**JINJA JOINT EXAMINATIONS BOARD**

Uganda advanced certificate of education

**THEORY OF BUILDING CONSTRUCTION**

**P720/3**

**MARKING GUIDE 2019**

1. ***a) (i)* *Building owner:***

* Commissions work and directly or indirectly employs every one thus he is the financier of the project

***(ii) Architect:***

* He translates the ideas of the client into working drawings
* He advises the client about a particular design, and ensures that the project is kept within cost an complies with that particular design

***(iii) Quantity surveyor***

* He prepares Bills Of Quantities, Checks tenders, Prepares interim variations and advises the architect on the cost of variations.
* He gives a rough estimate of the cost of the project.

***(b)(i) Factors to consider in choosing a building site***

* ***Aspect;*** This is the amount of sunlight received on the various elevations of the site which helps in planning for habitable rooms.
* ***Prospect;*** The site should command a pleasant view and the ad joinery land uses should be compatible.
* ***Site sub soils;*** These should be of greater consideration because of their effect especially when it comes to the foundation.
* ***Site contamination;*** Former industrial sites that could involve expensive site works to remove potential hazards should be avoided.
* ***Cost of the land;*** How expensive or cheap a site is has a great bearing on the possibility of a site to be chosen for the construction of a building.
* ***Elevation;*** Elevated sites are always preferred because they are dry and easy to drain compared to the low lying ones which are likely to be cold and damp
* ***Availability of facilities;*** These assist in day to day living for example shops, schools, transport or roads, religious institutions.
* ***Availability of services;*** A site should have access to adequate public services like water, electricity, telephone, sewers.
* ***Legality;*** Under this arrangement, areas are demarcated as commercial, residential, industrial and thus one can only operate in the accepted zone.
* ***Access;*** This is important for the passage of materials, and also for getting to the building after construction.
* ***Water table;*** the water table of the site should be normal. It is essential to construct a building above the highest ground water level.
* ***Security;*** It is an important factor as regards the safety of the inhabitants and their properties.
* ***Climate;*** This refers to the variations which change from place to place for example some areas are prone to moist or fogs thus the need for consideration.

***(b)(ii ) Site investigation*** is the process of obtaining a comprehensive picture of the site

below the ground.

***(b)(iii) Reasons for site investigation***

* To determine the suitability of the building on the site especially in terms of loading.
* To determine the nature and extent of preliminary works.
* To know the nature of the soils probably its load bearing capacity which is done by means of trial holes or borings since there may be variations along the site.
* To know the level of water table.
* To know the ordinance of the survey maps that should show the presence of disused mines or former ponds.
* To know the position and size of main services like sewers.
* To know the environment of the site for example mature trees on the site which ought to be retained and those to cut.

***(b)(iv)Timbering in loose wet soils***

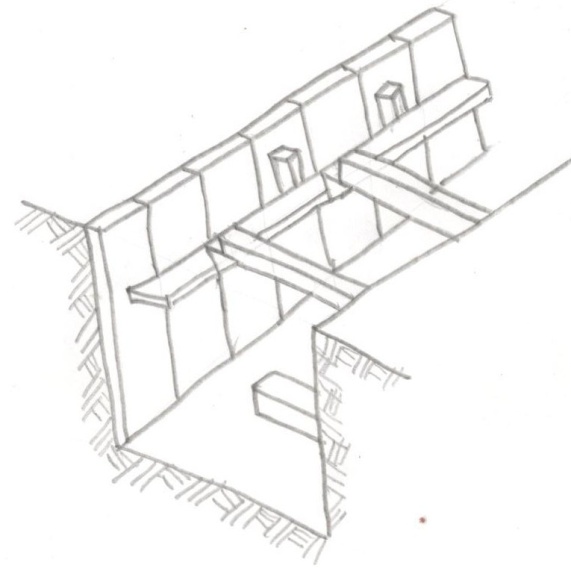
*Vertical sheeting*

*Walling*

*Wedge*

*Strut*

*Pegs*



***(c)(i) Methods of reducing levels.***

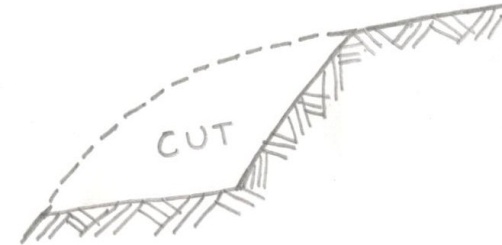
* ***Cut method;*** This is where soil is cut from the site and then ferried away from the site.

