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The Pakistan Civil Engineer

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Development of Construction Industry Codes - Ancient Times to the United States

Sundar Industrial Estate Building Failure - Collapse of a Building or Collapse of the System?

A World for Entry-level Civil Engineering Graduates

PEC Elections, 2018

Professional Practice Corner

The Pakistan
Civil Engineer

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Editorial

The second issue of the Pakistan Civil Engineer is here. The inadvertent delay in the publication certainly calls for a word of explanation. The editorial board painfully notes a lack of contribution from those who received the first issue. We are confident that this is not for want of able minds but for the fact that PSCE is still in its teething period and in the process of reaching out to the community. We keep our fingers crossed as we start getting ready for the third issue. In any case, all future issues would be published on time.

The magazine still remains only a modest effort. As a guiding principle, we firmly believe that the best is the enemy of good. Not being able to do extremely well is no reason for us not to do anything at all. PSCE believes that we have to begin somewhere, even if the task is big and we cannot do full justice to it at the outset. The silver lining, however, is that as we receive more contributions from PSCE members, the future issues would be livelier, more readable and more informative.

A section under the name of Professional Practice Corner has been added to this issue and it is intended to be a permanent feature of future issues. We hope it would be well-received by our readers.

The editorial board invites contributions, for the Pakistan Civil Engineer, from all civil engineers and allied professionals, encouraging them to contribute in whatever way they can.

With the 2018 elections of Pakistan Engineering Council just round the corner, PSCE encourages and request all engineers and, particularly civil engineers, to exercise their right of vote and make informed and independent decisions in the interest of the profession.

Please do not fail to send us your most valuable feedback which is one of the most important and most direct means for us to improve the Pakistan Civil Engineer.

Rizwan Mirza
Chief Editor

Cover Story

Development of Construction Industry Codes – Ancient times to the United States

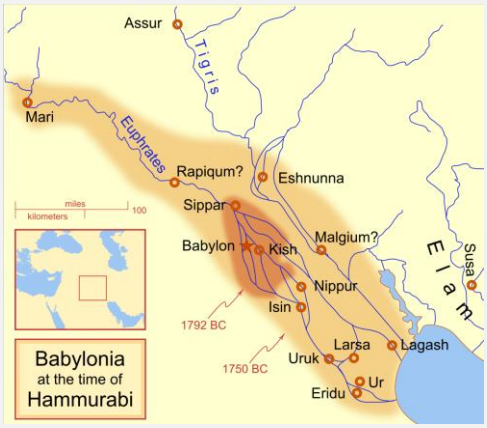
Rizwan Mirza[1]

Introduction

Engineers, today, take codes of practice as an integral part of professional practice, but it has not always been like this. The fact is that codes of practice have evolved through a long drawn out evolutionary process. The process has also been panoramic history of the development of the professional practice. This article begins the story from with the ancient times and takes the reader to the modern times.

Mesopotamia: 2285 – 2242 BCE

The story of codes started in Mesopotamia at the times of King Hammurabi (21285-2242 BCE).



The Hammurabi Code

The Hammurabi code was a simple performance code, set in a rather primitive form:

> ***Law §229 - If a builder has built a house for a man and has not made strong his work, and the house he built has fallen, and he has caused the death of the owner of the house, that builder shall be put to death.***

The Holy Bible: circa 1450 BCE

The Old Testament contains a prescriptive requirement requiring the provision of parapets around the roofs, more in the nature of those contained in the modern codes.

[1] CEO, Rizwan Mirza, Consulting Engineers

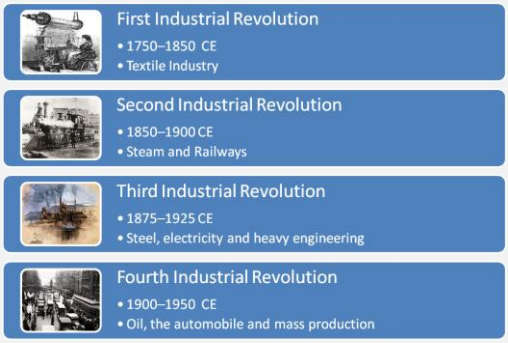
When thou buildest a new house, then thou shalt make a battlement for thy roof, that thou bring not blood upon thine house, if any man fall from thence.

The Holy Bible, King James Version, Old Testament, Deuteronomy 22:8 The fifth book of Torah (Pentateuch). The Second Law.

The later ancient history remained, by and large, uneventful.

Come the Industrial Revolution

Two hundred years starting in 1750 and ending in 1950, is a period studded with a series of events because of which it is roughly labeled as the Industrial Revolution.



Industrial Revolution

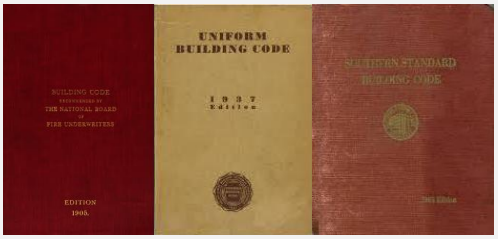
As the said changes were taking place, the engineering profession was also undergoing parallel changes. It is not a coincidence that it was the same period which witnessed the formation of professional societies, across the developed world, thus paving the way for future code development. Following timeline makes an interesting and thought-provoking reading in this regard:

Description		Founded
United States of America		
American Society of Civil Engineers	ASCE	1852
American Society of Mechanical Engineers	ASME	1880
American Society of Heating, Refrigerating, and Air-Conditioning Engineers	ASHRAE	1894
American Society for Testing and Materials	ASTM	1898
American Concrete Institute	ACI	1904
American Association of State, Highway and Transportation Officials	AASHTO	1914
American National Standards Institute	ANSI	1918
American Institute of Steel Construction	AISC	1921
National Society of Professional Engineers	NSPE	1934
United Kingdom of England, Scotland and Wales		
The Royal Institute of British Architects	RIBA	1834
Society of Engineers	SoE	1854
Institution of Civil Engineers	ICE	1918
Chartered Association of Building Engineers	CABE	1925
Canada		
The Canadian Society for Civil Engineering	CSCE	1887

Genesis of Modern Codes

The industrial revolution, particularly as practiced in North America, brought with it changes in social order and administration of laws. In addition, building construction practices were changing. Tragic losses of life in textile mill fires in the nineteenth century led to innovations such as sprinkler systems and multiple exits. It also became clear that better regulation of the built environment was required. Code practitioners joined hand to promote the concept of professionalism and to promulgate 'model' building codes. Stage had, thus, been set for the genesis of modern codes, which appeared one after the other. Three non-profit groups came to pre-eminence.

