

## **STATEMENT OF QUALIFICATIONS**

# **OIL AND GAS PIPELINE TRANSPORTATION ROUTING AND FEASIBILITY CITY GAS DISTRIBUTION**



### **SECON Private Limited**

#147, 7B Road

Export Promotion Industrial Park

Whitefield, Bangalore - 560 066, India

Phone: + 91-80-4119 7778

Fax: + 91-80-4119 4277

Email: [feedback@secon.in](mailto:feedback@secon.in)

[www.secon.in](http://www.secon.in)

## Table of Contents

<b>1</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>2</b>	<b>INTRODUCTION .....</b>	<b>4</b>
2.1	HUMAN RESOURCES .....	4
2.2	ORGANIZATION CHART .....	5
2.3	KNOWLEDGE BASE .....	5
<b>3</b>	<b>SERVICE OFFERINGS .....</b>	<b>7</b>
3.1	RECONNAISSANCE AND ROUTE OPTIMIZATION USING SATELLITE IMAGES/ BASE MAP .....	7
3.2	CENTERLINE AND DETAILED ROUTE SURVEY .....	8
3.3	SOIL STRATIFICATION AND RESISTIVITY SURVEY .....	8
3.4	GEOTECH, HYDROGRAPHIC AND HYDROLOGICAL INVESTIGATIONS FOR HDD CROSSING .....	8
3.5	ROU ACQUISITION, PERMITTING AND CLEARANCE .....	8
3.6	EIA AND EMP STUDIES .....	9
3.7	GIS BASED SOFTWARE DEVELOPMENT .....	9
3.8	ENGINEERING FOR RAW WATER TRANSPORTATION .....	9
3.9	PIPELINE ENGINEERING DESIGN .....	9
3.10	PRE-CONSTRUCTION ASSISTANCE .....	10
3.11	CONSTRUCTION PHASE .....	10
3.12	CITY GAS DISTRIBUTION NETWORK .....	11
<b>4</b>	<b>PROPRIETARY SOFTWARE .....</b>	<b>14</b>
4.1	ROU MASTER FOR RIGHT-OF-WAY/USE PROPERTY MANAGEMENT OF PIPELINES/HIGHWAYS .....	14
4.2	SECON ALIGNMENT SHEET GENERATOR (SASG) .....	15
4.3	SECONMAP .....	16
4.4	PIPELINE ASSET MANAGEMENT SYSTEM (PAMS) .....	16
	<b>RELEVANT EXPERIENCE .....</b>	<b>17</b>



## 1 Executive Summary

SECON Private Limited is an ISO 9001:2008 certified, NABL Accredited, GIS Driven Multidiscipline Engineering Company. 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 one of the largest and oldest Surveying and Mapping firms in India. Most of SECON's clients are repeat and long-term clients.

The key differentiator for SECON is that the company is a well-established (established in 1981) financially stable (Zero Debt and Consistently Profit Making) Multidiscipline Mapping and Engineering firm that provides a total solution from a single window for the entire lifecycle of an Infrastructure development project.

The domain expertise of SECON comprises:

<b>Design Consultancy and Engineering Services</b>	<b>Investigation and Services</b>
1. Irrigation, Flood Control and Water Management	1. Land Surveying for Topographic, Cadastral Mapping, Construction Supervision and Hydrographic Surveys
2. Water, Sanitation and Storm water Engineering(Public Health Engineering)	2. Geotechnical Engineering and Soil Investigations
3. Highway Engineering and Construction Supervision	3. Water Distribution System Leak Detection, Rehabilitation and GIS Based Asset Management Services
4. Electrical Network Distribution Engineering	4. Photogrammetry, LiDar, Satellite Image Processing and Remote Sensing and generation of 3D Digital Terrain and City models.
5. Oil and Gas Pipeline Transportation Routing and Feasibility	5. GIS Data Conversion and Maintenance
6. Web enabled GIS Driven Software Development and Database Creation for Infrastructure.	6. Route Planning, 3D Corridor Mapping, Generation of GIS database
7. Software development to improve productivity for Engineering Design and Drafting (CAD) fields.	7. Ground water and Resistivity Surveys
8. Civil and Structural Design	8. Underwater Leak Detection and Turnkey Solutions
9. Town Planning and Urban Development	9. Exploration, Mine Survey & Planning
10. Environmental Engineering and Environmental Impact Assessments and Permitting	10. Terrain Evaluation and Geological Appraisal
11. Assistance in Right of Use Acquisition and Permitting	11. Detection of Underground Utilities using Ground Penetrating Radar and Associated Tools.

