

# **Statement of Qualifications**

## **Structural Engineering**



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<b>INTRODUCTION.....</b>	<b>1</b>
<b>TYPE OF PROJECTS .....</b>	<b>5</b>
<b>CAPABILITIES AND SERVICES .....</b>	<b>5</b>
PROJECT MANAGEMENT.....	5
PROJECT ENGINEERING.....	5
INITIAL ENGINEERING .....	6
AUTOMATION.....	6
SOFTWARE DEVELOPMENT.....	6
PURCHASING SUPPORT.....	7
PROJECT COST ESTIMATION .....	7
CONSTRUCTION MANAGEMENT .....	7
COMPUTER DRAFTING & DESIGN .....	7
SOFTWARE.....	7
<b>DESIGN AND STRUCTURAL ENGINEERING SERVICES .....</b>	<b>8</b>
<b>IRRIGATION, FLOOD CONTROL AND WATER MANAGEMENT .....</b>	<b>8</b>
SERVICES RELATING TO HYDRAULIC STRUCTURES .....	9
STRUCTURAL DESIGNS RELATING TO HYDRAULIC STRUCTURES .....	9
<b>MAJOR PROJECTS IN IRRIGATION, FLOOD CONTROL AND WATER MANAGEMENT.....</b>	<b>10</b>
<b>HIGHWAY AND TRANSPORTATION SERVICES.....</b>	<b>11</b>
<b>HIGHWAY STRUCTURAL DESIGN SERVICES.....</b>	<b>12</b>
<b>MAJOR PROJECTS IN HIGHWAY AND TRANSPORTATION ENGINEERING .....</b>	<b>12</b>
<b>BUILDING PROJECT TYPES.....</b>	<b>16</b>
<b>SERVICES FOR WATER SUPPLY AND SANITATION: .....</b>	<b>16</b>
<b>STRUCTURAL DESIGN SERVICES FOR WATER SUPPLY AND SANITATION .....</b>	<b>17</b>
<b>GENERAL PLAN FOR WATER SUPPLY, SEWERAGE AND STORM WATER DRAINAGE SYSTEM AND ACCOMPANYING WORKS IN LIBYA .....</b>	<b>18</b>



**Introduction**

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:

Design Consultancy and Engineering Services	Investigation and Services
<ol style="list-style-type: none"> <li>1. Irrigation, Flood Control and Water Management</li> <li>2. Water, Sanitation and Storm water Engineering(Public Health Engineering)</li> <li>3. Highway Engineering and Construction Supervision</li> <li>4. Electrical Network Distribution Engineering</li> <li>5. Oil and Gas Pipeline Transportation Routing and Feasibility</li> <li>6. Web enabled GIS Driven Software Development and Database Creation for Infrastructure.</li> <li>7. Software development to improve productivity for Engineering Design and Drafting (CAD) fields.</li> <li>8. Civil and Structural Design</li> <li>9. Town Planning and Urban Development</li> <li>10. Environmental Engineering and Environmental Impact Assessments and Permitting</li> <li>11. Assistance in Right of Use Acquisition and Permitting</li> </ol>	<ol style="list-style-type: none"> <li>1. Land Surveying for Topographic, Cadastral Mapping, Construction Supervision and Hydrographic Surveys</li> <li>2. Geotechnical Engineering and Soil Investigations</li> <li>3. Water Distribution System Leak Detection, Rehabilitation and GIS Based Asset Management Services</li> <li>4. Photogrammetry, LiDar, Satellite Image Processing and Remote Sensing and generation of 3D Digital Terrain and City models.</li> <li>5. GIS Data Conversion and Maintenance</li> <li>6. Route Planning, 3D Corridor Mapping, Generation of GIS database</li> <li>7. Ground water and Resistivity Surveys</li> <li>8. Underwater Leak Detection and Turnkey Solutions</li> <li>9. Exploration, Mine Survey &amp; Planning</li> <li>10. Terrain Evaluation and Geological Appraisal</li> <li>11. Detection of Underground Utilities using Ground Penetrating Radar and Associated Tools.</li> </ol>



## Statement of Qualifications, Structural Engineering

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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.



