FINISHING CONSTRUCTION WORK

Level-II

Learning Guide= 12

Unit of Competence: Carry Out Different Types of Pointing to Block work

Module Title; Carrying out Different Types of Pointing to Block work

LG Code: EIS FCW2 MO12 LO1 LG 46

TTLM Code: EIS FCW2 M12 TTLM 0919v1

LO 1: Prepare for work

Instruction Sheet	Learning Guide #1

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

1, 1 Obtaining the Work instructions and operational details

1, 2 Follow Safety (OHS) requirements

1, 3 identifying and implementing Signage and barricade requirements

1.4 selecting tools and equipment

1, 5 calculating material quantity requirements

1, 6 Identifying materials appropriate to the work application

1, 7 Identifying Environmental protection requirements

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

1.1 Obtain the Work instructions and operational details

1. 2 Follow Safety (OHS) requirements

1.3 Identify and implementing Signage and barricade requirements

1.4 select tools and equipment

1.5 calculate material quantity requirements

1.6 Identify materials appropriate to the work application

1, 7 Identify Environmental protection requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4”self-check 5,self –check 6, self-check 7, **in page -4,7,10,17,28,32,and 35** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -36,36**
6. Do the “LAP test” **in page – 40** (if you are ready).

Information Sheet-1	*Obtaining the Work instructions and operational details*

1.1 WORK INSTRUCTION

- Work instructions, including plans, specifications, quality requirements and operational details are obtained using suitable information sources, confirmed and applied for restoration of brickwork structures**.**
- Safety (OHS) requirements are followed in accordance with safety plans and policies.
- Plant, tools and equipment selected to carry out tasks are consistent with job requirements, checked for serviceability, and any faults are rectified or reported prior to commencement.
- Material quantity requirements are calculated in accordance with plans, specifications and quality requirements.
- Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use.
- . Environmental requirements are identified for the project in accordance with environmental plans and and regulatory authority obligations, and are applied.

- Work instructions are called work guides, Standard Operating Procedures (SOPs), job aids or user manuals, depending on the situation. In any case, the purpose of work instructions is to clearly explain how a particular work task is performed.
- They're like the step-by-step instructions we receive when we learn to drive a car: check gear stick is in neutral, start ignition, press clutch, change to first gear and so forth.
- A process hierarchy shows your overall process architecture and how it supports your business. (For more on this read our Guide to creating process hierarchies)
- A process is a chain of activities that transform inputs to outputs.
- A procedure outlines how to perform a process – sequence and who does what. In Gluu we combine process and procedure into a single, simple format (since people confuse them all the time).
- A work instruction or work guide, job aid or standard operating procedure.
- describes in detail how an activity within a process (or procedure) is performed

List of Reference Materials

1- www.Ideal ConcreteBlock.com

2- Mar 3, 2011 hibler, Inc.
3- Shower pan construction, Morthland Glenn **A** Oct 11, 1949
4- **https://www.youtube.com/watch?v=65jYtUMLl2E**
5- **https://www.youtube.com/watch?v=MYp6fOn01HM**
6- **https://www.youtube.com/watch?v=ZrSU9-r9qB8**

Self-Check 1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

I. choice the correct answer from the alternatives (15%)

---------- 1, work instructions may include ----------?

A plans B specifications C quality details D All

---------- 2, working instruction means principals of guide lines to implement as well

A True B False C. UN known

---------- 3 one is different from the work instructions

A specifications B Plans C OHS D ALL E None

Satisfactory rating above 7 unsatisfactory below 7

Answer Sheet

Name: _____ Date: _____

Answer key

Score = _____

Rating_____--

Information Sheet-2	*Follow Safety* (*OHS*) requirements

2.1 Applying safety procedures and OHS

Safety is to protect our self, co-worker, tools, equipment's & materials from danger or risk.

- Safety at all times should be positive. You must know what to do, what to use, what to prevent & what guards in the work area.
- You must use personal protective equipment's (PPE).such as safety shoes, goggle, leather gloves, ear protection etc.
- Don't test sharpened tools with your finger.
- Don't use a file without handle.
- Use wire brush to remove metal chips, don't use your bare hands.
- Use sharp materials /tools properly used.
- Keep work area free from un necessary item, that cause slipping hazards.
- Avoid touch any machines & tools without the recognition
- Heavy hammers should not be done on a bench vise.

- **Accident: -** may be defined as an unplanned, non-controlled, and an undesirable event or a sudden mishap which interrupts an activity or a function.
- **Injury:-** may be defined as the bodily hurt sustained as the result of the accident, such as a laceration, abrasions, bruise, puncture, wound, foreign body, fracture, etc...
- **Unsafe Condition** may be defined as any physical condition that if left uncorrected may lead to an accident. Again it is well to keep mind that most unsafe conditions have been observed before the accident occurs. Thus, the supervisor has numerous opportunities to correct the unsafe condition before the accident.
- Always wear protective clothing:
    - ✓ Gloves when handling materials and components
    - ✓ Safety footwear in case of impact injury
    - ✓ Mask in dusty atmospheres
    - ✓ Ear defenders in noisy conditions
    - ✓ Goggles to protect eyes from flying debris

- Helmets at all times when on a building site
- Be aware of emergency procedures in the event of an accident:
- Who the first aider is
- Where the first aid box is located
- How to fill in the accident book
- Report accidents to the person in charge

List of Reference Materials

www.IdealConcreteBlock.com Prof Abebe Dinku
Mar 3, 2011 hibler, Inc.
Shower pan construction, Morthland Glenn **A** Oct 11, 1949
https://www.youtube.com/watch?v=65jYtUMLI2E
https://www.youtube.com/watch?v=MYp6fOn01HM
https://www.youtube.com/watch?v=ZrSU9-r9qB8
https://www.youtube.com/watch?v=4jCxBcgLGPU

