WATER MANAGEMENT SOLUTIONS & APPLICATIONS FROM AN ENGINEERING POINT OF VIEW
ECG Overview

Sample Water Preservation Projects

Sample Water Treatment and distribution Projects

Sample Waste Water Treatment Projects
ECG is One of the Largest Engineering Firms in the Middle East and Africa

Introduction

- Founded in 1969
- Architecture & Engineering Multi-Disciplinary Firm
- Top 10 Design Firms in the MENA Region (Ref. ENR 2013)
- ECG Offices
  - Headquarter at Cairo, Egypt
  - Smart Village, Egypt
  - Alexandria, Egypt
  - Assiut, Egypt
  - Riyadh, Saudi Arabia
  - Abu Dhabi, UAE
  - Dubai, UAE
  - Al Ain, UAE
  - Kuwait, Kuwait
  - Doha, Qatar
  - Erbil, Kurdistan – Iraq
  - Khartoum, Sudan
  - Tripoli, Libya
  - Dar Es Salam, Tanzania
  - Kampala, Uganda
  - Nairobi, Kenya (virtual office)
  - Lanobre, France
Since its foundation, ECG has completed more than 2,030 projects in 29 countries, over 4 continents, including:

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<th>AFRICA</th>
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<th>NORTH AMERICA</th>
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<td>USA</td>
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ECG has a growing permanent staff of more than 2,000 people, including architects, planners, interior designers, landscape architects, civil, structural, geotechnical, electrical, mechanical, chemical, transportation and environmental engineers; geologists, scientists, economists and computer science specialists, accountants, financial analysts, drafters, technicians and a highly competent support staff.

In addition to the full time core staff, ECG maintains an active roster of over 1,000 experts and specialists in all fields of relevant importance to the firm. These experts are well known in their specialization and most of them are active members/researchers in national and international academic institutions.
# The Top International Design Firms

**The international design market is feeling the impact of global woes of the last two years, which can be seen from the results of ENR's Top International Survey.**

The ENR Top 225 International Design Firms generated $71.63 billion in design revenue in 2013 from projects outside their home countries, down 0.2% from $71.77 billion in 2012. They also had $72.32 billion in revenue from domestic projects in 2013, up 2.8% from $70.38 billion in 2012. The total 2013 design revenue for the group was $143.95 billion, up 1.3% from $142.15 billion in 2012.

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## How to Use the Tables

COMPANIES are ranked according to revenue for design services performed in 2013 in $ millions (**). Those with subsidiaries and where each firm worked outside of the U.S., see www.enr.com

**Firms not ranked last year. Some markets may not add up to 100% due to omission of "other" miscellaneous market category and rounding. NA - Not Available.**

KEY TO TYPE OF FIRM A-architect; E-engineer; EC-engineer-contractor; AE-architect-engineer; EA-engineer-architect; P-planter; O-other. Other combinations possible. Firms classified.

GENERAL BUILDING includes commercial building includes commercial buildings, offices, stores, educational facilities, government buildings, hospitals, medical facilities, hotels, apartments, housing, etc.

MANUFACTURING includes auto, electronic assembly, textile plants, etc.

POWER comprises thermal and hydroelectric powerplants, waste-to-energy plants, transmission lines, substations, cogeneration plants, etc.

TELECOMMUNICATIONS includes transmission lines and cables, towers and antennae, data centers, etc.

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## International Design Firms Ranking

<table>
<thead>
<tr>
<th>Rank</th>
<th>2014</th>
<th>2013</th>
<th>Firm</th>
<th>Type</th>
<th>2013 Intl Revenue in $ Mil</th>
<th>% of Total Rev.</th>
<th>Group Rating</th>
<th>Press</th>
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<td>142</td>
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Quality is our foundation of success …..

ECG Quality Management System

ISO 9001: 2008

- Identify problems related to the quality system
- Record & Report problems related to the quality system
- Recommend solutions to quality system problems
- Design solutions to quality system problems
- Verify that solutions were implemented
- Evaluate whether solutions were effective
- Only trained personnel are assigned
- Ensure managers have the resources they need to verify work
- Ensure internal auditors have the resources they need
- ECG Quality systems are reviewed and carried out on a regular basis.
- Documents and records are constantly maintained
- ECG Quality systems are reviewed to ensure that:
  - Quality system requirements are being met
  - Quality objectives are being achieved
  - Quality policy is being applied
Quality is our foundation of success …..

