



## YPG Quarterly Newsletter

### (Quality Management in Consulting Engineering) Summer 2014



Quality can be defined as a high level of value and excellence. It is something that consultants strive to provide in their work and achieve in the projects that they are associated with. Quality is both internal to our companies and iteratively addressed in construction projects that our companies provide services to.

As a Materials Engineer, I am regularly involved with aspects of quality in my daily activities on any given project. I frequently oversee new infrastructure projects as a materials testing subcontractor to help fulfill the contractual quality control requirements of the General Contractor. I routinely conduct condition assessments on infrastructure and identify deficiencies that are at times due to a lack of quality control during the original construction. Additionally, I have developed quality assurance programs for complex rehabilitation and construction projects. The integrity of “quality” in any given project is dependent on adherence to and investment in these component parts: 1) quality control at the outset; and 2) post-construction quality assurance.

To achieve quality in construction projects, the quality management framework must be well-defined and adequate for the complexity of the work. The consultants and contractors must also implement appropriate quality management systems.

APEGBC has mandated field reviews on construction projects by Professional Engineers and Geoscientists on their design work. Additionally, APEGBC has created a voluntary Organizational Quality Management (OQM) program that certifies organizations that implement policies and procedures consistent with the requirements of the *Engineers and Geoscientists Act*, and the bylaws of the Association.

This newsletter aims to set out the framework of quality management within construction projects and to provide an introduction to quality management systems within consulting engineering companies.

We hope you find this newsletter useful. Please feel free to contact us for more information or to get involved! You can find us on Facebook, Twitter, or through email at [info@acec-bc.ca](mailto:info@acec-bc.ca).

**Mark Byram, P.Eng.** ACEC-BC YPG Past Provincial Chair

#### Also in this edition:

- QC/QA: Framework in Construction
- Designers’ Role in Construction Quality in Large DB Projects
- APEGBC OQM
- Implementing OQM
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- Consultants’ Contraption
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## **Quality Control and Quality Assurance: A Framework in Construction**

*Denis R. Michaud, AScT, IRCA, Principal, Levelton Consultants Ltd.*

Quality Control (QC) and Quality Assurance (QA) are components in the broader field of Quality Management and are important in the performance, effectiveness, and success of any project or organization. QC and QA work to deliver good quality products and services and have a strong interdependence. However they are, in all respect, different processes undertaken by different parties.

To define and understand the role of QC and QA in construction, we must recognize the context for which they are being applied to and consider the relative point of view of those who would define them. The ISO 9000 family of quality management standards, for example, defines the terms as follows:

- QC: Those activities focused on fulfilling quality requirements.
- QA: Those activities focused on providing confidence that quality requirements will be fulfilled.

Note the subtle difference. In simpler terms, QC “controls” quality to help to make sure the job is done right, while QA helps to give “assurance” that the job will be done right.

In a typical construction contract, the owner will generally regard the contractor as performing QC. The contractor will typically complete a comprehensive series of inspections, tests, checks, and other activities upon the work. The owner (or owner’s representative) conducts QA which usually involves random or representative sampling, reviews, audits, and other such monitoring processes of the contractor’s activities and of the work itself. The owner, in essence, evaluates the contractor’s level and ability to successfully plan and complete the work. This evaluation can often involve the owner comparing the results of their own inspection and tests against those reported by the contractor. The owner, endeavouring to maintain their confidence in the contractor, will communicate and try to reconcile any resulting discrepancies.

Consider, however, if we were to shift our point of view to that of the contractor. They conduct QC upon their own forces but also conduct QA upon their subcontractors and suppliers (who they view as conducting QC on that work component they were hired for). Move the point of view further to the subcontractors or suppliers, and we will again find similar QC and QA roles being managed.

An examination of both the products and the processes that generate the products should be scrutinized by QC and QA activities. To avoid any conflict of interest, an individual or organization cannot be doing both QC and QA upon the same work or activity they are directly responsible for. In a smaller organization, this fundamental principle about the separation of QC and QA may be harder to establish but is nonetheless required.