Self-Check 2	Written Test

Directions: **multiple choose**

I choice the correct answer from the given

1 safety PPE include
A shoes B goggles C gloves D all
2 Wire brush is used to remove
A metal chips B sand chips C stone chips D all
3 Always wear protective clothing includes----------?
A foot wear B helmet C.mask D all

Satisfactory rating above 7 unsatisfactory below 7

Name: _____ Date: _____

Answer sheet

Score = _____

Rating:_____

1 ----------

2 ----------

3 ----------

Information Sheet-3	Identifying and implementing Signage and barricade requirements

3,1 Barricading Requirements

Barricading is one of the risk control measures used to protect personnel from hazard such as:

• being struck by falling objects, material movements or plant;

• fall from height, including falling into open excavations or penetrations;

• fall from unprotected edges (e.g. removed flooring, walkways, stairs and handrails);

• exposure to hazardous substances, process or activities;

• unauthorised entry into a confined space or other restricted work areas;

• any potentially hazardous work processes, such as hot works, demolition work, scaffolding, radiation work and work involving asbestos.

Barricading may also be used as part of incident management and emergency response procedures

3,2 Safety Signage Requirements

Safety signs are erected to warn workers or the public of specific hazards and to communicate necessary precautionary measures and emergency actions. **Safety signage, is required for:**

• construction sites;

• confined spaces;

• asbestos;

• hazardous areas;

• hazardous chemicals;

• site specific Personal Protective Equipment (PPE) requirements;

• fire protection equipment;

• emergency and first aid information;

• emergency eyewash shower; and

• traffic management and pedestrian control.

- **Accident Prevention Tags**

An accident prevention tag is a miniature sign on card, paper, pasteboard or similar temporary or semi-permanent material, which can be attached to plant, equipment or

other objects for the purpose of imposing a regulatory requirement, or for advising or informing users about some safety aspect of the item. For details on the use of these

ASSOCIATED DOCUMENTS

- General Safety Controls Directive
- Hazardous Chemicals Management Procedure
- Working at Height Procedure
- Trenching and Excavation Procedure
- Confined Space Entry Procedure
- Asbestos Management Procedure
- Workplace Risk Assessment Procedure .
- Lockout and Tag out Procedure
- First Aid Procedure
- People Managers Toolkit – Barricading and Safety Signage

Toolkits provide practical guidance, useful tools and information for people managers to effectively manage the risks associated with staff working with, around or on Barricading and Safety Signage tags,

List of Reference Materials

- www.IdealConcreteBlock.com
- Mar 3, 2011 hibler, Inc.
- Shower pan construction, Morthland Glenn **A** Oct 11, 1949
- **https://www.youtube.com/watch?v=65jYtUMLl2E**
- **https://www.youtube.com/watch?v=MYp6fOn01HM**
- **https://www.youtube.com/watch?v=ZrSU9-r9qB8**

https://www.youtube.com/watch?v=4jCxBcgLGPU

Self-Check -3	Written Test

Directions: ***multiple choice***

/ choice correct answer from given alternatives

1. Safety signage is required for--------?

   A construction B fire protection C traffic management D all

2. Associated documents signage includes

   A general safety B trenching & excavations C first aid procedures D all

Satisfactory rating above 5 unsatisfactory below 5

Answer Sheet

1 ----------

2 ----------

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

INFORMATION SHEET 4	Selecting tools and equipments

4 .1 Selecting tools and equipments

There are several type tools used by a Mason. Hand tools, in general, ease the work and accelerates the process, improves quality of work significantly and they are very important for everybody who wants to do decent work so that keep tools in perfect order. In addition tools and equipment also represents highly valued assets. For this reasons it is crucial necessary to handle tools and equipment with extra care. That means cleaning after use, storing neatly, slightly greasing if necessary and regular maintenance.

Carefully handled hand tools are safe tools!

Figure 4.1 safety tag

Measuring and Levelling Hand Tools

Measuring Hand tools and instruments are precise devices but needed to be handled with extra care, e.g. Spirit level should be checked every day before use!

Spirit level

It is used to control the horizontal and vertical alignment of wall surface and edges. The length is at least 80 to 120cm long. It is made of metal, synthetic material or wood. It has two measuring bubbles: one is located at mid length is used to check horizontal positions. While the second one, at the end, is used to check vertical position. This tool requires always to be handled with care and needs to be checked from time to time weather it is still working accurate or not.

Figure 2 sprit level

Plumb bob A plum bob is made of metal. When suspended from a vertically attached string, it is employed to check the vertical alignment of corners and surface of walls. A freely hanging plumb bob gives exactly the vertical alignment, because any undisturbed freely hanging mass points to the centre of the earth.

Plumb bob for vertical marking & leveling

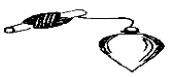
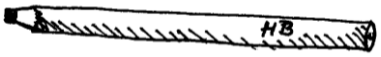


Figure 3 plumb bob

Alignment string /masons' line/ Alignment string /mason line/, sometimes called, Fish line, is a rope used to transfer horizontal & vertical alignments or lines, i.e., use to mark base line on the floor or vertical point alignments of wall. In other words, it is used to align the walling blocks, (stone, bricks, concrete blocks, hydra form etc). It is available in different thickness & sizes in the market.