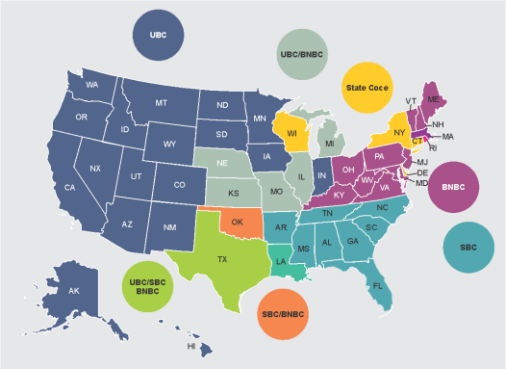
Year	Code	Organisation	Region
1905 CE	BOCA National Building Code	National Insurance Association, National Board of Fire Underwriters	East
1927 CE	Uniform Building Code	International Council of Building Officials (ICBA)	South
1945 CE	Southern Standard Building Code	Southern Building Code Congress (SBCC)	West



All the above documents developed independently into model codes, reflecting unique characteristics and different philosophies of building construction and code enforcement. Each of these building codes is

one of a family of codes, including mechanical, plumbing, housing, zoning, and fire prevention codes, which are interrelated and correlated to work together to achieve complete regulation of the built environment.

The tripod of the first three codes reflected the geographical division of the United States.



US Geographical Regions and Building Codes

BOCA (east)

Building Officials Code Administrators, BOCA reflects attitudes of the east and the needs of a highly urbanized environment. BOCA's National Building Code (NBC) is primarily performance based and liberally utilizes references to consensus standards published by other entities, such as: the American Society for Testing and Materials (ASTM) and American National Standards Institute (ANSI).

ICBO (west)

International Conference of Building Officials, ICBO developed the self-contained, freestanding Uniform Building Code (UBC), within which standards were originally transcribed and most materials needed to enforce or interpret the code are contained. The UBC is a mix of performance and prescriptive requirements. Many of the structural provisions reflect the area's exposure to earthquakes and need for proper seismic design.

SBC (south)

Southern Building Code Congress, International, SBCCI developed the Standard Building Code (SBC), originally known as the Southern Standard Building Code, reflecting the needs of code enforcement in the south, with particular emphasis placed on wind-resistive design in recognition of the southeastern states' exposure to hurricanes. The SBC is also primarily performance based with liberal use of referenced consensus standards published by other entities for use in judging the performance of materials and systems.

Towards Unification

Because these model codes reflected the characteristics of construction and the environmental conditions that were prevalent in their region, they differed in their format, content, and appearance, despite the fact that they imposed very similar regulations on many construction aspects.

In the early 1970's, the American Institute of Architects (AIA) developed a policy which called for short-term and long-term changes in the code development arena.

Short-term
Their short-term goal for the three model codes was merely to reorganize the documents around a common code format, locating similar requirements in the same chapters in each of the three model codes.

Long-term
The long-term goal called for development and publication of a single set of national model codes through the cooperation of the three model code groups.

In 1972 the Council of American Building Officials (CABO) was created by the three model code groups as an organization that would, among other things, provide the means to address matters of common concern among BOCA, ICBO, and SBCCI. CABO, in turn, established the Board for the Coordination of the Model Codes (BCMC) which was intended to identify conflicts between the three model

codes and recommend revisions to address those conflicts.

BCMC tackled numerous problems in codes, one of the biggest being their differing format. BCMC eventually developed a common format based on organizing the codes around similar materials and life safety. BOCA reorganized its documents into this new format in 1993 and SBCCI and ICBO followed in 1994.

One of the early joint code-writing efforts by the three code groups occurred under the CABO umbrella. It was the development of the One- & Two-Family Dwelling Code (OTFDC). The OTFDC is a specification code which is applicable to one- and two-family dwellings and townhouses, as defined in the code, and addresses not only the construction of the structural elements of the building, but also the plumbing, mechanical, electrical, and fuel gas systems.

Although all of these elements are addressed in the larger building codes and their related codes, the OTFDC provides a single source of primarily prescriptive requirements and contains little performance language. Although it is recognized by all three code organizations, the OTFDC is not a mandatory document unless specifically adopted by a jurisdiction.

International Code Council (ICC)

Around the time that BOCA, ICBO, and SBCCI reorganized their code books to reflect the BCMC format recommendations, the three model code groups formed a new umbrella organization called the International Code Council (ICC). Subsequently, the code groups rolled CABO into the ICC. ICC was incorporated as a not-for-profit corporation in 1994, dedicated to developing a single set of comprehensive and coordinated codes similar to what was desired by AIA. This bold and ambitious program called for a new set of model codes to be completely developed and published by the first quarter of the year 2000, in time for the new millennium.

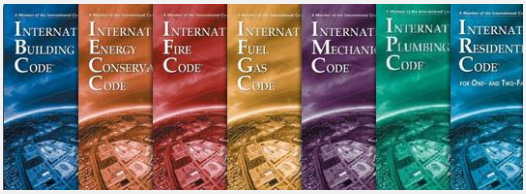
Each of the three model code groups sent a three-member delegation and one staff member to each of the committees. The time schedule set forth by the ICC Steering Committee resulted in the committees meeting between six and ten times to develop their respective draft chapters. These were then consolidated into an initial working draft of a new International Building Code (IBC).

As is typical in legislative processes, each committee developed its own personality and thus its own philosophy during developmental activity.

The Structural Committee expressed an intention to incorporate the most current and generally accepted engineering standards for conditions such as environmental loads (wind, seismic and snow), new maps for wind and snow, and the latest in design methodologies for various materials.

The Occupancy committee decided to develop use groups and height and area limits which would embrace all of the limits then existing in the various codes. The Fire Safety Committee wanted to utilize the “most restrictive” provisions of the model codes. The Egress and the General Committees developed similar independent personalities.

Surprisingly, given the parochial attitudes of many of the members of the three model code organizations, the ICC code development process quickly dispatched several elements of its family of codes.



