Construction for Deconstruction

A Look into How Structural Design and Construction Impacts Both the Economy and Environment

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When designing and constructing a building, the future life-cycle and potential deconstruction of the structure is usually not considered. Designing for deconstruction benefits both the economy and the environment, allowing for the re-use of a building, or building components, at the end of its ‘life’. Some benefits of designing for deconstruction includes reduction of materials (and therefore material costs), reducing the impact a building has on the environment, and minimizing the amount of materials discarded (Milani).

Construction for Deconstruction became more widely known during its successful use in the London 2012 Olympics. In many areas across the world, the Olympics have caused catastrophic effects to a country and/or city’s economy. Recently, the Rio 2016 Olympics aggravated previous economic troubles in Brazil. As a result, most, if not all, of the Olympic buildings have been deserted (Sport, Guardian). After the Olympic Games end, living arrangements for the Olympians become useless, not having the ability to become apartments or housing. Stadiums and arenas also tend to become impractical, as very few professional teams have the ability to up-keep use of the stadium and fill its’ capacity.

As a result, most Olympic stadiums, arenas, and towns, become either torn down or deserted (Sport, Guardian).

In the London 2012 Olympics, engineers and architects decided to approach the design and construction of the buildings differently, in order to preserve both the economy and the environment. One of the most successful examples of Construction for Deconstruction in the London 2012 Olympics was their Olympic housing, which housed over 17,000 athletes. This is because, “following the games, the accommodation was retrofitted into new homes” (Designing Buildings Wiki). Some engineering solutions
for these retrofits included “cladding panels” which “were interchangeable and generally full story in height,” “the bathrooms, kitchens, facades and balconies” which “were manufactured off-site,” and “the partitions” which “were movable so that spaces could be reconfigured” (Designing Buildings Wiki). In addition, construction of many arenas and stadiums were built as temporary structures. This meant many of the buildings were able to be easily taken apart, and a large portion of the building materials were reused and recycled. Also, some of the larger arenas and stadiums were down-sized, so smaller sports teams could make use of the Olympic venues.

While the Olympics have shown us the importance of Construction for Deconstruction, it may be difficult for engineers to understand the impact these principles can have on smaller-scale projects. There are many ways structural design can be improved to positively affect the economy and environment through the building’s future life cycle. For example, structural engineers can simplify design connections, steel member sizes, and other structural elements. This allows for “efficient construction and deconstruction” as well as a more simplified recycling and future re-use of these elements. Engineers can also “simplify and separate building systems”, as well as accurately dictate where certain building systems and structural elements are located on building plans, allowing future engineers to analyze different aspects of the building easily (Designing Buildings Wiki). Tracy Perry PE, Associate Principle and Unit Manager for Wiss, Janney, Elstner Associates, Inc., mentioned how it can be difficult sometimes to observe a building’s structure and/or building systems if you do not have original drawings (Perry). These design considerations, and having accurate building plans, may not seem important while designing
a building. However, when a building is inevitably remodeled, updated, or re-purposed in the future, these steps can keep costs and the environmental effect of a building low (Milani).

In addition, engineers can “design for prefabrication, preassembly and modular construction”. This is because “prefabricated units are easily deconstructed and can be transported in large units. Additionally, modular construction materials allow for large quantities to be transported in one journey” (Designing Buildings Wiki). Easy deconstruction of a building makes the re-purposing of a current building more plausible, and economical, to an owner, preventing a building from being torn down. In addition, it is important to minimize transportation, as transportation has a negative effect on the environment, and can drive up overall project costs (Guy). This is due to general moving costs and because materials are more likely to be destroyed while being transported. An engineer should also “select fittings, fasteners, adhesives, sealants etc. that allow for disassembly,” and should “design with reusable materials” (Designing Buildings Wiki). While some of these design decisions are dictated by the Architect, the engineer has the ability to suggest specific materials, like brick and wood, which can be removed and re-used more easily when a building is inevitably remodeled (Guy).

Lastly, “the design should consider any future renovations or adaptations that may be required to extend the life of the building” (Designing Buildings Wiki). While it can be easy for an engineer to forget while designing, buildings and other structures will not last forever, and will not ‘live’ very long without a plan for up-keep. It is one of the structural and civil engineers’ job to design a structure with complexity of maintaining it in mind, especially in cases like bridges or other intricate structures. In addition to extending a buildings ‘life’, it is important for the owner and engineer make design decisions with the future use of a building in mind. An example of designing for a building’s future use, from my co-op experience in London, is garage ceilings. In cities, public transportation has become more prevalent. In some major cities, such as New York or London, it is inconvenient to have a car, and the amount of personal cars downtown has dropped significantly. A garage near my co-op in downtown London was transformed into apartments, saving significant time and money. This would not be possible for most
garages, as the ceilings are usually designed as short as possible, and would not have room for building systems. A small consideration such as higher ceilings in a garage, saved an owner in downtown London a significant amount of time and money, showing the long-term benefits of future design considerations.

Design considerations such as the garage ceiling height, while very simple, can become difficult for an engineer to incorporate. Currently, the most prevalent issue with Construction for Deconstruction in the United States is with the way buildings are being built. Currently, most buildings are built by developers, and immediately being sold to new owners. Perry also mentioned how she feels it is currently not the engineer’s job to consider the future life-cycle of a building, although many engineers wish they could input more of their opinion into that aspect of the design. And how “unless it is a long-term owner, they won’t think about 20 years from now” (Perry). This attitude from developers, or short-term owners, has a cost to both our economy and environment, leading to issues in the future. The best way to overcome this obstacle is to educate potential owners on the importance of designing for the entire life-cycle of a building, which would put developers in a position to create a better engineered building in order to attract owners (Perry).

Construction for Deconstruction is not just imperative for the design of a building, but also the construction of a building. There are many ways construction can be improved to positively affect the economy, environment and a building’s future life cycle (Guy). Different ways to include Construction for Deconstruction in the field include creating “a detailed deconstruction plan,” that will include “a statement of strategy for the building/project,” “a list of building elements and how they will be best
reused/reclaimed/recycled,” and “instructions on the deconstruction of elements” (Designing Buildings Wiki). Following this criteria can help any future construction or engineering companies disassemble or change the scope of a building without a significant impact on the economy or the environment.

As engineers look toward the future, it is important to analyze the trends in the construction industry, and decide what changes in the industry could be beneficial to engineers, construction workers, owners, the economy, the environment, and anyone/anything else that is impacted by this industry. I believe that designing for flexibility in a building’s purpose, designing with more reusable and deconstructable materials, and creating building plans and construction plans for future engineers and construction workers are effective beginning steps to creating a better engineered future.
Works Cited


Perry, Tracy. Personal Interview. 18 April 2019.


Figure 1: www.dailymail.co.uk

Figure 2: www.e-architect.co.uk

Figure 3: www.fastcompany.com