SECON is the only firm in India to offer a Total Solution for Mapping, Infrastructure Investigation, Engineering Design and Construction Supervision. All of these services are offered wholly in-house by SECON.



SECON's over **3 decades of mapping experience** in Land Surveying, Photogrammetry, LiDAR Data Acquisition and Processing, and Remote Sensing, gives it a significant advantage for advanced mapping since it has a comprehensive combined experience in all of the above technologies.

SECON has long-term partnerships with International Engineering and Mapping Firms across Asia, North America, Africa, Middle East, Europe and Australia and has executed both Engineering and Mapping projects in these areas for its clients. SECON is registered with Asian Development Bank (ADB) and DACON (World Bank) to provide consultancy services.

SECON has been awarded the 3rd CIDC Vishwakarma Award 2011. This is a National Award for Projects of National Excellence.

SECON has been awarded the best services Export Excellence Award-2010 by Federation of Chamber of Commerce and State Bank of India.

SECON has the following standing in India:

- The largest private Land Surveying and Mapping firm in India for Topographic and Cadastral Surveys.
- One of the Largest and most Experienced Firms for Land Acquisition Assistance for Pipeline, Highway and other Linear Corridor and Large Area projects. SECON has developed Customized Web Enabled Software for Data Management and Administration of this Complex Process which have included the compilation and data management more than 10 million parcels compiled by SECON as of date (including field data collection).
- One of the leading private Mapping and Design firm for Irrigation and Water Management projects.
- One of the largest private Highway Mapping, Design and Construction Supervision firms in India.
- One of a handful of firms in India to have the NABL certification for its Geotechnical Laboratory. NABL is the National Accreditation Board for Testing and Calibration Laboratories (NABL).

Government of India has authorized NABL as the sole accreditation body for Testing and Calibration laboratories.

- The first private company to execute LiDAR flying and processing services in India. SECON now one of the largest LiDAR Data processing company in India.

SECON has executed over:

- 65,000 km of large-scale Pipeline Corridor Mapping – this includes Route Engineering, Topographical and Cadastral Mapping and Rights-of-Way Acquisition assistance and management. This is the largest amount of Pipeline Corridor mapping done by any corporation in India.
- 15000 km of mapping, design, and construction supervision of highways
- 11950 sq km of large-scale mapping (topographical and cadastral) for Irrigation projects. This includes the Topographic and Cadastral Mapping of 6000 Sq Km for the World Bank Aided Uttar Pradesh Water System Restructuring Project.

- 7950 Sq Km of Irrigation and Water Management design projects. SECON is currently executing and Irrigation Mapping and Design Project for an area of 14000 sq km for the Narmada River Basin in Madhya Pradesh. This project was done by mapping with a combination of High Resolution (0.5 m) Stereo Satellite Imagery and Land Survey Method. This technology is being used for the first time in India for an Irrigation and Water Management project.
- 600 infrastructure development projects (includes subdivision/township mapping, design and planning) which includes construction supervision and quality control for the International Tech Park (ITPL) in Bangalore.
- 600,000 meters of geotechnical investigation and drilling in various soil strata including investigations for the Bangalore International Airport.
- SECON has completed a major multimillion dollar mapping and consulting project for the planning and design of the Water and Sanitation system for 13 municipalities (100 settlements) in Libya. The capital expenditure of the project is around 2.5 billion US\$.
- SECON has successfully completed the Multi Million Dollar Contract for Project Management Consultancy Services for Up Gradation of important Road Corridors in Bangalore Urban and Rural Districts for a length of 1004 Km. Estimated capital expenditure of the project is 9.96 Billion Rupees(US \$ 220 million).
- SECON has successfully completed more than 500,000 Sq Km of LiDar, Photogrammetry and Remote Sensing Projects as of August 2010.

SECON has a state of the art 105,000 sq ft ISO 9001:2008 certified operations center set on a 2.5 acre campus in Bangalore, India that is fully owned by the company. Bangalore is the technology capital of India and is globally recognized for its technical excellence.





## 2 Introduction

Due to large industrialization and increase in population, demand of Oil and Gas has increased day by day. Transportation of Oil & Gas through underground pipeline is safest and economical mode of transport. Also due to global warming, Gas is considered as Eco-Friendly Fuel and hence Gas Based Industries are promoted by various Government / Private Sector.

