

Construction Technology

[Name of Student]

[Name of Institute]

TASK 1: Introduction

(a)

This paper discusses some of the construction technical and physical activities. Also, the benefits of using these technological activities in the construction process (Benitez and Henseler, 2018). To carry out these activities the equipment which should be used are also discussed. Use of which technique would result in the more strengthened structure, is also discussed.

The structures on the basis of their varies. This variation causes the difference in the residential, industrial and office structures. These structures demand different kinds of structural facilities for the people using this infrastructure. If the structure is used for accommodation purposes then called residential (De Domenico, Falsone, and Ricciardi, 2018, pp. 198 - 212). If used for the manufacturing of products or give services then called industrial. If the space is used for different kinds of people to get the same work done then this place is called official building.

Differences	Residential	Commercial	Industrial
Use	For accommodation purposes (Siegrist, Crimi, and Brown, 2011).	Used as storehouses or offices (Allan, Smith, and Anderson, 2012).	Used for the manufacture of product (Haninger, Ma, and Timmins, 2017).
Location	Societies for dwelling (Olubunmi, Xia, and Skitmore, 2016, pp. 1611 – 1621)	In city fields (Darko, Zhang, and Chan, 2017, pp. 34 - 49).	At places of site (Siegrist, Crimi, and Brown, 2011, pp. 1 - 32).

Material	It is made of concrete, iron, steel, etc. (Yan, Dai, and Hu, 2015).	Building materials include concrete, iron, etc. (Olubunmi, Xia, and Skitmore, 2016, pp. 1611 - 1621)	Building materials include concrete, iron, etc. (Yan, Dai, and Hu, 2015).
Structure	Composition and composite form of subassemblies (Yan, Dai, and Hu, 2015).	This type of structures is highly complex and difficult. (De Domenico, Falsone, and Ricciardi, 2018, pp. 198 - 212).	Infrastructure Manufacture (Ghosn, Moses, and Frangopoulos, 2010,).
Technology	structure designing, construction equipment, interior and exterior flashes. (Ben-Ner, 2013, pp.87-96)	s, dozers, trolleys, conveyor. (Ashokkumar, 2014, pp.36-43)	designing of building specifications (BIM) and AI Drawing (CAD) (Haninger, Ma, and Timmins, 2017)
Design	The residential contractors (Yan, Dai, and Hu, 2015).	This type depends on the structural needs. (Ramesh, Prakash, and Shukla, 2010, pp. 1592 - 1600)	This type depends on the structural needs. (Yan, Dai, and Hu, 2015).

Example	Residential plot area, or apartment in a building (Adams, Raman, and Hodgkins, 2013).	Retail outlets, markets, restaurants, etc. (Haninger, Ma, and Timmins, 2017).	Breweries, mills, wineries, and factories (Haninger, Ma, and Timmins, 2017).
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(b)

The process for the construction of sustainable infrastructure and the development of the structure is a proper task that can be divided into 3 types, minimization of the cost, sustainable consumption of the resources and human friendly methods of construction. This method of sustainability is adopted all across the world because this is a human friendly method. The sustainable consumption of the resources can be achieved by the use of methods and procedures related to material conservation laws and policies, over the project (Zhao, and Tonia, 2012)

. The conservation of the resources like electricity, material, water, rocks, aggregates, etc. done by applying laws and policies can be used in further construction or other requirements of the project.

These implications of the conservation laws are for the prepared site. If the laws are not properly followed then the structure might have some issues relate to sustainability and environmental. A completed sustainable infrastructure that follows all the conservation laws and is human friendly acts as an example for other construction companies (De Domenico, Falsone, and Ricciardi, 2018).

(c)

In the case of given scenario, the hotel complex building is a high-rise infrastructure. Within this infrastructure there are some components of building called as gym, restaurants, cafe, swimming pool, retail shop, generators, etc (Van Nguye, Fatahi and Hokmabadi, 2016). This

infrastructure contains some important information in the form of regulatory documents, wellness, durability, strength of the building, load bearing capacity, thermal behaviour and soil conditions.

the section of wellness within the hotel complex is to provide health benefits and to cope any emergency threat to life of the people at the hotel. The legal documents are the rules for the building areas, specification imposed by et government (Vossos, Garbesi, and Shen, 2014, pp. 223 - 231). Durability is also an important factor that tells the user till when the structure will remain same and wont collapse or contain any creep or permanent deformation that will threat the life of people or will not be aesthetically pleasing as the original structure was.

