTIVE

The Objective of this work is as follows:

i. Reconnaissance survey.

ii. Detailed grid line survey: Performing topographical, geotechnical and other studies as more specifically stated herein in the document along the pipeline route after physical verification of most optimized route and collecting information about the existing facilities, development plans, restricted areas etc. located along and in the vicinity of the proposed pipeline route.

iii. Obtaining details of crossings en-route pipeline.

iv. To survey the routes for connecting the existing Steel and MDPE pipeline to enroute the proposed Steel/MDPE pipeline for providing the gas to Domestic, Commercial and Industrial customers in BGL- Hyderabad authorized GA.

v. To obtain permission and NOC from Authorities concerned for laying of pipeline and across various obstacles or crossings such as National Highway, State Highway, R&B Roads, GHMC, HDMA, HGCL, IALA, HRDCL, MEIL, NCC, KNR Constructions, MVR Constructions & BSCPL, Municipalities, Gram Panchayats, Railway, River, Nalas and water bodies etc.

vi. Supply of high resolution satellite image. Digitization of the satellite images to produce base maps. Superimposing the on ground features on the base maps and submitting to BGL.

vii. Development of Geographical & Land information system (GIS & LIS) along the pipeline route as per Company requirements enclosed in the tender.

viii. Uploading as built/Existing MDPE pipe network data & assets like valves, fittings, markers etc. in BGL's GIS software. This includes collection of all the data (Measurement sheets, reports, sketches etc.) from the BGL/ MDPE pipeline laying contractors, site validation of the same for accuracy, DGPS survey in the pipeline area to have control points, geo referencing, ground survey of the MDPE pipelines, digitisation etc. as required to maintain the accuracy & uploading the existing MDPE pipeline network in to GIS software as per specification.

ix. Uploading as built/Existing steel pipe network data & assets like valves, fittings, markers etc. in BGL's GIS software. This includes collection of all the data (Measurement sheets, reports, sketches etc.) from the BGL/ steel pipeline laying

contractors, site validation of the same for accuracy, DGPS survey in the pipeline area to have control points, geo referencing, ground survey, locating the steel pipeline with locator, digitisation etc. as required to maintain the accuracy & uploading the existing steel pipeline network in to GIS software as per specification

x. Uploading all the details of customers (domestic, industrial and commercial) by collecting the data from the Survey Contractor and superimposing the same on the base maps. The details should be as mentioned in the technical specification.

xi. Contractor to carry out soil investigation/soil stratification along the proposed pipeline route including road & water crossing as per specification enclosed with Tender Document.

xii. Contractor to carry out measurement of soil resistivity as per the relevant scope of work and specifications enclosed elsewhere in the tender document.

xiii. Contractor to locate all buried/ above ground pipelines, cables and other utilities within a distance of 30 meters on either side of the centre line of the proposed ROU with the help of pipelines/ cables locator or other suitable instruments [In case of the densely populated portions and other restricted locations this may be limited to the extent feasible and approved by Engineer-in-charge on the merit of each case]. All detailed interference survey work to be carried out as per technical specification.

xiv. Supply and installation of the survey markers as per requirements of the specifications and instructions of the Company Representative will be in the scope of the contractor.

xv. Preparation of survey reports/drawings/documents and submission of the same to BGL/LEPL for review & approval.

xvi. The scope of work shall also include any other item/activity required to complete the work in all respects as per specifications, drawings, implementation schedule, and instructions of BGL/LEPL whether specifically mentioned herein or not, but is required to fulfill the intended purpose of this tender document.

3.0 SCOPE OF WORK

The brief description of the scope of work is as under:

Contractor’s scope of work for detailed pipeline route survey work and liaisoning shall include, but shall not be limited to the following. The work described herein shall be carried

for the pipeline as per applicable technical specifications enclosed along with the tender documents.

3.1 Carrying out table top study, reconnaissance survey of alternate routes wherever possible and critical evaluation of route considering survey efficiency. Techno-commercial feasible route shall be properly mentioned in the reconnaissance survey report for approval of BGL/LEPL. However, if there is no possibility of alternate reconnaissance survey route, unwanted efforts to generate optional route may be avoided.

3.2 Contractor to carry out detailed route survey work along the entire route of the proposed pipeline as established by Contractor and approved by BGL/LEPL. Detailed route survey works shall be carried out in accordance with technical specification including detailed study of crossing like Railways, Roads, River, Canals, Forest Areas and Hilly Terrains etc. Survey shall also cover an area of 30m on either Side of centreline of surveyed pipeline. The survey shall also include locating of all existing underground cables/pipelines/utilities using cable/pipelines locators and determination of depth of cover.
It shall include identifying and establishing the environmentally sensitive areas and Obtain required permission from the authorities to laying the line in the area.

3.3 Contractor to collect development plans along the proposed pipeline route from various agencies having Jurisdiction thereof.

3.4 Establishing the areas where:
a) Difficulty is expected in mobilization of pipeline construction equipment.
b) RoU is likely to be restricted due to build up areas/habitation.
c) Areas earmarked for future developments.

3.5 Carrying out reconnaissance route survey work along the entire route of the proposed pipeline as established by Contractor and approved by Company. Detailed route survey works shall be carried out in accordance with technical specification including detailed study of crossing like Railways, Roads, Rivers, Canals, Forest Areas and Hilly Terrains etc. Detailed route survey includes Grid Line Survey & Soil Investigation including corrosion survey along proposed gas pipeline routes including Crossing Survey of large carriageway, water body, railways, flyover /over bridge, subways and similar obstructions. The survey shall also include locating of all existing underground cables/pipelines, using cable/pipelines locators and determination of depth of cover.

3.6 Collection of population density data along the entire route of the proposed pipeline route as per specification enclosed with the tender document.

3.7 Supply and installation of the survey markers as per requirements of the specifications and instructions of the Company Representative.

3.8 Tie-in of the starting and termination point of the proposed pipeline survey to the grid control system being used for end facilities. A global geo-referencing system to be used for complete integration of the survey database.

3.9 Contractor shall also identify the earthquake area along the pipeline route and shall define the seismic zone and its category with proper marking on the route map. This should also be a part of the project report. A separate list of elevation difference be submitted along with project report, wherever major difference has occurred.

3.10 Preparation of survey reports/drawings/documents and submission of the same to Company for review & approval.

3.11 Locating all buried/ above ground pipelines, cables and other utilities within a distance of 5 meters on either side of the centre line of the proposed ROU with the help of pipelines/ cables locator or other suitable instruments [In case of the densely populated portions and other restricted locations this may be limited to the extent feasible and approved by Engineer-incharge on the merit of each case]. All detailed interference survey work to be carried out as per technical specification.

3.12 The scope of work shall also include any other item/activity required to complete the work in all respects as per specifications, drawings, implementation schedule, and instructions of BGL whether specifically mentioned herein or not, but is required to fulfil the intended purpose of this tender document.

3.13 The Contractor should collect proposed DP plan / scheme for road expansion, widening and proposed underground utilities. Contractor should aware of future planning of local authorities like Hyderabad Municipal Corporation, Gram Panchayat, PWD, Railway, NHAI etc. and other statutory authorities before finalizing detailed route survey.

3.14 Preparation of base map:

a) Use of high resolution satellite image.

1. Use of High resolution satellite data in digital form covering the selected areas of Hyderabad GA etc. High resolution Satellite Image will be used of the following specification:
   Options: Natural colour
   Projection: UTM, WGS84
   Zone: pertaining to Hyderabad Geographical Area

b) Establishing Ground Control Points(GCP's) with the help of DGPS and post processing of DGPS data.

c) Geo Technical Investigation on plots, area survey for MDPE Network including supply of world view-2 high resolution (0.5 m) satellite image, image processing, registration, digitization (Vectorisation)

d) Digitization of secondary maps and superimposing on base map prepared from Satellite image.

e) After verification of the Consumer information from BGL, link it to base map.

f) After verification of built drawings from BGL and transferring it to the base map.

g) Linking Area survey data from the survey contractor to base map.

h) Preparation of consolidated base map from High resolution satellite image.

3.15 CGD Networking:

a) Supply of Base map in the required format.

b) Confirming the drawings with manual inspection and length with the help of Road-o-meter.

c) Surveyor shall prepare drawing along with route for laying the gas pipeline network with the location of DRS, Service regulators and valve chambers.

3.16 BGL has steel &MDPE existing network in Hyderabad city. Digitisation and Development of GIS/LIS of the existing pipeline i.e steel, MDPE network by collection of all the data like Measurement sheets, reports, sketches etc. from the BGL/ MDPE/steel pipeline laying contractors, site validation of the same for getting the accuracy, DGPS survey in the pipeline area to have control points, geo referencing, ground survey of the MDPE pipelines, locating the steel pipeline with locator etc. as required to maintain the accuracy is also included in the scope of work.