Demand of Oil and Gas is required throughout length and breadth of country. Accordingly it is become essential to transport oil and gas upto the demand centers, consumption centers consistently, wherein SECON plays important part.

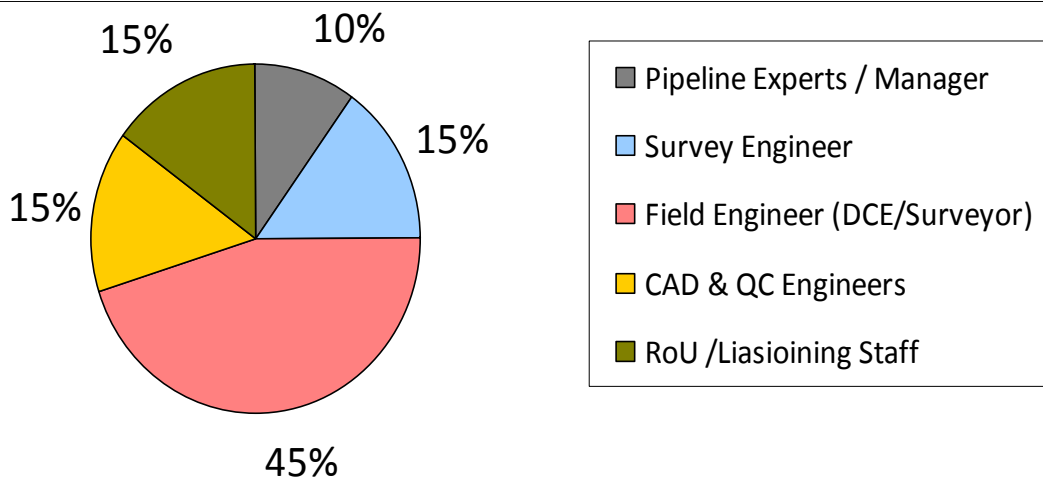
Also in present scenario, a number of Oil and Gas companies are providing Gas through Piped Natural Gas (PNG) Network to individual domestic /small scale industries through development of City Gas Distribution Network.

SECON provides consultancy services for Oil and Gas Pipeline to Private /Public and Government Sectors comprising Feasibility Study, Design & Engineering, Alignment Survey, Soil Investigation, Cadastral Survey, RoU Acquisition as per Government Act, Statutory Clearances, EIA/EMP & RA/DMP Studies including Environmental Clearances and assistance during construction/laying of pipeline.

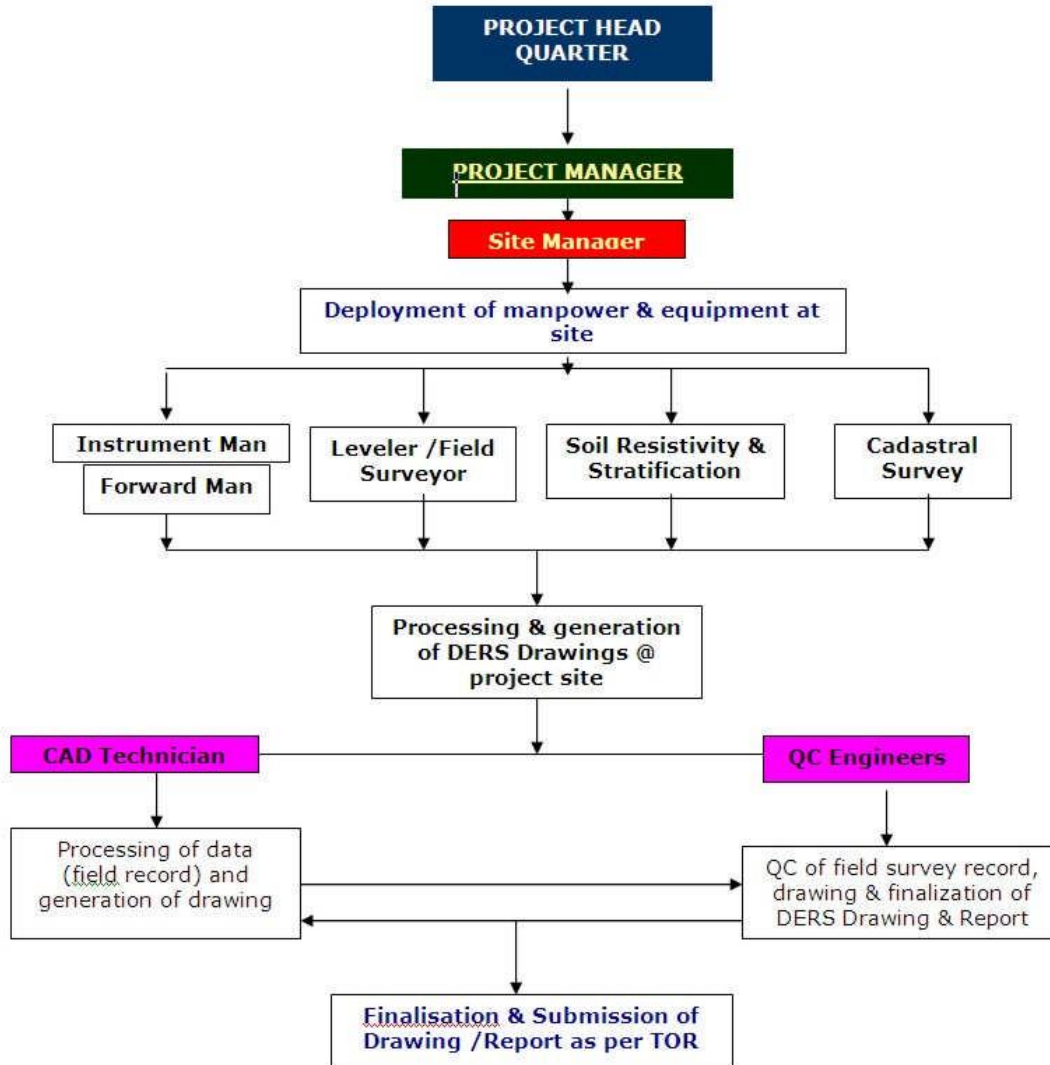
One of SECON strengths is to provide services from beginning of Feasibility Study, Alignment Survey, Investigation, Planning till completion of all the activity, except construction.