TASK 2: Substructures

(a)

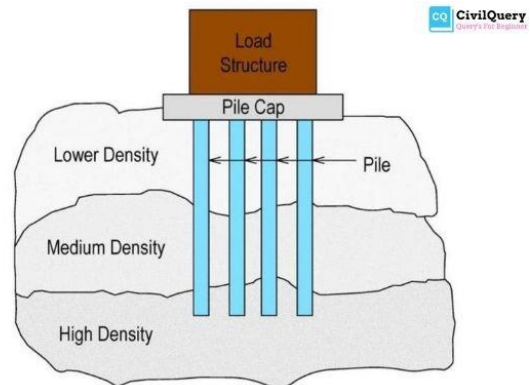
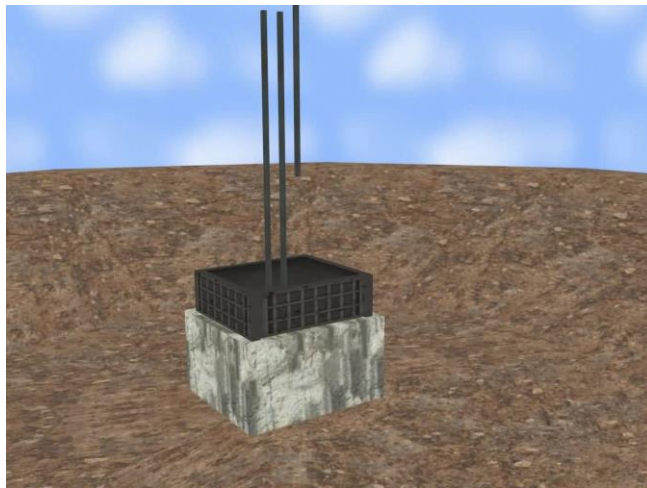
The purpose of the pre-design research is to adequately construct the building. The data collected through process is the requirement to start the construction. The data also contain the information of the site that is why it is also the specifications of the site (Ramesh, Prakash, and Shukla, 2010, pp. 1592 – 1600). To carry out this site survey, special team of highly qualified engineers and professionals are hired because the accuracy of the data cannot be compromised.

The data obtained from the sites are of different nature. There are geo-technical data, topographical data, ecological data, climatic data, etc (Olubunmi, Xia, and Skitmore, 2016). The topographical data is collected by carrying out topographical survey of the site. It contains land data such as, land elevation, condition, places near the site. The geo-technical data consist of the soil information like bearing capacity of the soil and the porosity, consolidation, etc. Another data is ecological data that consist of the evaluation of the bio diversity of the site. Climate of the site is also important to determine. So, the climatic survey is also carried out on the site. More data, if

required, can be collected from different types of surveying techniques (Van Nguye, Fatahi and Hokmabadi, 2016).

(b)

Depending on the structure type, various foundation in the structure are used. However, shallow foundations and deep foundations are most commonly used foundations. As the name suggests, the shallow foundation is the type of foundations that are not so far from the ground level. The soil condition if is load bearing then these foundations are used. As compared to the deep foundations that are penetrated deep in the ground in a form of piles (Ben-Ner, A., 2013, pp.87-96). Of the structure is high rise or the soil conditions are not good than this foundation type is applicable. Otherwise in the residential buildings shallow foundations are commonly used (Ben-Ner, A., 2013, pp.87-96).



(c)

For the ease of carrying out construction operation on the site, the site should be managed first. The vegetation should be removed, site should be cleaned and investigated of any hazardous

material on the site (Ashokkumar, 2014, pp. 36 – 43). The track which connects the site from the main road should be able to let the heavy machinery, used for the material and mixing of concrete, etc., pass through it. All the services like water, electricity, gas and arrangement of light should be done as a preparation of the construction site.

The site should also be free from the overflooded water. Sanitation and drainage of the site should also be correct. The forecasting of the atmospheric condition at the site should be kept in mind during the phase of planning and execution in order to carry the construction process without any hindrance. Safety and security of the staff should also be provided. Any of terrorism and unethical activity should be avoided (Ghosn, Moses, and Frangopol, 2010, pp. 257 - 278).