3.17 The scope also includes the liaisoningactivates as following:

i. Identifying the name, contact nos. & complete address of the authorities/agencies for obtaining statutory clearances/no objection certificates/ Permissions/ Sanctions/ recommendations etc. Contractor shall verify all crossings and obstacles in the Right of use of Roads for which permission is required for laying of steel with MDPE pipelines in same trench and or MDPE pipelines in separate trench as per the client's direction.
ii. Obtaining necessary application forms/ formats requirements from concerned authorities/ agencies (cost incurred towards purchase of application forms / formats, if any, will be paid on actual subject to submission of proofs/ bills/ stamped receipt).
iii. Contractor shall understand the departmental procedures involved in processing of various approvals & shall expedite the proposal at each level/ office till final permissions / NOCs, clearance obtained.
iv. Filling/ completing the application forms/ formats preparing the necessary documents/ Sketches / proposals as per the requirement of the concerned authorities/ agencies and submitting the same to these agencies. Contractor has to submit the revised application and obtain permission from the concerned authorities due to suggested changes in route / alignment etc. of pipeline at no extra cost to BGL as per field inspection.
v. Coordination, Liaison andfollow-upwith authorities/ agencies till thepermissions/ approvals/ clearances are received against obstacle crossings for National Highways, State Highways, R&B, Major Roads division, City Road and Radial road division, HMDA, GHMC, Gram Panchayats, Municipality, Railways, and other water bodies like Nalah, Drain, ponds, Creek etc.
vi. The inspection by the authorities/agencies, including field verifications, if any, shall be arranged by the contractor and necessary coordination & liaison in this respect shall also be the responsibility of the contractor.
vii. Collection of Field data, revising/modifying the documents/sketches, collection and submission of additional information as per the requirement of these authorities.
viii. Submitting the approval/ clearance papers to BGL within the time schedule as indicated in this tender document.

4.0 SCOPE OF SUPPLY

4.1 Company shall not supply any materials, manpower or equipment for the tendered work and this shall be the responsibility of the Contractor.

4.2 The procurement and mobilization / supply in sequence and at appropriate time of all equipment, data, skills, accessories, materials, software's, hardware's and consumables etc. required for completion of all works covered under this contract shall be entirely the responsibility of the Contractor.

4.3 All positioning system, survey equipment, operating personnel including travel cost of operator, their lodging and boarding, local transport, transportation of equipment to and fro, surface transport insurance, any other items required to complete the work as per the requirements of this Tender Document and directions of BGL representative shall be supplied/arranged by the Contractor at his cost without any liability on the part of BGL. All licenses/authorization/levies/charges for connectivity with satellites shall be Contractors' responsibility.

4.4 The flag marks shall be properly chosen and marked at major crossings, specified locations and major turning points etc on the maps /drawings including the facility of the Path Finder in such a manner that the same are identifiable at the time of subsequent detailed survey & cadastral survey.

5.0 **CONTRACTOR'SRESPONSIBILITY**

For Route Survey:

5.1 Contractor in general shall carry out Reconnaissance Survey and finalize the route for detail survey in consultation with BGL/LEPL. Deviation from route, if considered essential by contractor, shall be brought to the notice of the Company Representative.

5.2 Providing all qualified/skilled personnel to carry out the entire job, all survey and other equipment, tools, tackles including pipe/cable locator (Met Rotech or equivalent) and all other necessary materials and facilities required to complete the job to the entire satisfaction of the Company Representative in accordance with the requirements of the tender document.

5.3 Arranging, acquiring all data, access, permissions and other activities/services required for and/or incidental to performing the work tendered.

5.4 Settling all compensation and disputes arising out of any damages caused by Contractor or Contractor's workmen during the execution of the work.

5.5 Survey of India Bench-marks and determination of their values including tieing-in of proposed pipeline profile to the same shall also be Contractor's responsibility.

5.6 Information of concerned departments of Government of India/State Governments, private/public institutions/companies etc. within reasonable distance on either side of the proposed pipelines alignment. Information about future plans, irrigation projects, infrastructure projects, afforestation plans, defence, and industrial projects by private/public enterprises in the vicinity be also collected and furnished.

5.7 Contractor shall carryout all works in strict compliance with applicable documents enclosed with the tender documents and as per the instructions of Company Representative. The scope of work shall also include any other item/work required to complete the work in all respect as per specifications, drawings and instructions of Company Representative whether specifically mentioned here in or not, but required to fulfil this intended purpose of this tender document.

5.8 All maps procured by the Contractor under this contract shall be property of the Company and shall be handed over to the Company on completion of the work.

5.9 Procurement of all required Survey of India maps / Satellite imageries / any other map necessary to undertake reconnaissance survey and detail route survey of proposed pipeline shall be in contractor's Scope of Works, without any additional cost to BGL.

For Liaisoning:

5.10 Preparing the applications on behalf of the BGL for submission to relevant authorities along with copies of required certificates complete in all respects with data/documentation / Sketches / details and submission.

5.11 Providing all required manpower for follow up to obtain permission from various Authorities, including organizing meetings with authorities such as NH, GHMC, Metro Rail, MRD, Municipality, Gram Panchayats and Railway Departments etc.

5.12 Arranging, acquiring all data, access, permissions and other activities / services required for and /or incidental to performing the work tendered.

5.13 Contractor shall carryout all works in strict compliance with applicable specifications documents enclosed with the tender documents and as per the instructions of Company Representative. The scope of work shall also include any other item/work required to complete the work in all respect as per specifications, sketches and instructions of Company Representative whether specifically mentioned here in or not, but required to fulfillthis intended purpose of this tender document.

5.14 Arranging all required documentation, sketches etc. necessary to be submitted along with application to the concerned statutory authorities.

5.15 Contractor's manpower/ staff/ representatives shall have knowledge about procedures, Acts, Rules and Guidelines etc. of the concerned authorities who will involve for permissions / NOCs / approvals etc.

5.16 Contractor's manpower/ staff/ representatives should be fully equipped with GPS, laptop, data card, typing (Hindi & English) etc. and should be well conversant about procedures, preparing of proposal, filling of applications, submission of proposal etc.

6.0 COMPANY'S OBLIGATION

6.1 BGL will provide start and end locations only.

6.2 Standard format of drawings like plans & profile, Alignment sheet, Topography, cross section, data sheet for soil investigation & population density etc. will be submitted by Contractor for the approval of BGL.

7.0 ASSISTANCE FROM BGL.

BGL shall provide the following Data to successful bidder and any other suitable information, which is acquired by BGL and required to complete the assignment and other support services for the period of assignment.

I. BGL will sign the original letter/ application to be made to statutory authorities.

II. BGL will make necessary payment of statutory fee / deposit directly to the concerned Depth. /Authority as per their demand note.
III. BGL will provide all available survey data/details/documents required for obtaining permission.

8.0 DOCUMENT/DATA SUBMISSION

8.1 Contents and presentation of route survey data/ records shall be reviewed / approved by BGL/LEPL in the initial stage on sample drawings/documents to be prepared by the Surveyor.

8.2 Two sets of paper copy of sample drawings/ data/ documents covering at least 03km. Stretch, shall be submitted by the Contractor for BGL's review in the form of draft report for entire activities. Suggestions/ Comments, if any, shall be incorporated by the Contractor. This report can be demanded in parts and in different phases as per discretion of BGL/LEPL.

8.3 All drawings, reports, formats etc. forming the part of submission to BGL/LEPL shall be prepared on approved computer package. All drawings, including, but not limited to alignment sheets, crossing drawings, soil profiles etc. shall be prepared using AutoCAD latest version & GIS based suitable package of the latest version as per decision of BGL. All reports, formats, write-ups, charts shall be prepared on computer using software package compatible with MS Office 2019 or higher version.

8.4 The following data and drawings submitted shall be in approved GIS package format latest version:

a)Drawings - Three paper copies in colour, (Alignment sheets, Route Map Crossing drawings, etc), and one copy on standard CD ROM & one in Pen drive.

b) Soil Resistivity Report - Three paper copies and one copy on standard CD ROM &one in Pen drive.

c)Geo-technical investigation - Three paper copies and one Report copy on standard ROM & one in Pen drive.

d)Other Reports and Records - Three paper copies and one copy on standard CD ROM & one in Pen drive.

e) Documents for Liasioning as under:

Sr. No.	Documents	No. of Copies
1	Original Permission Letter as received from authorities along with original/copy of all correspondences with Authority Concerned	Original-01 Copy-02 Scan copy of All correspondence and Sketches/ sketches/agreements in Hard Disk

9.0 LIST OF ENCLOSURE

Technical Specification

9.1 Specification for Detailed Pipeline Route Survey

9.2 Soil Investigation Survey (Route)

9.3 Standard Specification for Corrosion Survey.

9.4 Standard Specification for Geotechnical Investigation & Hydrographic Investigation for Crossings

9.5Reconnaissance Survey

9.6 Supply and processing of high resolution satellite images.

9.7Specification for digitization and development of GIS/LIS

	CITY GAS DISTRIBUTION PROJECT	Bhagyanagar Gas Ltd.

Technical Specifications

9.1 STANDARD SPECIFICATION

FOR

DETAILED PIPELINE ROUTE SURVEY

CONTENTS

1.0 **SCOPE**

This specification covers the minimum requirements of topographical survey along the pipeline route including locating the centre-line of pipeline alignment on the ground, constructing survey monuments, field measurements for planimetry and profile and preparation of drawings and documents. This specification also covers the minimum requirements for soil investigation for
the purpose of visual engineering classification of soil along the pipeline route.

2.0 **REQUIREMENTS**

2.1 All survey works shall be performed by or under the supervision of a qualified land surveyor.

2.2 All measurements shall be in metric units.

2.3 The readings and noting shall be neat, legible and scorings and over-writing shall be duly initialed by the Surveyor.

2.4 All survey shall be carried out using approved methodology and equipments e.g. GPS DGPS, Total Stations, Auto levels, High precision Theodolite , etc.

3.0 **PRELIMINARY AND LOCATION SURVEY**

3.1 **Reconnaissance surveys**

3.1.1 BGL/LEPL will provide only start and end location of survey and successful bidder will procure required SOI map, satellite imageries and other document at his own cost. Contractor has to carry out table top study and subsequently field verification for route identified based on table top study.

3.1.2 Contractor has to make critical evaluation of alternate routes and will recommend for techno-commercial feasible route based on merits and demerits to BGL/LEPL and shall obtain approval of best route before start of detailed engineering survey.