*Original ground level*

*Formation or reduced level*

*Battered face*

*CUT*



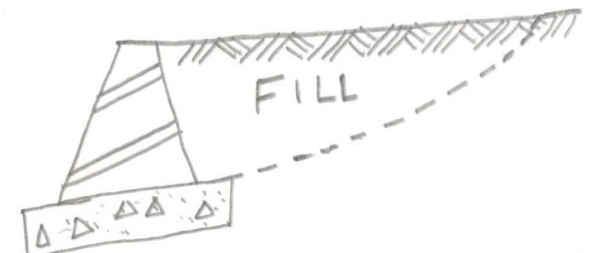
* ***Fill method;*** This is where soil is ferried from somewhere else and is filled on the site so as to level the slope.

*FILL*

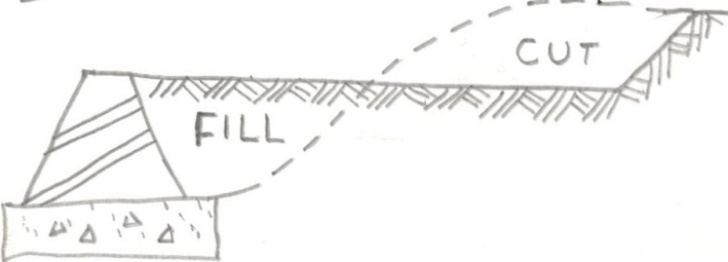
*Original ground level*

*Formation or reduced level*

*Retaining wall*



***Cut and Fill method;*** This is where soil is cut from a higher section of the site and used to fill the lower section of the same site thereby leveling the site.



*CUT*

*Formed level*

*Retaining wall*

*Battered face* facefafacelevel

*Original ground level*

*FILL*

FILL

Original ground level

Battered face facefafacelevel

Retaining wall

FILL

CUT

Original ground level

FILL

CUT

Battered face facefafacelevel

Retaining wall

Retaining wall

Battered face facefafacelevel

Original ground level

FILL

CUT

***(c)(i) Flying shore.***

*Wall plate*

*Wall*

*Horizontal shore strut*

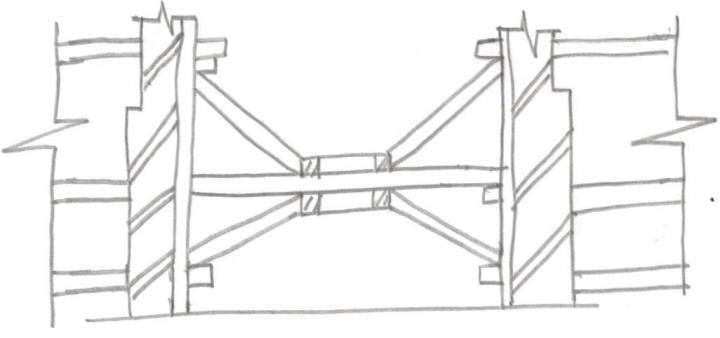
*Needle*

*Straining sill*

*cleat*

*Strut*

*Strut*



***(c)(ii) Raking shore***

*Wall*

*Wall plate*

*Needle*

*braces*

*Bottom raker*

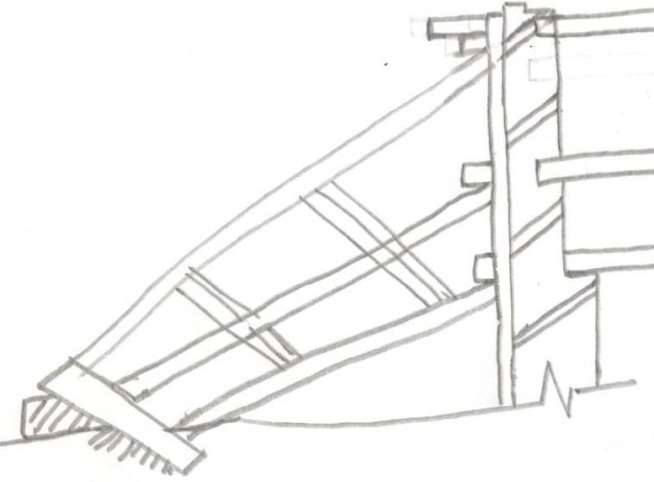
*Cleat*

*Cleat*

*Top raker*

*Middle raker*

*Sole plate*



***(c)(iii) Causes of buckling in walls;***

* Un even loading
* Overloading
* Excess moisture in the soil

1. ***(a)(i)*** To transmit the total loads of the building to suitable soils or the ground below.

