The Algo Mall Collapse. Patrick Quinn P.Eng. Nov. 2013

1.0 GENERAL

1.1 The cause of the collapse was that a quarter inch thick piece of weld metal that carried the roof loads into the columns rusted away. It was the needle in the haystack and it was not found because the focus was on the leaking that was compromising the everyday functioning of a shopping centre. The reality is that no regulatory standards or other reminders would have changed the outcome. What in hindsight is glaringly obvious was missed. It is usually called human error.

1,2 So what can be learned from an inquiry that will cost more than the replacement cost of the building, and will not restore families or a community? Quite a lot, if this incident is seen in the larger context of the rot which infests much of our aging infrastructures; buildings, parking structures, roads, bridges, power stations, transmission lines, etc., etc.. Many, because of neglect, lack of fore planning, and the non-setting aside of funds, are reaching the end of their safe life. There is a need for identifying, prioritising, and instituting corrective measures for public safety. If restoring and replacing does not become a public initiative, more Algo Mall collapses are inevitable.

**1.3. There needs to be a requirement for mandatory timely inspections of all buildings with public use or occupancy, and infrastructure components.**

**1.4. Just as condo buildings are required to have reserved trust accounts for on-going maintenance and renewals, all pubic use or occupancy buildings should have similar requirements.**

**1.5. All governments must address the issue of aging infrastructures under their jurisdictions.**

2.0 CONSULTING ENGINEERING IN THE CONTEXT OF THE ALGO MALL.

2.1. Failures which become public issues are frequently unique, except that, in hindsight, many were predictable and the disasters were avoidable. The collapse of the bridges at the Hyatt Kansas Hotel , the space shuttle failure, the World Trade Centre collapse, the collapse of the Burnaby shopping centre roof, and the Algo Mall, all had simply understood failure mechanisms which now seem to be self evident. Understanding the environment in which failures occur is critical to conclusions on future actions.

 2.2. The collapse of the Algo Mall was the result of a weak link in the support system, the weld of a beam to a column, which had little substance in size and therefore a serious weakness in the loss of material from corrosion. This is as obvious in hindsight as was the fact that O-rings on the shuttle that blew up were poor performers in cold conditions or that drywall enclosures to main stair exits in the WTC were vulnerable to impact, or that the unbraced bottom chord of the beams in the Burnaby collapse were subject to buckling. In the case of the Algo Mall the connection of a beam to a column just rusted out. How was this vulnerability not discovered earlier by a succession of experts?

2.3. Consulting engineers in the building industry generally have no autonomy in decision making, and work within building codes and the norms of the construction industry. There are clear and accepted limitations on their inspection processes. Calls for assurances of the adequacy of the Algo Mall structure were treated within norms, and there is ample evidence that the various owners were told of the deterioration of the structure. These concerns were based on limited inspection of the areas of beams where fireproofing had fallen off and exposed parts of the beam. It is also clear that what now seems obvious, (that the connections were actually the weak link in the structure), was not obvious to experienced engineers at the time. The obvious is not always as obvious as later events indicate, probably because of the isolated contexts in which some decisions are made.

2.3. In the case of the Algo Mall, only an engineer whistle blower would be beyond criticism now. This person would have insisted that there was imminent danger, that the hundreds of connections to columns needed to be exposed and examined, that the building needed to be cleared, and that some protection of workers be in place during the work. The mountain that a lone whistle blower would have had to climb seems impossible, and it is clear that the actions being demanded would have had repercussion throughout the community. While it seems easy to put in place legislation that narrows down the responsibility for such situations to a consulting engineer, or chief building department engineer, or chief provincial engineer, it is in fact impractical and fraught with unintended consequences. The Gardiner Expressway would be closed tomorrow, as would a host of bridges which are lifelines of communications for travelers, were the onus and accountability for failure to be put on one firm with finite insurance.

