

Short Course Curriculum with Resources

Construction Site Supervision of Houses

SHORT COURSE CURRICULUM WITH RESOURCES

Training Units for the CARICOM Regional Code
of Practice for the Construction of Houses
(CRCP 10:2023)

CARIBBEAN VOCATIONAL QUALIFICATION OCCUPATIONAL STANDARD

CCBCM30122 LEVEL 3 - CONSTRUCTION SITE SUPERVISION

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The Curriculum is one of six resources developed by CDEMA for safer building in the Caribbean, that includes, an Answer Booklet, Pocket Guide, Learner's Guide, the Occupational Standard for the Caribbean Vocational Qualification (CVQ) - Level 3 in Construction Site Supervision (CCBCM30123), and the CARICOM Regional Code of Practice for the Construction of Houses (CRCP 10: 2023).

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OBJECTIVE DESCRIPTIONS

KNOWLEDGE OBJECTIVES focus primarily on the theoretical aspect of the module

PERFORMANCE OBJECTIVES are the specific tasks that learners must perform to the required standards.

ENABLING OBJECTIVES support the learners' achievement of the performance objectives.

The economic cost of disasters in the Caribbean has been substantial, exceeding US\$28 billion over the last seven decades. Between 1950 and 2016 these costs surpassed \$22 billion (in constant 2009 dollars). Since then, several other hazards have wreaked havoc in the region. Some of the costliest disasters include Hurricane Maria in 2017, which resulted in \$1.3 billion in damages and losses in Dominica. In 2019, Dorian, the strongest hurricane on record to affect The Bahamas, resulted in \$3.2 billion in damages and losses. In 2021, the eruption of La Soufrière resulted in \$233 million in damages and losses in Saint Vincent and the Grenadines. That same year, on August 14th, a 7.2 magnitude earthquake affected the southern peninsula of Haiti resulting in more than \$1.6 billion in damages and losses. At least 137,500 buildings were damaged or destroyed. Disasters are costly, and they also take lives. In the Caribbean, more than 250,000 people were killed from disasters over the period 1950 to 2022. The August 2021 Haiti-earthquake resulted in 2,246 deaths, 12,763 injured and 329 missing persons. More than 660,000 people were affected.

Post disaster damage and loss assessments reveal that in the Caribbean, a significant portion of damage from disasters has been in the housing sector. Moreover, much of this damage could be avoided as repeatedly, the application of building codes was found to be inconsistent and there was weak to no legislation in place to address safe building. Poor building practices were evident as was the absence of sensitization to safe building practices. There are also indications that a substantial portion of the housing stock in the Caribbean has been built through the informal construction sector which does not necessarily adhere to formal building codes and standards. Moreover, many practitioners within the informal sector, in most instances, have never received formal skills training or certification. These realities provide the basis for the development of the Curriculum for Construction Site Supervision of Houses which is one of six resources developed by the Caribbean Disaster Emergency Management Agency (CDEMA) for safer building in the Caribbean:

- CARICOM Regional Code of Practice for the Construction of House (CRCP 10:2023), developed under the authority of the CARICOM Regional Organisation for Standards and Quality (CROSQ).
- Caribbean Vocational Qualification (CVQ) Occupational Standard- Level 3 in Construction Site Supervision (CCBCM30123), developed under the authority of the Caribbean Association for National Training Authorities (CANTA).
- Curriculum for the Short course in Construction Site Supervision of Houses
- Learner's Guide for Construction Site Supervision of Houses
- Answer Booklet for Construction Site Supervision of Houses
- Pocket Guide for Construction Site Supervision of Houses

The Curriculum is a resource for training in CCBCM30123 which was approved as a revised CVQ in 2022 at the 44th meeting of the Caribbean Community (CARICOM) Council for Human and Social Development (COHSOD). CRCP 10:2023 was approved as a CARICOM Regional Standard by the CARICOM Council for Trade and Economic Development (COTED) at its 56th Meeting. Whilst CRCP 10:2023 outlines the specifications for constructing houses in CARICOM Member States to a common standard for strength and durability for improved resilience; the CVQ Occupational Standard which is a competency-based occupational regional qualification, establishes the skills and competencies needed to meet the CRCP 10: 2023 standard according to the CARICOM Qualifications Framework at

¹ İnci Ötker and Krishna Srinivasan (2018) Bracing For The Storm, Finance & Development, March 2018, Vol. 55

² Government of the Commonwealth of Dominica (2017) Post-Disaster Needs Assessment Hurricane Maria

³ ECLAC, IDB, PAHO, WHO (2019) Assessment of the Effects and Impacts of Hurricane Dorian in the Bahamas - Executive Summary

⁴ Government of Saint Vincent and the Grenadines (2021) La Soufrière Volcanic Eruption Post Disaster Needs Assessment Saint Vincent and the Grenadines

⁵ Government of the Republic of Haiti, Ministry of Planning and External Cooperation (2021) Post Disaster Needs Assessment in Haiti

⁶ EM-DAT, Centre for Research on the Epidemiology of Disasters (CRED) / UCLouvain, Brussels, Belgium – www.emdat.be

Level 3- Independent or Autonomous Skilled Worker.

As the regional inter-governmental agency for disaster management in CARICOM, CDEMA is the facilitator, driver, coordinator and motivating force for the promotion and engineering of Comprehensive Disaster Management (CDM) in its nineteen (19) Participating States, which encompasses the 15 CARICOM Member States. CDM requires leadership by all people and sectors in building the resilience of the region. This ethos underpins the Regional CDM Strategy and Results Framework 2014-2024. Since the Caribbean Association of National Training Authorities (CANTA) is the implementation arm of the CARICOM Regional Coordinating Mechanism for Technical and Vocational Education and Training (TVET) and is also responsible for establishing the regional certification system, labelled as CVQs, CDEMA therefore partnered with them to revise the CVQ for Construction Site Supervision to address CRCP 10:2023. Developing this revised CVQ is pivotal to resilience since it provides a standard as well as basis for uniform delivery of competency-based technical and vocational education and training and certification within the Caribbean Single Market and Economy (CSME) for resilient houses to disasters. It provides a means for certifying persons practicing in the industry within the CSME.

The CVQ in Construction Site Supervision will be the basis for delivering training through the CANTA network of National Training Authorities and vocational training providers that will build capacity amongst foremen and experienced artisans and the next generation of builders, for the safe construction of houses in the region. CANTA therefore plays a critical role in advancing the regional goal of a Safer, more resilient and sustainable CDEMA Participating States through Comprehensive Disaster Management " and is contributing to achieving Pillar II, Safeguarding Infrastructure, of the "Caribbean Pathway for Building Resilience' adopted by CARICOM Heads of Government in July 2018.

The development of these safer building resources, was done under an overarching project implemented by CDEMA from 2021-2024 with five components that included review and revision of the Code of Practice for the Construction of Houses (first developed by CDEMA in 2005) as a CARICOM Regional Standard, the development/ revision of an accompanying CVQ to the Code of Practice to support institutionalisation and sustainability; offering of certified training in the rudiments of CRCP 10:2023 through the CVQ; and the provision of training by vocational institutions in eight Member States, Antigua and Barbuda, Barbados, British Virgin Islands, Dominica, Grenada, Saint Lucia, St. Kitts and Nevis and St. Vincent and the Grenadines. Special acknowledgement is given to the development partners that supported the development of regional standards- CRCP 10:2023, and CVQ Level 3 in Construction Site Supervision (CCBCM30123); and delivery of training and marketing. Namely, the Government of Norway Support to the Advancement of Comprehensive Disaster Management (CDM) in the CDEMA Participating States, the United States Agency for International Development (USAID) under the Caribbean Climate Resilience Initiative (CCRI) project, the Caribbean Development Bank (CDB), and the Building the Resilience of the CARIFORUM States to Disaster Risks and Climate Change Impacts project, financed by the European Union through the 11th European Development Fund.

Safe housing is a basic need of society, and adequate housing is a human right. These safer building resources are commended to training providers, artisans, contractors, building authorities, policy makers and financial institutions for the construction of safer, and more resilient housing in the Caribbean region.

⁷Articles – CANTA (cantaonline.org)

INTRODUCTION

Residents in CARICOM Member States risk being impacted by a diverse set of natural hazards including earthquakes, hurricanes, floods, landslides, volcanoes, tsunamis, torrential rainfall, and the predicted negative effects of climate change. Houses built in CARICOM Member States may be prematurely weakened by corrosion, moisture, insects, heat, and the sun's ultra-violet rays. One of the aims of the Caribbean Disaster Emergency Management Agency (CDEMA) is to improve the quality of the housing stock in the Caribbean region.

To further this aim, CDEMA facilitated the development of the CARICOM Regional Code of Practice for the Construction of Houses (CRCP 10:2023). This Code of Practice was developed under the authority of the CARICOM Regional Organisation for Standards and Quality (CROSQ). It was approved as a CARICOM Regional Standard by the CARICOM Council for Trade and Economic Development (COTED). The Code outlined the specifications for constructing strong and durable houses for improved housing resilience in CARICOM Member States.

CDEMA also facilitated the development of Occupational Standards for a Caribbean Vocational Qualification (CVQ) Level 3 in Construction Site Supervision (CCBCM30122). These Occupational Standards were developed under the authority of the Caribbean Association of National Training Authorities (CANTA).

To support the CVQ, CDEMA facilitated the development of a curriculum for the Occupational Standard, which comprises the contents of this document. This curriculum allows a short course to be taught, comprising all units of Cluster 1 and the first unit of Cluster 2, which are new units. The remaining units already exist and may be found in the document: **“Heart Trust Building Construction: Construction Site Supervision Curriculum Level 3”**.

The CVQ is built upon the CRCP 10 and involves training and assessment to support the competence of construction supervisors in the residential construction sector. The curriculum is built on the CVQ and is intended to aid trainers to ensure the necessary competencies, skills and knowledge among course participants to supervise the building of strong and durable houses in the Caribbean that allows the occupants of those houses to remain safe during major natural hazards.

The United Nations Report on Climate Change noted that the world is on a pathway to global warming of more than the limit of 1.5 degrees Celsius (United Nations, 2022). This means that small island developing states (SIDS) like the islands of the Caribbean, will likely experience:

- I. increased rainfall from hurricanes, and
- II. increased intensity of hurricane force winds and the likelihood of the increase in category 4 and 5 hurricanes (Knutson, 2022).

Due to this imminent natural hazard's increasing threat, there is a need for construction supervisors and senior artisans who manage residential construction sites to strength their skills, knowledge and competence in the building of stronger, more durable homes that can withstand the predicted higher-intensity hurricanes.

The development of this certification is further enhanced by the call of CARICOM Heads of State to strengthen the building stock and infrastructure in the Caribbean especially after the occurrence of the two Category 5 hurricanes in 2017, Irma and Maria.

Philosophical Principles

The curriculum is based on a competency-based education which has basic philosophical principles. The principles are that:

1. Skills are what a learner should be able to do, while attitudes are characteristics that the learner should exhibit while demonstrating the skill.
2. Learners need to prove mastery of a skill or competency to determine advancement to the next level.
3. The assessment of student's mastery takes place through skill-application.
4. Learning can take place outside the classroom, such as during an internship, job shadowing, through online, blended or distance learning or otherwise (Sisternans, 2020).



PART ONE

THE SHORT COURSE



1 THE SHORT COURSE

This short course aims to train participants to supervise the construction of strong and durable houses. Before they graduate, course participants must demonstrate:

- I. knowledge of good-quality construction practices as defined in the CARICOM Regional Code of Practice for the Construction of Houses (CRCP 10:2023).
- II. the ability to explain how good-quality construction practices should be done.
- III. the ability to check whether good-quality construction practices have been demonstrated.

This short course is benchmarked against the following units in the first two clusters of the Caribbean Vocational Qualification Occupational Standard: CCBCM30122 NVQ Level 3 - Construction Site Supervision.

CLUSTER 1 UNITS

1. BCGCSS0013A - Build and Excavate Foundation Footing
2. BCGCSS003A - Install Floors in Concrete and Timber Homes
3. BCGCSS0023A - Construct Concrete Stairs in Residential Homes
4. BCGCSS0043A - Construct Concrete Block Masonry Walls
5. BCGCSS0053A - Construct Timber Walls
6. BCGCSS0063A - Install Roofs on Timber and Concrete Structures

CLUSTER 2 UNIT

7. BCGCOR1583C - Read and Interpret Building Plans and Specifications

This document contains two units from Unit Code CCBCM30122 that were excluded from the Heart Trust Curriculum. However, it should be noted that these units are included in this short course. The units are as follows:

8. CRICM0013B - Apply Advanced Language and Communication Skills
9. BCGCUS0013B - Provide Customer Service in Construction

The units included in this short course (in the order of their presentation) are as follows.

CLUSTER 1

Unit 1- Build and Excavate Foundation Footing

Focuses on the knowledge, skills and attitude needed to build three types of foundations for walls and timber homes.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install strip footing.
3. Install Pad footing.
4. Install slab on ground footing.
5. Install timber posts.
6. Coordinate clean up.

Unit 2- Install Floors in Concrete and Timber Homes

Focuses on the knowledge and skill to install floors in concrete and timber homes.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install suspended and reinforced concrete slab fill.
3. Install a suspended timber floor.
4. Execute industry standard clean-up methods.
5. Clean up.

Unit 3- Construct Concrete Block Masonry Walls

Focuses on developing the skills, knowledge and attitudes required to prepare and construct masonry walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Lay concrete block walls.
3. Install concrete stiffeners.
4. Erect beam formwork.
5. Follow procedures for concrete work.
6. Clean up.

Unit 4- Construct Timber Walls

Focuses on developing the skills, knowledge and attitudes required for the installation of timber walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install wall timber plates.
3. Install timber beams.
4. Install wall cladding.
5. Execute clean up methods to industry standards.

Unit 5- Construct Concrete Stairs in Residential Homes

Focuses on the skills, knowledge and attitudes required to construct stairs in a residential home and applies to individuals working in masonry in the construction industry.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Set out steps.
3. Lay bricks and form steps.
4. Coordinate clean up.

Unit 6- Install Roofs on Timber and Concrete Structures

Focuses on the skills, knowledge and attitudes required for the installing of roofs on timber framed walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install roof structure/support.
3. Install roof truss.
4. Coordinate clean up.

CLUSTER 2

Unit 7- Read and Interpret Building Plans and Specifications

Focuses on the skills, knowledge and attitudes required to read and interpret plans and specifications applicable to low rise residential and commercial projects in order to inform estimation, planning and supervisory activities. This unit of competency supports the needs of site managers, forepersons, estimators, builders, managers and other building and construction industry personnel responsible for ensuring the currency of plans and specifications and for reading and interpreting these for application to estimation, planning and related supervisory activities.

By the end of this module, learners will be able to:

1. Identify types of drawings and symbols used in construction.
2. Locate and identify key features on a site plan and drawings.
3. Read, interpret building plans and specifications.

Unit 8 - Apply Advanced Language and Communication Skills

This unit focuses on the competencies required to effectively communicate information in different forms that facilitates smooth business operations. The areas of focus are to communicate effectively using written and oral communication to facilitate smooth site operations.

By the end of this module, learners will be able to:

1. Write using grammatical rules, punctuation rules and sentence structure rules.
2. Conduct meetings.
3. Read and Interpret construction documents.
4. Respond in oral and written form to communication.
5. Present information orally in different settings.
6. Write smart goals.

Unit 9 - Provide Customer Service in Construction

This unit focuses on the knowledge, skills and attitudes required to provide customer service in construction. It includes contributing to customer service systems, delivering reliable customer service and monitoring customer service.

By the end of this module, learners will be able to:

1. Develop and implement customer service standards.
2. Develop customer service satisfaction tools.
3. Collect customer service data.
4. Analyse customer service data to improve service.
5. Use feedback data to improve customer service standards and delivery.
6. Resolve customer service problems.
7. Communicate changes to construction plans or procedures.

UNIT 1

BUILD AND EXCAVATE FOUNDATION FOOTING



CLUSTER 1

SUGGESTED TIME: 100 HOURS

KNOWLEDGE OBJECTIVES: which focus primarily on the theoretical aspect of the module:

Focuses on the knowledge, skills and attitude needed to build three types of foundations for walls and timber homes.

By the end of this module, learners will be able to:

1. Plan and prepare work
2. Install strip footing
3. Install Pad footing
4. Install slab on ground footing
5. Install timber posts
6. Coordinate clean up

LIST OF SUPPLEMENTAL MATERIALS		
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	Formwork Materials Calculation Worksheet Template	47
	Erection of Formwork Demonstration	48
	Construction Site Clean-Up Simulation	50
Unit 1 Checklist	Assessing the Organisation and the Digging of a Trench on a Construction Site	52
Unit 1 Assessment Methods	Build and Excavate Foundation Footing	55

OCCUPATIONAL HEALTH & SAFETY

KNOWLEDGE OBJECTIVE
1. State occupational health and safety standards requirements for building and excavating foundation footings.
2. Identify the Personal Protective Equipment (PPE) to be worn when building and excavating foundation footings.
PERFORMANCE OBJECTIVE
1. Adhere to occupational health and safety standards when dealing with concrete.
2. Wear personal protective equipment accurately.

ENABLING OBJECTIVE #1	
1. Gain knowledge of the occupational health and safety standard requirements for building and excavating foundation footings.	
2. Practise implementing occupational health and safety standards when dealing with concrete.	
3. Practise wearing personal protective equipment (PPE).	
LEARNING EXPERIENCE	
Read Legislation on Safety and Health appropriate to your country.	Instructor can provide "Legislation Safety and Health at work Act 2005-12 (Barbados)." https://www.barbadoslawcourts.gov.bb/assets/content/pdfs/statutes/SafetyandHealthatWorkCAP356.pdf IADC. (n.d.) Personal Protective Equipment and Safety. https://www.iadc.org/safety-meeting-topics/personal-protective-equipment-safety/ The Structural World. (n.d.). Personal protective equipment in construction. https://www.youtube.com/watch?v=Q3VLM0-IXqY
Watch a video on Health and safety standards and personal protective equipment in construction on a construction site.	
Participate in a scenario where you are a construction site supervisor overseeing the excavation and construction of foundation footing for a residential home. Apply the information from the video and safety and health legislation.	