**Occupational Health and Safety Management System**

**OHSAS 18001 : 2007**

- Demonstrate that ECG meet all the requirements of the standard
- Establish an OH&S management system
- Implement, maintain and continuously improve an OH&S management system
- Assure its conformance against the OH&S policy
- Demonstrate such conformance to others
- Seek certification/registration of its OH&S management system by an external organization (Bureau Veritas)
- Make a self-determination and declaration of conformity with this OHSAS specification
ECG’s environmental performance run in a continuous improvement cycle

**ISO 14001 : 2004**

**Environmental Policy**
Top Management is committed to regulatory compliance, pollution prevention; and continuous improvement.

**Management Review**
Top management to review environmental performance, EMS performance, policy, priorities and objectives; and, recommend improvements.

**Planning**
Identify environmental interactions and significant aspects; identify legal and other requirements; and, develop environmental objectives, targets and the programs in which to achieve them.

**Checking**
Monitor and measure environmental interactions; evaluate compliance; establish a nonconformance, corrective action and preventative action system; maintain records; and perform periodic internal audits of the EMS.

**Implementation and Operation**
Define structure and responsibility; identify and complete training needs; establish communication procedures; document the EMS through policies, plans and procedures; establish document control; establish operational control; implement emergency preparedness and response.

Quality is our foundation of success ....
ECG Considers HSE as an integral part of Business

ECG Engineering Consultants Group is committed to maintain a safe, healthy and sustainable working environment wherever we operate. Everybody is responsible for safety.

Committed to Sustainability in Operations and Projects

ECG has been a member of the United States Green Building Council (USGBC) since 2010.

Leading the Architectural / Engineering firms in Egypt, ECG is the first Egyptian Architectural design firm to register a LEED project in Egypt.

ECG use in-house “LEED Green Associates” covering all engineering disciplines.
Value Engineering Practice

Value Added Services

ECG performs value Engineering practices using the in-house “Associates Value Specialists” covering all engineering disciplines
We cover the entire project cycle

Our multi-disciplinary approach provides our clients with the most efficient, integrated and cost effective designs.
### Main sectors served

<table>
<thead>
<tr>
<th>Buildings</th>
<th>Industrial / Oil &amp; Gas</th>
<th>Power</th>
<th>Transportation</th>
<th>Urban Development</th>
<th>Water &amp; Wastewater</th>
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<tr>
<td>Banks</td>
<td>Cement &amp; Steel plants</td>
<td>Gas and combined cycle power plants</td>
<td>Airports</td>
<td>Mixed-use projects</td>
<td>Urban Water and Wastewater</td>
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<td>Diesel power plants</td>
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<td>Manufacturing plants</td>
<td>Electrical Substations</td>
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<td>Water &amp; Wastewater Treatment Plants</td>
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<td>Healthcare</td>
<td>Lube oil blending plants</td>
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<td>Storage tanks, reservoirs and pump stations</td>
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<td>Oil pipelines</td>
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<td>Transmission lines</td>
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<td>Gas/oil separation plants</td>
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<td>Distribution systems</td>
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<td>Sewage and storm water collection</td>
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<td>Pumping station and force mains</td>
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Water Preservation
Sample Projects
مشروعات مكافحة التلوث في الصناعة بشركة الجلود المصرية
الانتهاء من مرحلة التنفيذ

سبق أن نشرنا في عدوى أكتوبر 1987 ويجوز 1988، ملخصاً عن مشروعات مكافحة التلوث في الصناعة بشركة الجلود المصرية بالسادات، بالقاهرة، ضمن مشروعات أخرى تم تنفيذها بالاشتراك مع أخرى للهيئة العامة للتصنيع في ستة منصات تتبع خمس شركات كبرى في مصر.

وتفهد هذه المشروعات إلى الاستعانة بأحدث الوسائل للتحكم في التلوث الناتج عن صناعة الجلود والذي يمثل في الخلاطات الصناعية والعروض والروائح الكريهة. ويعتبر علاج هذا التلوث ضرورياً لتوفر الظروف البيئية الملائمة للعاملين بالعاملين والمواقع المحيطة بها. وبالإضافة إلى ذلك يمكن الحصول على متعاطي عرضية ذات قيمة اقتصادية كبيرة من هذه الخلاطات وتدخل في كثير من الصناعات مثل صناعة الأحماض والملابس الجلدية والسوبر حوالة.