Fig 4 Mason line/alignment string



Graphite Pencil This is used for marking in wall construction. It is specially produced for this purpose in such a way that it will not wear out fast.

fig 5 pencil

Folding meter/rule-2/ for measuring length in wall construction, it is convenient to use rigid scales. Such a measuring scale/ folding rule/ is made of 20cm separate wooden pieces joined together by pins. The scale has subdivisions in cm and mm.
Folding meter

Figure; 6 folding meter

Hose level

It is a transparent PVC hose. It is used to transfer or mark vertical levels on surface of wall when it is filled with water, but without any air bubbles. The water level in each end of the hose is equal. It is an instrument to mark equal levels on site. It is very accurate but not eases to handle.

Fig 6 Hose level to transfer meter score

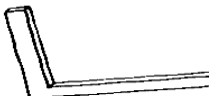
Straight edge/Level/

This is a perfectly straight metal/aluminium/ with all long and short edges parallel to its centreline. It is employed to check straight alignments of walls. Straight edge Its length ranges from 2m up to 4m. Together with the sprit level, it can be used to bridge over the point

to be checked. A straight edge/Level/ can also be made from a wooden plank with perfectly parallel edges.

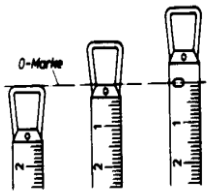
Angle / Try square

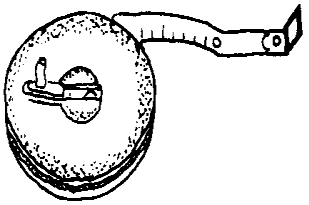
It is used to measure a right angle (90º) of a corner. Used in laying masonry units or blocks at corners of masonry wall.



Measuring tape figure 8 try square

Tape is used to measure dimensions of building parts and distances in site. It is manufactured from steel, plastic or fibre in lengths of 1m, 2m, 3m, 5m, 30m, etc. and 50m. In using tapes for measurements, the two points should be aligned perfectly. In addition, when long horizontal measurements are needed, care should be taken to avoid sag on the tape meters.



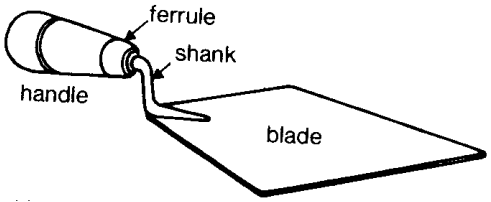


Figure; 9 Proper adjustment of measuring tape

Mason tools

<u>Block laying trowel</u>

This is a tool, which every mason needs. Used for picking up mortar out of the barrel, spreading mortar on the wall, bed joints and cutting off excess mortar. In addition to the picture shown, a Triangular and rectangular trowel are also used by the mason.



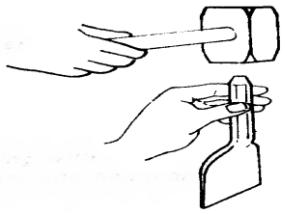
Walling Hammer/Mason hammer/

Walling Hammers are used especially to knock of parts of walling unit blocks, /brick, concrete blocks etc/. The hammer weighs about half a kilogram and is made of steel. It has a wooden handle, which should always fit, firmly to the hole in the head. The flat part of the hammer at one of its end is called cutting edge/use to cut bricks or concrete blocks/ and the square head of the hammer on the other end is called striking face which is used to strike laid stones. The hammer must be formed in a kind that the cutting edge and central line of the hammerhead lie in a circular arc.

Fig 9 Brick hammer

Club hammer and bolster

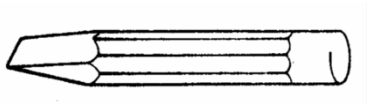
Is used to strike marrow – headed chisels and brick set or for driving stakes into the ground.

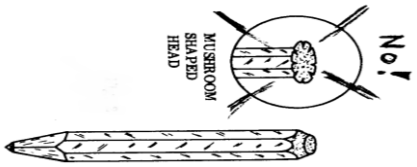


Chisel **figure 10 club hammer**

Used to cut concrete blocks, bricks, plaster surface and to remove mortar projections etc. Cold chisels are available in different sizes and shapes. The operation is done together with a club hammer.

Flat chisel



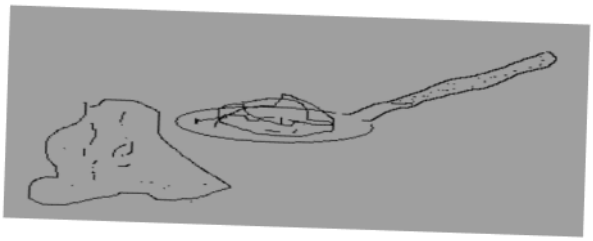


Mortar barrel/ drum **figure 11 flat chisel**

This is used by mason, plasterer, tiller, etc, and serves to prepare small amount of mortar right at the working place. It is also used as temporary mortar storage, supplied from mixing station, and to control water ratio of the mix when it gets dry. Always, keep it workable and clean.

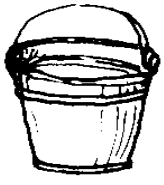
Mortar drum

Mortar spade - Mortar spade is used to stir the mortar paste, prepared in the barrel or drum and keeps the mix to right and uniform consistency.



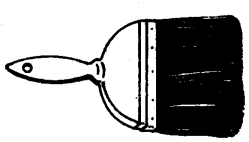
Bucket

A Bucket is used to serve small amount of water or material and to take the tools after work.



Bucket

Brush



Is used for wetting the building stones, cleaning fresh mortar joints of masonry wall, to clean hand tools before and after use and to clean dust on surfaces.

Equipment/Machinery

Concrete/ Mortar Mixer

Concrete mixers are available in from of different capacities. Small mixers can produce 250Lit. Of mortar or concrete and the big ones produces more and more, up to 6000Lit.; widely used, small mixers up to a capacity of 1000Lit. Mixers are driven with diesel, benzene engine or electrical power.