QUALITY ASSURANCE: STANDARDS

	KNOWLEDGE OBJECTIVE
	1. State the organisational policies and procedures for quality assurance.
	2. State the building code standards for foundation footings for walled and timber homes.
	PERFORMANCE OBJECTIVE
	1. Select materials using quality assurance and that conform to building code standards needed to erect footing.

ENABLING OBJECTIVE #2	
1. Gain knowledge of the organisational policies and procedures for quality assurance.	
2. Gain knowledge of the building code standards for foundation footings for walled and timber homes.	
3. Gain knowledge of the materials used in foundation footings, such as concrete, timber, reinforcements, release agent and formwork.	
4. Practise applying quality assurance and building code standards when selecting materials to build a foundation footing.	
LEARNING EXPERIENCE	
Research building codes for foundation footings for residential homes from your research answer the questions in Activity 2.	
Make a list of the materials used in foundation footings for a residential home.	See CDEMA's Learner's Guide, Section 6
Participate in a Mock Material Selection Exercise: Divide students into small groups and assign them a hypothetical construction project that involves building foundation footings. Provide them with information about the project requirements, site conditions, and local building codes. Task each group with selecting the most appropriate material for the footings, taking into account quality assurance and building codes. Have the groups present their material selections, explain their reasonings and defend their choices. Or Visit a construction site that is laying foundation footings. Students observe first-hand how quality assurance and building code standards are applied when selecting materials. Students take pictures and record the materials and quality of the materials.	

COMMUNICATION SKILLS

	KNOWLEDGE OBJECTIVE
	1. State effective communication skills.
	2. State how to read a construction site map.
	PERFORMANCE OBJECTIVE
	1. Demonstrate effective communication skills.

ENABLING OBJECTIVE #3	
1. Gain knowledge on effective communication skills on a construction site.	
2. Practise demonstrating effective communication skills on a construction site.	
LEARNING EXPERIENCE	
Read the article “Why Is Communication Important In Construction And How To Improve It.”	RIBCCS. (n.d.). Why Is Communication Important In Construction And How To Improve It. https://ribccs.com/importance-of-communication-in-construction/
Watch video on “Communication Skills Every Manager Needs.”	Andrews, M. (2021, April 20). Communication Skills Every Manager Needs. https://www.youtube.com/watch?v=mm9_iyTe0oM
Participate in mock inspection session.	Instructors set up a simulated inspection session for materials commonly used in construction. Provide the learners with a checklist of inspection criteria. In groups, learners will take turns inspecting and communicating their findings, including acceptance or rejection of materials. Encourage learners to give feedback on effective communication during the inspection period.
Participate in communication scenarios such as communication procedures for inspecting, accepting, safe handling and storage of materials.	See information sheet Communicating Defective Materials



Q&A MATERIALS & EQUIPMENT

KNOWLEDGE OBJECTIVE

1. Specify the quality materials needed for foundation footings.
2. State the equipment needed to excavate and build foundation footings in walled and timber buildings.

PERFORMANCE OBJECTIVE

1. Organise equipment and materials for the building and excavating of foundation footings.

ENABLING OBJECTIVE #4

1. **Gain knowledge** about quality materials needed to build foundation footings.
2. **Gain knowledge** of the equipment needed to excavate and build foundation footings in walled and timber buildings.
3. **Practise** organising equipment and materials for the building and excavating foundation footings.

LEARNING EXPERIENCE

Review article on quality of the materials.

Read and Watch accompanying video on quality materials in the Caribbean. Learner's Guide section 4.

Additional reading: Training rural masons: Learning Unit 1, Basic Knowledge.

Caribank. (2018). Building standards for construction supervision: Improved practices for the construction of houses in the Caribbean section A6. Quality of materials. (page 115)

<https://www.caribank.org/sites/default/files/publication-resources/Caribbean%20Construction%20Training%20Manual.pdf>



Q&A MATERIALS & EQUIPMENT CONT'D

Participate in field trips and site visits to construction sites or building material suppliers to observe the use of different materials, their quality and compatibility consideration in actual construction projects.

Video on quality building materials (Commissioned by CDEMA and to be included)

Participate in hands on demonstration of excavation and foundation building equipment. Allow learners to operate and familiarise themselves with the tools under supervision.

CDEMA Learner's Guide-Construction Supervision of Houses pages 4-47

Beusch, A., Murali, A. and Johannessen, B. (2015). Training rural masons: Learning Unit 1, Basic Knowledge. https://labordoc.ilo.org/discovery/delivery/41ILO_INST:41ILO_V1/1285294000002676

Lecturers see information sheet on "Types of Building Equipment."

Listen to a Guest Speaker sharing insights on specific equipment used for excavating foundation footings.

Participate in Simulated Exercise using excavation and building equipment under supervision.

Instructor should organise such visits. The instructors are to also engage participants with site managers to gain insight into material selection and factors influencing compatibility decisions.

Instructors will arrange the demonstration of excavation and foundation building equipment.

Instructors will create a simulated construction site where learners can practise using excavation and building equipment.



SOIL & FOOTINGS

KNOWLEDGE OBJECTIVE

1. State the types of soil that impact the installation of foundation footings.

PERFORMANCE OBJECTIVE

1. Conduct soil tests to determine the type of soil where footings will be built.

KNOWLEDGE OBJECTIVE #5

1. **Gain knowledge** of the types of soil that impact the installation of foundation footings.
2. **Conduct** soil tests to determine the type of soil where footing will be built.
3. **Estimate** the width of the footing based on the soil type.

LEARNING EXPERIENCE

Read article on Why soil testing is important before construction.

Civil Engineering Guru. (2021). Soil and Soil tests.

https://www.youtube.com/watch?v=74xk0tGU_Ww&list=PL1_FTup46I6_tfeJiWBUTQ9w8_zleY_q5



Examine samples of different soils. Look at soil moisture, texture, and compaction.

Civil Engineering Guru. (2021). Type of soils for soil tests for construction of buildings.

https://www.youtube.com/watch?v=0T1rKTtVbeo&list=PL1_FTup46I6_tfeJiWBUTQ9w8_zleY_q5&index=2



Read "Bearing capacity" section 6.1 in Learner's guide.

Conduct a soil test using a soil test kit and explain type of soil and how that impacts the foundation footing.

Soil Test Kits
Shyam Steel. (n.d.). Why soil testing is important before construction.

<https://shyamsteel.com/blogs/why-soil-testing-is-important-before-construction/#:~:text=Soil%20testing%20is%20primarily%20done,the%20weight%20of%20the%20building.>



Discuss how the strength, stability, and settlement characteristics of various soils can affect the width requirements of foundation footings.

Calculate the width estimation activity using the information sheet as a guide.

Civil engineering guru. (2021, Moisture content of soils.

https://www.youtube.com/watch?v=uqR_gouQFYU



Instructors see Activity 3-Width Estimation Activity.

FOOTING STRUCTURES

KNOWLEDGE OBJECTIVE

1. State the types of footing sizes and requirements.
2. State the rebar and reinforcement requirements when laying foundation footings.
3. Explain the rebar layout for ground footing, masonry walls and timber walls.

PERFORMANCE OBJECTIVE

1. Install strip footing, slab on ground and pad footing.

ENABLING OBJECTIVE #6

1. **Gain** knowledge of the types of footing sizes and requirements.
2. **Gain** knowledge of the rebar layout for ground footing, masonry walls and timber walls.
3. **Gain** knowledge of the geometry requirements of slab-on-ground footing for masonry and timber walls.
4. **Gain** knowledge on the purpose of props to install posts for foundation footings.
5. **Practise** the installation of strip footing, slab-on-ground footing and pad footing.

LEARNING EXPERIENCE

Read Footings Section 6 in the Learner's Guide

CDEMA (2023). Learner's Guide: Construction Supervision of Houses. Section 6.2.4 Footings page 21-25.

Lesics (2021). Footings –Why are they used.
<https://www.youtube.com/watch?v=ZIKSAJ8B07U>

Katrina (2017). Bar bending schedule for footings/ estimation of reinforcement in footings.
<https://civilread.com/estimation-of-steel-reinforcement-footings/>

Watch the video “Types of foundations: Footings in construction buildings” Video demonstrating the installation of strip, slab-on-ground and pad footing. Participate in a construction laboratory exercise where strip footing, slab footings and pad footing are installed.

Civil Mentors (2018). Difference Between Foundation and Foundation Footings.

<https://www.youtube.com/watch?v=bXztZriWcRU>

Structures Explained. (2021). Types of foundations: Footings in building construction.

https://www.youtube.com/watch?v=s6E2t_kW57M



FOOTING STRUCTURES CONT'D

Additional videos:

UNDP Multicountry Office in Jamaica (2021, March 5th)
Quick tips for hurricane resilient foundations.

<https://www.youtube.com/watch?v=w59ISqCmlH4>

UNDP (2021, March 5). Building hurricane-resilient
foundations to the Bahamas building code.

<https://www.youtube.com/watch?v=3yfkZhpRI&list=PL8d3DnGxyIVY3PF-AvDGK6Ubkv9MIR46M&index=4>



TRENCHES & POSTS

	KNOWLEDGE OBJECTIVE
	1. State the purpose of trenches in building and excavating.
	2. Explain the purpose of props to install posts for foundation footings.
	PERFORMANCE OBJECTIVE
	1. Install timber posts.

ENABLING OBJECTIVE #7	
1. Gain knowledge on excavating a 4-foot hole and trenches.	
2. Supervise the digging of holes and trenches.	
3. Practise the installation of timber posts	
LEARNING EXPERIENCE	
Watch and take videos of a live demonstration on a construction site of a trench excavation process. Discuss the strengths and weaknesses of the live demonstration of a trench excavation process.	The instructor should highlight pertinent information and incorporate Caribbean examples.
Demonstrate the use of excavation tools and equipment, emphasising safety precautions and efficient work methods. Participate in the digging of a 4-foot hole for timber in order to communicate to workers the mechanics and the required depth of digging holes on a construction site.	Instructors see information sheet on "Organising The Digging Of A Trench On A Construction Site" US Department of Labour. (n.d). Excavation in construction/trenching.
Watch Excavation in construction/ trenching. Discuss ideas in the video on trenching requirements and workers' safety. Organise the digging of a trench on a construction site/simulated construction site to the specified depth and to check it meets the standard.	https://www.youtube.com/watch?v=cFYkeTOYk6k The instructor will design an online quiz based on information presented in the video.



LEVELLING PROCESS

	KNOWLEDGE OBJECTIVE
	1. Explain the importance of correct procedures prior to and during the levelling and bonding process in preparation for foundation footings.
	2. State the reasons and use of the levelling equipment.
	3. Describe the levelling process.
	PERFORMANCE OBJECTIVE
	1. Demonstrate the ability to mix, pour, level and trowel concrete to build a foundation footing according to specifications.

ENABLING OBJECTIVE #8	
1. Gain knowledge of the importance of correct procedures prior to and during the levelling and bonding process in preparation for foundation footings.	
2. Gain knowledge about the reasons and use of levelling equipment.	
3. Gain knowledge the levelling process.	
4. Practise demonstrating the levelling process in creating a foundation footing.	
5. Practise conducting the correct procedures prior to and during the levelling and bonding process.	
LEARNING EXPERIENCE	
Read information sheet "Correct Procedures Prior to and During Levelling and Bonding Process for Foundation Footings."	Instructors see "Correct Procedures Prior and During the levelling and Bonding process in preparation for foundation Information Sheet."
Watch a video on the correct procedures prior to and during the levelling and bonding process in preparation for foundation footings.	See https://www.buildsafe.cdema.org



FORMWORK

	KNOWLEDGE OBJECTIVE
	1. Discuss the construction techniques for laying foundation footings when working with the concrete such as mixing, pouring, trowelling and curing.
	2. Describe the materials used in foundation footings, such as concrete, reinforcements and formworks.
	PERFORMANCE OBJECTIVE
	1. Calculate formwork materials to build footings.
	2. Supervise the erection of the formwork for foundation footings.

ENABLING OBJECTIVE #9	
1. Gain knowledge of constructing formwork for foundation footing. 2. Calculate formwork materials to build footing. 3. Practise supervising the erection of the formwork for foundation footing.	
LEARNING EXPERIENCE	
Watch steps involved in formwork. Use the formwork activity worksheet to calculate formwork materials. (See Activity #4-Formwork materials calculation worksheet)	Desilets, R. (2017). The steps involved in formwork.
Participate in groups, in an erection formwork demonstration (See Practice Activity 4A-Erecting of Formwork), Upload pictures of formwork/ Take pictures of formwork samples and create an explanation board.	https://www.youtube.com/watch?v=RrYPysOnvG8
Explain to a worker, using a picture board, the process of formwork installation.	Instructors see: 1. Formwork Demonstration Sheet and Activity 4. 2. Formwork Materials Calculation Worksheet. 3. Practice Activity 4a Erecting of Formwork.



FOUNDATION WALLS

KNOWLEDGE OBJECTIVE
1. Discuss the construction techniques for laying foundation footings when working with the concrete such as mixing, pouring, trowelling and curing.
2. Describe the materials used in foundation footings, such as concrete, reinforcements and formworks.
PERFORMANCE OBJECTIVE
1. Calculate formwork materials to build footings.
2. Supervise the erection of the formwork for foundation footings.

ENABLING OBJECTIVE #10	
1. Gain knowledge of building foundation walls.	
2. Practise building the foundation walls according to building specifications.	
LEARNING EXPERIENCE	
Read article on mixing concrete for foundation walls.	Mixing Concrete. (n.d.). https://www.marshalls.co.uk/gardens-and-driveways/blog/how-to-mix-cement-to-make-mortar-or-concrete#:~:text=For%20foundations%2C%20a%20mix%20of,mix%20the%20other%20half%20later. 
Watch video on building foundation walls. Participate in a building foundation wall simulation.	RP E-learning. (2020, Aug.6). Rwanda Polytechnic-masonry-level 3- building a slab 1 of 2. https://www.youtube.com/watch?v=-Db-Dt-yHvg&list=RDCMUClIF3TNK8Y8OXrODK42nI2Q&start_radio=1&rv=-Db-Dt-yHvg&t=4 

TERMITE TREATMENT

	KNOWLEDGE OBJECTIVE
	1. Discuss the construction techniques for laying foundation footings when working with the concrete, such as mixing, pouring, trowelling and curing.
	2. Describe the materials used in foundation footings, such as concrete, reinforcements and formworks.
	PERFORMANCE OBJECTIVE
	1. Calculate formwork materials to build footings.
	2. Supervise the erection of the formwork for foundation footings.

ENABLING OBJECTIVE #11	
1. Gain knowledge on applying termite treatment.	
2. Organise the application of termite treatment to foundation footing	
LEARNING EXPERIENCE	
Participate in a lecture on termite biology, behaviour and treatment in construction projects.	The lecture should also explore different treatment types and the advantages and disadvantages.
Watch and participate in a live demonstration of the correct procedures for the application of termite treatment to foundation footings.	Instructors ensure the proper use of PPE equipment is also emphasised.
Practise application of termite treatment to foundation footing in a laboratory setting or in the field.	Instructors provide the opportunity for learners to apply termite treatment to foundation footing.

ESTIMATING THE WIDTH OF A FOUNDATION FOOTING

To estimate the width of a foundation footing, you must consider various factors such as the weight of the structure, soil type, load bearing capacity, and local building code requirements. Here is a general process to estimate the width of the foundation footing:

1. **Determine the load-bearing capacity:** Identify the load-bearing capacity of the soil on which the foundation will be built. This can be determined through soil testing or consulting soil reports prepared by geotechnical engineers. The load-bearing capacity will help determine the required width of the footing.
2. **Consult building codes:** Refer to local building codes and regulations to understand the minimum width requirements for foundation footings based on the soil type and the weight of the structure. Building codes provide guidelines to ensure the stability and safety of the foundation.
3. **Consider the weight of the structure:** Evaluate the weight of the structure that will be supported by the foundation. This includes considering the number of storeys, the type of construction (e.g., wood or concrete), and any additional loads (such as seismic loads) that may be applicable to the region.
4. **Determine the width estimate:** Based on the load-bearing capacity of the soil, the weight of the structure, and the building code requirements, estimate the initial width of the foundation footing. This estimate is typically a starting point and may be adjusted based on engineering calculations and site-specific conditions.
5. **Engage structural engineers:** In complex projects, structural engineers can be consulted to perform detailed calculations and analysis to determine the precise width of the foundation footings. This width will ensure that the footings can adequately distribute the load of the structure to the underlying soil and prevent excessive settlement or failure.
6. **Finalise the width:** Once the calculations have been done, and the structural engineer contacted where necessary, the final width of the foundation footing can be determined. This width will ensure that the footing can adequately distribute the load of the structure to the underlying soil and prevent excessive settlement or failure.

The estimation of foundation footing width is a critical task that requires expertise and adherence to local building codes and regulations. It is recommended to consult with qualified professionals, such as structural engineers or experienced builders, to ensure accurate calculations and compliance with applicable standards.

Calculating the width estimation

Step 1: Determine the Load-Bearing Capacity Factor.

Step 2: Calculate the initial width estimate:

- Multiply the weight of the structure by the load bearing capacity factor obtained in Step 1.
- Initial width estimate = Weight of structure $\times$ Load-bearing capacity factor.