***(ii) Functional requirements of a foundation:***

* It should be strong to bear its own weight and resist the stresses set up within it by the satisfactory design of the foundation its self and materials of the super structure
* It should be stable. This depends upon the behavior under the load of the soil on which it rests thus the bearing capacity should be greater than the bearing pressure.
* It should be resistant to chemical attack. A foundation should be set up in soils that do not have chemicals or else sulphate resisting additives should be incorporated into the foundation to resist further reactions.

***(iii)***  *-* ***Back fill;***

These are materials excavated from the site and if suitable, used to fill around foundation walls.

* ***Bearing capacity***

This is the ability of the soil to carry a given load

* ***Bearing pressure***

This is the amount of force of the structure exerted on trhe ground per unit area

* ***Made ground***

These are refills, excavated rocks or soil deposited for filling in a depression or for raising the site above its natural level.

* ***Settlement***

This is the ground movement leading to shrinking of the foundation.

***(iv) Causes of settlement:***

* Deformation of the soil due to imposed loads
* Volume changes of the soil due to seasonal changes.
* Mass movement of the ground in un stable areas

***(b)(i) Factors that influence the choice of the foundation type:***

* The method used for leveling
* The type of building to be built
* The nature of the site whether leveled or slopping
* The total loads of the building.

***(ii) Data required in calculating the total loads of a building***

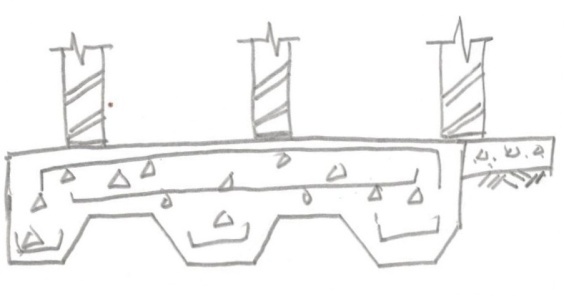
* Soil bearing pressure on the foundation
* Area of the foundation (its width and thickness)

