

QUALIFICATION

DOCUMENT

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International IGM s.a.r.l.

QUALIFICATION DOCUMENT

I - INTRODUCTION

International IGM s.a.r.l. is an international company specializing in Geotechnical engineering. It started in the Lebanese market as “IGM” in 1998. As the company successfully grew over the years, it evolved into “International IGM” because of its increasing involvement in projects abroad. The new company and management team started officially in October 2003.

Today the company has presence and offices in Lebanon, Nigeria, France, China, and notably in the US since 2009 – see appendix A for a list of US projects.

While *I*IGM started US operations with investigations and designs, the objective of the US branch is to provide design-built and turn-key solutions, in particular in the renewable energy field. To that effect we are proud to have joined forces and partnered up with EPE, Electric Power Engineers. EPE is a Texas-based company with over 20 years of experience in renewable energy, and has clients and projects in the US and worldwide.

I.G.M. stands for the Institute for Geotechnics and Materials (*Institut de Géotechnique et Matériaux*). The main idea was to create a focal institute able to handle major projects and solve tough problems related to geotechnical and materials engineering.

The institute is presently managed by **Dr. Marc Ballouz**, Ph.D. Eng’g graduating from the USA (Texas A&M University). Dr. Ballouz is a lecturer at the Lebanese University (UL) and Lebanese American University (LAU). He has released numerous publications in the past and continues to do. He plays active and leading roles at ISSMGE, the International Society of Soil Mechanics and Geotechnical Engineering.

*I*IGM has grouped its operations in five different divisions:

- Investigation
- Design
- Contracting
- Research & Education
- Software

These divisions are working in parallel and following the **ISO** recommendations for future certification. The aim of *I*IGM is to satisfy its clients by providing top quality work delivered on time.



II - GENERAL INFORMATION

Currently, the company is counting on a staff of about 35 people, a laboratory fully equipped for testing soils and materials, a maintenance yard with manufacturing capabilities, and a sizable fleet of specialized equipment for piling, micropiling, high pressure grouting, anchoring, nailing, shotcreting, soil investigation, in-situ testing, quality control, dilapidation surveys, coring, etc...

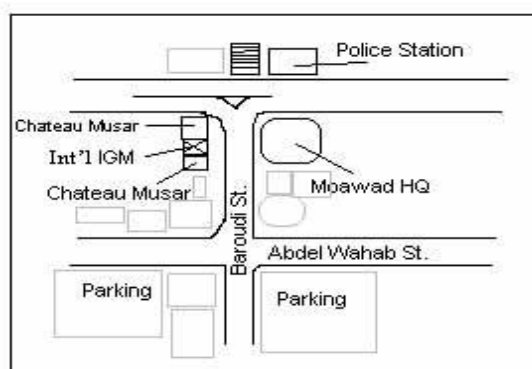
The official status is summarized as follows:

II-1- REGISTRATION :

Site : Beirut
Date : 26 August, 2003
N# : 1001671

II-2- NAME & ADDRESS

International I.G.M. s.a.r.l. : International Institute for
Geotechnics and Materials
Main Branch : IIGM
Int'l Institute for Geotechnics & Materials
Achrafieh, Baroudi St., Sara Bldg.
Beirut, Lebanon
Tel : 01-217825 / 6 , Fax : 01-217826
e-mail : igm@i-g-m.com
mballouz@i-g-m.com
Web Page : www.i-g-m.com



Other branches are expected to open soon.

II-3- REPRESENTATIVES

Dr. Marc Ballouz, Ph.D. Eng'g	Director, General Manager, Partner
Mrs. Hala Nasr, M.Sc. Eng'g	Director, Partner
Mr. Roy Abi Chedid	Lawyer

III - BANK REFERENCE

BLOM Bank – Banque du Liban et d’Outre Mer

General Director : Mr. Habib Rahal

Director : Mrs. Salma Achkouti
Rmeil Branch
Tel : 01-567140/1/2

CREDIT Bank

General Director : Mr. Fredy Zreik

Director : Mr. Joseph Salem
Freeway Branch
Tel : 01-501600

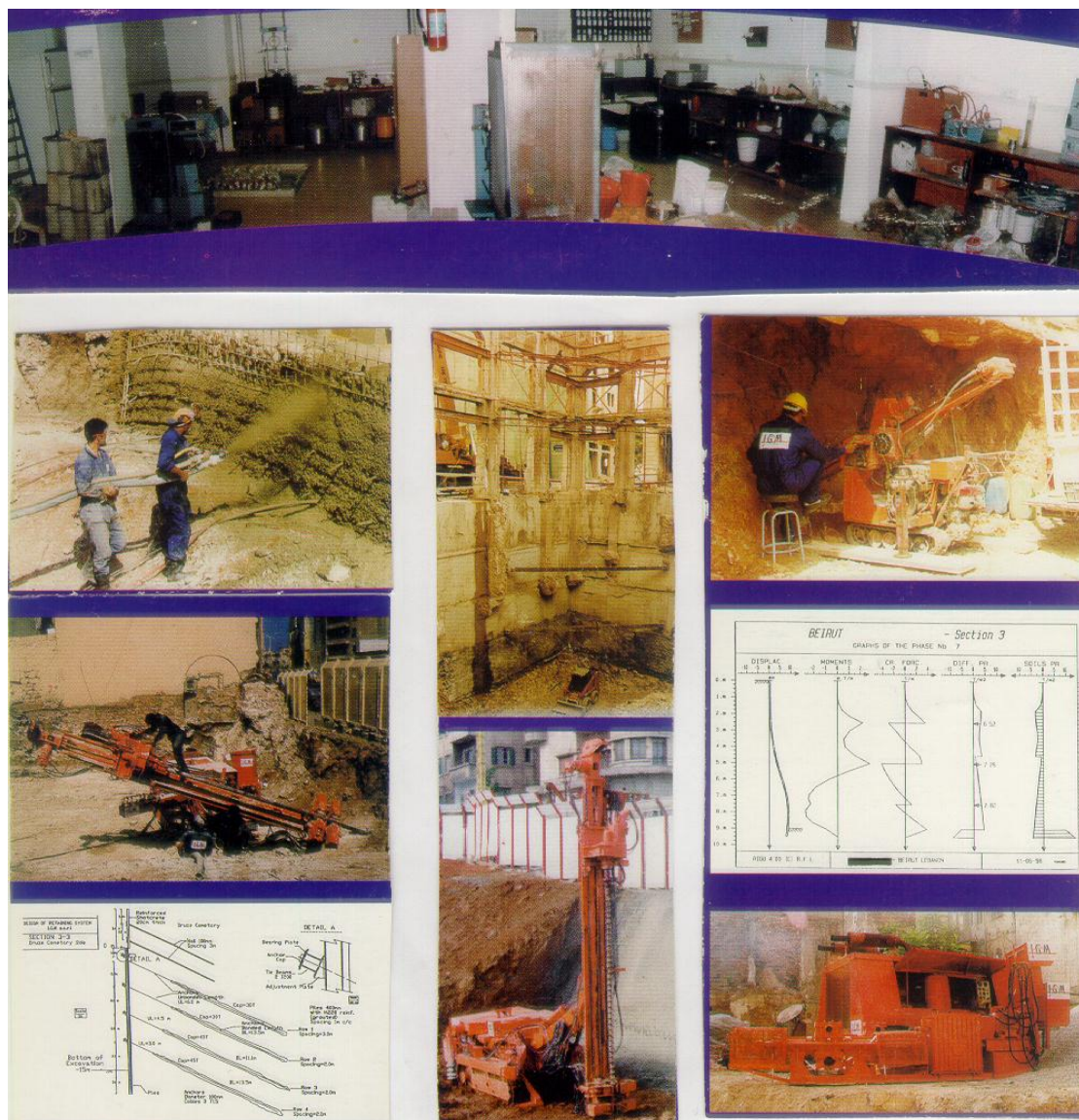
IV - TYPE OF SERVICES

The services offered by **IGM** are numerous covering most of the needs related to geotechnical and materials engineering.

As part of its organization, IGM offers these services through its five divisions:

- I. Investigation
- II. Design
- III. Contracting
- IV. Research & Education
- V. Software

Each Division is presented in the following chapter



V - INVESTIGATION DIVISION

The investigation division is the most active of all. Its services include:

- Soil Exploration
- In Situ Testing
- Laboratory Testing for Soils
- Laboratory Testing for Materials
- Quality Control
- Non-Destructive Testing (PIT + Schmidt + ...)
- Dilapidation Surveys
- Instrumentation & Monitoring

The major services are listed in the following table.



LAB. INVESTIGATION

AGGREGATES

Specific gravity
Unit Weight
Moisture content / Water absorption
Finer than #200
Organic impurities color method
Sieve analysis dry
Sieve analysis wet
Sand Equipment
Los Angeles Abrasion
soundness test (one cycle)
Petrographic analysis
Angularity of particles
Clay lumps and friable particles
Potential alkali reactivity

SOILS AND ROCKS

Specific gravity
Unit weight
Moisture content / Water absorption
Shrinkage limit
Finer than #200
Sieve analysis dry
Sieve analysis wet
Sieve and hydrometer analysis
Atterberg limits
Modified Proctor Compaction test
CBR test (soaked 4 days at OMC)
Unconfined compression test
Unconfined compression test
(with stress / strain data)
Direct shear test
Chloride content
Sulfate content
Point load index
Consolidation test (5 cases)

CEMENT AND CONCRETE

Compression test (cylinder / cube)
Compression test (other)
Setting time of cement
Expansion test
Flexural strength of beams, tiles, curbstone

Slump test
Air content of fresh concrete
Calibration of testing machine

ASPHALT AND BITUMEN

Penetration test
Flash point
Loss on heating
Ash content of bitumen
Bitumen extraction test
Marshall test (one mold)

STEEL

Tensile strength of steel bars
Diameter & deformations measurement
Bending test

WATER AND AIR QUALITY

Turbidity, PH
COD, BOD
Air quality (Sox, Nox, CO, Particulates,...)
Chemical Analysis

ARCHITECTURAL MATERIALS FINISHING PRODUCTS

ANY OTHER TESTS COULD BE DISCUSSED

SITE INVESTIGATION

Schmidt hammer
Concrete Coring
Steel Rebar Locator
Asphalt Coring
Field Density Measurement
Straight Edge – Pavement Micro-profile

PIT Pile Integrity Tester
Drilling in Soil with in-situ SPT & ISST
Drilling in Rock with RQD & TCR
Test Pits
Plate Load Test
Static Load Tests (vertical & lateral)

VI - DESIGN DIVISION

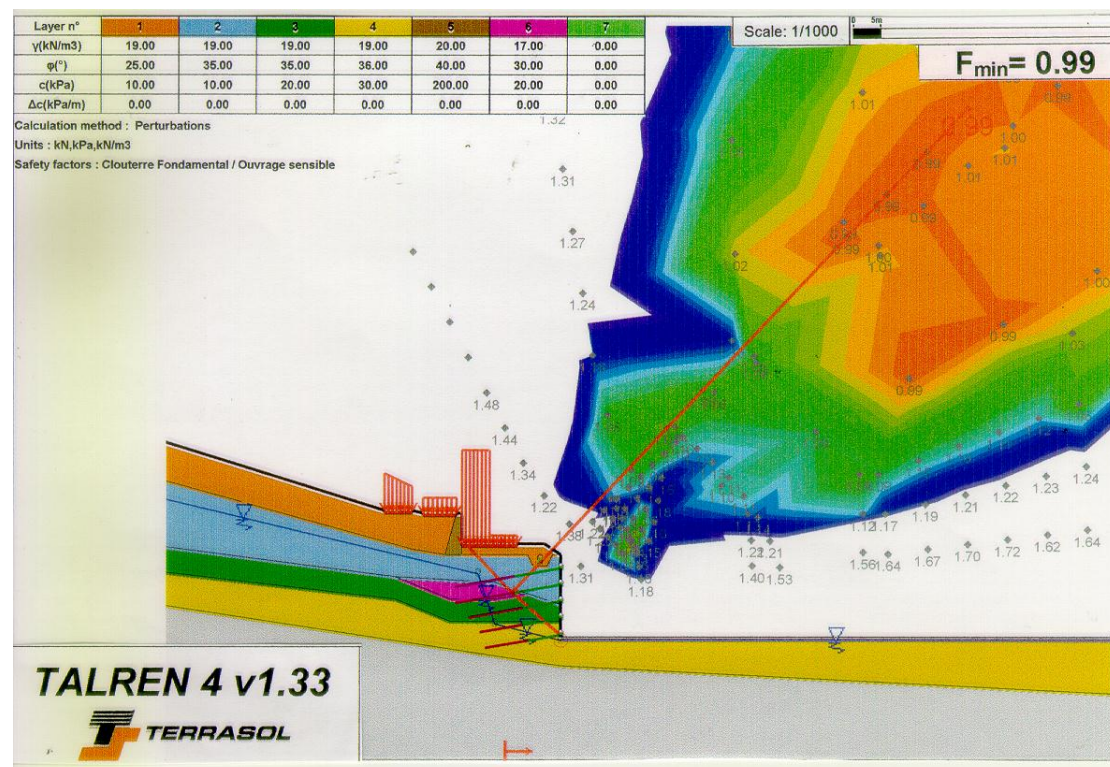
We'll design it to work right the first time.

The design division is headed by **Dr. Marc Ballouz**. It is counting on a highly qualified team of engineers (refer to chapter X). In addition, a well organized (on a database) library with old and new books, journals, reports, videos, magazines, and software. The library supplies our design team with the necessary tools to achieve the most adequate designs that is suitable for the project in question.

PC (IBM compatible) computers with the latest softwares such as; RIDO, TALREN, GRAN, ARCH/EFFEL, TRENCH, MB DESIGN, etc... are used by our team. Some of these are developed or modified in house (refer to chapter IX – Software Div.).

The services offered by this division include but are not limited to the following :

- Foundation Systems
- Retaining Structures
- Shoring Systems
- Slope Stability
- Underpinning
- Soil Improvement
- Materials Mix Designs
- Confinement & Environmental Geotechnics
- Optimization
- Structural Evaluation & Strengthening (new)



VII - CONTRACTING DIVISION

The most important division within the IGM company. It contributes by itself to about 80% of the total turnover. This division has pushed aggressively in the market to become in less than 3 years one of the leading specialized geotechnical contractor in Lebanon.

It comprises the majority of IGM's equipment and material, and is employing a large number of personnel & technicians.

This division offer services that include but are not limited to :

- Piling
- Diaphragm Walls
- Micropiling
- Anchoring
- Nailing
- Shotcreting
- Grouting
- Structural Strengthening using CFRP (new)



VII - RESEARCH & EDUCATION DIVISION

This division has a very important role on the Lebanese academic level. The link between the different engineering schools and the industry is close to non-existence. IGM is trying to establish some kind of relationship by promoting seminars, encouraging research, and teaching young engineers how to put their talent to work.

One of this division's achievement was the technical seminar entitled "Behavior of a Full Scale VERT Wall in Sand" by Dr. Jean Louis Briaud that was held on August 24, 1999 at Hotel Alexandre Achrafieh. Dr. Briaud is a professor at Texas A&M University in USA and he was invited in the summer of 1999 by IGM to present this seminar. Dr. Briaud has been very kind to come visit us in Lebanon, and very generous to give his lecture free of charge.

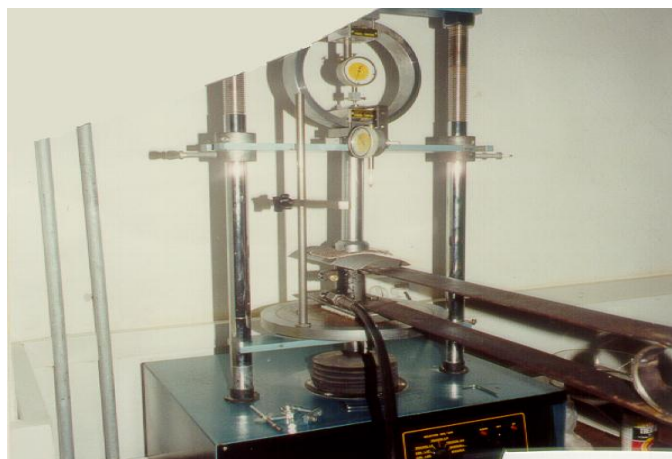
One of the achievements in this division was the invention of the ISST (In-Situ Shear Test) which is directly done on site and determines in a relatively precise manner the main soil properties such as c (cohesion), ϕ (angle of friction), E (elastic modulus), and G (shear modulus). IGM's Investigation Division is currently utilizing this new test where accurate soil data is needed. The results of the ISST research would soon be published, adding one more publication to the existing IGM publications (refer to Appendix C)

Full scale testing on micropiles embedded in rock led to new discoveries in this field that will soon be published at the Lebanese University conference this year, May 2004.

Lately, strengthening of concrete with CFRP (Carbon Fiber Reinforced Polymers) was tested in columns and beams with very interesting results. Just one layer added to a 5m long rib improved its behavior by 20%.

This division offer services that include but are not limited to :

- Research
- Short Courses
- Seminars
- Training & Workshops
- Publications



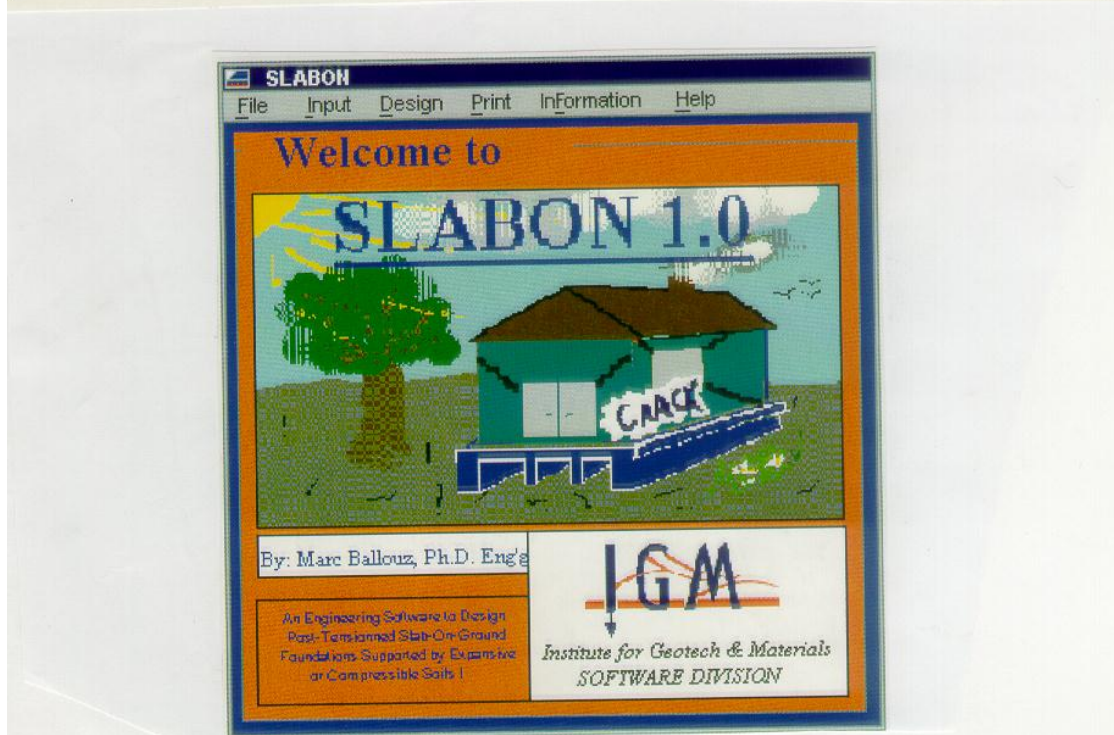
IX - SOFTWARE DIVISION

In our opinion, no company should step in the 2nd mentioned without the support of a software division.