They can be distinguished into

Free-fall or gravity mixer consists from a rotating drum with metal blades inside

Compulsory mixer, here is the drum fixed and the blades al one are rotating

Figure 9 Mixer 250 lit

- **Advantages of Mixers: -** In case where a large quantity of mortar or concrete is to be produced, hand mix becomes costly even if the labour is cheap. Hence machine mixing becomes essential and the mix (mortar or Concrete) can be thus being produced at faster rate, at a lesser cost and of better quality.
- **Wheel barrow: -** Wheel barrow is used to dispose disposal materials from working place, to transport or serve materials and tools during construction activities in the site. In comparison to a barilla,(commonly used in the country).
- **https://www.youtube.com/watch?v=65jYtUMLl2E**
- **https://www.youtube.com/watch?v=MYp6fOn01HM**

fig10 wheel barrow

List of Reference Materials

1- .IdealConcreteBlock.com
2- Mar 3, 2011 hibler, Inc.
3- Shower pan construction, Morthland Glenn **A**

Self-Check 4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1_____ is used to picking up mortar out the barrel.(2 points)

A. hammer C float

B. plump bob D. wheel barrow

2 List out construction tools at least 4 with their use. (5 points)

---

3 Write the use of wheel barrow(3 points)

……

Note: Satisfactory rating – 5 above 7 points Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

INFORMATION S HEET 5	calculating material quantity requirement

5.1 Introductions to Estimating Required Materials

An estimate is probable cost of a building before construction. This estimate should not be far away from the actual cost of the building after completion of the project. it is done by mathematical calculation based on working trainings. First of all the quantity of the work is calculated based on standard unit of measurement for each work. This unit of measurement can be pieces (No), meter linear, meter square and meter cube.

HCB masonry a cost and time economical solution in construction.

1, Classes of Hollow Concrete Blocks

Load bearing HCB Class A and B

Non load bearing HCB Class C

a) HCB Standard Dimensions of Ethiopians 20 cm x 20 cm x 40 cm

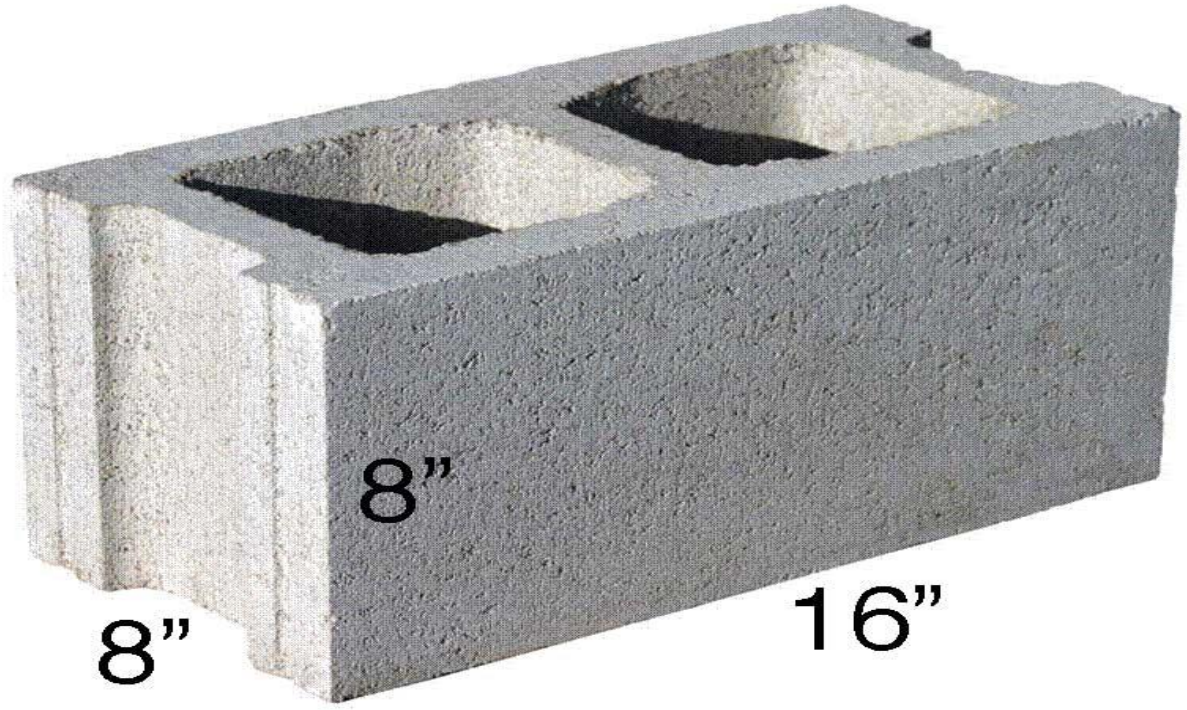
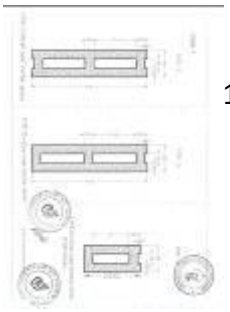