## Statement of Qualifications, Structural Engineering

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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.





### **Type of Projects**

- Hydraulic Structures
- Road and Bridge Structures
- Water supply and wastewater treatment plants and components
- Residential, Commercial, Educational, Institutional, Manufacturing, Public and Leisure Buildings, Industrial projects
- Inspection and Rehabilitation of Structures
- Investigations into distressed or failed Structures
- Special structures (Communication Masts/towers)
- And other Civil Engineering related structures

### **Capabilities and Services**

SECON provides a complete range of engineering services to cover every facet of project implementation including surveying, feasibility studies, estimating, scheduling, procurement, design, automation, software development construction management, construction, and commissioning. These services include:

#### ***Project Management***

Project Management services offered by SECON enable clients to deal with one individual throughout all phases of a project. SECON project managers are experienced with projects of varying sizes from retrofits to new, complete, Low budget to High Budget Project. Services include:

- Project Management and Control
- Development Procedures
- Scheduling
- Cost Control
- Project Estimating
- Scope Development
- Reporting Systems and Document Management
- Start-up and On-going Technical Support Services
- Construction

#### ***Project Engineering***

SECON can furnish an integrated team of professionals for civil, structural, piping, mechanical, instrumentation and electrical engineering design. This project team can produce the working documents necessary for procurement, fabrication and installation of all materials required to construct a material handling project ready for operation. Our designs emphasize safety, quality, and practicality. In addition, economy, ease of operation, and maintenance are important considerations in each process plant design.



### ***Initial Engineering***

SECON process design team offers the benefits of many years of experience in industrial applications. Our engineers have performed a wide range of studies, from process optimization of existing design to new design. Services include:

- Preliminary engineering studies including reconnaissance, surveying, feasibility and economic studies, cost estimates and scheduling
- Detailed standard specifications
- Process control for new and retrofit of existing design.

### ***Automation***

Great engineering is all about getting the project done right and on time. That will never change. What will change is the technology you use to design, review, and improve your projects so they can be delivered quickly, accurately and cost-effectively. Automation both brings computer technology into the field of civil engineering and increases the rate at which a task is performed and decreases the amount of direct human time and attention necessary to perform the task with increases in cost effectiveness. Most of the present project clients demand for the numerical parametric study in order to meet their criteria and optimization, over past years of experience SECON is automated many such problem which has reduced our and client time and cost by more than 30%. Further based on the updates and revisions made in the numerical study and automation serves as a draft for building effective software.

### ***Software Development***

Our unique ability to provide complete solutions incorporating surveying, engineering, and software services with quality and cost-effectiveness, SECON is the preferred choice of companies across the world for developing software solutions in the engineering domain and development of software applications in civil and structural engineering. Due to the upsurge in projects, time plays a key role in meeting deadlines and targets. In order to increase productivity, efficiency and quality of work various in house software have been developed.

- L-S Generator
- Earthwork & Cross Section Program
- Design & Drawing of Canal Drop
- Estimate of Canal Drop
- Area Statement Program
- Estimate & Drawing of Head Regulator
- Drawing of small Road Bridge
- Planimetry.
- Alignment Sheet Generator



### ***Purchasing Support***

SECON offers complete purchasing services, from purchasing assistance to complete procurement management. Our up-to-date knowledge of equipment vendors, scheduling and costs can be beneficial to the flow of a project. Our in-house purchasing assures close coordination with engineering to assure proper compliance with specifications. SECON also works closely with clients.

### ***Project Cost Estimation***

For medium to large projects, SECON uses customized estimating software products to efficiently prepare detailed cost estimates. This software is continuously updated to maintain accurate labor, materials and equipment cost databases for projects.

### ***Construction Management***

Experienced construction management can help owners reduce cost and risk throughout a construction project. We provide professional assistance with the following tasks:

- Determination of project goals and budget
- Development of cost control, scheduling and reporting systems
- Review of design documents
- Development of procurement and contract strategies
- Assistance with bidding
- Maintenance of project records
- Coordination of construction activities
- Inspection for conformance to plans and specifications
- Negotiations

### ***Computer Drafting & Design***

In keeping pace with the latest technology, our design staff uses AutoDesk, Microstation and ESRI products

### ***Software***

Our design staff uses a variety of in-house and standard software to aid in design.