Presently, The role of this division is mainly supportive to the other divisions. Some of software developed in house, such as SLABON and GR-AN are already released in the market.

The activities and services of this division include but are not limited to:

- Software Development
- Internet Links
- Search latest computational development in the field
- Web Page Domain: [WWW.i-g-m.com](http://www.i-g-m.com)



X - KEY PERSONNEL

X-1- List of Engineers

Name	Education	Years of Experience	Job Description
Marc Ballouz	Ph.D. Civil Eng'g Geotechnical.	19	Partner, Director (see Appendix C)
Hala Nasr	M.Sc. Electrical Eng'g Power	14	Partner, Director
Charles Radi	M.Sc. Civil Eng'g Structural	24	Branch Manager, USA
Pierre Nahhas	B.E. Civil Eng'g. UL	12	Project Engineer
Elias Imad	Civil Eng'g IPNET	8	Operation's & Lab Manager
Rachid Aad	Mechanical Eng'g	38	Yard Manager
Toni Naddaf	Technical Eng'g License	5	Laboratory Technician
Mary Anne Reese	M.Sc. Civil Eng'g Materials.	11	Part Time Engineer
Ghassan Akrouh	B.E. Civil Eng'g. UL	3	Design Engineer

X-2- List of Technical Staff

Name	Education	Years of Experience	Job Description
Joumana Ziadé	Accounting Technical Degree	7	Administrative Accountant
Hanady Sarrouf	M.B.A Management	1	Administrative Assistant
Charbel Zgheib	Baccalaureate + Technical Degree	9	General Foreman
Naji Aoun	Technical Mechanic	33	Chief Mechanic
Krikor Klouchi Bachi	Technical Degree	29	Chief Driller – Foreman
Bachir Mrad	Baccalaureate + Technical Degree	9	Procurement & Logistics
Mohammad Naim	Technical Degree	18	Specialized Operator – Foreman
Yazen Assaad	Baccalaureate	11	Driller – Technician – Foreman
Abdallah Younes	Secondary School	7	Operator – Technician

XI - LIST OF EQUIPMENT

Type	ID	Qty	Made in	Description	Condition
Vehicles	Nissan	1	Japan	Pick-up truck	Excellent
	Daihatsu	1	Japan	Large Pick up truck	Excellent
	VW	1	Germ.	Van	Good
	Suzuki	1	Japan	Jeep 4x4	Good
	Hyundai	1			Excellent
	Rapide	1	France	Small Van	Excellent
Drill Rigs	SoilMec R10	1	Italy	Piling Rig (1.5m diameter)	Excellent
	C6	1	Italy	Hydraulic Drill Rig on Crawlers	Excellent
	Atlas	1	Italy	Hydraulic Drill Rig on Crawlers	Excellent
	Liebherr	1	Germ	Hydraulic Drill Rig on Crawlers	Excellent
	Krupp	1	Italy	Hydraulic Drill Rig on Crawlers	Good
	Apafor 22	1	Italy	Hydraulic Drill Rig on Crawlers	Good
	IM -100	1	(IGM)	Hydraulic Drill Rig	Excellent
	Accessories	-	-	Augers Tubes Drilling Bits and Tricones, SPT samplers Shelby tube samplers, Core T2 barrels	-
Excavation	CAT212	1	Germ	Backhoe Excavator + JackHammer	Excellent
	Liebherr	1	Germ	Backhoe Excavator on tract	Good
	Komatsu	1	Japan	Wheel Tract Loader	Excellent
Crane	Cole	1	Germ	Telescoping Crane – 20m/7T	Good
Comp- ressors & Hammers	Mission	2	U.S.A.	4" Diameter Hammer	Good
	Ing. Rand	2	U.S.A.	6" Diameter Hammer	Good
	Detroit	1	U.S.A.	Compressor 650 cfm	Good
	Rolce Royce	2	U.K.	Compressor 600 cfm	Good
	I	2	Italy	Compressor 180 cfm	Excellent
Pumps & Mixers	Bunker	2	Italy	Shotcrete (Wet mix) Pumps	Excellent
	Bunker	2	Italy	Hydraulic Power Packs (1 Electr. + 1 Diesel)	Excellent
	Clivio	1	Italy	Turbomixer	Excellent
	Clivio	1	Italy	Stirrer	Excellent
	Clivio	2	Italy	Grouting Pump- High Pressure 80 bars	Excellent
	Barracuda	1	Italy	Large Capacity Mixer + Pump – 20 bars	Excellent
	Packers	2	Italy	For High Pressure Grouting	Excellent
Pumps	Mixer & Pump	1	Lebanon	Local	Working

& Mixers	Concrete Mixer	1	Lebanon	Electric Concrete mixer	Good
Generators	Perkins	1	U.K.	Generator – Power supply 60 KVA	Excellent
	Honda	1	Japan	Generator – Power supply 4 KVA	Excellent
Miscellaneous Machines	Set of Site Setup	1	-	6 Site Offices and Containers for Site+Accessories+Furniture	Good
	PIT	1	U.S.A.	Pile Integrity Tester	Excellent
	Enerpac	1	U.S.A.	Static Load Test setup & loading beam	Good
	Enerpac	2	U.S.A.	Enerpac 2x50=100T	Excellent
	W.F.	1	U.K.	Hydraulic Power Pack (Elect) 10 L	Excellent
	Enerpac	1	U.S.A.	Hydraulic Hand Pump	Excellent
	Deydeium	1	Germ	Coring machine	Excellent

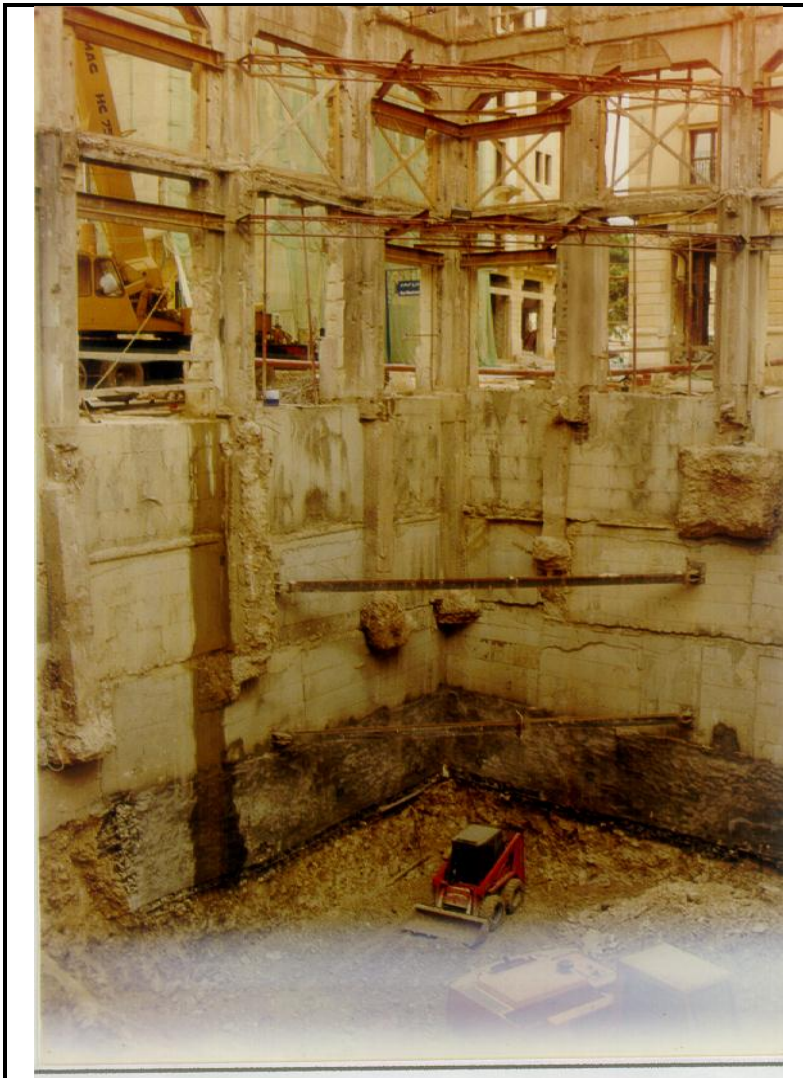
Fully equipped lab for testing construction materials (concrete, asphalt, steel, soils, rocks) including:

- ◆ 10 T Wykham Farrance-Straight Edge rolling beam
- ◆ Wykham Farrance-Testing Frames : 200T ; 50T ; 5T
- ◆ Wykham Farrance-Los Angeles Machine
- ◆ Wykham Farrance-Centrifuge for Asphalt Extraction
- ◆ Sets of Sieves (2) + Atterberg Apparatus

XII - REFERENCE PROJECTS

***PLOT 131 – SOLIDERE –
(Sept. 1997 – Oct. 1997)***

Client	: BATITEC
Consultant	: RODOLPHE MATAR
Quality Control	: VERITAS
Main Contractor	: BATITEC



PLOT 131 is an old existing building on Foch street in the Beirut central district. The project consists of creating 3 new basements under, and a new structure within the 4 sided I that had to remain intact.

The soil is a sandy fill (8m) on top of a marly formation. The water was abundant and perched on top of the marl.

ID Number : 97-502

The **IGM** team proposed to use the underpinning by micropiles technique. The solution proved to be the fastest and least expensive method.

Micropiles (6" in diameter) were installed around the perimeter under the arches of the I. The average depth was 17m. The micropiles were tied by a perimeter beam that grabbed the existing columns for the load transfer mechanism.

SUMMARY OF WORKS

- 500 l.m. of micropiles.

**BSAT SUPERMARKET – AABRA –
(Feb. 1998 – March 1998)**

Client	:	Mr. YEHIA BSAT
Consultant	:	RODOLPHE MATAR
Main Contractor	:	EDRI



ID Number 98-503

The **BSAT SUPERMARKET** is a relatively large project in Saida Region. The project consists of 4 basements and 4 upper floors.

The soil is a lightly fractured limestone with marly inclusions.

IGM intervened when the client asked to add an extra basement to the originally 3 planned ones. Anchors were installed against the existing perimeter piles.

SUMMARY OF WORKS

- 240 l.m. of high capacity Anchors.

LEBANESE ORDER OF PHYSICIANS – HEADQUARTERS –
(Dec 1998 – Oct 1999)

Client : **Lebanese Order of Physicians (LOP)**
Consultant : **ERGA Group**
Quality Control : **VERITAS**
Main Contractor : **C.A.T.**



ID Number 99-505

The **LEBANESE ORDER OF PHYSICIANS** project consists of 6 basements and 7 upper floors. The site is surrounded by 2 major roads and old residential buildings – high risk.

The terrain is sloping. On one side the excavation to be supported is 27m deep!

The soil is mainly a clayey sand (from the +9m to -6m) on top of a very stiff gray clay. The Clay includes intermittent shale seams & layers. The water is abundant perching on top of the clay. The excavation reaches the (-18m) elevation; That is 15m below the water level!

I.G.M. proposed a mixed solution. Nailed and Anchored shotcrete on the top portion (0 to +9m) & anchored piles (0 to -18m) on the lower portion. The piles are tangent (40cm diameter, 21m deep) cased at top and anchored by 4-5 rows of high capacity anchors. The Anchors are about 13-20m in length and tensioned to 45T against a reinforced concrete beam. The anchors were installed using the **IRS system** allowing repetitive and selective injections. Grouting in the top sandy portion was done to lower the water inflow to pumpable levels.

SUMMARY OF WORKS

- 8000 l.m. of Piles (40cm Diameter , Depth 21m).
- 3500 l.m. of High Capacity Anchors (13m to 20m)
- 1500 l.m. of Nails (length from 10m to 12m).
- 500 l.m. of Anchors (length from 11m to 13m).
- 1500 l.m. of Tie beam
- 1200 m² of shotcreted area
- 50 m³ of grouting.
- 44000 m³ of excavation.

HARBOR DRIVE BUILDING – GEMMAYZEH –
(July 1998 – Sept. 1998)

Client	: CHEKERBUILD
Consultant	: A.C.E.T.
Supervision	: Mr. Nicolas Ghanem
Main Contractor	: CHEKERBUILD s.a.r.l.



ID Number 99-506

HARBOR DRIVE BUILDING is a commercial building in the Saifi area of Beirut which consists of 5 basements and 9 upper floors. The excavation extends down to 14m below grade. The area of the project site is about 600m².

The Soil is Fill Sandy Clay 6m on top of a hard shale.

The Surrounding is a high risk including 3 old buildings medium weight with a main traffic road.

I.G.M. proposed a 15cm shotcrete wall retaining the top fill by 2 rows of anchors. For the first row of anchors, the distance between anchors is 2.5m and the total length of the anchor is 14.5m. For the second row of anchors, the distance between anchors is 3m and the total length of the anchor is 12m.

SUMMARY OF WORKS

- 900 l.m. of Anchors (length from 12m to 15m) with steel tie beam.
- 1000 m² of shotcreted area.
- 10000 m³ of excavation.

WEHBE BUILDING – SASSINE SQUARE –
(March 1999 – April 1999)

Client : **Mr. TONY WEHBE**
Consultant : **ERGA GROUP**
Main Contractor : **FUNDAMENTALS**



ID Number 99-508

WEHBE BUILDING is an existing building on Sassine Square. The Client wanted to excavate under the foundation of the existing building for constructing 1 extra basement. Counting on this underpinning operation. The final foundations of columns would be constructed. The structural skeleton was strengthened and 2 extra floors were added on top. The soil is a 20ensio fractured limestone.

I.G.M. proposed a solution based on underpinning with micropiles (about 12m length) under the existing footings for retaining the existing building. Once, the micropiles are drilled and grouted the excavation works start by phases. The micropiles are braced against buckling after each phase of excavation (1.5m deep).

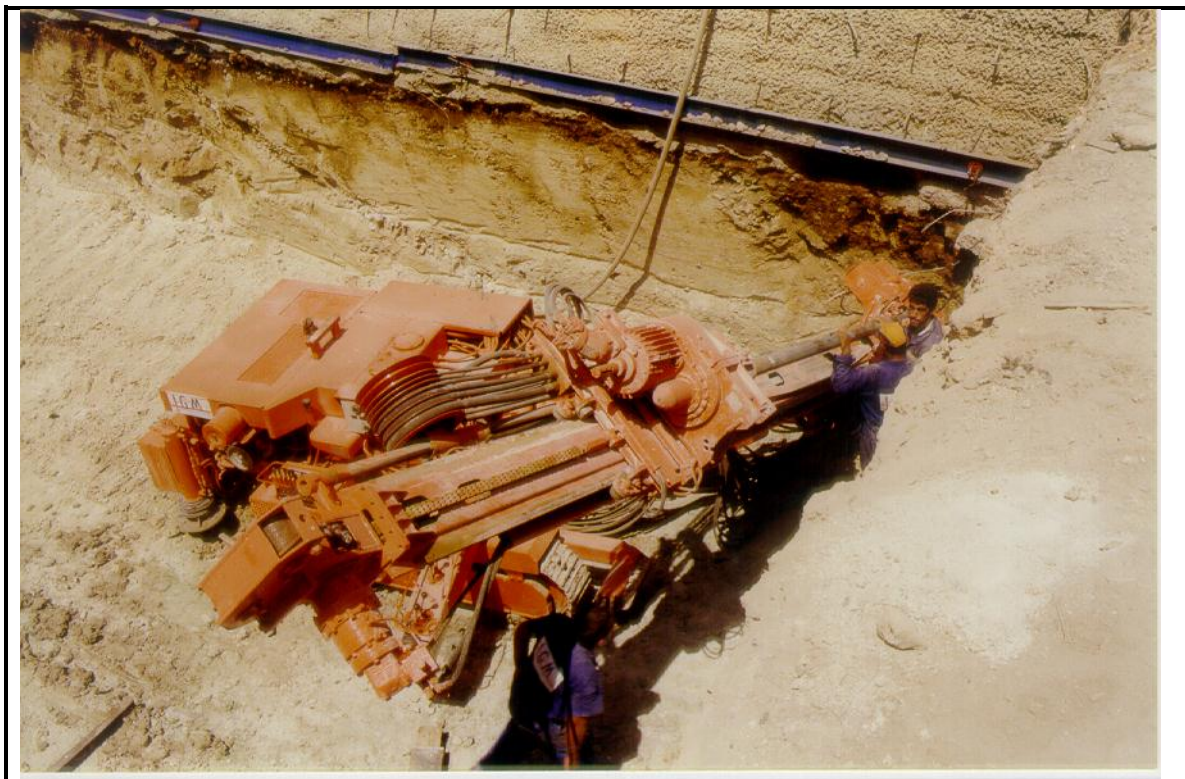
The micropiles act as columns in the excavated portion and as foundation piles in the soil. New footings and columns would be installed. Non shrink grout is used between the new and old columns, where the load transfer mechanism takes place in order to minimize unwanted displacements.

SUMMARY OF WORKS

- 500 l.m. of micropiles
- Supervision

HARBOR TOWER – ACHRAFIEH –
(April 1999 – May 1999)

Client	: Mr. CHAWKY FAKHRY
Consultant	: RODOLPHE MATAR
Main Contractor	: ENTREPRISE C. FAKHRY



ID Number 99-509

HARBOR TOWER is a commercial building in the Saifi area of Beirut which will consist of 5 basements and 8 upper floors. The excavation extends down to 14m below grade. The area of the project site is about 400m².

The Soil is Fill Sandy Clay 5m on top of a hard shale.

The Surrounding is a high risk including 2 old buildings medium weight with a main traffic road.

I.G.M. proposed 2 rows of anchors supporting the top fill by tensioning against a cast in place reinforced concrete wall. For the first row of anchors, the distance between anchors is 3m and the total length of the anchor is 14.5m. For the second row of anchors, the distance between anchors is 3m and the total length of the anchor is 12m.

SUMMARY OF WORKS

- 750 l.m. of Anchors (length from 12m to 15m) with steel tie beams.

CLINIQUE DU LEVANT – SIN EL-FIL –
(May 1999 – Jul 1999)

Client	: Dr. JEAN MAALOUF & Dr. EDOUARD HADDAD
Consultant	: Mr. JOSEPH MAALOUF
Main Contractor	: M.C.C.



ID Number 99-511

The **CLINIQUE DU LEVANT** project is a new specialized hospital to be built. The building has eight full basements and a narrower ninth one. The excavation will then extend 27m below grade.

The surrounding is empty plots with low risk and light traffic.

The soil is a 22ensio limestone, slightly fractured.

The solution proposed by **IGM** consists of piles diameter 50cm installed every 2m behind the excavation limit. They are only temporary structures that will be horizontally supported by 3 rows of anchors. Each row of anchors is tensioned against a steel frame tying 2 piles. The solution was optimized by implementing a zig zag anchoring formation.

SUMMARY OF WORKS

- 2600 l.m. of Piles (50cm Diameter , Depth 20m) with HEB30 steel tie beam.
- 3000 l.m. of Anchors (length from 15m to 18m).
- 250 l.m. of Nails (length from 10m to 12m).
- 300 m³ of shotcrete.

UNIVERSITE LA SAGESSE – TEHOUITA –
(Sept. 1999 – Oct. 1999)

Client	: St. PAUL DE LA SAGESSE UNIVERSITY
Consultant	: RAPHAEL & AGOUSTINE
Main Contractor	: M.A.N.



ID Number 99-515

The **UNIVERSITE St. PAUL DE LA SAGESSE** project is a new University to be built in the Tehouita area. The area of the project is about 7000 m². The excavation will extend down to 10m below the street level. Hence, a retaining system is necessary to achieve this excavation.