3.2 **Alignment and location surveys:**

3.2.1 A preliminary survey for locating the centre-line of pipeline alignment on the ground shall be carried out and where it becomes apparent that a better route could be followed, the Surveyor shall consult the COMPANY/ENGINEER for authorization to make a change.

3.2.2 Turning Points (TPs) shall be located by Surveyor in consultation with COMPANY/ENGINEER considering the following.

- To avoid obstruction along the line, by ranging on ground and shifting the

Turning Points if need be.

- Check for terrain gradient by using hand clinometer.
- Ensure proper angle of crossing by keeping as nearly right angle(to road / rail / streams, etc.) as possible. The right angle may be laid on ground by using a chain or string lengths in ratio of 3, 4 and 5.
- To check from construction point of view and avoid objects like power, telephone and telegraph poles, walls, tube wells or such other structures falling in the strip of land, 50m on either side of pipeline alignment.

3.3 **Staking of pipeline route**

3.3.1 The pipeline defining trench centre line shall be staked by placing suitably painted marker stakes at Turning Points (TPs) and at Intermediate Points (IPs) between consecutive TPs. All turning Points (TPs) and intermediate points are referred as Intersection Points. The pipeline centre line shall be staked on the ground as follows:

First, the Turning Points (TPs) shall be staked on the ground. After locating and marking the TPs, the intermediate points shall be staked while measuring slack distance. The staking shall normally be done at intervals of 250 m. approx. along the centre line of the pipeline.

3.3.2 The intersection Points shall be serially numbered form the starting point. The serial number of each Intersection Point shall be boldly inscribed on the marker stake. In addition, the Turning Point (TP) marker stake shall identify the Turning Point reference number from the starting point.

3.3.3 For Intermediate Points (IPs) letter “P” shall precede the serial number of the intersection Point marker. For Turning Points, the letters “TP” shall precede the Turning Point reference number and the letter “P” shall precede the serial number of the Intersection Point.

3.3.4 The marker stakes at Turning points (TPs) shall be referred with three reference stakes around the TP. The reference stakes shall carry the Turning Point reference number and their respective distance from the TP marker stake. Change in direction of line shall be marked on the TP marker stakes. In addition, direction markers near TPS and other locations shall be placed wherever necessary.

3.4. Stakes and Marker

3.4.1 All marker stakes shall be of pre-cast reinforced cement concrete (1:2:4) pillars or stone, having dimensions 150 x 200 x 800 mm and shall be fixed in centre position to a depth of 500 mm. with 1:3:6 cement concrete in pit size of 400x350x800mm at intervals of 250m approx. along the centre line of the pipeline. If, pre-cast RCC markers are provided, it should have reinforcement of 04 nos.-6 mm dia bars with 04 equally spaced rings of 6 mm dia. All pre-cast RCC pillars should be engraved with company name on one shorter vertical face. In case of stone pillars, Company name

is to be written with the paint. The exposed surface of the blocks shall have a smooth finish and shall be painted with 'Post Office' red paint. All letters and figures shall be paint marked on the surface of the blocks in white.

3.4.2 On the top surface of the reinforced concrete blocks, a cross inside a circle shall be engraved at the centre or a nail shall be put centrally inside an engraved circle, to indicate the exact position of the Intersection Point. The circle shall be of approximately 50mm diameter. In case of stone markers, a cross inside the circle at the centre of stone shall be made with the paint.

3.4.3 Surveyor can, however, propose to the COMPANY/ENGINEER other types of stakes/markers which are better suited to site conditions.

4.0 BENCH MARKS

4.1 Bench Marks (BM) at approx. every 5 Km on permanent structures along the Right of-Use (ROU) i.e. within 100m either side of RoU, shall be established and described. Additional bench marks shall be established near the major pipeline crossing sites, if any.

4.2 **Permanent Bench Mark** shall be of cast-in-situ Reinforced Cement Concrete (having size 500x500x1000mm) in 1:2:4 (nominal mix) with reinforcement of 04 nos-12mm dia bars & 05nos-8mm dia equally spaced rings. At the top of bench mark, an insert plate (8 mm thick steel plate of size 150x150 mm provided with holdfast/lugs) shall be fixed/embedded in R.C.C. in centrally & horizontally levelled position. R.C.C. work shall be carried out over 75mm thick plain cement concrete in 1:3:6 of size 650 x 650mm. Permanent bench mark shall be 400mm above natural ground level and 600mm below ground level. The reduced level of the BM shall be paint marked in the concrete block. Letters "BM" shall precede the reduced level of bench mark recorded to the second place of decimal.

4.3 Accuracy of the reduced levels of the Bench Marks shall be verified wherever possible by checking levels with the nearest permanent Bench Mark established by survey of India.

5.0 CROSSING

5.1 General

As far as possible, crossings shall be made right angles. The surveyor shall record the angles of crossing for all fences, property lines, utilities, railways, canals streams, etc. that are crossed. In addition, the true bearings of the centerline of the road, railway, canal as well as that of the pipe centre-line shall be recorded. Turning Points (TPs) provided near crossings shall be located, at least 50m from the crossing's boundaries, in stable and firm ground.

5.2 Railway Crossings

The angles for all railway crossings shall be as close to 90 degrees as possible, but in no case less than 85 degrees to the centre-line of the railway.

5.3 Primary Road Crossings

The angels of crossing for secondary roads shall be as close to 90 degrees as possible, but in no case less than 45 degrees to the centre-line of the roads. All seasonal roads, unpaved village roads, cart-tracks, etc. come under this category.

5.4 River/Stream/Nala Crossings

These crossings shall be established as close as possible to the locations shown on the route map. Crossings shall be located in a comparatively straight each of the river where the banks are stable and there is sufficient area for construction. Angle of crossing shall be as close to 90 degrees as possible.

5.5 Canals/Drainages Ditch Crossings

The angle of crossing shall be as close to 90 degrees as possible but in no case less than 60 degrees to the centre-line of the canal/drainage ditch. Crossings shall be located where there is no evidence of slumping or erosion of banks, or bed.

5.6 Utility Crossings

Utilities crossed shall be located their centerlines with stakes containing station numbers in the survey. The angle or crossing shall be measured and locations established relative to their above-ground facilities. The names and sizes of all utility lines shall be included in the survey notes. In the cases of overhead power and telephone lines, the distance to the poles and towers on each side of the survey line shall be measured, and the numbers of poles or towers noted. Line voltage shall also be recorded. Where possible, the survey shall be established so that there is a minimum distance of 50 meters from the survey line to the nearest High Tension pole or tower. Underground utilities shall be located as far as possible and staked for a minimum distance of 25 meters on each side of the survey line.

6.0 ACCURACIES IN MEASUREMENT

6.1 Surveyor shall incorporate corrections to the linear ground measurement due to standard errors, variations from standard errors, variations from standard temperature and pull.

6.2 The error for angular closure for the work shall not exceed one minute per station and for linear measurements it shall be read to the nearest 0.005 M.

6.3 The error on closure for measurements on vertical distance to establish bench marks shall not be more than $24\sqrt{K}$ mm (Where K is the linear distance in km).The for measurement of vertical distances on bench marks shall be read to accuracy to the nearest 5 mm and for Intersection Points and other points also Pipeline route and at crossing to the nearest 10mm. The error of misclosure in vertical distance shall be distributed linearly.

7.0 CHAINAGE

7.1 Slack distance measurement will be made using 50-meter steel tape or 30-meter chain.

However, in case of abrupt slope change the tape/chain is straightened parallel to the probable grading.

7.2 Distance between Intersection Points staked along the pipeline route shall be measured and recorded. In addition, distance between level points shall also be measured and recorded.

7.3 Chainages will be continuous in the direction of survey.

7.4 The true bearing of all straights shall be observed and recorded.

7.5 Data on nature of terrain, viz. sandy, stony, vegetation, etc. and type of ground will also be recorded along with chainages of change points.

7.6 Check on distance measurements will be by stadia method at the time of leveling.

7.7 Standard chain survey format will be used for record keeping.

8.0 MEASUREMENT OF HORIZONTAL ANGLES

Horizontal angles are measured to indicate the change in direction of alignment and specify the horizontal bend at the Turning Points.

8.1 Theodolite, reading direct to 10 seconds or better, shall preferably be used. Angles shall be measured clockwise from back station to fore-station. Mean of two readings one

on face left and other on face right shall be taken as the horizontal angle.

8.2 The line at both ends shall be tied to the grid control system being used for end facilities. True bearing at the beginning, end and every 15-20 KM shall be observed to keep a check on errors in angular measurement.

9.0 PROFILE

9.1 The continuous profile of the proposed pipeline route shall be established from the reduced levels taken.

i) at the starting point,
ii) at all Turning Points (TPs)
iii) at all Intermediate Points staked on the ground.
iv) at all points on the pipeline route where there is a change in slope.

9.2 When the terrain is flat, reduced level shall be additionally recorded along the pipeline route at 100m interval.

9.3 When the terrain is undulating observation of reduced level shall be made at a sufficient number of points so as to given an accurate plotting of the ground profile along the route.

9.4 For road and railway crossings, the reduced levels shall b recorded at all points along the pipeline alignment wherever there is a change in slope within the entire width of the Right-of-Use of the road/railway. CONTRACTOR shall prepare a detailed drawing for the crossing in scale 1:100 (in both horizontal and vertical directions) which shall be truly representative of the crossing profile.

9.5 For river/stream/nala/canal crossings, levels shall be taken at intervals of 5M upto 30M beyond the highest banks on both sides. Levels shall be taken at closer intervals, if there is a change in slope. CONTRACTOR shall prepare a detailed drawing for the crossing in scale 1:100 (in both Horizontal and Vertical directions) which shall be truly representative of the crossing profile.

