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18/ENG05/040

MECHATRONICS ENGINEERING

ENGINEERING IN SOCIETY ASSIGNMENT

Project: Alfa Belgore Rehabilitation.

QUESTION1.

SCOPE OF WORKS.

The works to be performed in the Rehabilitation of Alfa Belgore Hall is given below.

1. PLANNING/ OUTLINING THE REQUIREMENT OF CLIENT.

- This stage involves the identification and planning of the Rehabilitation process. The parts of the hall to be reshaped and remodelled will be discussed and listed down. At this stage the works are also outlined. The main works will include an expansion work for increased space and installing new equipment such as doors, windows and a HVAC system, new speaker positioning, new floors and addition of a small room.

2. INITIAL DRAFT/ DESIGN.

- The architect is required to make a design which he feels is in agreement with the requirement of the client. This is not the final design but that which serves as a guide to other estimations.

3. MATERIAL SPECIFICATION AND EXPENSE EVALUATION.

- Evaluation of the expenses and setting up the budget with the owner of the building is necessary before any work can be done. Therefore expertise such as a quantity surveyor will be needed to analyse how much of different materials will be needed for the job. The equipment that will be used in the rehabilitation will also be taken into account as well as the payment of the workers involved in the project.

4. TO SEEK APPROVAL FOR THE REHABILITATION PROJECT FROM THE GOVERNMENT

- The government should be informed on the projects occurrence in order for adequate supervision and assistance.

5. MATERIAL PROCUREMENT

- The next step is the ordering of materials and equipment for the Project from a reliable supplier. In most cases, this involves a prior relationship with the manufacturer to reduce expenses through discounts and excessive patronage.

6. REVISITATION OF REGULATIONS.

- The regulations of the state or Country regarding renovation and rehabilitation will be revisited. In most cases each Municipality has its own regulations regarding construction and renovation of buildings.

7. INSPECTION.

- When the materials and equipment arrive, an inspection has to take place to determine if the material is in proper quantity and condition and also if it conforms the requirements needed.

8. FINAL DESIGN/ SPECIFICATION.

- The final design is drafted and the specifications are documented to give an insight to how the final project will look. This is done before the actual work begins to understand what jobs are going to be done. The designer is very essential in this phase

9. SECURING THE SITE.

- This involves the isolation of the site. That involves the restriction of access into and out of the site.

10. DEMOLITION.

- After safety rules, regulations and protocols have been disseminated to all workers by the safety manager and the work site has been secured using bollards and gates,

the project progresses with demolition and dismantling of the building, removing the roof giving space for a new one, removing old doors and windows as well as old electrical wires for AC units that will be removed

11. EXPANSION PROCESS.

- The process of moving the walls happens at this phase. This is done for the purpose of expansion to create more room and in effect, a high sitting capacity during congress and other general activities. Framing is also done to give a skeletal projection and dimensions of the new work.

12. INTERIOR WORKS AND PROVISIONS.

- Cavities for new windows and doors as well as rough-ins are created for new electrical installations like security light around the perimeter, HVAC lines and vents, added accessories for the small room to be added

13. PLUMBING , ROOFING WORK AND ELECTRICAL INSTALLATION.

- Work behind the walls, under the floor and above the ceiling commences. Drainage systems for the toilets are installed and plumbers work on installing new pipes for the new set of water closets and wash basins. Pipes for HVAC system installation is also set up before the actual installation. Electrical installations are also included. More new electrical sockets are placed at predetermined places.

14. PAINTING AND FINISHING.

- After walls and roofing is constructed, the painting job is done and followed by the installation of new flooring which will be a combination of porcelain and ceramic.

15 .The new stronger double swinging glass doors are installed at the entrance and for the small room inside the hall. Windows are also installed which will be more air tight to reduce noise coming from generators. HVAC systems will be installed before the doors and windows to reduce the stress of carrying materials and equipment in and out a tight door space. The outdoor units will be placed at the back of the hall

16. The small room will be furnished with a conference style centre table and chairs to match. Curtains will be placed at the windows to reduce echoes and direct sunlight which could cause warming.

