

ROUNDTABLE 3 - ROLE OF PROFESSIONALS and OTHER BUILDING CONSULTANTS

WEDNESDAY NOVEMBER 20, 2013 – THURSDAY NOVEMBER 21, 2013

Comments by Jag Humar, Carleton University

The opinions expressed in these notes are based primarily on my experience as an academic engaged in teaching and research in the discipline of civil engineering and as a consultant in areas related to structural engineering. The engineering education at the undergraduate level in civil engineering, as in all branches of engineering, imparts to the students, broad based knowledge in their specific discipline as well as problem solving and communication skills. Since the civil engineers are called upon to assume responsibilities for the design, construction, maintenance and rehabilitation of a vast variety of engineering projects, their academic education must be supplemented through specialization, continuing education, and on-the-job learning. Evidently, experience and engineering judgment play major role in the task of an engineer.

- 1) *Should the term “prime consultant” be defined and the roles and responsibilities clearly enunciated?*

A "prime consultant" must be designated in any project that involves the participation of professionals from multiple disciplines. This is especially true of the construction, renovation or enlargement of a building. Among other things, the prime consultant's role would be to establish lines of communication between various professionals so that when design decisions in one area have impact on other aspects of design they are properly accounted for. For example, if roof-top parking is to be provided appropriate design decisions must be made so as to provide adequate drainage, appropriate water proofing measures, and suitable concrete quality.

The definition and roles and responsibilities of the prime consultant could be defined in the Building Code Act.

- 2) *Should Consultants, including engineers, architects and building inspection companies, be required to clarify the scope of their expertise to their clients and to clearly establish which elements of the building they are qualified to provide an opinion on and which elements of the building they will not be inspecting or addressing due to lack of sufficient expertise.*

This is certainly to be recommended and again the Building Code Act may be the place to emphasize this.

- 3) *Should the PEO, the OAA and the OACETT provide guidelines with clearer standards for the inspection of an existing building*

As recommended in the submission of PEO a performance standard, which will have the force of law, would go a long way in ensuring that appropriate standards are followed in the inspection of buildings. It should be recognized, however, that guidelines cannot be substitutes for engineering judgment and knowledge. It is not possible for the guidelines to cover every possible eventuality, and just satisfying provisions in the guidelines does not ensure structural safety. As is the case with most standards, guidelines only outline the minimum that should be satisfied; there may be cases when the minimum is not enough and one has to go beyond that which is specified

The guidelines should include best practices to

- *establish clear terminology to ensure that clients and regulators understand the scope of work, defining the scope of work expected in various types of inspections (for example, opening up concealed areas to examine connections or measuring corrosion) and ensuring that the engineer has sufficient resources, and a sufficient retainer, to be able to complete the required work;*

This is certainly desirable. The cited example applies to one specific type of structural system; there are, of course, a wide variety of such systems.

- *clarify which documents should be reviewed prior to the inspection;*

Would be good to specify.

- *clarify which questions must be asked of the on-site owner representative, including a request for production of previous structural engineering reports;*

Would be appropriate, but as stated earlier, there may be cases when one has go beyond the minimum specified.

- *identify the critical areas and determining the appropriate number of samples on which to draw credible conclusions;*

It will be difficult to cover every possible case and just sticking to the guidelines may at times give the false impression that one has met the requirement of the specific case.

- *document the inspected areas, including photographs, measurements, samples and notes.*

This should certainly be done.

- *clarify and define terms such as ‘visual’ inspection’, ‘condition assessment’, ‘detailed condition assessment’, ‘structural assessment report’, ‘structural elements’ etc.*

This is quite appropriate

- *prohibit the use of statements in reports such as “All beams inspected had little loss of section and we would consider the members still structurally sound” where the location of those beams or structural elements on which that opinion was based has not been identified within the report;*

This is too specific to a particular structural system and is best avoided in guidelines that are supposed to apply to a variety of systems.