9.6 In right-of-Use having slope across the pipeline alignment, as encountered in hilly areas, Ghat regions, ravines and other similar areas as directed by COMPANY, cross section at 50 M interval and for a length of 50 M on either side of the pipeline alignment shall be observed and recorded.

9.7 For major water crossing sites, cross section as above shall be observed at both banks.

9.8 Method of RISE and FALL shall be used to compute reduced levels of various points. Check on computation shall be made by using the following formula:

Back site – Fore Site = ΣRise – ΣFall = First R. L. – Last R. L.

9.9 Maximum misclosure shall not exceed $24\sqrt{K}$ mm where 'K' is the distance in Km Maximum length of line of sight shall not exceed 100m.

9.10 All levels shall be with respect to Means Sea Level (MSL).

10.0 BUILT-UP AREAS

10.1 Monuments and Properties

The pipeline alignment shall run clear of the existing monuments, properties and structures etc., as indicated in Pipeline Route Survey Data Sheet (Annexure-IV). For congested areas, closer distance may be adopted, however, location shall be approved by COMPANY/ENGINEER.

10.2 Parallel Alignment

The pipeline alignment wherever runs parallel to an existing or planned under/over ground facility will be treated as parallel alignment. For underground facilities surveyor shall identify and locate them with suitable special ground laths. The following clearances shall be observed in case of parallel alignment defined above.

- Between existing/planned electrical power cables/lines and the proposed line – 50.0 meters.
- Between existing/planned communication cables/lines and the proposed line – 25.0 meters.

10.3 Parallel Encroachment

Unless otherwise stated, when the pipeline alignment runs generally parallel to a road or railway it shall be kept sufficiently clear of the Right of way limits of the facility.

11.0 SURVEY NOTES, OBSERVATIONS AND COMPUTATIONS

11.1 The procedures followed both for field and office calculations shall be such that the results obtained shall be maintained by surveyor.

11.2 All up-to-date notes and observations related to the basis for determination of boundary lines and corners shall be maintained by surveyors.

11.3. Survey records must contain schematic diagrams of all horizontal controls pertinent to the project showing all existing and established control points, bench marks, any triangulation station and boundary lines.

11.4 Geo-graphical and UTM co-ordinates of all Turning Points and starting/end points of the pipeline shall be computed and furnished to the COMPANY/ENGINEER.

12.0 MAPS AND DRAWINGS

12.1. All maps and drawings shall be made on standard format furnished by the COMPANY. Surveyor shall perform mapping and drawing work so as to contain all relevant data consistent with the survey notes and observations. The drawings shall also contain details of roads, streets, highways, structures, all types of crossings, terrain, surface vegetation and all other details which will be required for the purpose of engineering design.

12.2 Following types of detailed survey drawings will be made

- Right-of-Use Planimetry in UTM grid	: 1:2500 along the line : 1:2500 across the line
- Ground Profile	: 1:2500 Horizontal : 1:250 Vertical
- Crossing Details (Road, Railway, Stream, Nala & Canal)	: 1:100 Horizontal : 1:100 Vertical
Crossing details (River Crossing) Upto 250 M width	: 1:200 Horizontal : 1:200 Vertical
Upto 500 M width	: 1:500 Horizontal : 1:500 Vertical

Greater than 500 M width	: 1:1000 Horizontal : 1:1000 Vertical
- Detailed Pipeline Route Map	: 1:50,000 on SOI Topo Map
- Additional Route Map for Hilly, Ghat and ravenous regions	: 1:15,000
- Cross Section for sloping Right-of-Use	: 1:100 Horizontal : 1:100 Vertical

Note: Crossing drawings shall be prepared using same horizontal and vertical scale as indicated above. No. of sheets may increase, if required.

13.0 PRESENTATION OF FIELD SURVEY DATA

13.1 Survey drawing

- Survey drawing shall contain the following data as a minimum requirement.
- Right-of-Use Planimetry drawings shall show all objects within 50 meters on either side of the Pipeline in Plain
- In case of all rail, road, river, steam, canal and utility crossings, the angle of crossing shall be mentioned.
- In case or rail, road, river, stream and canal crossings wider than 10m, the distances at the start and at the end of the crossing from the nearest IP shall also be mentioned. For crossings less than 10m, the distance of the centre line of crossing from the nearest IP shall be given.
- For all river, stream and nala crossings, the level of water at the time of survey and the approximate surface velocity of the flowing steam shall be observed and recorded and reported in the survey drawings. Also, the general nature of the surface soil (soft/hard, normal soil or rock/boulders) at the bed and banks of the river/steam/nala shall be observed and mentioned in the drawings.
- “Ground profile (chainage vs ground elevation) for the entire pipeline route shall be prepared and presented in a tabular format using Microsoft Access Database format.”

13.2 Pipeline Route Map

- Pipeline route map shall show all features including, but not limited to roads and railroads, canals, streams, lakes, rivers, villages, towns, and cities that are located within a distance of 10 km from the pipeline centre-line on either side of it. For the entire region, contours shall be plotted on the route map at 20m contour interval. Additional information like cultivated areas, barren land, areas prone to flooding, rocky areas and forests including access path/roads to Right-of-Use shall also be shown on the route maps.

- Additionally, for areas which are undulating such as hilly areas, Ghat regions, ravines, and other areas as directed by COMPANY, Pipeline route map to a scale 1:15,000 shall be drawn over a distance of 1.0 Km from the pipeline

centre-line on either side of it. For such areas, contours shall be plotted at 10m contour interval.

- Right-of-Use Planimetry drawings shall show all objects within 50 meters on either side of the Pipeline in Plain.
- In case of all rail, road, river, steam, canal and utility crossings, the angle of crossing shall be mentioned.
- In case or rail, road, river, stream and canal crossings wider than 10m, the distances at the start and at the end of the crossing from the nearest IP shall also be mentioned. For crossings less than 10m, the distance of the centre line of crossing from the nearest IP shall be given.
- For all river, stream and nala crossings, the level of water at the time of survey and the approximate surface velocity of the flowing steam shall be observed and recorded and reported in the survey drawings. Also, the general nature of the surface soil (soft/hard, normal soil or rock/boulders) at the bed and banks of the river/steam/nala shall be observed and mentioned in the drawings.
- "Ground profile (chainage vs ground elevation) for the entire pipeline route shall be prepared and presented in a tabular format using Microsoft Access Database format."

14.0 DOCUMENTS/DATA SUBMISSION

All drawings/reports/formats, alignment sheet etc. submitted to the Company shall be prepared on electronic media. All drawings/sketches shall be prepared using latest version of Autocad. All reports and write-ups shall be in Microsoft Office software. All photographs shall be in JPG/TIF format. Two copies of final approved survey data/documents shall be submitted to Company on standard CD ROM and pen drive. In addition, three sets of hard copies of all approved survey data/documents shall also be furnished.

9.2 SOIL INVESTIGATION SURVEY (ROUTE)

1.0 Objective

The objective of soil investigation survey is to obtain visual engineering classification of soil and geotechnical properties of soil when specified in data sheet for design & engineering of various facilities required along the pipeline route.

2.0 Requirements

2.1 General

2.1.1 The soil investigation includes boring, collection of disturbed samples from bore holes and visual engineering classification of soil along the pipeline route and submission of detailed report to Company.

2.1.2 Visual classification of soil shall be in accordance with IS-1498; :IS Classification and Identification of Soils for General Engineering Purposes" Geotechnical investigation of soil shall be carried out as per relevant clauses of IS 1892 and other applicable IS standards.

2.2 Location of Bore Holes

2.2.1 Boreholes shall be made at an intervals of 1000 m along the pipeline route, at all intermediate points where there is apparently a change in the type of soil and at other places as given below by Company/Engineer-in-charge.

2.2.2 For rail, state highways, national highways, rivers/streams and canals, at least twobore holesshall be made at each crossing location.

2.2.3 Boring shall be carried out in accordance with the provision of IS:1892. Minimum diameter of boring shall be 150 mm. Auger boring shall be resorted to above water table, whereas below water table the boreholes shall be advanced by rotary drilling with mud circulation through all kinds of soil other than rock. While boring above water table, no water shall be introduced in boreholes. Casing shall be used to support the sides of boreholes.

2.2.4 Except for crossing location as defined under clause 2.2.5, the boring shall be either terminated at a depth of 3 m below NGL or on top of bed rock if rock is encountered at a depth of less than 3 m.

2.2.5 In case of boring at Highways (National/State), River and Railways crossings, the boring shall either have terminated at a minimum depth of 10 m below NGL or on top of bed rock, if rock is encountered at a depth less than 10 m.

2.3 Sampling

Disturbed representative samples shall be collected from all boreholes for visual classification of soil. Collected soil samples shall be packed in container and identification label shall affixed on it indicating bore hole no., chainage, depth and visual soil classification.

3.0 Presentation of Survey Data

3.1 Results of soil investigation survey shall be submitted in the form of report covering as aminimum the following.

a. Visual engineering classification of soils encountered along the pipeline route in bore log form. Depth of Ground Water Table (GWT) below NGL shall also be mentioned if encountered.

b. Soil profiles along the pipeline route shall also be prepared and attached with the report.

c. Regions along the pipeline route where hard rock is present and special excavation techniques like blasting, etc. needs to be adopted for excavation of pipeline trench shall be clearly indicated in the report.

d. Summary of results obtained from tests and their interpretation to evaluate soil parameters.

3.2 Visual engineering classification of soils obtained from bore holes shall be shown in Alignment sheets also whenever preparation of Alignment sheets are in SURVEYOR'S scope of work."

