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Department: Mechanical engineering

Level: 200

Course code: Eng 284 (engineer in society)

The Alfa Belgore Rehabilitation project is ongoing. As a designated Student Consulting Engineer you are expected to do the following

1. Outline the Scope of work in detail in order of occurrence
2. Prepare a project Gant Chart
3. List all the human resources needed and constitute the Project Team stating who the Lead Consultant is
4. Explain why the site was secured
5. Develop a BEME for the project by lump sum projections including 10% of the total estimated cost (tec) as Miscellaneous, 15 % tech as consultancy fee, 5% tec for site preparations and clearing after completion, 12% of tec for transport cost. 20% tec as profit
6. Prepare a payment schedule as follows
 - (a) 30 % tec for Mobilization
 - (b) Next 30 % tec at 50% completion
 - (c) Final Payment of 40 %tec at completion and hand over. Retain 10 % tec for a 6 months Defect liability period
7. What is BEME, Defect Liability Period, Lead Consultant, Project Life cycle, Environmental Impact Assessment (EIA)

SCOPE OF WORK FOR THE PROJECT

- The school management conceives the project and discusses its feasibility, and the use of alternatives to substitute the services provided by the structure.
- A renovation company is enlisted for the project.
- The management reaches to an agreement and the team is sent to discuss about the project, its duration, payment plans and workforce mobilization plans
- A list is therefore drafted to show the project specification and a simple breakdown of the project requirements is created.
- A team of professionals is then brought to the site to do a survey and determine how many hands would be required to meet the project deadline. The team would therefore include the lead consultant, the site foreman, the team leaders of each group of work specialization, and a leader for the labourers.
- Clearance of valuables within the structure commences, starting with the removal of unfixed item of furniture, electrical and mechanical appliances such as ICT gadgets like computers, printers etc....
- The fixed equipment in the structure are removed (such as door frames lamp holders wooden partitioning etc.....)
- The perimeter of the structure is cordoned off using aluminium sheets and bamboo sticks to stop in and out movement of the site
- The roofing area are taken off and stacked to be examined and the reusable separated from the permanently damaged.
- The civil engineers and labourers commence the additional construction work then the electrical engineers start the electrical wiring. Then the plumbers start plumbing and setting out pipe layout space.
- The plumbers and electricians proceed to fix in all the toilets and plumbing equipment and all wiring and lightning
- The painters and tillers then come along to do their work (the painter paints first then the tiller)
- The rubbish around the site is therefore disposed properly
- The moving team then comes along and place all equipment in their right location and places them in good condition and positions.
- The site is now unsealed and the last of the obstructions is cleared away.

• Project Gant Chart

Week	1	2	3	4	5	6	7	8	9	10	11	12
works												
Pre analysis Phase	■											
Feasibility study		■										
Project proposal			■									
Detailed study and analysis			■	■	■	■						
Initial prototype			■	■	■	■						
Mid term defence							■					
Implementation of system								■	■	■	■	
testing									■	■		
Documentation of project work		■	■	■		■	■	■		■	■	■
Final defence												■

HUMAN REASOURCES NEEDED

- 1) CIVIL SUPERVISOR (LEAD CONSULTANT)
- 2) MECHANICAL SUPERVISOR
- 3) ELECTRICAL SUPERVISOR
- 4) PAINTER
- 5) PLUMBER
- 6) ARCHITECT
- 7) SURVEYOR
- 8) IRON BENDER
- 9) CARPENTER

- 1) **Civil supervisor** - monitor civil construction projects. They oversee activities such as building bridges, repairing highways and doing construction on airports. ... They are leaders who have worked their way up to this position from earlier experience in civil engineering and public works.
- 2) **Mechanical supervisor** - oversee repair and installation work conducted by mechanics in various industries. A Mechanical Supervisor conducts inspections, ensures that safety procedures are

being adhered to and maintains inventory of machine parts. He or she will create work performance reports, document the production of mechanics and hire and discipline employees as needed.