- *establish a baseline of what is deemed to be an appropriate representative sample of the structural system and its components, including joints and connections, and structural steel to be inspected before the professional inspecting the building can confidently confirm that a building is ‘structurally sound.’*

Again, this is too specific to a particular structural system and is best avoided

- *set out the minimum standards for inspection by the professional inspecting the building to determine whether there has been ‘section loss’ of structural elements. In particular whether actual measurement is required where corrosion has been identified or that a ‘visual assessment’ of the degree of corrosion is sufficient?*

Again, this is too specific to a particular structural system.

- *define what the professional inspecting the building must include in their reports in relation to which elements of the building have and have not been inspected. Should the Guidelines require that a review of structural steel must include an inspection of and report on the condition of the connections, failing which the structural review is not complete?*

Guidelines on what should be included in the report would be most desirable and the PEO submission provides appropriate recommendations. Reference to what should be done for the specific case of steel structures, to the exclusion of other types of structures, is not suitable in a guideline.

- *specify when the professional conducting the inspection should include a warning in their report to the client of the potential risks of failing to follow the recommendations in the report where significant or potentially unsafe deficiencies in the building have been identified and recommendations have been made for the repairs;*

This is quite appropriate

- *set out when it is appropriate to make changes to a draft report based on client feedback;*

This may be appropriate in the context of Elliot Lake, but a guideline is not required to remind a professional that technical content of a report and the professional opinion based on the inspection should not be altered just because that is what the client desires.

- *set out when copies of the reports for the buildings which have been inspected in the past should be retained;*

This is appropriate

- *establish an obligation to create and maintain a searchable database within their respective offices (locally and nationally) which would allow the professional conducting the inspection to search to see if their respective companies have inspected a particular building in the past (for any reason) and to review the previous files and reports prior to taking on a new retainer, or conducting a further inspection of the building; and*

The onus on the professional should be to provide all records and reports to the client, and where required, to the CBO. Consulting companies may find it difficult to maintain the suggested searchable data bases; the companies may cease to operate, or may be acquired by others. Obviously, since a consulting firm may be retained to inspect a structure or building that they had previously inspected, it would be in their own interest to maintain records of their inspections.

- *clarify the procedure to be followed when signing a report prepared by a graduate professional in training, a C.E.T. or an unlicensed engineer.*

Yes, and the PEO submission deals with this quite adequately.

- 4) *Should there be a requirement on engineers and architects to advise clients (past and present?) of the suspension or revocation of their license?*

Professionals must advise the client of the suspension or revocation of their license, but only if they are currently engaged in a work for the client.

- 5) *Although architects and engineers currently have a duty to report a building which poses a threat to the safety and security of the public, should a guideline be issued by the PEO, OAA and/or the OACETT which provides:*
- a standard of when the professional is to report the unsafe conditions (i.e. degree of risk);*
 - that public safety should be the primary consideration;*
 - to whom the professional is to report the unsafe condition (i.e. professional organization, CBO of the municipality in which the unsafe building is located, owner, etc.); and*

- d. *whether the professional (architect, engineer, C.E.T.) reporting the unsafe building should be afforded immunity from liability where the building has been reported in good faith.*

Agree with all of the foregoing. Unsafe condition must be reported to the client and to the CBO.

- 5A) *The Algo Centre Mall included an open air parking lot over occupied space. Are you aware of other commercial buildings in Canada of similar design and construction? Are there problems with this kind of structure which need to be addressed by consultants?*

I am not personally aware of a commercial building in Canada that includes an open air parking lot over occupied space. I also consulted some colleagues from the consulting practice; they did not recall such an instance but there was mention of a commercial building that had parking spaces sandwiched between several floors of occupied space.