ANNEXURE – IV"

PIPELINE ROUTE SURVEY DATASHEET

Pipeline Size (NB, inch)	: 12/10/8/6/4
Gradient *ROU) alignment	: 1:5 (max.) Along pipeline
	: 1:5 (max.) Across pipeline alignment
Minimum Distance between TP's	: 100 m
Maximum Deflection Angle at TP	: 900
ROU width	: 30 m
Pipeline location in the ROU	: Centerline of RoU width
Minimum distance from existing	

Hebetated dwellings : 15 m

Buildings/structures/monuments : 50 m
Co-ordinates of starting point/

Terminating point : To be filled by Survey
Contractor

Notes:

1. Number of TP's along the pipeline route shall be kept to a minimum. Additional traversing requirement for TP optimization shall be carried out by the Contractor priorto finalization of TP's.

2. Chainages for pipeline shall start with 0.0 chainage in the direction of flow for eachPart. In case of spur lines the branch off location from trunk line shall be chainages0.0km.

3. At road/rail/canal crossing location, nearest TP on either side shall be located at adistance not less than 50 m from the ROU of the facility being crossed, unless instructed otherwise by Company Representative.

4. In case of river crossings, no TP shall be located within 150 m from the defined bank on either side, unless instructed otherwise by Company Representative.

9.3STANDARD SPECIFICATION

FOR

CORROSION SURVEY

CONTENTS

1. SCOPE

The specification covers the corrosion survey including measurement of soil resistivity chemical analysis of soil/ water and other cathodic protection related data collection along Right of Use (RoU) of the proposed pipeline.

2. CODES AND STANDARDS

Equipment and measurement techniques shall unless otherwise specified, conform to the requirement of following latest applicable standards:

BIS Specifications
BS specifications and codes of practice
NACE publications

The work shall be carried out in compliance with all applicable local laws and regulations.

3. GENERAL

This specification defines the basic guidelines for carrying out the corrosion survey. Contractor shall be responsible for providing necessary data interpretation based on corrosion survey measurements which is intended to form a basis for design of cathodic protection system for the pipeline to be buried along ROW.

4. SOIL RESISTIVITY SURVEY:

4.1 Unless otherwise specified the soil resistivity measurements shall be carried out at intervals of approximately 1000 mtr. along the ROU where soil resistivity is less than 100 ohm/mtr. and two successive readings differ by more than 2:1 then additional soil resistivity readings in between the two locations shall be taken.

4.2 To carry out the soil resistivity measurement, Wenner's 4 Pin method or approved equivalent, shall be used. The depth of resistivity measurement shall be approximate 1.5 mtr. from NGL. At locations where multi-layer soil with large variation in resistivity/corrosiveness is expected, measurements at additional depth of upto 2.5 mtr. (approx.) or more shall be taken. In general the resistivity of soil which shall be surrounding the pipe shall be measured. Hence the depth of measurement/electrode spacing may vary depending on topography and strata at the area. In general, electrode spacing shall be approximately equal to 1.5 times the depth of the pipeline.

4.3 At places where Right of Way has not yet been cleared measurements shall be made right over the centre line of pipeline route surveyed accounting for the cutting/ filling also.

4.4 All measurements shall be taken at right angles to the right of way unless otherwise asked by OWNER or his representative at site.

4.5 At places in right of way where other pipe lines are already existing care shall be taken to precisely locate such pipes line and take such precautions that observations are not adversely affected by presence of such pipelines.

4.6 Care shall also be taken that the observations are not influenced by presence of other earth currents in the area especially in the vicinity of HT lines and plants using earth return in their source of power etc.

4.7 Wherever possible/ advised by BGL/LEPL depth of water table shall be determined by resistivity observations.

4.8 All measurements shall be made and recorded in metric units. While recording the data reference to the nearest intersecting point shall be made; To provide visual representation of variations in the resistivities along right of way, values shall be plotted on semi-log graph sheets. The resistivity graph shall also indicate the resistivity's at additional depths measured at various locations and depth of water table.

5. TESTS OF SOIL SAMPLES

Soil/ water samples shall be collected along the Right of way for analysis. Samples shall be collected on an average at one location per every 10 KM along Right of way with minimum at two locations. Exact locations shall be decided at site depending on the type of soil, soil resistivity and in consultation with BGL/LEPL. The soil samples shall be collected at 1 mtr and 2 mtr. depth at each location.
The collected soil / water samples shall be analysed to determine presence and percentage of corrosive compounds including moisture content, oxygen activity and pH value.

6. ADDITIONAL DATA COLLECTION

The following data shall be collected with a view to generate design for evaluation of cathodic protection interaction possibilities due to presence of other services in Right of Way and its vicinity.

6.1 Route and types of Foreign Service/ pipelines in and around or crossing the Right of Way.

6.2 Diameter, wall thickness, pressure, soil cover etc. of the foreign pipeline.

6.3 Voltage rating, phase and sheathing details of parallel running or crossing cables with ROU.

6.4 Foreign pipeline coating details.

6.5 Details of existing cathodic protection systems protecting the services including rating and location of grounds bed test station locations and connection schemes etc. Where pipeline is likely to pass close to any existing ground bed, necessary anode-bed potential gradient survey shall be carried out.

6.6 Interference remedial measures existing on foreign pipelines/ services/ shall be collected from the owner of the foreign pipeline/ services.

6.7 Graphical representation of existing structure/ pipe to soil potential record. T/R unit / CP power source voltage/ current readings.

6.8 Possibilities of integration/ isolation of the pipeline CP System with foreign pipeline/ structure CP System, which may involve negotiations with owners of foreign services.

6.9 Information on existing and proposed DC/AC power sources and system in the vicinity of the entire Right of way.

6.10 Crossing and parallel running of electrified and non-electrified railway tracks along with details of operating voltage and type (AC/ DC).

6.11 Crossing or parallel running of any H.T. AC/DC overhead line with in approximately 25 mtr. from ROU alongwith details of voltage rating, fault level etc.

6.12 Any other relevant information that may be needed in designing and implementing of proper cathodic protection scheme for the proposed pipeline.

7. REPORT

On completion of all the field and laboratory work an interim report incorporating results generated from surveys, additional data collected, results of test carried out, etc. shall be submitted for comments/ approval. The final report incorporating comments/ missing data shall be furnished for records. The report along with various drawings, graphs etc. prepared in connection with the work shall be submitted along with three sets of hard copies and one copy on standard CD ROM & one in Pen Drive, by the contractor.

	CITY GAS DISTRIBUTION PROJECT	

9.4 STANDARD SPECIFICATION

FOR

GEOTECHNICAL INVESTIGATION & HYDROGRAPHIC INVESTIGATION FOR CROSSINGS

1.0 INTRODUCTION

This specification deals with detailed hydrographic survey and collection of Geotechnical parameters including soil investigation proposed to be carried out for crossings.

The number of bore hole shall be decided on the basis of Category of crossings.

2.0 OBJECTIVE

The objective of Hydrographic investigation is to obtain riverbed profile, nature of bed material, hydrographic data. The purpose of obtaining this data is to establish accurate bed profiles, to map surfacial features in the river crossing and to obtain scour profiles at crossing location.

Similarly, the requirement of soil investigation is to develop various soil parameters for calculation of scour depth and installation of pipeline.

3.0 SCOPE OF WORK

Depending upon the bank to bank width of river/water body the scope of work shall be decided in consultation with the BGL/LEPL

3.1 SOIL INVESTIGATION

The work comprises, but not limited to the following:

i. Two Bore Holes up to at least 10m below GL..In case the bore holes show varying profile, additional boreholes to be provided as directed by the Engineer incharge.
ii. Standard Penetration tests and collections of disturbed and undisturbed soil sample from bore holes at every 2.0m interval and change of strata.
iii. Laboratory tests on soil samples collected.
iv. Submission of reports in four number of copies.

3.1.1 REQUIREMENT

The work shall be carried out in line with the relevant clause no. 6.0 of technical specification for soil investigation. For boring in water, suitable arrangement shall be made by the Contractor. Borehole shall be measured from riverbed level/GL.

3.2 HYDROGRAPHIC INVESTIGATIONS (FOR RIVER CROSSING)

The scope of work for hydrological investigations shall be as follows or as directed by the Company.

i. To carry out hydrographic surveys in river crossings along the proposed pipeline routes.
ii. To collect, store, transport and analyze river bed samples of rivers as specified.
iii. To process all the survey data in order to establish accurate bed profiles, Surfacial features both dry bed as well as under water areas.
iv. To assess geological and geotechnical nature of the material in the close vicinity of the proposed pipeline crossing.
v. To obtain scour profile at pipeline crossing location for the river.

3.2.1 Scope of work for hydrographic investigation work comprises of the following:-

River Bank Grid Survey	As per Technical Specifications attached
Historical data collection on HFL/LWL Regime, silt factor, river course etc.	As available from authentic sources / local enquiry
Determination of scour depth	Refer Annexsure-III
Submission of Report	A draft report in 2 sets and final report in 4 sets shall be submitted by contractor. The reports shall include a write-up on proposed methodology for river crossing

The work shall be carried out in line with the relevant clause no. 8.0 of Technical Specification for hydrographic investigation.

4.0 INSPECTION OF WORK:

The work is subject to inspection/ supervision at all times by the Company. The Contractor shall carry out all instructions given during inspection and shall ensure that

the work is being carried out according to technical specifications, the technical documents and the relevant codes of practice.

All the survey details collected by the Contractor shall be furnished to the Company in the form of a survey report.

5.0 SITE CLEANING AND RESTORATION:

The contractor shall take care for cleaning the area from time to time for easy access to work site and also from safety point of view.

Working site should be kept cleaned and ground restoration shall be up to the entire satisfaction of the Company.

