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MECHATRONICS ENGINEERING

ENGINEER-IN-SOCIETY

REHABILITATION PROJECT OF ALFA BELGORE HALL

Question1

SCOPE OF WORKS

The works to be performed in the Rehabilitation of Alfa Belgore Hall is summarized below;

1 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 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.

3 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.

4 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.

5 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.

6 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

7 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

8 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.

9 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

10 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.

11 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.

12 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

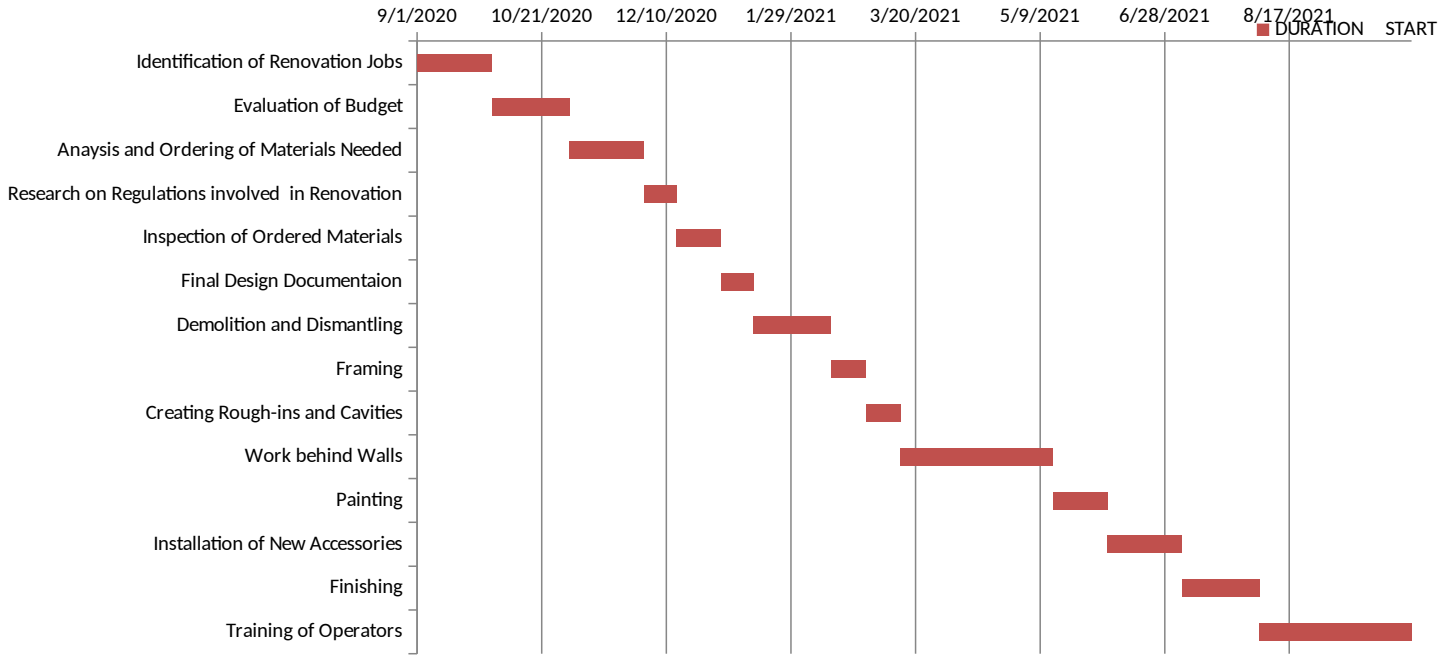
13 The small room will be furnished with a conference style centre table and chairs to match. Curtains will be placed at the windows to reduce echoes and direct sunlight which could cause warming.

14 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.

15 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

Project Gantt Chart



Question 3

List of Human Resources Needed

1. Electricians and Lighting Technicians
2. Plumber
3. Painters
4. Carpenters
5. Structural Engineer
6. Construction Workers and Operators
7. Safety manager
8. HVAC Technician/Sub Contractor
9. Suppliers
10. Interior Designer
11. Quantity Surveyor
12. Flooring Expert(Floorer)
13. Construction Foreman
14. Architect
15. HVAC and new Projector System trainers
16. Transporters
17. Security Guards

Project Team

This includes the following;

- The lead consultant: this will be the architect that will be appointed for the project. The architect will be responsible for envisioning the needs of The Founder and the needs of the school. He will oversee the execution of the project and also act as the project manager.
- Site Manager(Clerk of works)
- Main Contractor and sub-contractors
- Construction Team Leader
- Design team (designers and licensed engineers)
- Other consultants(For HVAC system)
- Safety Team including the Safety Manager

Question 4

Why was The Site Secured?

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.

Question 5

PAYMENT SCHEDULE

TASK	TIME OF PAYMENT	PAYMENT SCHEDULED IN PERCENTAGE	COST
Mobilisation	01/09/2020	30%	₦10,500,000
During construction	02/04/2020	30%	₦10,500,000
Final Payment	05/10/2021	30%	₦10,500,000
DLP	05/04/2022 (6months after completion)	10%	₦3,500,000
Total Estimated Cost	₦35,000,000		
Total Time	399 days excluding DLP		

Question 6

BILL OF ENGINEERING MEASUREMENT AND EVALUATION FOR THE REHAB OF ALFA BELGORE HALL

S/N	Description	Quantity	Unit Price(₦)	Percentage from TEC	Cost
1	Porcelain and Ceramic Tiles	4320 Tiles	405/ft²	5%	₦1,750,000.00
2	Doors	10 Units	35,000/unit	1%	₦350,000.00
3	Large Windows	50 Units	14000/unit	2%	₦700,000.00
4	HVAC System	1 Unit	–	10%	₦3,500,000.00
5	Paint	50 Gallons	14000/gallon	2%	₦700,000.00
6	Lights	93 Units	15000/unit	4%	₦1,400,000.00
7	Water Closets and Basins	9 Units	38500/unit	1%	₦350,000.00
8	Other construction materials	–	–	23%	₦8,050,000.00
9	Consultant fee	–	–	15%	₦5,250,000.00
10	Site Preparations and Clearing after Completion	–	–	5%	₦1,750,000.00
11	Transport	–	–	12%	₦4,200,000.00
12	Profit			20%	₦7,000,000.00
	TOTAL				**₦35,000,000.00**

Question 7

1. WHAT IS A BEME?
   BEME stands for Bill of Engineering Measurement and Evaluation. This is a tool used Before, during and post construction to assess and value the cost of construction works. It includes cost of materials, labour, equipment and all/any other resource(s) required for the success of any construction project based on a pre-determined scope of works. 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.
2. Defects Liability Period(DLP)
   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.
3. Lead consultant
   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.
4. Project life cycle
   By definition, a project has a beginning and end and passes through several phases of development know as life cycle phases. It is a sequence of phases that a project goes through from its initiation to its closure. The number and sequence of cycle are determined by the management and other various factors like needs of the

organization involved in the project, the nature of the project and its area of application. The life cycle provides the basic foundations of actions that has to be performed in the project, irrespective of the specific work involved. It usually starts with the initiation phase then moves to the planning then from there it passes the execution phase by carrying out the project and finally closes with the termination phase.

5. Environmental Impact Assessment(EIA)

   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