STATEMENT OF QUALIFICATION - OIL & GAS PIPELINE ROUTING AND CITY GAS DISTRIBUTION NETWORK MAPPING AND PLANNING

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Revision Chart

Date	Author	Approved By	Description of Changes
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Executive Summary

SECON is an ISO 9001:2000 certified GIS Driven Multidiscipline Engineering company with over 850 personnel. SECON is a financially sound, stable, zero-debt company that was established in 1981. SECON is one of the leading multidiscipline engineering consulting firms and the largest and oldest surveying and mapping firm in India with over 28 years of experience. Most of SECON's clients are repeat and long-term clients.

SECON provides world-class GIS services and software solutions at cost-effective rates by using the global delivery model. SECON is an ESRI Business Partner and a member of the Autodesk Developer Network (ADN).

SECON has long-term partnerships with international engineering firms and can operate in most areas of Asia, the Middle East, and North Africa. SECON prefers the partnering model for its US and European areas of operations.

The key differentiator for SECON is that the company is not just a mapping firm, but a well-established (established in 1981) Multidiscipline Engineering firm. The SECON QA/QC staff working on the surveying and mapping projects have firsthand experience in dealing with SECON's Engineering Consulting staff that provide input while working on SECON's engineering consulting projects.

SECON personnel have access to its engineering talent and domain expertise in:

- Oil and Gas Pipeline Transportation Routing
- Water and Sanitation Engineering
- Highway and Transportation Engineering
- Civil and Structural Design
- Irrigation and Flood Control Engineering
- Electrical Engineering
- Environmental Engineering
- Geotechnical Engineering
- Cadastral and Parcel Mapping
- Land Surveying and Mapping
- Photogrammetry, LIDAR and Image Processing
- GIS Driven Software Development
- GIS Data Conversion and Maintenance

SECON has the following standing in India:

- The largest private (non-government) surveying and mapping firm in India
- The dominant pipeline corridor mapping firm in India
- The largest private (non-government) mapping and design firm for irrigation and water management projects
- One of the largest private (non-government) highway mapping and design firms in India

SECON has executed over:

- Over 55,000 km of large-scale Pipeline Corridor Mapping – this includes Route Engineering, Topographical and Cadastral Mapping and Right-of-Way Acquisition

assistance and management. This is the largest amount of Pipeline Corridor mapping done by any corporation in India

- 10,000 km of mapping, design, and construction supervision of highways
- 1,000,000 Hectares (3,861 sq miles) of large-scale mapping (topographical and cadastral) for Irrigation projects
- 600,000 Hectares (1,550 sq miles) of Irrigation and Water Management design projects
- 600 infrastructure development projects (includes subdivision/township mapping, design and planning)
- 600,000 meters of geotechnical investigation and drilling in various soil strata.
- SECON has also extracted the Detailed Project Report data for 7,300 km of National Highways in India and collated this data for entry into the NHAI Road Information System
- SECON is successfully executed a major multimillion dollar mapping and consulting project for the planning and design of the Water and Sanitation system for 13 municipalities (101 townships) in Libya
- SECON was the only firm selected in India by OPUS, New Zealand to be their offshore design center.

Pipeline Experience Summary

- SECON has executed over 55,000 Km of pipeline routing projects, which includes 600,000m of soil investigation
- Pipeline routing has been executed through difficult terrain having coastal and desert features, wetlands, evergreen forests, Western Ghats and densely populated cities

1 Service Offerings

- Reconnaissance and Route Optimization
- Centerline and Detailed Route Surveys
- Soil Stratification and Resistivity Surveys
- Geotech, Hydrographic and Hydrological Investigations for HDD Crossing
- Right of Use/Way (ROU) Acquisition, Permitting, and Clearance
- Environmental Impact Assessment(EIA) and Environmental Management Planning (EMP) Studies
- GIS Based Software Development
- Pipeline Pre-Construction Assistance
- Pipeline Construction Supervision assistance
- City Gas Distribution

1.1 Reconnaissance and Route Optimization

- Desktop study of maps / satellite imagery and identification of alternate pipeline corridors and optimization of best alternative.
- Reconnaissance survey and establishment of flag control points at definable and major crossing locations
- Assessment of terrain, geology, soil strata (visual), land use, forest area, land cost, weather, administrative jurisdiction and related information
- Pipeline route is optimized based on:
    - Safety of Pipeline and Public
    - Shortest Pipeline Length

- Terrain Favorability
- Favorable Ground Profile for Pipeline Hydraulics
- Infrastructure and Access
- Least Environmental Impact
- Avoiding Existing and Future Developments
- Proximity of Distribution Center

