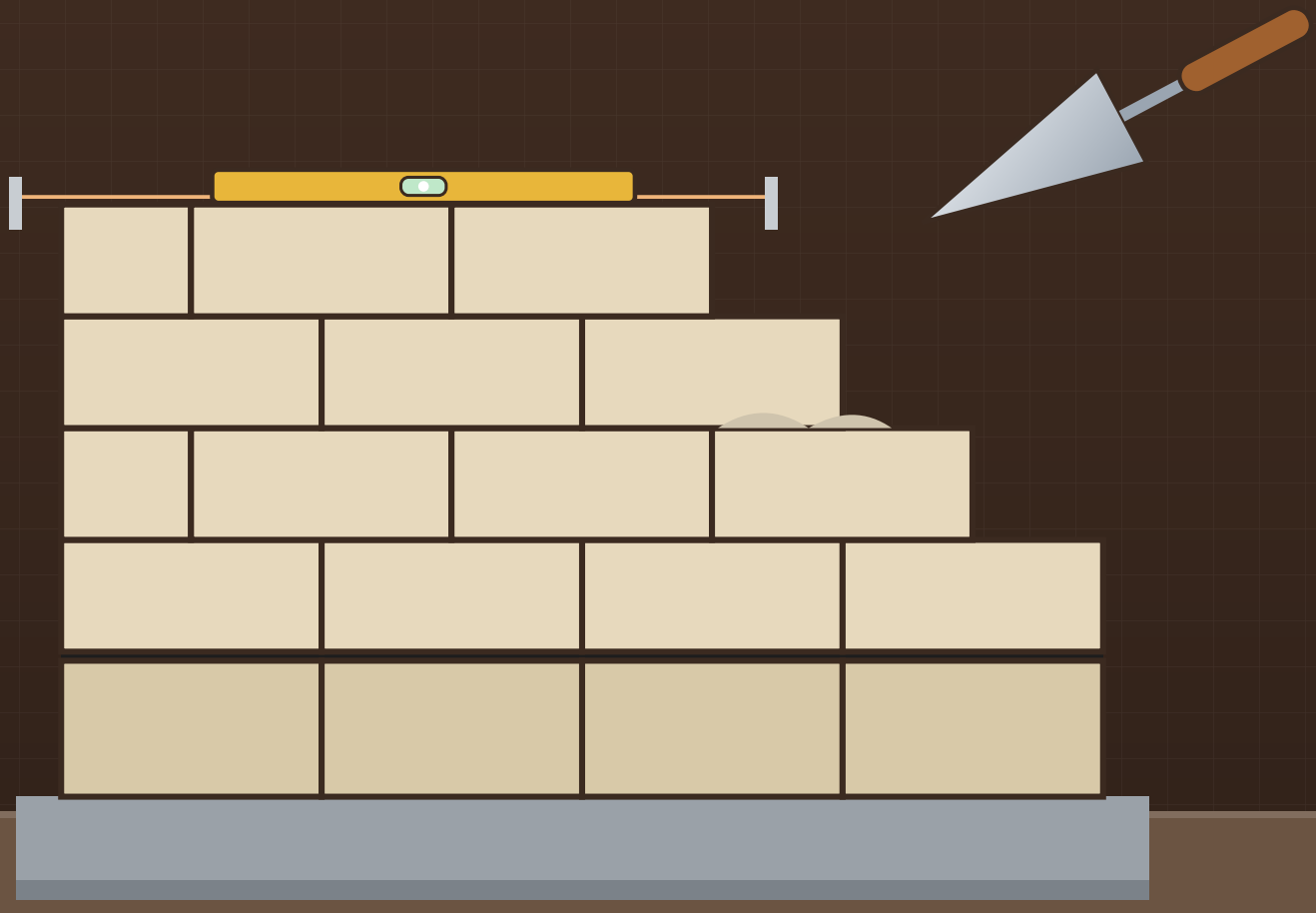
KNQF LEVEL 3 · TVET CDACC CYCLE 3

Masonry Level 3

A Practical Study Guide for Kenyan Trainees

Masonry works · Finishes · Masonry units production



Green Skills Edition

Low-carbon materials · less water and waste · safe sites

Alphonce Kimutai Kirui

Aligned to the TVET CDACC Competency-Based Modular Curriculum, Masonry KNQF Level 3

Masonry Level 3

A Practical Study Guide for Kenyan Trainees

Masonry Works · Masonry Works Finishes · Masonry Units Production
Kenya National Qualifications Framework (KNQF) Level 3 · Green Skills Edition

Alphonce Kimutai Kirui

Masonry Level 3: A Practical Study Guide for Kenyan Trainees
First edition, October 2026

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Published by the author. Website: alphoncekirui.com

About the curriculum

This book is an independent study guide. It follows the topics and units of the TVET CDACC Competency-Based Modular Curriculum and Occupational Standard for Masonry, KNQF Level 3 (Cycle 3, greened version, unit codes CON/CU/BLD/CR/01–03/3/MB). Unit titles and codes are used for reference only. The book is not published, endorsed or approved by TVET CDACC, TVETA or the Ministry of Education. Always follow the current official curriculum and your trainer's guidance.

Safety and accuracy notice

Building work can cause serious injury and costly structural failure. Trenches can collapse, scaffolds can fall, and wet cement burns skin. The methods in this book are for training under the supervision of a qualified trainer. Figures given as "typical" (mix ratios, cover to reinforcement, lap lengths, slab and wall thicknesses, curing and striking times, and prices) are general guidance only. Always follow the approved drawings, the engineer's specification, the manufacturer's instructions, county building requirements and relevant Kenyan standards. Structural decisions belong to a qualified engineer. Prices are approximate (2026) and will vary.

Names of people, schools and places used in examples are made up for teaching.

Illustrations

All drawings and diagrams in this book were drawn for it. They are teaching drawings and are not to scale unless a scale is shown.

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How to use this book

This book follows the Masonry Level 3 course from start to finish. It covers the three core units and the industry training, in the same order as your training. You can read it cover to cover, or study one unit at a time if you are taking a part qualification.

The course at a glance

Part	What it covers	Training time
1. Getting started	The trade, the course, assessment, safety and green building	Used throughout
2. Masonry works	Unit 1: Masonry Works (CON/CU/BLD/CR/01/3/MB)	130 hours
3. Masonry works finishes	Unit 2: Masonry Works Finishes I (CON/CU/BLD/CR/02/3/MB)	90 hours
4. Masonry units production	Unit 3: Masonry Units Production (CON/CU/BLD/CR/03/3/MB)	100 hours
5. Industry training and assessment	Industry training and getting ready to be assessed	240 hours

What is in each chapter

- **What you will learn:** the chapter's goals, with the unit, learning outcome and training hours it belongs to.
- **Key words:** the trade words you need, explained simply. More are in the Glossary at the back.
- **Explanations and drawings:** each topic explained step by step, with labelled diagrams.
- **Practical tasks:** workshop jobs with the tools, materials, steps and safety points. Do them with your trainer.
- **Check your competence:** a checklist of what an assessor will expect you to show. Tick each item when you can do it without help.
- **Practice questions:** answers are at the back of the book.

Look out for these boxes

SAFETY FIRST

Hazards and how to stay safe. Never skip these.

GREEN TIP

Ways to save cement, water, energy and materials, and to handle waste correctly. Green skills are part of your assessment.

TRAINER'S TIP

Advice from experienced trainers to help you work faster and better.

COMMON MISTAKES

Errors trainees often make, and how to avoid them.

ON SITE IN KENYA

How the topic looks on real jobs on Kenyan plots and sites.

Colours in the drawings

The drawings use the same colours all through the book, so you can pick out each material at a glance. Real building drawings are often printed in black only, so also learn the hatching patterns in the Building drawing symbols chart at the back.

Stone and concrete blocks		Clay bricks	
Concrete		Mortar, plaster, render and screed	
Earth (soil)		Hardcore	
Reinforcement steel (thick dark-red lines, or dots in section)		DPC and DPM (thick black line)	
Water		Green (eco-friendly) items	
Dimension lines and arrows			

PART 1

Getting Started

What a Level 3 mason does, how you will be trained and assessed, and the safety and green building habits you will use on every site.