***(iii) How to determine the width of the foundation***

* Loadings
* Type of soil

***(c)***

* ***Raft foundation***



*dpc*

*Concrete paving*

*Re-inforcement bars*

*Re-inforcement bars*

*Concrete paving*

*Re-inforcement bars*

*Re-inforcement bars*

*Concrete paving*

*Re-inforcement bars*

*Concrete paving*

***OR***

*Re-inforcement bars*

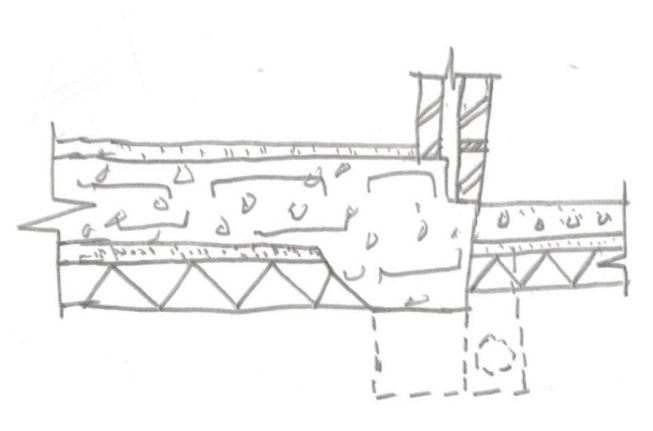
*dpc*

*Concrete paving*

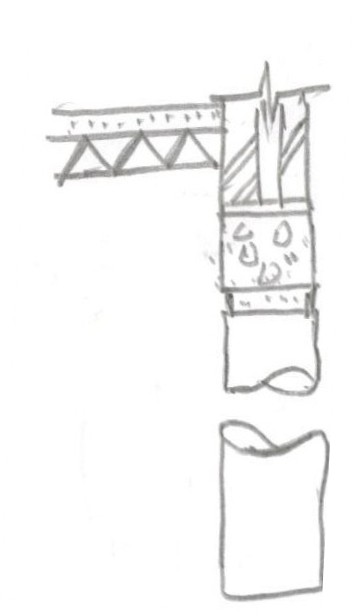
*Field drain*

*Deepened edge beam*

*Land drain*



* ***Pile foundation***





*Pile*

*Imposed load*

*Firm stratum*

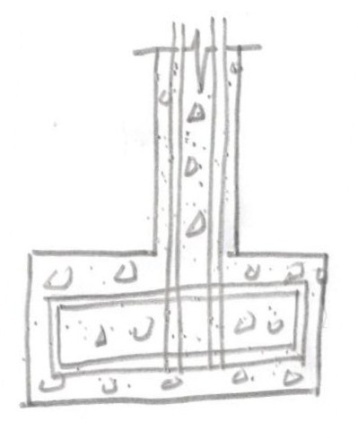
*Re- in forced concrete beam*

*Short bored piles*

*Re inforced concrete beam*

*Blinding*

* ***Pad foundation***



*Starter bars for columns*

*Reinforced concrete column*

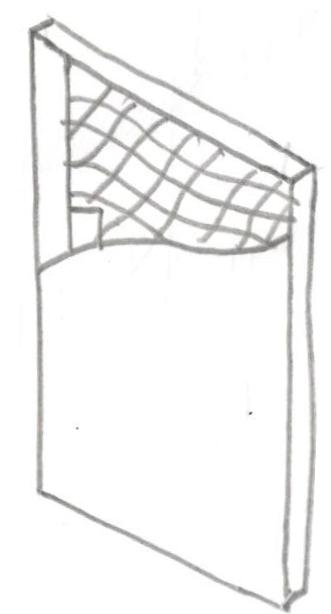
*Main steel bars in both directions.*

*Weak concrete blinding beneath*.

1. ***(a)(i) A flush door is*** a door consisting of a solid or semi solid framed skeleton ( core) covered on both faces or sides with ply wood or hard board or plastic laminate giving a perfectly flush and joint less surface.

***(ii) Types of flush doors;***

* Cellular core flush door
* Skeleton core flush door
* Solid core flush door



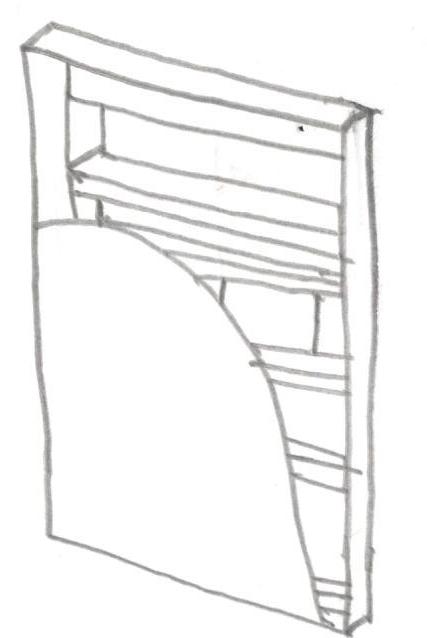
*Egg crate*

*Ply wood or hard board*

*Lock block*

*Lock block*

*Ply wood or hard board*



*Bottom rail*

*Top rail*

*Lock block*

*Middle rail*

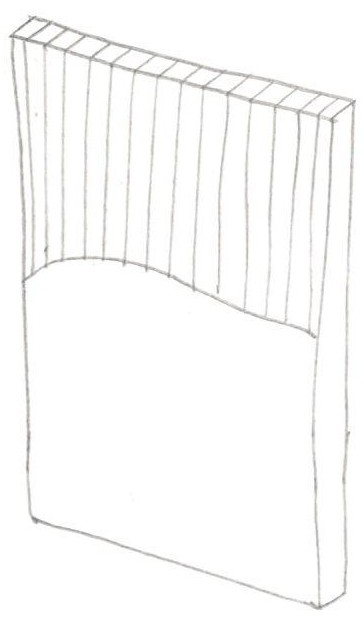
*Ply wood*

*Ply wood*

*Middle rail*

*Lock block*

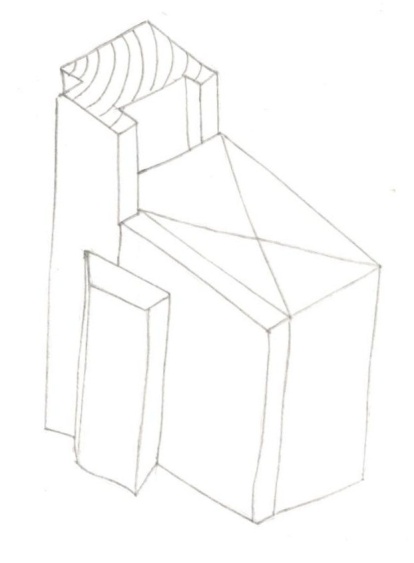
*Top rail*



*Strips of wood glued together*

*Ply wood or hard board*

***(b)***

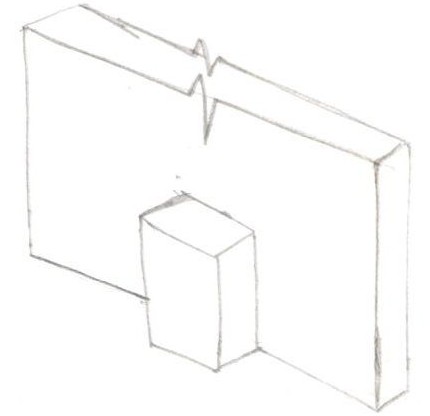
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*Lining jambs*