1.2 Centerline and Detailed Route Survey

- Establishment of trench centerline
- Staking and survey measurements for angles, distances and ground profile
- Preparation of strip plan, alignment, and crossing drawings
- Collection of Meteorological data, population density, utility and administrative jurisdiction

1.3 Soil Stratification and Resistivity Survey

- Stratification survey of soil / rock along pipeline by auger boring at specified intervals upto 3m depth and visual engineering classification
- Auger boring at major crossing locations upto 5m depth and testing of soil samples in a laboratory
- Comprehensive corrosion survey, comprising resistivity survey, physical and chemical analysis of soil and water samples

1.4 Geotech, Hydrographic and Hydrological Investigations for HDD Crossing

- Deep boring for major river / creek crossings both in bed and at tanks.
- Hydrological and hydrographic investigations for crossing locations (water table, aquifer studies, flow pattern, high flood level, bathymetry of river and sea bed, silt pattern, scour depth, sub-bottom profiling)
- Testing of soil samples at laboratory

1.5 ROU Acquisition, Permitting and Clearance

- Cadastral survey and land information, ownership details, validation and data generation for ROU acquisition under the Pipeline Act
- Data management system for property inventory, evaluation of land, crops, and fertility loss for land compensation
- Assistance to CA for 3(1), 6(1) notification, serving of notices, recording of interest, payment of compensation
- Assistance in site selection and evaluation for stations and other facilities
- Permitting and clearance from various statutory authorities, road, rail lines, foreign pipelines, underground and over-ground utilities, forest, and defense lands

1.6 EIA and EMP Studies

- Extensive data collection and analysis
- Socio-economic and environmental impact studies
- Pollution monitoring, risk analysis, and disaster management
- Preparation of comprehensive EIA and EMP reports for Pollution Control Board and environmental clearances

1.7 GIS Based Software Development

- Generation of comprehensive GIS/MIS database integrating engineering and land information
- Creation of seamless drawings/ route maps with overlays for alignment sheets, stratification, corrosion survey, land information, and crossing details.
- Database for disaster management and upgradation of same to facilitate operation and maintenance
- Development of ROU Software – this is software for Right of Use/ Way property management
- Development of Fully Automated Autocad based Alignment Sheet generators for Survey, Engineering, Construction and As-Built Alignment Sheets
- Development of GIS based software to manage Pipeline Construction
- Development of GIS based Pipeline Asset Management Software to monitor Pipeline Right of Way, Integrity and Operation and Maintenance, including Disaster Planning and Management

1.8 Pre-construction Assistance

- Identification of validation of pipeline routes
- Assistance in opening of ROU
- Survey and updation of final changes in alignment
- Staking of ROU boundaries and trench centerline

1.9 Pipeline Construction Supervision Assistance

- Supervision of construction activities
- Project Monitoring and Quality Control
- Maintaining and updating pipe book in line with progress
- Certification of invoices / claims submitted by agencies
- Approval of sub-contractors for various disciplines of works
- Preparation / certification of as-built drawings.

1.10 City Gas Distribution

1.10.1 Preparation of Base map of the city from satellite imagery

- Obtain appropriate satellite imagery of large scale and high resolution to enable identification and location of developments and their relative position to other man made structures such as houses, roads, property boundaries and small farm fields, industries, etc.
- DPGS control Points shall be established at 3 km interval grid. Control points shall be chosen on permanent & important structure during survey, which are as well visible in satellite image.
- Satellite Images are Georeferenced as per Ground control points. The digitization of roads, residential & commercial areas, important facilities & amenities, Govt buildings, etc., shall be digitized
- Preparation of large scale GIS compatible Base Map showing all roads, infrastructure including the industrial units

1.10.2 Preliminary Reconnaissance survey

- Desk top study of the maps prepared shall be done and alternate routes shall be marked

- Reconnaissance Survey shall be done to verify the routes marked and Base Map will be rapidly updated using various utilities in the investigation area.
- Based on the preliminary reconnaissance survey, the feasibility of the various routes with the merits and demerits of the various alternatives with a firm recommendation of the most feasible route shall be submitted in the form of report for approval

1.10.3 Assessment of Consumer requirement

- Survey of potential users, both domestic and commercial
- Assessment of quantum of demand
- Survey for willingness to change to the new system from the existing one
- Compilation and analysis of results

1.10.4 Detailed Engineering Pipeline Route Survey & Geo-technical Investigation

On approval of the route, the following surveys and investigations shall be undertaken