Chapter 1: Becoming a Mason in Kenya
Chapter 2: Safety and Green Building Basics

CHAPTER 1

Becoming a Mason in Kenya

WHAT YOU WILL LEARN

- Describe the work a Level 3 mason does and who employs masons in Kenya.
- Plan your growth from Level 3 to higher levels and into related trades.
- Explain the words of competency-based training: unit, element, performance criteria, part qualification and RPL.
- Read your course map and know the hours for every unit and learning outcome.
- Calculate a unit score and decide whether a candidate is competent and at what rating.
- Explain what green buildings are and how a mason helps to build them.

Introduction to the qualification · Masonry KNQF Level 3 (Cycle 3, greened) · 3 core units + industry training · 560 hours · 56 credits

Almost every permanent building in Kenya starts with a mason. Masons dig and cast the foundations, raise the stone walls, lay the floor slab, plaster the rooms and even make the blocks. You will find them on a bungalow in Kapsabet, a rental block in Ruiru, a county dispensary in Sotik and a block yard in Mlolongo. This chapter shows you what the job involves, how your course is organised, how you will be judged competent and how to behave like a professional from day one.

Key words

Mason
A tradesperson who builds with stone, blocks, bricks and concrete, and applies plaster, render and screed.

Fundi
Kiswahili for a skilled worker. On site it means a tradesperson, as opposed to a helper (mtu wa mkono).

CBET
Competency-Based Education and Training. You are trained and judged on what you can actually do.

Unit of competency
One complete area of work, such as performing masonry works.

Element
A main task inside a unit, for example setting out a building.

Performance criteria
Statements that say how well each task must be done before you are judged competent.

Learning outcome (LO)
What you must be able to do at the end of one block of training.

Formative assessment
Assessment during training that checks your progress.

Summative assessment
The final assessment at the end of a unit.

Portfolio of evidence (PoE)
Your file of signed task sheets, sketches, photos and reports that proves your skills.

RPL
Recognition of Prior Learning: being assessed and certified for skills you already have.

Green building
A building designed and built to use less energy, water and materials and to be healthy for its users.

1.1 What a Level 3 mason does

A Level 3 mason builds the solid parts of a building by following a drawing and the instructions of a supervisor. You will not design the building, but you must read the drawing correctly, measure accurately and build to the right line, level and plumb. Good masonry lasts for generations. Bad masonry cracks, leaks and sometimes falls.

Your qualification has three core units. Each unit matches a big part of the job. Table 1.1 shows the main tasks and the chapters where you will learn them.

Table 1.1 Main work of a Level 3 mason

Area of work	Typical tasks on a Kenyan site	Unit	Chapters
Masonry works	Read drawings, set out with profiles, cast strip footings, build foundation walls in machine-cut stone, lay hardcore and the ground slab, cast columns and lintels, raise walls above DPC	Unit 1	3–9
Masonry finishes	Plaster internal walls, lay floor screed, render outside walls, rake out and point stone and brick joints	Unit 2	10–12
Masonry units production	Make burnt clay bricks, concrete blocks and paving blocks, press stabilised soil blocks, dress stone by hand	Unit 3	13–15

1.1.1 Who employs masons

Masons are needed wherever people build. The main employers and markets are:

- **Building contractors** registered with the National Construction Authority (NCA). They build houses, flats, schools, churches and shops.
- **Private clients and landlords** who build in stages as money comes in. Many of them hire a fundi directly.
- **County and national government projects**: classrooms, dispensaries, markets, ECDE centres and water works.
- **Block, brick and paving yards** that need skilled people to batch, mould, cure and test products.
- **Maintenance teams** in estates, hospitals, hotels and institutions that repair walls, floors and plaster.
- **Self-employment.** Many masons start their own small business: walling on contract, a small block yard, or a soil-block press for rural homes.

> **ON SITE IN KENYA**
>
> On most domestic sites the team is small: a lead fundi, two or three masons and several helpers. The helpers carry stones, mix mortar and bring water. As a trained Level 3 mason you should quickly become the person trusted with the line, the level and the corners. That trust is what moves you from helper wages to fundi wages.

1.2 Your career path

Level 3 is a starting point, not a ceiling. The Kenya National Qualifications Framework (KNQF) arranges awards in levels. Each level adds skill and responsibility. Figure 1.1 shows a common route upwards and some side moves.

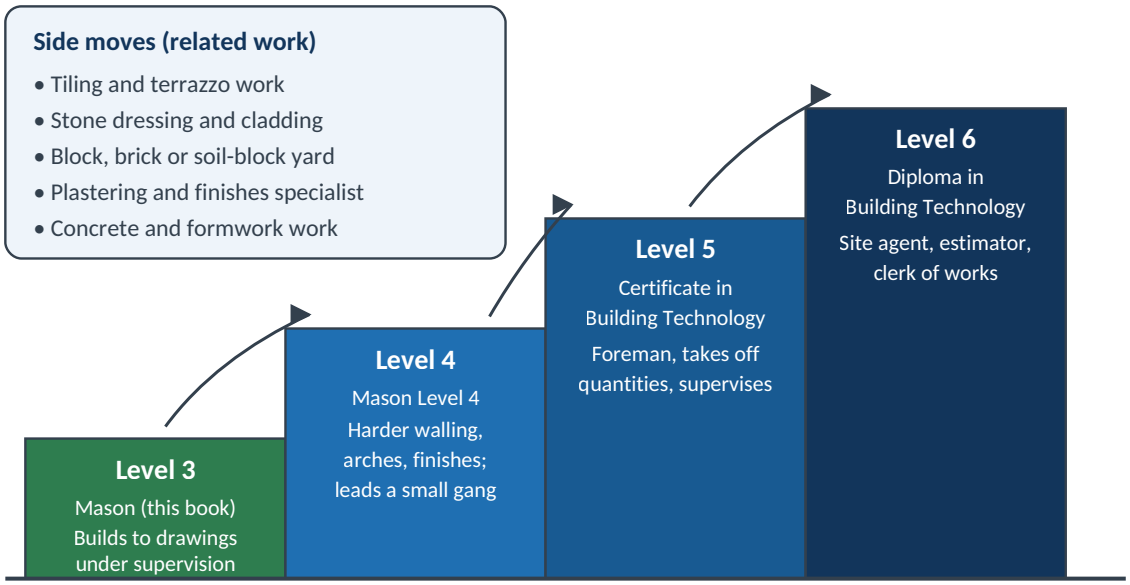


Figure 1.1 A typical career ladder for a mason, with related work you can move into. Award names depend on the curricula in force.

The exact names of higher awards change from time to time, so confirm them with your trainer or institution. The idea stays the same. A Level 3 mason builds what the drawing shows. A Level 5 or 6 graduate may estimate the materials, set out the whole building, supervise several gangs and check the work against the drawings.

Side moves also pay. A mason who can tile, dress stone neatly or run a block yard earns more and has work all year. Contractors also look for masons who can work green: people who save cement, cure with less water and cut waste. The NCA keeps a register of accredited construction workers. Once you qualify, ask about the current registration requirements.

1.3 How competency-based training works

Your course follows CBET. In the old exam system you could pass by memorising notes. In CBET you must *show* that you can do the work to the required standard, and explain why you do it that way.

1.3.1 Two documents behind your course

The **occupational standard** was written with people from the building industry. It describes what a competent mason does at work. It breaks each unit into elements, and each element into performance criteria. The **curriculum** turns that standard into training. It lists learning outcomes, content, hours, tools and suggested assessment methods. Your trainer plans lessons from the curriculum. Your assessor judges you against the performance criteria.

Here is how the parts fit, using one example in plain words:

- **Unit:** Perform masonry works.
- **Element:** Set out the building.
- **A performance criterion, in plain words:** the corners are checked for square and the measurements match the drawing.

- **Evidence:** your trainer watches you check the diagonals with a tape and signs your task sheet.