- AutoCAD / Microstation
- Estimating (In-house Estimator Package)
- Structural (STAAD/Pro®)
- Roadway Design (Geopak, Nova Point, MX Road)
- Water & Sanitation (WaterCad, SewerCad, StormCad)
- GIS (ESRI, Inpho)
- Scheduling (Microsoft Project®)
- Business Systems (Microsoft)



### **Design and Structural Engineering Services**

SECON is capable of handling a project over the entire spectrum of structural design from concept stage through to contract administration and quality control.

- Planning: project objectives, design criteria, site selection, layout optimization
- Modeling: numerical and physical models to assess structure performance and design conditions
- Design: preliminary and final design, plans and specifications
- Materials: evaluation of sources, quality, cost, specifications
- Construction: monitoring/administration, payment, claims, liaising with client/contractor
- Monitoring: post-construction monitoring
- Repair: condition assessments, maintenance/restoration/rehabilitation of existing structures

**New Construction:** We will provide you with the design drawings and specifications that are required for the project.

**Additions:** Space limitations and the constraints imposed by the existing structure often require innovative designs. We explore all options that are available.

**Rework of Existing Structures:** We will analyze the existing conditions to determine the effects of new loadings or the best way to accomplish desired modifications to the structure.

**Evaluation of Existing Structures:** We will perform a structural evaluation based on visual observations. If more detailed information is required, we can arrange for both on site and laboratory testing of soils, concrete, etc.

**Failure and Damage Investigations:** We will establish the extent of the structural damage; and in the case of a failure, we will determine the cause.

**Engineering Reports:** SECON will review your structural concerns and prepare a report of our findings and recommendations.

**Construction Assistance:** To help ensure that projects are completed according to our specifications, we offer field assistance during the construction phase. This includes reviewing shop drawings, making observations at the job site, and answering any questions that may arise in the field.

### **Irrigation, Flood Control and Water Management**

Our staff has over 40 years of experience designing and managing the construction of hydraulic structures for flood control, flood conveyance, navigation, recreation and ecological restoration. Our projects have ranged from constructed wetlands to new dam design and construction. Structures to protect urban infrastructure may be completely different in appearance to river restoration structures constructed of primarily native materials, but both require proper technical analysis and design. SECON

has the technical expertise and the practical experience to design and construct these and other structures to achieve the project's safety, functional and aesthetic goals.

***Services relating to Hydraulic Structures:***

- Macro and micro level survey.
- Geotechnical, Geological Investigation and Material testing.
- Capacity survey, reservoir analysis, design and reservoir sedimentation analysis
- Hydrology and hydraulic studies, Investigation and modeling
- River hydraulics (water levels, flow patterns, discharge distributions), Morphological development of riverbeds and banks (lowland and mountainous areas), Regulation and canalization of rivers, River morphology and sediment-transport.
- Capacity survey, reservoir analysis, design and reservoir sedimentation analysis
- Hydrology and hydraulic studies, Investigation and modeling
- Numerical Analysis of Hydraulic Structures
- River hydraulics (water levels, flow patterns, discharge distributions), Morphological development of riverbeds and banks (lowland and mountainous areas), Regulation and canalization of rivers, River morphology and sediment-transport.
- Natural river features
- Dam break hydraulics
- Reservoir sedimentation rates
- Floodplains / flooding / floodways
- Bridge hydraulics and bridge scour analysis
- Environmental study and rehabilitation of submerged area
- Economic, financial analysis, cost estimation, land acquisition, preparation of bid documents, detail project report, bill of quantities, Permitting through resource agencies and project management.
- Construction services including bidding services, Construction management and project start-up services project monitoring and inspection services.
- Design assistance, Technical advice, specialist review, and expert opinion and software development.
- GIS based asset and management system