The soil is a sandy clay. On one side of the site the top soil (4m) is a gravelly river deposit.

I.G.M. proposed a solution optimized by sloping the top 4 meters. The shoring system consists of a 15cm shotcrete wall retained by 2 rows of nails.

The length of The Nails is 11m. Where the top gravelly layer was encountered, nails driven by percussive hammer were added.

SUMMARY OF WORKS

- 1000 l.m. of Nails (10m length).
- 2500 m² of shotcreted area.

AZZI BUILDING – AWKAR –
(Feb.2000 – March2000)

Client : **Mrs. Lamia Azzi**

Design/Build : **IGM sarl**



ID Number 00-503

AZZI BUILDING had a major problem since failure had occurred in the shoring system that was installed by another contractor prior to IGM's arrival. The adjacent building was seriously damaged and could not tolerate any extra movements. IGM designed and executed the new shoring system to retain a 7m deep excavation next to the building in distress.

The Soil is Sandy with active properties and zero cohesion (post failure).

The Surrounding is a high risk including 2 old buildings medium weight with 1 main traffic road and 1 access road.

I.G.M. proposed a 15cm shotcrete wall with vertical micropiles and 2 rows of horizontal active anchors. The distance between anchors is 2.5m and the total length of the anchor is 13m.

SUMMARY OF WORKS

- 200 l.m. of micropiles – 4" steel tubes
- 250 l.m. of Anchors (length from 12m to 15m) with steel tie beams.
- 210 m² of shotcreted area.
- 2000 m³ of excavation.

***Clover Village – Rabieh –
(March 2000 – May 2000)***

Client : **BANK SARADAR**
Design/Build : **IGM s.a.r.l.**
Supervision : **CCI s.a.r.l**



ID Number 00-506

CLOVER VILLAGE consists of a residential building constructed within a rocky excavation 20m deep. In winter times the exposed surfaces (about 1800m²) of the rock cliff experienced spalling failures of rocks and cobbles that jeopardized the safety of the residences below.

The Soil is a fractured limestone formation.

I.G.M. proposed a 15cm shotcrete wall at the top portion where the rock is highly fractured, and a rock fall barrier with a galvanized wire mesh nailed to the rocky surface. The distance between anchors is 1m with a length of 1.6m. The accessibility during construction was extremely difficult, which renders the execution of this project an important achievement.

SUMMARY OF WORKS

- 500 m2 shotcrete
- 1600 m2 Rock Fall Barrier (Galvanized wire mesh with tie beams)
- 600 l.m. Nails

***Tager-DAMMOUS Building – Ashrafieh –
(Aug.2000 – Oct. 2000)***

Client	: Mr. Anis Tager
Design/Build	: IGM s.a.r.l.
Supervision	: Mr. Anis Tager



ID Number 00-509

TAGER-DAMMOUS Building consists of a residential building constructed within a confined area surrounded by adjacent structures and roads. The excavation of this building required the installation of an efficient shoring system with a limited budget. The soil is a calcareous shale (marl) formation with some soft areas.

I.G.M. proposed a 15cm shotcrete wall (with vertical micropiles at selected locations). The excavation was only 5 meter deep except at the west side where an existing 3m wall had to be retained also (total depth =8m). Active anchors and passive nails in the horizontal direction were installed to maintain equilibrium in the shoring system. Anchors were tensioned against steel waler beams.

SUMMARY OF WORKS

- 300 m2 shotcrete
- 150 l.m Micropiles
- 240 l.m. Anchors
- 270 l.m. Nails
- 2500 m3 Excavation

**HITACHI HQ Building – Bauchrieh –
(March 2001 – May 2001)**

Client	: Mr. Spiro Papasarandis
Design/Build	: IGM s.a.r.l.
Supervision	: Mr. Spiro Papasarandis / Mr. Georges Sakr



ID Number 01-506

The **HITACHI Building** consists of a commercial center on the main highway in Bauchrieh. Empty plots surround the site, which minimizes the needs for shoring works. Exception is made towards the main highway side where excavating about 12m in depth was planned. The client prior to IGM's arrival excavated with some inclination the top 6m which were cohesive and stable.

The Soil was Sandy Clay with the water table at a depth of 9m. The bottom of excavation was planned at 12 meters (3m. below water).

I.G.M. proposed an anchor/pile system consisting of 60cm concrete piles each 9m long (-6 to -15m) and spaced 70cm c/c, with 1 row of high strength anchors spaced 2.1m. The piles were exposed 6m after excavation and had to retain 6m of sandy soil on top (surcharge). The anchors were tensioned against a rigid cap beam connecting all piles.

SUMMARY OF WORKS

- 500 l.m. Piles
- 300 l.m. Anchors

**College SACRE-COEUR – Gemayzeh –
(May 2001 – June 2001)**

Client/Supervision : **Mr. Anis Obeid**

Design/Build : **IGM s.a.r.l.**



ID Number 01-508

The new extension in the **COLLEGE SACRE-COEUR** consists of a 7 storey concrete building with 3 basements. The main challenge in this project was the restricted time frame since the shoring works needed to be finished in a very quick way to allow the erection of the building prior to the school start in the coming fall. Technically 2 sides were of concern: the main road on one side and the Old Procurement building on the other side, which could not tolerate any movement. The planned excavation was 9m deep on the average.

The Soil was Sandy and clayey fill on the top 6 meters, then a calcareous marl below. The water table was encountered at a depth of 8m.

I.G.M. proposed a nailed shotcrete wall reinforced with vertical micropiles on the main road side, and an anchor/pile system on the Procurement building side. The piles were 25cm in diameter with a 70cm spacing c/c and 2 rows of active anchors tensioned against concrete waler beams.

SUMMARY OF WORKS

- 300 l.m. Piles
- 300 l.m. Micropiles
- 750 l.m. Nails
- 350 l.m. Anchors
- 90 m3 Shotcrete

***Lot 1731 Roumieh – Roumieh –
(September 2001 – December 2001)***

Client	: High Development – Moawad Group
Design/Build	: IGM s.a.r.l.
Supervision	: Eng. Elias Karaan



ID Number 01-517

The **Structure on lot 1731** is an existing residential building in Roumieh. The building was erected on a 50° sloped terrain. The nature of the soil in this region is mainly cemented sand highly erodable by water.

The building was jeopardized by a slope stability problem due to underground water seepage and Seismic considerations.

I.G.M. proposed installing under the existing Mat Foundation, about 130 steel API Micropiles with high pressure injection and Pre-compression. In addition a peripheral drainage system around the building was installed, and about 180 meter long retaining walls with anchors were constructed on the downhill side.

SUMMARY OF WORKS

- 130 Injected and Precompressed Micropiles – Length =21m, Diam=150mm
- 100m long Drainage Trench, Depth =7m
- 180 m Long Retaining Walls with Anchors

***Bassatines Tripoli – Tripoli –
(May 2001 – June 2001)***

Client	: Mr. Abdul Razzak Hajji
Design/Build	: IGM s.a.r.l.
Supervision	: Eng. Ahmad Hassanein

The building in **Bassatines – Tripoli** consists of a 1 storey concrete building with 2 basements. The lot is surrounded by residential buildings (concrete towers) from 2 sides and by major roads on the other two sides.



ID Number 01-518

The topsoil layer (about 5m deep) consists of a silty clay material CL, then the clay becomes interbedded with a hard cemented gravel layer down to 9m. Below 9m the soil becomes soft again and the water table appears at a depth of 11m. The excavation needed for the new building was about 9m deep.

I.G.M. proposed and constructed an anchor/pile system on the building sides to retaining the excavated sides and minimize any movement of the adjacent structures. On the roadsides, sheetpiles with active anchors were utilized. The piles were 40cm in diameter with a 80cm spacing c/c and 2 rows of active anchors tensioned against a concrete waler beam.

SUMMARY OF WORKS

- 700 l.m. Piles
- 200 l.m Sheet Piles
- 650 l.m. Anchors

HILTON HOTEL – BCD –
(Feb 2002 – April 2003)

Client	: : OPTIMAL ENGINEERING
Design/Build	: IGM s.a.r.l.
Supervision	: Dar El Handassah

The old Hilton Hotel in the BCD is now doomed to be demolished to make room for a new project. The demolishing operation was to be done by implosion of the 26 storey tower + the 3 existing basements. The lot is surrounded by major roads and infrastructure, and by the Kanafani building from the West side.



ID Number 02-502

The topsoil layer (about 5m deep) consists of a sandy clay fill material, then the clay becomes interbedded with a hard cemented marl and limestone layer down to 15m. The demolition requires that the basement walls be utilized as temporary shoring before, during and after demolition.

I.G.M. designed and constructed special anchors capable of supporting the dynamic loads during the explosion, and the static load after. The anchor heads and blocks were also specially fabricated by IGM to take the impact load without release of tension in the anchor strands. The anchors were tensioned and tested against the existing basement walls that were checked for structural integrity also.

SUMMARY OF WORKS

1200 l.m. High Stressed Anchors below Water Level

SANTA ZOUK

(Dec 2002 – April 2003)

Client : **MASTERPAK S.A.L.**
 Design/Build : **IGM s.a.r.l**
 Supervision : **PHOENIX MACHINERY – PMD**

The new Sanita project is to replace an old factory in Zouk. The project consisted of removing the old structure and replace it by a new concrete one. The surface of the construction is 7000m² with about 140 columns, spanning 10x8m. The Live Load is 2.5 T/m² on the new Slab that is planned to be prestressed, with prefab elements.



ID Number 02-517

The topsoil layer (about 2m deep) consists of a sandy clay material, then the hard bedrock is reached. The main soil problem was the abundant presence of cavities. The planned foundation was a strip footing with bearing pressure of 4 kg/cm².

I.G.M. proposed an alternative solution to the Foundation system. Under each column a cavity search was done and cavity filling was proposed through API 4" steel tubes that acted as micropiles. A static load test (see figure above) confirmed that the micropile embedded 6m into the rock was able to carry 80T. Under the entire site about 3000l.m. of micropiles are being installed, to assist the newly designed spread footings to carry the applied loads. The saving in foundation cost was about 20% with technical advantages such as: reducing the risk of cavities, opening the possibility of expansion in the future, possibility of salvaging the existing slab-on- grade. IGM also executed the entire civil works.

SUMMARY OF WORKS

- 3000 l.m. Micropiling
- 3500m3 Concrete Works

MEDCO – BCD –
(February 2003 – March 2003)

Client	: : S & L Contracting
Design/Build	: iIGM s.a.r.l
Supervision	: GICOME

The new MEDCO Station in the BCD area was a small yet challenging project. Its narrowness made it impossible to provide room for a shoring system. A vertical wall with micropiles and shotcrete was utilized with active anchors to support the sides.



The topsoil layer (about 5m deep) consists of a sandy clay fill material, then the clay becomes interbedded with cemented sand. Water was encountered at 6m below grade.



ID Number 03-501

SUMMARY OF WORKS

- 1000 lm of steel and concrete micropiles
- 400 l.m. High Stressed Anchors

**SAAB BUILDING – ACHRAFIEH –
(April 2003 – May 2003)**

Client	: : Eng. Michel Saab
Design/Build	: iIGM s.a.r.l
Supervision	: Eng. M. Saab



The new Saab building in Achrafieh is planned to be constructed within an 8 meter deep excavation. Since the soil is marly, a shoring system with micropiles and anchors was installed.



ID Number 03-503

SUMMARY OF WORKS

- 800 lm of steel tube micropiles 6"
- 600 l.m. High Stressed Anchors below Water Level

PROJECT IN ALEY
(September 2003 – November 2003)

Client	: : Mr. Michel Wahhab
Design/Build	: iIGM s.a.r.l
Supervision	: Eng. Rodolph Matar

The Project in Aley consists of a 8 stories concrete building with 3 basements. The lot is surrounded by residential building from one side, empty plots and a main road on the other sides.



ID Number 03-513

The topsoil layer (about 4m) is clayey and rocky then after. The excavation needed for the new building was about 10m to 12m deep.

Int'l I.G.M. proposed and constructed an anchor/Micropiles system on the building side and the empty plots sides were retained by active anchors tensioned against a final permanent concrete wall. The road side was retained by a shotcreted steel mesh. The Micropiles were 10cm in diameter with 1m spacing c/c and one row of active anchors tensioned against a final permanent concrete wall.

SUMMARY OF WORKS

300 l.m. Micropiles - 300 l.m. Anchors.
100 m² Permanent walls.

PALACE OF JUSTICE – TRIPOLI –
(Sept. 2003 – Oct. 2003)

Client	: : OEC Contracting
Design/Build	: iIGM s.a.r.l
Supervision	: K. Augustine



ID Number 03-514

The new Palace of Justice in Tripoli was one of the largest projects in the North that year. It was a challenging job because of its fast track. An optimized design with monitoring allowed the geotechnical works to finish ahead of schedule. About 300 piles were installed in 20 days! Only one row of high capacity anchors 16m long was installed in order to maintain equilibrium of this 10m deep excavation.

SUMMARY OF WORKS

- 3000 l.m. of concrete piles (45 cm)
- 2000 l.m. High Capacity Anchors (40T)

RESIDENCE ACHRAFIEH 683
(October 2003 – March 2004)

Client : : **Mr. Chawki FARHAT**
Design/Build . : **International IGM s.a.r.l**

The “Achrafieh 683” building in Achrafieh consists of an 11 stories concrete building with 3 basements. The lot is surrounded by residential buildings from two sides and by roads on the other two sides.



ID Number 03-519

The topsoil layer (about 4m) consists of sand material, then hard marl. The excavation needed for the new building was about 10m deep.

Due to the limited time available, **Int'l I.G.M.** proposed and constructed vertical micropiles system coupled with a vertical concrete wall (10cm to 20cm). In the horizontal direction, two rows of active anchors, with spacing 2 to 3m were installed to retain the excavated sides and minimize any movement of the adjacent structure or infrastructures. The Micropiles were 10cm in diameter with 0.7m to 1.2m spacing c/c.

SUMMARY OF WORKS

600 l.m. Micropiles	- 300 l.m. Anchors.
350 m ² Permanent walls	- 50 m capping beam

VILLA IN MEZIARA
(November 2004)

Client : : **Mr. Joe Saliba**
Design/Build : **International IGM s.a.r.l**

The Project in Meziara consists of a permanent nailed shotcrete wall. This wall was necessary to protect the site limits with the neighbors. Spalling failures were common in winter times and required a shoring solution.



ID Number 04-500

Int'l I.G.M. proposed and constructed the shotcrete wall with permanent rock Nails. The shotcrete mix was done on site.

SUMMARY OF WORKS

300 m² shotcrete. - 300 l.m. nails

HARET SAKHER UNDERPASS
(2003 – 2004)

Client : : **Enterprise Edmond Acar**
Consultant : **Dar el Handassa – Taleb**
Design/Build : **International IGM s.a.r.l**

The “Harissa – Bkerki ” road and underpass.



ID Number 04-506

Int'l I.G.M. scope of work was to design & build 2 bridges with the shoring system along the new Bkerke – Harissa highway .

The geotechnical works included without being limited to:

- Permanent Shotcrete nailed wall system along the high cuts.
- Traditional retaining walls
- Micropiles and Anchors for temporary retention of existing structures

The structural works included without being limited to:

- Box Culvert bridge at the Haret Sakher intersection
- Supported Bridge at the Entrance

SUMMARY OF WORKS

2700 l.m. Nails. - 300 l.m Anchors - 2000 m³ Concrete. 2000 m² Shotcrete.

ARAMAN – BHANNINE HIGHWAY
(May 2004 – Present)

Client : : **HOMAN Engineering Company**
Design/Build : **International IGM s.a.r.l**
Supervision : **ACE Eng'g**

The new highway in northern Lebanon requires 4 underpass bridges. Int'l IGM recommended, designed and implemented a new "Top Down" Technique for bridge construction. This technique was first implemented in Milano in the 1980's, and consists of installing secant and permanent piles at each side of the bridge and in the centerline. The top slab is then poured on the floor level connecting the top of the piles. The piles will replace the foundations and the walls of the classical box culvert system.



ID Number 04-510

This technique has tremendous advantages in case of soft soil, as was the case in Araman where the soil was wet highly plastic clay, CH. The time of execution was reduced by almost ½ since the temporary shoring that was needed for the box culvert excavation was avoided, the amount of earthworks was reduced by 40%, and the scaffolding system for the top slab was no longer necessary. As shown in the picture below, after installing the piles and the top slab, the excavation could proceed safely from the top and down.

SUMMARY OF WORKS

Each bridge required about 20,000 lm of piling 60 and 80 cm in diameter.

KARAMEH BUILDING
(July 2004 – October 2004)

Client : : **Eng. WALID EL RASSI**

Design/Build : **International IGM s.a.r.l**

The “KARAMEH BUILDING” in TRIPOLI consists of repairing the damages caused by a fire accident, especially in the basement and the first story of the building.



ID Number 04-511

Int'l I.G.M. proposed and executed all the works, mainly the following:

- Demolition & removal of all affected concrete elements.
- Jacketing & anti-buckling (steel frame &/or cables) where needed.
- Demolition & removal of the basement ceiling.
- Preparation & treatment of the concrete surfaces & joints
- Installation of epoxy dowels where needed.
- Slab replacement & CFRP strengthening of ribs.
- Construct columns skirts.

SUMMARY OF WORKS

2000 m³ Concrete. 2000 m² Shotcrete.

PM2 TISSUE MILL
(Nov. 2003 – Feb. 2004)

Client : UNIPAK s.a.l. – Tissue Mill
Design/Build : International IGM s.a.r.l
Supervision : PMD – INDEVCO Group



ID Number 04-512

The “Tissue Mill” factory in Sanita’s compound Halat. The project consists of creating a space (60x15m²) under an existing structure in order to accommodate a new manufacturing machine. The soil consists of Gravelly Clay material at the top 5m, then the hard marl. The excavation needed for the new structure was about 6m deep.

The challenge in this project was to complete the drilling, micropiles / anchors installation, concreting, excavation & tensioning in a tight & delicate environment, and within a very tight schedule, while the factory next door remains operational.

The Design/Build solution consists of installing Micropiles with Active Anchors as a shoring system to support the existing structure and infrastructure and retain the excavated sides. The Micropiles were 10cm in diameter with 1.2m spacing c/c, one row of active anchors spaced 3m to 4m & tensioned against a final concrete wall.

SUMMARY OF WORKS

1100 l.m. Micropiles.	-	800 l.m. Anchors.
200 m ² Permanent walls.	-	4000 m ³ Excavation.

CHAMBRE DE COMMERCE – TRIPOLI
(September 2004 – November 2004)

Client : : Establishment Ing. Said HALLAB.

Design/Build : : International IGM s.a.r.l

Supervision : : Builders Design Consultants

The “Chambre de commerce” building in Tripoli consists of a 12 storey concrete building with 3 basements. The lot is surrounded by residential building from one side, an empty lot at the opposite side and by major roads on the other two sides.



ID Number 04-513

The topsoil layer (about 4m) consists of clay & silty sand material, then the clay becomes silty with gravel down to 12m. Below 12m the soil becomes silty sand with gravel.

The excavation needed for the new building was about 7m deep

Int'l I.G.M. proposed and constructed an anchor/pile system on the building & roads sides to retain the excavated side and minimize any movement of the adjacent structure or infrastructures. The piles were 60cm in diameter with 1.6m spacing c/c and one or two rows of active anchors tensioned against a concrete waler beam.

SUMMARY OF WORKS

1600 l.m. Piles.

1050 l.m. Anchors.

235 m³ Shotcrete.

TAWK BULIDING IN FANAR
(December 2004 – Jan. 2005)

Client : **Mr. Hanna Tawk**
Design/Build : **International IGM s.a.r.l**
Supervision : **Prof. Wilson Rizk & Engr. Fadi Yaacoub**

The Project in Fanar consists of supporting a permanent excavation after a slope failure occurrence.