The nature of the QC and QA activities that would fulfill their respective definitions will vary depending on the nature of the project, the needs of the contractor, the expectations of the owner, and the result of any risk analysis. For example, in QC, will a particular component of work require 100% testing or would a reduced frequency of testing be acceptable? In QA, do we have to travel to the other side of the globe to witness a component being manufactured, or do we accept the quality control that is claimed to be in place?

These questions, and many others, are fundamental to establishing robust QC and QA programs that will serve the needs of all stakeholders towards a successful construction project.

## **Designers' Role in Construction Quality in a Large Design-Build Project**

*Brian Arndt, ASCT, Manager, Design Review During Construction team, H5M Onshore Works PMH1, Associate, MMM Group Ltd.*

Professional Engineers, as designers of civil and structural infrastructure, have a professional obligation to review construction of their work as it progresses. This is mandated in British Columbia by APEGBC Bylaw 14:

(b) Members and licensees shall establish and maintain documented quality management processes for their practices, which shall include, as a minimum:

(3) documented field reviews by, or under the direct supervision of, members or licensees, of their domestic projects during implementation of construction;

Not only are field reviews mandated by the professional body overseeing engineers, but they are typically also mandated by contract by the Owner of large infrastructure projects. In the case of the Port Mann Highway One Improvement Project ('PMH1'), field reviews, or Design Reviews During Construction, were mandated in the Design Build Agreement.

How one goes about field reviews and how these fit in with the client-contractor's construction quality program is not defined anywhere. To answer this, Hatch Mott Macdonald and MMM joint venture (H5M) prepared detailed Quality System Procedures identifying who, what, where, when, how, do we set out to undertake field reviews. The contract, in the case of PMH1, spelled out the construction certificate wording that we, H5M, had to jointly sign at the end of the project with the contractor, certifying that we had examined construction and that in our opinion, the work has been constructed in accordance with the design, the contract, and the specifications.

With the above as the requirements, H5M devised a plan with two basic pillars of our Design Review During Construction obligations:

### 1. Field Reviews

- a. General review of works on an on-going basis on behalf of our design leads (site presence)
- b. Review of pre-identified Hold Points and Witness Points- as mandated by the design leads
- c. Review of works by sub-consultants (electrical, paving, landscape, geotechnical disciplines)

### 2. System Reviews

- a. Review of contractor's quality documents- CQMP, CITP, Inspection checklists, etc.
- b. Review of systems- ongoing review of contractor's quality inspection, testing, and reporting

How well did the system work? Generally, it worked very well. It was a regimented system that allowed for some flexibility in what we wanted to review, but didn't allow any flexibility in our hold point reviews.

The client-contractor saw our system at the onset that this was defacto Quality Assurance on their

system, which it was, but not designed nor intended to be as such. It was in fact meeting H5M's requirements for field review and for QC/QA oversight- again not intended to fulfill construction QA requirement. At the end of the day, our deliverables- field review memos, and system review audits were filed in with the Design Build construction quality documentation.

The Owner also saw us as a third branch of quality oversight in the field, which I believe they appreciated. H5M was also quite involved in the nonconformance report resolution process.

## **Employers Supporting Young Professionals through OQM**



As a young professional, wouldn't it be great if you worked for an organization with a program to help support you in meeting your professional obligations? Organizations employing professional engineers, professional geoscientists or engineering or geoscience licensees have a significant influence on the practice of the professions.

With this understanding, APEGBC has developed the Organizational Quality Management (OQM) Program to improve the quality management of professional engineering and geoscience practices at the individual and organizational level. This voluntary program certifies organizations that implement policies and procedures consistent with the requirements of the Engineers and Geoscientists Act, and bylaws of the association.

Benefits of working for an OQM Certified organization:

1. Exemption from random selection for APEGBC Practice Reviews.
2. An employer whose policies and procedures support your professional obligations under the Act and APEGBC Bylaws.
3. Working within a standardized system that boosts efficiency.