- Detailed Engineering Pipeline Route survey using Total Stations, Auto levels, etc.
- Utility study including pipeline route selection by Pipeline locator/ GPR method.
- Soil Investigation and Soil Resistivity Survey
- Population Density Survey
- Cadastral Survey
- Geo-technical Investigation for HDD Crossing location and cased crossing locations.
- Preparation of Detail reports based on findings

1.10.5 Obtaining Statutory Clearances

- Obtaining crossing permission for Road, River, Railway Line, National Highway, State Highway, Road, Canal, Nala etc.
- On Principal Approval from Urban Development Authority for laying pipeline.
- On Principal Approval from Municipal Corporation for laying pipeline within the Municipal limit
- Forest Crossing permission, if any

1.10.6 Investigations for City Gate Station (CGS) / CNG Station

- Reconnaissance survey for identification of adequate land for CGS/CNG Stration
- Topographical Survey of the area finalised showing all the features and levels at 10m intervals.
- Demarcation of the site using concrete pillar of size 150mm x 200mm x 750mm at all the boundary corners.
- Geotech investigations for the structures to be built at the CGS

1.10.7 Acquisition of Land for City Gate Station

- Acquisition of land for proposed city gate station.
- Obtaining approach road permission and power connection for proposed city gate station.
- Obtaining permission / clearance from the Electricity Board for the supply of required power from nearest service station/ power supply system to City Gate Station.

1.10.8 EIA/EMP Study, Risk Assessment and Disaster Management Study including clearances Pollution, Environment & Forests Authorities

- Baseline study data collection including air monitoring for the preparation of EIA/EMP Report.
- Preparation of EIA/EMP Report
- Carrying out Risk Assessment and Disaster Management Plan.
- Obtaining clearance from State Pollution Control Board after conducting public hearing at District level, where project has to be executed.
- Environmental Clearance from MOE&F, New Delhi, if the cost of project is more than Rs.100 Crores.

1.10.9 Generation of GIS database and GIS Based Software Development for the network

- Creation of a geodatabase consisting of land base & gas grid
- User friendly GIS tools shall be created for easy management of data
- Network detail analysis for periodic maintenance
- Disaster Management support tools like
    - Quick search for emergency assisting centers like Hospitals, Fire stations, Police stations, etc.,
    - Preventive measures planning within sensitive radius of danger zone
    - Link to SCADA system for Disaster reporting
- GIS/GPS based mobile devices for field inspection & maintenance
- Gas network expansion & new connection planning through GIS system
- Link to following consumer details for usage analysis
    - Name, address, etc.,
    - Billing information
- Periodic updation with satellite image for residential & commercial consumer survey
- Planning new installation of valves, safety equipments, etc., by overlaying with satellite images & ground survey details
- Web access for periodic data updation & reporting system

2 Proprietary Software Applications

ROU Master, SASG, SeconMap and PDMS are being used extensively by the pipeline industry for data capture, processing, alignment, property documentation & ROU management.

2.1.1 ROU Master for Right-of-Way/Use Property Management of Pipelines/Highways

ROU Master is an advanced Windows based application for managing large amounts of property data collected for land acquisition.

The applications include Right-of-Use/Right-of-Way Management for pipelines and highways.

Features/Benefits of the ROU Master include:

- Automatic Generation of Notices
- Multi-Language supported database and user interface
- Substantially Reduces Time and Labor

- Flexibility for Further Customization
- Facilitates Project Monitoring
- Dynamic Reporting
- Automatic Compensation Calculator for Land, Tree and Crop
- Automatic Printing of Receipts
- Linking of Cadastral Maps using GIS
- Data Security

ROU Master is currently used by:

- Reliance Industries for its National Gas Grid (2500km)
- Indian Oil Corporation Limited - IOCL for Chennai-Madurai-Trichy Pipeline (520km) and Viramgam-Ramsar Pipeline (504km)
- Gujarat State Petronet Limited – GSPL for Sourashtra Network Gas Grid (750km)
- CAIRN Energy Pty Limited – for Barmer–Salaya Pipeline (690km)
- Hindustan Petroleum Corporation Limited – for Mundra-Delhi Pipeline (1050km) and Pune-Sholapur Pipeline (342km)

2.1.2 SECON Alignment Sheet Generator (SASG)

SECON Alignment Sheet Generator is a mapping application that completely automates the production and maintenance of alignment sheets with planimetry, profile, cross-sections and soil investigation details on a standard CAD platform and generates reports such as Population Density Index, Crossing, Soil Resistivity/Soil Investigation, Control Points Chainage, Bearing and Deflection Angle reports. SASG automatically produces high-quality alignment sheets from a CSV file data source.