6.0 TECHNICAL SPECIFICATIONS FOR SOIL INVESTIGATION

6.1 SPECIAL INSTRUCTIONS

- Each boring and field test shall be conducted under the direct supervision of a qualified and experienced engineer. The bore hole locations shall first be fixed at site with reference to a permanent reference point. A report incorporating all field observation test findings and recommendations for foundations at different depth with allowable settlements shall be submitted.
- All data/ information's including any unusual data/ information obtained during the execution of the work shall be immediately brought to the notice of the Company.
- Survey and leveling work for establishing location and levels of bore holes and the contractor shall carry out other exploratory work. However, reference point/ lines will be provided by the Company to successful bidder for carrying out such work. Depending on site condition, the locations and nos of test can be altered at site, if found necessary by the Company.
- All field investigations, laboratory tests and reports etc., shall be done in accordance with the latest relevant Indian Standard Codes.

6.1.1 BY SHELL & AUGER

All bore holes shall be of minimum 150 mm in diameter. The exploratory work at site shall be carried out using shell and auger equipment. The boreholes shall be terminated at a depth whenever with chiseling and subsequent cleaning with bailer, the bore hole cannot be advanced more than 300 mm in one hour. The casing shall

be extended up to a maximum depth which could be possible as per site conditions. No bentonite mud shall be used to advance boring. Chiseling shall be carried out with minimum 0.5 mm tonne cross type chisel falling from a height of 2.0 m. Chiseling and cleaning with bailer shall be done alternately, each operating from 5 to 10 minutes. Refusal to chiseling shall be considered after one hour of chiseling or when progress is less than 30 cms for each 200 drops, whichever is later. One bore hole thereafter shall be extended by core drilling method using Nx size drilling bits until 50% core recovery is achieved. Cores shall be properly preserved in core boxes and shall be handed over to the Company, if required. Whenever clay or other soft material is interspersed in rocky strata, the drilling shall continue deeper into rock to ascertain such formation. Disturbed samples from boring shall be collected every 2.0 m or change in stratum and representative samples placed systematically for proper logging of the strata. The existing ground level shall be marked. Proper logging shall be done with description of different strata encountered with their reduced levels. (Profile of the different strata shall be plotted joining all adjacent boreholes apart from individual boreholes. All bore holes after completion of work shall immediately be filled in with a mixture of bentonite slurry and clay sand mixture).

6.1.2 By Mud Circulation Drilling

In case the site conditions require the bore drilling shall be employed using Mud circulation method. It should be adopted in all type of soils. Minimum dia of bore holes shall be 150 mm if the rate of progress of boring in hard strata is observed to be slow (Not more than 20 cm in two hours) contractor may be permitted to adopt core drilling with Nx size bit. However, the bit for core drilling shall be with double tube core barrel and this core drilling operation shall be at no extra cost to the Company, so long as to core recovery is less than 25%. Commencement of rock coring shall be considered at a depth below which the core recovery is min 25%. For rock strata encountered having RDQ 50% Diamond Head of Nx size shall be used. Termination of bore holes shall be as indicated below. Max length cored in rock shall be limited to 10 x Nx if rock available within 2.0 m from the Bed/GL level. Length of rock coring will decrease linearly.

6.1.3 Depth of Bore holes:

Depths indicated for bore holes or trial pits or any other depth correspond to the depth from general ground level unless otherwise specified.

Boring shall be done to a minimum depth of 10 meter from the ground level /River Bed level of each location marked in the drawing. However, boring shall be terminated in case hard rock is met at depth lesser than mentioned above with minimum 500 mm core recovery beyond 3 m depth from ground level.

6.1.4 Sampling:

In cohesive and semi cohesive soils, undisturbed samples conforming to IS:2132 shall be taken using open tube samples with an area ratio of less than 15% so as to obtain a core of sample of 100 mm diameters and 450 mm long at every change in stratum or at intervals of 2.0 meter which ever is less. The tube shall be properly marked and the ends of the sample tube shall be sealed properly with wax of thickness not less than 25 mm and capped properly immediately after the sample is recovered from the bore holes to ensure no loss of moisture with time while retained in the tube. Sample tubes shall be immediately shifted to the laboratory for testing.

6.1.5 Disturbed samples

Representative disturbed samples obtained from boring at every staggered 2.0 m interval in depth and change in stratum shall be placed in suitable jars labeled properly for onward transmission to the laboratory. These samples shall be sent to the laboratory immediately after the boring is completed. All SPT samples shall also be similarly preserved.

6.1.6 Standing Ground Water Level :

Records shall be maintained of the level at which water is struck and the level of any rapid inflow shall also be recorded. On reaching such level the borehole shall be left open for a period of two hours to observe the rise of water in the casing. Bore hole can be continued, thereafter, up to the end of the day. The level of water in the casing at the end of the day and at the beginning of the next day shall be recorded properly. For studying the ground water table no drilling mud will be permitted for stabilizing the hole.

6.2 Laboratory Tests:

6.2.1 Introduction :

Laboratory tests shall be conducted on selected samples collected from site to establish the physical and chemical properties of soil. Following tests shall be done as appropriate in accordance with latest relevant Indian code of practice.

i. Natural moisture content
ii. Void ratio

iii. Liquid, Plastic and Shrinkage limits
iv. Specific gravity
v. Dry density and Bulk density
vi. Cohesion and Angle of internal friction
vii. Particle size analysis
viii. Identification of core
ix. Chemical properties of the soil and subsoil water

6.2.2 Atterberg limits:

Liquid and plastic limit test shall be conducted on all cohesive soils for classification purposes and for predicting engineering properties. The results of limits tests shall be plotted on the plasticity chart of A. Casagrande. Shrinkage limit shall also be determined for half of the soil samples.

6.2.3 Particle Size Analysis

Particle size analysis shall be done on all clayey and sandy samples. Both sieve and hydrometric Analysis shall be conducted and gradation curves shall be plotted to show the Particle size distribution.

6.2.4 Shear Tests

Shear tests shall be conducted on the un-disturbed samples. The cohesion value and angle of internal friction are to be determined by Mohr's circle method.

6.2.5 Specific gravity and Bulk density

These shall be determined as per standard procedure.

6.2.6 Standard Penetration Tests

Standard Penetration Tests shall be conducted as per IS Specification in bore hole nos. as specified. These shall be conducted at interval of 1.0 m starting first test of 1.0 m depth below existing ground level. The disturbed representative samples shall be visually classified, labeled for identification and properly preserved for laboratory testing.

7.0 REPORT

Brief report as per standard specification shall be prepared and submitted to the Company as soon as the field and laboratory works are completed in a draft form for review and comments. All the information as mentioned below shall be furnished in the draft copy of final report. After reviewing, contractor shall be informed about

comments/ remarks, if any, the same shall be incorporated. The report shall also include but not limited to following:-

i. A plot plan showing all the test locations with respect to reference change.
ii. General geological information of the site.
iii. Procedure of investigation and method of various testing adopted.
iv. Detailed bore-logs indicating co-ordinates, reduced level, ground water table etc., subsoil Along various profiles indicating boreholes nos. depth wise in situ tests like SPT.
v. All field and laboratory test results shall be plotted against depth and also in tabular form. Summary of results obtained from various tests and their interpretation to evaluate various soil parameters.
vi. Silt factor for scour able soil strata, borehole and depth wise shall be furnished in a tabular form. Stable slope near bank both in natural as well as excavated states.
vii. Longitudinal lateral friction co-efficient between pipeline and soil.
viii. Stable trench slope along the width of the river through.
ix. Proposal on the type of foundation for pipeline and methodology for river crossing.
x. Anti-buoyancy measures at specified locations.
xi. Presence of high levels of chlorides, sulphates and other chemically aggressive elements in soils shall be reported and protective measures suggested.
xii. All data be digitized and supported with photographs wherever necessary.

8.0 TECHNICAL SPECIFICATION FOR HYDROGRAPHIC INVESTIGATION

8.1 SCOPE

These specifications cover the Technical requirement and procedure for Hydrographic and Topographic Survey of River.

8.2 EQUIPMENT

The Contractor shall provide boats and all equipments required for carrying out the survey works. Details of the boats and survey equipment including specifications along with relevant certificates of the equipment to be mobilized for carrying out the survey works shall be submitted by the Contractor. Before setting out for survey mobilization status shall be indicated as per Annexure-I.

8.2.1 Small Survey Boat

The Contractor shall mobilize a suitable survey boat/ floating Platform equipped with dual-frequency echo-sounder for conducting sounding surveys in the river.

8.3 Survey Equipment

A dual-frequency precision echo-sounder/sounding poles, distomats, the odolites, sextants, masts, levels etc., as needed for the land and river survey shall be mobilized.

8.3.1 Grab/ bed Materials Samples

The Contractor shall provide suitable equipment such as grab or push sampler to sample the bed material.

9.0 PERSONNEL

The Contractor shall provide necessary experienced personnel for operation of the survey equipment and for conducting field surveys.

The Contractor shall provide qualified personnel with relevant experience to collect and assess hydraulic and sediment logical parameters.

9.1 Requirements & Methodology

9.1.1 River Surveys

Bank grid survey of the river bed shall be carried out upto 20 mtrs. on either side of the proposed pipe alignment in a grid with the centerline along the proposed alignment. The wing lines shall be located at 10 m intervals on either side of the proposed pipe line alignment. Cross lines (along the river) shall be run at every 5 m intervals. The dry bed shall be surveyed upto HFL on either side and spot levels shall be taken at 5 m intervals. Closer spot levels may be taken whenever a change occurs. However, the exact location and number of wing lines shall be decided by the Company at site depending on the site conditions at the time of survey.

Contractor shall assess change in river bed slope upto 200 m on either side of the pipeline crossing.