Benefits of OQM Certification for Organizations:

1. Receive a 5% discount on Professional Liability Insurance from Marsh Canada.
2. Employees are exempt from random selection for APEGBC Practice Reviews.
3. Your company is listed on the APEGBC website and its certification will be announced in the APEGBC member journal.
4. Build your company brand by being licensed to use the trade-marked OQM logo in promotional material, proposals.
5. Meet market demand by having a quality management system endorsed by APEGBC
6. Demonstrate that your organization is a leader in its commitment to quality management practices and standards.
7. Support your APEGBC professionals in meeting their professional obligations, thus attracting and retaining talent.

Benefits of OQM Certification for Customers:

1. The product or service provider has a quality management system endorsed by APEGBC.
2. OQM certification can be used as selection criteria when procuring engineering and geoscience products and services.
3. Knowledge that the product or service provider has policies and procedures to ensure:
  - Applicable APEGBC Professional Practice Guidelines are being followed.

- Documented file management procedures are being used to meet regulatory requirements.
- Documented checking of all engineering or geoscience work and where required independent reviews are taking place.
- All documents containing engineering or geoscience will be appropriately authenticated by the application of the professional's seal.
- All delegated engineering or geoscience work will be directly supervised by an APEGBC Professional.
- Appropriate field reviews will be conducted during construction or implementation.

Since the launch of the OQM Program in September 2012, over 240 organizations have initiated the process of becoming OQM Certified, of which 64 have already been awarded certification. Certified firms include sole practitioners all the way up to large multinational firms, including consulting, manufacturing, and government. For a complete list of certified organizations visit [apeg.bc.ca/oqm-certified](http://apeg.bc.ca/oqm-certified).

APEGBC organizes full day OQM Certification training sessions for representatives from organizations interested in OQM Certification. Next training session is scheduled for July 8, 2014.

Further information is available at [apeg.bc.ca/oqm](http://apeg.bc.ca/oqm) or [oqm@apeg.bc.ca](mailto:oqm@apeg.bc.ca).

## **Implementing an Organizational Quality Management Program**

*Mike Olmstead, P.Eng, Urban Systems Ltd.*

Consulting engineers are often asked to lead and implement change. This can be for a client or within their own organization. A growing number of consulting engineering firms in BC are seeking certification through APEGBC's Organizational Quality Management Program (OQMP). This process offers a great example of implementing change.

It is safe to say that all ACEC-BC member firms pay attention to quality. They would not be in business for long if they did otherwise. Most firms will have quality system to address information management, checking work, etc. There can be many perspectives on quality within a firm. This is to be expected, especially at companies offering a number of services. At Urban, we were in a similar situation in 2013 when a group of us (of all ages) was asked to lead our application for OQMP certification. Our experience may help others.

Our first step was to understand our own context and be precise about our objectives. At Urban, we rely on three systems to protect our people, clients and business. They are: Health and Safety, Quality Management and Project Leadership. We spent the time to make sure we understood these systems and how they relate to one another. Urban operates in several Canadian provinces and territories, serving many client groups and sectors. Like many ACEC-BC firms we have non-engineering professionals, e.g., planners, landscape architects, biologists, land surveyors, and others. Our assignments range from a few thousand dollars in fees to major infrastructure projects. What is perhaps unique about Urban is that we use almost no organizational hierarchy and structure. To understand our objectives we reviewed APEGBC's OQMP literature, held numerous workshops and lunch and learns and attended APEGBC's training session. By understanding our own context and using APEGBC's OQMP as a framework we were able to identify our gaps and our quality management objectives.

Recognizing our role as one of leading change helped us to develop and communicate guiding principles to all staff. Our key messages included:

- We place the highest value on the professional judgment of our practitioners. Our quality system is about supporting them. It seeks excellence in client service. It is not meant to be a perfect, internal system to control our activities.
- Many of our assignments involve more than one professional group. We needed our non-engineering professionals to see the value in making these changes. We also needed everyone to acknowledge that our engineers have stricter quality management requirements. They need the support and cooperation of others. We communicated that our system is scalable and can accommodate these differences.
- Our system is based on meeting minimum standards and does not require our professionals to do anything they are not already obliged to do. This was critical as we needed to ensure that we were in fact meeting our professional obligations. By not asking for anything more than what was truly needed we were able to demonstrate a genuine value proposition.
- We communicated that we all may need to compromise a little and change some of the ways we are doing things.