1.3.2 Part qualifications and certificates

You do not have to finish the whole course before you receive anything. Each core unit is a separate block of competence. This means you can enter, leave and return to training, and still be recognised for what you have achieved. Table 1.2 shows the awards. All of them are issued by TVET CDACC.

Table 1.2 Awards you can earn

Award	What you must show	Example
Statement of Attainment	Competence in one certifiable element inside a unit	You are found competent in laying the ground floor slab
Certificate of Competency	Competence in one full core unit	You complete all of Masonry Works Finishes I
Kenya National TVET Certificate in Masonry Level 3	Competence in all units of the qualification	You complete all three core units and industry training

1.3.3 Recognition of Prior Learning

Many good masons in Kenya learned on the job and never went to college. RPL lets such a person be assessed against the same standard and receive part or all of the qualification. The candidate shows evidence from past work and does practical tasks and oral questions. If you already work as a fundi, ask your institution about RPL. If you have friends on site without papers, tell them about it.

1.4 Your course map

The course has three core units and a period of industry training. Hours are converted to credits at ten hours per credit. The core units total 320 hours. Industry training adds 240 hours. The full course is 560 hours, or 56 credits. Figure 1.2 shows how the hours are shared between learning outcomes, and which chapter of this book covers each one.

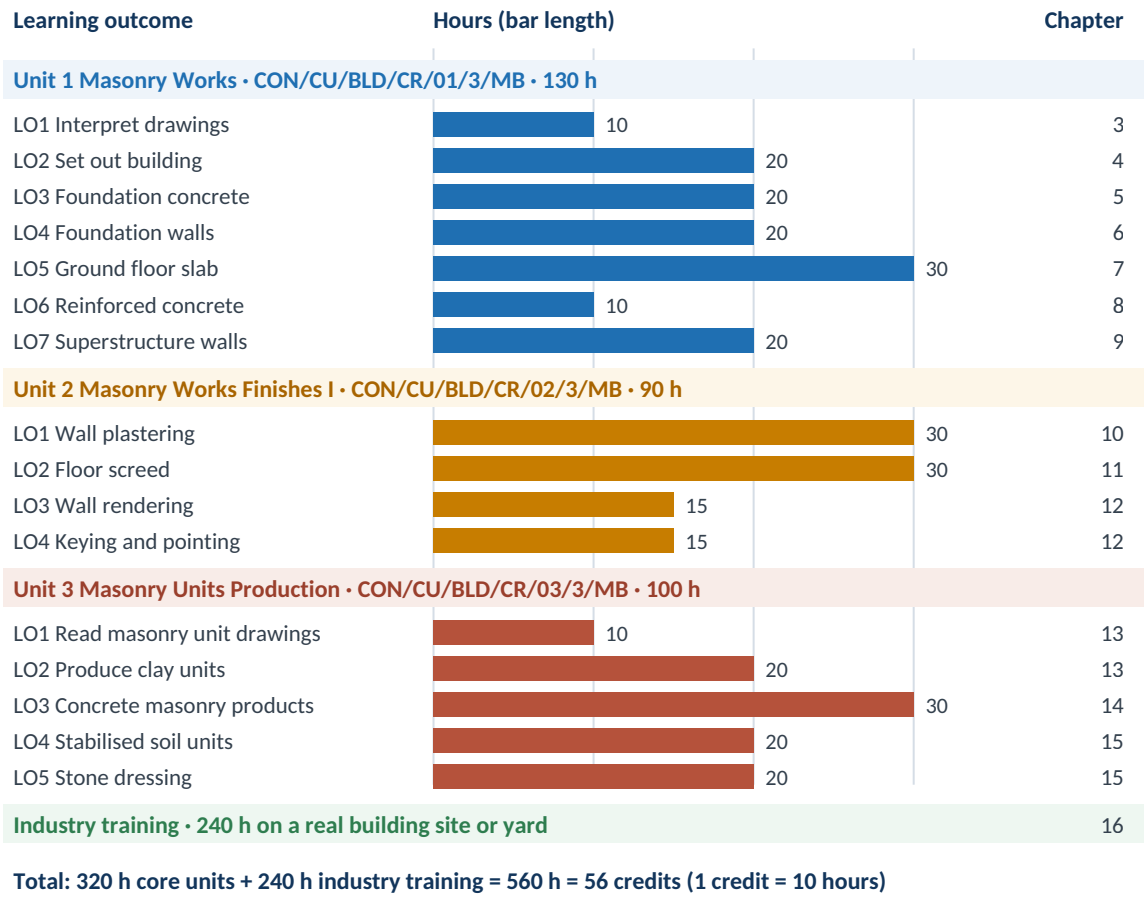


Figure 1.2 Course map. Bar length shows the hours for each learning outcome (LO); the right-hand column gives the chapter of this book that covers it.

Look at where the hours go. The ground floor slab, plastering and floor screed each get 30 hours, because they need a lot of hands-on practice to get right. Learn to use the map. When you start a new learning outcome, turn to its chapter and read ahead.

Industry training is your time on a real site or in a real yard. It may come after all the units, or be shared out between units if you are studying for a part qualification. Your institution will tell you the exact arrangement, because placement rules can change. Chapter 16 explains how to get the most from it.

1.5 How you will be assessed

Every unit is assessed twice. **Formative assessment** happens during training: practical tasks, oral questions, short tests and projects. It covers all the performance criteria. **Summative assessment** comes at the end of the unit and focuses on the most important (critical) parts of the work. Figure 1.3 shows how the marks are combined.

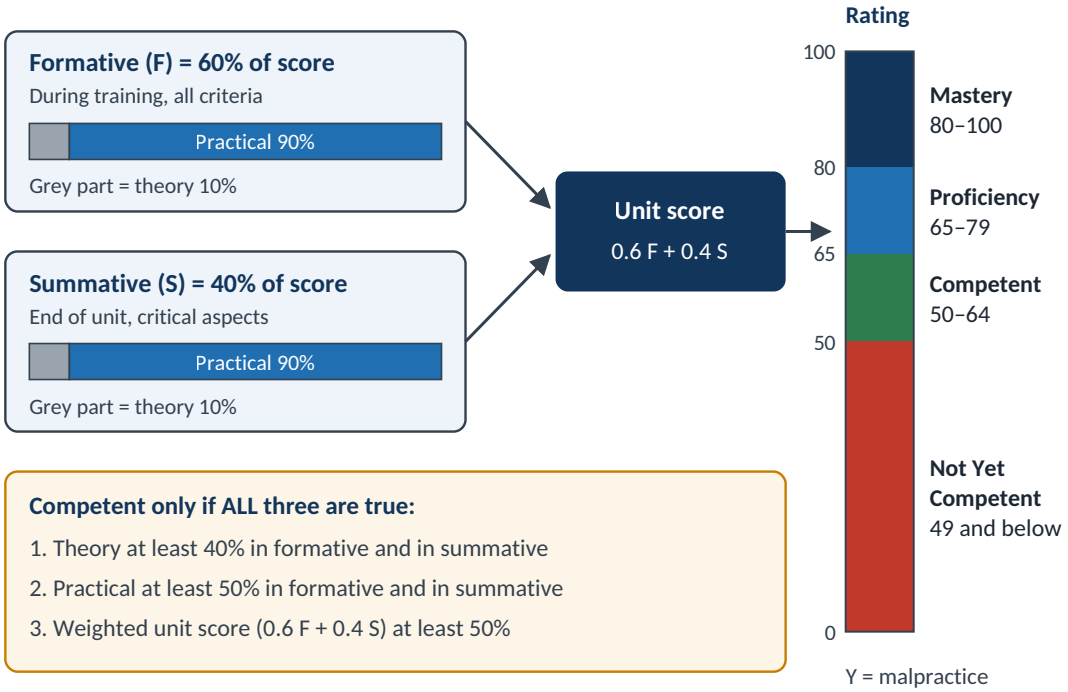


Figure 1.3 How a unit is scored: formative and summative weights, the theory and practical split, the three conditions for competence and the rating scale.