Task 3: Superstructures

(a)

Elements	Functional Characteristics, and design selection criteria
Walls	ty, strength, durability, the weather resistance, the moisture resistance, fire safety, resistance to the passage of heat, sound resistance, highly effective performance (Kim, 2013, pp.319-332)
Roofs	Weather resistance, the stability, the strength, the sound insulation, the heat protection, the fire resistance, the day lightening (Sun, et.al, 2014, pp.1075-1080)
Floors–ground and intermediate	cost, the appearance calc, the cleanliness, durability, the sound insulation, the damp-resistance, the thermal insulation, the smoothness, the hardness, the maintenance (Christopher and Holweg, 2011, pp.63-82)

Windows and doors	al system, connects the internal system with outer environment, source of the natural light (Christopher and Holweg, 2011, pp.63-82)
Staircases	ty, strength, sound insulation, fire insulation, connects the lower portion with upper portion, safety (Benitez, Ray and Henseler, 2018)
Finishes	ces the structure, the colour of the structure, the soldiers, and the materials (Ashokkumar, 2014, pp.36-43)

The pre-design studies for a construction project is crucial (Ashokkumar, 2014, pp. 36-43). The data collected form this study contain main information for the construction and design of the project. In this way, the predesign survey needs to be done with high accuracy. Many highly qualified and able engineers are appointed for this purpose. following is the table which contains all the information of the construction element 's functions (Benitez, Ray and Henseler, 2018).

Design management <ul style="list-style-type: none"> • Visualize drawings and 3-D models on-site, using mobile platforms • Update blueprints in the field with markups, annotations, and hyperlinks 	Scheduling <ul style="list-style-type: none"> • Create, assign, and prioritize tasks in real time • Track progress online • Immediately push work plan and schedule to all workers • Issue mobile notifications to all subcontractors 	Materials management <ul style="list-style-type: none"> • Identify, track, and locate materials, spools, and equipment across the entire supply chain, stores, and work front 	Crew tracking <ul style="list-style-type: none"> • Provide real-time status updates on total crew deployed across work fronts, number of active working hours, entry into unauthorized areas, and so on
Quality control <ul style="list-style-type: none"> • Offer remote site inspection using pictures and tags shared through app • Update and track live punch lists across projects to expedite project closure 	Contract management <ul style="list-style-type: none"> • Update and track contract-compliance checklists • Maintain standardized communication checklists • Provide updated record of all client and contractor communications 	Performance management <ul style="list-style-type: none"> • Monitor progress and performance across teams and work areas • Provide automated dashboards created from field data • Offer staffing updates and past reports generated on handheld devices 	Document management <ul style="list-style-type: none"> • Upload and distribute documents for reviewing, editing, and recording all decisions • Allow universal project search across any phase

(d).

The main structural design is very important to design accurately (Ramesh, Prakash, and Shukla, 2010, pp. 1592 – 1600). The impact of a good structural design will result in a good building characteristic. Otherwise, if there will be a problem in the main structural design then the other designs and activities won't be carried out correctly and this issue can change the purpose of the building. Slabs, walls, floors, beams and columns are a part of main structural design (Ramesh, Prakash, and Shukla, 2010, pp. 1592 – 1600). Other types of structural design elements are

important to maintain the integrity of the structure otherwise these are not as important as the main ones. In order to construct the basic structure, main structural design elements are more important.



Task 4: Civil Engineering Infrastructure

(a)

A remediation process is important to be done before the beginning of construction operations on the site (De Domenico, Falsone, and Ricciardi, 2018). This process includes the recovery of soil and ground water. These remedial processes can be done from different technique including physical, chemical and biological. These techniques can be carried out in various steps. If the soil at the construction site consist of hydro carbons and other impurities than biological technique is to used to separate impurities from soil. Bio filters and drains are used to eliminate the impurities from the air at site. These impurity particles are separated by efficient screening through the filters (Zhao and Tonia, 2012). This process is very economic to conduct on the large scale and smaller scales of construction as well.

A physical approach to the soil preparation is ‘‘capping’’. This approach uses machineries to wash the soil from impurities. The work duration for this process is an hour or two for more than 3 tons of impure soils. The physical method of separation of material on the basis of their sizes is used in this process (Van Nguye, Fatahi and Hokmabadi, 2016). It also uses radiations to separate the impurities. Another physical technique is used for the removal of water from the site is electron beam technique. After this the neutralization process of the soil is done by using hydroxide ions and hydrogen ions. All of these techniques are essential to prepare the soil for the construction.