17. Finishing touches for a typical modern hall. New positioning of speakers will be implemented by the help of an acoustics engineer. Installation of new T5 fluorescent tubes

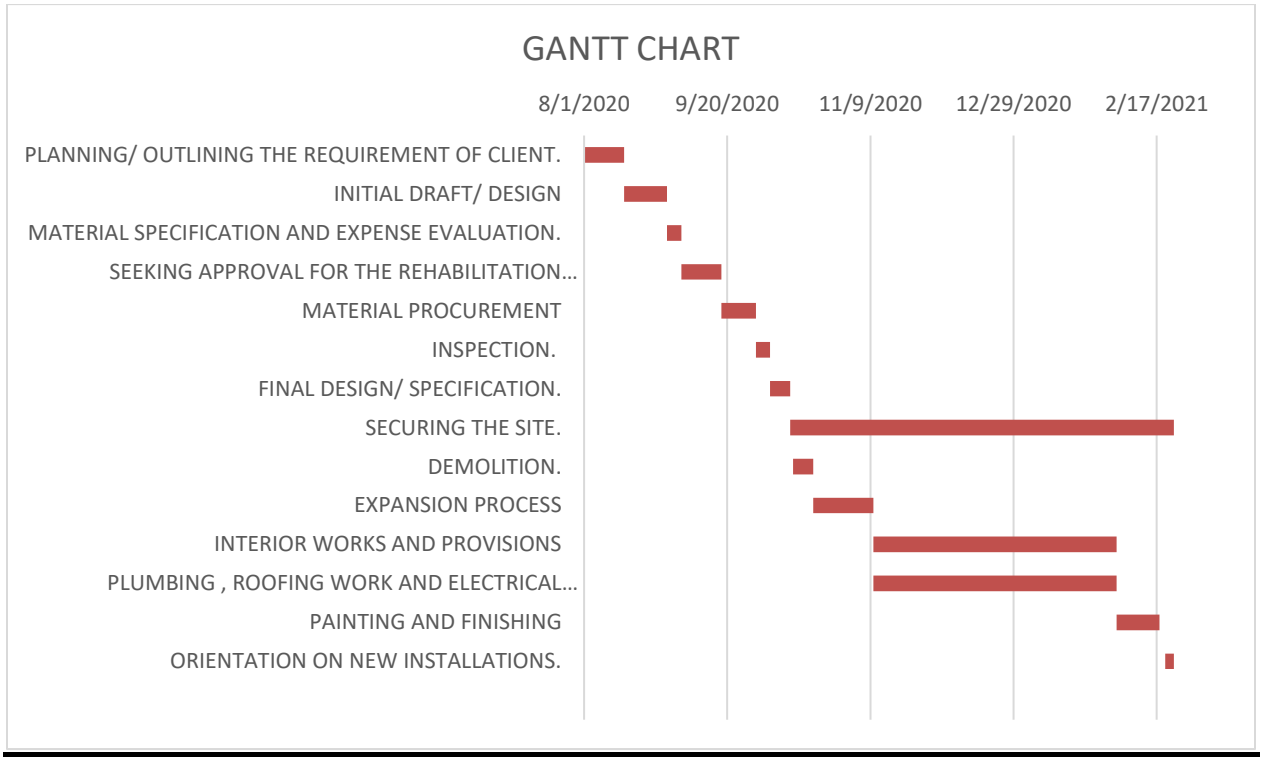
in the hall and projectors with projector screens. They were g chosen due to its high efficiency compared to the other types.

18. ORIENTATION ON NEW INSTALLATIONS.

- Training is a very important stage in this project. This phase continues for a month. The essence of this is to reduce risk of systems of appliances breaking down due to incompetence in usage. This will reduce cost of maintenance.

QUESTION 2.

GANT CHART.



QUESTION 3.

Human Resources required.

1. Electricians
2. Plumber
3. Painters
4. Structural Engineer
5. Construction Workers
6. HVAC Technician/Sub Contractor
7. Suppliers
8. Interior Designer
9. Quantity Surveyor
10. Flooring Expert(Floorer)
11. Construction Foreman
12. Architect
13. HVAC and new Projector System trainers
14. Carpenter.
15. Bricklayer.
16. Wielder.
17. POP technician.
18. Safety officer.
19. General laborer.

Materials needed.

1. Granite.
2. Sharp sand.
3. Plastering sand.
4. Iron rod (imported type)
5. Water.
6. Cement.
7. Ladder.
8. Electrical lightening (for nightwork).