*Planted door stop*

*Planted door stop*

*Lining jambs*



*Door frame*

*Partition*

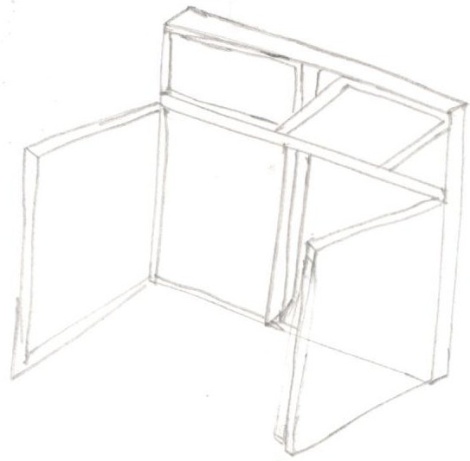
*Plaster*

*Architrave*

***(i ) A door frame is*** a section of rebated wood or metal that is secured in the wall or partition opening to support internal or external doors while as ***a door lining is*** a thin section of wood or metal that is fixed securely in a door or opening as a lining around the thickness of the wall of partition.

***(ii) An architrave*** is a moulding or fillet around a door to mask the joint between the wall finish and the frame while as ***a door stop*** is a thin slat or wedge built inside a door frame to prevent a door from swinging through when closed.

***(c)***

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*Fixed light*

*Transom*

*Mullion*

*Casement*

***(i) Casement*** is part of a window consisting of a frame and shutter composed of styles, top rail and bottom rail, vertical and horizontal sash or glazing bars and glass panes while as ***fixed light*** is glazing mounted directly into the frame without any kind of opening function.

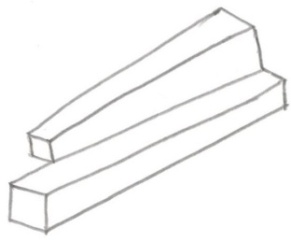
***(ii) Mullion is*** a vertical member that divides a window into partitions while as ***a*** ***transom*** is a horizontal member that divides a window into partitions.

***(d)(i) Types of windows according to their positions;***

* ***Bay window:*** Projects outward from a wall of a room.
* ***Corner window:***Located in the corner of a room.
* ***Dormer window:*** Vertical window built on the slopping side
* ***Gable window:***Window produced in the gable end of a pitched roof.
* ***Sky light:***A fixed window provided on the slopping surface of a pitched surface the roof being parallel with the slopping surface.
* ***Fan light:***This ensures cross ventilation in the room even when the door is closed.

***(ii) Fittings used on a casement window:***

* Hinges
* Bolts
* Handles
* Stays

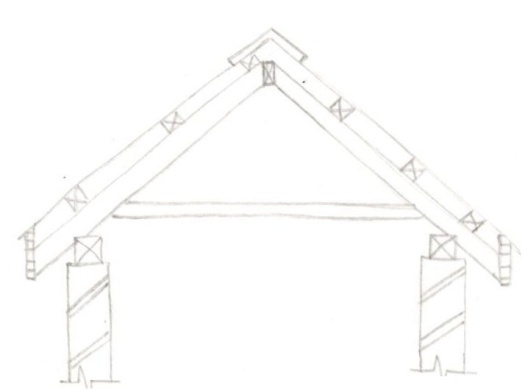
1. ***(a)(i) Firring pieces is*** a wedge shaped fillet on top of a joist to provide the fall or slope to the roof while as a ***tilting fillet is*** a thin wedge strip of wood placed under slates or tiles to align the bottom course used where there is need to shade water more effectively.

***Firring piece***

***(ii) A ridge board*** is a piece of timber which runs horizontally at the apex while as a ridge is the apex line of a slopping roof or it is the spine of a roof.

***(iii) Common rafter*** is a piece of timber inclined, and runs from ridge to eave while as ***Jack rafter*** is the shortened rafter that spans from eaves to hip or from ridge to valley.