Step 3: Adjust the Building Code Requirements (if applicable).

Step 4: Finalise the width estimate.

- Take into account any additional project-specific information (e.g. number of storeys, design considerations) and make any further adjustments, if required.

Estimate Width of Foundation Footing: _____

COMMUNICATING DEFECTIVE MATERIALS

Clear and Timely Reporting

- Immediately report the discovery of defective materials to the relevant stakeholders, such as project managers, supervisors or quality control personnel.
- Clearly communicate the nature of the defect, its location, and any potential risks or implications for the project.
- Support your report with detailed documentation, including photographs, measurements and any supporting evidence to support your report.

Collaborative Problem solving

- Engage in collaborative discussions with project team members, including architects, engineers, foremen and suppliers, to develop a plan for addressing the defective materials.
- Foster open and respectful communication to encourage the sharing of ideas and perspectives.
- Encourage all stakeholders to contribute their expertise and suggestions for resolving the issue.

Effective Stakeholder Communication

- Communicate with stakeholders who may be affected by the defective materials, such as clients, regulatory authorities, or subcontractors.
- Clearly and transparently explain the situation, the actions being taken to address the issue, and any potential impacts on the project timeline or budget.
- Keep stakeholders informed of any updates or changes throughout the resolution process.

Documenting and Tracking

- Maintain thorough documentation of all communication related to defective materials, including emails, meeting minutes, and any agreements or decisions made.
- Create a tracking system to monitor the progress of resolving the issue, ensuring that all necessary actions are taken in a timely manner.
- Update relevant stakeholders on the status of the issue and any change to the resolution plan.

Problem Escalation

- If the problem persists, escalate the problem to higher levels of management.
- Provide supporting evidence and documentation to justify the need for further intervention.

UNIT 1 - BUILD AND EXCAVATE FOUNDATION FOOTING - INFORMATION SHEET

INFORMATION SHEET: CORRECT PROCEDURES

Prior to and during the levelling and bonding process in preparation for foundation footings

Preparatory Steps:

1. **Site Inspection:** Conduct a thorough site inspection to assess the conditions and determine the location of the foundation footings. Consider factors such as soil type, drainage, nearby structures, any potential obstructions.
2. **Site Clearance:** Clear the site of vegetation, debris, or existing structures that may interfere with the levelling and bonding process.
3. **Marking and Layout:** Mark the layout of the foundation footings on the ground, following the approved architectural or engineering plans. Use stakes, strings, or other appropriate marking tools for accuracy.
4. **Levelling:** Use a levelling tool, such as a laser level or string level, to ensure that the compacted base is level and in accordance with the required slope and elevation as specified in the building plans. Make necessary adjustments as needed.

Excavation:

5. **Excavation Plan:** Develop an excavation plan based on the foundation layout. Consider the depth, width, and shape of the footings as specified in the building plans.
6. **Excavation Process:** Excavate the soil within the marked areas using appropriate equipment, ensuring that the depth and dimension of the trenches are consistent with the design requirements. Excavate the trenches to a level where a uniform, solid base can be established.

Levelling and Compacting:

7. **Base Preparation:** Ensure that the bottom of the excavated trenches is firm, level, and free of loose soil, debris, and standing water.
8. **Compaction:** Compact the base of the trenches using suitable compaction equipment, such as a plate compactor or vibrating roller, to achieve the required level of compaction or stability. Repeat the compaction process in layers if necessary, ensuring uniformity across the entire base.
9. **Levelling:** Use a levelling tool, such as a laser level or string level, to ensure that the compacted base is level in accordance with the required slope or elevation as specified in the building plans. Make necessary adjustments as needed.

Bonding:

10. Bonding Agent: Apply a bonding agent, such as a cement slurry or epoxy resin, to the sides and bottom of the excavated trenches. The bonding agent improves the bond between the footing and the surrounding soil.
11. Formwork Installation: Install formwork along the sides of the trenches to define the shape and dimensions of the footings. Ensure the formwork is secure and aligned with the marked layout.
12. Reinforcement placement: If reinforcement steel (rebar) is required, place it in the trenches as per the design specifications. Ensure proper spacing, alignment, and secure placement of the rebar within the formwork.
13. Pouring concrete: Pour concrete into formwork, starting from one end and gradually filling the entire footing area. Ensure the concrete is evenly distributed and properly consolidated to eliminate air pockets or voids.
14. Finishing: Use appropriate tools to finish the concrete surface, such as a trowel, to achieve the desired smoothness and surface quality.

Curing and Protection:

15. Curing: Follow appropriate curing procedures to ensure the concrete attains sufficient strength and durability. This may include covering the concrete with curing blankets, applying curing compound or providing moist curing.
16. Protection: Protect the newly poured footings from adverse weather conditions, excessive heat, or other potential damage. Use suitable protective measures such as covering with tarps or providing temporary shelters.

UNIT 1 - BUILD AND EXCAVATE FOUNDATION FOOTING - INFORMATION SHEET

TYPES OF BUILDERS' LEVELS	
Tool/ Equipment	Description
STRING LINE LEVEL 	String line levels are simple and inexpensive levelling tools consisting of a string or wire with a level bubble. Line levels are commonly used for establishing level lines over shorter distances, such as for alighting foundation footings. They can be attached to stakes or strings to create straight and level reference lines.
SPIRIT LEVEL 	Spirit levels use a liquid filled vial with an air bubble inside. Guides on the vial indicate when the bubble is centred, showing the user that it is level.
BUILDER'S LEVEL 	A traditional levelling tool that consists of a telescope mounted on a tripod. It uses a spirit level and graduated rod to measure height difference and establish level lines. Builder's levels are used for larger-scale projects where precise levelling is required.
LASER LEVEL 	A more advanced level that uses a laser beam to establish level lines. Laser levels provide high accuracy and efficiency, making them popular in modern construction projects. They can be either manual or self-levelling and offer various features like horizontal and vertical levelling.
DIGITAL LEVEL 	A digital levelling device utilises electronic sensors and displays to provide accurate levelling readings. Digital levels offer quick and precise measurements, often with digital displays and audible alerts. They are compact, easy to use, and suitable for smaller scale levelling tasks.

INFORMATION SHEET: ORGANISING THE DIGGING OF A TRENCH ON A CONSTRUCTION SITE

Here are the steps to be followed:

Project Planning and Preparation

1. Determine the purpose and specification of the trench, such as soil type, width and length.
2. Assess the site conditions, including the presence of utilities, soil type and any potential obstacles or hazards.
3. Identify the required permits, approvals, and any specific regulations or codes that need to be followed for trenching activities.

Design and Layout

4. Prepare a detailed trench design and layout plan, indicating the dimensions, slope, and any additional features like supports and shoring.
5. Ensure that the trench design complies with local building codes, safety regulations and engineering requirements.

Utility and Service Locating

6. Contact utility companies to locate and mark the underground services, such as water lines, gas lines, electrical cables, or communication lines, in the vicinity of the proposed trench.
7. Verify the accuracy of the utility markings before proceeding with the trenching activities.

Equipment and Materials

8. Determine the required equipment for trench excavation, which may include excavators, shovels, hand tools, and safety equipment.
9. Ensure the availability and proper functioning of the equipment and tools needed for the trenching work.
10. Arrange for the delivery of construction materials such as gravel, sand or concrete, if required, for backfilling or support.

Safety Preparations

11. Conduct a comprehensive safety assessment and develop a trench-specific safety plan.
12. Provide appropriate personal protective equipment (PPE) for all workers involved in trenching activities.
13. Ensure workers are trained in trench safety protocols, including the use of shoring, trench boxes or other protective systems.

Communication and Coordination

14. Communicate the trenching plan, design and safety requirements to all relevant stakeholders, including workers, supervisors, and subcontractors.
15. Coordinate with other construction activities or trades that may be impacted by the trenching work, ensuring proper sequencing and minimising disruptions.

Site Preparation

16. Clear the area of debris, vegetation, or obstructions that may hinder the trenching process.
17. Mark the boundaries of the trench on the ground using paint or other visible markers, to guide the excavation work.

Excavation and shoring

18. Begin the excavation process according to the planned dimensions, using appropriate excavation techniques and equipment.
19. Monitor the excavation process to ensure the trench remains stable and does not exceed the planned dimensions.
20. Install shoring or other protective systems as needed to maintain the stability of the trench sidewalls.

Inspection and Quality Control

21. Conduct regular inspections during the trenching process to ensure compliance with design specifications, safety protocols and building codes.
22. Address any issues or deviations promptly and take corrective measures as required.

Backfilling and Restoration

23. Once the trenching work is complete, backfill the trench using suitable materials.

Documentation and Record keeping

24. Maintain thorough documentation of the trenching activities, including design plans, permits, inspections, and any changes or incidents that occurred during the process.
25. Keep records of safety training, equipment inspections, and maintenance to ensure compliance with regulatory requirements.

PRACTICE ACTIVITY FOR UNIT 1 - BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: FOUNDATION FOOTING

You are a construction site supervisor overseeing the excavation and construction of foundation footings at a residential home. Your role is to ensure that all health and safety standards are followed to protect the workers, promote a safe working environment, and meet new regulatory requirements.

Scenario Description:

The project involves constructing the foundation footings for a new residential home. You have a team of skilled workers who will be responsible for excavating the site and building the footings. Your objective is to implement and enforce health and safety standards throughout the process to mitigate risks and ensure a safe working environment.

Key Elements of the Scenario:

1. **Safety Briefing:** Begin the day with a comprehensive safety briefing for all workers involved in the excavation and construction of foundation footings. Emphasise the importance of following health and safety standards, identify potential hazards specific to the project (especially working with concrete) and explain the proper use of professional protective equipment (especially working with concrete).
2. **Site Assessment:** Conduct a thorough site assessment before beginning excavation work. Identify and mark any underground utilities, including water lines, gas lines, or electrical cables, to avoid damage during the excavation process. Ensure workers are aware of the locations and take the necessary precautions to prevent utility strikes.
3. **Excavation Safety:** Implement proper safety measures during the excavation process. This includes establishing proper slope angles or shoring to prevent cave-ins, providing safe access and egress points to the excavation area and maintaining stable trench walls throughout the project.
4. **Personal Protective Equipment (PPE).** Ensure that all workers on the site wear appropriate PPE. This may include hard hats, high-visibility vests, steel-toed boots, gloves, and safety glasses. Always encourage and enforce the use of PPE during excavation and construction activities.
5. **Equipment Inspection:** Regularly inspect excavation and construction equipment to ensure proper functioning of safety equipment. This includes machinery such as excavators, backhoes, and concrete mixers. Verify that operators are trained and certified to operate the equipment safely.

6. **Material Handling:** Promote safe material handling practices to prevent injuries. Train workers on proper lifting techniques, encourage teamwork when moving heavy objects, and provide mechanical aids such as wheelbarrows or forklifts when necessary.
7. **Fall Protection:** Implement fall protection measures when working at heights. For example, if workers are required to work on scaffolding or elevated platforms during the construction of footings, ensure that proper guardrails, safety harnesses, and fall arrest systems are in place.
8. **Electrical Safety:** Address electrical safety hazards by ensuring proper grounding of electrical equipment and tools, using ground fault circuit interrupters (GFCIs), and avoiding contact with overhead powerlines. Provide training and guidelines to workers on electrical safety practices.
9. **Emergency Preparedness:** Establish emergency response protocols in case of accidents, injuries, or other emergencies on the construction site. Ensure that first aid kits, fire extinguishers, and emergency contact information are readily available and that workers are trained in basic first aid procedures.

PRACTICE ACTIVITY FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: BUILDING CODES RESEARCH FINDINGS		
Standards	Description	Findings
Minimum width and depth of foundation footing	What are the minimum width and depth depending on the region and soil?	
Footings materials quality	What specific materials release agent, strengths and durability requirements are specified by the code?	
Reinforcement	What is the minimum reinforcement for foundation footings?	
Soil and site considerations	What are the soil and site considerations outlined in the code or quality assurance standards?	
Construction techniques	What excavation practices, compaction of soil, forming and placement of footings?	

PRACTICE ACTIVITY FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: WIDTH ESTIMATION ACTIVITY

Instructors place learners into groups or pairs. Assign each group a soil type to work with (clay, sand, loam etc.). Provide students with a set of building specifications (e.g. weight of the structure, number of stories) and the corresponding building codes guidelines for the width of foundation footings. Instruct students to estimate the width of the foundation footing required for their assign soil type, based on the provided specification and building code guidelines.

INSTRUCTIONS

Use the given parameters and consideration to estimate the width of the foundation footing:

1. Soil type:
a. Load bearing Capacity:
2. Weight of structure:
3. Local Building Code Requirements
4. Additional Project-specific information:
a. Number of storeys:
b. Design considerations:

WORKSHEET FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: FORMWORK MATERIALS CALCULATION WORKSHEET TEMPLATE

This worksheet will help you calculate the formwork materials required for your project. Make sure to adjust the calculations and material requirements based on the specific dimensions, project requirements, and any other factors relevant to your construction project.

Project:	Date:
Length	
Width	
Height	
Side 1	
Side 2	
Side 3	
Side 4	
Top	
Bottom	
Total Surface Area	
Walls	
Columns	
Beams	
Others	
Total Number of Components	
Surface Area per component	
Total surface area of components	
Wastage Percentage:	
Additional surface area for wastage:	
Total Surface Area with wastage:	

FORMWORK MATERIAL REQUIREMENTS	
Material	Quantity

PRACTICE ACTIVITY FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: ERECTION OF FORMWORK DEMONSTRATION

Objective: To demonstrate the proper techniques and procedures for the erection of formwork in a construction project.

MATERIALS NEEDED

- Hammer or screwdriver
- Level
- Measuring Tape
- Nails or screws
- Safety equipment (hard hat, gloves and safety glasses)
- Wooden planks or plywood sheets

INSTRUCTIONS

In a construction laboratory, provide a step-by-step demonstration of the formwork erection process. Candidates should be placed in groups, with each candidate participating in the demonstration.

- a. Discuss the layout and design requirements for the specific formwork.
- b. Show how to measure the dimensions for the formwork.
- c. Demonstrate the proper assembly and joining of formwork components.
- d. Explain the techniques for bracing and securing the formwork to ensure stability.
- e. Emphasise the importance of proper alignment and levelling of the formwork.
- f. Highlight safety precautions and the use of personal protective equipment.

HANDS-ON PRACTICE

- a. Divide the participants into small groups.
- b. Provide each group with the necessary materials and tools for erecting formwork.
- c. Assign a specific formwork design or dimensions for each group to work on.
- d. Instruct participants to follow the demonstrated steps and erect the formwork accordingly.
- e. Circulate among the group to provide guidance and clarification as needed.
- f. Facilitate group discussion and feedback.
- g. Bring all participants together for a group discussion.
- h. Allow each group to present their erected formwork and explain their process.
- i. Encourage questions, observations and feedback from both participants and facilitators.
- j. Summarise the key points and address any misconceptions or areas that require further clarification.

CONCLUSION

- a. Recap the key concepts and techniques learned during the activity.
- b. Emphasise the importance of following proper procedures for formwork erection.

PRACTICE ACTIVITY FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

PRACTICE ACTIVITY: CONSTRUCTION SITE CLEAN-UP SIMULATION

Objective: To simulate the process of cleaning up a construction site and reinforce the importance of maintaining a safe and organised work environment.

MATERIALS NEEDED

- Simulated construction debris
- Brooms, dustpans, and cleaning tools
- Garbage bags or containers
- Safety equipment (gloves, safety glasses, and any additional personal protective equipment)

INSTRUCTIONS

1. **Introduction:**
 - a. Provide an overview of the importance of construction site clean-up while maintaining safety and productivity.
 - b. Explain the objectives of the learning activity.
2. **Preparing the Work Area (10 minutes):**
 - a. Set up a designated area that represents a simulated construction site with debris scattered abroad.
 - b. Ensure the area is clear of any hazards and provides enough space for participants to move around and clean up.
3. **Demonstrating Construction Site Clean-up:**
 - a. Step-by-step demonstration of the construction site clean-up process.
 - b. Discuss the importance of identifying and prioritising areas for clean-up.
 - c. Demonstrate the proper techniques for gathering and collecting data.
 - d. Explain the use of appropriate tools and equipment for cleaning, such as brooms and dustpans.
 - e. Emphasise the use of appropriate disposal methods for different types of debris.
 - f. Highlight safety precautions and the use of personal protective equipment during clean up.

4. Hands-on-simulation:

- a. Divide participants into small groups.
- b. Provide each group with the necessary materials and tools for the simulation.
- c. Assign specific areas of the simulated construction sites for each group to clean up.
- d. Instruct participants to follow the demonstrated steps and clean up their assigned areas.
- e. Encourage participants to work together, communicate effectively and maintain safety throughout the process.
- f. Circulate among the group to provide guidance and clarification as needed.

5. Group Discussion and Reflection:

- a. Bring all participants together for a group discussion.
- b. Allow each group to share their experiences and challenges faced during the simulation.
- c. Discuss the importance of teamwork, organisation and time management in construction site clean-up.
- d. Reflect on the impact that a clean and organised work environment has on safety, productivity, and overall project success.

6. Conclusion:

- a. Recap the key concepts and techniques learned during the activity.
- b. Emphasise the importance of maintaining a clean and safe construction site throughout the project.

PERFORMANCE ASSESSMENT FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

CHECKLIST: ASSESSING THE ORGANISATION AND THE DIGGING OF A TRENCH ON A CONSTRUCTION SITE

Use the checklist to observe the learner; give feedback to the learner from the checklist

Learner's Name	Date:	
Competency Units:	Test Attempt	
Facilitator's Signature/Approval:		
Directions: As a construction supervisor, you are to organise the digging of a trench to prepare for the foundation footings.	Mastery	75-100
	Proficient	60-74
	Competent	50-59
	Not competent	40-50
	Not competent	Below 40
PERFORMANCE STANDARDS Reflecting the learner's competence, all items should receive a "Yes", "No" or "N/A" response.		