For the three masonry units, theory carries only 10% and practical carries 90%. That tells you something important. Your hands decide most of your mark. But do not ignore theory. You still need at least 40% in it, and a theory mark below that makes you Not Yet Competent even with a strong practical.

1.5.1 Worked example: working out a unit score

Wanjiru is assessed in Masonry Works. Her marks are:

- Formative: practical 78%, theory 60%
- Summative: practical 70%, theory 50%

Step 1. Formative score. (78 × 0.9) + (60 × 0.1) = 70.2 + 6.0 = 76.2

Step 2. Summative score. (70 × 0.9) + (50 × 0.1) = 63.0 + 5.0 = 68.0

Step 3. Unit score. (76.2 × 0.6) + (68.0 × 0.4) = 45.72 + 27.2 = 72.92, about 73

Step 4. Check the conditions. Theory is 60 and 50, both at least 40. Practical is 78 and 70, both at least 50. The unit score of 73 is above 50. She is competent, with a rating of **Proficiency** (65–79).

COMMON MISTAKES

- Thinking a high total is enough. All three conditions must be met.
- Skipping theory because it is "only 10%". A theory mark below 40% fails the unit.
- Leaving the portfolio until the end. Missing signed task sheets can delay your results.
- Copying another trainee's sketch or report. Malpractice is recorded as "Y" and can cancel the result.

1.5.2 Your portfolio of evidence

Your portfolio is the record that you did the work. Keep it neat from week one. Good evidence includes:

- signed practical task sheets and observation checklists;
- measured sketches: setting-out plans, foundation sections, bond patterns, joint profiles;
- your material estimates (blocks, cement bags, sand, ballast);
- dated photos of your work, taken with permission;
- notes of green practice, such as water or cement saved and waste sorted;
- your industry training logbook and reports from your supervisor (third-party reports).

1.6 Green buildings and the green mason

Your curriculum is a "greened" curriculum. Every unit expects you to protect people and the environment while you work. Cement production gives off a lot of carbon dioxide, quarrying scars the land, and sites waste water and materials. A mason controls many of these things with daily habits.

A **green building** uses less energy, water and materials over its life and is healthy to live in. Several rating systems judge how green a building is. **EDGE** (Excellence in Design for Greater Efficiencies) is used for many Kenyan housing projects. It asks for clear savings in energy, water and the energy locked in materials, compared with an ordinary local building. **LEED** (from the United States), **BREEAM** (from the United Kingdom) and **Green Star SA** (from South Africa) give points across areas such as energy, water, materials, waste, site and indoor health. All of them reward the same things a careful mason can deliver: less cement and water wasted, local and recycled materials, well-sealed walls, sorted waste and a clean, safe site.

Green building is not only about the planet. It also saves money. A building that uses less energy and water costs less to run every month. Looking at the whole life of the building in this way is called **life-cycle cost**. A slightly higher cost to build can pay back many times over the years.

> **GREEN TIP**
>
> Green habits you will practise in this course: mix only what you can use in about an hour; use blended cement (CEM II) where the specification allows; cure under polythene or wet hessian instead of hosing all day; reuse formwork timber; use crushed concrete or broken blocks as hardcore where allowed; make interlocking stabilised soil blocks that need less cement and mortar; and sort waste so that metal, timber and plastics can be reused or recycled.

1.7 Professional conduct

Clients choose masons they can trust. Skill brings the first job. Behaviour brings the next ten. Good conduct on site means:

- **Time.** Arrive on time and give a full day's work.
- **Honesty.** Never inflate material lists or take materials home. Return extra cement and steel to the store.
- **Quality.** Build to the drawing. If something looks wrong, ask the supervisor before you build, not after.
- **Safety.** Wear your PPE and look out for others, including the public and children near the site.

- **Respect.** Treat helpers, women and men on site, neighbours and clients with courtesy. No harassment, drunkenness or abusive language.
- **Communication.** Explain problems simply to the client, report progress and keep simple records.

1.7.1 A day on a walling site

Figure 1.4 shows a typical day for a mason raising walls on a bungalow. Notice that the day starts and ends with tasks that are not walling: checking, mixing, curing, cleaning and recording. These tasks protect quality and are part of the job.

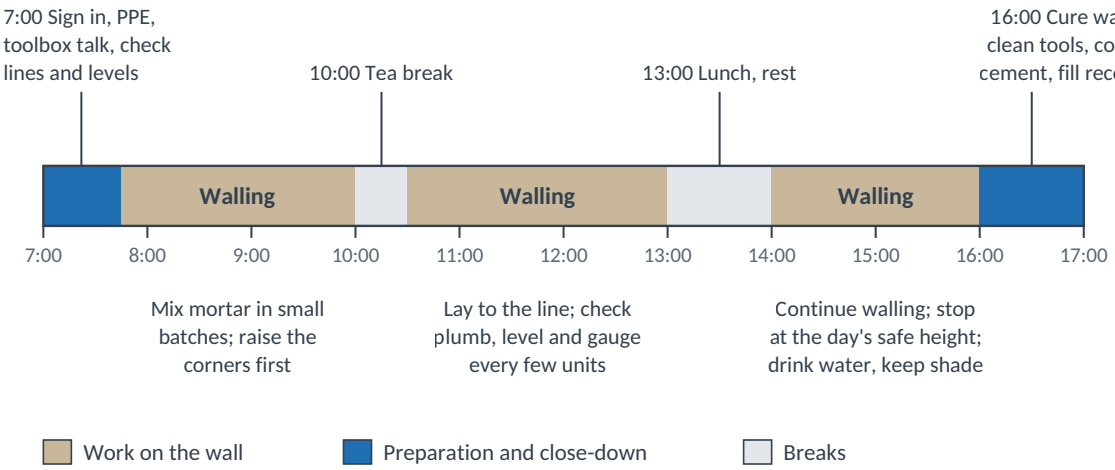


Figure 1.4 A typical day for a mason raising walls on a bungalow. Preparation and close-down are part of quality work, not wasted time.

> **SAFETY FIRST**
>
> Never start work without the right PPE: helmet, safety boots, gloves, and goggles when cutting or chipping. Chapter 2 covers safety in detail. Read it before your first practical session.

1.8 Study habits that work

Masonry is learned with the hands, but the head must lead. These habits will help you pass and become a better mason:

- **Read before you build.** Read the chapter before each practical. You will understand the demonstration better.
- **Sketch everything.** Draw each section, bond and joint profile in your notebook with dimensions. Sketching fixes the idea in your memory.
- **Practise the numbers.** Work every calculation in this book yourself: blocks per square metre, concrete volume, bags of cement. Contractors value a mason who can estimate.
- **Ask "why".** Why is the DPC above ground level? Why are joints staggered? If you know the reason, you will not forget the rule.
- **Learn from site.** Visit sites near your home. Watch, ask politely and note good and bad practice.

- **Revise in short daily sessions.** Twenty minutes each evening beats a whole night before the test.

> **TRAINER'S TIP**
>
> Keep a small "site notebook" in your pocket. Write down every new word, measurement and mix you hear on site, with the date. After a month you will have your own reference book, and it will make your portfolio and industry training reports much easier to write.

Practical task 1.1: Site observation visit

Tools and equipment

- Notebook and pencil
- 5 m steel tape
- Phone camera (with permission)
- Helmet, safety boots, reflective vest

Materials

- Observation sheet from your trainer
- Permission letter from your institution
- Clipboard

Steps

1. With your trainer, visit a building site where masonry work is going on. Report to the site supervisor first and follow the site rules.
2. Note the stage of the work (foundation, walling, slab, plastering) and the people on site and their roles.
3. List the main tools, equipment and materials you see, with the type of walling unit and its size.
4. Measure and sketch one item, for example a wall thickness and joint size, or a foundation trench width. Label the dimensions in millimetres.
5. Record two good safety practices, one hazard and how it could be controlled.
6. Record one green practice you see, or one chance to save materials, water or energy that was missed.
7. Thank the supervisor. Write a one-page report and file it in your portfolio after your trainer signs it.