The first to be promulgated was the International Mechanical Code (IMC) in 1995. Quickly following was the promulgation of the International Plumbing Code (IPC), the International Private Sewage Disposal Code (IPSDC), and an International Zoning Code (IZC). Finally, in late 1996, Building Code Development Committees were established by ICC with the task of melding three distinctly different regional building codes into a single model code. The task of developing a single model code was broken up into five technical

code development committees: Structural, Occupancies, Fire Safety, Means of Egress, and General. These code development committees were formed and tasked with developing model code provisions from materials already available on each subject within the existing model codes, BCMC reports, or in rare circumstances, the work of other groups such as the Building Seismic Safety Council (BSSC).

Structural Failure

Sundar Industrial Estate building failure – Collapse of a building or collapse of the system?

Rizwan Mirza[2]

Picture credit: The Daily Mail Online, 4th November, 2015

Wednesday, 4th November, 2015, was like any other day for the workers at Rajput Polyester Industries. No one had suspected that a colossal tragedy was just round the corner for hundreds working under the plastic bag factory located at 93 Sundar Industrial Estate, Lahore. It was already dusk and the morning shift workers were preparing to knock off. All of a sudden, the building crumbled to the ground, with the debris falling over hundreds of workers below the debris. What followed was a human tragedy that sent shock waves not only within the provincial metropolis of Lahore but around the entire country and even beyond.

Rescue operation continued for 131 hours and concluded in the early morning of Tuesday, 10th November, 2015.

A total of around 45 dead and 103 alive bodies were recovered from the debris during this marathon task involving 2,079 workers and 309 pieces of construction equipment.

An inquiry was ordered by the provincial government and the seven-member inquiry committee included three bureaucrats, three public-sector engineers and one town planner. No independent practicing structural engineer was included in the team that was charged with the responsibility of investigating a structural failure. As the terms of reference of the committee also included fixing of responsibility, there was a legitimate need for including a legal expert within the committee, which obviously was not done. To make things verse, the report – and we have a legitimate expectancy to assume that there was one – was quietly brushed under the carpet and was never made public.

The outline of the facts of the case, as gathered, to the best of the author's information, depict the following timeline of events:

It may be noted that Sundar Industrial Estate is governed by Punjab Industrial Estates Development and Management Company (PIEDMC). The PIEDMC is a public-private-partnership company where major administrative control is in the hand of the prominent businessmen and industrialists of the province.

[2] CEO, Rizwan Mirza, Consulting Engineers

According to daily News, dated 6th November, 2012, the Punjab government issued a notification, for forming a 7-member inquiry committee, comprising two bureaucrats, a member of chief minister's inspection team, a structural engineer from NESPAK, chairman civil engineering department, UET, Lahore, chief town planner, LDA and chief engineer, LDA (having a background in traffic engineering). As the terms of reference of the committee also included fixing of responsibility, there was a legitimate need for including a legal expert within the committee, which obviously was not done.

On 21st November, daily Dawn reported that the inquiry committee held the following responsible for the tragedy: CEO, PIEDMC, the construction contractor, the resident engineer, the architect(s), the chief engineer, factory owner and his son. Legal action was recommended against them. There is no way that this can be verified by this writer.

According to the Dunya News, dated 12th November, 2015, the inquiry report, released on Thursday, 12th November, 2015, stated that the committee was unable to meet the engineer and architect of the building since both of them were missing. The report says that the building was extremely weak from engineering and design point of view and therefore, the structure of the factory was unable to carry the heavy machineries deployed there.

The report recommended a detailed survey of all industrial structures in the various industrial estates of the province and other public and private sites, ensuring that the construction of such buildings was in line with regulations and proper monitoring mechanism to deal with such issues. According to media reports, the report was submitted to the Chief Minister, by the industry department secretary, who was entrusted with the task to "investigate the incident, fix responsibility and recommend action and remedial measures to avert such incidents in future".

"Although the Sundar Industrial Estate falls in the limits of Allama Iqbal Town Municipal Administration, its building control affairs – approval of maps, construction etc. – are supposed to be supervised or dealt with by the PIEDMC's board of management. So the board members will also be inquired in detail at a later stage over lacking supervisory control in the estate," a senior official told Dawn while quoting the report.

The story states that an official claimed the owner violated the map approved by the PIEDMC authorities during construction. The map did not fulfil requirements of the industry building regulations, and despite these facts, it was approved prior to construction, IEDMC Chief Executive Officer Naveed Mushtaq Gill is stated to have admitted that the documents provided for approval of the map did not fulfil legal requirement. He is also reported to have said the PIEDMC management had constituted its own committee to probe the incident and amend prevailing laws that could enable officials to monitor or supervise construction.
According to the daily Dawn, dated 22nd November, 2015, the Sundar police on 21st November, 2015, on the complaint of District Officer Muhammad Azhar, registered a case against two architects, chief engineer and the owner of the ill-fated factory under Section 7 of the Anti-Terrorism Act (ATA) and murder attempt charges. Raiwind City ASP stated that the case had been registered against architects Tahir Mehmood and Rana Munir Hussain, engineers Hussain Ahmed and Ahmed Riaz and owner the late Ashraf.

According to the daily Dawn of 24th November, police claimed on 23rd November, to have arrested two architects who were amongst the nominated accused in Sundar Industrial Estate factory collapse case. A case was registered under terrorism, murder and attempt to murder charges against five people on the complaint of Sundar Industries Officer Azhar Husain. The nominated accused include factory owner Rana Ashraf, building's architects Tahir Mehmood and Rana Munir Hussain, structural engineers Ahmad Riaz and Hussain Ahmed.

Homicide Unit Inspector told the newspaper that architects Tahir Mehmood and Rana Munir Hussain were arrested. He said raids were on to arrest the engineers. He said investigation had begun and people who were held responsible for negligence in the inquiry report submitted to the Chief Minister would be interrogated first. He said report held the architects (who finalised the building plan), the engineer (who supervised the construction) and the town municipal administration officials (who approved the building plan, map and structure), besides the contractor, responsible for the tragedy. All of them would be arrested, he added.

