GEO

The Newsletter of
EBS Geostructural Inc.
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Geostructural Engineering Outlook / SPRING 2014

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PROFILE

Nadir Ansari P. Eng., D.GE, M.ASCE

COMPANY
Isherwood Geostructural Engineers
President

LOCATION
Mississauga, Ontario

Why did you get into shoring design?
Some people have a gene that allows them to get fired-up by shoring. I get asked how this niche of work can keep a person inspired for 25+ years, if you ask that, you don't have that gene. I'm kidding of course, but the truth is, when you dig down into any subject it gets more and more interesting. The nuances of how nature behaves become more fascinating. It is true the more you know, the more you realize how much more there is to know, so things don't get boring. What got me into the business of excavation support (shoring) was meeting Brian Isherwood, who is by all measures an engineer's engineer. He is a master of his trade and a delightful, charismatic person. If you are lucky enough to find a mentor like that at a young age, you are wise to stay by his side. Brian gave me a tremendous opportunity, which opened my eyes to the wonderful world of earth retention. Our clients have been great, the challenges many.

What trends have you seen in the shoring design field over your career and what has changed the most? Once upon a time we designed with pencils and paper. If you wanted to talk to someone, you drove somewhere to meet them. The facsimile then started taking the place of driving and couriering information across town. Email has since made transmission of drawings and electronic files nearly instantaneous. The technological explosion has had a dramatic impact on the way we work. But the fundamentals of how nature behaves – how earth moves – haven't changed. The great advantage we have now, 41 years in the business, is our years of experience and observation. We have many more tools in our toolkit. For instance, we can use tie-backs instead of struts, we can use precision monitoring which allows us to design leaner structures, and persevere over nature's anomalies – ultimately saving big dollars in construction costs – while mitigating personal and property risks. These are some practical changes.

Another huge change, of course, is demographic. Our office is filled with brilliant engineers, many of whom are women. It is a major advantage in our industry to have the sharpest minds in the room, not just the sharpest male minds. As in other sectors, society benefits from that shift. We are also much younger than in the past. With youth comes vitality, creativity, and an even keener focus on sustainability. Though good engineering has been green since its inception, the next generation is helping the older generation "remember" that engineering is a sustainable pursuit at the noblest level.

In your opinion, what are the greatest challenges facing this field? Technology has a double edge. People need to put down the gadgets and engage their minds and senses with what they are doing, else we will end up dulled by the misinformed solutions provided by computers and those desensitized from the effects of gravity on construction sites. If you aren't out there touching the dirt on site, you won't be able to break into the next level of perception that innovative solutions need. When people think they can design remotely, far from construction sites, or sit back and let computers spit out the numbers without crunching them themselves, on a napkin, we are in trouble. Real productivity has to do with the power of our minds. If we don't use our minds we slide backwards.

What are the top three projects you worked on and why? An impossible question to answer! We just published our first edition of Isherwood's Memorable Jobs. It's a beautiful book outlining some of our trickiest and most rewarding projects. As soon as we printed it, we were impressed by how many great jobs are missing from it!

Every project has its thrill — some are technically challenging, all are learning experiences about communication and human psychology. Every job has something to teach us; that is the key to growing as an engineer — pulling lessons out of all jobs.

5 St. Joseph Development
Temporary Historic Façade support structure in Toronto

PROFILE CONTINUED //

By Nadir Ansari P.Eng., D.GE, M.ASCE

How do you see shoring design changing in the future?

Through greater enlightenment of our clients, using better-refined social skills and diverse teams, engineering firms will be able to design leaner and greener without compromising safety, increasing the value of our contributions to society.

What you like to tell everyone about yourself that not many people know?

For us at Isherwood, it's all about raising the bar of engineering and leaving our society with a legacy of great work. We treasure our educated clients and colleagues with whom we can explore creative solutions to 'impossible' problems. There are lots of unknowns in our future, but one certainty is that, in teams of like-minded, passionate people, we are able to do great work, make money and, most of all, have tons of fun.