Using these guiding principles and APEGBC's OQMP framework we developed a system that is now in use across our jurisdictions. It is used by all of our professionals - not just engineers. We were able to use our existing system as is and meet our OQMP requirements through the introduction of a single template document that is now required for all projects.

We received OQMP certification in early January and are now in the process of implementing a comprehensive auditing process that incorporates health and safety, quality management, project leadership and sustainability principles. By acknowledging change management principles and using an open and transparent process our professionals are implementing our [updated] quality management system.

## **ACEC-BC - Committee Updates**

ACEC-BC committees help members deal with issues in procurement, contracts, proposals and legislation in four industry sectors: Transportation, Municipal, Building as well as Resource and Energy. ACEC-BC also regularly meets with specific liaison groups to reach the needs of individual clients.

ACEC-BC YPG is represented on most of these committees. YPG members are present at the meetings, report back important information, and voice any concerns that the Young Professionals in our industry may have. Below is an update on activities for several of the committees.

### **Building Committee**

The ACEC-BC Building Committee has been meeting regularly to discuss important items effecting consulting engineers in the building services sector. These items include Professional Liability Insurance, better defined scopes and requirements as part of RFPs, BIM and modeling considerations and digital seals to name a few. Members of the committee are taking part in a number of other ventures which work to strengthen the position of ACEC-BC. The Road Map for Carbon Neutral Neighbourhoods has kicked off with many partners, hosted by Lighthouse Sustainable Building Center, and two members of the committee are taking part.

The Building Committee encourages all members of the consulting engineering community to keep sustainability and the environment as a priority in all our projects and continue to educate decision

makers and end users.

### Municipal Engineering Committee

The Municipal Engineering Committee (MEC) helps to organize mixers for various municipalities to share their latest projects with consultants and to mingle with those consultants in an informal setting. There are no upcoming mixers currently scheduled for the near future. The MEC also has a subcommittee that is currently working with Metro Vancouver on contract language.

### Resource & Energy Committee

#### Objectives

- Build a strong relationship based on learning and information exchange.
- Proactively keep each other informed of interests and issues.
- Promote the interests of ACEC-British Columbia member firms to Resource and Energy firms and government that use or can influence the use of our services.
- Focus the committee effort on BC Hydro and the Provincial Government; committee will become involved with private firms only if the need arises from our member firms.
- Engage the Provincial Government in a proactive discussion to better utilize consulting engineers on projects.

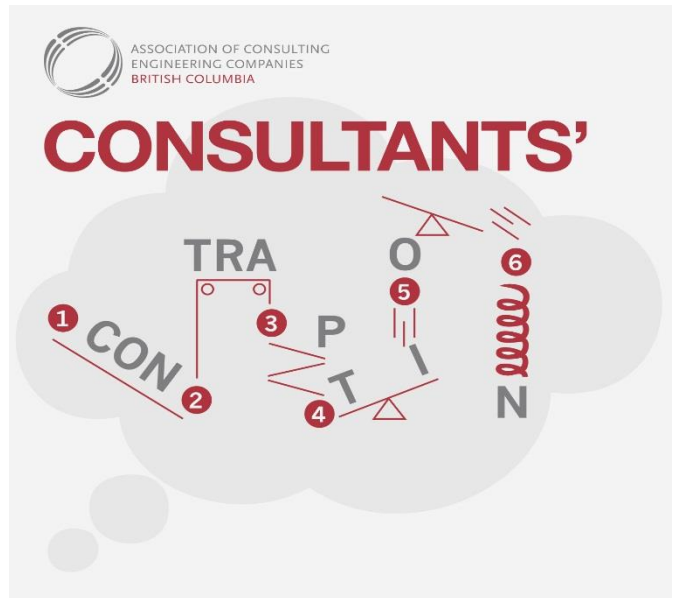
BC Hydro has been the major focus of the committee. The underlying principle when ACEC-BC is dealing with BC Hydro is to maximize the benefit to ACEC-BC Member firms when working/bidding with BC Hydro. This would include maximizing work contracted, making a fair and non-onerous bidding process, having terms and conditions that are fair (good) for consultants, having a steady stream of services required, providing long range forecasts of service requirements, and maximizing potential profits and revenue of ACEC BC member firms. The committee is now expanding its focus to reach out further into the resource and energy sector in the province, with specific interest in the potential LNG industry, pipeline developments and the mining sector. Contact with the provincial government is of continued interest, with outreach to key ministries and officials to not only keep connected, but to show our ongoing support for the growth of the resource and energy sector.

