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# Modern and Future Issues facing Civil Engineering and Construction

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## Abstract

The world of construction and civil engineering faces many broad issues in today's climate. These issues affect areas such as road, bridge, rail, ship, general building construction, as well as oil and gas projects, tunnels, dams and wind farms. The civil engineering profession involves a lot of sub- disciplines and deals with the infrastructure and maintenance of built environments. As civil engineers there is a social responsibility to maintain and adapt structures to make life manageable. In this brief article we aim to highlight some of the most pressing issues that are occurring, and we offer some solutions and thoughts.

**Keywords:** Civil engineering; Challenges; Infrastructure; Community; Sustainable; Safety; Management; Pandemic; Covid-19

## Introduction

There are a lot of pressures on civil engineers these days, and in order to survive and prosper we need to be aware of them. It is no longer sufficient to just focus on doing your job in isolation; modern global and economic issues mean we have to be collaborative and knowledgeable. The entire world economy has been affected by the Covid-19 pandemic; this unfortunate event has generated even more obstacles, including practical issues of unemployment. The first major challenge (during the planning and design stage) involves the transport system. A thriving city must deliver areas of residence, industry, retail and other amenities. If a strong transport link is created, it will attract more users and grow the economy. The correct planning for traffic flow and the reduction of congestion is extremely important. Cities all over the planet are rapidly increasing, the rate of annual growth (since 2000) of some of the most populous cities in the world for example, show 1.4% up to 6.6% as in Suzhou, Jiangsu [1]. A future issue here for consideration is the invention of self-driving cars and delivery trucks. Although the world is somewhat behind the ambitious predictions of Telsa owner Elon Musk, one day his vision of driverless transport will be a reality [2]. At that point, additional safety structures may be required to put travelers at ease and to facilitate standardized AI traffic control protocols. The issue of flood management and climate change is a huge problem for multiple reasons. Climate change is not only an increase in wind temperature or heat extremes, but it also covers rain intensity and the lengthening of dry seasons. Under these conditions, structures that are already in existence undergo extended weather erosion, reducing the durability and service lifetime of constructions. All of these factors must be kept in mind when materials are selected for construction. Further to climate changes, rivers in places such as UK, in towns such as Telford, unaccustomed to such environmental conditions, now require better levees and dredging. The selection of sites avoiding flood plains is preferred, not just in developing countries but also in highly developed ones. A further consequence

of this action is that authorities (in the planning stages) may go against utilizing brown-field sites in preference of new sites. These points highlight the need to improve flood management and the enhancement of disaster management.

Through collaboration, the industrialized world can share advanced, practical knowledge on how to properly manage groundwater in different situations. The use of this technology and knowledge in the proper management of groundwater is a huge challenge, especially in African and Asian countries. The reason for this is fundamentally population escalation and the further demands for improved sanity conditions, this increasing use of groundwater has actually become a threat to itself [3]. The use of pump wells for groundwater development for industry and agricultural supplies has been growing for decades, approximately 800 $Km^3$ of groundwater is used each year globally [4]. The water quality control itself is another international debate, with growing plastic pollution, that can leach into water tables from landfills. Although some European Union (EU) members have banned using dumps, around 50% of waste plastic continues to end up in them [5]. The safety of employees on construction sites covers the protection and avoidance of dangers that could cause injuries, fatal accidents or in current times, disease infection. The civil engineering work sector is a major work force where members are exposed to multiple dangers on a daily basis. It has been reported that in developed nations, the rate at which construction operators die as a result of fatal accidents is up to 4 times greater than those employees who work in other industries [6]. Under normal circumstances dangers include hazards such as asbestos, harsh weather conditions, manual handling of heavy loads, heavy noise, falls from great height, dust emission, being struck by equipment, hand/arm injury from vibration tools, electrocution and Covid-19 exposure. Civil engineering professionals must provide appropriate personal protection equipment (PPE), where possible employ social distancing and provide good hygienic conditions for toilets and break-times. Put simply, education is the key to ensure that the message and importance of good practice is maintained from management to the ground level. When workers understand the rules, their performance improves, and as such, safety and productivity is raised. Some matters affecting construction are more country specific, such as the fast-degrading rate of infrastructures in countries like Bangladesh or Cameroon which requires more attention and financial investment. In order to get accurate data on the state or health of the infrastructures to make better choices on which actions to take for building improvement or upgrades, there is a need for tighter health monitoring of the infrastructures. Once more, there is a demand for the Civil Engineering community to utilize more accurate methods of global displacement measurement for use in construction and the monitoring of the health of infrastructures [7,8].

The issues stated are challenges and they each require a methodical approach. Firstly, each must be tackled at their foundations, and defined. Then each cause must be considered, along with the implications they entail. The historical alternative options need to be thought-out and explored, and then new, innovative answers need to be examined. Once viable solutions are presented, they must be scrutinized, using CAD or other new simulation technologies. Then in the attempt to build these solutions, transparent and clear data must be shared. Only by utilizing all of our resources can such obstacles be overcome. Finally, an issue that is often overlooked is finding work in the civil engineering and construction industry amidst such a tumultuous time. It is difficult; however, some advice would be to not give up. Start your search locally if possible, this will not only save on travel costs, if you target smaller companies that do not have advertising, you may avoid excessive competition. Larger companies, such as Bechtel, L&T, or Technip FMC are highly sought after, with rounds of interviews; but by all means apply, just have a backup plan. Local 5-to-15-man firms often have competitive pay-rates and do not have huge HR departments that applications can be lost in; humanity will always need builders.

## Conclusion

This article highlighted many of the issues facing the civil engineering now and likely to be ongoing for the next 20 years. Some problems were not mentioned in detail, but worthy of consideration are: preservation of heritage, reducing carbon footprints and the gradual changing mindset of management moving towards the use of sustainable materials. The world is facing an unprecedented time of change. We are currently experiencing global warming, increasing population levels, civil unrest and a pandemic. Now more than ever, there is a vital need for more infrastructures to be put in place and maintained. So there is a duty that the civil engineering community must adapt and rise to the challenge. The longstanding issues of sustainability are also gathering more attention. These difficulties have the potential to cascade into larger issues, but if they are met now with collaboration of research specialists and experienced engineers, they can be overcome. By putting in place, good work ethics, by being consistent and with the support of the government, the construction workers can provide life-enhancing services and security internationally.

## Acknowledgment

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## Conflict of Interest

No conflict of interest.

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