***(b)(i) Collar roof***

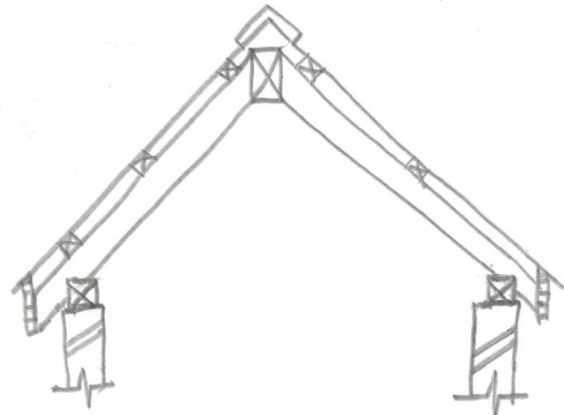


*Ridge piece*

*Purlin*

*Wall*

***(ii) Couple roof***



*Ridge cap*

*Ridge piece*

*Rafter*

*Fascia board*

*Wall*

***(iii) Lean to roof***



*Bracket*

*Wall plate*

*Wall rising to higher levels*

*Roof covering such as iron sheets*

*Rafter*

*Wall post*

*Wall post*

*Rafter*

*Roof covering such as iron sheets*

*Wall rising to higher levels*

*Wall plate*

*Bracket*

*Wall rising to higher levels*

*Wall plate*

*Wall post*

*Rafter*

*Roof covering such as iron sheets*

Wall post

Rafter

Roof covering such as iron sheets

Wall plate

***(c)(i)Roofing materials used on;***

* ***Pitched roof:***
* Thatch covering
* Tiles
* Galvanized corrugated iron sheets
* Slates
* ***Flat roof:***
* Mastic asphalt
* Felt
* Sheet metal roofing
* Concrete

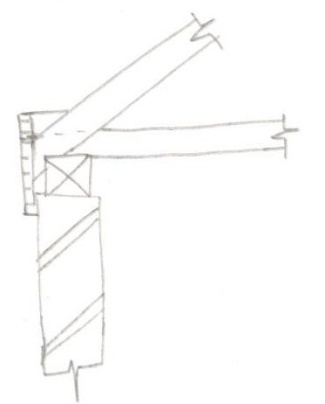
***(ii) Types of eaves.***

* ***Flush eaves***

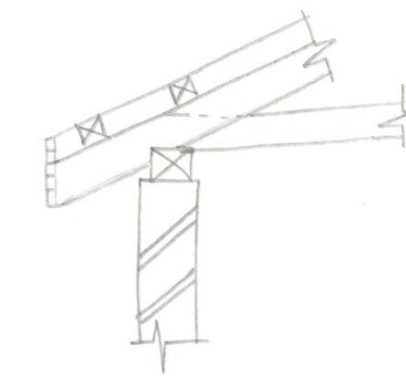
*Tilting fillet*

*Fascia board bbbbbbbbboard*

*Wall*



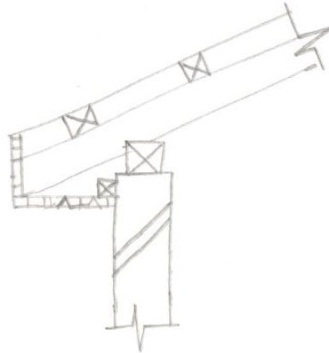
* ***Open eaves***



*Tie beam*

*Fascia board*

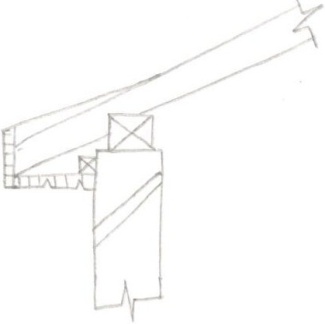
* ***Closed eaves***



*Holes for ventilation*

*Fascia board*

* ***Sprocketed eaves***



*Sprocket*

*Soffit*

***(d)(i) A stair case*** is a complete stair structure including flights, landings, balustrades and also that part of the building which encloses them while as ***a stair well*** is a hole formed in the floor (by trimming the joist) which accommodates a stair or ***a stair well*** is the space ( on plan) between the outer strings of a geometrical or open newel stair.

***(ii) Functional requirements of a stair:***

* Stairs should be strong and stable to carry loads ( of people, furniture and other moveable goods)
* A stair should be fire resistant in order to maintain its structural integrity and to prevent spread of fire from one floor or one level to another.
* A stair should have good insulation against sound.