وفي هذا النطق أتى جمعة المهندسين الاستشاريين مرحلة التصميم للمشروعات الثلاثي البالغة شركة الجلود المصرية:

1- تجريد أحوال الرسب المرتبطة لكل مدببة ويشمل ذلك إنشاء روابط علوية ومolas متصلة على أحوال الرسب وذلك يعد روش وصف الغراء وصفاً بالخالصات المحمية للصائات، وطماحية للغاء رسوب وفارسات ملائمة للجلود.

2- إعادة تطوير وتأهيل محطة مكافحة التلوث الكبيرة بهدف إزالة الرواسب والعوالق.

ويتطلب أن أشتراعات مثلن لطيفة مكافحة التلوث الجلودي مع أفراد النائية، وتعريض الرسب والخطوات الملاحية، وصياغة النواة التكميلية في النباتات، وتعريض النباتات من خلال الخلاطات المكشوفة.

ومن الجدير بالذكر أن مرحلة التنفيذ للمشروعات الثلاثية السابقة قد أُجْبُرَت على الانتهاء، وجاري حالياً إجراء اعتبارات ب目的地 التشغيل استعداداً للاستحقاق النهائي.

نظام إضافة حمض الكحول
خزان الناقل ونظام الهواء
This project is one of the Industrial Pollution Control Projects presently implemented by ECG for the General Organization for Industrialization in six factories of five large industrial companies in Egypt. ECG has already accomplished the design phase of Low Emission Ammonium Nitrate Neutralisers Project of Semailco-Talkha.

The discharge of ammonium nitrate from the exhaust gas scrubbers serving existing neutralisers constitutes the major water pollution problem at the Semailco facilities. The contaminants of concern are ammonia and ammonium nitrate, which escape the neutraliser during the reaction of ammonia and nitric acid to be removed in the existing scrubbers.

To reduce product losses and wastewater loading, it was planned to install 2 x 600 ton/day low emission neutralisers and a new process control system. This provides flexibility for the operation of the existing and new neutralisers.

The scope of design work included detailed engineering of mechanical, electrical, structural, drainage works, piping systems, instrumentation and stainless steel storage tanks.

The engineering designs of the project are made in compliance with the International Standards and Codes. ECG computer and CADD facilities were used in the design and drafting of the structural works, piping systems and stress analyses.

The supply and erection phase of the different parts and equipment of the project has already started. The neutralisers have been supported on their steel structures erected on reinforced concrete pile caps. Piling was necessary to raise the soil bearing capacity at the site in order to resist the equipment loads and stresses.

The stainless steel storage tanks have been constructed, each with a storage capacity of 43 cubic metres. The fabrication and erection of the piping system, connecting the project units and the existing plant units, have almost been completed. Meanwhile, testing, precommissioning and start-up are being prepared.
River Nile Protection and Development Project

Funded by the Canadian International Development Agency (CIDA), the River Nile Protection and Development (RNPD) project aimed at achieving rational utilization of available resources, mitigation of side effects and increasing the efficiency and effectiveness of present use and future development of the River Nile Channel and its two branches, namely, Damietta and Rosetta.

The River Nile Protection and Development (RNPD) Project comprised various tasks and subtasks including:

- Preparing pre-feasibility studies, designs and tender documents for the optimum alternative concerning the following:
  - Protection of the Nile and its main structures from bed degradation and bank erosion.
  - Preparing an acceptable and implementable pollution control system.
  - Hydropower generation in existing and/or proposed barrages and head regulators.
  - River training and navigation improvements.
  - Utilization of surplus releases and flows that exceed consumption requirements.

- Development and implementation of computer programs for monitoring changes in river beds and banks, predicting the impact of new projects, and for pollution control.

- Studying and designing civil works required for stabilizing the river regime, navigable channel and river banks in critical areas upstream of Assiut Barrage. Also, designing the civil, mechanical and electrical works required for reducing the organic pollution in drained water to allow its re-use in irrigation.

- Implementing two pilot projects, one to stabilize the river banks and the other to treat drained water for re-use in irrigation purposes.