Using SASG, it is possible to generate a corridor or alignment sheet with the most current data within minutes. SASG is designed to integrate seamlessly with an AM/FM/GIS or to stand alone.

Testimonial

"SECON's Pipeline management modules for generating crossing drawings, bore logs, reports, etc., ensures mapping and capturing with much higher speed and excellent repeatability compared to conventional methods. Updating and retrieval of data and information is greatly simplified. Being GIS compatible, the product has the capability for a seamless integration with other available pipeline application to perform "End-to-End" functions for Pipeline facility in all phase of its life cycle, viz., Concept to Commissioning, Asset Management and Statutory Compliances. The modules are field proven"

Senior Officer, Gas Transportation Infrastructure & Co. Ltd (Reliance Group)., Mumbai, India

Features/Benefits of SASG include:

- A simple Total Station file in the CSV format is sufficient to generate the basic alignment sheet, reports, such as Control Points Chainage, Bearing and Deflection Angle
- Additional data, such as Population Density, Soil Investigation, and Land Details can be entered into the database through a unique user interface, which allows the user t edit directly or load data through a CSV file
- Generates Crossing Drawings, Drawings with Soil Investigation/Soil Resistivity details
- Ready availability of data pertaining to the Crossing of the Photograph of the crossing
- Map data utility to check the accuracy of the survey data at the site
- Generates Soil Investigation details as either a drawing or a report
- Option to change, add, or delete the Feature Codes (used during survey, data captured by Total Stations), in order to accommodate a variety of instrument and site details

- Multi-user facility to view generated drawings from a central site
- Secure data access
- Highly scalable to meet additional customization based on client requirements

SASG has also been customized for a leading European engineering firm. This will help the company generate survey and engineering alignment sheets for their water transmission pipeline projects.

SASG has been customized for Reliance, the largest private sector Indian corporation, and is extensively used by them for their large oil and gas transmission pipeline network.

2.1.3 SeconMap

SeconMap is a 3D surface mapping program that runs under Microsoft Windows and AutoCAD 200-4. It directly reads from the CSV file obtained from a Total Station and quickly plots the feature code along the alignment in its respective X, Y, Z coordinates.

The software also is supported b a .CDR file, which is a predefined feature code list used to plot the features. Using these feature code libraries, the plots and linear features are drawn. Virtually all aspects of a map can be customized to product the exact output required.

Features/Benefits of SeconMap include:

- Errors in the raster images can be cleaned using SeconMap. The software later converts the pixels in the raster image to the vector mathematical descriptions required by CAD applications. Finally, the vectors are compared to the original raster and any required corrections can be made. The result is exported as a CAD file in the DWG format.
- SeconMap has the capability to read the data in whichever order the information is stored. The system is so robust that it can plot from any make of Total Station.

2.1.4 Pipeline Asset Management System (PAMS)

This is an advanced tool to address cross-country pipeline route planning, implementation, operation and maintenance. It has been used in leading Oil and Gas companies, such as Indian Oil Corporation Limited (IOCL) and Gujarat State Petronet Limited (GSPL).

Testimonial

"SECON's Pipeline Asset Management System (PAMS) implementation is very useful for our day-to-day pipeline management. It is serving as an efficient tool for our Land information system, Disaster management, Operation and Maintenance. We are pleased to place on record our appreciation for the excellent GIS-MIS application implemented to us"

Gujarat State Petronet Limited (GSPL), Gujarat, India

Features/Benefits of this system include:

- GIS database capable of storing integrated geographic data like base maps, cadastral maps, and corridor maps
- Intelligent Route Selection System optimizes the time and effort taken to finalize the pipeline route
- Efficient Document Management System for easy retrieval of design, legal and quality documents
- Disaster Management System
- 3D Terrain and Pipe Visualization

- Web-Based Pipeline Maintenance, Data Capture and Monitoring System
- On-the-Fly management of Right-of-Use data

2.1.5 Gas Distribution Network System

This web based system to manage City Gas distribution Network by maintaining up-to-date information with a centralized enterprise spatial database that supports Analysis, Planning, Engineering, O&M etc.

Features includes

- Detailed map analysis features with Roads & existing utility networks, As-Built details, existing & potential Consumers with Billing information
- Customized query & report generation for usage & maintenance statistics and other MIS reports etc.

This application is useful as a valuable Decision Support System for planning & emergency response and an effective marketing tool to understand consumer preferences for gas distribution companies.