Figure 1 8*8*16inch

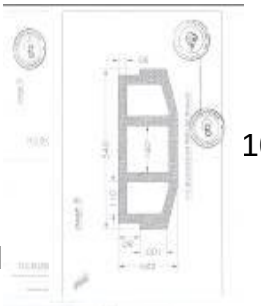
15 cm x 20 cm x 40 cm

10 cm x 20 cm x 40 cm b) At the following HCB will be used**:**



15cm*20*40 HCB for internal

20*20*40 HCB for external



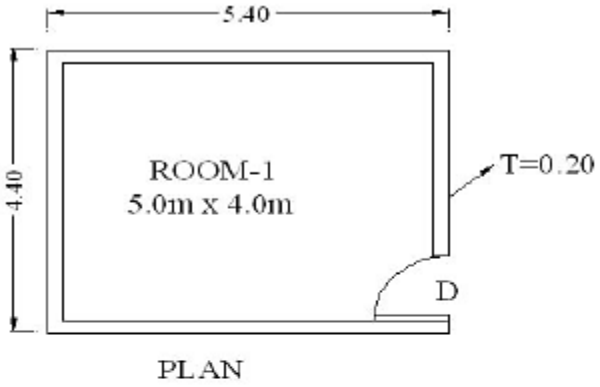
10 cm x 20 cm x 40 Ripped for slab

Calculation Activities

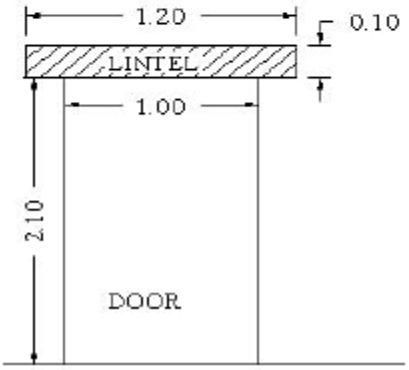
Q:- For a given plan find (i) No. of bricks (ii) C:M required for Brick work with ratio 1:5.

D = 1.0 X 2.10
Height of Ceiling = 3.0 m

Solution:



PLAN



Length of wall (L) = 5.40 x 2 + 4.0 x 2 = 18.80 m
L = 18.80 m
B = 0.20 m
D = 3.0 m

Volume of brickwork = Length x width x Thickness of wall

= 18.80 x 3.0 x 0.20

= 11.28 m^3

Deduction of Door = L x B x D = 1.0 x 2.10 x 0.20 = -0.42 m 3
Deduction of Door Lintel = L x B x D = 1.20 x 0.10 x 0.20 = -0.024 m 3
Since, Breadth of Lintel = thickness of wall = 0.20 m

Total Volume of brick work after deductions = 11.28 - 0.42 - 0.024 = 10.836 m3

Assuming:-

1. Brick size = 19cm x 19cm x 19cm
2. Thickness of mortar = 10 mm

Quantity of Bricks:-

No. of bricks = Volume of brickwork
volume of 1 brick with mortar

= 10.836/0.002

∴ No. of bricks = 5418 bricks

Volume of 1 Brick with mortar = 0.20×0.10×0.10=0.002 m^3

CM required for brickwork**:-**

Volume of total no. of bricks = (0.19×0.09×0.09) x 5418

= 0.001539 x 5418

= 8.3383 m^3

Quantity of mortar = Quantity of brickwork – Volume of bricks

Quantity of mortar = 10.836 – 8.3383

= 2.4977 m^3 ≅ 2.5 m^3

Mix Ratio –> 1:6

Dry volume of mortar = Wet volume x 1.33

∴Dry volume of mortar = 2.5 m^3x 1.33

= 3.325 m^3

Quantity of cement:-

Quantity of Cement = Dry Volume of mortar x Cement ratio
Sum of the ratio

∴Quantity of cement = (3.325 x 1) /(1+6)

= 0.475 m^3

Density of Cement = 1440 kg/m^3

∴ Weight of Cement = 1440 x 0.475

= 684 Kg

1 bag of cement contains 50 kg of cement

∴ Number of bags = 684 Kg / 50 kg

= **13.68 No's**

Quantity of Sand:-

Cement : Sand :: 1:6

Quantity of Sand = Quantity of Cement x 6

∴ Quantity of Sand = 0.475 m^3x 6

= 2.85 m^3

1 m^3=35.3147 Cubic Feet.

∴ Quantity of sand = 2.85 x 35.3147

= 100.647 CFT

Density of sand = 1650 kg/m^3

∴ Weight of the sand = 2.85 x 1650

= 4702.5 kg

=4.7025 tonnes

Number Of Concrete Blocks In A Wall:

There are several methods for calculating number of blocks in a wall. In this article, I will explain two simple methods to find out total no. of blocks for a wall.

1. Surface area method.
2. Volume method.

PROCEDURE:

1. Calculation By Surface Area Method:

REQUIRED DATA:

1. Surface area of the wall.

2. Surface area of a standard concrete block.

3. Surface area of openings in the wall.

Step 1:

Determine The Length & Height Of The Wall:

Let, the Length of the wall = 10 feet.

The height of the wall = 10 feet.

Step 2:

Calculate The Surface Area Of The Wall:

We know, Surface Area = Length x Height

∴ Surface area of the wall = 10 x 10 = 100 sq. feet.

Step 3:

Calculate The Surface Area Of Openings:

If the wall has any openings such as door, windows etc, calculate the surface area of openings.

Let the wall has a window of 3′ x 3′

∴ Surface area of the window = 3 x 3 =9 sq. ft

Step 4:

Subtract the Surface Area Of Openings From Surface Area Of Walls**:**

∴ Final Surface Area of wall = 100 – 9 = 91 sq.ft.