BEFORE TRENCHING			
Activities	Yes	No	N/A
Project planning and preparation has been completed, including defining trench specifications and assessing site conditions. The specifications must be stated orally.			
Trench design and layout plan has been prepared, considering depth, width, slope and any necessary support or shoring.			
Layout markings are accurate and visible.			
Equipment and materials required for trench excavation are available and in good working condition.			
Safety precautions have been taken, including developing a trench-specific safety plan and providing appropriate PPE.			

DURING TRENCHING			
Activities	Yes	No	N/A
Communication and coordination among stakeholders have taken place, ensuring understanding of the trenching plan, design and safety requirements.			
Site preparation has been completed, including clearing the area and marking the boundaries of the trench.			
Excavation is being carried out according to planned dimensions and using appropriate techniques and equipment.			
Shoring or protective systems are in place to maintain stability and prevent cave-ins.			
Regular inspections are being conducted to ensure compliance with design specifications, safety protocols and building codes.			
Any issues or deviations encountered during the trenching process are being addressed promptly with appropriate corrective measures.			
Safety measures and protocols including the use of barricades, warning signs, and worker supervision, are being observed.			

AFTER TRENCHING			
Activities	Yes	No	N/A
Backfilling is being done using suitable materials, compacted in layers to ensure stability.			
Site restoration is being carried out as required, including grading, and reseeded if necessary.			
Thorough documentation of the trenching activities is maintained, including design plans, permits, changes and incidents.			
Records of safety training, equipment inspection and maintenance are being kept for compliance purposes.			
Evaluator's Signature:			

ASSESSMENT METHOD FOR UNIT 1- BUILD AND EXCAVATE FOUNDATION FOOTING

Assessment of this module will be carried out as follows:

- Observation
- Questioning
- Completed Worksheets and activities
- Pictures or videos of formwork, and different types of footings
- Use of equipment
- Online quiz

UNIT 2

INSTALL FLOORS IN CONCRETE AND TIMBER HOMES



CLUSTER 1

UNIT 2 - BCGCSS003A - INSTALL FLOORS IN CONCRETE AND TIMBER HOMES

SUGGESTED TIME: 120 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on the knowledge and skill to install floors in concrete and timber homes.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install suspend and reinforced concrete slab fill.
3. Install a suspended timber floor.
4. Execute industry standard clean-up methods.
5. Clean up.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 2 Information Sheet	Calculating Building Materials for Concrete Floors	64
	Calculation of Floors Worksheet	65
	Equipment Needed for Working with Concrete to Lay Floors	67
Unit 2 Performance Activity	Equipment and Tools for Laying Concrete Floors	69
Unit 2 Check List	Equipment and Tools for Laying Concrete Floors	70
Unit 2 Information Sheet	Formwork	72
Unit 2 Performance Activity	Building Formwork	73
Unit 2 Information Sheet	Suspended Reinforced Slab Fill	75
Unit 2 Learning Activity	Pouring Concrete Scenario	77
Unit 2 Performance Assessment	Pouring of Concrete	79
Unit 2 Learning Activity	Suspended Reinforced Concrete Slab Fill	81
Unit 2 Performance Assessment	Suspended Reinforced Concrete Slab	82
Unit 2 Information Sheet	Steps For Measuring, Cutting, and Fastening Timber Components to a Floor Frame	84
Unit 2 Self Assessment	Installing Timber Floor Planks and Securing Floorboards	86
	Installing Timber Floors and Securing Floorboards	88
Unit 2 Performance Assessment	Installing Timber Floor Planks	89

QUALITY ASSURANCE: BUILDING MATERIALS

KNOWLEDGE OBJECTIVE

1. Outline the quality assurance requirements for building materials.
2. Discuss the quality materials needed to meet quality assurance specifications.

PERFORMANCE OBJECTIVE

1. Select quality building materials for ground floor, suspended reinforced concrete slabs and suspended timber floors.
2. Measure to determine the quantities of building materials needed to build concrete and timber floors.
3. Calculate the building materials used to build concrete and timber floors.
4. Calculate the steel work (rebars) needed to build a concrete floor.

ENABLING OBJECTIVE #1

1. **Gain knowledge** on the quality assurance requirements for building materials for constructing floors in residential homes.
2. **Gain knowledge** of the building materials needed for a typical ground floor, suspended concrete slab, and suspended timber floor.
3. **Select** quality building materials for ground floor, suspended reinforced concrete slabs and suspended timber floors.
4. **Practise** measuring to determine the quantities of building materials needed to build concrete and timber floors.
5. **Practise** calculating the building materials needed to build a typical ground floor, suspended concrete slab and suspended timber floors.
6. **Practise** calculating the steel work for building concrete and timber floors.

LEARNING EXPERIENCE

Research building codes and standards relevant to residential construction in your country or region.

Write a list of the specifications for the building materials needed for construction of timber floors and concrete floors.

Research the properties, advantages and disadvantages of each material including factors such as strength, durability, thermal performance, cost, and environmental impact.

Create a comparison chart or presentations to highlight the qualities of each material and discuss their suitability for specific applications.

Read Section 7-Floors, then use the information to calculate building materials.

Calculate building materials needed for the construction of concrete floors.

See CDEMA. (2024). Learner's Guide: Construction Supervision of Houses. (Section 7)

EQUIPMENT NEEDS

KNOWLEDGE OBJECTIVE

1. Discuss Occupational Health & Safety requirements for constructing timber and concrete floors.
2. Discuss the building materials needed for a typical ground floor, suspended reinforced concrete slab and suspended timber floor.
3. Discuss the equipment needed to construct concrete and timber floors.
4. State the appropriate personal protective equipment needed for the construction of concrete and timber floors.

PERFORMANCE OBJECTIVE

1. Select the appropriate equipment needed to build concrete and timber floors.

ENABLING OBJECTIVE #2

1. **Gain** knowledge of the equipment needed to construct concrete and timber floors.
2. **Gain** knowledge of the appropriate personal protective equipment needed for the construction of concrete and timber floors.
3. **Practise** selecting the appropriate equipment needed to build concrete and timber floors.
4. **Practise** selecting and wearing personal protective equipment.

LEARNING EXPERIENCE

Watch video describing the equipment needed to construct concrete and timber floors.	Civil engineering 4 u. (2021). Construction tools and Equipment. https://www.youtube.com/watch?v=sGNbsZbbefo
Complete online quiz.	The Instructor will create a quiz to test knowledge of different types of equipment and their purpose.
Watch a video on appropriate personal protective equipment when working with concrete.	Teach construction community. (2021). Construction PPE-Basic Construction Safety Series-Trades training videos series. https://www.youtube.com/watch?v=DI-HrlQ0DZg
Read the information sheet on equipment and tools and complete the activity.	RP E-learning. (n.d.) Setting out Tools and Equipment. https://www.youtube.com/watch?v=4-mSolJEff4&list=PLo0HI5Dow7ykzPN68zoX9ys9VuX-4lqtz



TERMITE TREATMENT

	KNOWLEDGE OBJECTIVE
	1. Explain the importance of protecting the wood needed for floor construction.
	PERFORMANCE OBJECTIVE
	1. Apply termite treatment to protect wood.

ENABLING OBJECTIVE #3	
1. Gain knowledge of applying termite treatment to protect wood.	
2. Practise applying termite treatment to protect wood.	
LEARNING EXPERIENCE	
Participate in a hands-on demonstration of how to protect wood using a termite treatment. This can be done in a controlled environment with mock wood structures and appropriate termite treatment products.	Instructor will organise for a termite treatment company to perform the demonstration.
Take pictures of the procedures demonstrated and materials used, and use them to create a termite treatment.	

FORMWORK

	KNOWLEDGE OBJECTIVE	
	1.	State the purpose of formwork.
	2.	Explain the building specifications for pouring a concrete floor.
	PERFORMANCE OBJECTIVE	
	1.	Build formwork for preparation for pouring concrete floors.

ENABLING OBJECTIVE #4	
1. Gain knowledge on the purpose of formwork.	
2. Practise building formwork in preparation for pouring concrete floors.	
LEARNING EXPERIENCE	
Watch video on types of formwork for concrete structures.	Natsoulis, N. (2019). Types of formwork for concrete structures. https://www.ny-engineers.com/blog/types-of-formwork-for-concrete-structures
Read handout on formwork construction.	The instructor can organise for a carpenter to demonstrate the building of formwork according to design.
Participate in a demonstration of building formwork.	
Complete the performance activity.	



BUILDING CONCRETE FLOORS - ON FILL & SUSPENDED

KNOWLEDGE OBJECTIVE

1. Discuss the procedures to build a suspended reinforced concrete slab fill.
2. Explain the building specifications for pouring a concrete floor.
3. Discuss the procedures to build a suspended timber floor.
4. Explain the purpose of spacers, joists, plans, and sole plates in the building of timber floors.
5. Explain the purpose of spacers.

PERFORMANCE OBJECTIVE

1. Build concrete floors using concrete slabs.
2. Organise the pouring of concrete floors

ENABLING OBJECTIVE #5 & 6

1. **Gain knowledge** of pouring of concrete.
2. **Gain knowledge** of the procedures to build a suspended reinforced concrete slab fill.
3. **Practise** organising the pouring of concrete to make concrete floors.
4. **Practise** building concrete floors using concrete slabs.

LEARNING EXPERIENCE

Read the article "How to Pour Concrete."	Natsoulis, N. (2019). Types of Formwork for Concrete Structures. https://www.ny-engineers.com/blog/types-of-formwork-for-concrete-structures
Discuss the importance of proper organisation when working with concrete on a construction site.	Rwanda Polytechnic. (n.d.) Masonry Level 3, Building a Slab. https://www.youtube.com/watch?v=9pMFEG4XIlw
Review visual aids or video that illustrates the step-by-step process of organising concrete.	Ortiz-Vega, G. (2021). How to Pour Concrete. https://www.wikihow.com/Pour-Concrete
Discuss the significance of accurate measurements and markings to ensure the correct placement of concrete.	
Participate in a demonstration on pouring concrete.	
Watch a video demonstration of the purpose, significance of a suspended reinforced concrete slab fill in construction as well as the process and sequence of construction steps involved in building the slab fill.	Video on 'Steps to build a suspended reinforced concrete slab'. See https://www.buildsafe.cdema.org Ortiz-Vega, G. (2021). How to pour concrete. https://www.wikihow.com/Pour-Concrete
Participate in small groups, in a construction site mock up and demonstrate the steps to construct a suspended reinforced concrete slab.	
Participate in group discussion, sharing experiences, challenges, observations during the hands-on practice.	The facilitator will encourage participants to reflect on the importance of each step and the interplay between different elements of the construction process.



BUILDING TIMBER FLOORS

KNOWLEDGE OBJECTIVE

1. Discuss the procedures to build a suspended timber floor.
2. Explain the purpose of spacers, joists, plans, and sole plates in the building of timber floors.
3. Explain the purpose of spacers.

PERFORMANCE OBJECTIVE

1. Build timber floors using quality timber materials.
2. Install joists, straps and spacers during floor construction

ENABLING OBJECTIVE #7

1. **Gain knowledge** of building quality timber floors.
2. **Gain knowledge** on the purpose of spacers, joists and sole plates in building timber floors

LEARNING EXPERIENCE

Discuss floor planning in building timber floors. In your discussion, mention load bearing capacity, subfloor preparation and moisture protection.

In rotation groups (have different stations where each station focuses on a different task), focus on a specific area of floor framing process such as joist installation, beam support, floor installation to name a few. The groups will move to each station in order to try each process.

Read Information Sheet on cutting, measuring, and fastening the timber components to a floor frame.

Participate in a demonstration where in groups, learners observe the cutting, measuring and fastening of the timber components to construct the floor frame.

Participate as a group in the installation of timber floor planks and secure floorboards in place.

Strong Homes. (2008, Sept 8.). Hurricane Straps. [Video].

YouTube. <https://www.youtube.com/watch?v=JbGCxFN7nfM>

Gol, N. (2021). How Important Are Hurricane Straps?

<https://www.ngplatinumhomes.com/post/how-important-are-hurricane-straps>

BRC. Hurricane Straps.

<https://brcwestindies.com/wp-content/uploads/2017/03/straps-1.pdf>

The instructor will set up the stations for the specific areas



CALCULATING BUILDING MATERIALS FOR CONCRETE FLOORS

Calculating building materials for concrete floors and timber floors requires consideration of different factors. Here's a general overview of the materials needed for each type of floor.

Concrete Floors:

1. Concrete: Calculate the volume of concrete needed based on the floor area and desired thickness. Floor thickness determined from span/depth tables in CRCP 10:2023. The formula is:

$$\text{Concrete volume} = \text{Floor Area} \times \text{floor thickness}$$

2. Floor Rebars: Calculate the number of floor rebars required based on engineering specifications and local building codes. Determine the length of rebars using the rebar tables in CRCP 10:2023.

$$\text{Floor rebars} = \text{length of rebars in each direction}$$

3. Formwork: Calculate the amount of formwork needed to shape and support the concrete during pouring and curing. Measure the perimeter and height of the floor.
4. Subbase and Subgrade Preparation: Estimate the quantity of aggregate material needed for the subbase and subgrade preparation. This depends on the type of soil and desired compaction.

Timber Floors:

1. Joists or Beams: Determine the number, size and spacing of timber joists or beams required based on the floor span, load-bearing capacity and local building codes.

$$\text{Length of Timber Joists} = \text{Length of wall section} / \text{Joist spacing} + 1$$

2. Subfloor: Calculate the amount of subfloor material such as plywood or oriented strand board (OSB), based on the floor area and thickness.
3. Finished Flooring: Calculate the material needed for the finished flooring, such as hardwood, laminate, or engineered wood. This depends on the floor area and desired coverage.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

CALCULATION OF FLOORS WORKSHEET

1. Concrete Floors:

A. Floor Area

a. Length	ft (or metres)
b. Width	ft (or metres)
c. Total Floor Area	sq ft (or sq metres)

B. Thickness of Concrete

a. Desired Thickness	inches (or centimetres)
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C. Concrete Calculation

a. Volume of Concrete = Floor Area x Thickness	
b. Volume of Concrete	Cubic ft (or cubic metres)

D. Floor Rebars

a. Determine the quality and length of rebars or steel mesh needed.	
---	--

E. Framework

a. Perimeter of the Floor	ft (or metres)
b. Height of the Floor	ft (or metres)
c. Total Formwork Quality	sq ft (or sq metres)

F. Subbase and subgrade preparation

Follow engineering specifications and local guidelines for estimating the quantity of aggregate material needed for subbase and subgrade preparation.

2. Timber Floors:

A. Floor Area

a.	Length	ft (or metres)
b.	Width	ft (or metres)
c.	Total Floor Area	sq ft (or sq metres)

B. Joists or Beams

a.	Span	ft (or metres)
b.	Load-Bearing Capacity	lbs/ft (or kg/m)
c.	Joist Spacing	inches (or centimetres)
d.	Number of Joists	

C. Concrete Calculation

a.	Volume of Concrete = Floor Area x Thickness	Cubic ft (or cubic metres)
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D. Subfloor

a.	Thickness of subfloor	inches (or centimetres)
b.	Material	(e.g, plywood, OSB)
c.	Total Subfloor Quantity	sq ft (or sq metres)

E. Finished Flooring

a.	Material (e.g Hardwood, Laminate, Engineered Wood)	
b.	Coverage per pack	sq ft (or sq metres)
c.	Number of packs needed	

INFORMATION SHEET UNIT 2 -INSTALL FLOORS IN CONCRETE AND TIMBER HOMES

EQUIPMENT NEEDED FOR WORKING WITH CONCRETE TO LAY FLOORS	
Tool/ Equipment	Description
CONCRETE MIXER 	Used to mix the concrete ingredients, including cement, sand, aggregates and water, to create a consistent and uniform mixture.
CONCRETE SCREED 	Used to level and smooth the surface of freshly poured concrete. It can be a straight board or a vibrating screed for achieving an even and flat concrete finish.
BULL FLOAT 	A large, flat tool used to smooth and level the concrete surface. It helps remove excess water and fills voids to create a uniform surface.
HAND TROWELS 	These small handheld tools are used for finishing and smoothing the surface of the concrete. They come in various shapes and sizes, including margin trowels and finishing trowels.
EDGER 	Used to create a rounded edge along the perimeter of the concrete floor. It helps prevent chipping and adds a neat finish.
GROOVER 	Used to create control joints or decorative patterns in the concrete surface. It helps control cracking and allows for expansion and contraction.
CONCRETE FLOATS 	A flat or slightly curved tool used to level and smooth the surface of wet concrete. It helps remove imperfections and creates a uniform texture.

EQUIPMENT NEEDED FOR WORKING WITH CONCRETE TO LAY FLOORS

Tool/ Equipment	Description
POWER TROWEL 	A motorised tool with rotating blades used for large scale concrete flooring projects. Power trowels provide a smoother and more polished finish compared to hand trowels.
CONCRETE VIBRATOR 	Used to consolidate and remove air pockets from the freshly poured concrete. It improves the concrete's density and eliminates voids, while offering an enhanced strength and durability.
CONCRETE GRINDER 	Equipped with abrasive discs, it is used to grind and polish and achieve an even finish; it can be used for concrete floor preparation and refinement.
MOISTURE METER 	Used to measure the moisture content of the concrete before applying floor coverings. It helps ensure proper moisture levels to prevent such issues as floor covering delamination or adhesive failure.
MIXING TOOLS 	These include shovels, buckets and wheelbarrows for manually mixing and transporting concrete.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

PERFORMANCE ACTIVITY: EQUIPMENT AND TOOLS USED FOR LAYING CONCRETE FLOORS

Objective: Candidates must familiarise themselves with the equipment and tools used for laying concrete floors and demonstrate their proper use.