**2.4. What society needs for its protection from deteriorating infrastructure is a forum where whistle blowers can, in a protective environment, express their concerns and have this forum rule on the cost/risk benefits of taking action on behalf of the community. Regulations associated with ageing infrastructure are needed and should establish responsibility within a broad framework.**

**2.5. All politics are local, so a local committee analogous to a committee of adjustment should be empowered to consider any situation of building or infrastructure concerns brought by inspection or building department engineers or concerned citizens. Final decisions are those of society and government, where decisions need to be made for the greater good. They must be made in the political arena. The decisions of these committees should require the consent of elected councils who are the ultimate representatives of communities and are entrusted by an electorate with acting for it and assuming any cost/benefit risks on its behalf. Such a legislated body is needed to overcome the inertia and self interests that are often barriers to the protection of the public. If we get another collapse like Algo Centre this need, in hindsight, will be self evident.**

3.0. SELF-REGULATION, THE ROLE OF PROFESSIONAL ENGINEERS ONTARIO.

3.1. Professional Engineers Ontario (PEO) was established in 1922 and given special status by government to control who could practise engineering and under what conditions. Societal education, mores, and values at that time were very different from those in vogue in society today.

3.2. William Lahey, director of the Dalhousie Health Law Institute, writing recently for the Canadian Association of Nurses, commented on "[Is self-regulation under threat?" as follows,](http://www.canadian-nurse.com/index.php?option=com_content&view=article&id=451%3Ais-self-regulation-under-threat&catid=4%3Aperspectives&Itemid=39&lang=en) *"Regulation is the government’s way of protecting the public.* Self*-regulation is different because the government has delegated responsibility for setting and enforcing the rules to the occupation that is to be regulated. Self-regulated professions have often been criticized for being passive. For example, they have traditionally relied heavily on* input *regulation — licensing, rather than on* output *regulation — oversight of the practice of those who are licensed".*

3.3. In recent years, PEO is exclusively reactive as to output regulation. Years after a collapse of a demolition project with a fatality, it put out a Practice Guideline, [Professional Engineers Providing Services for Demolition of Buildings and other Structures](http://www.peo.on.ca/index.php/ci_id/22081/la_id/1.htm) (2011). After the fatalities at the Algo Mall collapse it put out a Practice Bulletin, **Regulatory No. 2** - [Structural engineering assessments of existing buildings](http://www.peo.on.ca/index.php/ci_id/22608/la_id/1.htm) 2012. This is the total output of practise standards relating to public safety in the last decades, from an organisation with 100 staff and a budget this year of some $27 million.

3.3. There is evidence that PEO presently has a factionised governing Council which is, in a modern sense, incapable of governing and regulating in a timely fashion. The proposal document offered to the enquiry commission comes from a small delegated committee of its Council and staff, did not seek input from the membership or from the consulting sector, was not peer reviewed, and was not approved by Council in its final form. What it seeks in direction from the commission has in large part always been part of its mandate and as it applies to its members has always been within its regulatory powers.

3.4. It is clear that society has moved dramatically away from reliance on codes of ethics observed in what is now the dim past. Following the disclosure of corruption in the engineering community in Quebec, the engineering regulator in that province is introducing ethics as a way forward, mostly in an effort to regain a lost trust. In today's society, it appears to be too little, too late.

3.5. In Chapter 18 of "Engineering in Context" (a major contribution on the profession by leading European educators), Martin Meganck writes, *"The difficulty of defining what engineering exactly is, makes it difficult to apply to it the major indicators of professionalism which function well elsewhere. Finally a new kind of professionalism seems to emerge in the development of formalised procedures for improving and guaranteeing the quality of engineering services. Keeping up with these procedures requires a level of specialisation comparable with how traditional professions work."* In regulatory terms, standards are formalised procedures.

3.5. PEO clearly does not prioritise that standards written in advance are necessary for improving and guaranteeing the quality of engineering services, and that without their application, (both of which are PEO obligations to public safety), professional engineers are left to their individual practices and individual concepts of ethics and duties. In respect of oversight of the practice of those who are licensed, PEO is clearly not performing a vital role of a self-regulator.

3.6. Lahey notes, "Other criticisms of self-regulated professions include the perception of leniency when it comes to disciplinary matters and the tendency to put turf protection ahead of the public’s interest". PEO's disciplinary regime has been the subject of criticisms for decades, mostly because it seems to many to be locked into a pattern of dealing with plea bargains and wrist slaps.

**3.6. Toward determining its future, an independent analysis of PEO is required; its spending, its governance, its performance in fulfilling its regulatory role, and its cost/benefits to society. This analysis should determine the governance and other changes required to ensure a regulatory regime fulfilling that role in a modern context. The protection of the public demands no less.**