- Pre-feasibility study for the development of Naga Hammadi Barrage. The study aimed at investigating present conditions of the Barrage, and immediate maintenance needs to guarantee conditions service, in addition to providing conceptual design and cost estimates for rehabilitation works. The possibility of constructing a new barrage was also studied.

Client: Ministry of Water Resources & Irrigation
Location: Cairo, Egypt
Scope

- Providing technical assistance and equipment for the preparation of pre-feasibility studies, conceptual designs and tender documents for priority projects.
- Strengthening the institutions responsible for monitoring, understanding and predicting causes and effects of erosion and pollution.
- Implementing pilot projects in priority areas to test the feasibility of the river channel protection and the treatment of drained water for re-use in irrigation purposes.
- Scope also covered studies related to pollution control, hydro-generation from existing and proposed barrages, increase of river navigation, development of intermediate water storage, utilization of flash float flows and reduction of water spills to the sea.

Types of activities

Civil works
Project Name: Hydraulic Water Network  
Client: National Organization for Potable Water & Sanitary Drainage  
Location: El Obour City, Egypt

Project Overview

Hydraulic and detailed design of the water network for ElObour city:
- Target year Population = 626,000 capita
- WTP = 1 WTP total capacity 1,000,000 m³/day
- Network total length = 270 km
- Network Pipes Diameters = 100 – 1000 mm
- Water Tanks = 7 elevated tanks
- Transition Lines diameters = 6 (six) 1400 mm lines and 1 (one) 1200 mm line
- Total Length of transition Lines = 60 km
- Booster Pump station = 4 pump stations (total capacity of each pump station 550,000 m³/day)

Scope of Services

- Hydraulic Study of Existing Water Networks
- Hydraulic Study of Water Networks until Target Year
- Water Resources Study
- Detailed Design for all Proposed Works
- Preparing Complete Proposed Tender Documents
Hydraulic and detailed design of the water network for Markaz Mashtol ElSouk in ElSharkia governorate:

- Target year Population= 385,803 capita
- WTP= 1WTP total capacity 14,688m³/day
- No. of villages = 14 village in addition to Mashtol EL-Souk city
- Artesian water plant = 13 plant (average capacity of each one is 5,000m³/day)
- Network total length = 60 km
- Network Pipes Diameters = 100 – 600 mm
- Water Tanks = 3 elevated tanks
- Transition Lines diameters = 200 – 1100 mm

Scope of Services

- Hydraulic Study of Existing Water Networks.
- Hydraulic Study of Water Networks until Target Year.
- Water Resources Study.
- Detailed Design for all Proposed Works.
- Preparing Complete Proposed Tender Documents
The project aimed at raising the capacity of the southern part of Rod ElFarag Water Filtration Plant from 200,000 m³/day to 600,000 m³/day. ECG provided engineering services for the raw water intake pumping station, sedimentation and filtration tanks, and treated water pumping station to serve both the northern and southern parts of Rod ElFarag Plant. The construction cost is $120 million.

Scope of Services
- Concept Design
- Surveys and Soil Investigations
- Detailed Design
- Tender Documents and Tender Action
- Construction Management and Supervision
- Operation and Maintenance Manuals
ECG Overview

Sample Water Preservation Projects

Sample Water Treatment and distribution Projects

Sample Waste Water Treatment Projects
**Project Name:** Middle Egypt Water and Wastewater Component  
**Client:** Mongomry Watson Harza  
**Location:** Fayoum, Minia, and Beni Sueif, Egypt

<table>
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<th>Project Description</th>
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| The Middle Egypt Utilities project involved the upgrading and expansion of water and wastewater services in the Egyptian governorates of Fayoum, Minia, and Beni Sueif. ECG’s responsibilities included the assessment of existing conditions; identification of high-priority projects; completion of a privatization study, a first-stage investment program, and an implementation plan; in addition to the development of a long-term strategic plan. | ▪ Construction Management  
▪ Environmental Impact Assessment  
▪ Studies  
▪ Master Plan |

**Project Overview**
Project Name: Wastewater Design, Design Review & Supervision for Six Centers
Client: National Organization for Potable Water & Sanitary Drainage (NOPWASD)
Location: Kafr El Sheikh, Egypt

### Project Description

Detailed design and construction supervision for complete sanitary project for 28 village at 6 different centers in Kafr El Sheikh governorate. The project comprised approximately 120 Km of gravity pipes with diameters vary from 150 to 700 mm, and 100 Km of force mains with diameters vary from 150 to 700 mm. The project also included 28 pump stations and one wastewater treatment plant. The project scope also includes master planning for the sewage networks at Kafr El Sheikh governorate.