Some highlights from the past year:

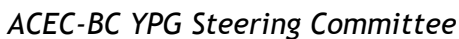
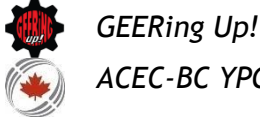
- BC Hydro Mixer was held on March 6th 2014
- Shell LNG Canada mixer on March 20, 2014
- Kinder Morgan mixer on November 19, 2013
- Creation of a Mining Subcommittee
  - Promote the interests of ACEC-BC member firms to mining firms and government that use or can influence the use of our services.
  - Identify, promote and enhance active cooperation between ACEC-BC member firms and the mining industry at large on issues of concern.
  - Engage with existing organizations that work to develop policy and definitions for mining studies including AMEBC, CIM, MABC, APEGBC and Geoscience BC.

## Consultants' Contraption

Consultants' Contraption took place this year at Guildford Town Centre on 26 April 2014. A total of 5 member companies participated (Hatch Mott MacDonald, Levelton Consultants, Opus DaytonKnight, Urban Systems and Klohn Crippen Berger) in the event, in addition to Knight Piesold who was a sponsor of the event. YPs from these member organizations made donations to "Geering Up!" through the creation of their own Rube Goldberg (chain reaction) modules. These modules were connected to transfer a golf ball from one end to the other. We raised \$3,000 for "Geering Up!" and brought a lot of joy to the shoppers at Guildford! Special thanks to Alan Mak of Tetrattech, Michelle Reid of Stantec, Patrick Ho of Levelton and Stuart Nash of Associated Engineering for organizing this event. Thank you to those who participated and we hope to see more of you next year!



A special thanks to the following:



More photos from the event can be found on the [Consultants' Contraption Facebook Page](#).



## **Scientists and Innovators in the Schools (SIS)**



ACEC-BC YPG would like to invite all the YP members to act as speakers for the Science World Initiative: Scientists as Innovators in the Schools program.

Science World's [\*Scientists and Innovators in the Schools\*](#) (SIS) is a volunteer-based program that helps address British Columbia's need for more scientists, engineers, technologists and technicians to promote students' interest in these areas. The goal is to inspire students with exciting, in-school presentations by real scientists. The program is offered to Grades K-12 everywhere in BC.

This is a great opportunity to inspire future generations of engineers by sharing your story and introducing elementary and high school students to exciting world of engineering. As well, you will have a chance to educate the students on what consulting engineering is really about.

If you are interested in volunteering please email us at [ypg@acec-bc.ca](mailto:ypg@acec-bc.ca).

## **Social Media**

To get information regarding upcoming YPG seminars and events please find us at your favourite social media outlet.



Like us on Facebook: <http://www.facebook.com/acecbc>,



Follow us on Twitter: @acecbc,



Join our group on LinkedIn: ACEC British Columbia Young Professionals Group, or



Check out our webpage: <http://www.acec-bc.ca/young-professionals>.

## **Young Professional Liaison**

Want to keep your company and yourself informed about ACEC-BC YPG events and updates? Become a Young Professionals liaison! We are looking for one representative from each member firm to act as a liaison between their company and the APEGBC Young Professionals Group. Please email us at [ypg@acec-bc.ca](mailto:ypg@acec-bc.ca) to become your firm's ACEC-BC YPG liaison.