***Structural designs relating to Hydraulic Structures:***

- Develop feasibility studies, planning, detailed design, specification and CAD drawings of hydraulic structures (e.g. sluices, barrages, dams, gates, Irrigation headwork, diversion, flow measurement, training and protection works, canals and pipeline distribution networks, cross-drainage works, recreational structures, pump stations, Intake structures, Brackish water shrimp farms)
- Dam inspection, classification and monitoring
- Dam inflow design flood evaluation and routing
- New dam and dam rehabilitation design

- Flooding and dam break incremental damages analysis
- Irrigation headwork, diversions and flow measuring
- Recreational structures
- Analysis of bank stability techniques and design
- Hydraulic structures evaluation, rehabilitation and restoration.
- Structural safety analysis and inspection, underwater leak detection for dams, shafts, tunnels and arresting leakage, seepage control with turnkey solution.

### Major Projects in Irrigation, Flood Control and Water Management

The technical capabilities of SECON Consultants has been highlighted and rewarded on several occasions through awards for excellence for specific projects in which we acted as consultants. The following projects are specifically noted:

- **Under Water Leak Detection:** Determination of Geotechnical Characteristics of tailings to carry out dynamic analysis of proposed plateau in Lakhya Reservoir and arresting leakage at intake well and exit portal of Gravity Tunnel.
- **Salt-water exclusion Dam across Varahi River :** (Type: Gravity Dam with Vertical Lift Gates, Length: 250m Location: Kundapura , Udupi District, Karnataka, India.) Proposed to avoid entry of Sea Water in to Varahi River during summer..
- **Vented Dam across Netravati River :** (Type: Gravity Dam with Vertical Lift Gates. length: 410m,Location: Near Thumbbe Village of Mangalore District, Karnataka, India.) Proposed for Water Supply Scheme near Mangalore City.,
- **Bellary Nala Dam. Bellary Nala Irrigation Project. :** (Type: Gravity Dam with Radial Gates and Central Spillway. Capacity: 1.5 TMC. length: 330m.Location: Near Hudali Village of Belguam District, Karnataka, India.) Proposed across Bellary Nala River near for storage of water and to provide irrigation facility to draught prone areas of Gokak and Saudatti Taluks of Belguam District..
- **Bridge cum Barrage across Bhima River near Kallur 'B' . :** (RCC Type, length: 370m. Location: Kallur 'B' Village, Jevargi Taluk of Gulbarga District, Karnataka, India.) One of the series of barrages proposed across Bhima river to increase downstream water table and to provide irrigation facility to draught prone areas of Gulbarga District.,.

- **Structural Design of Aqueduct:** (Type: RCC Cantilever Type. Length: 558m, Capacity: 19.50 cumecs. Location: Siddapura Village, Kundapura Taluk, Udupi District, Karnataka, India.) Proposed across Varahi River connecting Varahi Right bank Canal and Varahi Left Bank Canal.
  
- **Structural Design of Rising main, Pump house and Intake channels:** Upper Bhadra Project.
  
- Survey, Investigation, Hydrology and hydraulic Studies, Detailed Planning of Canal Network, Preparation of detailed Design, CAD Drawing and specification, Estimation for Canal and Hydraulic Structures.
  - Bellary Nala Irrigation Project.
  - Indira Sagar Project Right Main Canal
  - Handri Neeva Sujala Sravanti (HNSS) project
  - Handri Neeva Sujala Sravanti (HNSS)
  - Pancham Nagar Complex Major Irrigation Project and Bariyarpur Right Bank Canal Water Resources Department, **MP.**
  - Narmada Canal Sardar Sarovar Nigam Limited., **Govt. of Gujarat.**
  - Kachenehalli Lift Irrigation Scheme and Adike Bommanahalli Lift Irrigation Scheme.
  - Indi Lift Canal, Almatti Left Bank Canal, Shahapur Branch Canal
  - Amarja Irrigation Project, Bhima Lift Irrigation Project-Belundagi LIS & Alagi LIS, Ainapur West Canal, Varahi Irrigation Project- Varahi Left Bank Canal & Varahi Lift Canal, Sri Rameshwaram Lift Irrigation Scheme, Chikodi Branch Canal, Markandeya RBC, Itagi – Sasalwad LIS, Kotabagi Lift Irrigation Scheme, Ghataprabha Branch Canal, Bennithora Project, Lower Mullamari Project, Upper Bhadra Project.