MATERIALS NEEDED:

- Build float
- Concrete float
- Concrete mixer
- Concrete screed
- Edger
- Groover
- Hand trowels
- Personal Protective Equipment

INSTRUCTIONS

1. In designated area used to simulate the process of laying a concrete floor, gather the necessary equipment and tools listed above.
2. Put on the required personal protective equipment (PPE) to ensure your safety during the activity.
3. Begin by simulating the mixing of concrete using the concrete mixer. If no concrete mixer, use buckets and shovels.
4. Once the concrete mixture is ready, simulate the pouring of the concrete onto the designated area.
5. Use the concrete screed to level and smooth the surface of the poured concrete. Practise using both a straight board and a vibrating screed to achieve a flat and even finish.
6. Next, simulate the use of a bull float to further smooth the surface of the concrete. Move the bull float back and forth to eliminate any ridges or imperfections.
7. Take the hand trowels and demonstrate their use in finishing the concrete surface. Practise different techniques such as smooth finish and swirl finish, using proper hand movements and pressure.
8. Use the edger tool to create a rounded edge along the perimeter of the simulated concrete floor. Move the edger along the edges to create a clean and professional finish.
9. Simulate the creation of control joints or decorative patterns using the groover tool. Show how the groover is used to cut lines into the concrete surface, providing control for cracking and adding aesthetic appeal.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

CHECKLIST: EQUIPMENT AND TOOLS FOR LAYING CONCRETE FLOORS

Use the checklist to evaluate each candidate; give feedback to the participant from the checklist.

Participant's Name:		Date:	
Preparation			
Activities	Yes	No	Comment
Gathered all the necessary equipment and tools.			
Ensured the availability of personal protective equipment (PPE).			
Appropriate PPE worn accurately			
Execution			
Activities	Yes	No	Comment
Demonstrated the proper use of the mixer.			
Simulated the pouring of the concrete onto the designated area.			
Used the concrete screed to level and smooth the surface of the concrete.			
Used the bull float to further smooth the surface of the concrete.			
Practised various trowel techniques for finishing the concrete surface.			
Utilised the edger tool to create a rounded edge along the perimeter of the floor.			
Used the concrete float to further refine the surface and achieve a uniform texture.			

Post Activity			
Activities	Yes	No	Comment
Cleaned and stored the equipment and tools properly.			
Removed and properly disposed of any waste.			
Checked for any safety hazards and addressed them accordingly.			
Additional Comments/Notes:			
Evaluator's Signature:			

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

INFORMATION SHEET: FORMWORK

Formwork for concrete is the total system for freshly placed concrete, including the mould or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing. The purpose of formwork for laying a floor is to provide temporary support and containment for freshly poured concrete until it cures and gains sufficient strength to support its own weight and any imposed loads. Formwork, also known as shuttering or moulds, serves the following purposes

1. **Shape and structure:** Formwork creates the desired shape, size, and structure of the floor. It defines the dimensions and contours, ensuring the concrete is poured in the correct configuration.
2. **Support and stability:** Formwork provides support and stability to the wet concrete during the pouring and initial curing stages. It prevents the concrete from spreading or deforming under its own weight and helps maintain the desired level and alignment.
3. **Concrete containment:** Formwork contains the concrete within the designated area, preventing it from flowing or spilling over. It ensures that the concrete is confined within the planned floor area and maintains the intended thickness and volume.
4. **Surface Finish:** Formwork influences the surface finish of the concrete floor. It can be used to create a smooth, textured surface depending on the type and design of the formwork used. The quality of the formwork surface directly affects the final appearance of the floor.
5. **Reinforcement Placement:** Formwork provides the necessary support for placing and securing reinforcement bars or mesh within the concrete. It holds the reinforcement in the desired position, ensuring proper concrete cover and structural integrity.
6. **Safety and accessibility:** Formwork allows for safe access and working conditions during the concrete pouring and finishing processes. It provides platforms, access points and guardrails for workers to perform their tasks safely and efficiently.
7. **Ease of demolition:** Once the concrete has sufficiently cured, the formwork can be removed or stripped. Properly designed and constructed formwork enables easy and efficient removal, minimising damage to the cured concrete and facilitating subsequent construction activities.

In summary, the purpose of the formwork for laying is to shape, support and contain the wet concrete until it hardens. It ensures the structural integrity, desired dimensions and surface finish of the concrete floor, while also providing a safe working environment for construction personnel.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

PERFORMANCE ACTIVITY: BUILDING FORMWORK

Objective: To develop practical skills in building formwork to concrete construction.

MATERIALS NEEDED:

- Plywood or form panels
- Lumber or form stakes
- Screw or nails
- Measuring tape
- Carpenter's square
- Circular saw or hand saw
- Drill or hammer
- Pencil or marker
- Personal Protective Equipment

INSTRUCTIONS

1. Introduction:

- a. Begin the activity by providing an overview of formwork and its importance in concrete construction.
- b. Explain the types of formwork commonly used and the factors to consider when designing and constructing formwork.

2. Demonstration:

- a. Demonstrate the process of building formwork, starting with marking and measuring the layout on the ground or existing surface.
- b. Show how to calculate the required dimensions, considering the thickness of the concrete floor, reinforcing bars, and any additional features such as beams or columns.
- c. Explain the process of selecting appropriate materials such as plywood for the form panels and lumber for the stakes and bracing.

3. Safety precautions:

- a. Emphasise the importance of wearing PPE equipment during the construction process to protect against potential hazards.

4. **Hands on practice:**

- a. In groups of four, build a formwork structure for a simulated concrete floor based on provided dimensions or specified requirements.
- b. Discuss with your group a plan of action regarding the formwork design and the construction process.

5. **Construction steps:**

Participants will demonstrate the following:

- a. Cutting: demonstrate the safe use of circular saw or hand saws to cut plywood and lumber to the required dimensions.
- b. Assembly: Show how to assemble the form panels and stake them securely into the ground, ensuring proper alignment and stability.
- c. Bracing: Explain the importance of adding diagonal or horizontal bracing to the formwork to enhance stability and prevent bulging or movement during curing concrete pouring.
- d. Finishing: Teach participants how to inspect and make necessary adjustments to ensure the formwork is level, plumb and properly aligned.

6. **Review and Evaluation:**

- a. Evaluate the completed formwork structures for accuracy, stability, and adherence to the provided dimensions.

7. **Reflections and Discussion:**

In your reflective piece based on the group activity, write or engage in discussion using these questions as your guide:

- a. What challenges did your group encounter?
- b. What lessons did you learn?
- c. What are your thoughts on precision and attention to detail in formwork construction?

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

INFORMATION SHEET: SUSPENDED REINFORCED SLAB FILL

The construction of a suspended reinforced concrete slab fill involves several steps. Here are the general procedures for building a suspended reinforced concrete slab fill:

1. Design and Planning

- Obtain the structural design drawings and specifications for the suspended reinforced concrete slab fill.
- Review the design to understand the required dimensions, reinforcement details and load bearing capacity of the slab.
- Plan the sequence of construction, considering access, formwork, installation, concrete pouring and curing requirements.

2. Site Preparation

- Prepare the construction site by clearing any obstacles and ensuring a level and compacted base for the slab fill.
- Install temporary supports or scaffolding to provide a stable platform for working on the suspended slab.

3. Formwork Installation

- Set up formwork system according to the design specifications. The formwork should be capable of supporting the weight of the wet concrete and the reinforcement.
- Install perimeter formwork, including beams, walls, and any required edge supports.
- Place internal formwork, such as joists or battens, at the specified spacing to support the reinforcement and control the thickness of the slab fill.
- Ensure the formwork is properly aligned, levelled, and securely braced to prevent movement during concrete placement.

4. Reinforcement and Placement

- Place and secure the reinforcement bars or mesh according to the design requirements.
- Ensure proper cover and spacing of reinforcement bars as specified in the design.
- Use spacers or chairs to maintain the reinforcement at the desired position within the slab fill.

5. **Service Installation**

- If required, install all the necessary service conduits, pipes, or ducts within the slab fill before concrete pouring.
- Coordinate with other trades to ensure proper placement and routing of service installations.

6. **Concrete Pouring**

- Prepare concrete mix as per the design specifications, ensuring the correct proportions of cement, aggregates, water and any additives.
- Use appropriate equipment, such as concrete pumps or buckets, to transport, and pour the concrete into the formwork.
- Pour the concrete in a controlled manner, starting from one end and working towards the other, to ensure uniform filling and avoid segregation.
- Use vibration equipment or technique to consolidate the concrete and remove any trapped air bubbles.

7. **Finishing and Curing**

- Finish the concrete surface using appropriate tools, such as trowels, to achieve the desired smoothness or texture.
- Apply curing compounds or cover the slab fill with curing blankets to prevent rapid moisture loss and promote proper hydration of the concrete.
- Follow the recommended curing period as per the design specifications.

8. **Formwork Removal and Cleaning**

- Allow sufficient time for the concrete to gain adequate strength before removing the formwork. Follow the curing period guidelines as per the design specifications.
- Carefully remove the formwork, starting from the perimeter and gradually working towards the centre of the slab fill.

9. **Inspection and Quality Control**

- Conduct inspections to verify the quality and adherence to design specifications during various stages of construction.
- Perform any required tests, such as concrete strength testing, to ensure the slab fill meets the required standards.

10. **Post-Construction Activities**

- Coordinate with other trades for the installation of finishes, such as flooring or surface treatments, as applicable.
- Document the construction process, including any deviations from the design and corrective actions taken, for further reference.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

LEARNING ACTIVITY: POURING CONCRETE SCENARIO

You are a construction site supervisor overseeing the excavation and construction of foundation footings at a residential home. Your role is to ensure that all health and safety standards are followed to protect the workers, promote a safe working environment, and meet new regulatory requirements.

Key Elements of the Scenario:

1. **Preparation:**

- a. Ensure the subfloor base is clean, level and properly prepared for concrete pouring.
- b. Check that the formwork is in place, fastened and properly aligned.
- c. Verify that any necessary reinforcement, such as rebar or wire mesh, is correctly positioned within the formwork.

2. **Concrete Delivery:**

- a. Coordinate with concrete suppliers to schedule the delivery of the concrete mix to the construction site.
- b. Ensure that the concrete mix meets the required specifications, including strength and slump.

3. **Safety and Precautions:**

- a. Conduct a safety briefing with all workers involved in the pouring process.
- b. Ensure that all workers are wearing appropriate personal protective equipment, such as hard hats, gloves, safety goggles and boots.

4. **Pouring Process:**

- a. Direct the concrete delivery truck to the designated pouring area.
- b. Use the appropriate equipment, such as concrete pumps or wheelbarrows, to transfer the concrete from the truck to the pouring location.
- c. Begin pouring the concrete evenly and consistently throughout the entire floor area.

5. Consolidation and Finishing:

- a. Use a vibrating screed or bull float to consolidate the concrete and remove air pockets.
- b. Smooth the surface using a float or trowel, working from one end to the other.
- c. Pay attention to edges and corners, ensuring they are properly finished.

6. Expansion Joints and Contour Lines:

- a. Install expansion joints or control lines as required to accommodate concrete shrinkage and movement.
- b. Place joint filters or sealants in the joints to prevent water infiltration and maintain the integrity of the floor.

7. Curing and Protection:

- a. Apply a curing compound or cover the poured concrete with curing blankets to promote proper hydration and minimise moisture loss.
- b. Protect the freshly poured floor from excessive heat, direct sunlight, strong winds and precipitation.

8. Clean-up:

- a. Clean and remove any excess concrete or debris from the work area.
- b. Dispose of waste materials responsibly, following local regulations.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

PERFORMANCE ASSESSMENT ACTIVITY: POURING OF CONCRETE

Participant's Name:		Date:			
Concrete Mixing					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Consistent and accurate measurement of concrete ingredients.					
Proper mixing techniques to achieve a uniform and workable concrete mix.					
Formwork Preparation					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Precise placement and alignment to formwork.					
Adequate bracing and reinforcement to ensure stability during pouring.					
Controlled Pouring Techniques					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Controlled and even pouring of concrete into formwork.					
Minimise air pockets and voids in the poured concrete.					

Participant's Name:		Date:			
Concrete Finishing					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Skilful use of tools for levelling, smoothing, and compacting the poured concrete.					
Proper edging and joining technique to neat and durable finishes.					
Reinforcement placement.					
Accurate placement and alignment of reinforcement bars and mesh.					
Sufficient clearance from formwork to ensure proper concrete cover.					
Worksite Cleanliness and Organisation					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Maintaining a clean and organised worksite throughout the pouring process.					
Proper disposal of excess materials, debris and waste.					
Safety Compliance					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Adherence to safety guidelines.					
Awareness and implementation of safety measures to protect workers and ensure a safe working environment.					
Overall Workmanship					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Attention to detail and overall quality of work.					
Consistent craftsmanship and professional finish.					
Evaluator's Signature:					

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

LEARNING ACTIVITY/ASSESSMENT: SUSPENDED REINFORCED CONCRETE SLAB FILL

You are a construction supervisor tasked with completing a suspended reinforced concrete slab fill. You have been given a crew; direct them in constructing a reinforced concrete slab fill. You have the following tasks to complete, listed below:

- Task 1: Team Management
- Task 2: Formwork Construction
- Task 3: Reinforcement Placement
- Task 4: Concrete Pouring
- Task 5: Finishing and Curing
- Task 6: Quality Control and Inspection

As a supervisor you are to ensure that you provide the necessary materials, tools and equipment required for the construction task. Information Sheet #4, "Performance Activity: Suspended Reinforced Concrete Slab" which is included in this unit, will guide you through this Learning Activity.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

PERFORMANCE ASSESSMENT: SUSPENDED REINFORCED CONCRETE SLAB

Team/ Participant's Name:		Date:	
Team Management			
Description	Yes	No	Comment
Assign roles and responsibilities to the construction team members based on their skills and expertise.			
Effectively communicate the project goals, objectives, and construction plan to the team.			
Monitor and supervise the team's performance, providing guidance and support as needed.			
Formwork Construction			
Description	Yes	No	Comment
Accurately interpret design drawings.			
Construct the formwork according to design.			
Ensure the proper alignment, levelling, stability of the formwork.			
Verify that the formwork dimensions, beams, and openings are implemented correctly.			
Reinforced Placement			
Description	Yes	No	Comment
Directions given on reinforcement details according to design are accurate.			
Team correctly places and secure the reinforcement within the formwork.			

Team/ Participant's Name:		Date:	
Concrete Pouring and Finishing			
Description	Yes	No	Comment
Monitor the team in preparing the concrete mix according to the design specifications.			
Supervise the pouring of concrete evenly and ensure all corners and edges of the formwork.			
Ensures the formwork has a smooth finish.			
Quality Assurance			
Description	Yes	No	Comment
Quality control measures are demonstrated throughout the construction process.			
Correct PPE equipment is worn at all times to design.			
Evaluator's Signature:			

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

INFORMATION SHEET:

Steps for measuring, cutting, and fastening timber components to a floor frame

1. Planning and Preparation:

- a. Review the floor frame design and identify the timber components that need to be measured, cut, and fastened.
- b. Gather the necessary materials, including timber beams, joists, or boards, along with appropriate tools such as a measuring tape, pencil, saw, drill and fasteners.

2. Measurement and Marking:

- a. Measure the required length of the timber component based on the dimensions of the floor frame.
- b. Use a measuring tape and pencil to mark the measured length on the timber, ensuring accurate and precise markings.

3. Cutting the Timber:

- a. Select the appropriate saw based on the type and size of timber used. Common options include a hand saw, circular saw, or mitre saw.
- b. Align the saw blade with the marked line and carefully cut through the timber, ensuring a straight and clean cut.
- c. Follow all safety precautions while cutting, such as wearing safety glasses and securing the timber firmly in place.

4. Fitting the Timber Component:

- a. Position the cut timber component in its designated location within the floor frame
- b. Ensure that it aligns properly with adjacent components and fits securely into place.
- c. Use a level or square to check for accurate alignment and ensure the component is level or plumb if necessary.

5. Pre-drilling and Fastening:

- a. Identify the points where the timber component needs to be fastened to the floor frame, such as the joists or beams.
- b. Use a drill to create pilot holes in the timber component. The pilot holes prevent the timber from splitting when the fasteners are inserted.
- c. Align the pre-drilled holes with the corresponding points on the floor frame and use the appropriate fasteners, such as screws or nails, to secure the timber component in place.
- d. Drive the fasteners into the pre-drilled holes, ensuring they are flush with the surface of the timber.

6. Repeat the Process:

- a. Repeat the above steps for each timber component that needs to be cut, measured, and fastened to the floor frame.
- b. Maintain accuracy and precision in measuring, cutting, and fitting each component to ensure a well-constructed floor frame.

7. Inspection and Quality Control:

- a. Inspect the installed timber components to ensure they are securely fastened, level, and properly aligned.
- b. Check for any gaps or unevenness between the components and adjust if necessary.
- c. Conduct a thorough quality control check to ensure the floor frame meets the required standards and specifications.

8. Cleanup:

- a. Remove any excess materials, such as sawdust or debris, from the work area.
- b. Store tools and equipment properly to maintain a safe and organised construction site.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

INFORMATION SHEET:

Installing timber floor planks and securing floorboards

1. **Preparation:**

- a. Ensure that the timber subfloor or floor frame is clean, level and free of debris.
- b. Acclimate the timber floor planks to the room's temperature and humidity for a recommended period, if required by manufacturer.