## **Young Professional Group Annual Report**

submitted by

**Mark Byram, P.Eng.**

Chair, YPG Provincial Steering Committee

The Young Professionals Group (YPG) has continued to build on the strong foundation developed by the previous steering committees in 2013-2014.

The main objectives for the year have been to increase member engagement, and to develop networking with young professionals in related groups. A motivated, experienced and dedicated group was able to implement strategies to achieve these objectives. At the start of the year, an executive manual for the YPG was drafted to reflect the strategic priorities of the Board and to provide a framework for the YPG to work within.

Breakfast seminars remain the core medium through which the YPG promotes and empowers YP's within British Columbia. The three regions (Lower Mainland, Vancouver Island and Okanagan) have offered 17 breakfast seminars since September (a new record for the YPG). These seminars offer networking opportunities and soft skills development to YPs in areas of communication, financial and legal competency, and dynamic leadership. This year, topics have ranged from "How to Reduce Stress and Improve Effectiveness" to "Designing and Delivering Billion Dollar Capital Programs with Engineering Consultants: A Public Utility Owner's Perspective".

The YPG newsletter has been developed as a learning and information sharing tool for the YPG. Topics explored include Life Long Learning, Quality-Based Selection, and Quality Management in consulting engineering. We thank all contributors for the quality input for the newsletter.

Synergies have been realized through partnering with the young professional or U40 groups of the Vancouver Regional Construction Association (VRCA) and the U40 of the Vancouver Island Construction Association (VICA). A joint talk, which included a speaker from VICA on Design Build Communication, was fostered through input on the topic from YP's in both organizations.

The YPG has been able to continue to support the Association of Professional Engineers and Geoscientists by being involved in an educational outreach event at the University of Victoria. APEGBC has also provided articles for the YPG newsletter on the Organizational Quality Management Program (OQM), as well as the status of professional development offerings and requirements. Additionally, the YPG has begun to support the Science World initiative: Scientists as Innovators in the Schools program.

Highlights of the YPG's many achievements over the course of this year include:

- Drafting of executive manual for YPG;
- Transformation of YPG newsletter into a learning tool (Life Long Learning, QBS, Quality Management);
- Founding of task force to identify other YP groups in the province;
- Founding and development of a regional chapter in Kamloops;

- Support of ACEC-BC government relations initiative by YPG representative attending Spring Mixer (MLA day) in Victoria, as well as securing a presentation from former BC Premier, Mike Harcourt on leadership in the context of sustainable infrastructure;
- Engaging YPG in Kamloops and Nanaimo through inaugural breakfast seminars;
- Continuing outreach initiative and promotion of the Association through presentation by YPG Chair at APEGBC / UVic Industry Night;
- Continuation of the Consultants' Contraption with proceeds for Geering Up; and
- Increasing community engagement through YPG volunteering to act as a speaker for the Science World Initiative: Scientists as Innovators in the Schools program.

The group built upon the work of previous years to strengthen and develop our committee throughout the province. We look forward to fostering continued engagement of YP's in the newly founded Kamloops regional group.

I would like to thank Allison Clavelle and Anne Girtz for their hard work and insight throughout their time as Steering Committee members. I would also like to welcome next years' committee and wish them continued success in the 2014-2015 year.

#### **2014-2015 Provincial Steering Committee**

Past Chair: Mark Byram, P.Eng.

Chair: Charlie Yao, P.Eng.

Vice Chair: Tijana Smiljanic, P.Eng.

Okanagan Kelowna Chair: Natasha Orlitzky, E.I.T.

Okanagan Kamloops Chair: Andrew Chand, P.Eng.

Vancouver Island Chair: Caroline Silins, E.I.T.

Lower Mainland Chair: Patrick Ho, EIT

ACEC-Canada Representative: Patrick Ho, EIT

Communications: Graeme McAllister, EIT

PD/Education: Siobhan Holladay, EIT