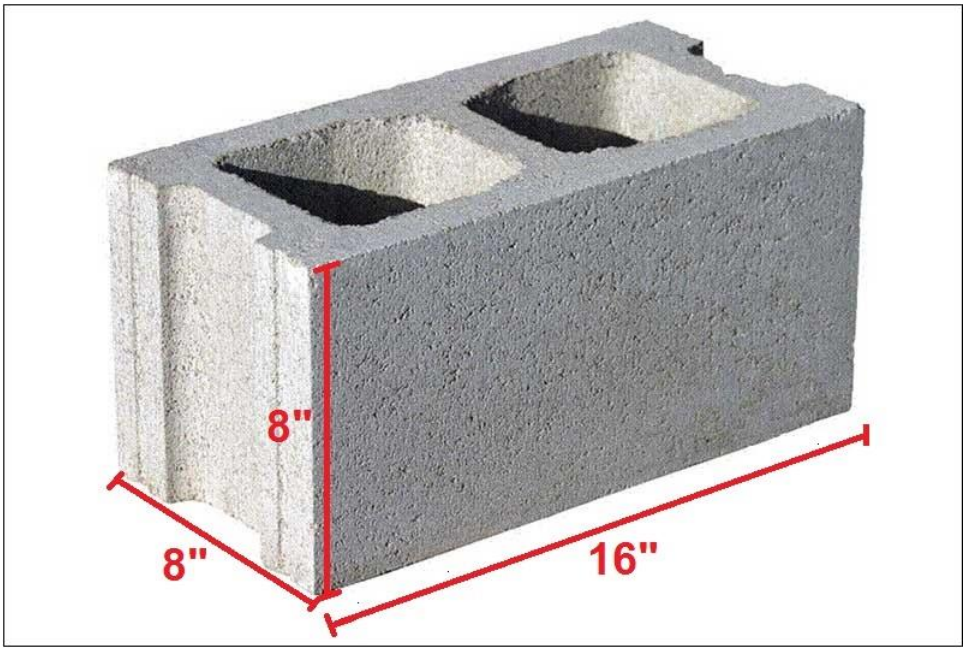
Step 5:

Calculate The Surface Area Of A Concrete Block With Mortar Allowance:

Let the block is 16″ x 8″ x 8″ and mortar allowance is 1″

∴ Surface Area of one block with mortar = (16+1) x (8+1)= 153 inch^2

= 153/12×12 = 1.0625 sq.ft



Step 6:

Divide The Total Surface Area Of The Wall By Surface Area Of One Block:

∴ Number of blocks = Surface Area of wall/Surface Area of a block = 91/1.0625 = 86

Consider 5% wastage of concrete blocks.

So the total numbers of blocks required = 86 + (86 x 5/100) = 86 + 4 = 90.

2. Calculation By Volume Method:

required data**:**

1. Volume of the wall.

2. Volume of a standard concrete block.

3. Volume of openings in the wall.

Step 1:

Determine The Width, Height, And Thickness Of The Wall:

Let, the width of the wall = 10 feet.

The height of the wall = 10 feet.

The thickness of the wall = 8″ = 0.67 feet. [Thickness of wall will be same as the thickness of one concrete block]

Step 2:

Calculate The Volume Of The Wall:

We know, Volume = Width x Height x Thickness

∴ Volume of the wall = 10 x 10 x 0.67 = 67 cubic feet.

Step 3:

Calculate The Volume Of Openings:

If the wall has any openings such as door, windows etc, calculate the volume of openings

Let the wall has a window of 3′ x 3′ x 0.67′ [Thickness of the window will be same as the thickness of the wall]

∴ Volume of the window = 3 x 3 x 0.67 =6 cu. ft

Step 4:

Subtract the Volume Of Openings From Volume Of Walls**:**

∴ Final volume of wall = 67 – 6 = 61 cu.ft.

Step 5:

Calculate The Volume Of A Concrete Block With Mortar Allowance**:**

Let the block is 16″ x 8″ x 8″ and mortar allowance is 1″

∴ Volume of one block with mortar = (16+1) x (8+1) x 8 = 1224 inch3 [The mortal will be given on the upper side and one side of every concrete block]

= 1224/12x12x12 = 0.70 cu.ft

Step 6:

Divide The Total Volume Of The Wall By Volume Of One Block:

∴ Number of blocks = Volume of wall/Volume of a block = 61/0.70 = 86

Consider 5% wastage of concrete blocks.

So the total numbers of blocks required = 86 + (86 x 5/100) = 86 + 4 = 90.

Note:

If the wall does not have any opening **skip step 4,** and just divide the surface area of wall by the surface area of one block.

How do I calculate cement, sand, & water for a 1m2 block work (1:4 ratio brick size 400x200x200mm)?

We usually calculate brick work in cubic meter as the width of wall is not a fixed one. In this case i assume width of one brick and mortar thickness 10 mm. The size of brick including mortar is 410x 210 x 210 mm.

The quantity for 1 sq.m is = 1x .210=.210 cu.m brick

Qty of brick for .210 cu m block work =.210/(.410x.210x.210)=11.61 nos

volume of 1 brick =.4x.2x.2=.016 cu.m

Volume of 11.61 brick=.186 cu.m

Therefore qty of mortar =.210-.186=.024 cu.m

for 1:4 mix

qty of cement =1.3x.024/5=.00624 cu.m

qty of sand =1.3x .024 x 4/5=.025 cu.m

Assume Water cement ratio of 0.4

Qty of water =0.4x .0074=.00249 cu.m

Quantity of material used for a Hollow block work (400X200X200)?

1. Qty of HOllow block is 10 to 12 numbers / Sqm
2. Cement sand ratio preferable is 1:4
3. For 1:4 CM the cement, sand calculation as follows

Volume of mortar = Horizontal joints 5 rows of 200 mm wide 20 mm thick = 5*.2*.02 = .02 cum

Volume of vertical joints : 5*2.5*.2*.2*.02 = .01 cum

Total = .03 + 30 % wastage = 0.039 Cum of Cement Mortar

For 1:4 ratio

Weight of cement in 1 Sqm = .039*1*(1/5)*1440 = 11.232 Kg /Sqm

Volume of Sand = .039*1*(4/5) = .0312 Cum = 1.11 Cubic foot

NOTE: But in actual it occurs more than the above calculated values because many unskilled people filling the hollow portions of the block. This is the wrong practice.
The Laying system is such that the hollow portion to be overlapped with filled portion hence the hollow portion to be maintained. This will give good heat reduction inside the building.how much quantity of blocks, cement and sand is required to complete 1sq.m of CC Hollow block work...