BELOW

Sir Adam Beck Hydroelectric Expansion Project
Steel Circular Cell Cofferdam in Niagara River at Intake Structure/Tunnel Boring Machine Extraction Shaft

TECH WATCH //

By Roger Frenn P.Eng.

DYNA Force® Elasto-Magnetic Sensor to add new dimension to micropiles testing

Most conventional testing of micropiles still uses a test frame/reaction anchors, a hydraulic jack with dial gauges and sometimes a load cell. Details on micropile testing methodology can be found in the Federal Highway Administration (FHWA) and Post-tensioning Institute (PTI) publications.

Given that a micropile relies on friction and high tensile strength steel element in grout for a behavior in compression and tension, it presents itself as a prime application for the use of DYNA Force® Sensor.

DYNA Force® is based on the elasto-magnetic (EM) technology, which is a novel approach to monitor forces in Threadbar®. It is essentially a solenoid composed of a primary coil and a secondary coil, which are made of copper wire and insulated from each other and work together to formalize the elastic magnetic characterization of the material. A lead wire will connect a sensor to a portable Power Stress (read-out) unit. This unit will create the magnetic field and then measure the residual value and convert it to a direct force reading. DYNA Force® does not alter the characteristics of the steel element other than its magnetization and does not affect the structural behavior and presents no safety issues to worry about.

Multiplexer

DYNA Force® Sensor for Strand or bar

Readout Unit

TECH WATCH // DYNA FORCE®

DYNA Force® sensors are a valuable source of data that are worth adding to the tools repertoire of Owners, Engineers and Contractors

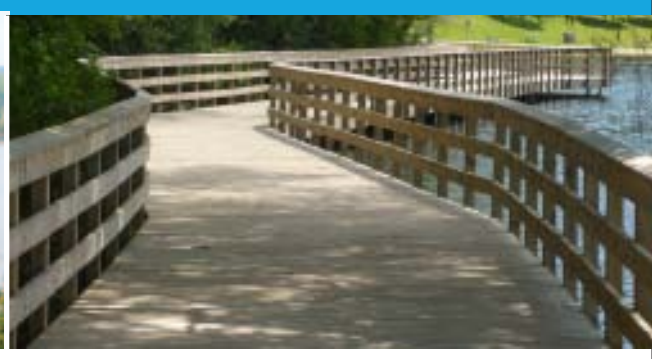
Key characteristics of the Non-destructive DYNA Force® include quick and easy installation that allow accurate measurements (3% for bars) with only one trained person able to do the job. The system is robust with similar service life of the structure, allowing for the ability to set up long-term monitoring, with remote reading access. The ability to install the DYNA Force® sensors and monitor the loads at different elevations of the grouted Threadbar® allows for evaluation of bond length.

INDUSTRY NEWS

by Trevor Quayle M.A.Sc, P.Eng.

Considerations for True Cost Evaluation of a Contractor or Subcontractor

Ottawa Rockcliffe Parkway, Ottawa, Ontario



Kelso Shoreline Trail, Milton, Ontario

Your project is ready to go, all tender submissions have been received and it's just a matter of picking the one with the lowest cost and proceeding. It's as simple as that, or is it?

For any project that gets contracted out, there are two costs:

1. **The up-front or bid cost:** This is the value that the project contract was based on from the tendering process.
2. **the final or true cost:** This is the value that ends up being paid at the end of the project, or possibly even extended over the service life of the project

The up-front cost is easy to see, however, the contractor or owner should be more concerned with the true cost, which is what will inevitably be what comes out of their pocket. The difference between the true cost and bid cost shows up as budget or cost over-run (or under-run), and, depending on the conditions of the tenders, can be small or considerable. As is evident in the media in the past number of years, there is far more publicity and visibility generated by projects that run over-budget and this can be directly related in magnitude to the disparity.