1. ***(a)(i) Components of a good paint:***

* ***Vehicle or carrier;*** This is the liquid portion of paint. It contains the binder or film and the solvent.
* ***Pigments or bases;*** These are crystalline particles of organic or inorganic materials which give the paint body and colour.
* ***Additives:*** These perform specialist functions like catalysts (change paint from liquid to hard surface), driers for speeding up the drying process, plasticisers that prevent the film from becoming brittle, flatting agents which reduce the surface gloss.

***(ii) Objectives of applying paint to a surface;***

* To protect the surfaces from rain, sunlight, abrasion, chemicals, fungi.
* To provide decoration in form of colour, light diffusion and area definition.
* To absorb sound.
* To provide hygienic surfaces.

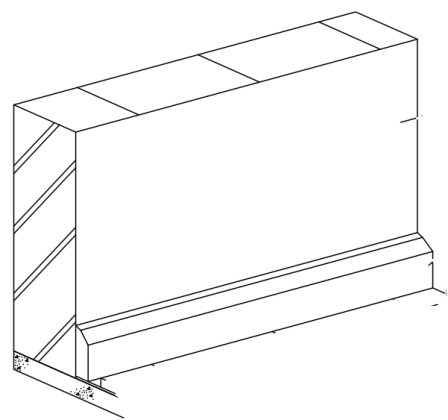
***(iii) Sequence of operation involved in painting new wood work:***

* ***Surface preparation;*** Woodwork should be properly seasoned, clean, dry, free from dust and smoothened.
* ***Knotting;*** This is the process of sealing knots by suitable means to prevent the bleeding through the paint.
* ***Priming;*** this is the application of the first coat of paint used to seal the surface of the wall to protect the surface against damp air, act as a barrier to prevent any chemical action between the surface and the finishing coats and give a smooth surface for the subsequent coats.
* ***Stopping;*** This is the filling of holes and surface defects with a filler so as to obtain a uniform surface level.
* ***Second and succeeding coats (or undercoating);*** This is applied to the primed surface and should be approximately of the same shade as that of the desired finish.
* ***Finishing coat;*** This is applied after the undercoat is properly dry. It should be free from thin patches and brush marks.

***(b)(i) Causes of cracking in plaster work:***

* Old surface not being properly prepared
* Excessive shrinkage of plaster work due to the application of mortar in thick coats.
* Poor workmanship and inappropriate method of application of the plaster.

***(b)(ii) Wooden skirting***

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*Wall*

*Floor*

*Chamfered skirting*

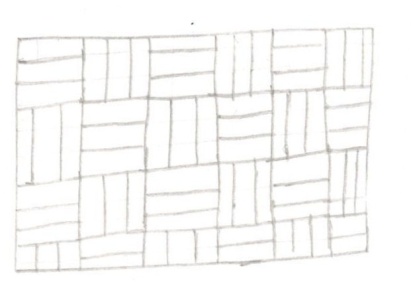
***(iii) Flag stone flooring*** is the laying of thin slabs of stones which may either be square or rectangular in shape with squared edges on concrete bedding.

***(iv) Advantages of flag stone flooring;***

* Provides hard durable and wear resistant floor surface.
* It is easy to construct and has got low maintenance costs.
* Where the stones are in abundance, the floor finish is cheap.

***(c)(i) Patterns of wood block finish flooring:***

* ***Basket wave pattern***



* ***Herring bone pattern***



***(ii) Granolithic floor*** is a concrete floor which is composed of cement, sand andspecially selected aggregates called granite.

***It is suitably used for;***

* Factory floors
* Public washrooms
* Toilets
* Entrance halls to public buildings

***(iii)***

* ***Advantages of granolithic floor finish:***
* Floor finish is resistant to abrasion and damage by water
* Cost is less than terrazzo
* Provides a smooth and easily cleanable surface.
* ***Disadvantages of granolithic floor finish:***
* Not attractive
* The floor ids cold and noisy.

1. ***(a)(i) A wall*** is a continuous, usually vertical solid structure, made of bricks, stones, concrete, timber or metal, thin compared to its length and height which encloses and protects a building or serves to divide a building into rooms and compartments.

***(ii) Advantages of cavity wall construction:***

* It is able to withstand rain in all situations from penetrating to the inner wall surface.
* It gives good thermal insulation, keeping the building warm in winter and cool in summer.
* There is no need for external rendering.
* It enables use of cheaper and alternative materials for inner construction
* The wall provides greater sound insulation compared to a standard one brick thick wall.