Business Recorder, on 25th November, quoting APP, claimed, that an anti-terrorism court (ATC), on 24th November, 2015, handed over two architects – who were among main nominated accused in Sundar Industrial Estate factory collapse case, to police on seven days physical remand. Earlier, police produced accused architects before the honourable ATC-II Judge. Police claimed that the accused had finalised the building plan of the collapsed factory and had been nominated in the case and sought their custody for investigation. The honourable judge granted the request allowing a seven-days remand. The police had arrested the accused architects on Monday in a case registered under terrorism, murder and attempt to murder charges against five people on the complaint of Sundar Industries Officer Azhar Husain.

Despite all attempts by this writer, no copy of the inquiry report or the first information report (FIR) seems to be available anywhere on the cyberspace. So much for the right to information of the common people of Pakistan, guaranteed under Article 19A of the Constitution, the provisions and spirit of the Punjab Transparency and Right to Information Act, 2013 (Act XXV of 2013) and the tall claims of transparency and e-government by the various governments. As it is, the truth seems to be the first victim of the tragedy. The policy of the government of playing all cards close to its chest, on an issue of utmost national interest, needs to be revisited, especially if is a result of a bare oversight by the higher officials.

In the absence of the availability of information to the common man and amidst the prevalent confusion, it seems hard to direct any specific comments on the charges. However, since the required information is unlikely to be made available any time soon, there seems to be no choice but to direct tentative comments which merit paramount attention.

It seems that no one has made any serious attempt to address the real causes of the tragedy or made any attempt to find out why these incidents continue to repeat themselves. The question is more fundamental than investigating a particular case; it is a case of generic flaws in the entire system which no one wishes to admit. Everyone is busy playing to the galleries over a huge loss of human life.

Interestingly the inquiry report recommends that management of industrial estates be given regulatory powers and at the same time has held its officials guilty of failing to regulate. It has held ghosts guilty when it states that the resident engineer (*if any*) was guilty. The committee has found the design defective when it has neither seen the structural designs and drawings nor met any of the design engineers, according to its own claim.

There are fundamental questions that remain unanswered. How, by any stretch of imagination, could the provision of Anti-terrorism Act be attracted, in such a tragedy? Why did police intend to arrest all the professionals associated with the building in any way, from day one, without first establishing if there was a prima facie evidence criminally implicating any of them? No one has cared to distinguish between the original design for two storeys and that for the addition of the third storey; the deviations from the designs made by the owner; and the deviations from designs and specifications by the contractor. Why was Mr Hussain Ahmed arrested and remained in prison for a long time without bail, despite the fact that he had undertaken the original structural design only which has not been claimed to be flawed? The committee has said that the construction was defective, while it has no idea what the actual design or specifications were. It has said that the engineers did not supervise the construction without knowing their contractual obligations. It is a basic principle of law that a duty has to be proven before a breach can be proven. But these principles of law are contemptuously and defiantly flouted by the executive organ of the government when it acts only to intimidate and fleece whoever has a capacity to grease its hands. It all seems so senseless, at least on the face of it.
As a result, the technical aspects of the tragedies of this type are never made transparent to the rest of the engineering community, far less to the general public. Stated in the softest terms, this approach suggests no less than a cover-up.

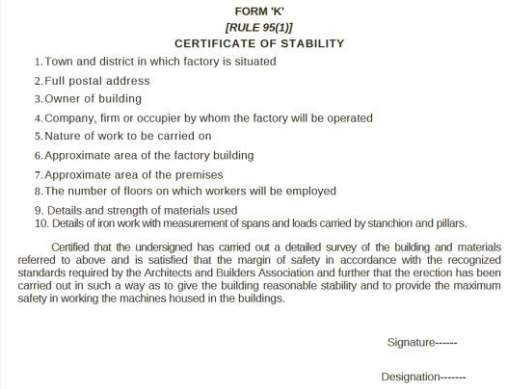
A scene of rescue operation; Picture credit: The News, November 8, 2015

Some regulatory bodies continue to insist that only engineers with a master's degree shall design structures. The fact is that both the accused engineers are said to possess respected foreign master's degrees. The million-dollar question is: where, then, is the flaw? Structures obey the Newtonian laws of mechanics and do not behave randomly. That fact is that even if all the accused are hanged, nothing is going to change. The answer is that a selected few have been made scapegoats – even if they were guilty by various degrees – while life would go on as usual for the rich, the wealthy and the powerful. The system of flaws is like cancer; excision of a few pounds of meat here and few here would not help the patient.

The million-dollar question is: where, then, is the flaw? Structures obey the Newtonian laws of mechanics and do not behave randomly. That fact is that even if all accused are hanged, nothing is going to change.

To begin with, it seems pertinent to review the various legal provisions relevant to the case. Let us first examine the legal framework for the safety of industrial facilities. It is interesting to note that according to Section 33-Q, Rule 95(4) of the Punjab Factories Rules of 1978, the stability of an industrial building is to be certified by: (a) a member of the Royal Institute of British Architects; or (b) an associate Member or Member of Institute of Engineering, Architects of Pakistan or (c) an Associate Member of the Civil Engineers; or (d) who possesses such qualifications as the Chief Inspector may approve.

The certificate under form K, to be issued pursuant to this rule is required to contain "details of iron work with measurement of spans and loads carried by stanchion and pillars." The certificate is also required to state, on the basis of a "detailed survey of the building and materials", that "margin of safety in accordance with the recognized standards required by the Architects and Builders Association and further that the erection has been carried out in such a way as to give the building reasonable stability and to provide the maximum safety in working the machines housed in the buildings."



FORM 'K'
[RULE 95(1)]
CERTIFICATE OF STABILITY

1. Town and district in which factory is situated
2. Full postal address
3. Owner of building
4. Company, firm or occupier by whom the factory will be operated
5. Nature of work to be carried on
6. Approximate area of the factory building
7. Approximate area of the premises
8. The number of floors on which workers will be employed
9. Details and strength of materials used
10. Details of iron work with measurement of spans and loads carried by stanchion and pillars.

Certified that the undersigned has carried out a detailed survey of the building and materials referred to above and is satisfied that the margin of safety in accordance with the recognized standards required by the Architects and Builders Association and further that the erection has been carried out in such a way as to give the building reasonable stability and to provide the maximum safety in working the machines housed in the buildings.