Tender pricing received will obviously vary, but sometimes it can vary considerably, or perhaps one price that lies well below the range of the others. Often it is very easy to look at the up-front costs presented by a tender bid at face value, and natural instinct makes it tempting to take the lowest cost presented, however there are always reasons that one cost may be lower than another, and this should receive due consideration, especially when there is a large disparity. The true cost of a project will be realized following completion of the project and beyond, and can end up being substantially higher. It is quite often the case, that a lower bid cost will end up costing far more in true costs.

When weighing out the options that have been presented other aspects of the bid should be considered and weighed against the base price, to ensure the true cost of each is understood.

> **"A LITTLE FORESIGHT BY THE CONTRACTOR OR OWNER IN DUE CONSIDERATION OF ALL COST IMPLICATIONS CAN GO A LONG WAY TO ENSURE THAT THEY ARE GETTING GOOD VALUE FOR THEIR MONEY."**

Some points of consideration can include:

Scope of work: To properly compare costing, they need to be an apples-to-apples comparison. Is the scope of work that the cost is based on properly defined, and is it equivalent to other contractors? The potential need for extras, and delays associated with getting them completed due to an incomplete scope of work can add up quickly.

Materials: Is the pricing based on using proper and proven quality materials? Are the materials being used, as specified by design requirements, or are cheaper and potentially substandard materials being substituted to lower upfront costs.

Experience: Does the contractor have experience in the work to be completed? Are they familiar with the proper equipment, materials and methods of construction?

Reputation: How is the contractor's general reputation in the industry? Can they be relied on to perform with quality results? When problems arise, can they be expected to stand up for their work, and make it right both during, and following completion of the work?

The order and magnitude of importance of each of these relative to the bid cost can vary. Failure to perform comparatively in these points can lead to additional cost in terms of additional direct costs due to unaccounted-for extras, time delays and associated damages and legal battles. Additionally, it can also, by extension, damage the contractor's or owner's own industry and public reputation, the value of which can be tremendous and difficult to quantify.

A little foresight by the contractor or owner in due consideration of all cost implications can go a long way to ensure that they are getting good value for their money.

Trevor is a senior structural engineer with Pretium Anderson's Waterloo office.

ON SITE

CIGI Campus—Waterloo, Ontario

The Problem:

The Balsillie School for International Affairs is a collaborative initiative between the University of Waterloo and Wilfred Laurier University, with the support and involvement of the Centre of Internal Governance Innovation (CIGI). In 2009, plans were announced to construct the new centre that would be a global hub of innovation and learning

The Solution

The $67 million, 115,000 square foot campus was constructed by Copper Construction Ltd. The structural design was completed by Blackwell Engineering, geotechnical investigation was completed by LVM, and construction inspection was completed by InspecSol. The City of Waterloo donated the land for the campus, and $50 million of funding was also received through the Knowledge Infrastructure Program.

" EBS GEOSTRUCTURAL INC. COMPLETED THE ANCHOR INSTALLATION IN FIVE WORKING DAYS."

The basement of the campus was to be constructed below the ground water elevation.

The basement slab needed to be designed to resist uplift due to hydrostatic pressure. LVM recommended Chance® Helical Anchors to be installed to tie down the basement slab. A total of 60 Chance® Helical Anchors were installed ranging from 5 to 12 meters beneath the proposed slab. EBS Geostructural Inc. completed the anchor installation in five working days. G

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1) **CIGI campus during construction**

2) **Installation of Chance© Helical Anchors**

3) **Final CIGI Campus**

WHY EBS GEOSTRUCTURAL INC. WAS AWARDED THIS PROJECT:

- Mitigation of vibrations and spoils
- Customized Design Capabilities – EBS designed the type of anchors for the soil conditions and capacity requirement
- The ability to perform sacrificial load testing to ASTM standards and report results
- Verification of each helical anchor capacity at completion of installation
- 350kN ultimate tension capacity per helical anchor
- Speed of Installation – 60 Helical Anchors installed in five working days

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