***(b)(i)A lintel*** is a horizontal member of stone, brickwork, wood or reinforced cement concrete fixed above a window or door opening to support the load above an opening while as ***an Arch*** is an arrangement of wedge shaped blocks of stone or bricks known as voussoirs designed to support each other and carry the load over an opening round a curved profile with abutments on either side.

***(ii) Details of an arch construction***

*Face joints*

*Haunch*

*Extrados*

*Intrados or soffit*

*Springing*

*Abutment*

*Springer*

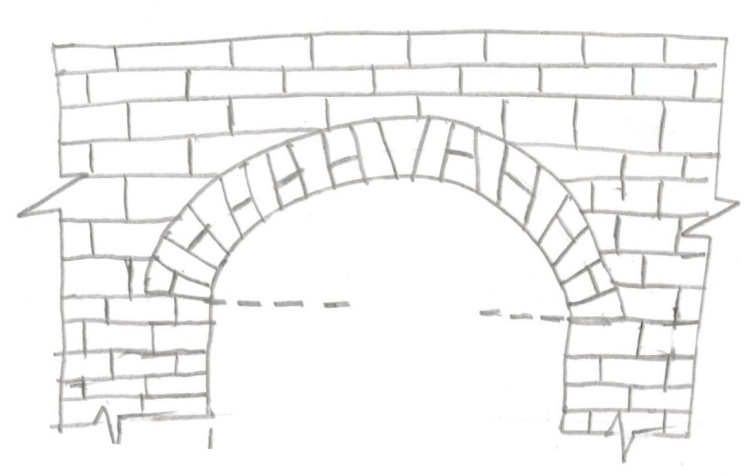
*Key brick*

*crown*

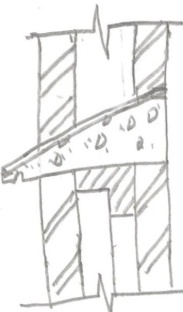
*RADIUS*

*RISE*

*Voussoir*



***(c)(i) Boot lintel is*** a pre-cast reinforced horizontal member that spans over the opening in a cavity wall and supports the load above it.



*wall*

*R.C Boot lintel*

*Window/door frame*

*dpc*

***(ii) Rough arch is*** an arch constructed of common bricks in half brick rings with joints that are not worked on ( separated by wedge shaped joints) used on work which does not require a high standard of finishes or work which is to be plastered over.

***(iii) Turning piece is*** a temporally wooden support shaped of the arch soffit to support the arch during construction.

***(iv)Pointing*** is the finish given to the brick joints by racking out a depth of not more than 200mm and filling it in on the face with a hard setting mortar which may have a colour additive.

***(v) Quoin*** is the exterior angle or corner of a wall. Or

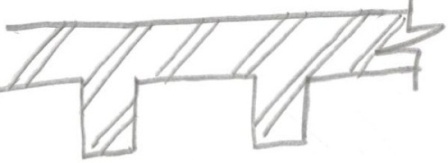
It is the brick or wedge shaped stone used for the corner of walls.

***(d)(i) Factors that affect the performance of a chimney;***

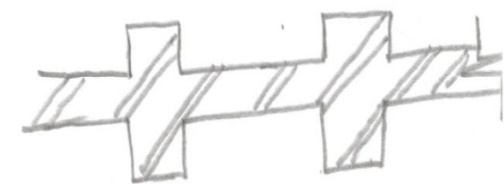
* Down draught caused by the buildup of pressure at the chimney top. This may be influenced by the form of the building its self, trees neighboring buildings.
* Adverse flow conditions resulting from the poor design of passages through which the smoke passes (throat, gathering and flue).
* insufficient air entering the room to replace that passing up the chimney

(ii)

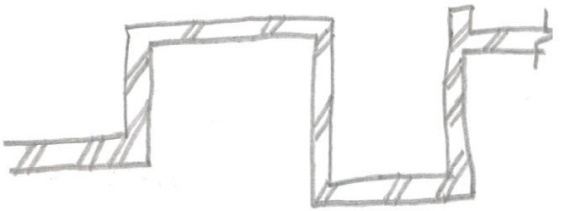
* ***single fire place;*** This is formed on one side of the wall***.***



* ***Back to back fire place;*** This is formed on a party wall. It is constructed oneach side or part of the wall.



* ***Interlacing fire place;*** This is constructed on internal walls. They are placedside by side.



***(iii) Principal requirements of a fire place:***

* To secure maximum heat for the benefit of occupants.
* To take adequate precautions against spread of fire
* To ensure effective removal of smoke and avoidance of downdraught.

**END**