### 2.1 Human Resources

The Team composition is a very good mix of Office and Field Crew in the rank of Sr. and Experienced Engineer in their respective field. Field crew is mobile and ready to move to site location with short notice. The staff composition chart is as follows



## 2.2 Organization Chart



## 2.3 Knowledge Base

SECON is well equipped with latest instruments and technology to fulfill the requirement as per IS Standards and Pipeline Safety Guidelines. SECON being an ISO 9001:2008 Certified, all activities complied to ISO Standards and activity manuals are available for the approach to Planning, Design and Preparation of Drawings.

SECON has the largest Surveying Precision Instruments, Equipments, Related Hardware / Software in India.

**DGPS**



**Auto  
Level**



**GROUND PENETRATING RADAR ( GPR )**



**Total  
Station**





### **3 Service Offerings**

#### Scope of Services

- Reconnaissance and Route Optimization using Satellite Images/ Base Map
- Centerline and Detailed Route Surveys as per WGS – 84 using DGPS and Total Station
- Soil Stratification and Resistivity Surveys
- Geo-tech Investigations for HDD Crossing
- Right of Use/Way (ROU) Acquisition, Permitting, and Clearance
- Environmental Impact Assessment(EIA) and Environmental Management Planning (EMP) Studies
- Engineering for Raw Water Transportation
- GIS Based Software Development
- Pipeline Engineering Design
- Pipeline Pre-Construction Assistance
- Pipeline Construction Supervision assistance
- City Gas Distribution Network

#### **3.1 Reconnaissance and Route Optimization using Satellite Images/ Base Map**

- 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 :
  1. Safety of Pipeline and Public
  2. Shortest Pipeline Length
  3. Terrain Favorability
  4. Favorable Ground Profile for Pipeline Hydraulics
  5. Infrastructure and Access
  6. Least Environmental Impact
  7. Avoiding Existing and Future Developments
  8. Proximity of Distribution Center

### 3.2 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



### 3.3 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

### 3.4 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.

### 3.5 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 Competent Authority (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

### **3.6 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

### **3.7 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 Auto Cad 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

### **3.8 Engineering for Raw Water Transportation**

- Sourcing of raw water and Quality tests
- Raw water transportation and hydro testing
- Water for firefighting Reservoir / Tanks at stations

### **3.9 Pipeline Engineering Design**

- Design of pipeline network
- Design of Antibuoyancy measures
- Geotechnical Engineering to arrive / suggest foundations for various units of stations.
- Architectural layout and plans
- Co-ordination and approval of vendors
- Preparation of bid documents and estimates
- Co-ordination and technical guidance during tendering
- Evaluation of bids and recommendation of price bid opening



### **3.10 Pre-construction Assistance**

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

### **3.11 Construction Phase**

- 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.