Parking garages are vulnerable to structural damage because of the harsh climate of Canada and our use of de-icing salt. In fact, parking surfaces even other than those on a roof, are equally vulnerable because of the salt, slush and moisture tracked by the vehicles. These facts are well-known in the profession and provided the incentive for the development of a standard related to the construction of garages. In 1987 the Canadian Standards Association issued the first edition of Standard S-413 that dealt with the design and construction of parking garages. The standard had stringent requirements related to provision against leakage and corrosion. Among other requirements it called for positive drainage, provision of traffic bearing membrane system, concrete wearing surfaces and use of corrosion inhibiting admixtures in the concrete. The standard was revised in 2007 and contained changes that were based on additional experience. The stringent requirements on water proofing and corrosion resistance stayed in the standard.

The risk posed by the deterioration of structure caused by the migration of water and salt is far greater when a parking surface lies above a space used for human occupancy. In such cases, the underside of the parking surface is usually covered by a ceiling and is not exposed to sight, unlike in a structure constructed exclusively for parking. When the underside is covered by a ceiling, a simple visual inspection is seldom adequate for determining the state of the structure and for locating any potential and/or real damage in it. It is evident that whenever a parking surface is integrated within a structure used for human occupancy, great care must be exercised in its design, construction, and maintenance.

It is my understanding that the current standards require that parking structures be inspected at least once every 5 years to determine their structural sufficiency.

6) *Should the concept of a “provincial engineer” be adopted in Ontario?*

It is not clear how this will help in the current set up.

7) *In the past, engineers had specialties that were identified on their seals. Should the PEO, in the case of structural engineering at least, revert to that approach, including specific training and mandatory continuing professional education components for engineers practicing and holding themselves out to the public as “structural engineers”?*

This is appropriate.

8) *Should Professional Engineers Ontario adopt a system of mandatory continuing education similar to other professions in the province and like other professional engineering licensing bodies in several other provinces?*

Yes.

9) *Should PEO adopt guidelines for structural engineering practice and independent documented structural engineering review similar to those now published by APEGBC and which resulted from the inquiry into the Station Square collapse in Burnaby, B.C. in 1988?*

Yes

10) *What is the general state of knowledge in the engineering profession of corrosion, and particularly what conditions affect the rate of corrosion of structural steel and what is the impact of corrosion on the anticipated life of a building’s structural integrity? Is there continuing education in this area and, if not, should there be?*

In general, undergraduate education in engineering does not provide adequate knowledge related to corrosion. There are opportunities for the study of corrosion and its impact during graduate studies. Continuing education will be very useful and should be mandatory for professionals engaged in assessing the state of corrosion and its impact on structural safety.

Considering the information you have gleaned from the proceedings of the Elliot Lake Commission of Inquiry, can you provide your top five recommendations as to what should be done to ensure that a similar tragedy does not occur again in Ontario or Canada? If possible, identify the sort of buildings or occupancies which should be the highest priority.

The following are some recommendations that I consider would help in ensuring that a tragedy such as that at the Elliot Lake has minimum likelihood of occurring.

1. A performance standard for the inspection of buildings, similar to the one described in the submission of PEO, should be formally enacted under the provisions of the Building Code Act.
2. Buildings constructed to serve as parking garages, arenas, commercial, institutional and educational buildings, and other buildings with high human occupancy (*Building Code Act would provide more specific definition*) should require inspection at specified intervals (for example, once in 5 years) to determine structural sufficiency. The inspection would be the responsibility of the owner(s) and should be carried out by professionals qualified to carry out such inspection. (*I believe that the requirements for such inspection already exist for parking garages and arenas*).
3. The owner(s) should maintain records of all inspections carried out under (2) above or for other reason and transmit such records to the new owner(s) when the building is sold.
4. If the mandatory or voluntary inspection of structural sufficiency reveals existing or potential structural weakness, the professional carrying out the inspection should be obliged to report such finding to the owner as well as to the CBO along with recommendations on what further actions would be required to ensure structural sufficiency.
5. Licensing authorities issuing certificates of authorization should indicate on the certificate whether the professional is qualified to carry out inspections of building to determine structural sufficiency, based on a combination of basic education, continuing education, and skills gained through relevant experience.