ID Number 04-515

The failure occurred in the cemented sandy soil after heavy rains due to unsupported excavation > 15m height.

The remedial solution was to first backfill the area, prepare a platform, and drill 60cm diameter piles curtain. The piles are then supported by permanent active anchors and a shotcrete face. The anchors were grouted under pressure (IRS System) and well protected.

SUMMARY OF WORKS

1100 l.m Piles - 40m³ shotcrete. - 1000 l.m. permanent anchors.

**PETRA 3 – Lot 5508 Hazmieh
(April 2005)**

Client : Mr. Nabil Saad
Design/Build : International IGM s.a.r.l

The project in Mar Takla – Hazmieh consists of a 9 stories concrete building. The lot is surrounded by residential buildings from two sides and by road on the upper side level and an adjacent deep cut on the lower side level. This deep cut proved to be vertical.



ID Number 05-502

The soil investigation in this lot shows a top loose fill (~7m), then a gravelly silts layer (~ 5m), then the bedrock.

In lieu of the deep adjacent cut and the deep layer of backfill material, **Int'l IGM** recommended placing the structure on deep foundations system after the removal of as much as possible of the fill material (IE: Foundation on grade). Due to the lack of accessibility it was decided to reinforce the footings with 6" micropiles. The length of the micropiles (6" in diameter reinforced with 4" API steel tubes) executed under the bearing columns varied from 6m to 12m length in order to cover three criteria:

- 1- Load on each footing.
- 2- 3m length as a minimum below the 45° effect line of the deep cut of the adjacent lot.
- 3- The soil/Micropiles friction assumption.

SUMMARY OF WORKS.

- 900 l.m. of Micropiles.

HAYEK INTERCHANGE Bridge
(February 2005 – 2006)

Client : CMC / Jalkh J.V.
Design/Build : International IGM s.a.r.l
Supervision : Dar Al Handasah

The Project in Sin El-Feel consists of Design, Construction & Testing of Concrete Piles.



ID Number 05-503

The share of Int'l IGM in this project was to design the piles & perform the required tests:

- Ultimate Static load test (280 Ton = 200% of design load) according to ASTM D 1143.
- Construction of the test piles (1m diameter 10.5m length).
- Construction of the steel reaction beams.
- Construction of 10 ground Anchors around the test pile to attain the ultimate load.
- Jack & gauges Calibration.
- Service piles Static load test (210 Ton = 150% of design load) according to ASTM D 1143.
- Piles integrity tests: PIT, according to the frequency required.
- Perform the test in accordance to International Standards and under the supervision of the Consultant.

**TAGER Bldg 4 – TRABAUD
(November 2005)**

Client : Mr. Anis Tager
Design/Build : International IGM s.a.r.l

The Project consists of a residential building constructed within a confined area surrounded by adjacent structures and roads. The excavation of this building required the installation of an efficient shoring system with a limited budget.



ID Number 05-510

The soil is a clayey sand 5 to 6 meter deep, underlain by calcareous shale.
The excavation needed for the new building was about 8m.

Int'l IGM proposed and constructed an anchor/pile system on the building & road sides to retain the excavated sides and minimize any movement of the adjacent structure or infrastructures. The piles were 30cm in diameter with 1m c/c spacing and one or two of active anchors tensioned against a concrete waler beam.

SUMMARY OF WORKS.

650 l.m. Piles
450 l.m. Anchors
60 m³ Shotcrete

MANSOURIEH-DAYCHOUNIEH ROAD
(August 2005 – 2006)

Client : Est. Salim Katul
Design/Build : International IGM s.a.r.l

The Project consists of upgrading the Mansourieh – Daychounieh road; the road length is about 4 km. On a critical portion 300m in length the soil on the upper is sandy and would be excavated from ~5m to 11m in height. Hence, a shoring system is necessary to achieve the excavation and work as a permanent retaining structure.



ID Number 05-513

The soil is Clayey Sand.

The traditional concrete wall was not practical for the following reasons:

High risk of collapse during the excavation and construction.

Delay in the Main Contractor schedule.

Int'l IGM proposed an optimized solution by sloping the excavation 15% as shown above. The shoring system consists of installing a 15cm shotcrete wall retained by 3 to 6 rows of permanent nails. The length of the nails varied from 3m to 12m.

SUMMARY OF WORKS

- 2,500 l.m of Nails (Length from 3m to 12m)
- 300 m³ of Shotcrete

BIREH LANDSLIDE- QOBAYAT
(September 2005 – October 2006)

Client : Est. Antoine Makhoulf
Design/Build : International IGM s.a.r.l

The Bireh-Kobayat road is crossing a major and historic landslide area. This area is extending 75m in length. After each rainy season the landslide is activated affecting the road and infrastructure alignment and levels and creating major safety hazards.



ID Number 05-514

In order to solve this problem permanently, **Int'l IGM** recommended to first install a deep drainage trench parallel to the road and towards the uphill side. Then a slope stabilization system was implemented consisting of three rows of 60cm diameter permanent piles battered and nailed to the stable layer, spaced 3m and connected by a slab-on grade.

SUMMARY OF WORKS.

- 1200 l.m Permanent Piles

**AUST – Ashrafiéh
(August 2005)**

Client : **Mr. Jack Lahoud**
Design/Build : **International IGM s.a.r.l**

The Project in Achrafieh is a newly acquired building at the AUST campus. Int'l IGM task was to investigate the existing structure, design for strengthening & construction.



ID Number 05-515

The study was directed towards allowing a sizeable increase in live load capacity to reach school load standards (450 kg/m^2).

The tasks of **Int'l IGM** are described in the following sequence:

1. Testing the concrete quality, steel reinforcement and key dimensions.
2. Strengthen any structural element that is found unsatisfactory either by using reinforced shotcrete or the CFRP.
3. Element with corroded steel reinforcement were repaired & supported by steel beams
4. Strengthen the foundation system by installing micropiles.

In order to hand over the site before the school year start, Int'l IGM worked on this job on a 24 hours program and was able to complete the above tasks in one month.

SUMMARY OF WORKS

- 250 l.m. of micropiles
- 100 l.m steel beams
- 200 m^2 Shotcrete
- 150 m^2 CFRP

**ACHRAFIEH 732 – Awad Bldg
(November 2005)**

Client : Mr. Charles Awad
Design/Build : International IGM s.a.r.l

The “Achrafieh 732” building consists of a 9 stories concrete building with 1 basement. The lot is surrounded by residential buildings from three sides and by road on the other side.



ID Number 05-516

The topsoil layer (about 3m) consists of sand material, then soft marl. The excavation needed for the new building was about 4m deep.

Due to the limited time and space available for shoring, **Int'l I.G.M.** proposed and constructed vertical micropiles system coupled with a vertical shotcreted steel mesh. In the horizontal direction, one row of active anchors, with 3m spacing were installed to retain the excavated sides and minimize any movement of the adjacent structure or infrastructures. The Micropiles were 10cm in diameter with 1m spacing c/c.

SUMMARY OF WORKS

- 200 l.m. Micropiles
- 170 l.m. Anchors.
- 25 m³ Shotcreted steel Mesh

**ZEINO Tower II
(December 2005)**

Client : Alfred and Jack Matta
Design/Build : International IGM s.a.r.l

The Project in Achrafieh consists of a 14 storey concrete tower with 4 basements. The lot is surrounded by residential buildings on 2 sides and roads on the others.



ID Number 05-517

The challenge in this project was to submit a flexible design: Either Concrete Bracing or Anchors or Concrete Bracing / Anchors together.

It was a request from the Client to gain extra time while negotiating with neighbors to receive any needed permission without jeopardizing the construction schedule. **Int'l IGM** submitted the flexible design that fits the client requirements, and the project was launched as planned.

The top soil layer (about 2m) consists of clay & silty sand material underlain by a deep layer of soft marl (~ 14m). The excavation needed for the tower was about 13m. **Int'l IGM** proposed and is constructing an anchor/pile system on the building & road sides to retain the excavated side and minimize any movement of the adjacent structure or infrastructures. The piles were 40cm & 60cm in diameter with 1m to 2.4m spacing c/c respectively and one to two rows of active anchors tensioned against a concrete waler beam.

SUMMARY OF WOKS

- 1500 l.m. of Piles
- 800 m of Anchors
- 250 m3 of Shotcrete
- 220 m of Struts

Alta Vista Hotel
(Jan. 2006, Sept. 2006.)

Client : **Mr. Edmond Assaf**
Consultant : **EDRI**
Quality Control : **EDRI**
Main Contractor : **International IGM sarl**



ID Number : 06-500

The Alta Vista Hotel was subject to a heavy explosion that was placed at road level under a major structural column, with 5 basements below and 20 floor levels above. The column is 1.6m in diameter and was completely destroyed with 2 other adjacent columns severely damaged. About 3 slabs were completely destroyed and the entire structure cracked all the way to the upper floors.

The **IGM** team proposed a design/build solution for the reinstatement of the Hotel structure. The solution consists of jacking up the structure with 1200T capacity, and proved to be the most technically viable and the least expensive method. Concrete jacketing was installed around the damaged column with 300 dowels with epoxy. Concrete columns and slabs were reconstructed after clearing the damaged portions. Jacking with comparison to theoretical simulation was performed with 1200 T capacity hydraulic system that was completely designed and manufactured by the company

SUMMARY OF WORKS

- 3D Finite Element model + design simulations
- Jacketing with 300 epoxy dowels + Jacking 1200T – 20 story structure
- Demolition & Reconstruction of 400m³ concrete slabs & columns

CFRP 200m² Strengthening : balcony and cracked elements

**Chidiac Tower – Dora
(July 2006)**

Client : **Mr. Elie Chidiac**

Design/Build : **International IGM s.a.r.l**

The Project in Bouchrieh consists of a 14 storey concrete Tower with 1 basement. The lot is surrounded by residential buildings on 2 sides and roads on the others.



ID Number 06-503

The first soil layer (about 7.5m) consists of saturated Sand & silty sand material underlain by a deep layer of gray clay (~ 14m). This stratigraphy represents liquefaction hazard should shallow foundations be used.

Int'l IGM proposed and constructed a pile system to replace the solution of a very thick mat by a CFRP System (Combined Pile-Raft Foundation). The piles were 60cm in diameter embedded deeply into the clay layer.

SUMMARY OF WORKS

- 2000 l.m. of Drilled Piles .

ARAMAN – BHANNINE HIGHWAY PHASE II
(November 2006 – Present)

Client : **HOMAN Engineering Company**
Design/Build : **International IGM s.a.r.l**
Supervision : **ACE Eng'g**

The new highway in northern Lebanon requires 4 underpass bridges. Int'l IGM recommended, designed and implemented a new "Top Down" Technique for bridge construction. This technique was first implemented in Milano in the 1980's, and consists of installing secant and permanent piles at each side of the bridge and in the centerline. The top slab is then poured on the floor level connecting the top of the piles. The piles will replace the foundations and the walls of the classical box culvert system. In Lebanon, this technique was used for the first time in this project for the first underpass in Araman (see Before project 04-510).



ID Number 06-509

This technique has tremendous advantages in case of weak soil, as is the case in Bhanine. The time of execution and cost were reduced by this solution.

SUMMARY OF WORKS

Each bridge required about 20,000 lm of piling 60 and 80 cm in diameter.

**Warehouse Lot # 95 Halat
(January 2007)**

Client : SANITA
Design/Build : International IGM s.a.r.l
Supervision : PMD – INDEVCO Group



ID Number 06-512

The project is in Sanita's compound, Halat. The project consists of creating a space next to an existing warehouse structure in order to build a New. The soil consists of Sandy Clay material with gravel inclusions.

The challenge in this project is to complete the drilling, micropiles / anchors installation, concreting, excavation & tensioning in a tight & delicate environment, and within a very tight schedule, while the old warehouse remains operational with heavy loads and traffic of loading trucks.

The Design/Build solution consists of installing Micropiles vertically covered by a permanent shotcrete wall 25 cm thick. The wall will be temporary supported by one. The row of active anchors spaced 3m to 4m & tensioned 40T . One row of permanent nails will be installed to optimize the wall thickness.

SUMMARY OF WORKS

400 l.m. Micropiles.	-	250 l.m. Anchors.
300 m ² Schotcrete wall.	-	200 l.m. Nails.

***Slim Building- Lot # 3397 Achrafieh
(January 2007)***

Client : M/S Ayoub & Masri
Design/Build : Interantional IGM s.a.r.l.

The project consists of a reinforced concrete multistory building with 1 basement and 9 upper floors. The lot is presently an empty terrain with a surface about 150 m². It is surrounded by two main roads on each front, and by adjacent structures on the other side.



ID Number 07-501

The top layer consists of a man made fill (about 2m) a brown clayey layer is under the top layer with a thickness of 5m underlain by a clayey calcareous layer

Int'l I.G.M. proposed and constructed vertical Piles for foundation system. With pile 80 cm and 60 cm piles diameter.

SUMMARY OF WORKS

- 145 l.m. of Piles 80 cm.
- 121 l.m. of Piles 60 cm.

Lot # 789 Rmeil
(April 2007-April 2008)

Client : : **Fouquet Real Estate**
Design/Build : **International IGM s.a.r.l.**
Supervision : **Eng Antoine Rizkallah**

The Building in Achrafieh – Rmeil Lot #789 consists of a 10 stories concrete building with 4 basements a. The lot is surrounded by residential buildings from two sides and by roads on the other two sides.



ID Number 07-502

The topsoil layer (about 3m) consists of sand material, underlain by a marl layer and marlstone. The excavation needed for the new building was about 24m deep.

Int'l I.G.M. designed and constructed a shoring system consisting of micro piles and anchors with a 20 cm. shotcrete wall, and also does all the work of excavations (20,000 m³).

SUMMARY OF WORKS

- 3000 l.m. of micropiles
- 2500 l.m. of Anchors
- 465 m3 of shotcrete

***Hazmieh Municipality
(June 2007-September 2007)***

Client : : Ets. Joseph Maalouf
Design/Build : International IGM s.a.r.l.

The backside wall of the Municipality Building in Hazmieh required to be nailed and shotcreted in an architectural way. As well as the main road had to be retained to permit the excavation to go deeper.



ID Number 07-504

The soil consists of clay material.

Int'l I.G.M. designed and constructed the two separate portions of shoring system consisting of micro piles and anchors with a shotcrete wall, and also does all the work of retaining of the upper wall by nailing and shotcreting

SUMMARY OF WORKS

- 400 lm Micropiles.
- 200 lm Anchors.
- 750 lm Nails.
- 50 m³ Shotcrete.

LAU Road – Jbeil
(August 2007– January 2008)

Client : : Ets. Antoine Menassah
Design/Build : International IGM s.a.r.l.

The Project consists of widening and rehabilitating the main road; about 100m road. These works require excavations on the mountain side with vertical cuts 9 to 12m high, which necessitate to be retained by nailing and shotcrete.



ID Number 07-507

The soil generally consists of highly fractured limestone material.

SUMMARY OF WORKS

- 350lm Nails
- 200m³ shotcrete

Lot # 5494 Baabda
(November 2007-April 2008)

Client : Mr. Sami Meemari
Design / Build : International IGM s.a.r.l.

The “Lot # 5494 Baabda” project consists of a residential with a concrete structure .the site is bound by an existing concrete building on the northeast side, adjacent empty plots on the 2 sides and access road on the southwest side.



ID Number 07-511

The topsoil layer (varying from 3 to 6 m.) consists of Clayey Gray Sand Soil material, underlain by a Marl and Marlstone layer.

Int'l I.G.M proposed and constructed a shoring system consisting of 15 cm diameter micro piles, anchors, beams and nails with a shotcrete wall.

SUMMARY OF WORKS

- 562 l.m. of Micro piles
- 389 l.m. of Anchors
- 114 l.m. of Nails
- 275 l.m. of Beams
- 44 m³ Shotcrete

**Lot# 2385 Gemayzeh
(March 2008)**

Client : : Saifi Attics s.a.l.

Design/Build

: *INTERNATIONAL IGM S.A.R.L*

The “Lot# 2385 Gemayzeh” project consists of a residential & commercial center composed of 4 basements levels and 17 upper floors. The site is bound from the east by a 2 story old house, a 4 story building with one basement on the north side and access roads on the west & south sides. The site is almost square and covering a surface area of 1000m².



ID Number 08-501

The topsoil layer (about 7m) consists of silt and sandy clay, and fractured hard marl is found under this soil layer (between 7 and 16 m), those 2 layers are underlain by a hard gray clay layer (starts at a depth about 14m below street level). The depth of excavation is about 13m.

Int'l I.G.M. proposed and constructed an anchor/pile system over all sides to retain the excavated sides and minimize any movement of the adjacent structure or infrastructures.

SUMMARY OF WORKS

- 660 l.m. of piles

Mansourieh Road – Rock Fall Stabilization
Aug 2008 – Nov 2008

Client : Lebanese Ministry Of Public Works
Design/Build : International IGM s.a.r.l

The Project in Mansourieh consists of shoring system for a multi- stories concrete building under which a slope stability failure occurred. The building is situated on Mansourieh Main Road.



ID Number 08-504

The soil consists of sand stone with a filling material underneath.

Int'l IGM Designed & constructed a shoring system consisting of micro piles & nails with a shotcrete wall.

SUMMARY OF WOKS

- 620 l.m. of Micropiles
- 1050 l.m.of Nails
- 550 m2 Shotcrete.

APPENDIX A

LISTS OF PROJECTS IN THE USA – INVESTIGATION DIVISION

INVESTIGATION DIVISION - USA

The following list represents the projects on which IGM was directly involved in Investigation Services in the US

Reference	Project	Location	Description
06-417	Freeman Residence	Waco, TX	Slope stability evaluation
09-701	Shannon Wind Farm Project	Shannon TX	Consultancy
10-701	Seabreeze 200MW Wind Farm Coastal Project	Beaumont, TX	Consultancy
10-702	Comanche Ridge Wind and Solar Farm	Aspermont, TX	Consultancy
10-703	Jordan Wind Turbine Project Installation	Fort Worth, TX	Consultancy
10-704	RRE 60MW Solar Farm	Pflugerville, TX	Consultancy
11-601	Starwood Solar I Farm	Arizona, TX	Design
11-701	Solar to Steam Chevron Oil Field	Coalinga, CA	Consultancy
11-702	White Camp Solar Farm	Kent County, TX	Soil Investigation & Foundation
12-701	Horn Wind Farm Project	Shannon TX	Wind speed monitoring, Soil Investigation & Foundation

APPENDIX B

LISTS OF PROJECTS OVERSEAS – INVESTIGATION DIVISION

INVESTIGATION DIVISION

The following list represents the projects on which IGM was directly involved in Investigation Services worldwide.