Safety

- Wear PPE at all times and stay with your group.
- Keep away from trench edges, scaffolds, mixers and loads being lifted.
- Take photos only with permission, and never photograph people without their consent.

Chapter summary

- A Level 3 mason builds foundations, walls and slabs, applies finishes and makes masonry units, working to drawings under supervision.
- Masons work for contractors, private clients, government projects, block yards and maintenance teams, or for themselves.
- The course has three core units (130 h, 90 h and 100 h) plus 240 h of industry training: 560 hours, 56 credits.
- In CBET you are judged against performance criteria. You can earn a Statement of Attainment, a Certificate of Competency per unit, and the full national certificate. RPL recognises skills gained at work.
- Unit score = 0.6 × formative + 0.4 × summative, with theory and practical weighted 10:90. You need at least 40% theory, 50% practical and 50% overall.
- Ratings: Mastery 80–100, Proficiency 65–79, Competent 50–64, Not Yet Competent 49 and below.
- Green building systems such as EDGE, LEED, BREEAM and Green Star SA reward savings in energy, water and materials, which a careful mason helps to deliver.
- Time keeping, honesty, quality, safety, respect and clear communication build a mason's reputation.

Check your competence

- [ ] I can describe the main tasks in each of the three core units.
- [ ] I can name at least five types of employer or market for masons in Kenya.
- [ ] I can explain the difference between a unit, an element and a performance criterion.
- [ ] I can name the three awards issued by TVET CDACC and what each requires.
- [ ] I can use the course map to find the hours and chapter for any learning outcome.
- [ ] I can calculate a unit score and decide whether the candidate is competent and at which rating.
- [ ] I can explain in simple words what a green building is and name two rating systems.
- [ ] I can list the main rules of professional conduct on a building site.

Practice questions

1. List four kinds of employer or market where a Level 3 mason can find work in Kenya.
2. Explain the difference between the occupational standard and the curriculum.
3. Name the three core units of Masonry Level 3 with their hours. How many credits does the full course carry, and how is that figure worked out?
4. What is the difference between a Statement of Attainment, a Certificate of Competency and the Kenya National TVET Certificate in Masonry Level 3?
5. Kiprotich has built stone walls for twelve years but has no certificate. What would you advise him, and what will he need to show?
6. Calculate the unit score for a trainee with formative practical 85%, formative theory 70%, summative practical 80% and summative theory 55%. Is she competent, and what is her rating?
7. A trainee scores 90% in both practical assessments but 35% in summative theory. His weighted score is above 50. Is he competent? Explain.

8. Oral: What does a green building rating system such as EDGE reward? Give two ways a mason on site helps a building meet it.
9. Give five types of evidence you would keep in your portfolio.
10. Practical: Carry out Practical task 1.1 and hand in a one-page report with a dimensioned sketch.

CHAPTER 2

Safety and Green Building Basics

WHAT YOU WILL LEARN

- Choose, wear, look after and dispose of the right PPE for each masonry task, preferring greener options.
- Recognise the main hazards on a masonry site and the controls for each.
- Work safely in trenches, on ladders and scaffolds, and near mixers and power tools.
- Give basic first aid for cement burns, cement in the eye, cuts and crush injuries, and report accidents.
- Explain the duties of employers and workers and what an ESMP asks of a small site.
- Lay out a site for safe storage and sort construction waste for reuse, recycling and safe disposal.

Applies to all three units · PPE, site safety and green practice appear in every learning outcome · Read before your first practical

A masonry site is full of heavy loads, deep trenches, wet cement, sharp tools, dust and noise. Most injuries come from a small number of causes: falls, collapsing trenches, strained backs, cement burns, flying chips and machines. Nearly all of them can be prevented with good habits. The same habits also protect the environment. A tidy site that wastes less cement and water is safer, cheaper and greener.

Key words

Hazard
Anything that can cause harm, such as an open trench or a running mixer.

Risk
How likely the harm is and how serious it would be.

Control
A step that removes a hazard or reduces its risk.

PPE
Personal protective equipment: helmet, boots, gloves, goggles and other items worn for protection.

Dermatitis
Red, cracked, itchy skin caused by repeated contact with wet cement or chemicals.

Silica dust
Very fine dust released when stone, blocks or concrete are cut or ground. It damages the lungs.

Spoil
Soil dug out of a trench or excavation.

Toolbox talk
A short safety briefing at the start of the day.

ESMP
Environmental and Social Management Plan: the plan that says how a project will control its effects on people and the environment.

Segregation
Sorting waste into separate types so that it can be reused or recycled.

Hazardous waste
Waste that is poisonous, flammable or corrosive, such as fuel, paint and termite chemicals.

2.1 Safety law and who is responsible

In Kenya, safety at work is governed by the **Occupational Safety and Health Act, 2007 (OSHA)**. The government office that enforces it is the **Directorate of Occupational Safety and Health Services (DOSHS)**. Building sites are also inspected by the National Construction Authority (NCA) and by county building inspectors. Environmental matters fall under the National Environment Management Authority (NEMA).

The law gives duties to both sides. In general terms:

- **The employer** must provide a safe site, safe tools and machines, suitable PPE, training and supervision. The employer must assess risks and report serious accidents to DOSHS.
- **The worker** must take reasonable care of their own safety and that of others, wear the PPE provided, follow safety rules, and report hazards, accidents and near misses. A worker must never remove guards or misuse safety equipment.

Safety is a legal duty, not a favour.

2.2 Personal protective equipment

PPE is the last line of defence. First we remove or reduce hazards: we support the trench, guard the mixer and wet the dust. Then PPE protects against what remains. Figure 2.1 shows a mason dressed for walling and cutting work, and Table 2.1 lists the ten types of protection your course covers.

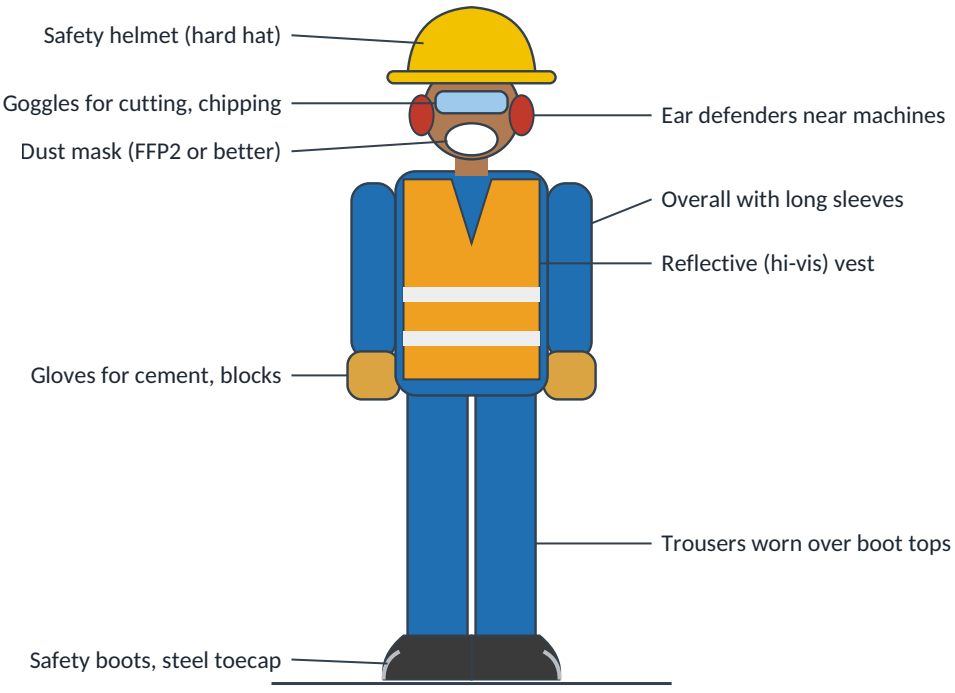


Figure 2.1 A mason dressed for cutting and walling. Helmet, boots, gloves and vest are worn all the time; goggles, mask and ear defenders are added for dusty and noisy tasks.