9. ladder.

PROJECT TEAM

- The leader of the team is always an ARCHITECT. The first thing, we must understand what went wrong in the old building. The architect has to give a new design to define the modification.
  After identifying your resources, we need manpower, we set completion date, organization of resources, sourcing of raw material or building material, advanced payment 30% to setup among the workmen.

- Site Manager(Clerk of works)
- Main Contractor and sub-contractors
- Design team (designers and engineers)
- Other consultants(For HVAC system)
- Safety Team including the Safety Manager
- Experts which would include the electrical engineers, plumbers, carpenters, etc.

QUESTION 4.

Importance Of Securing The Site.

The site is a very expensive work where the project is implemented and they are very vulnerable to all types of problem. As the work is in progress, aside from Alfa Belgore hall being rehabilitated, expensive equipment and valuable materials that are being used are kept on the site. The tools, equipment, machinery, and materials are also worth millions of Naira. The project will also be on for several months so such materials equipment and the site will be open to a heap of potential disasters. The site could be vulnerable to;

- Fire
- Theft
- Vandalism
- Accidents
- Natural Disasters
- Water Damage
- Wind Damage

For these reasons the security of the site is hugely important. A group of security guards will be on patrol day and night looking out for any suspicious or criminal activities. Bollards and using of the former roofing to surround the site will also be effective in guarding the area and keeping unauthorized personnel clear. The two measures stated above will help deal with theft and vandalism. These guards will also be on the watch for students that stray of into the site if this happens. They will help look out for any potential problems when workers or contractors are not around at the time.

OTHER REASONS MAY INCLUDE:

- For safety reason
- For access control.
- To fulfill government law guiding site construction.
- Preventing trespassers from entering the building site and climbing on equipment which puts not only the variables but also the trespasses in danger.

QUESTION 5.

Develop a BEME for the project by lump sum projections.

S/N	*Description*	*Quantity*	*Unit price(N)*	*Cost(N)*
1	*Granite*	*20*	*120,000*	*2,400,000*
2	*Sharp /plastering sand*	*30*	*45,000*	*1,350,000*
3	*Cement*	*1,200 bags*	*2,600*	*3,120,000*
4	*Iron rod(16mm)*	*15 tons*	*230,000*	*3,450,000*
5	*Iron*	*15 tons*	*230,000*	*3,450,000*

	Rod(12mm)			
6	*Iron Rod(10mm)*	*6 tons*	*210,000*	*1,260,000*
7	*Plank(1x12)*	*100*	*1500*	*150,000*
8	*Plank(2x3)*	*100*	*1500*	*150,000*
9	*Plank(3x4)*	*150*	*1500*	*225,000*
10	*Plumbing materials*	*1*	*1,200,000*	*1,200,000*
11	*Electrical materials*	*1*	*2,500,000*	*2,500,000*
12	*POP materials*	*1*	*1,500,000*	*1,500,000*
13	*Paints*	*80*	*5,000*	*400,000*
14	*Roofing sheet /square meter*	*1,800*	*5,000*	*9,000,000*
15	*Concrete facial*	*1*	*4,500,000*	*4,500,000*
16	*Tiles(cartons)*	*1000*	*2,500*	*2,500,000*
17	*Electrical fittings*	*1*	*5,500,000*	*5,500,000*
18	*Nails*	*50*	*4000*	*200,000*
19	*Transportation*	*1*	*400,000*	*400,000*
20	*Labor cost*	*10*	*200,000*	*2,000,000*
	TOTAL			*45,255,000*

Forty-five million two hundred and fifty-five thousand Naira only.

S/N	*Item*	*amount*
1	*Miscellaneous 10%*	*4,525,500*

2	*Consultancy 15%*	*3,017,000*
3	*Site preparation & clearing 5%*	*2,262,750*
4	*Transport cost 12%*	*5,430,600*
5	*Profit 20%*	*9,051,000*
	TOTAL	*24,286,850*

S/N	*Item*	*Amount*
1	*Material cost*	*45,255,000*
2	*Profit/handling cost*	*24,286,850*
	GRAND TOTAL	*69,541,850*

SIXTY-NINE MILLION FIVE HUNDRED AND FORTY-ONE THOUSAND EIGHT HUNDRED FIFTY NAIRA ONLY.