Reference	Project	Client	Description
97-001	Msaitbé plot 583	Abdel Rahman Solh	Soil Investigation
97-002	Lot 131 – BCD	Rodolph Matar	Subsurface and Soil Investigation
97-003	Lot 749 – BCD	AMECS	Soil Investigation
98-001	Sinno Trade Center	S. Sinno	Soil Investigation
98-002	Mechref Villa Plot 1208	URETEC	Material Testing & Structural Evaluation of 2 Villas
98-003	Sam's Gate (Mazraat Yachouh)	Sleiman Haddad	Soil Investigation
98-004	MECG-Park View Realty	ULCC	Soil Investigation
98-005	J&M Plaza – Verdun	Naji Masri	Soil Investigation – Design of Retaining & Foundation Systems
98-006	Bsat Supermarket (Aabra, Saida)	Yehia Bsat	Soil Investigation and Foundation Design
98-007	Chtaura Educational Center	Dar El Aytam	Soil Investigation
98-008	Water Tanks (Zahlé)	Entreprise N. Srouji	Soil Investigation
98-009	Minkara Car Park & Tower	A. Minkara	Soil Investigation
98-010	Jounieh-Harissa Highway	Entreprise E. Acar	Pavement and Mix Design & Testing of Asphalt
98-011	Villa Salib (Bteghrine)	Elie Saliba	Soil Investigation
98-012	Zahrani Interchange (Zahrani)	BRICC	Pile Integrity Testing NDT & Static Load, Testing SLT on 40cm Piles
98-013	Raydan Building (Bchamun)	A. Raydan	Soil Investigation
98-014	Abi Chahine Building (Adma)	Joe Karam	Material Testing and Structural Evaluation on existing skeleton
98-015	Annuciation Church (Bachoura)	Joseph Zbeidi	Materials Testing, Structural and Foundation Evaluation for Rehab.
98-016	Melrose SAL Building (Bab Idriss)	Rana Idriss	Soil Investigation
98-017	Source of Sir El Dannyieh	Ministry of Resources MRHE	Soil & Rock Investigation by continuous coring

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
99-001	Minkara Tower	A.Minkara	Soil Investigation
99-002	Hermel – Qbayyat	BTUTP	Soil Investigation
99-003	Fakhry Building	Chawki Fakhry	Soil Investigation
99-004	Plot 131	Fundamentals	Material Testing – Quality Control
99-005	Fattal Building	Samir Mokbel	Material Testing – Quality Control
99-006	St. Elie Supermarket	Samir Mokbel	Material Testing – Quality Control
99-007	Serail Hill – 58	Samir Mokbel	Material Testing – Quality Control
99-008	OLM Investigation	OLM	Soil Investigation
99-009	Atlantis Resto	R. Sabbagh	Soil Investigation
99-010	Bachoura 168	Hamid Tabchoury	Soil Investigation
99-011	Galaxy – Mariott	Samir Mokbel	Material Testing – Quality Control
99-012	Minz Hosn 1055-56	Hourié	Soil Investigation
99-013	Ahmar house	Wajih Ahmar	Material Testing – Quality Control
99-014	Bassil Building	Imad Bassil	Material Testing & Report
99-015	Deir Tamish village	SNAM	Material Testing, Coring & Report
99-016	Ablah Road	Dar El Handassah	Soil Investigation
99-017	Haouch El-Harimé Bekaa	Elie Machaalany	Soil Investigation
99-018	Aamchit – Tannourine	KREDO	Soil Investigation & Pavement
99-019	Chekka Sugar Factory	Talal Feghali	Concrete coring & Testing
99-020	Chantier Gouraud	Antoine Farah MAKEN	Concrete coring & Testing
99-021	Villa Makhlouf	Paul Makhlouf	Concrete coring & Testing
99-022	Fakra Highway	Michel Hajj	Concrete coring & Testing
99-023	Compuleb – Boulos	Mike Makhlouf	Soil Investigation
99-024	Tannoury Building	Georges Tannoury	Soil Investigation
99-025	Villa Jamil	Gharzouzi	QC Concrete & Material Testing
99-026	Maalouly Building	Michel Karam	Concrete Coring & Testing
99-027	Kfarchima Frigex Building	Lebanese Army	Soil Investigation & Material Testing – Evaluation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
99-028	Depot Adonis	Gary Chekerjian	Concrete Testing
99-029	Ain El-Roummaneh Underpass	Elie Selwan	Soil Investigation
99-030	Lac Collinaire	Green Plan	Soil Investigation
99-031	Baalbeck Site	C.A.T.	Bearing Capacity
99-032	Antelias-Bekfaya Road	Sleiman Haddad	Asphalt Testing
99-033	Mouawad HQ	Nassar Trading	Coring
99-034	Sabbagh Building	Alfred Matta	Steel Testing
99-035	Rawcheh Building	General Abbas	Concrete Testing & Repair
99-036	River Side Country Club	Dany Mezher	PIT on Columns
99-037	Jean Abi Karam	J. Abi Karam	Sand Equivalent – Testing
99-038	Deir El-Qamar	Entreprise E. Acar	Quality Concrete & Concrete Testing
99-039	OLM	C.A.T.	Material Testing – Quality Control
99-040	Baalbeck	C.A.T.	Material Testing
99-041	Halat Building	Indevco Group	Soil Investigation – Structural Eval.
99-042	Kassatly Project	Jihad Kassatly	Asphalt Testing
99-043	Ain El-Delbé	DAHNT	Soil Investigation
99-044	Ghadir Building	Elias Tabet	Concrete Testing
99-045	Ain-Saadé Project	Abdo Farjallah	Soil Investigation
99-046	Joseph University Tripoli	M.A.N.	Material Testing
99-047	Clinique du Levant	Joseph Maalouf	Material Testing
99-048	Lot 613 – Achrafieh	Walid Akawy	Material Testing
00-001	Ministry of Public Works	Mr. Joseph Abou Samra	Asphalt Testing
00-002	Harbor Drive – coring	Chekerbuild	Coring
00-003	Africa Factory	Boulos Boulos	Water absorption
00-004	Aley Commercial Center	Mr. Maroun Breidy	Investigation
00-005	OLM – Monitoring	Roger khoury	Cracks Monitoring
00-006	Stationnary Stores	Mr. Hanna Meouchi	Coring
00-007	J.M.Plaza(Verdun)	Mr.Naji Masri	Concrete Cylinders

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
00-008	Church Saint Joseph (Batroun)	Mr. Elie Abou Abdaallah	Material Testing
00-009	Azzi Bldg.	Dr. Marc Ballouz	Material Testing
00-010	MCC	Sport City	Material Testing
00-011	Villa Khalil	MHM – Mike Makhoul	Soil Investigation
00-012	Jiwar Adma	Mr. Issam Wardini	Material Testing
00-013	Frem Bldg.	Mr. Michel Karam	Material Testing
00-014	Saint Gregoire	Maken	Material Testing
00-015	Lac Collinire – Deir el Qamar	Kredo Ministry of Agri.	Investigation
00-016	Masterpack Factory	Indevco Group	Investigation
00-017	Faraya Road	Mr. Georges Sfeir	Concrete Cylinders
00-018	Mtolly Road	Mr. Georges Sfeir	Material Testing
00-019	Tfail Road	Kredo	Soil Investigation
00-020	Mechref Main Road	Mechref Society	Material Testing & Supervision
00-021	Achrafieh House	Nadim Manneh	Material Testing
00-022	Military Hospital	Lebanese Army	Structural Evaluation
00-023	Charbel Sejaan Bldg.	Mr. Abdou Farjallah	Structural Evaluation
00-024	Aintoura Project	Mr. Riad Hajj	Material Testing
00-025	Abi Saab Bldg.	Mr. Ziad Sairafeh	Material Testing
00-026	Plot 373Borj Hammoud	Mr. Charbel Tarzikhan	Soil Investigation
00-027	Tager Bldg.	Mr. Anis tager	Material Testing
00-028	Samara Bldg.	Mr. Richard Samara	Material Testing
00-029	Laqlouq Project	Mr. Boulos Massihev	Concrete Cylinders
01-001	Japanese Restaurant	Mr. Antoine Nahhas	Soil Investigation
01-002	Becharri Lake	Miss. Yolla Ghorra	Soil Investigation
01-003	Betchay Bldg.	Mr. Kamil Karam	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
01-004	Stone Cube Testing	Mr. Michel Aouad	(stone)Material Testing
01-005	Villa Azar	Mr. Emile Khoury	Soil Investigation
01-006	College Sacre Coeur	Mr. Paul Obeid	Soil Investigation
01-007	U.F.A.	Mr. Jamil Chammas	Soil Investigation
01-008	Atrib Bldg. Jdeideh	Mrs. Atrib	Structural & Geotechnical Evaluation
01-009	Phoenix Hangar	Indevco Group	Material Testing
01-010	C.R.C. Sin el Fil	Mr. Paul Mearrawi	Soil Investigation
01-011	Pharm at Mazraah	CET	Soil Investigation
01-012	Matelec	Mr. Kamil Karam	Material Testing
01-013	Municipality of Hazmieh	Mr. Patrik Mallat	Soil Investigation
01-014	Challita House	Dr. Challita	Soil Investigation
01-015	ATCL (Water Tank)	Mr. Jean Mamo	Soil Investigation
01-016	Tager Bldg. 2	Mr. Anis Tager	Demolition & Investigation
01-017	Moussallem Residential Bldg.	Mr. Rafic Moussallem	Soil Investigation
01-018	Villa in Adra	Mr. Michel Hounein	Site Visit Report
01-019	Bachnac Bldg.(Samkanieh)	Mr. Nadim Bachnac	Soil Investigation
01-020	Army Compound – Sarba	General Chammas	Structural Evaluation
01-021	Foyer De Vie Bekfaya	Mr. Roland Tamraz – Al Zawrak	Soil Investigation
01-022	Adma Development	Green acres Mr. Nabil Jreiche	Cavity Search
01-023	Phoenix Hangar	Indevco Group	Soil Investigation
01-024	Naous Residential Bldg.	Mr. Habib Kharsa	Soil Investigation
01-025	Irrigation Chnnels	ISOPAKs.a.r.l.	Material Testing
01-026	Mezher Construction Co.	Mr. Dany Mezher	Material Testing
01-027	Metro Super Stores	Mr. Louis or Semaan Barmo	Coring
01-028	Villa in Ain Saadeh	Mr. Metri Smaira	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
01-029	Aoun Bldg. Biakout	Dr. Michel Khoury	Coring
01-030	Residential Bldg. Antelias	Mr. Berg chichmanian	Soil Investigation
01-031	Repair of Channels – Aboudieh –Baabda	El Hadi Company	Material Testing
01-032	Lot 804 Dick El Mehdeh	Mr. Joseph Adaimeh	Structural Evaluation
01-033	Residential Bldg. Klaiat	Mr. Sami Aoun	Soil Investigation
01-034	Carmel Saint Joseph School	Mechref Soc.	Material Testing / Coring
01-035	Kahlounieh	Mr. Ragi Maasri	Soil Investigation
01-036	Chantier Mr. Joseph Nohra	Mr. Paul Obeid	Material Testing
01-037	El Mina Bldg.	Mr. Mouhammad Masri	Dewatering in Basement
01-038	Lycee extension Nahr Ibrahim	Mr. Louis saade	Stability & Shoring Investigation
01-039	Freres Des Ecoles Chretiennees	Mr. Paul Obeid	Geotechnical Site Visit Report
01-040	Saint Gregoires	Maken	Material Testing
01-041	Saint Rock Bldg.	Mr. Antoine Rahmeh	Soil Investigation
01-042	Imm. George Bassil	Mr. George Bassil	Soil Investigation
01-043	Villa Garo Kababjian	Mr. Habib Kharsa	Material Testing
01-044	Dam in Ain Atah	YMCA	Soil Investigation
01-045	Municipality of Furn El Chebbak	Mr. Tony Semaan	Soil Investigation
01-046	Bldg. In Hamra	Mr. Paul Feghali	Coring
01-047	Lotis 2365	Mr. Jihad Kassatly	Material Testing
01-048	Hemmana	Mr. Nicolas Nasrani	Soil Investigation
01-049	Bldg. In Jbeil	Jean Khneiser	CBR
01-050	Lot 2901 Bouchrieh	Mr. Toni Cortas	Soil Investigation
01-051	Retaining Wall Daroun	Mr. Habib Kharsa	Coring
01-052	Pumping Station Tripoli	Mr. Antoine Makhoul	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
02-001	Army Bldg. In Saida	Lebanese Army	Structural Evaluation
02-002	Landslide – Kfarchima	Lebanese Army	Soil Investigation
02-003	Municipality Of Haddath	Construction Co.	Material Testing
02-004	Semkanieh Plot 1648	Mr. Nadim Bachnac	Soil Investigation
02-005	Matelec Ghorfine -2-	Mr. Kamil Karam	Site Visit Report
02-006	Phoenix Machinery- New Hangar	Indevco Group	Supervision & Material Testing
02-007	Villa Abi Saab – Kfour	Mr. Abdallah Abi Saab	Material Testing
02-008	Jamati Bldg. Beit Meri	Mr. Antoine Nakhleh	Soil Investigation
02-009	Bldg. In Baabdat	Mr. Nassif Sakr	Soil Investigation
02-010	Lot 5133 Achrafieh	Mr. Paul Mearrawi	Soil Investigation
02-011	Tannous Tower	Mr. Kamil Karam	Structural Evaluation
02-012	Church Aaramoun	Mr. Assaf Assaf	Soil Investigation
02-013	Wall In Phoenix Machinery	Indevco Group	Material Testing
02-014	Bldg. In Broummana	Mr. Anouar Nassif	Coring & Testing
02-015	Ghorfine -3-	Mr. Kamil Karam	Oil Reservoir
02-016	Cathedral In Kfaraakka	Mr. Milad Semaan	Soil Inv. & Cavity Search
02-017	Zouein Bldg.	Mr. George Zouein	Soil Investigation
02-018	Semkanieh Lot 1096	Mr. Nadim Bachnac	Site Visit Report
02-019	Public School Becharreh (CDR)	Mr. Emile Khoury CDR	Soil Investigation
02-020	Port Tripoli (Phoenix)	Mr. Elie Abou Selwan	Soil Investigation
02-021	Public School Abbadieh (CDR)	Mr. Louis Saadeh	Soil Investigation
02-022	Charcuterie Aoun	Mr. Abdo Farjallah	Soil Investigation
02-023	Beit El Chaar Bldg.	Mr. Joseph Adaimeh	Structural Evaluation
02-024	Aoun Bldg. – Baabda	Mr. George Aoun	Soil Investigation
02-025	Mouawad Retail Bldg. Accawi	Mr. Elias Karaan	Soil Investigation
02-026	Project in Hazmieh	Mr. Toni Khalil	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
02-027	Karly Bldg.	Mr. Gary Chekerjian	Structural Evaluation
02-028	water Tank	Mr. Ali Baidoun	Steel Testing
02-029	Guibinian Center Dekwaneh	Sahag Guibinian & Sons	Soil Investigation
02-030	Residence. In Mechref Lot 3068	Mr. Patrick Mallat	Soil Investigation
02-031	Salon Eglise St. Elie-Lailaki	Mr. Kamil Karam	Material Testing
02-032	Ste. Boury Medawar	Mr. Habib Kharsa	Soil Investigation
02-033	Kfareman – Nabatieh	Kredo	Soil Investigation
02-034	Machghara	Kredo	Soil Investigation
02-035	Bldg. In Baabda Plot 4680	Mr. Antoine Sahyoun	Soil Investigation
02-036	Clinique Du Levant	MCC	Tile Testing
02-037	Public School BZIZA (CDR)	Mr. Louis Saadeh	Soil Investigation
02-038	Public School Kalamoun (CDR)	Mr. Amin Marhaba	Soil Investigation
02-039	Nabila Center Tripoli	Mr. Walid El Rassi	Soil Investigation
02-040	Dali Center Tripoli	Mr. Walid El Rassi	Soil Investigation
02-041	Al Wiam Tripoli	Mr. Walid El Rassi	Soil Investigation
02-042	Public School – Deir Ammar (CDR)	Mr. Amin Marhaba	Soil Investigation
02-043	Tabarja Chekka Highway Bridges	Mr. Antoine Makhoul	Structural Evaluation
02-044	Public School Amyoun (CDR)	Mr. Amin Marhaba	Soil Investigation
02-045	Clock In Solidere	Mr. Hamid Rahal	Soil Investigation
02-046	Kneiset	Kredo	Soil Investigation
02-047	Development of Roads	Mr. Elie Saliba	Plate Load Test
02-048	Saadiyat – Debbieh – Ain El Haour	Khatib & Alami	Soil Investigation
02-049	Lot 73 Beirut Central District	Mr. Elias Karaan	Soil Investigation
02-050	Saga Group Bldg. Saifi	Mr. Berj Chichmanian	Soil Investigation
02-051	Public School Aramoun (CDR)	Mr. Emile Khoury	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
02-052	Kesrouan Coastal Area Water Supply	UCE Karam Group Att. Patrick Abdel Hay	Steel Testing
02-053	Qlyaat – Villa FREM	Mr. Bob Naja	Plate Load Test
02-054	Plot 752 Saifi	MAKEN (Eng. Toni Farah)	Material Testing
02-055	Sanita Zouk Project	Masterpak George Zoghbi	Soil Investigation
02-056	MLCS – 38 El-Jahlieh	Imad Eddin Zaidan & Co.	Material Testing
02-057	Bldg. In Antelias	Eng. Sinan Balian	Soil Investigation
02-058	Farra – Mekalles	Mr. Joe Rufca	Material Testing
02-059	Bldg. In Beit Meri (Plot 3437)	Mr. Michel Rouhanna	Soil Investigation (Plate Load Test)
02-060	Hangar In Zekrit	Mr. Ralf Frayha	Material Testing
02-061	Villa Bahjat Ali Moussa – Yohmour	Mr. Paul Mearrawi	Soil Investigation
02-062	Bouchrieh Plot 411	Mr. Abdo Farjallah	Soil Investigation
02-063	Slayyeb Dump	Mr. Raji Maasri	Soil Investigation
02-064	Hilton Hotel	OPTIMAL (Dr. Khoury)	Concrete cylinders
02-065	SOLIDERE	Mr. Michel Aouad	Stone Testing (absorption, porosity)
02-066	Le MALL	TREGA Mr. Nadim Manneh	Concrete cylinders
02-067	Becharreh Lake – Ain Bakara	Mr. Mansour Abdallah	Soil Investigation
02-068	Kamil Sfeir Bldg.	Mr. Bechara Koueik	Site Visit Report
02-069	Paroisse Saint Antoine	Mr. Antoine Akiki	Material Testing
02-070	General Sleiman Residence	Commandant Akri	Material Testing
02-071	Kornet Chehwan Lot 1685	Mr. Iskandar Mahfouz	Soil Investigation
02-072	Matelec Carpentary Extension	Matelec	Site Visit Report
02-073	Kesrouan Coastal Area Water Supply	OPTIMAL (Dr. Khoury)	Material Testing
02-074	Kornet Chehwan Lot 1685	Mr. Andreh Mechleb	Site Visit Report
02-075	Public Open Square #4	AG contracting (roland Awad)	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
03-001	Villa Ido Chemlan	Eng. Imad Kortbawi	Soil Investigation
03-002	Medco Lot 1057 Saifi	Mr. Jihad Saleh	Material Testing
03-003	BCD Lot 1520	Landmark Mr. Ziad Chaar	Soil Investigation
03-004	Al Mahaba Bldg.	Mr. Joe Hawa	Coring
03-005	Achrafieh 5133	Mr. Fadi Baaklini	Material Testing
03-006	Kaaki Bldg.	Mr. Paul Nassar	Coring + Material Testing
03-007	Lot 1604 – Haret Saker	Mr. Michel Awad	Coring + Material Testing
03-008	Gemayzeh	Mr. Anis Samaha	Soil Investigation
03-009	Saradar Bank HQ	Mr. Michel Younes CCI	Site Inspection Report
03-010	Nakkach	Mr. George Torozian	Soil Investigation
03-011	Holiday	Mr. Jamil Iskandar	Soil Investigation
03-012	Ain Saadeh	Mr. Michel Saab	Material Testing
03-013	Bldg. In Roumieh	Mr. Elie Saliba	Site Visit Report
03-014	Adonis 1310	Mr. Kamil Karam	Site Visit Report
03-015	BK-BA -32 Ras Baalbak	Mr. Marwan Nabak	Material Testing
03-016	Betchay Bldg.	Mr. Kamil Karam	Material Testing
03-017	Safra Marine Block A	Mr. Chafic Khalifeh	Structural Evaluation
03-018	Brouchtay	Mr. Antoine Nakhleh	Soil Investigation
03-019	Bldg. In Hazmieh	Mr. Nabil Saab	Structural Evaluation
03-020	Nasr Bldg. Ain Saadeh 2718	Mr. Houssein Nasr	Site Visit Report
03-021	Bhamdoun	UCE Karam Group	Soil Investigation
03-022	Tager 3 Ach. Lot 5275	Mr. Anis Tager	Site Visit Report
03-023	Plot 3069 – Kfarmatta	Mr. Patrick Mallat	Site Visit Report
03-024	Villa In Monte Verde	Mr. Elie Salibeh	Material Testing
03-025	Bldg. In Adonis 1310	Mr. Kamil Karam	Cavity Search
03-026	Plot 495 – Aoukar	Mr. Georges Hamoush	Site Visit Report
03-027	Water Tank In Hrajel	Mr. Nazih Breideh	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
03-028	Villa Kozah Lot 957 Naameh	Mr. Mohamad Kozah	Soil Exploration Report
03-029	Haddad Factory Lot 1450Bchemoun	Mr. Yasser Alhaddad	Soil Exploration Report
03-030	Nabatieh Road	KREDO	Soil Investigation
03-031	Collège Protestant	MAKEN	Material Testing
03-032	Villa Boulos Bouji	Artisan Concrete System	Material Testing
03-033	Sir Donnieh Bridge	Mr. Antoine Makhoul	Soil Investigation
03-034	Residence Arfan Aiach	Mr. Patrick Mallat	Material Testing
03-035	Residential bldg. Fanar	Mr. Georges Eid – Eid Farah	Material Testing
03-036	Achrafieh 1157	Mr. Walid Akkawi	Matinal Testing
03-037	Lahoud Residence	Mr. Edgard Zoghbi	Matinal Testing
03-038	Water Tank Nabatieh	Mr. Fadelalla Mestrah	Soil Investigation
03-039	Asi Trade Unipark Halat	Mr. Georges Zoghbi	Matinal Testing
03-040	Meziara	Rabih Ramadi Trega	Soil Exploration Report
03-041	Villa Dandan – BarrElias	Walid Dalloul	Soil Exploration Report
03-042	Guibinian Center Dekwaneh	Sahag Guibinian	Soil Investigation Report
03-043	Lot 3395 Moussaytbeh	Mr. Nicolas Nasrani	Soil Investigation
03-044	Labaki bldg. Broumana	Mme Chalhoub	Soil Investigation
03-045	School Bridge-Kbayat	Mr. Antoine Makhoul	Soil Investigation
03-046	Church Bridge-Kbayat	Mr. Antoine Makhoul	Soil Investigation
03-047	Road Sliding-Kbayat	Mr. Antoine Makhoul	Soil Investigation
03-048	Rabieh Road	Municipality of Rabieh	Material Testing (Asphalt)
04-001	Ashrafieh Lot 5275	Mr. Anis Tager	Material Testing
04-002	Building In Bouar	Mme Aida Boueiri	Material Testing
04-003	Fakhreddine Restaurant	NAGECO s.a.r.l.	Material Testing
04-004	Mosque in Sanayeh	NAGECO s.a.r.l.	Material Testing