Table 2.1 The ten types of protection for masons

Protects	PPE	When a mason needs it
Head	Safety helmet	Always on site; essential below scaffolds and near lifting
Eyes	Safety goggles or glasses	Chipping stone, cutting blocks, mixing, hacking plaster, working overhead
Face	Face shield	Using an angle grinder or block cutter, spraying chemicals
Hearing	Ear plugs or ear defenders	Near mixers, vibrators, cutters and compactors
Breathing	Dust mask or half-mask respirator with filters	Dry cutting, sweeping, mixing cement, soil-block pressing, termite treatment
Hands	Rubber or nitrile gloves; leather gloves	Rubber for wet cement and plaster; leather for stones, blocks, steel and timber
Feet	Safety boots or gumboots with toecaps	Always on site; gumboots when placing concrete
Body	Overall; reflective vest; apron	Always on site; vest near vehicles and on roads
Falls	Full-body harness with lanyard	Work at height where guardrails cannot be fitted, such as edges of upper floors
Skin	Long sleeves, barrier cream, sunscreen, neck shade	Plastering and concrete work; long hours in the sun

2.2.1 Choosing, using and caring for PPE

- **Match the PPE to the task.** A dust mask does not protect against chemical vapour. Leather gloves soak up wet cement and hold it against your skin.
- **Check the fit.** A helmet that slides off, or a mask with gaps at the nose, gives little protection.
- **Inspect before use.** Replace a cracked helmet, torn gloves or boots with split soles.
- **Clean and store.** Wash goggles and reusable masks, dry gloves and keep PPE in a dry, clean store away from sun and chemicals.

2.2.2 Greener PPE choices

The greened curriculum asks you to think about PPE as a material too. Thousands of gloves and masks are thrown away on Kenyan sites every week. You can reduce that waste without reducing protection:

- **Durable and reusable:** a good helmet, boots and a half-mask with replaceable filters last much longer than cheap single-use items.
- **Recycled or recyclable materials:** where you have a choice, buy boots with recycled rubber soles, overalls of recycled fabric, and goggles with recyclable polycarbonate lenses.
- **Biodegradable and non-toxic:** some gloves and ear-plug foams are made to break down safely.
- **Reuse where safety allows:** wash and reuse gloves and overalls, but never reuse a damaged helmet or a clogged filter.
- **Dispose of contaminated PPE correctly:** gloves, masks and overalls soaked with termite chemicals, fuel or paint are hazardous waste. Bag and label them for the licensed collector. Do not burn them or throw them on the open tip.

2.3 Safety signs

Safety signs speak without words. Their shape and colour tell you the type of message before you read it. Figure 2.2 shows the five families you will see on Kenyan sites.



Prohibition
Red circle, slash
You must NOT
e.g. no smoking

Mandatory
Blue circle
You MUST
e.g. wear helmet

Warning
Yellow triangle
Danger ahead
e.g. deep trench

Safe condition
Green square
Help is here
e.g. first aid

Fire equipment
Red square
Fire-fighting kit
e.g. extinguisher

Figure 2.2 The five families of safety signs, recognised by shape and colour.

2.4 Hazards on a masonry site

Before any task, ask three questions: What could hurt someone? How likely and how bad is it? What will we do about it? This is a simple **risk assessment**. Table 2.2 lists the hazards you will meet most often.

Table 2.2 Common masonry hazards and their controls

Hazard	Possible harm	Main controls
Wet cement, lime, mortar	Alkaline burns, dermatitis, eye damage	Rubber gloves, long sleeves, goggles; wash skin quickly; clean water on site
Dust from cutting and mixing	Silicosis and other lung disease	Wet cutting, cut outdoors downwind, dust mask FFP2/ FFP3, damp sweeping
Lifting bags, stones, blocks	Back and shoulder injury, hernia	Correct lifting, two-person lifts, wheelbarrows, small loads, rest breaks
Trenches and excavations	Burial when sides collapse, falls into trench	Support or batter the sides, spoil set back from edge, barriers, ladder access
Ladders and scaffolds	Falls, the most serious site injuries	Sound equipment, guardrails, firm base, ties, never overload
Mixers, cutters, vibrators	Entanglement, cuts, electric shock, noise	Guards in place, switch off before cleaning, trained operator only, ear protection
Falling objects	Head injury	Helmets, toe boards, no loose blocks on platforms, keep out from under work
Sun and heat	Heat exhaustion, sunburn	Drinking water, shade at breaks, neck shade, heavy work in cooler hours

2.4.1 Cement and dust

Wet cement is strongly alkaline. It can burn skin badly, often without pain at first. Repeated contact causes **cement dermatitis**, and some masons become allergic to cement for life. Wear rubber gloves for plastering and concrete work, keep sleeves down and wash off splashes at once.

Cutting or grinding stone, blocks and concrete produces fine **silica dust**. The dust is too small to see once it is in the air. Over years it scars the lungs, causing silicosis, which cannot be cured. Cut with water where possible, work with the wind behind you, and wear a properly fitted dust mask.

2.4.2 Manual handling

A bag of cement weighs 50 kg. A machine-cut foundation stone can weigh 25–40 kg. Lifting them carelessly all day ruins backs. To lift safely:

- Plan the lift. Clear the path and decide where the load will go.
- Stand close to the load with feet apart. Bend your knees, not your back.
- Grip firmly, keep the load close to your body and lift by straightening your legs.
- Do not twist. Turn by moving your feet.
- Share heavy loads. A cement bag is best handled by two people or moved in a wheelbarrow.

2.4.3 Trenches

Trench sides can collapse without warning, especially in loose soil, after rain or near vibrating machines. One cubic metre of soil weighs well over a tonne. Keep spoil and materials at least 0.6–1.0 m back from the edge. Support (shore) or slope back the sides of any trench deeper than about 1.2 m, and of shallower trenches in loose or wet ground. Put barriers around open trenches, especially near homes and schools, and use a ladder to get in and out. Never work alone in a deep trench.

2.4.4 Ladders and scaffolds

Falls from height cause the most serious injuries on building sites. Figure 2.3 shows the key rules for a ladder and for a scaffold working platform.

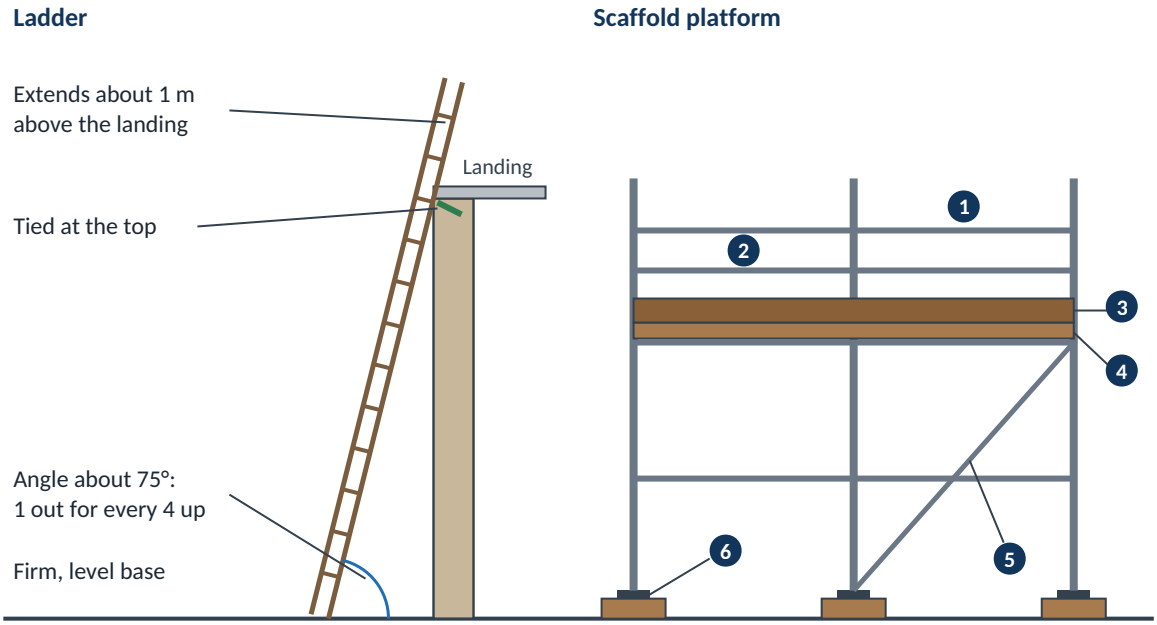


Figure 2.3 Left: a ladder set at about 75° (1 out for every 4 up), tied at the top and extending about 1 m above the landing. Right: a scaffold working platform with guardrail, mid-rail, toe board, bracing and base plates on sole boards. Heights are typical.