- Construction Cost = 60,000,000 EGP
- Pipes Diameters = 150 – 700 mm
- Network Length = 120 KM (Gravity Sewers)
- Forces Mains Length = 100 KM
- Total Population Served = 150,000
- Pump Stations = No/ 28 Total Capacity 290,000 m³/d
- WWTP = No/ 1 Total Capacity 45000 m³/d

### Scope of Services

- Preliminary Design
- Detailed Design
- Design Development
- Tender Documents
- Construction Supervision
- Construction Management
- Hydraulic Analysis
The project for deprived areas in Damietta Governorate including the following:

- Wastewater Network.
- Village Wastewater Collection System.
- Wastewater Treatment Plant.
- Extension of Wastewater Treatment Plant.
- Force mains, crossing.
- Pump Stations
- Construction Cost = 280,000,000 EGP
- Pipes Diameters = 150 – 500 mm
- Network Length = 260 KM (Gravity Sewers)
- Forces Mains Length = 60 KM
- Total Population Served = 600,000
- Pump Stations = No/30 Total Capacity 270,000 m³/d
- WWTP = No/12 Total Capacity 145,000 m³/d

Scope of Services

- Master Plan
- Concept Design
- Detailed Design
- Construction Supervision
- Construction Management
**Project Name:** Alexandria West Wastewater Treatment Plant  
**Client:** Alexandria General Organization for Sanitary Drainage (AGOSD) / USAID  
**Location:** Alexandria, Egypt

### Project Description

As part of the Alexandria Wastewater Program (Phase I), this project aimed at upgrading Alexandria West Treatment Plant to an average capacity of 186,000 m³/day. The project included improvements to existing treatment facilities and construction of new structures for the primary treatment of wastewater.

### Scope of Services

- Advising and assisting AGOSD in evaluating tenders and awarding equipment and construction contracts.
- Performing construction management and supervision services during the construction phase.
- Training AGOSD personnel on the operation and management (O&M).
- Preparing O&M Manuals, assisting in starting up and initial operation of the project.
**Project Name:** Alexandria *East* Wastewater Treatment Plant  
**Client:** Alexandria General Organization for Sanitary Drainage (AGOSD) / USAID  
**Location:** Alexandria, Egypt

### Project Description

As part of the Alexandria Wastewater Program (Phase I), this project aimed at upgrading Alexandria East Treatment Plant to an average capacity of 410,000 m³/day. The project included improvements of existing treatment facilities and construction of new structures for the primary treatment of wastewater.

### Scope of Services

- All necessary survey, studies, preliminary and detailed designs, tender documents and cost estimates
- Advising and assisting AGOSD in evaluating tenders and awarding equipment and construction contracts
- Performing construction management and supervision services during the construction phase
- Training AGOSD personnel on the operation and Maintenance (M&O) of the project
- Preparing O&M Manuals, assisting in starting up and initial operation of the project.

### Project Overview

- [Image of treatment plant](image1)
- [Image of construction site](image2)
USAID Egypt assisted the Supreme Council of Antiquities to develop a program to mitigate the effects of rising groundwater in the vicinity of Great Sphinx as well as the pyramids plateau, an important UNESCO world heritage site. The main objective of the project was to identify the sources and quantity of groundwater to be mitigated and to design a system that will protect the antiquities from future degradation due to high groundwater.

### Project Overview

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#### Project Description

USAID Egypt assisted the Supreme Council of Antiquities to develop a program to mitigate the effects of rising groundwater in the vicinity of Great Sphinx as well as the pyramids plateau, an important UNESCO world heritage site. The main objective of the project was to identify the sources and quantity of groundwater to be mitigated and to design a system that will protect the antiquities from future degradation due to high groundwater.
PUMPING STATIONS UPGRADE
PUMPING STATIONS UPGRADE
What is SCADA?

- Supervisory Control And Data Acquisition

أنظمة المراقبة والتحكم الاعرفالي
SCADA system advantages:

- SCADA system utilization will allow large panoramic monitoring and control of the water structures and gates along the river Nile and its canals.
- Operators to monitor the entire distribution system from one location.
THANK YOU

شكراً جزيلاً لحضوركم