- 3) **Electrical supervisor** - s motivate electricians to increase their productivity and meet work goals. Some electrical supervisors play a role in hiring, firing and evaluating employees.
- 4) **Painter**- the practice of applying paint, pigment, color or other medium to a solid surface. The medium is commonly applied to the base with a brush, but other implements, such as knives, sponges, and airbrushes, can be used. The final work is also called a painting
- 5) **Plumber** - is a tradesperson who specializes in installing and maintaining systems used for potable water, sewage and drainage in plumbing systems.
- 6) **Architect**- a person who plans, designs and oversees the construction of buildings. To practice architecture means to provide services in connection with the design of buildings and the space within the site surrounding the buildings that have human occupancy or use as their principal purpose.
- 7) **Surveyor**- update boundary lines and prepare sites for construction so that legal disputes are prevented. Surveyors make precise measurements to determine property boundaries. They provide data relevant to the shape and contour of the Earth's surface for engineering, mapmaking, and construction projects
- 8) **Iron bender**- Set up, operate, or tend machines to saw, cut, shear, slit, punch, crimp, notch, bend, or straighten metal or plastic material.
- 9) **Carpenter**- is a skilled trade and a craft in which the primary work performed is the cutting, shaping and installation of building materials during the construction of buildings, ships, timber bridges, concrete formwork, etc.

Construction is a vast and valuable industry which involves both the storage and on-going use of high value vehicles, materials, tools and machinery. All of these items have a resale value, whilst items such as fuel have an off-set cost value, making construction sites a highly profitable magnet for criminals.

The threats

Criminal activity as a result of unauthorized entry into a construction site presents several overall threats:

- To operations, including ongoing works and schedules, disruption to which costs millions each year.
- To property and materials – including buildings and outbuildings, structures under construction or demolition, as well as construction materials, tools, equipment, plant, fuel and petty theft of workers' possessions and assets.
- To life, including trespassers causing damage which has the potential to injure, maim or kill, such as ripping out fixtures and leaving wiring unsafe, as well as deliberate actions such as arson which threaten life as well as property.

As an example, the relatively high cost of fuel means that fuel theft is popular: it can easily be reused and disappear without trace, whilst the single action of stealing fuel from a construction site can have repercussions which threaten operations, property and life:

- Operational cost – few plant vehicles or generators can function without fuel. The delays caused by both the lack and the need to refuel affects schedules, which can affect overall progress towards deadlines.
- Property cost – expensive plant may be damaged in the process of the theft.
- Life – fuel spilled during theft is common and presents a fire hazard which could be both life-changing and life-ending.

Loss and liability

- As well as the threats to operations, property and life, the actions of thieves who've gained access through inadequately secured sites threatens site owners or managers with liability for further loss and damage. For example, if plant and heavy, powerful vehicles are stolen in order to gain access or destroy other buildings, such as ram-raiding retail premises, or to gain high up access to a building, this consequential action of the theft can be costly in terms of both site loss and liability for other damage / losses occurring off-site.
- Similarly, construction companies can find themselves liable for accidents involving trespassers or as a consequence of trespassers compromising overall safety. This is often the case when sites are inadequately secured against trespass and vandalism. Construction sites can be particularly vulnerable to vandalism as part of general anti-social behavior or specific, renegade rebellion against construction being carried out in the locality.

Security essentials

Every construction site is different, both in location, environmental factors and needs, but in order to achieve security, there are common factors for fundamental security:

Thorough risk analysis is essential for the site and should reflect physical security, operational security and changes across each phase of work.

- Protocols should be put into place to reduce risks identified in the risk analysis.
- Limiting access, both to vehicles and visitors on foot, is essential in reducing opportunity for unauthorised access. Numbers should be limited and only authorised vehicles and persons present – no one, including site workers, should be able to access a site through an open entrance.

Vehicle vulnerability should be addressed with action which includes key protocols so that plant which is temporarily not in use is not left unattended with keys in the ignition. All keys should be signed in and out and vehicles not in use should be locked in a separate parking area or garaged on-site. All plant should be fitted with immobilisation devices and tracking

Item	Item Description	Quantity	Rate	Amount	TOTAL
1.	Miscellaneous	Bonus time Feeding Extra materials	10%	8,000,000	8,000,000
2.	Consultancy fee	Doctors Architect consultant	15%	12,000,000	12,000,000
3.	Site preparation	Clearing of rubes Barricading	5%	4,000,000	4,000,00
4	Transport cost	Bringing of items to the site. Mobilization and demolization Importation of materials	12%	9,600,000	9,600,000
5.	Profit		20%	16,000,000	16,000,000
6.	Other expenses	Final inspektion. Final testing. Cost of material and equipment	38%	30,400,000	30,400,000
					Total= 80,000,000

s/n	ACTIVE DESCRIPTION	RATE	AMOUNT
1.	MOBILIZATION: Personnel/Equipment - Civil supervisor - Architecture - Elect supervisor	30%	24,000,000
2.	30% of 50% completion: - Decommissioning of electric system - Decommissioning of security provisions (e.g doors, windows)	20%	16,000,000
3.	Complete/ commissioning: - Finishing of civil work - Finishing of electrical work - Finishing and commissioning - Final commissioning	40%	32,000,000
4.	Retain 10% for 6 months: - All electric connection working very well - Plumbing and other facilities working well this is to ensure that after 6 months everything is working well.	10%	8,000,000
			= 80,000,000

BEME

Bill of Engineering Measurement and Evaluation (BEME) also referred to as 'Bill'; is a tool. Used before, during and post-construction to assess and value the cost of construction works.