Signature------

Designation-------

This writer finds the entire provision of the above rule a contradiction in terms, impractical, detached from realities, illegal and above all, marred by serious technical flaws. First, the only professional who can assess the adequacy of safety of a structure is a civil engineer and not an architect. Second, none of the bodies mentioned, other than the Royal Institute of British Architects exist, to the best of the knowledge of this writer. Third, the Pakistani law does not recognise architects unlicensed by Pakistan Council for Architects and Town Planners (PCATP) and does not recognise engineers unlicensed by the Pakistan Engineering Council (PEC). Fourth, the rest of the terms used are so hazy that probably no meaning can be ascribed to them and one who wonders why they have been added at all, if not for the purposes of creating confusion, over which corruption thrives. Fifth, the safety of a structure cannot be assessed by a single person and that too through a so-called "detailed survey". It may be noted that any structure has three aspects of its safety: a) design; b) construction; and c) any damage as a result of a subsequent action. The provision is illegal as it "requires" persons unlicensed by the PEC – the sole regulatory body of the engineering profession – to certify that a structure is safe. Such an act is penal offence under the PEC Act 1976 (V of 1976).

Let us now deal with the criminal proceedings, currently underway. First of all, how did the police, all of sudden, arrest two persons nominated in the inquiry report, while the homicide inspector himself admitted that he had arrested the two accused on the basis of the findings of an inquiry report and was yet to begin his own investigation. This is not how the law is! It is well settled that FIR is just a report and not any evidence of guilt. Constitution and findings of the committee also has no legal bearing on the police action as the latter is "required" to independently, and impartially act within the framework of the Police Rules and the Criminal Procedures Code, without being prejudiced by anyone else. The powers of the police to arrest someone are not unbridled and according to the law, the police have to independently form its own reason-based opinion that the persons claimed to have committed an offence are prima facie guilty. It is only then that an arrest can be made and not otherwise. It is also interesting to that the FIR reportedly nominated only five persons as accused while the committee extended the number to eight.

According to the law, the police do not need anyone else to ask it to act but is in fact "required" by the law to speedily act on its own the moment a cognizable offence has taken place and complete its investigation within twenty-four hours. The next question, therefore, is: what was the police doing for seventeen long days of one of the most widely publicised incidences? What had it been waiting for and under what provision of the law?

Now let us examine the offences that the accused are claimed to have committed. According to Section 6 of the Anti-terrorism Act, 1997, "terrorism" means the use or threat of action where: (a) The action falls with the meaning of sub-section (2) and (b) The use or threat is designed to coerce and intimidate or overawe the Government or the public or a section of the public or community or sect or create a sense of fear or insecurity in society; or (c) The use or threat is made for the purpose of advancing a religious, sectarian or ethnic cause.

A bare reading of the section shows that it is a clear case of the blatant abuse of criminal justice system to claim that the crimes allegedly committed by various accused having different roles – regardless of how serious the alleged crimes are – attract the provisions of Anti-terrorism Act. Abuse of the provisions is certain to open the doors for corruption, overburden the anti-terrorist courts and facilitate the acquittal of the accused on the grounds of misapplication of law. While the memory of the booking of a Shaheen Airline pilot – who had safely landed a plane despite a reported failure of the landing gears system – on charges of terrorism has still not faded away, the police has come up with yet another case of the serious abuse of the anti-terrorism law. Ask a lawyer what would happen if doctors are booked on terrorism charges for every complaint of negligence, or a lawyer is booked on terrorism charges if he

commits a contempt of court, what would be the most likely legal outcome. The answer would be: the accused would be acquitted. Every lawyer knows that an accused only needs to defend the charges against him as defined within the section of the applied law and if the necessary ingredients of the relevant section are not present, the accused cannot be convicted. It is such a simple principle that one does not need to be an Einstein in order to understand it. Lest we forget, only recently the Honourable Islamabad High Court had removed the anti-terrorism charges against the convicted criminal of the murder of Governor of Punjab, while maintaining the death sentence under PPC. Yes, it was a terrible crime but did not fall within the definition of a terrorist act, in the eyes of the court. According to Pakistan Today of 31st March, 2016, it was as late as on 30th March, 2016 that the Anti Terrorism court removed ATA sections from the charges against one of the engineers.

Let us now examine the attempted murder and murder charges. According to Pakistan Penal Code (PPC), the various categories of homicide are clearly defined. These, amongst other, include *qatal e-amd*, *qatl shibh l-amd*, *qatal e-khata* and *qatl bis-sabab*. It is clear from the reading of the PPC that *Actus reaus* (guilty action) alone, in the absence of *Mens rea* (mental state), does not constitute *qatal* of the first two types and also that *qatl bis-sabab* is subject only to *diyat*, while *qatal e-kata* may be subject only to *diyat*, if not caused by a rash act and subject to imprisonment of a term not exceeding ten years in the latter case.
The police cannot claim that *qatl e-amd* has taken place. If the police claim that *qatl bis-sabab* has taken place, it cannot claim that the accused are guilty of terrorism, as the latter requires the presence of *Mens rea* as a necessary ingredient, while the former expressly excludes it. If, on the other hand, the police claim that the accused acted with an intent to kill the victims of the tragedy (*qatl e-amd*), it is certain that the case is unlikely to stand on its two feet, in the first place. As has been noted, *qatal e-khata*, is subject only to *diyat* and its commission, by its very definition, is not a terrorist act, in any case.
In the light of the above, the incongruous concurrent application of the two laws clearly shows the flawed nature of the police action, at the very outset. The outcome of the prosecution is any body's guess now.

Lastly, with due deference to the honourable anti-terrorist court, and in humbleness, the common citizen has a legitimate expectancy that our esteemed judiciary would maintain a vigilant oversight over the high-handedness of the executive (including the police) and prevent all misapplication of law, at the very outset. Judiciary must not be oblivious of the fact that, for the common citizen, it is the only guardian of its fundamental rights and if this shield is eliminated, the system is certain to completely collapse.