All levels shall be referred to M.S.L.

Fixing the transit marks and using sextant angles shall carry out positioning of the survey boat.

9.1.2 Historical Data Collection

- Contractor shall collect/obtain the HFL and other hydrological data for river crossing site from the local/ regional agencies such as CWC, Department of Irrigation Drainage Works; Flood Control Authority, PWD etc. The data shall be collected for the nearest available gauge station irrigation and/ or drainage head works for past ten years.
- Contractor shall provide all the necessary back-up calculations/ details for the estimatedhydrological data at the point of interest.
- Contractor shall provide detailed methodology and procedures for field works, data collection and computations of hydrological parameters with/ without availability of historic data.

9.2 Equipment Calibration

Contractor shall carry out calibration/ checks/ trails of all the survey equipment in the field and obtain necessary approvals for the start of operations from the Company.

10.0 OBLIGATIONS OF THE CONTRACTOR

- The Company shall monitor survey procedures, data quality, preparation of charts and drawings. Contractor shall repeat the work that has not been certified and accepted by the Company to obtain acceptable quality.
- Contractor shall obtain completion certificate from the Company after completion of all the field works required as per the scope of work. Completion Certificate shall be issued to the Contractor only after collections/ obtaining data of acceptable quality.
- The Company shall be informed of the progress of survey at specified locations. Contractor shall provide necessary facilities to access the data collected at site/base. The Company shall have access to all the data collected during surveys. All the details regarding positioning, methodology of surveys, equipment deployment shall be provided to the Company.
- In case of any follow-up field work is required to incorporate comment/ suggestions made by the Company on the survey documents submitted by the Contractor in order to meet technical requirements, the same shall be carried out by the contractor.
- Contractor shall provide the following documentation:
- Details including specification of all equipments, survey boats, personnel etc., as per Annexure-I.
- The Company shall not accept any liability towards loss/ damage of any equipment/boat etc. during course of investigations.
- The Company will not collect the data for the Contractor from the regulatory agencies nor provide any information regarding place of availability or the procedure to go about the data collection. However, the Company shall provide to the Contractor any letters of clarifications/ projects details addressed to the agency. Entire data collection is the responsibility of the Contractor.

11.0 REPORT

11.1 Preliminary Report

The Contractor shall submit within a week of completion of surveys a preliminary report. This report should include:

- A summary of all work carried out by the Contractor including location of areas covered.
- Track charts of the boat and the grid points of the surveys carried out.
- Co-ordinates of the shore control station need for positioning the boat.

11.2 Final Report Detailed report shall be prepared as per specification in addition to the following specific requirement.

The report should consist of:

- Details of the field surveys
- Final track charts
- Geological and morphological features
- Cross-sectional details each riverbed along with the profiles across and along the riverbed.
- The grain size distribution curves of the soil samples collected from the riverbed including data of sampling, locations etc.
- Hydrological data such as HFL for each river-crossing site, based on the past data. The details of the basis of the data presented shall also be furnished i.e. details of the data from agencies and methods of computation.
- The historical local data available for any bank erosion, scour observed at nearby bridges etc. change in the river course including the source of the data.
- Scour profile of the riverbed along the pipeline crossing. [More stringent of IRC:78 and IS:6966]
- Analysis of pipeline depth and buoyancy calculations for the specified pipeline.
- All the working drawings shall be in 1:500 scale or as specified by the Company.
- Proposal and analysis for the pipeline crossing.
- Proposal for anti-buoyancy measures.

(DOCUMENTATION TO BE PROVIDED BY THE CONTRACTOR)

ANNEXURE–I

Details of Boat, Equipment and Personnel to be mobilized.

SURVEY BOAT

Size and other details of small boat and the proposed methodology of mobilization at sites.

SURVEY EQUIPMENT

i. Echo-sounder
ii. Positioning system
iii. Survey equipment

PERSONNEL

Details of qualification and experience of survey personnel required for smooth operation:

i. Boat positioning during survey and track plotting
ii. Operation of survey equipment like echo-sounder
iii. Data processing and report preparation

Set of all equipment, plant machinery etc. for successful completion of soil investigation.

ANNEXURE – II

LIST OF INDIAN STANDARDS REFERRED

1	IS: 1498	Classification and Identification of Soils for General Engineering Purposes.
2	IS: 1888	Method of Load Tests on Soils.
3	IS: 1892	Code of practice for Site Investigations for Foundations.
4	IS: 2131	Method for Standard Penetration Test for Soils.
5	IS: 2132	Code of Practice for Thin Walled Tube Sampling of Soils.
6	IS: 2720	Method of Test of Soils (Relevant Parts)
7	IS: 4434	Code of practice for In Situ Vane Shear Test for Soils.
8	IS: 4968- Part-I	Method for subsurface sounding for soils – Dynamic Method Using Cone without Bentonite Slurry.
9	IS: 4968- Part-II	Method for subsurface sounding for soils – Dynamic Method Using Cone and Bentonite Slurry.
10	IS: 4968- Part-III	Method for subsurface sounding for soils static cone penetration test.
11	IS: 5249	Method of Tests for Determination of in situ Dynamic Properties of Soils.
12.	IS:6966(Part I)	Indian Standard of Hydraulic design of Barrages & Weirs-Guidelines

9.5SPECIFICATIONS FOR RECONNAISSANCE SURVEY

1.0 SCOPE

The scope of work includes study of Survey Of India (SOI) topographic maps, route alternatives, identification of major/minor crossings(like river, streams, Nalas, canals, railway, NH ,SH etc) including approx. width, visual identification of type of soil, congestion of underground facilities limited upto visual inspection and local enquiry, collection of Land use pattern (cultivated,barren, protected/reserved/social forest), identification of areas which may pose problem during construction and acquisition, suggesting alternative routes for detailed survey estimation of pipeline length, approx. cost estimates for acquiring R.O.U. along pipeline route, determination of broad population density index, tentative location/ area for locating permanent facilities such as sectionalizing valves, terminals, Tap-Offs and other facilities including booster stations, if any. Providing details for existing hydrocarbon and other mineral pipelines.

The reconnaissance survey shall be carried out proposing minimum three or more feasible alternative routes and giving details of likely crossings and other constraints that is likely to be encountered during pipeline construction on each route, future development plans of land owning authorities like local Municipal authorities, Gram Panchayat, PWD, Railway, NHAI , etc, availability of land including ownership details for setting up of CNG stations, DRS stations, potential Industrial consumers for PNG usage and recommending the best feasible route .

2.0 REQUIREMENTS

2.1 All survey works shall be performed by or under the supervision of a qualified surveyor.
2.2 All measurement shall be in metric units.
2.3 The readings and noting shall be neat, legible and the Surveyor shall duly initial scorings and over-writing.
2.4 The length of all alternatives shall be clearly mentioned and shown separately in drawing.
2.5 Also routes should be suggested based on considerations regarding execution feasibility, minimum length, permission feasibility and minimum obstructions.
2.6 The side of road or structure along which the proposed pipeline will pass should also be mentioned with proper reasoning for the same.

3.0 RESPONSIBILITY OF COMPANY:

The company(BGL) will give only location of the two points i.e. the start and end points of the pipeline route. All the other responsibility will be tenderer’s.

4.0 CROSSING:

4.1 General

As far as possible, crossings shall be made at right angles. The Surveyor shall record the no., approxwdth and chainages at all crossings for all fences, property lines utilities, roads, railways, canals, stream etc., that are crossed shall be mentioned in the report

4.2 Utility Crossings

The underground facilities such as drainage lines, telephone lines, etc. which may cause problem during execution of pipeline shall be located by visual inspection and shown in drawings. Accordingly, suggestion shall be given on the side of road (or any structure) the pipeline should pass.

5.0 PROFILES:

The general ground profile shall be mentioned in the report. Also any major change in the profile shall be mentioned in the report. At all crossings the ground profile shall be specifically mentioned.

6.0 REPORT AND DRAWINGS:

6.1 The drawing shall be prepared in the standard format and inclusive of all the details mentioned above. Also draft report of the same shall be submitted. The report and drawings shall be approved by BGL before final submission of drawing and report

9.6 SPECIFICATION FOR SUPPLYING AND PROCESSING OF HIGH RESOLUTION DIGITISED SATELLITE IMAGE

1. PREPARATION OF BASE MAP:

Procurement of high resolution satellite image as per direction of BGL engineer and supplying the same to BGL within stipulated time. The image shall be of World view-2 with resolution 0.5 m. The imagery may be fresh / archive and shall not be older than 6 months. The image shall be of high quality and cloud free.

a. Use of High resolution satellite data in digital form covering the selected areas of Hyderabad
b. High Resolution Satellite Image will be used of the following specification:
   Options: Natural colour
   Projection: UTM, WGS84
   Zone: pertaining to Hyderabad Geographical area

2. IMAGE PROCESSING, REGISTRATION AND INTERPRETATION/DIGITISATION

Following operations in sequence are performed on the satellite imagery, popularly known as image processing in appropriate imaging software.
Image enhancement
Image registration
Mosaic of individual tiles.
Image interpretation/ Vectorization: Following list of features are extracted from satellite image-

Sr.No.	Feature Type	Sub. Type	Geometry	Attribute

1	Road	Road center Road edge Divider Footpath	Polyline Polyline Polygon Polygon	Name of the main road
2	Railway	Rail route Station	Polyline Polygon	Name of Route Name
3	Airport	Airport	Polygon	Name of Airport
4	Water Bodies	River Canals Major drainage Lakes	Polyline Polyline Polyline Polygon	Name of River - - -
5	Large Areas	Defence/Cantonment Industry Education Open spaces	Polygon Polygon Polygon Polygon	Name Name Name -
6	Green Areas	Agriculture Green cover Garden Play Ground	Polygon Polygon Polygon Polygon	- - - -
7	Property	Building footprint Slum boundary Plot	Polygon Polygon Polygon	Unique ID Name
8	GCPs		Point	Station number and coordinates
9	Landmarks		Point	Name
10	Utilities	Electrical Telephone	Pole Transformer Pole/DP	- - -
11	Boundary(from Secondary maps)	City Ward Locality	Polygon Polygon Polygon	Name Name Name

Digitization:

Contractor will follow multi-layer digitization technique to segregate various features marked on the required information while blanking out unwanted details. The digitized maps will be plotted and quality check would be done to separate the maps into different layers. This will provide the convenience of viewing only the missing features, undershoot, and overshoot. After incorporating the changes, a final plot would be taken to ensure that all reported errors have been eliminated.