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
04-005	Antelias Lot	Mr. Berj Chichmanian	Soil Investigation
04-006	Military Base Nabatieh	Eng. Antoine Nakhleh	Material Testing
04-007	Tsircon Samples	Mr. Jimmy Khoury	Material Testing
04-008	Hamra AS 400	Fransa Bank Jimmy Khoury	Material Testing
04-009	Bldg. In Adonis 1310	Mr. Kamil Karam	Material Testing
04-010	Karly bldg.	Mr. Gary Chekerjian	Structural Evaluation
04-011	Ghanaji Bldg. – Mathaf	Mr. Jean Harfoush	Structural Evaluation
04-012	P.M.2	Unipak Tissue Mill	Soil Investigation
04-013	Institue de Tourisme Dekwaneh	Mr. Amine Marhaba CDR	Soil Investigation
04-014	NARCO SAMPLES	NARCO s.a.r.l.	Material Testing
04-015	Kelhat	Mr. Antoine Feghali	Site Visit Report
04-016	AFMA group	Maître Waddah El Chaaer	Soil Investigation
04-017	Villa Kassab – Qlayaat	Mr. Roger Kassab	Soil Investigation
04-018	Villa Ido Chemlan	Mr. Ghassan Ido	Material Testing
04-019	Entreprise Michel Aouad Samples	Mr. Michel Aouad	Material Testing (Absorption...)
04-020	Dar Al Sayad	Abniah s.a.r.l.	Material Testing
04-021	Commercial Center- Halat	Mr. Jad Samaha	Site Visit Report
04-022	Kfour	Walid Khalaf Patrick Abdel	Soil Investigation
04-023	Karameh Bldg. – Tripoli	Eng. Walid El Rassi	Structural Evaluation
04-024	Military Police Base	Mr. Edgurd Zoghbi	Structural Evaluation
04-025	Lot # 3208 – Ain Saadeh	Eng. Roger Kassab	Soil Investigation
04-026	Plot 144 – Mar Roukoz	Mr. Elie Khoury	Site Visit Report
04-027	Mtayleb	Mr. Fares Dagher	Soil Investigation
04-028	Matelec – Ghorfine Additional Floor Level	Mr. Kamil Karam	Foundation Evaluation
04-029	Dekwaneh Bridge	Kredo	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
04-030	Steel Rebars	Eng. Maurice Al Saifi	Material Testing
04-031	Water Tank in Hadath El Jebbeh	Mr. Fadlallah Mestrah	Soil Investigation
04-032	Villa Chakar – Broummana	Mr. Fadi Chamoun	Soil Investigation
04-033	Ashrafieh Plot 1164	Mr. Elie Zahar	Soil Investigation
04-034	Nassif's Residence Plot # 183	Mr. Georges Baaklini	Structural Evaluation
04-035	Yohmor – Bekaa El Gharbi	Mr. Farhat Moussa	Material Testing
04-036	Chalet El Daouk – Fakra	CCI Mr. Michel Youness	Material Testing
04-037	Mansourieh Road	Mr. Salim Katul	Soil Investigation
04-038	Kfarharra – Bireh Road	Eng. Fawaz Baroudi	Soil Investigation
04-039	Bikfaya Lot # 742	Mr. Jihad Saleh	Soil Investigation
04-040	USJ – Mathaf	Maken / Eng. Gaby	Material Testing
04-041	Lot 2332 Sin El Fil	Mr. Kamil Karam	Soil Investigation
04-042	Villa Sandan Faqra	CCI sarl	Honeycombing Solution
04-043	Dennieh – Hermel Highway	Ets. Makhoulf	Soil Investigation
04-044	Rmeil Lot # 919	Mr. Elie Samah	Soil Investigation
04-045	Kfour Rock Failure	Municipality of Kfour	Expert Report
04-046	World War 2 Museum	S&L Construction	Material Testing
04-047	Kouroum Bhamdoun	Kouroum Bhamdoun sal	Soil Investigation
04-048	Khalil School Btourram	Ets. Eng. Said Hallab	Soil Investigation
04-049	Wall in Qornet Chehwan	Municipality of Qornet Chehwan	Soil Investigation
04-050	Tobaya Bldg.	Mr. Michel Karam	Soil Investigation
04-051	Public School Lot 471 Daroun	Municipality of Daroun	Soil Investigation
04-052	Sami Dandan Barr Elias	CCI sarl	Steel Testing
04-053	Rmeil Lot # 2040	Mr. Emile Sfeir	Soil Investigation
04-054	Bldg. Petra 3 Mar Takla	Mr. Nabil Saad	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
04-055	Villa Dhour El Abbadieh	Art Crete	Material Testing
05-001	Chekerjian Center lot # 2385 Gemayzeh	ATTICS	Soil Investigation
05-002	Plot 118 Tall – Tripoli	Mr. Ousman El Zaher	Soil Investigation
05-003	Pumping Station Nabi Youchaa	Mr. Fadlallah Mestrah	Soil Investigation
05-004	Water Tank Turbol	Mr. Fadlallah Mestrah	Soil Investigation
05-005	Tile & Stone Testing	Mr. Michel Awad	Material Testing
05-006	Jamati Building	Mr. Tony Nakhleh	Soil Investigation
05-007	Precast Material Testing	Ets. Gemayel Freres	Material Testing
05-008	Araman Bridge – Failure Wall	Homan Eng'g	Soil Investigation
05-009	Upgrading of Hayek & Saloumeh Cross	BATCO	Soil Investigation
05-010	Amchit Army HQ	Mr. Joseph Maalouf	Soil Investigation
05-011	Matelec	Mr. Kamil karam	Soil Investigation
05-012	Plot 1389 Zeitoun Tripoli	Mr. Tarek El Kurdi	Plate Load Test
05-13	Plot 1390 Zeitoun Tripoli	Mr. Tarek El kurdi	Plate Load Test
05-014	Plot 3278 Bassatine Tripoli	Mr. Abdel Majid Dabbousi	Plate Load Test
05-015	Plot 391 zeitoun Tripoli	Mr. ahmad Abdallah	Plate Load Test
05-016	Ghazir – Kfarhbab Lot # 3921	Mr. Assaf Assaf	Soil Investigation
05-017	Iradat	Mr. Imad Abou Ink	Material Testing
05-018	Trabaud Building	Mr. Anis Tager	Soil Investigation
05-019	Betchay Lot # 313	Mr. Kamil Karam	Soil Investigation
05-020	Church Mar Doumit Foundation	Mar Doumit Church	Soil Investigation
05-021	Rehabilitation of Infrastructure Baakleen	Mr. Joseph Maalouf	Mix Design Report
05-022	Ablah Military Base	Mr. Antoine Nakhleh	Concrete Cylinders
05-023	Lot # 7283 Zeitoun Tripoli	Mr. Abbas Youness	Plate Load Test
05-024	Araman Bridge	Homan Eng'g	Asphalt Mixed Design

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
05-025	Azar Building - Brumana	Mr. Nicolas Azar	Soil Investigation
05-026	Lot # 1321 Ashrafieh	Mr. Anis Tager	Soil Investigation
05-027	Asharfieh Lot # 1074	Mr. Nazih Breidi	Soil Investigation
05-028	Sir el Donieh – Jbab el Homr	Est. Antoine Makhoul	Soil Investigation
05-029	Chidiac Building Plot # 3264 Jdeideh	Mr. Kamil karam	Soil Investigation
05-030	Vartan Photogravure Center	Photogravure Vartan	Soil Investigation
05-031	Grand Magazin Sarba	Societe Khairallah	Concrete Cylinders
05-032	Anout – Eklim El Kharrub	ESGE	Soil Investigation
05-033	Mission De Vie – Antelias	Mission De Vie	Soil Investigation
05-034	Rachid El Aam Building Plot # 801 Halat	Eng. Jad Samaha	Soil Investigation
05-036	Villa Etel – Kfour	Mr. Fadi Chamoun	Coring
05-037	Daroun Lot # 1522	Mr. Michel Karam	Soil Investigation & Concrete
05-038	Arab Printing Press – Dekwaneh	Arab Printing Press	Coring
05-039	AUST	Mr. Riad Sakr	Structural Evaluation
05-040	Akar Samar Residence – Kfarhazir	Samar Akar	Soil Visit Report
05-041	Villa In Ferzol	Mrs. Yvette Mhanna	Soil Investigation
05-042	Bank of Beirut	MEC	Soil Investigation
05-043	Jieh Beach Project	Mr. Edgard Zoghbi	Material Testing
05-044	Beit El Kahan Maad	Mr. Naji Chlela	Site Visit Report
05-045	Plot # 4208 Mar Takla – Baadba	Mr. Joseph Feghali	Soil Investigation
05-046	Khiam Hills	Mercy Corps	Material Testing
05-047	Tilal Fakra	Mr. Antoine Karouni	Material Testing
05-048	Matelec	Matelec	Plate Load Test
05-049	Tawk Building – Fanar	Mr. Tony Tawk	Concrete Cylinders
05-050	Mrah Sreij Bakhoun – Taran	Arabian Construction	Soil Investigation
05-051	Montiverdi	Hamoush	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
05-052	Road Lot # 305 To 316	Samco	Asphalt
05-053	Ouyoun Al Siman	CCI	Concrete Cylinders
05-054	Riva Heaven Development Rahbeh – Akkar	Mr. Ziad Rouwayheb	Site Visit Report
05-055	Bank Audi Marjeoun	Mr. Jim Khalifeh	Soil Investigation
05-056	Development of Roads & Streets – Jal el Dib- Bkennaya- Phase 2	Samco	Soil Investigation
05-057	Villa Kassem – Felougha	Mr. Talal Kassem	Soil Investigation
05-058	Ashrafieh Lot # 693	Mr. Sami Gelwan	Soil Investigation
05-059	Lot # 1274 Ashrafieh	CNF sal	Soil Investigation
05-060	Mkalles Factory	Mr. Anis Obeid	Site Visit Report
05-061	Feytroun Lot # 2519	Mr Kamil Hachem	Soil Visit Report
05-062	Bou Boutros Building Baabda Plot # 2204	Mr. Toni Feghali	Soil Investigation
05-063	Yazbeck Building Mansourieh Plot # 2276	George Yazbeck	Site Visit Report
06-001	Perla Building Hazmieh	Mr. Nabil Saad Perla sal	Soil Investigation
06-002	Building in Tabaris Plot # 183	Mr. Charles Awad	Soil Investigation
06-003	Alfa Laboratories	Mr. Maroun Hnein	Structural Evaluation
06-004	Chami Bulding	Mr. Chafic Chami	Cylinders
06-005	Ain Saadeh Lot # 2727	Hussein & Elie Nasr	Soil Investigation
06-006	Retaining Wall – Wadi Chahrour	Mr. Toni Feghali	Structural Evaluation
06-007	Masterpak Transformer Platform	Masterpak / Mr. Rmoel Jaradaa	Concrete Cylinders
06-008	Centre Paroissial & Eglise Bouar	Concil Paroissial –	Site Visit Report
06-009	Sanita Zouk Shark 2	Sanita	Material Testing
06-010	Plot # 2333 Sin el Fil	Mr. Kamil Karam	Soil Investigation
06-011	Bank Audi – Dora	CCI / Mr. Paul Makhlouf	Soil Investigation
06-012	Safady Residential Building – Beirut	RNA architects & Associates /	Soil Investigation
06-013	Dali III & IV	Mr. Fahed Tleiss	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
06-014	Zod IV	Mr. Wiam Zod	Soil Investigation
06-015	Al Kawasar Building Plot # 3484 – Tripoli	Mr. Wiam Zod	Soil Investigation
06-016	Ramlet el Baida	Mr. Raif Kassem	Structural Evaluation
06-017	Minieh – Nabi – Bhannin Road	Homan Eng'g	Soil Investigation
06-018	Sahel – Alma – Tabet Building	Mr. Georges Mhanna	Soil Investigation & Structural Evaluation
06-019	Balechmay Municipality Wall	Mr. Nehmeh	Concrete Cylinders
06-020	Lot# 755 – Haret el Sett – Baadda	Eng. Ghazi Lahad	Soil Investigation
06-021	Mouawad Retail Bldg Accawi Phase 2	High Investment-	Soil Investigation
06-022	Petrol Refinery – Tripoli	Tripoli Oil Installation –	Soil Investigation
06-023	New Storage Bldg 2 nd floor Sanita Halat	Sanita s.a.l.	Material Testing
06-024	Pine Park – Roumieh	Mr. Sfeir / Mr. Fadi Nsayri	Soil Investigation
06-025	Building in Fatroun	Mr. Toni Khawaja	Soil Investigation
06-026	Casino Bridge	BUTEC	Material Testing
06-027	Zouk Mobeh 1309 Residential bulding	Mr. Kamil Karam	Site Visit Report
06-028	Sanita Lot# 95 Ware House	Sanita	Soil Investigation
06-029	Bank Audi – Bhamdoun	Bank Audi	Soil Investigation
06-030	School at Jbeil	Mr. Georges Lahoud	Soil Investigation
06-031	Building in Awkar Lot # 264	Mr. Cezar Jabbour	Soil Investigation
06-032	BCC – Port of Beirut Duty Free	Eng. Toni Farah	Concrete Cylinders
06-033	Creabee-1 Biakout	Mr. Amin Sfeir	Concrete Cylinders
06-034	Project in Bouchrieh	Mr. Jawdat Bitar	Concrete Cylinders
06-035	Plot 3674 Sioufi Ashrafieh	Mr. Paul Mearrawi	Soil Investigation
07-001	Lot # 440 Mtayleb – Rabieh	Mr. Rodrigue Raii & Mr. Jack Lahoud	Site Visit Report
07-002	Slim Building Lot # 3397 – Ashrafieh	Mr. Ayoub El Masri	Soil Investigation
07-003	Building in Sin El Fil	Mr. Chukri Abou Samah	Structural Evaluation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
07-004	Project in Kornet El Hamra	Mr. Elie Kaddoum	Concrete Cylinders
07-005	Stone Testing (Rocky White)	Mr. Michel Awad	Material Testing
07-006	Villa Rami Naccache	Mr. Jean Paul Rami / Eng.	Soil Investigation
07-007	Sin El Fil Building	Mr. George Mechantaf	Coring
07-008	Ecole des Soeurs Salvatoriennes-Hadath	Mr. Fares Said	Site Visit Report
07-009	Project in Ashkout	Mr. Michel Karam	Concrete Cylinders
07-010	Project in Daroun	Mr. Michel Karam	Concrete Cylinders
07-011	Building in Fanar	Mr. Mitri Maalouf	Structural Evaluation & Surveing
07-012	Roumieh 2982 Factory	Mr. Abdo Abi Chakra	Site Visit Report
07-013	Mansourieh	Mr. Kamal Bejjani	Site Visit Report
07-014	St. Charles Hospital	Eng. Rodolph Mattar	Structural Evaluation
07-015	Steel Rebars Testing – Sursock	Mr. Gabi Saghir / Nasr & Azar	Material Testing
07-016	Lot # 1309 Adonis	Mr. Kamil Karam	Material Testing
07-017	Villa Wall Ain El Rihani	Mr. Radi / Mr. Raymond Saadeh	Soil Investigation
07-018	Lot # 186 Rmeil	Mr. Anis Tager	Soil Investigation
07-019	Horsh Tabet Site	Mr. Gabi Saghir / Nasr & Azar	Concrete Cylinders
07-020	Residence in Tripoli	Mr. Youssef Fattal	Soil Investigation
07-021	Nabay	Mr. Imad Khoury	Site Visit Report
07-022	Zouk Mosbeh	Mr. Elie Awad	Soil Investigation
07-023	Mar Takla 4215	Mr. Kamal Bejjani	Soil Investigation
07-024	Meemari Bldg. 5494 Baabda	Mr. Sami Meemari	Soil Investigation
07-025	Tunnel in Nabeh	Homan Eng'g	Soil Investigation
07-026	Dora Plot # 53	ACECRAFT / Mr. Joseph Boulos	Soil Investigation
07-027	Lot # 420 Jal El Dib	Mr. Nadim Sebaali	Soil Investigation
07-028	Obagi Warehouse – Zouk	Sanita	Structural Evaluation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
07-029	Zakroun El Khoury	Mr. Faraj Kodsí	Soil Investigation
07-030	Children Village Tripoli	Mr. Naji Nasri	
07-031	Building in Baabdat	Mr. Abdo Abi Chakra	Structural Evaluation
07-032	Batchay Lot # 68	Mr. Kamil Karam	Soil Investigation
08-001	Ashrafieh Lot # 2329	Mr. Kamil Karam	Soil Investigation
08-002	Ot # 4512 Koube – Chouwayfat	Eng. Serge Aoun	Soil Investigation
08-003	Building in Mazraat Yachouh	Mr. Raphi Bissal	Structural Evaluation Report
08-004	Chidiac Residence Wadi Chahrour	Mr. Julien Chidiac	Soil Investigation
08-005	Lot # 1283 Fanar	Eid Farah & Georges Eid	Concrete Cylinders
08-006	Lot # 2343 Beit Merry	Mr. Toufic Maalouf	Soil Investigation
08-007	Hopital Saint Antoine – Mathaf	Mr. Antoine Karam	Material Testing
08-008	Lot # 154 Jamhour	Mr. Kamal Bejjane	Material Testing
08-009	Monte Verde House	Mr. Riad Sakr	Site Visit Report
08-010	Bcharreh Musee Gebran	Mr. Antoine Towk	Rock Fall Barrior
08-011	Awkar Project / Abraj Lebanon	Mr. michel Hnein	Soil Investigation
08-012	Bir El Heit Quartaba	Mr. David Jorr	Soil Investigation
08-013	Boulevard de Zahle	Mr. David Jorr	Soil Investigation
08-014	Baabdat	Mr. Elio Zahar	Soil Investigation
08-015	Lot # 5153 Bourj Hammoud	Mr. Richard Sanmaha	Soil Investigation
08-016	Jounieh Marine Base	Cdt Georges Richwan	Soil Investigation
08-017	Achrafieh Lot # 1462	Mr. Mouhammad	Soil Investigation
08-018	Fuel Tanks @ Beoit Barakat Casern – Tyre	Cdt Georges Richwan	Soil Investigation
08-019	Casern Dory Irani – Louwayzeh	Cdt Georges Richwan	Soil Investigation