Answer

1 .Qty of Hollow block is 11 to 12 Nos/ sqm
2. For 9" wide wall Cement sand ratio is 1:6 & 4" wide wall Cement sand ratio is 1:4.

Volume of mortar/Sqm = (No of Blocks required for the size of without mortar thick -No of Blocks required for the size of block including mortar thick)x No of Blocks required for the actual size of block

For 9" wall

No of Blocks required for the size of without mortar thick=1/(0.40*.20*.20)=62.5
No of Blocks required for the size of block including mortar thick= 1/(0.41*.21*0.21)=53.31 No's

Volume of mortar/Cum= [62.5-55.31]x[0.4x0.2*0.2]
=0.115 Cum
Add wastage 30% extra

Volume of mortar/Cum= 0.115*30% =0.150Cum

Cement sand calculation/Cum of Block work:

Ratio 1:6

Cement =[1/7*1440]*.150 =31Kg
Sand =[(6/7)*.15]=0.129Cum =4.55Cft

Cement sand calculation/Sqm2 of Block work:

Ratio 1:6

Cement =[1/7*1440]*.15*.23 =7.13Kg
Sand =[(6/7)*.15*.23]=0.03Cum =1.05Cft

1 ,**https://www.youtube.com/watch?v=ZrSU9-r9qB8**

2 ,**https://www.youtube.com/watch?v=Gw_tHbFxsvU**

Self-Check 5	Written Test

Directions: Multiple choice

I , choice the correct answer form the given

_____1,what is C=5 of mix ratios ?

A, 1,3,6 B 1,2,4 C 1,3,4 D 1,4,8

----------2 .what is the percentages shrinkage and wastage ?s.(5p)

A 0.30 & 0.05 B 0.40 &0.10 C 0.30 & 0.10 D all

----------3 what is the density of cement mortar ?

A 2300kg/m3 B 1400kg/m3 C 1840kg/m3 D 1200kg/m3

Satisfactory rating above 7 unsatisfactory below 7

Answer sheet

1 ----------
2 ----------
3 ----------

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

INFORMATION S HEET 6	Identifying materials appropriate to the work application

,6.1 Identifying materials appropriate to the work application

There are several type tools used by a Mason. Hand tools, in general, ease the work and accelerates the process, improves quality of work significantly and they are very important for everybody who wants to do decent work so that keep tools in perfect order. In addition tools and equipment also represents highly valued assets. For this reasons
it is crucial necessary to handle tools and equipment with extra care. That means cleaning after use, storing neatly, slightly greasing if necessary and regular maintenance.

E.g.1 sprit level requires always to be handled with care and needs to be checked from time to time weather it is still working accurate or not.

. 2 measuring tape when long horizontal measurements are needed, care should be taken to avoid sag on the tape meters.

Storing Material

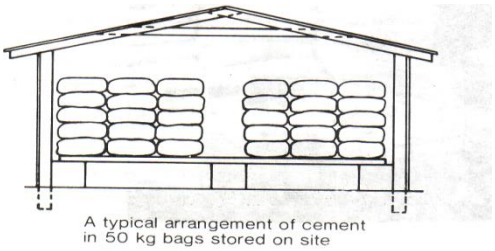
Proper way of storing material should be considered in schoolwork shops and training area and this has to be adopted in the real work of construction sites. It is use full to keep materials in a proper manner, to preserve materials long lasting, to secure chemical character of the material, for easy access and handling etc. In general proper way of storing material saves time and money. Accordingly methods of storing for some materials and hand tools are described and illustrated below.

Storing materials and tools depend up on the type, size, and product character, etc.

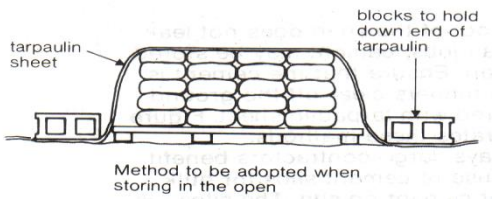
Storing of Binding Material /Cement and Lime/

In general cement and lime should be stored in a way that it does not come in contact with moisture. As soon as it gets moisture, setting starts, which render it, unfit for future use. In order to avoid this cement and lime should:

- Be stored in storage sheds with raised damp proof floors.
- Be stored about 60cms away from external walls.
- Be stacked up to reasonable height for ease of handling and for avoiding cooling (not more than 10 bags be stocked over one another)
- Not be stored in rainy season and long periods of storing should be avoided.
- Be stored in *silos or bins*, if stored in bulk form.
- Be used on first in first out basis



A typical arrangement of cement in 50 kg bags stored on site



Method to be adopted when storing in the open

Storing of bricks, HCB and aggregates

- Bricks and stones should be piled near where they are needed
- They should be handle carefully to minimize breakage
- They should be piled on edges and a layer crossing over the previous
- The piles should be stable.
- Aggregates /Sand and gravels/ should be stored in bunkers to protect from surrounding impurities.

Fig 6.1 Improper way of storing bricks!