### 3.12 City Gas Distribution Network

#### 3.12.1 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

#### 3.12.2 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



### **3.12.3 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

### **3.12.4 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

### **3.12.5 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

### **3.12.6 Investigations for City Gate Station (CGS)/ CNG Station**

- Reconnaissance survey for identification of adequate land for CGS/CNG Station
- 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

### **3.12.7 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.



### **3.12.8 EIA/EMP Study, Risk Assessment and Disaster Management Study including clearances from State Pollution Control Board & Ministry of Environment & Forests, New Delhi**

- 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 (Rs 1 billion).

### **3.12.9 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 updating 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 updating & reporting system

## 4 Proprietary Software

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

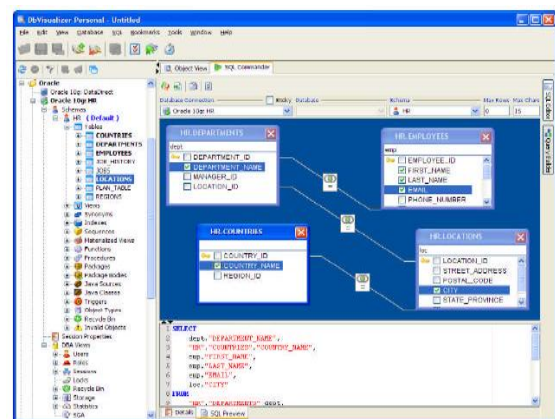
### 4.1 ROU Master for Right-of-Way/Use Property Management of Pipelines/Highways

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)



#### **4.2 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.

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 to 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 is currently being customized for IBG (<http://www.ibgrombach.com/>), 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 (<http://www.ril.com/>), the largest private sector Indian corporation, and is extensively used by them for their large oil and gas transmission pipeline network.



### 4.3 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 by 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.

### 4.4 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).

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

#### **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”

[Leading Energy Company, Gujarat, India](#)



Relevant Experience			
Sl No.	Project information	Scope of work	Cost of Project (in Rs 100,000)
1	Palanpur – Jaipur Pipeline Project (Pipeline Network in the State of Rajasthan) PO No. P21 / 4200003580, Dtd.25.04.07	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey</li> <li>• Cadastral Survey</li> <li>• RoU/ RoW Acquisition as per Act</li> <li>• Obtaining Statutory Clearances</li> <li>• Obtaining Permission from Forest Dept.</li> <li>• Assistance to Competent Authority for declaration of Awards</li> <li>• Support Services during the construction of pipeline (execution period)</li> <li>• Disbursement of land &amp; crop compensation (execution period)</li> </ul>	142.81
2.	Veraval - Porbander Pipeline (Length : 78 KM) P21/4200004990, Dtd.30.06.2008		123
3.	Rajpipla spurline (Length 84 Km) PO. No.: P21/4200005604, Dtd.23.09.2009		69.6
4.	Paddhari - Junagadh Spurline (Length : 76/45 Km) P21/4200004086, Dtd.19.09.2007		172.23
5.	Dajod - Jafrabad Pipeline (Length : 214 Km)		252
6.	Olpad – Utran Pipeline (24 Km)		25
7.	Bhadbhut – Rajkot – Jamnagar Pipeline Project (Length 440 Km)		572
8.	Saurashtra Pipeline Project (Phase – II) Length 428/034 Km		420.64