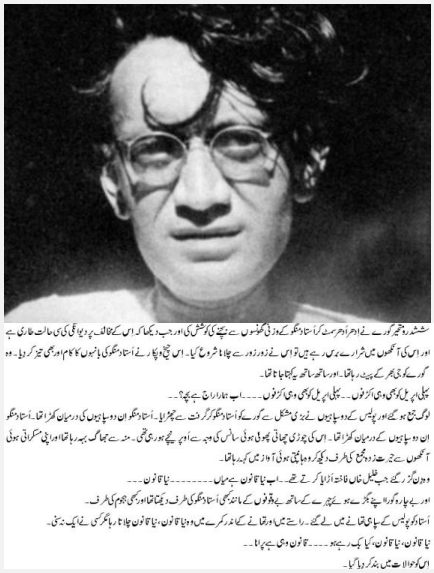
As everyone knows, the score card of Pakistan, in terms of structural safety is far from enviable. The 2014 collapse of the structure of a mosque (death toll 24), the floods that caused collapse of structures in 2014 (total death toll due to structural collapse, in double digits), the 2012, fire incidence of Baldia Town, Karachi factory (death toll 258), collapse of Shershah Flyover, Karcahi, in 2011 (Death toll 5), the collapse of the Harbanspura area overhead pedestrian steel bridge of Ring Road, in 2012 (Death toll 2), the collapse of the Punjab University pedestrian overhead bridge of Canal Road, in 2012 (Death toll 0, due to the time of the incident), the partial collapse of the DHA area overhead pedestrian bridge of Ring Road, in 2013 (Death toll 0), the collapse of the Punjab University overhead concrete pedestrian bridge of Canal Road, in 2015 (Death toll 0, due to the time of the incident), collapse of a wall over a stage building in 2015 (Death toll 6) and the collapse of a seven storeyed under-construction building in Rang Mehal, Lahore, in 2015, the collapse of a commercial building in Bahria Town, Lahore (Death Toll 0), the collapse of Chanawan Railway Bridge on 2nd July, 2015 (Death toll 19), Overturning of newly launched girders of bridge on Ghan Stream, Jhelum, 22nd May, 2016 (Death toll 0), the collapse of the Punjab University overhead concrete pedestrian bridge of Canal Road, in 2018 (Death toll 0), to name of a few. The list is literally endless.

The real causes of the tragedies are deep-rooted and widespread in the society. Everyone is guilty: the legislature, the police, the government and its functionaries, the private-sector entrepreneurs, weak professional bodies and where evidence of negligence exists, the professionals.

The writer believes that, given the corruption ridden executive and the influence of various mafia groups, the present legal proceedings would only make some functionaries richer, some innocent persons languish in prisons and nothing else is likely to happen. As no terrorism is involved, everyone would be acquitted of these charges. Would someone tell

the bereaved families and the injured victims of the 4th November, 2015 incidence what, by way of bigger picture, has been learnt from the tragedy? The perfunctory and illegal exercise of filling the files with ridiculous documents like Form K continue, is currently underway in all industrial estates of Punjab in order to ensure that no industrial worker would ever be able to work under safety?

Has anything changed? It would be instructive to recall the incisive ending lines from Sa'adat Hassan Manto's famous story:



"New law. What non-sense are you uttering? The law is the same. And he was placed in the lock-up."

Sa'adat Hassan Manto, Naya Qanoon

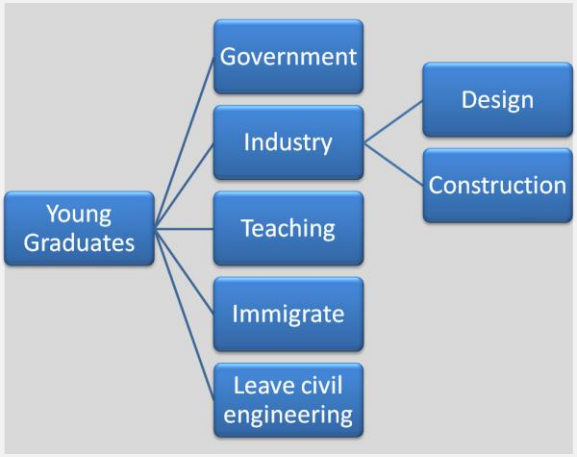
We have heard about high-level committees in most of the past incidents, but unfortunately, have never had the right to learn about the outcome. Do we need yet another committee to inquire why the previous comnmittees have not been efficacious? Or, else, do we need a committee to determine the causes which prevent the constitution of the proposed committee to inquire into the efficacy of the previous committees?

Pursuing higher studies is a logical option for those interested to become teachers.

Are we destined to live under the burden of a heavily criminalised, corrupt and incompetent police and executive, which are apt at bending, twisting and breaking the law only? Would someone get the corrupt police system off the back of the citizens of Pakistan and replace it with a police system like that of Great Britain, where the innocent feel safe and the guilty seldom escape punishment? Can it happen or is it a dream, or a fairly tale? Or would tragedy after tragedy continue to visit us helpless souls only to prove that we are a doomed as a nation.

A Word for Entry-level Civil Engineering Graduates

Every year hundred of young men and women graduate from engineering schools, with most eagerly looking forward to joining the profession. Some wish to pursue higher studies, some target government positions, other prefer industry jobs (within or outside the country), while still others favour teaching positions. This is not to mention those who find it hard to make a choice; those have no choice; those who immigrate to other countries; and those who do not wish to pursue engineering as a career.



With mushrooming growth of engineering schools and with many offering undergraduate civil engineering programs, the number of civil engineers has increased with time as has that of graduates in other major disciplines of engineering.

Unfortunately, there are hardly any active and meaningful career-counselling facilities in the country, thus making it extremely hard for the young graduates to make an informed choice.

While a general word of advice cannot be offered to everyone alike, some basic issues and facts can certainly be placed in perspective.

Firstly, one needs to note that a country's economy is the main prime mover of jobs. When the job market is slow, it may be due to the economic health of the country, absence of foreign investment or some other economic factors rather than on account of the young graduate being in the wrong discipline.

Secondly, everyone knows that civil engineering is the oldest, one of the largest and arguably one of the most diverse disciplines of engineering. If historical record is any guide, civil engineering profession has always offered jobs to graduates at various levels of training, when viewed in a broader context. The reasons are simple: if life has to go on, the society needs an infrastructure that only a civil engineer can help build. It is also true that civil engineering jobs are hard to be exported, something that is not true for many other disciplines of engineering. Except for some negative trends in the past few years most civil engineering projects generate maximum percentage of local jobs.