2. **Planning and Layout:**

- a. Determine the direction and pattern in which the timber floor planks will be installed.
- b. Measure the room and calculate the number of planks needed, considering any necessary expansion gaps.

3. **Start at the Wall:**

- a. Begin the installation on one wall of the room, preferably the longest and straightest wall.
- b. Leave an appropriate expansion gap (usually around $\frac{1}{4}$ inch) between the wall and the first row of planks using spacers.

4. **Install the First Row:**

- a. Apply a bead of wood adhesive along the grooved side of the first row of timber floor planks.
- b. Fit the tongue of the first plank into the groove of the previous row or against the wall, ensuring it is aligned and level.
- c. Secure the plank by nailing it to the floor frame using a pneumatic flooring nailer or by driving finishing nails at a slight angle through the face of the plank.

5. Continue with Subsequent Rows:

- a. Apply wood adhesive to the grooved side of each plank and fit it into the tongue of the previous row, using a tapping block and mallet to ensure a tight fit.
- b. Stagger the end joints between adjacent rows for added stability and aesthetics.
- c. Use a pneumatic flooring nailer or finishing nails to secure each plank to the floor frame as done in the first row.

6. Trimming and Cutting:

- a. Measure and mark the plank that needs to be trimmed to fit against walls or obstructions.
- b. Use a circular saw, jigsaw, or mitre saw to make precise cuts along the marked lines.
- c. Install the trimmed planks in place, ensuring a snug fit.

7. Ensure Alignment and Levelness:

- a. Use a level to periodically check the alignment and levelness of the installed timber floor planks.
- b. Make necessary adjustments by tapping lightly with a mallet or using shims to ensure a flat and even surface.

8. Secure Loose Floor Boards:

- a. Identify the loose areas if any floorboards feel loose or squeaky.
- b. Apply wood adhesive or construction adhesive into the gaps between the loose boards.
- c. Place weight or clamp the boards until the adhesive sets and holds them securely.

9. Finishing Touches:

- a. Install baseboards or moulding around the perimeter of the room to cover the expansion gap and provide a finished look.
- b. Fill any visible nail holes or gaps between the planks with wood filler, following the manufacturer's instructions.
- c. Sand the floor lightly if necessary and supply a suitable finish or sealant as per the manufacturer's guidelines.

10. Clean up:

- a. Remove any excess debris, or sawdust from the floor surface and surrounding area.
- b. Dispose of waste materials responsibly.

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

SELF-ASSESSMENT: INSTALLING TIMBER FLOORS AND SECURING FLOORBOARDS

- After installing timber floors, a self-assessment should be conducted to
- ensure the installation is completed to the required building standards.

As a construction supervisor you are to work with a team to install a wooden floor in a house. Complete the following tasks:

1. Given the floor plan, lead the team in marking out the area representing the floor layout.
2. Install timber floor planks and secure them according to the provided guidelines.

After the task is completed, assess yourself using the following criteria. In addition, capture photographs of the completed work at each stage and submit photos and criteria in a report.

Participant's Name:			Date:
Criteria	Yes	No	Comment
Accurately measured the floor planks.			
Accurately cut the floor planks to fit the layout.			
Properly applied wood adhesive.			
Secured plank using appropriate tools.			
Aligned and levelled installed floor planks.			
Planks are properly trimmed to fit planks around walls or obstructions.			
All loose boards are fastened using adhesive or other appropriate methods.			
PPE equipment is worn accurately at all times.			
All debris is removed.			
All debris is disposed of appropriately.			

PERFORMANCE ACTIVITY FOR Unit 2: Install Floors in Concrete and Timber Homes

PERFORMANCE ASSESSMENT:

Installing timber floor planks and securing floorboards

Participant's Name:		Date:			
Accurate Measurement And Cutting					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Precise cutting of planks to fit the layout.					
Consistent measurement and minimal waste.					
Proper Application of Adhesive					
Appropriate and consistent application of adhesive.					
Sufficient coverage without excess or insufficient use of adhesive.					
Securing and Fastening Floorboards.					
Effective use of pneumatic flooring nailer or other fastening tools.					
Properly driven nails or screws to secure the floorboards.					
Alignment and Levelness					
Consistent alignment and levelness of floorboards.					
Minimal gaps or unevenness between boards.					

Participant's Name:		Date:			
Trimming and Fitting					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Accurate trimming and fitting of floorboards around walls or obstructions.					
Clean and precise cuts for a seamless fit.					
Secure Fastening and Loose Floorboards					
Proper identification and securing of any loose floorboards.					
Effective use of adhesive or other methods to prevent movement or squeaks.					
Securing and Fastening Floorboards.					
Safety Compliance					
Adherence to safety guidelines and proper use of personal protective equipment.					
Awareness and avoidance of potential hazards during the installation process.					
Overall Workmanship					
Attention to detail and overall quality of work.					
Consistent craftsmanship and professional finish.					
Evaluator's Signature:					

UNIT 3

CONSTRUCT CONCRETE BLOCK MASONRY WALLS



CLUSTER 1

UNIT 3 - BCGCSS0043A - CONSTRUCT CONCRETE BLOCK MASONRY WALLS

SUGGESTED TIME: 70 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on developing the skills, knowledge and attitudes required to prepare and construct masonry walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Lay concrete block walls.
3. Install concrete stiffeners.
4. Erect beam formwork.
5. Follow procedures for concrete work.
6. Clean up.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 3 Information Sheet	Equipment Needed for Constructing Concrete Masonry Walls	99
	Scaffolding Safety	101
	Personal Protective Equipment (PPE)	102
	Calculating Ground Floor Walls	103
Unit 3 Learning Activity	Installing Utility Pipes in Walls Scenario	104
Unit 3 Performance Assessment	Concrete Wall Construction Checklist	106

HEALTH & SAFETY: MASONRY WALLS

KNOWLEDGE OBJECTIVE

1. Discuss the health and safety standards for laying masonry walls.
2. Discuss the tools and equipment for laying blocks need for building concrete walls.

PERFORMANCE OBJECTIVE

1. Demonstrate the appropriate use of hand and power tools to lay concrete walls.
2. Organise and prepare for constructing concrete walls.

ENABLING OBJECTIVE #1

1. **Gain** knowledge of health and safety standards when constructing masonry walls.
2. **Gain** knowledge of the tools and equipment for laying masonry walls.
3. **Practise** the appropriate use of tools and equipment according to health and safety standards.
4. **Practise** wearing appropriate PPE.

LEARNING EXPERIENCE

Read Barbados Legislation, Safety and Health At Work Act 2005-12.	Instructor provides access to required Legislation.
List the tools and equipment needed for laying masonry walls.	MacWashington, A. (2023). Construction PPE: What contractors need for job safety. https://www.procore.com/library/construction-ppe
Read the learning resource on tools and equipment needed for laying masonry walls in order to identify ones missed.	
Create a tools and equipment brochure and explain the purpose of the tools and equipment to new workers/colleague.	
Review the PPE equipment needed on the worksite.	Type of scaffolding used in construction. https://theconstructor.org/building/types-of-scaffolding-in-construction/11845/
Watch scaffolding video.	Sprout labs. (n.d.) Scaffolding training videos. https://www.youtube.com/watch?v=veF4uSUtrEY
Practise using scaffolding to construct and plaster walls.	



CONSTRUCTING MASONRY WALLS

	KNOWLEDGE OBJECTIVE	
	1.	Discuss the regulations, codes and standards for laying masonry walls.
	2.	Discuss the quantity of materials needed to construct concrete walls.
	3.	Discuss the purpose and quantity of beams, rebars, starter bars and links for building concrete walls.
	PERFORMANCE OBJECTIVE	
	1.	Practise selecting and wearing appropriate personal protective equipment.
	2.	Demonstrate the ability to lay and plaster blocks.
	3.	Demonstrate installing formwork, beams and rebars and stiffeners in the laying of concrete walls.

ENABLING OBJECTIVE #2	
1.	Gain knowledge of the regulations, codes and standards for laying masonry walls.
2.	Gain knowledge on the purpose and quantity of beams, rebars, starter bars and links.
3.	Gain knowledge on the quantity of materials needed to construct concrete walls.
4.	Calculate the quantity of materials needed to construct concrete walls.
LEARNING EXPERIENCE	
Read building code requirement for laying masonry walls.	Instructor to provide the building code information on requirements for electrical, plumbing, telephone and internet services.
Discuss the building code requirements for masonry walls and its implications for construction.	
List materials for building concrete walls for a residential home.	
Calculate material quantities for construction of concrete walls for a residential home.	Instructor will walk the students through the materials calculations sheet for masonry walls and give examples to use the sheet.

LAYING BLOCKS

KNOWLEDGE OBJECTIVE
1. Explain working drawings and specifications for working with masonry walls.
2. Discuss the techniques for laying blocks.
PERFORMANCE OBJECTIVE
3. Organise and prepare for constructing concrete walls.
4. Demonstrate the ability to lay and plaster blocks.
5. Demonstrate the water proofing/damp proofing of external walls.

ENABLING OBJECTIVE #3	
1. Gain knowledge on the techniques for laying blocks.	
2. Practise organising and preparing for constructing concrete walls.	
3. Practise laying blockwork for masonry walls.	
LEARNING EXPERIENCE	
Read section 8 of the CDEMA Learners Guide, especially Section 8.1.	CDEMA. (2024) Learner's Guide- Construction Supervision of Houses. Section 8, Walls and Beams
Watch a demonstration or video of laying blocks for the construction of a wall.	The Construction. (n.d.). Design of Reinforced Concrete Wall. Concepts, Calculations. https://theconstructor.org/structural-engg/design-of-reinforced-concrete-wall/6859/
Visit a construction site to observe the building of a concrete wall.	UNDP Multi-Country. (n.d.). Quick Tips for Hurricane Resilient Masonry Works. https://www.youtube.com/watch?v=Xo6hxEYBfqk&t=29s
Organise the workers and materials to prepare for building a concrete wall.	RP E-learning. (2020, Aug 6). Rwanda Polytechnic-Masonry level 3-Wall with brick and cement. 2 of 4. https://www.youtube.com/watch?v=QNSy5rN1WbA
Build a concrete wall using the techniques identified.	RP E-learning. (2020, Aug 6). Rwanda Polytechnic-Masonry Level 3-Wall With Brick and Cement. 4 of 4. https://www.youtube.com/watch?v=EW2ltedH2ec Video on Laying blocks for the construction of a wall (To be included- commissioned by CDEMA)
	See https://www.buildsafe.cdema.org



CURING, LEVELLING & DAMP-PROOFING

KNOWLEDGE OBJECTIVE

1. Discuss the purpose of curing, levelling and plastering concrete.
2. Discuss the procedures, and benefits of waterproofing /damp proofing external walls.

PERFORMANCE OBJECTIVE

1. Demonstrate the pouring, levelling and trowel finishing (plastering) of concrete walls.

ENABLING OBJECTIVE #4

1. **Gain** knowledge on benefits and procedures of damp proofing external walls.
2. **Gain** knowledge on the purpose of curing, levelling and plastering concrete.
3. **Practise** curing, levelling, and plastering masonry blocks.
4. **Practise** damp-proofing external walls.

LEARNING EXPERIENCE

Research the benefits and procedures of damp proofing external walls.	Constructionor. (n.d.) Damp-Proofing. https://constructionor.com/damp-proofing/
Research the purpose of curing, levelling and plastering concrete.	Videos of plastering techniques should be shown to the learners See https://www.buildsafe.cdema.org
Research the mixture of concrete for plastering and the techniques for plastering walls.	Building and home renovations. (n.d.). 8 tips for plastering. https://www.youtube.com/watch?v=9hRZ54JhJtE
Watch videos on plastering.	
Upload your findings to the discussion course page in the appropriate sections.	Instructor should organise such visits. The instructors are to also engage participants with site managers to gain insight into material selection and factors influencing compatibility decisions. Instructors will arrange the demonstration of excavation and foundation building equipment. Instructors will create a simulated construction site where learners can practise using excavation and building equipment.
Visit a construction site and observe the damp proofing external walls, the mixing of concrete for plastering and that are curing, levelling and plastering masonry walls. Take pictures/videos of the products and technique used for damp proofing and curing, levelling and plastering masonry walls.	The instructor will organise such a site visit.
Demonstrate in laboratory setting the techniques for mixing, levelling, plastering of concrete walls.	



INSTALLING UTILITY PIPES IN MASONRY WALLS

	KNOWLEDGE OBJECTIVE
	1. Explain the installation of utility pipes in concrete walls.
	PERFORMANCE OBJECTIVE
	1. Install utility pipes.

ENABLING OBJECTIVE #5	
1. Gain knowledge on the installation of utility pipes in masonry walls.	
2. Practise installing utility pipes in masonry walls.	
LEARNING EXPERIENCE	
Identify and record the standards for the utility pipe according to the building code standards.	
Participate in a lecture presentation/panel discussion on the utility standards for masonry walls.	
Visit a construction site where utility pipes are being installed in masonry walls.	
Practise installing utility pipes in a wall in a lab scenario.	The Instructor will provide the appropriate building code standard for utility pipes (water, electricity, telephone, internet).

COMPRESSION STRENGTH OF CONCRETE

	KNOWLEDGE OBJECTIVE
	1. Discuss the purpose of concrete stiffeners.
	2. Explain the purpose of span of lintel.
	3. State the compression strength of concrete.
	PERFORMANCE OBJECTIVE
	1. Calculate quantities of materials for concrete wall construction
	2. Demonstrate installing formwork, beams and rebars and stiffeners in the laying of concrete walls.
	3. Demonstrate the pouring, levelling and trowel finishing (plastering) of concrete walls

ENABLING OBJECTIVE #6	
1. Gain knowledge of compression strength of concrete.	
2. Gain knowledge of formwork, beams, rebars and stiffeners in laying of concrete walls.	
3. Practise installing formwork, beams, rebars and stiffeners in the laying of concrete walls.	
LEARNING EXPERIENCE	
Review section 8.1.1, 8.2, 8.3 in the Learner's Guide.	CDEMA. (2024) Learner's Guide- Construction Supervision of Houses. Section 8, Walls and Beams.
Discuss the slab thickness and reinforcement for beams and rebars and the reinforced concrete lintel beams.	
Build formwork for beams and rebars.	
Use knowledge of beams, rebars and stiffeners to lay concrete.	

INFORMATION SHEET UNIT 3 - CONSTRUCT CONCRETE BLOCK MASONRY WALLS

EQUIPMENT NEEDED FOR CONSTRUCTING CONCRETE MASONRY WALLS	
Tool/ Equipment	Description
BRICK HAMMER 	Designed for breaking rock, brick and concrete.
MARGIN TROWEL 	A flat-nosed trowel used to place small amounts of mortar into tight spaces.
MASON'S LEVEL 	Masonry level must be at least 4 feet long.
WIRE BRUSH 	Used to scrape away chips of rock and concrete that get in your work area. You often need this type of brush to rip away old debris in order to make a concrete repair.
POINTING TROWEL 	Used to repair mortar joints, these trowels come in two common heel shapes: the Philadelphia and the London. The heel is the back edge of the blade where it's connected to the handle. The Philadelphia has a sharp, square heel and a broader blade, perfect for laying concrete block. The London has a rounded heel and a smaller blade and is commonly used for laying brick.
FINISHING TROWEL 	Used to smooth off concrete. It brings water to the surface of the concrete, leaving a smooth finish.

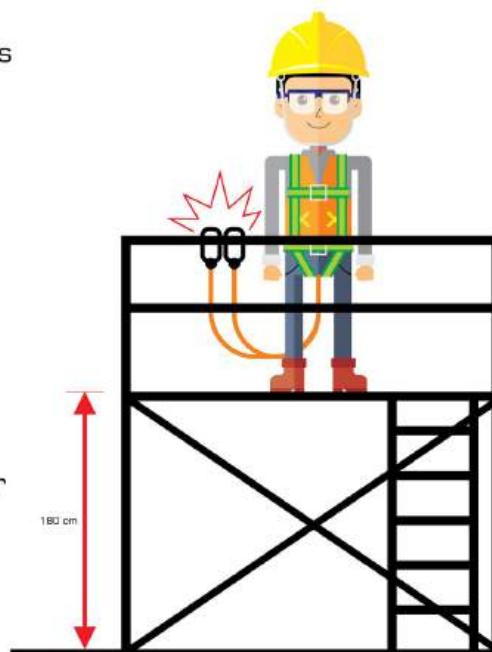
EQUIPMENT NEEDED FOR CONSTRUCTING CONCRETE MASONRY WALLS

Tool/ Equipment	Description
MASON TAPE MEASURE 	Used to measure bricks or stones, or distances between places or to obtain measurements for a piece of material.
FLOAT TROWEL 	Used to smooth or texture the top layer of hardening concrete or plaster. Floats are usually made from rubber, wood, plastic, sponge, or magnesium, and they have a thicker base than a trowel. A float trowel's handles are open rather than closed like a hand float's handles.
PLASTER FINISHING TROWEL 	Used to apply the plaster onto the surface and to even the materials out for a smooth finish.
MASONRY SAW 	Similar in principle and overall appearance to a tile saw, but is used for cutting construction blocks, such as bricks, concrete blocks, partition blocks, lintel blocks, or pavers.
WHEELBARROW 	Used for carrying bricks/blocks, stone or mortar.
HAND SAW 	Used for roughly cutting woods or logs.
CIRCULAR SAW 	Designed for making straight cuts through various materials.
MITRE SAW 	Used for cutting wood trim and moulding but also used for cutting used metal, masonry and plastics.