Sl No.	Project information	Scope of work	Cost of Project																
9.	<p>Development of City Gas Distribution Network in the State of Gujarat. City includes</p> <table border="1"> <tr> <td>• Umargam, Vapi</td> <td>• Than, Wankaner</td> </tr> <tr> <td>• Valsad, Sarigam</td> <td>• Jamnagar</td> </tr> <tr> <td>• Bilimora, Navsari</td> <td>• Bhavnagar, Sihor</td> </tr> <tr> <td>• Chikhali,</td> <td>• Gadhada, Dhasa</td> </tr> <tr> <td>• Nadiad, Petlad</td> <td>• Rajula, Palitana</td> </tr> <tr> <td>• Rajkot, Morbi</td> <td>• Talaja, Mahuva</td> </tr> <tr> <td>• Surendranagar</td> <td>• Limbadi, Sayala</td> </tr> <tr> <td>• Dhrangadhra</td> <td>• Halvad, Chotila</td> </tr> </table>	• Umargam, Vapi	• Than, Wankaner	• Valsad, Sarigam	• Jamnagar	• Bilimora, Navsari	• Bhavnagar, Sihor	• Chikhali,	• Gadhada, Dhasa	• Nadiad, Petlad	• Rajula, Palitana	• Rajkot, Morbi	• Talaja, Mahuva	• Surendranagar	• Limbadi, Sayala	• Dhrangadhra	• Halvad, Chotila	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey</li> <li>• Cadastral Survey RoU/ RoW Acquisition as per Act</li> <li>• Obtaining Statutory Clearances</li> <li>• Obtaining Permission from Forest Dept.</li> </ul>	405
• Umargam, Vapi	• Than, Wankaner																		
• Valsad, Sarigam	• Jamnagar																		
• Bilimora, Navsari	• Bhavnagar, Sihor																		
• Chikhali,	• Gadhada, Dhasa																		
• Nadiad, Petlad	• Rajula, Palitana																		
• Rajkot, Morbi	• Talaja, Mahuva																		
• Surendranagar	• Limbadi, Sayala																		
• Dhrangadhra	• Halvad, Chotila																		
10.	<p>Development of City Gas Distribution Network in the State of Gujarat. City includes</p> <ul style="list-style-type: none"> <li>• Kadi, Kalol</li> <li>• Himmatnagar</li> <li>• Mehsana</li> <li>• Prantej</li> </ul>	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey, Cadastral Survey</li> <li>• RoU/ RoW Acquisition as per Act</li> <li>• Obtaining Statutory Clearances</li> <li>• Obtaining Permission from Forest Dept.</li> </ul>	262																



11.	<p>Development of City Gas Distribution Network in the State of Gujarat. City includes</p> <ul style="list-style-type: none"> <li>Vadodara &amp; Ahmedabad City</li> </ul>	<ul style="list-style-type: none"> <li>Reconnaissance Survey</li> <li>Detailed Engineering Route Survey</li> <li>Soil Stratification and Classification Survey</li> <li>Soil Resistivity survey, Cadastral Survey</li> <li>RoU/ RoW Acquisition as per Act</li> <li>Obtaining Statutory Clearances</li> <li>Obtaining Permission from Forest Dept.</li> </ul>	203
12.	<p>Kakinada – Ahmedabad Pipeline Network passing through Andhra Pradesh, Madhya Pradesh, Maharashtra and Gujarat State (1851 Km Length)</p>	<ul style="list-style-type: none"> <li>Reconnaissance Survey</li> <li>Detailed Engineering Route Survey</li> <li>Soil Stratification and Classification Survey</li> <li>Soil Resistivity survey, Cadastral Survey</li> <li>RoU/ RoW Acquisition as per Act</li> <li>Obtaining Statutory Clearances</li> <li>Obtaining Permission from Forest Dept.</li> </ul>	416
13.	<p>Detailed route survey and ROU Acquisition for the Vadinar to Ratlam sectin of proposed pipeline, EOL/AG/2701 dt.27.01.2004</p>	<ul style="list-style-type: none"> <li>Reconnaissance Survey</li> <li>Detailed Engineering Route Survey</li> <li>Soil Stratification and Classification Survey</li> <li>Soil Resistivity survey</li> <li>Cadastral Survey</li> </ul>	137



14.	Onshore Pipeline route survey for Dahej - Vemar Bijapur Pipeline Project	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey</li> <li>• Cadastral Survey</li> </ul>	107
15.	Mora- Sachin – Palsana Pipeline Project (Proposed Pipeline Laying & Crossing of LDZ Expansion Re-enforcement) P.O. No. 4500023013, dtd. 06.12.2004	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey</li> <li>• Cadastral Survey</li> <li>• RoU/ RoW Acquisition as per Act</li> <li>• Obtaining Statutory Clearances</li> <li>• Obtaining Permission from Forest Dept.</li> </ul>	74
16.	Vadoli – Kim – Karanj Pipeline Project P.O. No. 4500023013, dtd. 06.12.2004	<ul style="list-style-type: none"> <li>• -- do --</li> </ul>	
17.	Hazira – Mora Pipeline Project (Length 15 Km)	<ul style="list-style-type: none"> <li>• Reconnaissance Survey</li> <li>• Detailed Engineering Route Survey</li> <li>• Soil Stratification and Classification Survey</li> <li>• Soil Resistivity survey</li> <li>• Cadastral Survey</li> <li>• Obtaining Statutory Clearances</li> <li>• Obtaining Permission from Forest Dept.</li> </ul>	93

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