DEFECT LIABILITY PERIOD

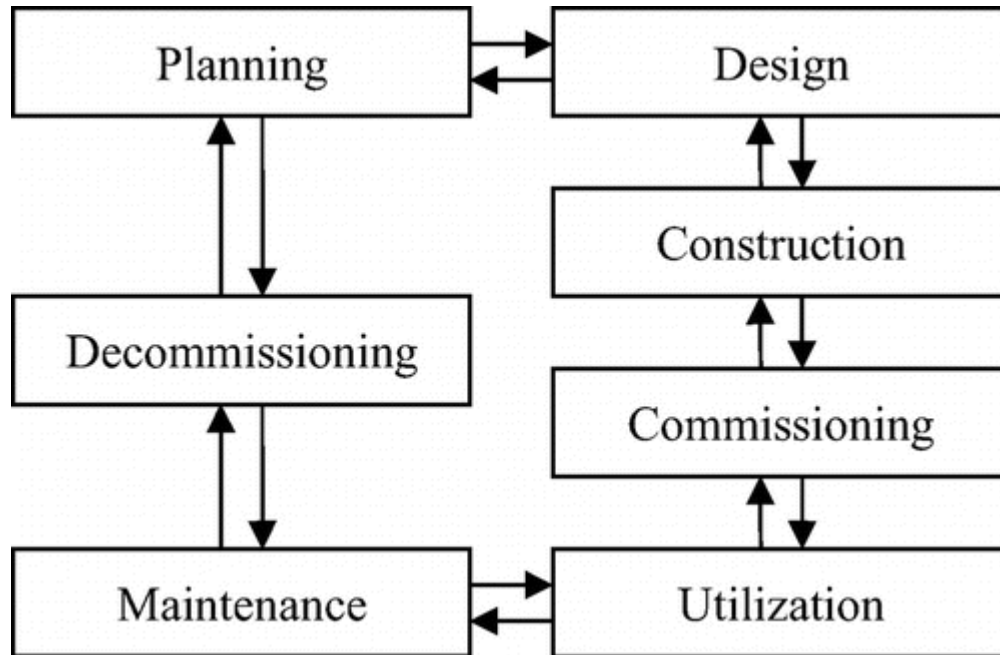
A defects liability period is a period of time following practical completion during which a contractor remains liable under the building contract for dealing with any defects which become apparent.

A defects liability period is usually a period of around six or 12 months but it can vary depending on the contract used. During this period, the clients reports any defects that arise to the contract administrator who decides whether they are defects (i.e. works that are not in accordance with the contract), or whether they are in fact maintenance issues. If the contract administrator considers they are defects, then they may issue instructions to the contractor to make them good within a reasonable time. It is actually the contractor's responsibility to identify and rectify defects, not the clients, so if the client does bring defects to the contractors notice they should make clear that this is not a comprehensive list of all defects At the end of the defects liability period, the administrator contract prepares a schedule of defects listing those defects that have not yet been rectified, and agrees with the contractor the date by which they will be rectified. The contractor must in any event rectify them within a reasonable time. When the contract administrator considers all the items on the schedule have been rectified, they issue a certificate of making good defects. This has the effect of releasing the remainder of any retention and results in the final certificate being issued.

Project life cycle

- A project life cycle is the sequence of phases Security essentials
- Every construction site is different, both in location, environmental factors and needs, but in order to achieve security, there are common factors for fundamental security:
- Thorough risk analysis is essential for the site and should reflect physical security, operational security and changes across each phase of work.
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- Limiting access, both to vehicles and visitors on foot, is essential in reducing opportunity for unauthorized access. Numbers should be limited and only authorized vehicles and persons present – no one, including site workers, should be able to access a site through an open entrance.
- Vehicle vulnerability should be addressed with action which includes key protocols so that plant which is temporarily not in use is not left unattended with keys in the ignition. All keys should be signed in and out and vehicles not in use should be locked in a separate parking area or garaged on-site. All plant should be fitted with immobilization devices and tracking.
- That a project goes through from its initiation to its closure. The project lifecycle can be defined and modified as per the needs and aspects of the organization.

For example:



Environmental impact assessment

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