2.1.6 GIS Based Pipeline Corrosion Stackchart and Alignment Sheet Generator

Generates GIS based alignment sheets with corrosion stack charts for monitoring pipeline integrity.

For additional information on these software products, please visit our website at www.secon.in.

3 Relevant Pipeline Experience

3.1 Over 55000 km of Pipeline Corridor Mapping

SECON has associated with over 52,000 km of cross country pipelines with regard to Data capture, processing and alignment sheet generation. Work also includes extensive CAD conversion, route maps, generation of DTM and GIS database for pre-construction, construction and post-construction activities.

Data generated also include Cadastral Survey, Land Information, in-house customization and MIS software development.

We can provide project datasheets based on request for relevant project experience.

3.2 Gujarat State Land Use and Base Map Generation from Satellite Imagery

The project area covered approximately 235,000 square kilometers. This was a two year project.

The project involved the identification of potential user industries of gas and oil products, location and customized mapping for the generation of an industrial base map, and planning and distribution of the pipeline network for supply of gas to the industries.

Testimonial

"The work assigned has been carried out to our satisfaction and they have the necessary capability in terms of infrastructure, skilled manpower and equipment"

Gujarat State Petronet Ltd, India

Satellite imagery was processed by SECON and extensively used for creating the base map, followed by field verification and surveys.

Raw images from the National Remote Sensing Agency (NRSA, Department of Space, India) were collected. Image processing, correction and enhancements were performed by SECON for better land use identification. Georeference to UTM-WGS84 was performed on DGPS Ground Control Points established across the state by field survey. Image classification, using a hybrid approach, was adopted to identify various types of land use, such as agricultural area, urban/rural area, forests, water bodies, etc. Detailed visual interpretation also was performed to identify roads, industries, canals, etc. Geodatabase in ArcGIS format was created for the entire state. Customized GIS tools were developed to access maps and images

3.3 Base Map Preparation for Gas Grids for 17 Cities

SECON has prepared the GIS base maps for 17 cities in India for City Gas Grid networks. This includes the City of Pune for GAIL, the national gas transmission company in India.

4 Security at SECON's ISO 9001:2000 Certified Operations Center

SECON has a state-of-the-art 105,000 sq. ft. ISO 9001:2000 certified Operations Center that is fully owned by the company.

The Operations Center is a secure facility and has robust security controls:

Aesthetically designed 105,000 sft. Company owned office space

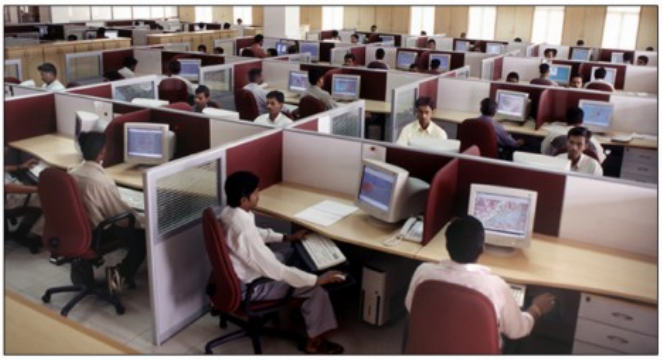
4.1 Security - Physical Controls

- 24X7 security guards
- Access Control Devices to restrict access to the different areas of the Operations Center

4.2 Security - Technical Controls

- Network Monitoring Tools
- Web content filtering tools to restrict websites and ftp sites
- Anti-Virus Tools
- Firewalls
- Secure Servers
- Encryption

- Restricted and controlled access to floppy drives, zipped drives, and CD/DVD writers--these are disabled on all machines. Disabled USB drive data transfer on all machines. Only the network administrator can perform data transfer to external devices and closely controls this external data transfer.
- Restricted access and monitoring of SECON FTP site
- Regular backup of data on daily and weekly intervals
- Power Backup with UPS and Generators
- Leased Line Backup for Internet Connectivity



5 SECON's Delivery Model

5.1 Project Management

Weekly progress reports will be sent by email from SECON to the client project manager. The SECON Project Lead will interact on a frequent basis (more than 2-3 times a week) with the technical lead from the client during the project.

SECON will extensively use webconferencing tools, such as Webex and Citrix Online to interact with the client on an as-required basis. Project documentation will be exchanged by Microsoft Word, Excel, Visio, and MS Project.

5.2 Communications Protocols

Email will be the preferred method of communication. In addition, teleconferencing and webconferencing will be used. File transfer will be accomplished through FTP.

6 Offices and Contact Information

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