INFORMATION SHEET: SCAFFOLDING SAFETY

WORKING AT HEIGHT SAFETY WITH SCAFFOLDING IN THE WORKPLACE

- Obtain any required "WORKING AT HEIGHT" permits,
- Make sure the scaffolding boards are in place and in good condition,
- The scaffold must be strong enough for the usage purpose,
- Never overcrowd scaffold with people, supplies, or equipment,
- Erect scaffold with proper access and guard rails,
- Tied scaffold adequately where required,
- Place the guard rails and toe board firmly,
- Do not climb or stretch out over the guard rails,
- Wear Double Lanyard and absorber of Body Harness,
- Always - PAY ATTENTION



INFORMATION SHEET:
Personal Protective Equipment (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)



INFORMATION SHEET UNIT 3 - CONSTRUCT CONCRETE BLOCK MASONRY WALLS

INFORMATION SHEET:

Calculating ground floor walls

1. **Number of blocks:**

- No Blocks = Net Wall area/block area
- Net wall area = Length of External and Internal Walls – Areas of doors and windows

2. **Volume of grout:**

- Volume = Grout area x wall height
- Grout area = (External Wall Length/0.6 m + 1) x core area + (Internal Wall Length/0.8 m + 1) x core area
- Assume Core area of 0.019 m² for 200 mm thick blocks and 0.014 m² for 150 mm thick blocks.

3. **Volume of plaster:**

- Volume = Net wall area x 2 block faces x plaster thickness
- Net wall area = Net Int Area + Net Ext Area + (Beam length x beam depth)

4. **Volume of concrete in ring beam:**

- Volume = length x beam cross sectional area

5. **Length of main rebar in ring beam:**

- Length = (Length of Interior + Exterior beams) x 4 bars x lap factor
Assume Lap factor = 1.1

6. **Length of links in ring beam:**

- Total Length = Length of 1 link x wall length/Link Spacing + 1

INFORMATION SHEET UNIT 3 - CONSTRUCT CONCRETE BLOCK MASONRY WALLS

LEARNING ACTIVITY: INSTALLING UTILITY PIPES IN WALLS SCENARIO

You are a construction supervisor responsible for a construction site. Your task is to oversee the installation of utility pipes in the walls of a building being constructed. The utility pipes include water supply lines, drainage pipes, and electrical conduits, telephone and internet. The building has a single story and you need to ensure that the pipes are properly routed, secured and connected to the appropriate fixtures and systems.

Scenario Steps:

1. **Conduct a Project Briefing and Plan:**
 - a. Brief the construction team to ensure the layout and design of the building.
 - b. Review architectural plans and plumbing drawings to identify the locations and routes for the utility pipes within the walls.
2. **Material Acquisition and Preparation:**
 - a. Organise the materials for plumbing, electrical and telephone and internet.
 - b. Inspect the materials to ensure they meet the required specifications and are suitable for the specific applications.
3. **Site Assessment and Preparation:**
 - a. Survey the construction site and identify the areas where the utility pipes will be installed in the walls.
 - b. Check for any obstacles, structural elements or other utilities that may affect the pipe routing.
 - c. Plan the utility routes to optimise efficiency and minimise potential conflict with other building components.
4. **Marking and Layout:**
 - a. Use marking tools, such as chalk or markers, to indicate the location of the utility pipes on the walls according to site plan.
 - b. Ensure accurate measurement and alignment to maintain consistency and avoid errors during installation.

5. Pipe Installation:

- a. Begin by installing the main water supply lines, following the designated routes and connecting them to the water source.
- b. Secure the pipes to the wall using appropriate supports, such as clamps or brackets at regular intervals to prevent sagging or movement.
- c. Install drainage pipes, ensuring proper slope and alignment to facilitate effective water flow.
- d. Route electrical conduits alongside the plumbing pipes, following electrical code.

6. Connection and Fixtures:

- a. Install valves, fittings and other necessary components to connect the utility pipes to fixtures, such as faucets, toilets and electrical outlets.
- b. Ensure proper sealing and joint connections to prevent leaks or potential damage in the future.
- c. Test the connections and fixtures for functionality and make any adjustments or repairs as needed.

7. Insulation and Protection:

Protect pipes from potential damage by adding protective sleeves or conduits where required, such as in areas with high foot traffic, or areas vulnerable to mechanical impact.

8. Quality Inspection:

- a. Conduct a thorough inspection of the installed utility pipes, checking for proper alignment, secure connections, and adherence to plumbing codes and regulations.
- b. Test the functionality and flow of water, ensuring there are no leaks or blockages in the system.
- c. Make the necessary adjustments to repairs to ensure the integrity and performance of the utility pipes.

9. Documentation:

- Document the installation process, including photographs, as-built drawings, and any specific notes or instructions related to the utility pipes.
- Provide a detailed report to the project manager for review and approval.
- Communicate any maintenance or operation considerations to the homeowner.

PERFORMANCE ACTIVITY FOR Unit 3:Construct Concrete Block Masonry Walls

PERFORMANCE ASSESSMENT:

Concrete wall construction checklist

Team/ Participant's Name:		Date:	
Formwork			
Criteria	Yes	No	Comment
Proper alignment and bracing of formwork to maintain desired shape and dimensions.			
Sealed formwork joints to prevent concrete leakage.			
Reinforcement Placement			
Criteria	Yes	No	Comment
Proper positioning of reinforcement according to design specifications.			
Adequate tying and securing of reinforcement bars for structural integrity.			
Sufficient cover between reinforcement and outer surface of the walls.			
Stiffeners are placed accurately and consistently (every 7.6 metres).			
Concrete Mixing and Pouring			
Criteria	Yes	No	Comment
Correct concrete mixing proportioning for required strength and workability.			
Mix concrete achieving uniformity and homogeneity.			
Smooth and uninterrupted pouring for continuous and even placement.			

Team/ Participant's Name:		Date:	
Concrete Plastering			
Criteria	Yes	No	Comment
Technique to plaster walls was accurate.			
The surface wall is smooth, free from excessive roughness and consistent with desired finish.			
Wall is waterproofed accurately.			
No visible defects such as cracks, or surface irregularities that need repair or attention.			
Curing and Protection			
Criteria	Yes	No	Comment
Concrete wall adequately cured to promote hydration and strength development			
Appropriate curing methods and compounds have been used.			
The wall has been protected from excessive moisture, or adverse weather conditions.			
Compliance with Building Codes and Standards			
Criteria	Yes	No	Comment
Construction of concrete walls complies with building codes and regulations.			
Safety Measures			
Criteria	Yes	No	Comment
Appropriate safety measures were implemented, such as PPE, and safe work practices were adhered to.			
Scaffolding was erected accurately and presented no safety hazards.			

Team/ Participant's Name:		Date:	
Installation of Utility Pipes			
Criteria	Yes	No	Comment
Utilities installed based on design and codes			
Utility plan that highlights the locations and paths of utilities within the walls			
Organise the necessary materials such as pipes, fittings, valves, supports and electrical conduits, telephone and internet			
The materials are compliant to relevant standards and codes			
Utility routes have been adequately marked			
Utility routes have been accurately installed according to designated paths and specifications			
Installation methods for each utility type, are appropriate (have considered factors such as pipe size, material compatibility and load bearing capacity)			
Connections, fittings, valves and fixtures have been installed correctly and securely			
Connections are watertight, airtight and free from leaks or potential damage			
Fixtures are properly aligned, anchored and supported			
Installation complies with relevant building codes, regulations and industry standards			
Additional Comments/Notes:			
Evaluator's Signature:			

UNIT 4

CONSTRUCT TIMBER WALLS



CLUSTER 1

UNIT 4 - BCGCSS0053A - CONSTRUCT TIMBER WALLS

SUGGESTED TIME: 90 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on developing the skills, knowledge and attitudes required for the installation of timber walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install wall timber plates.
3. Install timber beams.
4. Install wall cladding.
5. Execute clean up methods to industry standards.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 4 Information Sheet	Timber Wall Construction Worksheet	119
	Verification of the Selection of Materials from a Supplier on a Construction Site	121
	Construction of Timber Walls	122
	Inspection of Timber Walls	124

PLANNING & ORGANISING

		KNOWLEDGE OBJECTIVE
		1. Discuss the planning and organising of the construction of timber walls.
		PERFORMANCE OBJECTIVE
		1. Interpret architectural plans and specifications to make informed decisions regarding the selection of timber materials for the project.

ENABLING OBJECTIVE #1
1. Gain knowledge of planning and organising work to construct timber walls.
2. Plan the organisation of timber walls.
LEARNING EXPERIENCE
Shadow an experienced construction manager and observe how they plan and organise the construction of timber walls.
Develop a workplan to organise the construction of timber walls.

WORKING DRAWINGS & BUILDING CODES

	KNOWLEDGE OBJECTIVE
	1. Explain working drawings and specifications for construction timber walls.
	PERFORMANCE OBJECTIVE
	1. Wear appropriate PPE equipment.

ENABLING OBJECTIVE #2	
1. Gain knowledge of explaining working drawings and the building code specifications for construction timber walls.	
2. Practise interpreting architectural plans and specifications to make informed decisions regarding the selection of timber materials for the project.	
LEARNING EXPERIENCE	
Review architectural and structural drawings, as well as any specifications or instructions related to timber wall construction.	Instructor will provide architectural and structural drawings and guide to candidates in identifying the timber wall specifications from the drawings.
Discuss the building code specifications for building timber walls.	Instructor will provide the building code specifications for the timber walls
State the design requirements, dimensions and materials specifications based on the drawings.	
Make a list of the timber material needed for the construction of timber material for the project.	

APPROPRIATE USE OF TOOLS & EQUIPMENT

	KNOWLEDGE OBJECTIVE	
	1.	Discuss the health and safety regulations as it relates to constructing timber walls.
	2.	Discuss the tools and equipment for constructing timber walls.
	PERFORMANCE OBJECTIVE	
	1.	Observe the appropriate use of hand tools to construct timber walls.
	2.	Calculate quantities of materials for the construction of timber walls.

ENABLING OBJECTIVE #3	
1.	Gain knowledge of explaining the appropriate use of hand tools to construct timber walls.
2.	Gain knowledge of wearing appropriate personal protective equipment.
3.	Practise wearing the appropriate personal protective equipment.
4.	Practise using the appropriate use of hand tools to construct timber walls.
LEARNING EXPERIENCE	
Research the appropriate use of hand tools to construct timber walls.	
Hands-on demonstration where candidates practise the correct procedures for donning, adjusting and removing different types of PPE.	Instructor organises demonstrations.
Inspect PPE for signs of damage, wear, or deterioration. Maintain procedures such as cleaning or replacing.	
Research the equipment needed for the construction of timber walls.	
Participate in hands-on demonstration led by experienced carpenters or construction professionals.	
Observe their techniques for using hand tools effectively and safely.	
Practise using the tools under their guidance, receiving feedback and corrections as needed.	

SELECTING THE RIGHT MATERIALS

KNOWLEDGE OBJECTIVE

1. Discuss the selection of materials based on the project and the location.
2. Discuss the quantity of materials needed to construct timber walls.
3. Discuss the procedure for verifying construction materials.

PERFORMANCE OBJECTIVE

1. Select suitable timber materials based on the project requirements, considering factors such as strength, durability and aesthetic appeal.
2. Develop verification measures in the selection of timber materials including grading, moisture content, termite treatment requirements.
3. Provide clear guidance and instructions to the construction team regarding proper measurement, marking and layout of the timber components for wall construction.

ENABLING OBJECTIVE #4

1. **Gain** knowledge of the selection of materials based on the project and the location.
2. **Gain** knowledge of calculating quantities of materials for the construction of timber walls.
3. **Gain** knowledge of the procedures for verifying construction materials.
4. **Practise** calculating quantities of materials for the construction of timber walls.
5. **Practise** selecting suitable timber materials based on the project requirements, considering factors such as strength, durability and aesthetic appeal.
6. **Practise** developing verification measures in the selection of timber materials. including grading, moisture content, termite treatment requirements.

LEARNING EXPERIENCE

Seek expert opinions with experienced carpenters, or construction professionals on selecting the most appropriate timber materials based on project specification, performance requirements and budget considerations.	Instructor should use the architectural or site map to obtain the specifications.
Visit a hardware store or request samples of timber from suppliers and assess the appearance, grain patterns, colour variations, quality (strength and durability) and price.	Candidates can collect price lists to use to calculate quantities and price.
Calculate the quantities of materials required for constructing timber walls of houses.	Instructor can use the calculate quantity activity to calculate materials for timber walls.
Develop a checklist to verify measure in the selection of the timber.	Instructor can take the students on a worksite where they use the checklist to verify an order arriving.

BUILDING & TREATING TIMBER WALLS

KNOWLEDGE OBJECTIVE
1. Discuss the purpose of beams, studs, wall junction, cladding and timber frame.
2. Discuss the measurement of the wood for accurate construction of timber walls.
3. Discuss the organisation of termite treatment.
PERFORMANCE OBJECTIVE
1. Employ appropriate construction techniques for assembling timber walls, including framing, bracing and securing components effectively.
2. Conduct regular inspection of the timber wall construction to assess quality, accuracy and compliance with specifications and safety requirements.
3. Coordinate with other trades and disciplines in the installation of utility pipes, to ensure proper integration to timber walls with other building systems.

ENABLING OBJECTIVE #5	
1. Gain knowledge on the purpose of beams, studs, wall junction, cladding and timber frame.	
2. Gain knowledge on the measurement and layout of the wood structure for accurate construction of timber walls.	
3. Gain knowledge of the termite treatment of a timber wall structure.	
4. Practise providing clear guidance and instructions to the construction team regarding proper measurement, marking and layout of the timber components for wall construction.	
5. Practise employing appropriate construction techniques for assembling timber walls, including framing, bracing and securing components effectively.	
6. Practise organising wall layout for wood structure for accurate construction of timber walls.	
LEARNING EXPERIENCE	
Discuss the purpose of beams, studs, wall junction, cladding and timber frame.	
Listen to a lecture discussion on layout concepts and techniques, such as stud locations, plate placement and door or window openings.	
Participate in layout exercises that require learners to mark specific measurements on lumber or timber materials.	
Discuss ways to protect wood from termite infestation.	
Participate in a demonstration/ explanation of the appropriate techniques for assembling timber walls.	Instructors are required to develop the exercises and provide the candidates with project plans or drawings to reference during the layout process.
Participate in a hands-on framing exercise in groups where candidates engage in specific framing tasks, such as building a well section with studs, top plates, and bottom plates, ensuring placement and alignment.	The instructor must ensure framing, bracing and securing components are demonstrated.

INSTALLING UTILITY PIPES IN TIMBER WALLS

	■	KNOWLEDGE OBJECTIVE
		1. Discuss the installation of utility pipes.
	■	PERFORMANCE OBJECTIVE
		1. Install cladding on the exterior of the wall.

ENABLING OBJECTIVE #6	
1. Gain knowledge of installing utility pipes.	
2. Practise coordinating with other trades and disciplines in the installation of utility pipes, to ensure proper integration to timber walls with other building systems.	
LEARNING EXPERIENCE	
Discuss the installation of utility pipes in the layout process.	
Visit a construction site and observe a tradesman installing utility pipes in timber walls.	
Take pictures of the process of installation Create a diagram brochure of how to install utility pipes to share with a subordinate.	Instructor encourages learners to take pictures of the process.
Videotape yourself explaining the installation of utility pipes to a crew you supervise and upload to the course page.	
Comment on the video explaining the installation of pipes of at least two classmates.	Instructor should post guiding questions and a develop a rubric to assess the quality of the post.

INSTALLING CLADDING

	KNOWLEDGE OBJECTIVE
	1. Discuss the installation of cladding.
	PERFORMANCE OBJECTIVE
	1. Install cladding on the exterior walls.

ENABLING OBJECTIVE #7	
1. Gain knowledge of the steps in installing cladding.	
2. Practise the steps in installing cladding.	
LEARNING EXPERIENCE	
Research different types of cladding materials commonly used in construction.	Instructors should gather information on the characteristics, advantages and disadvantages installation methods, and maintenance requirements of each cladding material.
Participate in a construction mock up where candidates can practise installing different cladding materials (Lab project) including the preparation of the wall surface, measuring and cutting the cladding material, and securely attaching it to the mock wall.	Instructors provide a variety of cladding materials and allow candidates to securely attach it to the mock wall.

REGULATIONS AND STANDARDS

		KNOWLEDGE OBJECTIVE
		1. Discuss the regulations, codes and standards for constructing timber walls.
		PERFORMANCE OBJECTIVE
		2. Plan the organisation of timber walls.

ENABLING OBJECTIVE #8	
1. Gain knowledge conducting regular inspection of the timber wall construction to assess quality, accuracy and compliance with specifications and safety requirements.	
2. Practise conducting regular inspection of the timber wall construction to assess quality, accuracy and compliance with specifications and safety requirements.	
LEARNING EXPERIENCE	
Read the course readings on inspecting timber walls.	
Create a checklist to inspect timber walls in groups.	Note to Instructor: The group can post their checklist on a Learning Management System/ Course page and then comment on another's group post.

INFORMATION SHEETS FOR Unit 4 - CONSTRUCT TIMBER WALLS

INFORMATION SHEET:

Timber wall construction worksheet

1. Wall Dimensions:

• Length of wall	ft (or m)
• Width of wall	ft (or m)

2. Stud Spacing:

	in (or mm)
• On-centre (OC) spacing	
• Stud size	

3. Calculate the number of studs:

• Divide the length of the wall by the on-centre spacing to determine the number of studs needed.
• $\text{Number of studs} = \text{length of wall} / \text{on-centre spacing}$.

4. Calculate the top and bottom plates:

• Length of top plate	ft (or m)
• Length of bottom plate	ft (or m)

5. Calculate the header size:

• Opening size	in (or mm)
• Header material	
• Determine the header size based on local building codes and structural requirements.	