INVESTIGATION DIVISION (cont'd)

Reference	Project	Client	Description
09-001	Qornet chehwan	Eng Kamal Bejjani	Soil Investigation
09-002	Ashrafieh Lot # 1623	EDRI	Soil Investigation
09-003	Lot # 3651 Bauchrieh	Mr. Najib Jamati	Soil Investigation
09-004	Project in Rabieh	CCI	Material Testing
09-005	Lot 3 655 Haret Sakher	CCI	Soil Investigation
09-006	Lot # 2010 Zouk	Masterpak	Soil Investigation
09-007	Proj Rihani Baabda	Sami Meemari	Site Visit Report
09-008	Ouyoun al Siman Project	CCI	Material Testing
09-009	El Hajj Factory	CCI	Material Testing
10-001	Lot # 228 Sursok	EDRI	Soil Investigation
10-002	Luna Press Zouk	Luna Press	Coring & Testing
10-003	Dora Lot # 2521 Boat Showroom	MAM	Soil Investigation
10-004	Lot # 774 Tripoli	Paul Mearrawi	Soil Investigation
10-005	Lot # 180 Achrafieh	Achrafieh Mid Town	Soil Investigation
10-006	Lot # 2438 Achrafieh	AUST	Soil Investigation
11-001	FO 66 Monte Verde	Marc Chamoun	Coring & Testing
11-002	Lot # 283 Haret Sakher	Ramlet El Hamra s.a.l.	Soil Investigation
11-003	Module Store	Module	Material Testing
11-004	Ramzi & Salma Akkawi Project	CCI	Material Testing
11-005	Gharzouzi Fakra Project	CCI	Material Testing
12-001	Traboulsi Factory Hazmieh	Elie Traboulsi	Soil Investigation
12-002	Lot #1251 Port - Saifi	121 Downtown S.A.L.	Soil Investigation
12-003	Chemali Bldg Lot #667 Rabiye	Fredy Chemali	Monitoring
12-004	Balhawan Project – Beirut Port Warehouse	IBCO	Soil Investigation

APPENDIX C

LISTS OF PROJECTS OVERSEAS – CONTRACTING DIVISION

CONTRACTING DIVISION

The following list represents the projects that IGM was directly involved in the design and execution worldwide.

Reference	Project	Client	Description
97-501	Zahrani Interchange (Zahrani)	BRICC	Piling 40cm, 2000l.m.
97-502	Lot 131 (BCD)	BATITEC	Underpinning & Retaining system by Micropiling and Strutting
98-501	Sahel Alma project (Sahel Alma)	Entreprise E. Acar	Stabilization of Rocky Landslide by deep Nailing
98-502	Ferneini building (Achrafieh)	Entreprise Nahas	Anchoring
98-503	Bsat Supermarket (Aabra, Saida)	Yehia Bsat	Anchoring
98-504	Infrastructure Rehab (Deir El-Qamar)	Entreprise E. Acar	Nailing of Concrete Retaining Wall
98-505	Jounieh-Harissa Highway	Entreprise E. Acar	Micropiling and Anchoring to reinforce an existing Retaining wall
98-506	Deek El-Mehdi Residential Develop.	Sleiman Haddad	Shotcreting & Nailing
99-501	Tamish Building (Tamish)	Sleiman Haddad	Nailing
99-502	Sam's Gate (Mazraat Yachouh)	Sleiman Haddad	Piling + Anchoring
99-503	Square 3 (BCD)	BRG	Micropiling
99-505	OLM (Tehouita)	Lebanese Order of Physicians	Piling, Diaphragm Wall, Anchoring, Nailing & Shotcreting
99-506	Harbor Drive (Gemmayzé)	Chekerbuild	Shotcrete & Anchors
99-507	Spinneys Generators (Dbayeh)	Walid Tok	Coring & Grouting
99-508	Wehbé Building (Sassine Square)	Fundamentals	Underpinning with Micropiles
99-509	Fakhry building (Achrafieh)	Chawky Fakhry	Anchoring
99-510	Dalloul Townhouse (Saifi)	Fundamentals	Micropiling

CONTRACTING DIVISION (cont'd)

Reference	Project	Client	Description
99-511	Clinique du Levant (Sin El-Fil)	Joseph Maalouf	Design – Piling, Anchoring & Shotcreting
99-512	Atlantis Restaurant (Saifi)	Good Mood	Underpinning Foundations
99-513	Jalkh Building (Ain-Saadé)	Entr. Jalkh	Micropiling & Anchoring
99-514	Achrafieh 235 (Achrafieh)	Fundamentals	Anchoring
99-515	Université la Sagesse (Tehouita)	M.A.N.	Shotcreting & Nailing
99-516	Felougha Complex (Felougha)	Chafic Abi Rached	Micropiling & Shotcreting
99-517	Charbineh Wall (Deir El-Qamar)	Entreprise E. Acar	Design – Nailing
99-518	Sursoc	Asley Nammour	Underpinning
00-501	Rawsheh Bldg.	Mr. Jalal Fawaz	Column Jacketing
00-502	Habtoor Hotel	MAN	Shotcrete + Nails
00-503	Azzi Bldg.	Mrs. Azzi	Design – Shoring (Micropiles + Anchors)
00-504	Baabdat Villa	Patrik Abdel Hay	Design – Retaining System, Nailing
00-505	Araman Army Camp	Eng'g Direct. Leb. Army	Uplifting by Jacking + Grouting + Steel Strengthening
00-506	Clover Village	CCI	Shotcrete + Rock Fall Barrier
00-507	Hassoun Center	Mr. Aly Hassoun	Shotcrete + Anchoring
00-508	Samara Bldg.	Mr. R. Samara	Micropiling
00-509	Tager Bldg.	Mr. Anis Tager	Micropiles + Shotcrete + Anchors,

CONTRACTING DIVISION (cont'd)

Reference	Project	Client	Description
00-510	Carmel Saint Joseph School	Mechref	Structural Repair by Anchoring and steel beams
00-511	General Wehbeh Balcony	General Wehbeh	Structural Repair + New Balcony
00-512	Halat House	Indevco	Micropiling
00-513	Faraya House	Mr. Michel Arbaji	Foundation Repair + Micropiling
00-514	Chahine Bldg. Achrafieh	Mr. Antoine Chahine	Jacketing
00-515	Kfarzebien Parapet	Indevo	Road Parapets
01-501	Sejaan bldg.	Municipality of Jdeideh	Temporary support
01-502	Verdun store 732 "F11"	Mr. Moussa Fakhoury	Demolition of Staircase
01-503	Deir Saidate El Bir	Indevo Group	Handicap Ramps
01-504	UFA	Mr. Jamil Chammas	Underpinning with Grouted Micropiles
01-505	Aqua Marina Pool	AQUA	Coring
01-506	Hitachi Bldg.	ETS. Papasarandes	Shoring (Piles + Anchors)
01-507	Tager Bldg. 2	Mr. Anis Tager	Excavation & Shoring (Mpiles + Anchors)
01-508	College Sacre Coeur	Mr. Paul Obeid	Shoring (Piles + Anchors)
01-509	Tissue Mill – Sanita	Indevco Group	Shoring (Piles + Bracing)
01-510	Sheikh Salem Res. Falougha	Mr. Chafic Abi Rached	Slope Stabilization with Micropiles

CONTRACTING DIVISION (cont'd)

Reference	Project	Client	Description
01-511	Betchay	Mr. Kamil Karam	Permanent Stabilization with Nails
01-512	Mazloun Hospital	Mr. Mohammad Masri	Shoring with Piles
01-513	Quartaba Fountain	Municipality Mr. E. Karam	Horizontal Drain in Rock
01-514	Manneh Bldg.	Mr. Nadim Manneh	Drilling For Epoxy
01-515	Residential Bldg. AchKout	Hnr. Sami Aoun	Micropiling
01-516	Residential Bldg. Bassatines	Mr. Jad Abdel Salam	Foundation & Anchoring
01-517	Lot 1731 Roumieh	Moawad Group	Slope Stabilization, Micropiling, Underpinning
01-518	Bassatine Bldg – Tripoli	Mr. Abdel Razzak Hajjeh	Shoring System – (Piling + Anchors)
02-501	Bldg. In Faytroun	Mr. George Abi Chdid	Coring
02-502	Hilton Hotel	Dr. Michel Khoury	Shoring
02-503	Fakra Residence	Mr. Gary Chekerjian	Coring
02-504	Jamati Bldg. – Monte Verde	Mr. Najib Jamati	Shoring (Cast in situ walls + Anchoring)
02-505	Tamiche Project Phase I	Mr. Sassine Farah	Shotcreting + Nailing
02-506	Hounein Residence Fakra	Mr. Maroun Hounein	Coring
02-507	Restaurent @ Sodeco	Mr. Habib Kharsa	Shoring (Mpiles + Anchors)
02-508	Bldg. In Bhamdoun	Mr. Elie Halabi	Jacking up of Slab
02-509	Matelec New Hangar	Mr. Abdel Lattif Kambris	Piling (60cm)

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
02-510	Achrafieh Lot 68	Mr. Karim Karam	Drilling
02-511	Lot 1754 Achrafieh AUST	Mr. Riad Sakr	Micropiling
02-512	Restaurent @ Sodeco Concrete	Mr. Habib Kharsa	Structure (Concrete Works)
02-513	IMH Group – Lab ALFA	Mr. Maroun Hounein	Coring
02-514	Saifi Bldg.	Mr. Gary Chekerjian	Coring
02-515	Shiah Lot 4377	Mr. Khaled Hamad	Anchoring + Sheetpiling
02-516	Rmeil Residence Bldg.	Mr. Toros Kanikorian	Shoring
02-517	Sanita Zouk Project	Masterpak s.a.l.	Micropiling + Grouting + Concrete Construction
02-518	Bldg. In Antelias Lot 855	Mr. Sinan Balian	Shoring (Piles & Anchors)
02-520	Nahar Bldg.	Mr. Maroun Hounein	Coring
02-521	Achrafieh 5133	Mr. Fadi Baaklini	Shoring (Mpiles & Anchors)
02-522	Diamant Bleu	Mr. George Neeman	Micropiling offshore
02-523	Sanita Extra Works	Masterpak	Extra Works in Concrete
02-524	Pumping Station Tripoli	Mr. Antoine Makhoul	Grouting
02-525	Tamiche Phase II	Mr. Sassine Farah	Shotcrete

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
03-501	Medco BCD	Mr. Jihad Saleh	Shoring
03-502	Elias Propriety In Zouk (Play Boy)	Mr Romanos Maroun	Anchoring
03-503	Achrafieh Lot 126	Mr. Michel Saab	Shoring
03-504	Madik Sand Removal	Tajj/ Nicolas Ghanem	Grouting
03-505	DEBALEH – Imm. De Gendarmerie	Dr. Michel Khoury	Coring
03-506	St. Ramon Center Bejderfel	Mr. Roger Kassab	Micropiling
03-507	Akkar Road	OEC s.a.r.l.	Nailing & Shortcreting
03-508	Saradar HQ Achrafieh	CCI / Mr. Michel Youness	CFRP
03-509	Achrafieh Lot 5275	Mr. Anis Tager	Shoring
03-510	Harissa Highway	Ent Acar	Shoring
03-511	Monoprix Zouk	Mr. Paul Marrawi	Coring
03-512	Villa Haddad	Mr. Dani Haddad	Anchoring
03-513	Project In Aley	Mr. Hanna Hachem	Shoring
03-514	Palace Of Justice Tripoli	Ministry Of Public Works	Shoring
03-515	Harissa	Acar	Concrete
03-516	Dar Bochtar	Naja	Piling
03-517	Broummana Fakhredine	Ahmad Najm El Dine	Piling
03-518	Bldg. In Rochmaya	Eng. Elie Rafih	Coring In Wall
03-519	Ashrafieh Lot 683	Mr. Chawki Farhat	Shoring
03-520	Jamhour	Man Enterprise Kamal Khoury	Grouting
03-521	Broummana	Mme Hayat Chalhoub	Piling
03-522	Madik Sand Removal	Mr. Nicolas Ghanem	Grouting
03-523	Villa Bandali - Bsalim	Mme Bandali	Construction

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
04-501	Mosque in Sanayeh	Mr.Ahmad Najm Eddine	Shotcreting & Nailing
04-502	Beirut marina	Eng. Dany Khoury	Anchoring
04-503	Moawad Tower 8 th Floor	Eng. Roy Ingea	CFRP
04-504	Villa Soghayar	Mr. Kamil Karam	CFRP
04-505	Roumieh – Kannabi Landslide – Broummana	Kahi Contracting	Anchoring
04-506	Haret Sakhr Under Pass	Entreprise Edmond Acar	Shotcreting
04-507	Rizk Residence – Achkout	Mr. Roger Kassab	Micropiling
04-508	Modern Mills of Lebanon	Mr. Charles Khoury	CFRP
04-509	Retaining Walls Naeemeh	Devo Paints	Grouting – Wall
04-510	Bridges in Tripoli	HOMAN Eng'g	Piling
04-511	Karameh Bldg. Repair Tripoli	Mr. Walid El Rassi	CFRP
04-512	PM 2 Tissue Mill	Unipak s.a.l.	Shoring
04-513	Chambre de Commerce Tripoli	Ets. Eng. Said Hallab	Shoring
04-514	Military Police Base Fiyadieh	Mr. Jean Moufarrej	Shotcrete
04-515	Fanar Lot # 738	Mr. Peter Towk	Shoring
04-516	Aishti Diso Down Town	Tsircon Co LTD	CFRP Reinforcing
04-517	Discharge Well @ Unipak	Unipak sal	Installation of Discharge Well

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
05-501	PM 2 Foundation	Unipak Tissue-Mill	Shoring Micropiles and Anchors
05-502	Petra 3 Lot 5508 Hazmieh	Mr. Nabil Saad	Underpinning Micropiles (1m)
05-503	Hayek Bridge	CMC / Jalkh JV	Foundation Pile Testing – SLT & PIT
05-504	Matelec Factory Phase I	Matelec sal	Foundations Piles (60cm)
05-505	Water Well Hill Side – Halat	Unipak Tissue – Mill	Environmental Water Well
05-506	Lot # 225 Antelias	Mr. Anis Bechara	Shoring Piles (60cm) + Struts
05-507	Fosh 94	Themeliosi s.a.	Shoring Grouting & Anchors
05-508	Al Ouyoun – Villa Samir Chakar	Mr. Fadi Chamoun	Shoring Nailing
05-509	Choueiry Residence Hazmieh	Mr. Joseph Feghali	Foundations Piles (60cm)
05-510	Trabaud Bldg.	Mr. Anis Tager	Shoring Micropiles – Anchors – Shotcrete
05-511	Water Well Treatment – Batroun	Envirotech s.a.r.l.	Environmental Well Drilling – Wastewater diffuser
05-512	Haret Sakhr Underpass Bretelle B	Entreprise Edmond Acar	Shoring Permanent Wall Nails & Shotcrete
05-513	Mansourieh Road	Salim Katul for Eng'g & Contracting	Shoring Permanent Wall Nails & Shotcrete
05-514	Bireh Landslide Road Qobayat	Est Antoine Makhoul	Slope Stabilization Piles (60cm)
05-515	AUST Achrafieh	Mr. Jack Lahoud	Structural Evaluation Micropiles & Reinforced Concrete
05-516	Achrafieh Lot # 732	Mr. Charles Aouad	Shoring Micropiles & Anchors
05-517	Zeino Tower II	Alfred & Jack Matta	Shoring Design & Build – Piles , Anchors

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
06-501	Dora Viaduct	MAN Enterprise	Piling and Load Test
06-502	Ferzol	Mr. Michel Mhanna	Micropiling & Grouting
06-503	Immeuble Chidiac	Mr. Kamil Karam	Piling
06-504	Villa Kassab – Qlaayat	Mr. Roger Kassab	CFRP
06-505	Araman Phase 2	Homan Eng'g	Piling
06-506	Hazmieh Municipality	Mr. Joseph Maalouf	Shoring
06-507	Ashrafieh Lot # 981	Mr. Naji Masri	Piling
06-508	School Al Rama – Wadi Khaled / Akkar	Refaat Saad Eng.	Grouting
06-509	Upgrade of Deir Ammar-Abdeh Bhannin Underpass	Homan Eng'g	Piling
06-510	Villa Daher 1281 Qornet Chahwan	Mrs. Nicole Kanaan	Piling & Anchoring
06-511	Ashrafieh Lot # 700	Mr. Chawki Farhat	Shoring
06-512	Halat Ware House # 95	Sanita	Shoring
07-501	Slim Building Masri II Lot # 3397 – Ashrafieh	Mr. Naji Masri	Piling
07-502	Lot # 789 Rmeil	Fouquet Real Estate s.a.l.	Shoring
07-503	Bank Audi Dora	Bank Audi / Mr. Michel Youness	Micropiling
07-504	Municipality of Hazmieh	Mr. Joseph Maalouf	Micropiling
07-505	Aytat School	Mr. Joseph Maalouf	Piling
07-506	Ghorfine	Matelec s.a.l.	Micropiles
07-507	LAU Road next to St. George Jbeil	Mr. Antoine Menassa	Shoring
07-508	Bhanine Bridge Phase II	Homan Eng'g	Piling
07-509	Lot # 4215 Mar Takla	Mr. Kamal Bejjani	Piling
07-510	Baabda Lot # 5494	Mr. Sami Meemari	Shoring

CONTRACTING DIVISION (cont'd)

c	Project	Client	Description
08-500	Villa Ayoub Daroun	Eng. Louis Hachem	Structural Repair
08-501	Lot # 2385 Gemayzeh	Saifi Attics s.a.l	Shoring
08-502	Lot # 2188 Sioufi	Mr. Mouin Aoun	Shoring
08-503	AUST – Bloc G	Mr. Riad Sakr AUST	CFRP
08-504	Mansourieh Road – Rock Stabilization	Ministry of Public Works	Shoring
08-505	Lot # 1340 Rmeil	Mr. Khalil Bachaalani	Shoring
08-506	Ain El Rihani Lot # 35	Mr. Joseph Radi	Shoring
08-507	Lot # 692 beirut / Haigazian University	Mr. Jihad Doumit	Shoring
08-508	Lot 3 4354 Achrafieh	Deek & Masri	Shoring
08-509	Lot # 1937 Achrafieh	Ayoub & Masri	Shoring
09-501	Lot # 3107 Mansourieh Gate	Mr. Gaby Kikano	Shoring
09-502	Lot # 2385 Gemayzeh Phase II	Saifi Attics	Shoring
09-503	Lot # 2285 Achrafieh	CREDCO	Shoring
09-504	Lot # 1462 Achrafieh	GROUP 3 s.a.r.l.	Shoring
09-505	Villa Daniel In Fakra Club	CCI	Micropiling
10-501	Lot # 1137 Zkak El Blat	City Hill s.a.l.	Shoring
10-502	Lot # 3107 Ph II Mansourieh	Gaby Kikano	Shoring
10-503	Lot # 2438 Ashrafieh AUST	AUST	Micropiling
10-504	Nahr El Mot Lot # 141	Arope Care Customer Service	Shoring
10-505	Fakra Project	Toubia Kmeid	Piling
11-501	Lot # 1804 Ashrafieh	Capstone	Shoring

International IGM Qualification Document

11-502	Lot #141 Naher El Mot	Arope	Shoring
11-503	Lot #1137 Zquaq El Blat	City Hill	Shoring
11-504	Lot #1956 Bank Audi Hadath	CCI	Shoring
11-505	Berkayel	Homan	Shoring

APPENDIX D

CV OF MARC BALLOUZ

MARC JOSEPH BALLOUZ

Int'l Institute for Geotechnics & Materials
 IGM - Achrafieh, Baroudi St.
 Sara bldg, Beirut, Lebanon

Ph # (961) 1 217 825
 Fax : (961) 1 217 826
 Email: mballouz@i-g-m.com

OBJECTIVE Excel & Lead.