### Highway and Transportation Services

- Feasibility Study, Control Survey, Topographical Survey, Setting out
- Geotech, Material, Pavement and Structural Investigations
- Hydraulic and Hydrological Investigations
- Traffic, Inventory and Condition Survey
- Traffic studies and analysis
- Bridge feasibility study, planning and design
- Street, highway, and roadway planning and design
- Corridor analysis
- Bike and pedestrian trails, Vehicle routing analysis
- Railroads
- Environmental review and impact analysis
- Construction management
- Preliminary and Final Highway and Bridge Design
- Environmental Studies and Impact Statements Assessments
- Storm Water Drainage planning and design

## Statement of Qualifications, Structural Engineering

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- Design Reports, Design Approval Documents
- Highway Work Permits
- Value Engineering
- Economic, financial analysis, cost estimation, land acquisition, preparation of bid documents, detail project report, bill of quantities, Permitting through resource agencies and project management.
- Construction services including bidding services, Construction management and project start-up services project monitoring and inspection services.

### Highway Structural Design Services

- Basis analysis, advance Analysis, specification, design, proof-checking, and CAD drawings
- Preliminary and detailed Bridge Design
- Bridge evaluation Rehabilitation and restoration
- Bridge Component strength assessment and specifications
- Rigid and Flexible Pavements design and evaluation
- Rock foundation, Rock Anchors and Rock Sockets design
- Soil structure interaction studies
- Load Ratings
- Earth and water Retaining Wall Design
- In-depth Bridge Inspection
- Value Engineering
- Design assistance, Technical advice, specialist review, expert opinion and software development.
- In addition, we regularly design more common structure types including prestressed concrete I-beams, box beams, and voided slabs; precast or cast-in-place box culverts, arch culverts, and rigid frame structures; steel beams and built-up girders; and prefabricated trusses.

### Major Projects in Highway and Transportation Engineering

**Afghanistan European Commission**, Hydrological Investigation and Design of Major bridges for Kabul - Jalalabad Highway and on Jalalabad bypass.

**NHAI**, Preparation of detailed project report for rehabilitation and upgrading to 4/6 lane divided carriageway for Nellore and Chikalurupet Section (185 Km) of NH 5, Nellore Bypass with 884cm long Pennar Bridge on NH 5, Farukhnagar to Kottakota section (102 Km) of NH 7, Kanyakumari to Trivandrum section (115Km) of NH 47, Nelamangala-Hassan Section (163 Km) of NH 48, and Hyderabad to Vijayawada Section (120 Km) of NH 9.

**NHAI**, Construction and supervision, quality control and project management for Four laning and strengthening of the existing two lane of Nellore-Chilakalurupet Section of NH 5, Krishnagiri-Ranipet Section of NH 46.



## Statement of Qualifications, Structural Engineering

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**KRDCL**, DPR and Supervision of bridge across Yagachi River, Supervision of Maintenance in & Division of Karnataka Geotech Investigation for flyovers in Bangalore

Quality Assurance and Supervision of Highway Maintenance, 3700 km of State Roads.

Preparation of detailed Layout, design forces and dimensions for Avalanche Control Structures in Central Himalayas near Rohtang Pass.

Detailed Design and estimates for Bridge cum Barrage across River Bhima

Detailed investigations and designs for Integrated Road Development Project in the city of Kanpur.

Preparation of Detailed Project Report for selected roads in the city of Kochi.

Detailed investigations and Design for Bangalore Outer Ring Road Banashankari to Bellary Road. (World Bank Funded).

Navy, Detailed Project Report for new approach Hill Road to Dolphin Hill.

Detailed Design of road connecting the GSPCL terminal to Surat-Hazira SH, including 460 m long bridge across Tena Creek.