The mercury impurities can also be present on the soil surface which are used to be removed by mercury extraction or chemical extraction process (Sun, M.Y, et.al, 2014, pp.1075-1080). These techniques use aqueous stream apparatus and chemicals to remove impurities from the soil. This method is one of the many methods applied to clear out the surface impurities from

the soil. A technique most suitable for the soil type and present impurity is selected and used. Each technique is beneficial for related case on the site (Ashokkumar, D., 2014, pp.36-43). All of this removal directly increases the effects the structure's efficiency.

b.

A substructure is a part of structural building that is under the ground surface and is not visible. There are many elements of the substructure like, piles, foundations, footings, etc that can be used for different types of the structures (Sun, M.Y, et.al, 2014, pp.1075-1080). Engineers and designers uses different techniques to determine which type of substructure elements should be used based on different terminologies like, bearing capacity, consolidation of the soil, etc. The strength of the superstructure depends upon the substructure's strength. Hence, proper designing and construction of the substructure is important (Oh, J., 2013, pp.59-63).

C.

The superstructure for the hotel complex is consist of the columns, roofs, windows, finishes, doors, ceilings and the walls (Quaglia, A., Gargalo, C.L., et.al, 2015, pp.68-86). The substructure is the foundation and basement of the hotel structure. These superstructures and substructures make the hotel complex a fully developed civil engineering structures.

Task 5: Building Services

(a)

One of the services provided to the hotel complex building is the electrical distribution system (Nagesh, Rao and Karimi, 2017, pp. 3764 – 3777). The delivery of the electricity throughout the building is insured by the electrical distribution system. This facility is also made efficient to avoid energy loss and for a uninterrupted supply of electricity to the hotel building.

(b)

The electrical systems of power delivery can have different patterns of arrangements. The basic types of pattern arrangements are four, in which most economic and the simplified is the radial network form (Christopher and Holweg, 2011, pp. 63-82). Apart from the benefits it provides, there are some setbacks employed to this arrangement like, low reliability.

The method called primary selective method is applied where the power dissipation and reliability problems are concerned. This method uses a copy of resources to further purify the supply of energy. Not just it cleanses the system but is used to accomplish the mixed system.

The use of secondary selective system network is used in the electrical grids because of the higher reliability of this system (Kim, T.H., 2013, pp.319-332) . It also works on the low voltages along with giving right continuity of the activities performed.

(c)

Superstructures are the structural elements that are above the surface of the ground and are visible. This element of the civil engineering structure depends upon the strengthening and the stability of the substructures (Ben-Ner, 2013, pp. 87- 96). The super structure is visible that is why a high finishing is required. It consists of some columns, beams, boards, walls, roofs, stairs, overhead water tanks, etc. with the aesthetic elements too like, paints tiles, finishes, etc. The superstructure is also known for providing the utmost comfort and flexibility.



(d)

The importance of primary distribution system is of high concern for a civil engineering structure. Therefore, an efficient and proper designing of the structure by highly qualified and skilled engineers are required. The use of technology and innovation makes the process less errors and easy (Benitez, Ray and Henseler, 2018). Many types of machineries are used for various types of tasks and activities. If these tasks are performed by hand of the labour a great care and time would be required. Technology makes all these activities less time consuming too. The handling of these instrument is also done by very skilful professionals. Not just the engineers but skilled labour is required to fulfil the project milestones together as a team (Ashokkumar, 2014, pp. 36-43). These activities and tasks are carried out with the help of primary delivery services. Not just

these distributions help but also provides the speed to the activities. The risks on the site are also diminished in order to have a project safely conducted.

Conclusion

In this paper some basic concepts of construction structures and elements are discussed with relation to the given case of hotel complex. Some of the methods of using technology to reduce time and risk also to provide high efficiency within the civil engineering structures are elaborated. Some terminologies with their advantages and disadvantages are discussed. The details of foundations, superstructures, substructures and services of the structure are also discussed. in short, the efficiency and benefit produced due to the use of technology in the field of construction in the form of modern machinery is evaluated. Also, the effects of good design by the engineers is also discussed.

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