Fig 6.2 Properly stored bricks

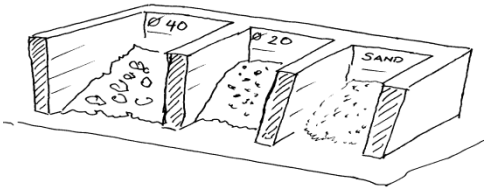


Fig 6,3 Storing sand and gravel in

Applying necessary requirements

- Use double scaffolding always and ensure the scaffolding is adequately braced with the permanent structure, for working in heights.
- Ensure the workers use safety appliances like safety belts in height, helmets, safety goggles while carrying out chipping etc while carrying out plastering and pointing in heights.
- Ensure the working area is kept clean for easy access and protect edges of opening by barricading etc while working.
- Ensure the area of working is well lighted (provided with lights) so that work area is easily accessed and moved around safely by workers.
- Inspect the scaffolding before starting work.
- Access platform/working platform double hand railing to be provided.
- Proper illumination to be provided during the work, if required.
- Educate the workmen through pep-talk meeting

List of link

1,**https://www.youtube.com/watch?v=ZrSU9-r9qB8**
2,**https://www.youtube.com/watch?v=4jCxBcgLGPU**
3. **https://www.youtube.com/watch?v=Gw_tHbFxsvU**

Self-Check- 6	Written Test

Instructions: multiple choice Questions

Directions: choice the correct answer from the given alternatives on space provided

----------1, Binding materials includes ----------?

A cement B lime C gypsum D A & B

----------2 Storing materials needs for ----------

A HCB B Bricks C aggregates D all

Answer Sheet

Name: _____ Date: _____

Short Answer Questions

INFORMATION S HEET 7	Identifying Environmental protection requirements

7 .1 Identifying Environmental protection requirements

A round half of all non-renewable resources mankind consumes are used in construction, making it one of the least sustainable industries in the world. However, mankind has spent the majority of its existence trying to manipulate the natural environment to better suit its needs so today our daily lives are carried out in and on constructions of one sort or another: we live in houses, we travel on roads, and we work and socialize in buildings of all kinds. Contemporary human civilization depends on buildings and what they contain for its continued existence, and yet our planet cannot support the current level of resource consumption associated with them.

Energy Use, Global Warming and Climate Change

. Rather than constantly battling against the natural environment, we need to start respecting natural systems and learning from ecological processes: creating a better balance between human need and the wider environment.

Responsibilities in Construction before, during, and after completing the work in protecting vegetation

BEFORE WORK

- Walk the job prior to starting any construction activities to ensure that you understand the limits of the job and to identify the location of any areas of vegetation to be protected.
- Ensure that vehicles and equipment are free from soil, weeds and seeds before coming on site.
- Take note if your site is subject to plant disease control measures.
- Check for areas, which may have been marked by bunting to protect vegetation.
- Check with your supervisor if you are unsure about anything

DURING WORK

- Minimize vegetation disturbance and protect all vegetation not identified for removal.
- Avoid the use of machinery or vehicles outside the construction zone. Use designated parking areas and plant compounds.
- Locate stockpiles and their access in cleared areas, away from drainage lines or good vegetation.
- Maintain bunting around protected areas.
- Store weed infested materials separately from clean materials.
- Clear or spray weeds before stockpiling topsoil.
- Check fill and construction materials for weeds and seeds before use.

- Re vegetate or mulch disturbed areas, particularly batter slopes, at the earliest opportunity.
- Do not flush spray bars near vegetation or under the tree canopy.
- Do not stockpile material on vegetation, under tree canopies or against trunks.
- Do not burn vegetation pruning or removals unless there are no other options and keep fires clear of other vegetation.

- **AFTER WORKING COMPLETION**

- Wash or brush down equipment and vehicles to remove soil and plant matter before leaving the site as this can carry weeds and soil diseases.
- Dispose of weeds and empty weed spray containers at a licensed waste depot.

List of reference

1 **https://www.youtube.com/watch?v=ZrSU9-r9qB8**

2, **https://www.youtube.com/watch?v=4jCxBcgLGPU**

3, **https://www.youtube.com/watch?v=Gw_tHbFxsvU**

Self-Check 7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page

I ANSWER THE FOLLOWING QUESTION WITH WHAT ARE YOU ASKED (10point)

1.**list out main purpose environmental protection .(5p)**

2.what is the responsibility of construction (5p)

……

Satisfactory rating above 5 unsatisfactory below 5

Name: _____

Date: _____

Short Answer Questions

Score = _____

Rating: _____

Operation Sheet 1	*selecting tools and equipments*

Techniques for selecting tools and equipment's

Step 1- wear PPE.
Step 2- Identifies tools and equipment's depends on their type.
Steps 3- set in order by placing the tools and equipment's in proper places.
Step 4- clean each tools and equipment.

Operation Sheet 2	**Identify materials appropriate to work application**

Techniques Identify materials appropriate to work application

Step 1- select material of appropriate .

Step 2- Applying necessary requirements

Steps 3- break down these bricks until it become 10mm of crushed stone.

Step 4- fill and compact the crushed brick aggregates for stabilizing cracks .

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4 hour.

Task 1. Clean the tools and equipment's

Task 2. Recycle broken bricks for 10mm size of

ANSWER KEY OF SELF CHECK LEARNING OUT COME (LO1)

Unit competence name	**Carry out different types block work**	**MO**
Learning out come	**Prepare for work**	**LO1**
	Choice	**Matching**
Self- check 1	**1 D ,2 A 3 E**	
Self -check 2	**1 D , 2 D 3 D**	
Self- check 3	**1 D 2, D**	
Self -check 4	**1 C D 2 D**	
Self-check 5	**1 A , 2 A , 3 B**	
Self-check 6	**1 D 2 D**	

Information list and names of provider

No	Name of trainer	Qualification	Region	E-mail
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3	Habtamu Abayneh	BSC in Building Construction Technology	SNNPRS	Habtishzeget05@gmail.com
4	Mihiretab Gashaw	BSC in Building Construction Technology	Addis Ababa	mihiretabgashaw@gmail.com
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