QUESTION 6.

PAYMENT SCHEDULE

S/N	*ITEM DESCRIPTION*	*AMOUNT*
1	*30% TECH for mobilization*	*2,318,061.67*
2	*30% completion*	*2,318,061.67*
3	*40% final payment*	*1,738,546.25*
4	*10% six months defect liability period.*	*6,954,185.00*
	TOTAL	*13,328,854.6*

QUESTION 7.

What is BEME?

For all engineering works, it is required to know beforehand the probable cost of construction known as estimated cost. 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. This includes the cost of materials, labor, equipment and all/any other resource(s) required for the success of any construction endeavor based on a pre-determined scope and specification.

It provides sufficient information during construction planning, for tendering and contracting purposes or for the purpose of knowing the estimated cost of the proposed project. It also provides rates and prices which can be used in the variation of additional works instructed by the Clients. It also helps the client or owner of the building to assemble actual tendered rates and prices to prepare for future estimating and budgeting.

What is Defect liability period?

A defect liability period (warranty 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.

This is a fixed period of time, starting from the date of practical completion, during which the contractor has an express contractual right to return to the site to rectify any defects. During this period of time, the contractor has the right top complete unfinished work. Under some contracts, if the contractor rectifies a defect during the defects liability period, there will be a new defects liability period in respect to that of the rectification work. DLP exists for the benefit of both the contractor and the client. The client will be able to use the building even if there are minor defects. The contractor will have the opportunity to rectify the defects or finish any incomplete items of work himself, rather than having to pay the client's costs of engaging in someone else to do that work.

What is lead consultant?

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A lead consultant is the consultant that directs the work of the consultant team and is the main point of contact for communication between the client and the consultant team. The lead consultant seeks instructions from the client and also advices the client on the choice of procurement route. The lead consultant will often be the architect. This consultant also helps in defining the selection criteria for contractors and preparing pre-qualification questionnaires.

What is project life cycle?

A project life cycle is the sequence of phases that a project goes through from its initiation to its closure. The number and sequence of the cycle are determined by the management and various other factors like needs of the organization involved in the project, the nature of the project, and its area of application. The phases have a definite start, end, and control point and are constrained by time. The project lifecycle can be defined and modified as per the needs and aspects of the organization. Even though every project has a definite start and end, the particular objectives, deliverables, and activities vary widely. The lifecycle provides the basic foundation of the actions that has to be performed in the project, irrespective of the specific work involved.

Project life cycles can range from predictive or plan-driven approaches to adaptive or change-driven approaches. In a predictive life cycle, the specifics are defined at the start of the project, and any alterations to scope are carefully addressed. In an adaptive life cycle, the product is developed over multiple iterations, and detailed scope is defined for iteration only as the iteration begins.

What is environmental impact assessment (EIA)?

Environmental impact assessment study is a tool used to identify the environmental, social and economic impact of a project before decision is made to continue or drop the project. This can be defined as the systematic examination of unintended consequences of a development project, with the view to alleviate or mitigate the negative impacts and maximize the positive ones. This negative impacts most times refer to environmental pollution. The purpose of the assessment is to ensure that the decision makers consider the environmental impacts when deciding whether or not to proceed with a project. The aim is not only to reduce environmental impact but also socio-economic, cultural and human-health impacts. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present predictions and options to decision makers. It involves the following stages;

- Screening; to determine which projects need full or partial impact assessment study.
- Scoping; to identify which potential impacts are relevant to assess, to identify alternative solutions that avoid, mitigate or compensate adverse effects on biodiversity and also to derive terms of reference for the impact assessment.
- Assessment and evaluation of impacts and development of alternatives; to predict negative impacts and propose possible alternatives.
- Reporting the Environmental Impact Statement(EIS) or EIA report , including an environmental management plan (EMP), and a non-technical summary for the general audience
- Review of the Environmental Impact Statement (EIS), based on the terms of reference (scoping) and public (including authority) participation.
- Decision-Making to approve on whether to approve the project or not and under what conditions
- Monitoring, compliance, enforcement and environmental auditing. Monitor whether the predicted impacts and proposed mitigation methods occur as defined in the EMP, to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion.cv