Thirdly, it needs to be realised that the markets for various levels of positions is not the same and has never been so. When jobs for entry-level graduates are relatively small in number, it does not necessarily suggest that there are no jobs for competent individuals at the entry-level, or that there are no jobs at higher levels of training. It is not to deny that every organisation has a pyramidal hierarchy with a wide base, which is the level open for the young graduates. With less work or no work in sight in the foreseeable future, organisations tend to reduce the hiring at the entry-level as this is generally a long-term investment for them. After the economy kick-starts the problem becomes over.

Fourthly, and mod most importantly, there is always a position available at the top. If you are good, there is simply no reason, why you would not find a job.

Comparing different types of jobs is another issue that the young engineers need to do.

Government jobs have generally been considered secure and prestigious and do not pay as meagre salaries as was the norm some two or three decades ago and have come with retirement and health-care benefits. But compared to the industry, they offer less flexibility, less professional work, regimented regimes of promotions and more governmental regulations. These jobs may sometimes become risky as public procurement policies place the engineers in a very vulnerable position.

Industry jobs have a potential to pay better, offer greater flexibility, provide greater opportunities for faster rise, pose greater professional challenges and greatly enhance one's professional skills. If one buys an insurance policy, some of the perks attached with governmental jobs can easily be obtained. Capable engineers are always a sought-after entity and never feel insecure. In a market economy, industry jobs are likely to increase in number.

> *. . . . . there is always a position available at the top. If you are good, there is simply no reason, why you would not find a job.*

What we can generally advise to the young graduates is:

a) Select the type of employment that suits you the most and try to focus on it.
b) Obtain a list of potential employers from one of the available lists such as that of Pakistan Engineering Council
c) Do not be disappointed if you do not receive a prompt response to your job application.
d) Carefully design your application and résumé, tailoring it each situation. Never forget that one stereotype résumé is not suited for each occasion.
e) Work hard when you find a job and increase your professional skills using beach available means.
f) Do not jump to a new job only for modest financial benefits.

PEC Elections, 2018

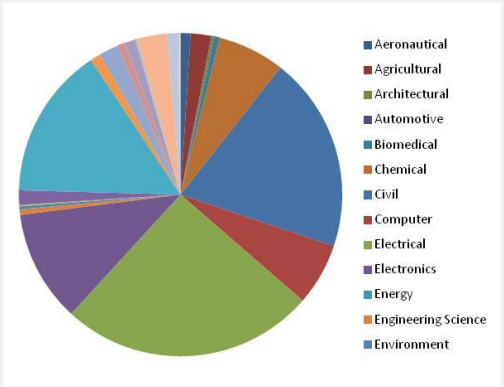
Schedule of Pakistan Engineering Council elections has been announced. The engineering community of Pakistan is set to go on polls on Sunday, 12th August, 2018. The elections would be held for the offices of chairman, senior vice-chairman, vice chairmen and members of the governing body. They would exercise their democratic right to select the engineers that, in their opinion, are most appropriate for leading them.

The number of registered and professional engineers was said to have reached the figure of around 0.20 million till June 2016. A little above eight hundred thousand (43.50%) of these are professional engineers.

If this statistic and the geographic expanse of the country is any guide, the PEC election is arguably a huge challenge for the candidates, at least for the top positions.

During the past several elections, voter turnout has not been large. This in, our opinion, reflects negatively on the hopes engineers associate with the PEC for addressing the issues that concern them the most. We keep our fingers crossed waiting for an improvement of the trend this year.

As the following figure shows, civil engineers constitute around a fifth of the total engineers in Pakistan and like all other fellow engineers, they shall also be cognizant of their professional duty to exercise the right to vote and shall get out and be counted. For want of a better choice, the data represents the number reported registered with the PEC.



Incidentally, civil, electrical, electronics, and mechanical engineers, together constitute around three-fourth of the engineering community of the country. As such these disciplines, by virtue of their sheer number, may play a major role in electing the leadership of engineering. This aspect places an additional moral burden on civil, electrical, and mechanical engineers, which they must discharge, on their behalf and on the behalf of their fellow engineers from other disciplines, in such a manner that majority does not neglect the legitimate rights of any minority.

> *PSCE also believes that campaigning for PEC offices shall remain dissociated from national politics and shall, instead, focus solely on professional issues. Engineers shall, as a community, jointly and unequivocally reject all overtones of national politics in its affairs.*

Many issues face the engineering community of the country at this time and many new issues are likely to emerge as the kaleidoscopic economic condition unfolds during the coming decades.

Pakistan Engineering Council is expected and required to play a key role in watching the interests of Pakistan, in as much as they relate to the field of engineering.

Availability of jobs, lack of disparity, working conditions, conformity to highest ethical standards, brain drain, engineers being forced to join other professions, development and enforcement of national manufacturing and services standards, quality engineering education, quality of standards of professional practice, elimination of corruption, unfair and

illegal prosecution of engineers as scapegoats, illegal political pressures on engineers, an effective engineering council ensuring conformity to PEC laws and rules, strengthening of PEC legal framework, transparency of conduct of PEC proceedings and decisions are some of the various issues that affect each one of us. These and many other relevant issues are expected to be parts of campaigns by candidates.

Each candidate shall be required, by the engineering community, to unambiguously and specifically state what he or she intends to do and how. Debates on social media shall focus on substantive issues and shall be positive, informed, non-partisan and sincere. Engineering community shall, then, pin down the winning candidates to their stated agenda and take them task when deviations are made. Let the candidates clearly understand and remember that engineers are educated and intelligent people and their opinions would not be swayed on the basis of non issues, irrelevant issues, misstatements and distortion of facts.

PSCE feels that engineering community needs to make informed, reasoned and dispassionate choices, carefully selecting the candidates they vote for. Every engineer shall remember that his or her vote is a sacred trust and linguistic, parochial, communal, religious, sectarian and personal reasons and organisational loyalties shall not be allowed to effect any voting decision.

PSCE also believes that campaigning for PEC offices shall remain dissociated from national politics and shall, instead, focus solely on professional issues. Engineers shall, as a community, jointly and unequivocally reject all overtones of national politics in its affairs.

Most importantly, we all need to remember that each vote counts.

PSCE also expects the highest ethical standards from its candidates. It asks the candidates to focus on professional issues during their campaigns, avoid personal criticism of their opponents and keep their campaign expenses to the barest minimum.