Many Kenyan sites still use timber or eucalyptus pole scaffolds. Whatever the material, the platform must be fully boarded, firm and wide enough to work on (at least about 600 mm). It must have edge protection, and it must stand on a firm base, not on loose stones or blocks. Never overload a platform with blocks. Bring up only what you can lay in the next hour or so, and spread the load.

2.4.5 Mixers and power tools

- Only trained people operate the mixer, block cutter, poker vibrator or compactor.
- Keep guards on. Never put a hand or shovel into a turning drum.
- Switch off, and remove the plug or key, before cleaning or clearing a blockage.
- Refuel petrol or diesel engines when they are cold, away from drains, over a drip tray.
- Check electric cables and plugs for damage. Keep them out of water and away from wheelbarrow routes.

> **SAFETY FIRST**
>
> Stop work and tell your supervisor if you see a trench side cracking, a scaffold without guardrails, a mixer without its guard, or a damaged electric cable. You have the right and the duty to refuse unsafe work and report it. A few minutes lost is better than a life lost.

2.5 First aid and reporting

Every site should have a stocked first aid box, clean water and at least one trained first aider. Learn where they are on your first day. Table 2.3 gives the first response for common masonry injuries. After any first aid, get medical help where needed.

Table 2.3 First response to common masonry injuries

Injury	What to do at once	Then
Cement or lime in the eye	Rinse with plenty of clean water for at least 15–20 minutes, holding the eyelids open. Do not rub.	Go to a clinic even if it feels better. Alkali damage can continue after rinsing.
Wet cement on skin	Remove soaked clothing and boots. Wash the skin with plenty of clean water and mild soap.	Seek treatment if the skin is red, blistered or painful. Cement burns may get worse over hours.
Cuts	Press on the wound with a clean pad to stop bleeding. Wear gloves to protect yourself.	Clean and cover. Deep cuts need a clinic; tetanus protection may be needed.
Crushed finger or foot	Free the casualty safely. Cool and raise the injured part.	Get medical help. Report what caused it.
Fall or trench collapse	Make the area safe. Do not move the casualty if the back or neck may be injured, unless there is further danger.	Call for emergency help at once and keep the casualty warm and calm.
Heat exhaustion	Move to shade, loosen clothing, give sips of water.	Rest. Get medical help if the person is confused or does not improve.

Report every accident and near miss to your supervisor the same day, and make sure it is written in the site accident book. Serious accidents must be reported to DOSHS by the employer. A near miss, such as a block falling from a scaffold without hitting anyone, is a free warning. Reporting it helps prevent the next one.

2.6 The Environmental and Social Management Plan

Larger projects go through an environmental assessment and receive a NEMA licence. The conditions are written into an **Environmental and Social Management Plan (ESMP)**. It lists each likely impact, the measure to control it, the person responsible and how it will be checked. On a small domestic site there may be no formal document, but the same thinking applies, and county approvals often carry similar conditions. A simple site ESMP for a bungalow might cover:

- **Soil:** strip topsoil and keep it for the garden; store spoil away from drains and roads; prevent erosion when it rains.
- **Trees and vegetation:** keep trees not marked for removal and protect their roots from machines and spoil.
- **Water:** save water during mixing and curing; harvest rainwater; keep cement washout away from streams and drains.
- **Dust and noise:** wet dusty work, cover sand and cement, keep noisy machines away from the boundary, run them only in agreed hours and switch engines off when idle.
- **Waste:** sort waste, reuse and recycle, and use licensed collectors for what is left.
- **People:** fence the site, keep children out, give local people fair chances of work, and keep good relations with neighbours.
- **Workers:** PPE, clean water, toilet, first aid and safe working conditions.

As a mason, you carry out the ESMP every day through how you dig, mix, cure and clean up.

2.7 Sustainable waste management

Construction is one of the biggest sources of waste in Kenyan towns. Much of it is valuable material thrown away: broken blocks, offcut steel, formwork timber, and cement left to set in the wheelbarrow. The **waste hierarchy** in Figure 2.4 shows the order in which to deal with waste. Always start at the top.



Figure 2.4 The waste hierarchy with masonry examples. Waste that is never created costs nothing to remove.

2.7.1 Types of site waste

Table 2.4 shows the main waste streams on a masonry site and the best route for each.

Table 2.4 Site waste streams and how to handle them

Waste	Examples	Best route
Construction rubble	Broken blocks and stones, hardened mortar, concrete spills, plaster droppings	Reuse as hardcore or fill where the engineer allows; crush for aggregate; otherwise to an approved tip
Excavated soil	Topsoil, subsoil, murram from trenches	Keep topsoil separate for landscaping; use subsoil for backfill and levelling; never dump on roads or in rivers
Wood	Formwork boards, pegs, profile boards, pallets	Remove nails, clean and reuse; give short pieces for pegs; untreated scraps for permitted uses
Metal	Steel bar offcuts, binding wire, hoop iron, tins	Use offcuts for spacers and chairs; collect the rest for scrap metal dealers
Plastics	DPM offcuts, water bottles, packaging, cement bags	Keep clean and dry; reuse for covering and curing; give to recyclers; never burn
Hazardous	Termite chemicals and containers, paints, solvents, fuel and oil, contaminated PPE	Store in a covered, bunded area; never reuse chemical containers for water; return or hand over to licensed handlers as the label directs

GREEN TIP

Clean the mixer and tools over a washout pit, not into the drain. Let the solids settle and reuse the clear water for the next wash or for curing. The settled slurry dries into rubble that can be used as fill. This one habit keeps cement out of streams and saves hundreds of litres of water every week.

2.8 Site layout and housekeeping

A well-planned site is safer and wastes less. Materials are stored near where they are used, paths are clear and waste goes into the right container. Figure 2.5 shows a good layout for a bungalow site.