Design and Construction supervision of Rehabilitation and improvement of road connecting the HPCL LPG terminal to NH 17 and internal roads of terminal involving both flexible and rigid pavements.

Detail Engineering, Construction supervision and quality control, procurement assistance for Rs. 100 crore BASF Chemical Plant at Mangalore ·

Design of complete township at Anjanapura, Uttarahalli Hobli, Bangalore South Taluk. as per modern town planning norms including internal and approach roads ·

**Govt. of Jharkhand**, Quality Control/concurrent evaluation / quality assurance in the works of Roads and Bridges ·

### Detailed Description

**Project:** Preparation of Detailed Project Report for Rehabilitation and Upgrading of Existing 2 lane Road to 4/6 lane Divided Carriageway configuration of Nellore to Chilakalurpet Section of National Highway No-5 in Andhra Pradesh.

**Major Structure Designed:** Design of Flyover at Ongole town between Nellore to Chilakalurpet stretch along NH-5.

**Scope of Work:** Structural Design and Design of Horizontal and Vertical alignment of Highway.

**Structural Details:**

- The structure consists of 540m Viaduct having 27 spans of 20m each and 240m approaches on either side
- The structure is of 4-lane carriageway width.
- Superstructure – RCC Box Girder.
- Sub Structure - RCC Plate Pier and RCC Cantilever Abutment.
- Type of foundation – Pile.

**Design Standards and Software Used:**

- Design standards as per IRC and BIS Specification.
- STAAD Pro Software is used in the analysis.



**Project:** Design of Major Bridge Across Kabul River Along Kabul – Jalalabad Highway as a part of Reconstruction of Kabul – Jalalabad Highway. Afghanistan.

**Client:** Sweden.

**Structural Details:**

- The Bridge is of 75m length having Viaduct having 4 spans of 18m each.
- The structure is of 10m wide with 9m wide carriageways.
- Superstructure – RCC I Girder.
- Sub Structure - RCC Circular Pier and RCC Cantilever Abutment.



## Statement of Qualifications, Structural Engineering

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- Type of foundation – Open.

### **Design Standards and Software Used:**

- Design standards as per AASHTO
- STAAD Pro Software is used in the analysis.

**Project:** Design of Major Bridge Across Pulo Sokhrao River Along Kabul – Torkham Highway as a part of Reconstruction of Kabul – Torkham Highway. Afghanistan.

**Client:** Sweden.

### **Structural Details:**

- The Bridge is of 170m length having Viaduct having 9 spans of 18m each.
- The structure is of 10m wide with 9m wide carriageways.
- Superstructure – RCC I Girder.
- Sub Structure - RCC Circular Pier and RCC Cantilever Abutment.
- Type of foundation – Open.

### **Design Standards and Software Used:**

- Design standards as per AASHTO
- STAAD Pro Software is used in the analysis.

### **Building Design Services**

SECON staff includes specialists in engineering for extreme hazards (earthquake, extreme wind, flood, etc). For many years, structures have been required to comply with various building codes depending on the location and building materials. Our teams are as familiar with the design of new buildings as with renovation, expansion and modernization of existing buildings. Engineers utilize state-of-the-art computer applications, as required, for static and dynamic analyses and soil-structure interaction. Our design team includes experienced drafting and graphics departments with the latest design and construction document production capabilities. Our engineers develop unique, cost-effective and practical performance-based solutions for new design and renovations to meet client-specific requirements. The structural design and Site Design are completed together to produce a consistent style and range of uses.

### **Our Building Design Services Include**

- Surveying, Geotechnical, Geological Investigation and Material testing.
- Structural Analysis and Design of new and existing building, Structural Repair Design, Building Foundation Design

## Statement of Qualifications, Structural Engineering

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- Evaluation, rehabilitation, restoration and renovation of existing building.
- Structural engineering regularly works with Clients and Consultants or Contractors involved, this supports for detailed analysis of various building components to ensure that the proposed structure is safe and economical.
- Structural Inspection / Structural Building Audits - This work usually involves a site visit and a structural inspection report which identifies any observed structural deficiencies.
- Supplementation for architectural drawings with structural information, and CO-stamp the Architectural drawings for Structural Engineering content.
- Economic, financial analysis, cost estimation, land acquisition, preparation of bid documents, detail project report, bill of quantities, Permitting through resource agencies and project management.
- Construction services including bidding services, Construction management and project start-up services project monitoring and inspection services.
- Design assistance, Technical advice, specialist review, expert opinion and software development.