In a true democratic tradition, the future leadership of Pakistan Engineering Council is required to represent every engineer in Pakistan, regardless of whether or not a particular engineer voted for it and also regardless of the discipline that an engineer practices. Although PSCE is a non-partisan organisation, it would be forced to raise its voice if ethical and standards and democratic norms, in this regard, are violated by anyone.

Writing a Résumé

Each one of us, at all stages of our professional careers, needs to write some sort of a résumé. Yet few of us spend the time and effort that this apparently routine document merits. This small note provides a brief advice, especially to the uninitiated.

The first thing that each civil engineer must understand is that a résumé is a very important document and must never be taken lightly.

Secondly, one must keep in mind the target readership, when writing this document. It could be a potential employer, client or a university. Ask yourself what information the reader would be most interested in and what information he or she would be least interested in. Arrange your facts in that order. Add the name(s) of persons who have known your abilities and character and can be asked about you.

Thirdly, keep the document as readable as practical. Classify and organise your information. Remember that your document

would be competing with many similar documents for moving up a pile and no one would have the spare time to painfully read through the document trying to dig out the relevant information. You have to arrange the information in and organized and readable fashion.

Fourthly, for the young graduates, writing a résumé offer a special difficulty as there is no list of past employers and no list of projects handled, except for a brief list of trainings, internships and academic projects handled during studies. The simple answer is that no one expects such information from an entry-level graduate. You would other things to write about. Focus on the special skills that you possess, which others might not. These could include special in-depth knowledge of certain subjects and software. Mention your skills in leadership, working as a team member, communication, language and even typing and driving. Prepare a brief statement of your career goals.

Fifthly, make sure that the formatting of your documents is elegant and graceful. Avoid mixing of too many type-faces and font sizes and do not use too many colours. Provide for fair and reasonable page margins. Check widow and orphan control. Avoid underlining as a means of emphasis. Avoid too extensive use of bold faces.

Finally, make sure that your document has no spelling, grammar and style mistakes. Also focus on punctuation. In the very least, language errors are extremely distasteful.

We wish you a happy résumé-writing.

Avoiding Conflicts in Construction Documents

It is very common to note conflicts in construction documents. Some can suffer through such conflicts, while some make additional sums capitilising on them. Bidders can make misread the documents at the time of costing and may suffer as contractors when disputes are not decided in their favour. Some bidders may note the embedded conflicts and as contractor may utilise them in their favour by filing suitably timed and well-designed claims.

Some useful and very basic tips are being provided to avoid such conflicts. There are generically many types of conflicts and these can be classified in a number of ways.

First of all, there may be conflicts between several different documents i.e. drawings, technical specifications and bills of quantities. These can generally be avoided by using each of these documents for the purpose that each is designed for. The geometry belongs to the drawings. Methods, materials, standards and methods of measurement belong to technical specifications. Estimated quantities and identification of pay items are a part of bills of quantities. If a drawing needs to provide a technical specification, reference shall be made to the relevant item in the technical specifications. Similarly, geometry shall stay away from the technical specifications and technical specifications shall not be repeated in the bills of quantities.

The worst form of confusion arises when an information is missing altogether while each document refers the reader to another, in this regard. One example would be: the drawing stating *flooring, per technical specifications*; the technical specifications stating, *flooring per bill of quantities*; and the bill of quantities stating *flooring per drawings*. Such circular reference is generally the part of the same indiscipline that does not respect the correct location of each type of information.

A second type of conflict arises when information is repeated within one document. A simple rule is the most obvious one: do not repeat.

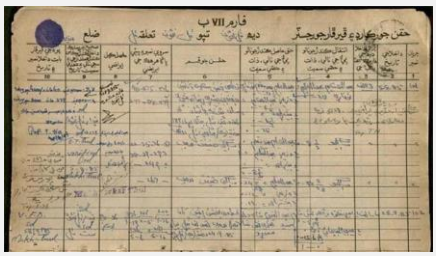
A third type of conflict arises when different terms or other words are used, at different places, to refer to the same concept. For instance, when you refer to flexural members of steel as steel beams at one place do not call them steel girders at another, unless a distinction is to be made between the two and that distinction is clear. Obviously, this type of interchangeable use of words must be avoided.

It is only natural that there is no substitute for experience but it also true that unless the key guiding principles are not followed, even experience cannot be a guarantee against avoiding conflicts within construction documents.

English Language and Civil Engineering in Pakistan

Indian and Pakistani English users very often use many vernacular words which are not part of the English language while adequate words are available within the language. Such is the inertia of copying and duplicating, of the terminology and the manuals, that no one makes any attempt to change this trend. An exhaustive list of such words in vogue may be longer, but here are a few common examples:

Vernacular	English
nullah	stream, drain
mumty	roof access room
khura	trough
kacha Rd.	earthen Rd.
pucca Rd.	metalled Rd.
gobri leaping	cow-dung application
purnala	spout
bahishti	water-carrier
gharki	soakage pit
killa bushing	insertion of bamboo sticks and bushes
mogha	tertiary outlet
wara bandi	roaster of water turns
doab	land encompassed by two rivers
kallar	salts



Much ahead of the engineering community are the land revenue departments who shroud their entire work in layers upon layers of mystery of words. Civil engineers often need to interact with these documents and would be at a loss to understand anything, unless some guidance is provided to them first. Here are some examples:

Term	Definition
abiana	water chargers
hhaatta	holding of a tenant
khaatauni	a list of holdings of tenants
khewat	list of owners' holdings
khasra	a list of folds, field register
fard	a copy of land records
jama bandi	a record of rights
banjar	uncultivated land
barani	dependent on rainfall
ghair mumkin	uncultivated land such as bed of a *nullah*, road grave yard etc.
girdawari	harvest inspection
shajra	map; plan
patwari	village accountant or registrar.
girdawar	Revenue official supervising the work of three or more *patwaris* in his *halqa* (circle)
kanungo	supervisor of *patwaris*

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The Pakistan Civil Engineers would be happy to receive your contributions. Send a soft copy, whenever possible. You can send:

a) Articles
b) Interesting project pictures (original or free of copyrights)
c) Details of significant civil engineering projects
d) Your professional and reasoned opinion on an important issue.
e) News of professional significance including newspaper clippings, citing source
f) Other important professional information
g) Identification of a topic that merits our attention
h) A letter to the editor

You do not need to be a writer in order to contribute; your professional skill is all we need. Please allow us to make editorial changes before we finally adopt a contribution.