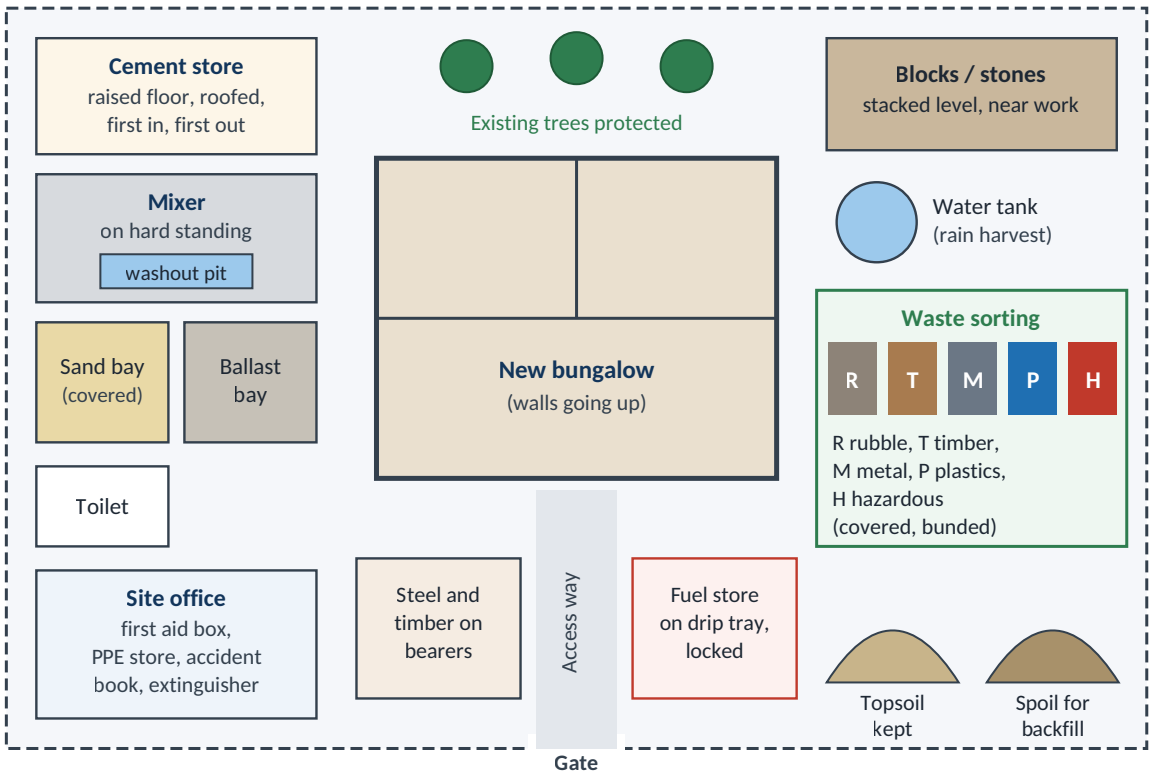


Figure 2.5 A well-organised bungalow site: dry cement store and aggregate bays beside the mixer, washout pit, waste sorting station, separate topsoil and spoil heaps, protected trees and a clear access way from the gate.

2.8.1 Storing materials

- **Cement:** in a dry, roofed store on a raised floor or pallets, away from walls. Stack no more than about 10 bags high and use the oldest bags first. Damp cement forms lumps and loses strength.
- **Sand and ballast:** in separate bays on a clean hard base, so that soil does not mix in. Cover sand to stop it blowing away.
- **Blocks and stones:** on level ground in stable stacks, not too high, close to where they will be laid.
- **Steel and timber:** off the ground on bearers, covered from rain, with nails removed from used timber.
- **Fuel and chemicals:** locked away, on a drip tray, away from drains and from the cement store.

2.8.2 Good housekeeping

Housekeeping means keeping the site clean and orderly while you work, not just at the end. Clear mortar droppings before they harden. Stack offcuts and broken blocks in the right place. Keep paths, ladders and scaffold platforms free of loose materials. At the end of each day, clean and oil your tools, cover the cement and sand, switch off and lock machines, and put waste into the sorting bins.

COMMON MISTAKES

- Wearing leather gloves for plastering. They soak up wet cement and hold it against the skin.
- Piling spoil right at the trench edge, where its weight can collapse the side.
- Loading the scaffold with a whole day's blocks at once.
- Washing the mixer into the nearest drain or ditch.
- Reusing an empty termite chemical container to carry drinking water.
- Burning plastics and cement bags on site.

ON SITE IN KENYA

On many plots a lorry of sand is tipped on the roadside, and rain washes much of it into the drain. Advise clients to prepare a bay before delivery and cover the heap. A polythene sheet costing a few hundred shillings can save thousands in sand.

TRAINER'S TIP

Start every practical with a two-minute toolbox talk among your group: today's task, the main hazards, the PPE needed and where the waste goes. Assessors look for this habit, and it is the same routine good contractors use every morning.

Practical task 2.1: Hazard walk, PPE check and waste station

Tools and equipment

- Full PPE for each trainee
- Clipboard, hazard checklist, pencil
- Tape measure
- Barrier tape and pegs
- Wheelbarrow, shovel, broom

Materials

- Five containers or marked areas for sorting
- Marker pen and labels
- Polythene sheet for covering
- Mixed waste from the workshop yard

Steps

1. Check your own PPE and that of a partner: fit, damage and suitability for today's task. Record any item that needs replacing.
2. Walk the workshop yard or a site with your trainer. List at least six hazards, the possible harm and a control for each.
3. Identify any safety signs present and name their family. Note where a sign is missing.
4. Locate the first aid box, the clean water point and the fire extinguisher. Mark them on a sketch plan of the area.

5. Set up a waste station with five labelled areas: rubble, timber, metal, plastics and hazardous.
6. Sort the mixed waste. Remove nails from timber, stack reusable pieces, and keep hazardous items covered and apart.
7. Mark off any open excavation with barrier tape at a safe distance from the edge.
8. Clean up, store your PPE correctly and hand in your checklist and sketch for signing.

Safety

- Wear gloves and goggles when sorting waste; watch for nails, sharp metal and broken glass.
- Do not open or pour chemical containers. Report them to the trainer.
- Lift heavy rubble with bent knees or share the load.

Chapter summary

- OSHA 2007 gives duties to employers and workers; DOSHS enforces it. NCA, county inspectors and NEMA also oversee building sites.
- PPE covers head, eyes, face, hearing, breathing, hands, feet, body, falls and skin. Choose it for the task, check its fit, care for it, and prefer durable, recycled or reusable items.
- Contaminated PPE and chemicals are hazardous waste and go to licensed handlers.
- The main hazards are wet cement, silica dust, manual handling, trenches, work at height, machines, falling objects and heat. Each has clear controls.
- Ladders stand at about 75° (1 out for 4 up) and extend about 1 m above the landing. Scaffold platforms need guardrails, toe boards, full boarding, bracing and a firm base.
- For cement in the eye, rinse with clean water for 15–20 minutes and seek medical help. Report every accident and near miss.
- An ESMP sets out how a project controls its effects on soil, trees, water, dust, noise, waste, neighbours and workers.
- Follow the waste hierarchy: prevent, reuse, recycle, recover, and dispose of only what remains, keeping hazardous waste separate.

Check your competence

- [ ] I can select PPE that matches the task and the safety rules, and wear it as the maker intends.
- [ ] I can inspect, clean, store and dispose of PPE in a way that limits waste and harm.
- [ ] I can name the five families of safety signs and what each means.
- [ ] I can identify site hazards and suggest a suitable control for each.
- [ ] I can lift and move heavy masonry materials safely.
- [ ] I can set up and use a ladder and check a scaffold platform before I work on it.
- [ ] I can give first aid for cement in the eye or on the skin, and report an accident correctly.
- [ ] I can explain how the ESMP guides site preparation, excavation and spoil handling.
- [ ] I can sort construction waste into its streams and handle hazardous waste separately.
- [ ] I can lay out storage on a site and keep my work area clean and orderly.

Practice questions

1. State two duties of the employer and two duties of the worker under OSHA 2007.
2. Name the PPE a mason needs when (a) plastering a wall, (b) cutting blocks with a power cutter, (c) placing concrete in a slab.
3. Give three ways a mason can make PPE use more environmentally friendly without reducing safety.
4. Explain why leather gloves are a poor choice for handling wet mortar.
5. Describe the colour and shape of a mandatory sign and a warning sign, with one example of each.
6. List four controls that reduce the risk of a trench collapse.
7. A ladder must reach a landing 4.0 m above the ground and extend 1 m above it. Using the 1-in-4 rule, how far from the wall should its foot be, and roughly how long must the ladder be?
8. A contractor buys 400 bags of cement at about KSh 800 per bag (approximate, 2026). If poor storage and over-mixing waste 6% of it, how much money is lost? Suggest two ways to prevent this loss.
9. Oral: A helper gets cement splashed in his eye. Explain what you do, step by step.
10. Practical: Carry out Practical task 2.1. Submit your hazard list, a sketch plan showing first aid, water point and waste station, and a short note on how each waste stream will be handled.

PART 2

Masonry Works

Unit 1: Masonry Works. From reading drawings and setting out, through foundations and the floor slab, to reinforced concrete and superstructure walls.

Chapter 3: Interpreting Building Drawings
Chapter 4: Setting Out a Building
Chapter 5: Laying Foundation Concrete
Chapter 6: Constructing Foundation Walls
Chapter 7: Constructing the Ground Floor Slab
Chapter 8: Constructing Reinforced Concrete Elements
Chapter 9: Constructing Superstructure Walls