### **Building Project Types**

- Recreational and athletic complexes
- Transportation and transit buildings
- Public buildings and institutions
- Commercial and industrial buildings
- Educational buildings and complexes
- Environmental works buildings
- Military and scientific buildings
- Rehabilitation, restoration renovation of buildings
- Structural steel roofing and other building components.

### **Services for Water Supply and Sanitation:**

- Preparation of Base Map
- Survey and Investigation
- Feasibility, Planning, Design
- Rate Analysis, Detailed Quantity Calculation, Bill of Quantities & Cost Estimates
- Preparation of Tender Documents and Vendor Evaluation
- Project Implementation, Supervision and generation of drawings
- Develop feasibility studies and reports
- Planning and design distribution systems
- Study supply and demand analysis
- Develop and implement conservation plans
- Reuse water resources
- Model water supplies
- Navigate water rights laws and rules
- Understand instream flow needs

## Statement of Qualifications, Structural Engineering

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- Plan and build water wells
- Protect source water
- Develop Ordinances and Water Rate Structures to help limit water use during drought periods
- Design and construct flood mitigation projects such as detention structures, channel improvements, diversion structures
- Manage storm water
- GIS based Asset Management

### **Structural Design Services for Water Supply and Sanitation**

Planning, analysis and design of:

- Storage systems,
- Treatment plants,
- Infiltration Galleries
- Wet and Dry Intake Towers
- Valve Tower
- Pipe design
- Pumping Stations
- Sedimentation Tanks
- Rapid Gravity Filters
- Ground and Elevated Water Tanks
- Skimming Tanks
- Trickling Filters
- Storm sewers
- Culverts

<b>Assignment Name:</b> General Plan for Water Supply, Sewerage and Storm Water Drainage System and accompanying works in Libya for Great Socialist People's Libyan Arab Jamahiriya – Preliminary Design, final design and preparation of Tender Documents		<b>Country:</b> Libya
<b>Location within Country:</b> Tripoli		<b>Professional Staff Provided by the Firm:</b>
<b>Name of Client:</b> -----		<b>No. of Staff</b> : 60
<b>Address:</b>		<b>No. of Staff Months</b> : 2135
<b>Start Date (Month/Year)</b> December 2005	<b>Completion Date (Month/Year)</b> June 2007	<b>Approximate Value of Services (in current USD)</b> : 11,030,000 /-
<b>Brief Description of Project</b>  The project is planned to provide the inhabitants of 13 Shabiyas / Municipality in the Tripoli Region with potable water of appropriate quality and quantity; with collection, treatment, disposal and re-use of sewage and storm water based on environmentally sound practices. The main objective of consultancy services is for the fact-finding, planning and design of the water supply, sewerage and storm water drainage network for 13 Shabiyas consisting of 119 settlements (35000HA). In addition, network of roads of 1500Km is also planned as a part of the Master Plan.		
<b>Details of Services</b> <ul style="list-style-type: none"> <li>• Review of preliminary reports</li> <li>• Establishing Control Grid Network by DGPS observations</li> <li>• Rectification of Quickbird satellite images of 0.6m resolution and preparation of Base Map</li> <li>• Planning the envisaged network of Water Supply, Sewerage, Storm Water and Roads.</li> <li>• Data Capture along the finalised corridor including Invert levels, water devices, areas for location of treatment plants, pumping stations.</li> <li>• Soil Resistivity Survey and analysis</li> <li>• Design of Water Supply, Sewerage, Storm Water, Accompanying Works and Roads.</li> <li>• Preparation of alignment and execution drawings.</li> <li>• Preparation of BOQ, Cost Estimates and Tender Documents.</li> </ul>		