TITLES Owner & Director, International I.G.M. s.a.r.l
 Professor, Lebanese University

EDUCATION Ph.D. in Civil Engineering (Geotech), May 1994, Texas A&M University,
 M.Sc. in Civil Engineering (Geotech), May 1991, Texas A&M University, College Station, Texas, U.S.A. GPA : 4.0/4.0
 B.E. in Civil Engineering, July 1987, American University of Beirut, Lebanon.
 Lebanese Baccalaureate Part I (Sc.) 1982 & Part II (Math Elem.) 1983, College, Notre Dame de Jamhour, Lebanon.

LANGUAGES Arabic, French, and English

SPECIALIZED COURSES	Soil Dynamics	Applied Foundations	Wave Propagation in Solids
	Soil Mechanics	Foundation Structures	Geotech.&Geol. Site Investigat.
	Rock Mechanics	Theoretical Soil Mech.	Foundation Analysis & Design
	Offshore Drilling	Seepage & Consolidation	Numerical Methods in Geotech.
	Marine Foundations	Earth Retaining Structures	Foundations on Expansive Soils
	Structure Reliability	Case Histories in Geotech.	Phys.&Eng'g Properties of Soils

ENG'G EXPERIENCE

Oct 01-present	- Assistant Professor, LU-Lebanese University (BII), Roumieh, Lebanon. Teaching the "Rock Mechanics", "Advanced Foundations" & the "Soil/Structure Interaction" courses, senior year in Civil Eng'g.
Jan 96-present	- Ass. Professor, LAU-Lebanese American University, Byblos, Lebanon. Teaching "Soil Mechanics" & "Foundation Engineering". senior year in Civil Eng'g
Jan 92-May 92	- Assistant Lecturer, Texas A&M Univ. Teaching "Soils in Construction" (CVEN 366). Principles of Soils Mechanics and its applications in construction. 4 th year students in Construction Science major.
Sep 91-Dec 91	- Assistant Lecturer, Texas A&M University. Teaching "Introduction to Geotechnical Engineering" (CVEN 365). Geotechnical theories of soils including foundations, soil retention, slope stability, water seepage... 4 th year in Civil Engineering major
Sep 89-May 90	- Teaching Assistant, Texas A&M University. Teaching the Lab of "Introduction to Geotechnical Engineering" (CVEN 365). Laboratory and In-situ testing of soils. 4 th year in Civil Engineering major

TEACHING

Sep 87-Dec 87 - Teaching Assistant, American Univ. of Beirut. Teaching the Lab of "Soil Mechanics" (CE 088). Basic laboratory testing of soils. 3rd year in Civil Engineering major

**Consulting
&
Execution** **Mar 97-present**

- Owner, and General Manager- International Institute for Geotechnics & Materials (International IGM). A leading company in Lebanon, with more than 40 employees operating with 5 divisions: *Investigation, Design, Contracting, Research & Computing*. The company has a fully equipped Lab and a sizable fleet of specialized equipment for Piling, Micropiling, Anchoring, Shotcreting, HP Injections, etc... Its reputation was acquired by Design/Built and/or innovative solutions for shoring and foundation systems with Reference Projects:

International Consultancies:

Indevco Factory: Footings for Dynamic Generators (Saudi Arabia- 2003)

Sheikh Allah Mall & Towers: Soil & Piling expertise (Iraq- 2004)

Indevco Factory –Georgia: Soil & Piling expertise (USA- 2004)

Fattal Residential Complex: Piling expertise (Nigeria- 2004)

Aboto Bridge: Piling expertise & Remediation process (Nigeria- 2005),

Homan Village: Mat Foundations for 50 villas (Djibouti- 2006)

Amassoma Bridge: Complete Structural and Pile design (Nigeria- 2006)

Freeman Residence: Slope Stability Analyses -Texas (USA- 2006)

Okbia/Nembah Highway: Evaluation ,Pav.mt & Bridges (Nigeria-06)

Pointe du Hoc: Expertise on Erosion & Cliff Stability (France- 2006)

Ondo Highway: Remediation to Embankment Failure (Nigeria- 2006)

Audi Bank – Halab: Geotech & Structural Evaluation (Syria- 2006)

Soma Windfarm Project: Soil & Foundation Expertise (Turkey- 2007)

Ondo Phase II + Ughelli Bridge Dualization (Nigeria- 2007)

Banana Bay Towers: Piling expertise (Nigeria 2007)

Alape Bridge: Complete Structural and Pile design (Nigeria 2007)

Consulting mission with Furgo (Mr. K. Khalaf – Dubai)

In Lebanon :

Zeino II tower (Shoring 16m deep), Alta Vista tower (Uplifting 1200T 22 stories tower after terrorist bomb) , Dennieh Cable-Stay Bridge & Rock Cliff (Geotech Expertise), Chambre of Commerce- Tripoli (Shoring 14m deep), Justice Palace- Tripoli (Shoring 14m deep), Akkar Tunnels (Piling with Top/Down Technique), Sanita Factory (Innovative Micropiling Foundation Solution + Complete Concrete Construction), Harissa Highway (Shoring, Permanent Shotcrete Nailed Walls + Construction of 4 Bridges) , Hilton Hotel (Shoring with Special Dynamic Anchors to resist Implosion), Lebanese Order of Physicians (Shoring 30m deep with 15m below water level) , Levant Hospital (Shoring 22m deep), Sagesse University (Shoring 12m deep with nailed shotcrete), Zahrani Interchange (Piling), Underpinning of Wehbeh bldg (using Micropiles), etc...

A full qualification document of iIGM is available upon request. – www.i-g-m.com-

Aug 96-Feb 97

- Owner, Partner, BKS Consultants. Establishing a new consulting firm that offers professional geotechnical services. Expertise in Non Destructive Testing (NDT) of Foundations.

- Feb 95-Jan 97** - Project Manager, with Entreprise E. Acar, Residential center with 35 apartments, 4m\$ turn key project.
- Project Manager, Entreprise E. Acar. Main contractor of the Jounieh-Bkerke-Harissa highway. 22m\$ project with works involving, but not limited to, excavations, retaining walls, drainage systems, 2 bridges, 2 tunnels and 8km pavement, Residential Center
- Mar 94-Nov 94** - Project Engineer, ATSER Eng'g Company, Houston TEXAS USA. Design, consulting, and inspection of many residential and industrial projects. Studies included site investigations, trenching, foundations, slope stability, retaining walls, etc... with complete geotech reports.
- Manager of Software Development Group, ATSER. Development of computer software for engineering and other applications.
- Mar 92** - Pressuremeter testing with Briaud Engineers, 80m. underground at the Superconducting Super-Collider project in Waxahchi, Texas.
- Jun 87-Aug 88** - Construction management with Entreprise E.Acar.

...

Research & Continuing Education	Mar 97-todate	- Applied research with IGM research Division. Monitoring data, Development of ISST, Supervision of Academic research projects at UL and LAU. Full scale testing on actual projects like “Micropiles in rock” and “Behavior of Anchors under Dynamic Loads”.
	June, 2007	- Attendee & Speaker at <i>First North American Landslide Conference</i> , Vail, Colorado, USA, June 4-8, 2007
	Nov, 2006	- Workshop on PLAXIS Finite Element software for Soil & Rock Mechanics, BAT Concept at Grand Gabriel Hotel, Adonis, 2006
	Sept. 2005	- Attendee & Speaker at <i>Tenth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impact of Karst TM</i> , San Antonio, Texas USA, Sept. 24-28, 2005
	May 2004	- Workshop on PLAXIS Finite Element software for Soil & Rock Mechanics, Lebanese Order of Engineers, Beirut, 2004
	May 2004	- Attendee and Exhibitor at <i>GeoBeirut, Int’l Conference of Geotechnical Engineering</i> , Beirut, May19-22, 2004
	April 2004	- Attendee of the <i>Vth Int’l Conference on Case Histories in Geotechnical Engineering</i> , New York, April 13-17, 2004
	May 2002	- Attendee, Presenter & Publisher at <i>JLG Journee Libanaise de Geotechnique</i> , Lebanese University, Roumieh, May 8, 2002
	Aug 2001	- Attendee of the <i>XVth Int’l Conference on Soil Mechanics & Geotechnical Engineering</i> , Istanbul, Aug 27-31, 2001
	Nov. 2000	- Committee Member, Lebanese Order of Engineers, for preparing the new guidelines for geotechnical requirements in Lebanon
	Jan 94	- Research Project Manager, Texas A&M University. WAK tests (NDT) on five full scale footings on sand at the Texas A&M National Geotech Sites. This work was part of the “ <i>Settlement 94</i> ” <i>ASCE Specialty Conference</i> in College Station, Texas, June 16, 1994
	Jun 92-Dec 93	- Research Assistant, Ph.D. with Dr. J.L.Briaud, Texas A&M University. Development of a non-destructive test LATWAK, to predict the lateral stiffness of piles.
	Sep 93	- LATWAK Tests and Lateral Static Load Tests on 4 full scale piles (reinf. conc. drilled piles) at the Texas A&M National Geotech Sites.
	May 93	- LATWAK Tests and Lateral Static Load Tests on 8 full scale piles (concrete filled steel pipes) in Edmonton, Canada.
	July 92	- LATWAK Tests and Lateral Static Load Tests on 10 full scale piles (concrete, steel, & timber) in New Orleans, Louisiana.
	Jan 92	- Speaker at the Transportation Research Board, TRB , 71 st . Annual Meeting, session 174, January 13, 1992.
	Nov 90-Aug 91	- Research Assistant, Texas A&M University. Construction, and static and dynamic testing of 9 drilled concrete piles at the Texas A&M National Geotech Sites.
	Jan 89-May 91	- Research Assistant, M.Sc. Texas A&M University. New computational method to design trench supports.
GENERAL	Since Sept 94	Member of Lebanese Order of Engineers & Architects

Aug 94	Recipient of ATSER Technical Achievement Award
Since Mar 93	Member of <i>Phi Kappa Phi</i> , $\phi K \phi$, Honor Society
Since Feb 93	Member of A.S.C.E. American Society of Civil Engineers
Since Jan 92	Member of ALPA, Associat. of Lebanese Professionals in America
Jan 91-Jan 93	Geotech Graduate Student Representative at Texas A&M University
1976 - 1988	Military training and Member of Lebanese Forces
March 86	First Aid training with the Lebanese Red Cross

COMPUTE R Skills	PROGRAMING	Extensive knowledge in programming architecture and software applications with products shown under <i>Developed Software</i> below
	Systems	VMS/VAX, DOS, Windows, Internet
	Drawing	Autocad, Corel Draw, and Paintbrush
	Word-processing	Microsoft Word
	Database	Microsoft Access
	Spreadsheets	Microsoft Excel
	Engineering	PLAXIS, GROUPV7, RIDO, TALREN, SNAILZ, SODA, PRIMAVERA, AUTOCAD, etc. Any software is welcome ...

Developed Software	LATWAK	Dynamic simulation and stiffness of laterally loaded piles
	TRENCH 1.0	Design of braced excavations
	WELPLAN	Planning of horizontal and directional wells
	GRAN	Design of Ground Anchors
	SLABON 1.0	Design of Prestressed Slab-on-Grade foundations
	MBDH	Macros Excel for designing structural and geotechnical elements

PUBLICATIONS & REPORTS	Aug- 08	-“Design, Installation & Performance of the Anchored Peripheral Basement Walls during the Implosion of the Hilton Hotel”, <i>Sixth International Conference on Case Histories in Geotechnical Engineering</i> , Arlington, VA, USA, August 11-16, 2008
	June 07	- “How the ‘Birch’ Landslide Quit Moving”, technical paper, ASCE Special Publication, <i>First North American Landslide Conference</i> , Vail, Colorado, USA, June 3-8, 2007
	Sep 05	- “Micropiling in Karstic Rock: New CMFF Foundation Solution Applied at the Sanita Factory”, technical paper, ASCE Special Publication, <i>Tenth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impact of Karst TM</i> , San Antonio, Sept. 24-28, 2005
	April 03	- “Improving Safety in Rock Engineering by Avoiding Common Mistakes”, paper, <i>Al Mouhandess</i> , the official semestrial magazine of the Lebanese Order of Engineers, Beirut, Lebanon
	April 02	- “ISST: In-Situ Shear Test for Soil Investigations”, technical paper, <i>JLG Journee Libanaise de Geotechnique</i> , Lebanese University, Roumieh, May 8, 2002

- Mar 02** - “Structural Evaluation and Strengthening Strategy for a Reinforced Concrete Commercial/Residential Complex in Northern Beirut”, Proceedings of the RTST 2002 Int’l Conference, Leb.Amer.Univ, March 4-6, 2002, Beirut, Lebanon
- Feb 02** - “Defects and Length Predictions by NDT Methods for 9 Bored Piles”, technical paper, *ASCE Special Publication: International Deep Foundations Congress*, Orlando , Feb 2002
- Jul 00** - “Static Capacity Prediction by Dynamic Methods for Three Bored Piles”, technical paper, *ASCE Geotechnical Journal*, Jul 2000
- Jun 96** - "LATWAK: A Test to Predict the Lateral Stiffness of Piles", a technical paper, *ASCE Geotechnical Journal*, June 1996.
- May 94** - "LATWAK: An Impact Test to Predict the Lateral Static Stiffness of Piles", *Ph.D. Dissertation*, Civil Engineering, Texas A&M University.
- Jan 95** - "WAK Tests On Five Full-Scale Footings in Sand", *Research Report*, Civil Engineering, Texas A&M University.
- Sep 93** - "LATWAK, User's Manual" *Computer Program Manual*, Civil Engineering, Texas A&M University.
- Aug 93** - "TRENCH-1.0-, User's Manual" *Computer Program Manual*, 2nd Edition, Civil Engineering, Texas A&M University
- Aug 91** - "Dynamic and Static Testing of Nine Drilled Shafts at Texas A&M University, Riverside Campus", *Research Report*, Civil Engineering, Texas A&M University and TRB January 1992.
- May 91** - "Design of Trench Supports", *M.Sc. Thesis*, Civil Engineering, Texas A&M University.

ACTIVITIES Sports (soccer, skiing, biking, running, hiking, hunting, fishing, kayaking), computer programming, reading, soft music.

Date of Birth July 1965

Nationality Lebanese

M.Status Married since 1993 to Hala (M.Sc. Elect.Engr), President of EPE Consulting in Texas USA -www.epeconsulting.com- & raising 2 Beautiful kids: Ronald (96) and Christina (98).

APPENDIX E

CV OF CHARLES RADI

Charles Radi, Eng.

cradi@i-g-m.com - 512.789.5603



ACADEMIC STUDIES

1991 - 1992 **M.ENG. Structural Engineering, 1992**
McGill University, Montreal, Canada.

1983 – 1987 **B.ENG. Civil Engineering, 1987**
American University of Beirut, Lebanon.

PROFESSIONAL EXPERIENCE

MANAGER OF OPERATIONS

10/10 – present **IGM Civil Engineering, Inc., Austin TX**

Work description:

- Oversees the operations of IGM Civil Engineering in Texas and across the US
- Oversees complex civil engineering designs
- Oversees execution of construction
- Manages major projects in all aspects

PROJECT MANAGER

10/00 - 05/2010 **Miscellaneous Metals Inc., Frederick, MD**

Work description:

- Review contract documents, including drawings and specifications
- Review, negotiation and approval of subcontracts, including comparison of scope, bid documents, and general conditions
- Preparation of schedule of values
- Monitoring of progress schedules
- Creation and control of overall project schedules
- Sequencing of shop drawing and product data submittals to allow ample review time
- Locate qualified vendors and negotiate contracts with subcontractors
- Review, price, and process all additional, modified and deleted work and change order
- Attendance of progress and coordination meetings, and adjustment of production schedule accordingly
- Assess site conditions and ensure that field crews have the necessary equipment to complete the scope of work, and that OSHA safety conditions are met
- Preparation of monthly payment requisitions in AIA format
- Review and approval of pay requisitions of subcontractors

PROFESSIONAL EXPERIENCE – cont'd

CHIEF ENGINEER / PROJECT MANAGER

5/97 - 10/00 Murox Engineering Department,
Canam Steel Corporation, Point-Of-Rocks MD, USA.

Work description:

- Supervision of a team of design engineers, draftsmen and steel detailers.
- Responsible for two national accounts in particular, that produced designs and drawings for more than 100 projects in 1998, and more than 250 projects in 1999
- Coordinated work internally and externally with customers.
- Coordinated scheduling with a team of project managers, and assisted them with their daily tasks. Project management/coordination was a big part of every day's work.
- Responsibilities above included, but were not limited to, decision making, scheduling, establishing priorities, work distribution, customer public relation, supervision of personnel and verification of technical work...

DESIGN ENGINEER & SOFTWARE DEVELOPER

5/96 - 4/97 Department of Research and Development,
8/92 - 3/95 Murox Department,
The Canam Manac Group Inc. , Montreal, Canada.

Work description:

Preliminary design of steel structures, preparation of cost estimates and bids.

This involved preliminary analysis and member design of various construction projects, as well as the take-off of quantities and preparation of bids and budget prices. Worked extensively on Murox projects from June 1993 to September 1994, as described on page 3.

Final analysis, design and detailing of steel structures:

This included load computations according to applicable building codes, conception of optimal structural systems, analysis of structures, design and detailing of structural members and preparation of the various related engineering drawings and calculations.

Research and Software development for structural engineering applications:

This involved studies of different design codes and technical books, preparation of algorithms and development of small to mid-scale software and spreadsheets to assist designers with their day-to-day work. Software ranged from conventional DOS-based programs to state-of-the-art Windows programs.

These developments came in conjunction with my main work as a Structural Designer.

Other Professional Activities:

Such activities involved visits to construction sites and steel fabrication shops, as well as attendance of several technical conferences.