Edge Matching:

Edge matching is a process of combining individual map sheet representing contiguous area in a single seamless environment. This involves substantial cleaning, rubber sheeting operations. Features lying on either side of the common boundaries tend to be disjoint and should be modified so as to make them continuous across the map boundary. Contractor will ensure that in the final comprehensive digitized maps, there is continuity between map sheets.

Edge matched maps allow a user to extract areas spanning across multiple map sheets. However, decision of edge matching is subject to approval of PROPOSED ULB

3. DIGITIZATION OF SECONDARY MAPS AND SUPERIMPOSING ON THE BASE MAP PREPARED FROM SATELLITE IMAGE

Digitization of secondary maps and superimposing on base map prepared from Satellite image (Maps shall be supplied by BGL).

Contractor will come up with a robust process and will work in parallel, in preparing the basemap using satellite imagery and secondary maps for the layers like municipal boundary, ward boundaries and localities.

a. Existing maps are collected from the BGL
b. Scanning and digitization of the maps collected

Maps collected will be scanned on A0 colour scanner

These scanned images will be registered with the help of Survey Of India(SOI) sheets/main features like road, river drainages etc.

Digitization will be carried out to convert the features mentioned above and shall be superimposed on base map.

(Note: - Secondary maps like development plan, ward boundary maps and locality maps etc. shall be supplied by BGL)

4. SUPERIMPOSING ON BASE MAP GROUND DETAILS

Collection of built drawings from BGL and transferring it to base map

a. As built drawings (Pipelines, material, valves, reducers & regulators) collected from BGL are then transferred to base map by identifying common features in both drawings.
b. QA/QC for verification & validation of data entry

The softcopy of attribute data along with Unique ID's is checked by standard data base software's to identify duplication in the record and spelling mistakes.

Hard copy of each sub grid is taken for physical checking displaying following features:

a) As built features
b) Roads along with names
c) Water bodies along with names
d) Landmarks
e) Properties with names and consumer names
f) The printouts are checked thoroughly for duplicate entries, missing unique ID for property and correctness of data entry
g) Separate printouts for wards, zones are taken for validating boundaries of respective features.

5. COLLECTION OF CONSUMER INFORMATION AVAILABLE WITH SURVEY AND LINKING IT WITH GIS

Collection of consumer verified information available with BGL and linking it to GIS base map.:

a) Linking existing survey database to GIS base map
b) The existing database (consumer information) will be linked to property data through Unique ID as a common field.

9.7 Digitisation and Development of GIS/LIS of as built existing MDPE & Steel Pipelines:

Collection of all the data (Measurement sheets, reports, sketches etc.) from the BGL/ MDPE/steel pipeline laying contractors, site validation of the same for accuracy, DGPS survey in the pipeline area to have control points, geo referencing, ground survey of the MDPE, steel pipelines, digitisation etc. as required to maintain the accuracy & uploading the existing MDPE pipeline network in to GIS.

SECTION VII

SCHEDULE OF RATES

Tender for Hiring an Associate(s) for Route Survey for pipeline laying connecting the existing pipeline and Obtaining permissions along the route, as well as obstacle crossings en-route of proposed natural gas steel and MDPE P/L network from various government bodies in Hyderabad GA on Rate Contract Basis

			Tender No	043-LEPL-BGL-001			
			Name of the Bidder				
S.No	**Description**	**UOM**	**Quantity**	**Basic rate inclusive of all taxes and duties and GST(Rs)**	**GST(Rs)**	**Unit Price inclusive of all duteis and Taxes and GST(Rs)**	**Total Price inclusive of all duteis and Taxes and GST(Rs)**
1	**Route Survey**						
1.1	**Steel Pipeline**						
1.1 a	Carrying out reconnaissance survey as per Specification/Scope of work in the tender and instructions of Engineer-in-Charge and submission of two coloured drawings and report. The reconnaissance survey shall be carried out proposing minimum three or more feasible alternative routes and giving details of likely crossings and other constraints that is likely to be encountered during pipeline construction on each route, future development plans of land owning authorities like Municipal Corporation, Gram Panchayat, PWD, Railway, NHAI , etc, availability of land including ownership details for setting up of CNG stations, DRS stations, potential Industrial consumers for PNG usage and recommending the best feasible route .	Kms.	65	-	-	-	-
1.1 b	Carrying out detailed survey along proposed gas pipeline routes covering maximum of 30m on either side of the road boundary limit to be obtained from the land owning authorities like Municipal Corporation, Gram Panchayat, PWD, Railway,NHAI, CRMP etc as per specifications and tender document on the approved route and submit digitized route , pipeline alignment and profile drawing, crossing drawings in 4 no's coloured prints on ascale of 1:1000 (Horizontal) & 1:100 (Vertical)along with original tracing and CAD output. All underground utilities like pipelines, cables etc should be surveyed and marked in the drgs using pipe/cable locator/ground positioning radar system and is included in this item	Kms.	45	-	-	-	-
1.2	**MDPE Pipeline**				-	-	-
1.2 a	Carrying out detailed survey along the existing gasified/proposed gas pipeline routes covering the maximum areas on either side of the road boundary limit to be obtained from the land owning authorities like Municipal Corporation, Gram Panchayat, PWD, Railway,NHAI, CRMP etc as per specifications and submit digitized route , pipeline alignment and profile drawing, crossing drawings in 4 no's coloured prints on ascale of 1:1000 (Horizontal) & 1:100 (Vertical)along with original tracing and CAD output. All underground utilities like pipelines, cables etc should be surveyed and marked in the drgs using pipe/cable locator/ground positioning radar system and is included in this item	Kms.	220	-	-	-	-
1.3	Digitisation and Development of GIS of As builting of the partial laid pipe lines (Steel/MDPE pipeline network) and regular Updating & uploading of same in BGL's GIS software as per specification and submission of drawings /documents in hard (4 copies) in 1:500 scale as well as soft copies in autocad format as per requirement of tender documents and instruction of the engineer-in-charge.	Kms.	440	-	-	-	-
1.4	Digitisation and Development of GIS of As builting of the Gasified pipe lines (Steel/MDPE pipeline network) and regular Updating & uploading of same in BGL's GIS software as per specification and submission of drawings /documents in hard (4 copies) in 1:500 scale as well as soft copies in autocad format as per requirement of tender documents and instruction of the engineer-in-charge.	Kms.	550	-	-	-	-
2	Supply of high resolution Google Map/World view Satellite image as per technical specification, tender document and direction of Engineer-in-charge	Sq. Km	220	-	-	-	-
3	**Obtaining of Permissions from Statutory Authorities**				-	-	-
3.1	Road cutting & Crossings from Major roads division; (GHMC, HMDA, HGCL, HRDCL, MEIL, NCC, KNR Constructions, MVR Constuctions & BSCPL) upto 5 kms of Road stretch.(Steel with PE in same trench on other side of Road as per requirement)	Nos.	12	-	-	-	-

3.2	Road Crossings from Major Road division, (GHMC, HMDA, HGCL, HRDCL, MEIL, NCC, KNR Constructions, MVR Constuctions & BSCPL). (Steel with/ without MDPE and or MDPE pipelines)	Nos.	22	-	-	-	-
3.3	Road cutting including road Crossings from all Muncipalities, panchayats & IALA upto 10 Kms of road stretch. (Steel/MDPE pipelines on one side and or on other side of roads as per requirement)	Nos.	22	-	-	-	-
3.4	Road cutting including road crossings from R& B Division upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	Nos.	6	-	-	-	-
3.5	Road cutting including road crossings from Cantonment Board upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	Nos.	6	-	-	-	-
3.6	Road cutting including road crossings from Forest Department upto 5 Km. road stretch (Steel with PE in same trench on one side & or with MDPE pipelines on other side of Road/MDPE Pipelines on both sides of roads as per requirement)	Nos.	3	-	-	-	-
3.7	Road cutting & Road crossings from State NH up to 10 Kms road length (including Metro Rail) ; (Steel with PE in same trench on one side & or with MDPE pipeline on other side of Road as per requirement)	Nos.	5	-	-	-	-
3.8	Road cutting & road crossings from NHAI (intermittent MDPE Laying on one side, with crossings)	Nos.	6	-	-	-	-
3.9	obtaining land permission to install DRS on NHAI Land	Nos.	3	-	-	-	-
3.10	Obtaining the agreements/undertakings etc. of permissions already given and laid on NHAI.	Nos.	7	-	-	-	-
3.11	Railway crossing permissions with laying inside Railway boundary	Nos.	3	-	-	-	-
3.12	For installation of DRS on the land of GHMC,HMDA, HGCL, IALA or R&B, govt office complexes or along Road Right of way.	Nos.	6	-	-	-	-
Note: The time will start from the date of intimation to the bidder in writing to obtain permission from Owner/Client							
						Total amount inclusive of all taxes and duties , INR	-