6. Calculate the sheathing:

• Wall height	ft (or m)
• Sheathing material	
• Determine the required quantity of sheathing based on the height of the wall and the specified sheathing material.	

7. Calculate the nails or screws:

- Type of fasteners
- Determine the approximate number of nails or screws required based on the number of studs, plates, and sheathing.

8. Additional Materials:

- Determine any additional materials required for electrical wiring, plumbing, internet and telephone.

9. Quantity summary:

- Number of studs
- Length of top plate ft (or m)
- Length of bottom plate ft (or m)
- Size of header
- Quantity of sheathing
- Number of nails or screws
- Additional materials

Based on the quantities calculated, create a plan to procure the required materials, considering lead times, suppliers and budget.

INFORMATION SHEETS FOR Unit 4 - CONSTRUCT TIMBER WALLS

INFORMATION SHEET:

Verification of the selection of materials from a supplier on a construction site

1. **Material Specification:** Ensure that the materials received match the specifications outlined in the purchase order or contract. Compare the received materials with the agreed-upon specifications, such as dimensions, grade, species and any other specific requirements.
2. **Quality Assurance:** Inspect the quality of the materials to ensure they meet the required standards. Check for defects, such as cracks, warping, splits, or damage, that could affect the performance and durability of the materials.
3. **Quantity Check:** Verify that the quantity of materials delivered matches the quantities stated in the purchase order. Count the items or measure the materials to ensure they align with the expected quantities.
4. **Certification and documentation:** Request and review any relevant certifications, test reports, or documentation provided by supplier.
5. **Visual inspection:** Conduct visual inspection of the materials to assess their appearance, colour, and texture. Look for any signs of inconsistencies or variations that may indicate a deviation from the agreed-upon quality or specification.
6. **Cross checking with specifications:** Compare the delivered materials with the project specifications or design drawings. Ensure that the materials are suitable for the intended use and align with the project requirements.
7. **Document and Communicate:** Keep detailed records of the verification process, including any discrepancies and issues identified. Communicate with the supplier promptly to address any concerns and seek resolution. Document any agreed-upon remedies or corrective actions.

INFORMATION SHEET: CONSTRUCTION OF TIMBER WALLS

The construction of timber walls involves several steps and techniques. Here is an overview of the process:

1. Planning and Design:

- Start by creating a detailed plan and design for the timber walls, considering factors such as wall height, openings for doors and windows, and structural requirements.
- Determine the necessary materials, including the type and size of timber, fasteners, and other components.

2. Site Preparation:

- Clear the construction area of any debris, or obstacles.
- Ensure that the site is level and properly prepared for construction.

3. Marking and Layout:

- Use measurements and layout tools to mark the location of wall plates, studs, and other structural elements on the floor or foundation.
- Ensure accurate alignment and spacing between wall components.

4. Cutting and preparation:

- Cut timber components to the required length using appropriate saws and cutting tools.
- Prepare the timber by removing any rough edges or imperfections.

5. Assembly and Framing

- Start by attaching the bottom wall plates to the floor or foundation using appropriate fasteners.
- Install the vertical studs at the marked locations, ensuring they are plumb (vertically straight) and aligned with the layout.
- Secure the top wall plates to the studs, creating a continuous frame.
- Install additional framing elements, such as header, cripple studs, or fire blocking, as per design and structural requirements.

6. Bracing and Reinforcement:

- Install diagonal braces or sheathing panels to provide stability and prevent lateral movement in the timber wall.
- Ensure proper placement and secure fastening of braces or sheathing.

7. Exterior cladding:

- Install the chosen exterior cladding material, such as siding or panels according to the manufacture's instruction and design specifications.
- Ensure proper weatherproofing and sealing of the cladding to protect the timber walls from moisture and the elements.

8. Interior Finishing:

- Install interior wall finishes, such as drywall, or panelling, as per the design and aesthetic requirements.
- Apply suitable finishes such as paint, or stain to enhance the appearance and protect the timber walls.

9. Inspection and Compliance:

- Conduct the necessary inspections to ensure compliance with building codes, regulations and safety standards.
- Address any deficiencies or issues identified during the inspections and make necessary corrections.

INFORMATION SHEET: INSPECTION OF TIMBER WALLS

1. General Inspection:

- Verify that the timber walls are constructed according to the approved plans and specifications.
- Check the compliance with local codes, regulations and industry standards.
- Assess the overall workmanship and quality of the timber wall construction.

2. Structural Components:

- Ensure the wall framing is correctly installed and aligned, including bottom and top plates, studs, headers and sill plates.
- Check the proper spacing between studs and adequate support for openings (doors, windows)
- Verify the use of appropriate connectors, fasteners, and reinforcement elements (such as anchor bolts, ties, or straps) as per design requirements.

3. Wall Alignment and Levelness:

- Check the vertical alignment (plumpness) of the timber walls using a level.
- Assess the straightness and levelness of the walls horizontally.
- Confirm that the walls are properly aligned with adjacent walls and other structural elements.

4. Bracing and Stability:

- Ensure that diagonal or sheathing is installed at appropriate locations for structural stability.
- Verify the adequacy and proper installation of any required shear panel or blocking.
- Assess the rigidity and resistance to lateral movement of the timber walls.

5. Moisture Management:

- Check the proper flashing, weather resistant barriers and sealants at wall openings (windows, doors) and intersection with other building elements.

6. Exterior Cladding:

- Inspect the installation of exterior cladding materials, such as siding, panels or veneers.
- Check for proper attachment, alignment, and weatherproofing of the cladding.
- Assess the quality of any trim, flashing or detailing around openings and transitions.

UNIT 5

CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES



CLUSTER 1

UNIT 5 - BCGCSS0023A - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

SUGGESTED TIME: 70 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on the skills, knowledge and attitudes required to construct stairs in a residential home and applies to individuals working in masonry in the construction industry.
By the end of this module, learners will be able to: 1. Plan and prepare work. 2. Set out steps. 3. Lay bricks and form steps. 4. Coordinate clean up.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 5 Learning Activity	Using Site Drawings to Determine Stair Geometry	133
	Calculation of Stair Geometry	134
Unit 5 Performance Assessment	Reading And Calculating Stair Dimensions Activity	135
Unit 5 Information Sheet	Tools and Equipment Needed for Stair Construction	136
	Do's and Don'ts of Using Scaffolding	139
	Ladder Safety	140
Unit 5 Learning Activity	Designing Specifications for the Aged and Physically Handicapped	141
	Formwork for Building Stairs	143
Unit 5 Information Sheet	Pouring of Concrete in Formwork	145
Unit 5 Checklist	Quality Assurance Checklist for the Construction of Stairs	146

BUILDING CODES & SPECIFICATIONS

KNOWLEDGE OBJECTIVE
1. Describe the different terms used in the composition of stairs.
2. State the building codes, specifications and standards for constructing stairs.
3. Explain the concrete compression strength of concrete for the construction of stairs.
PERFORMANCE OBJECTIVE
1. Apply stair geometry technique to guide the construction of stairs.

ENABLING OBJECTIVE #1	
1. Gain knowledge of the building codes, specifications and standards for constructing stairs.	
2. Practise using building codes, specifications, standard and stair geometry to determine the dimension of stairs.	
3. Practise using building codes, specifications, standards and stair geometry to determine the dimension of stairs.	
LEARNING EXPERIENCE	
Read the building codes and building specification for stairs.	CDEMA. (2023). Learner's Guide. Construction Supervision of Houses.
Read "Stairs" in CDEMA Learner's Guide, page 35.	Instructors provide learners with access to the relevant documents.
Watch video: "First Time Building Stairs-Everything You Need to Know."	Instructors will highlight any pertinent codes, specifications, and standards that learners must understand.
Read handout on design specifications for the aged and physically handicapped.	Instructors will create an online quiz based on the codes, standards and specifications for building stairs.
Discuss the specification for building stairs especially as it relates to the aged and physically handicapped.	Definition of technical terms used in staircases Civil Engineering. (2017). https://civilengineering.blog/2017/09/17/stair-case-technical-term/
Examine a map to determine stair geometry and specification.	Training Hand Academy. (n.d.). First Time Building Stairs - Everything You Need To Know. https://www.youtube.com/watch?v=UFlqiwtaAYA
Complete an online quiz.	



STAIR GEOMETRY

KNOWLEDGE OBJECTIVE
1. State the stair geometry specifications from drawings.
PERFORMANCE OBJECTIVE
1. Read building drawings to determine the stair specifications.
2. Apply quality assurance standards to the construction of stairs.

ENABLING OBJECTIVE #2	
1. Gain knowledge on stair geometry specifications from drawings.	
2. Practise using site drawings to determine stair geometry and specification.	
3. Practise using stair geometry tools to measure stair dimensions in the marking out of the stairs before construction.	
4. Practise calculating stair dimensions and geometry.	
5. Practise calculating stair dimensions and stair geometry.	
6. Practise wearing PPE equipment.	
LEARNING EXPERIENCE	
Read Stair Geometry in Learners Guide, page 35.	CDEMA. (2023). Learner's Guide. Construction Supervision of Houses.
Explain the stair geometry based on reading a map.	
Explain the significance of accurately interpreting site drawings to determine stair dimensions.	
Watch Constructing a staircase.	RP E-learning. (2022). Rwanda Polytechnic -Carpentry-level 5-Constructing a staircase-2 of 7. https://www.youtube.com/watch?v=bkVVnKdyAc
Calculate the dimensions and geometry of a staircase.	
Read the article, "How to Measure Stairs."	Colmenares, L. & Latore, S. (2022).How To Measure Stairs. https://www.wikihow.com/Measure-for-Stairs Instructor engages students in a learning activity.
Watch a demonstration on how to measure stairs on a construction site using appropriate tools.	
Practise measuring stairs after the demonstration on a construction site.	Calculate the dimensions of your spiral staircase. https://easystair.net/en/spiral-staircase.php



CONSTRUCTION OF STAIRS: TOOLS & EQUIPMENT

KNOWLEDGE OBJECTIVE

1. List the equipment, tools and materials needed for the construction of stairs.
2. Discuss the importance of using, checking and maintaining equipment used for the construction of stairs.
3. Discuss the importance of wearing Personal Protective Equipment.

PERFORMANCE OBJECTIVE

1. Construct stairs to consider body proportions and design considerations.
2. Construct formwork to build the stairs.
3. Use levelling, plastering and curing techniques in the construction of stairs.

ENABLING OBJECTIVE #3

1. **List** the equipment, tools and materials needed for the construction of stairs.
2. **Discuss** the importance of using, checking and maintaining equipment used for the construction of stairs.
3. **Discuss** the importance of wearing Personal Protective Equipment.
4. **Practise** using equipment effectively and accurately to construct stairs.
5. **Practise** the maintenance of tools and equipment.
6. **Practise** the accurate set up of scaffolding for stairs.

LEARNING EXPERIENCE

List the equipment, tools and materials needed for the construction of stairs.

Review the information sheet on tools and equipment for constructing stairs.

Rwanda Polytechnic. (2020, Aug.17). Rwanda Polytechnic-carpentry-level 5- Constructing a staircase-1 of 7. https://www.youtube.com/watch?v=zor7i_l-aHc

Research how to maintain each tool and equipment, (also see manufacturer's recommendations).

Discuss importance of the maintenance of tools and equipment in class session.

Review infographic of safe use of scaffolding.

Demonstrate the safe use of scaffolding on the construction site.

Demonstrate the wearing of PPE equipment.



BUILDING STAIRS FOR THE HUMAN BODY

	KNOWLEDGE OBJECTIVE
	1. Discuss design specifications for the aged and physically handicapped.
	2. Discuss the proportion of the human body when constructing stairs.
	PERFORMANCE OBJECTIVE
	1. Use equipment effectively and accurately to construct stairs.
	2. Demonstrate the maintenance of tools and equipment.

ENABLING OBJECTIVE #4	
1. Gain knowledge of design specifications for the aged and physically handicapped.	
2. Gain knowledge of the proportion of the human body when constructing stairs.	
3. Practise constructing stairs to consider body proportions and design considerations.	
LEARNING EXPERIENCE	
Participate in a lecture discussion on design principles for the human body proportion, design considerations and specification for the aged and physically handicapped.	Trainer organises the guest speaker to speak to the learners. Additionally, the trainer can show an instructional video. See https://www.buildsafe.cdema.org
Participate in a hands-on workshop on stair construction for body proportions and design considerations.	Trainer organises a hands-on workshop where stairs are being constructed for the aged and physically handicapped, that emphasises design principles.



FORMWORK FOR STAIRS

KNOWLEDGE OBJECTIVE

1. Discuss the slab thickness and reinforcement needed for the construction of stairs.
2. Explain the formwork needed to construct stairs.

PERFORMANCE OBJECTIVE

1. Demonstrate accurate set up of scaffolding.
2. Use tools to measure stair dimensions.

ENABLING OBJECTIVE #5

1. **Gain** knowledge of the slab thickness and reinforcement needed for the construction of stairs.
2. **Gain** knowledge of the formwork to build the stairs.
3. **Practise** constructing formwork to build the stairs.

LEARNING EXPERIENCE

Review Table 20 in the Learner's Guide on slab thickness and reinforcement.	CDEMA. (2023). The Learner's Guide- Construction Supervision of Houses.
Read the information sheet on formwork for building stairs.	Rwanda Polytechnic. (2020). Rwanda Polytechnic-carpentry-level 5- Constructing a staircase-3 of 7. https://www.youtube.com/watch?v=Zjp_NZV2suk
Visit a construction site/simulated site to observe the construction of formwork for stairs.	Rwanda Polytechnic. (2020). Rwanda Polytechnic-carpentry-level 5- Constructing a staircase-4 of 7. https://www.youtube.com/watch?v=0G6naEBcwH4
Oversee the construction of formwork for stairs in groups.	Rwanda Polytechnic. (2020). Rwanda Polytechnic-carpentry-level 5- Constructing a staircase-5 of 7. https://www.youtube.com/watch?v=dsv7RPESNK0
	Rwanda Polytechnic. (2020). Rwanda Polytechnic-carpentry-level 5- Constructing a staircase-7 of 7. https://www.youtube.com/watch?v=5A5eYGUcq6s



CONSTRUCTION OF STAIRS: LAYING CONCRETE

	KNOWLEDGE OBJECTIVE
	1. Discuss the steps of laying concrete for the construction of stairs.
	2. Discuss the plastering, levelling and curing of concrete.
	PERFORMANCE OBJECTIVE
	1. Calculate stair dimensions and stair geometry.

ENABLING OBJECTIVE #6	
1.	Gain knowledge on the steps of laying concrete for the construction of stairs.
2.	Gain knowledge on the plastering, levelling and curing of concrete.
3.	Gain knowledge on the concrete compression strength of concrete for the construction of stairs.
4.	Practise applying quality assurance measures to the construction of stairs.
5.	Practise using levelling, plastering and curing techniques in the construction of stairs.
LEARNING EXPERIENCE	
Read information sheet on laying concrete in formwork for the construction of stairs.	
Watch videos on the technique for pouring, levelling and curing concrete for the construction of stairs.	See https://www.buildsafe.cdema.org
Use quality assurance checklist after the stairs have been completed to determine the quality of the stairs.	



INFORMATION SHEETS FOR Unit 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

LEARNING ACTIVITY: USING SITE DRAWINGS TO DETERMINE STAIR GEOMETRY

Objective: To develop the skills of interpreting site drawings and calculating stair Geometry for construction purposes.

Materials Needed:

- Site drawings or architectural plans with stair details
- Ruler or measuring tape
- Calculator

Procedures:

1. Introduction:

- Introduce the concept of stair geometry and its importance in designing and constructing stairs.
- Explain the significance of accurately interpreting site drawings to determine stair dimensions.

2. Review Site Drawings:

- Provide participants with site drawings or architectural plans that include stair details.
- Familiarise participants with the different symbols and notations used in the drawings related to stairs.
- Explain the key elements depicted in the drawings, such as thread depths, risers' height, and overall stair dimensions.

3. Interpretation of Stair Dimensions:

- Instruct participants to carefully examine the site drawings and identify the relevant measurements for the stairs.
- Ask participants to locate and determine the tread depth and riser height specified in the drawings.
- Guide participants to identify any additional dimensions required for stair construction, such as nosing length, headroom, clearance, and handrail heights.

4. Calculation of Stair Geometry:

- Provide participants with a step-by-step guide on how to calculate stair geometry based on the dimensions obtained from the site drawings.
- Demonstrate the formulas and equations commonly used for determining the number of steps, overall run, and rise of the stairs.
- Encourage participants to practise using calculations with different scenarios and stair designs.

5. Application Exercise:

- Distribute sample site drawings or provide participants with individual copies.
- Assign participants to calculate the stair geometry for the given drawings, using the skills and knowledge acquired.

6. Review and Discussion:

- Review the calculated stair geometries as a group.
- Discuss the discrepancies encountered during the exercise.

INFORMATION SHEETS FOR Unit 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

LEARNING ACTIVITY: CALCULATION OF STAIR GEOMETRY

Objective: Practise calculating the dimensions and geometry of a staircase based on given measurements.

Formulas:

- Number of steps (NS) = Total Rise / Riser Height
- Step Height (SH) = Total Rise / Number of Steps
- Run (R) = Total Run / Number of steps

Given the following dimensions calculate the number of steps, step height and run:

- Total depth: 10 inches
- Riser height: 7.5 inches
- Total Rise: 108 inches
- Total Run: 144 inches

INFORMATION SHEETS FOR Unit 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

ASSESSMENT:

Reading and Calculating Stair Dimensions Activity

Participant's Name:		Date:			
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Reading stair dimensions on a map (verbally read stair dimensions on a given map).					
Calculating stair dimensions. Using stair dimensions. Using the correct formula. Provide the correct results.					
Measuring stair dimensions using appropriate tools and techniques.					
Additional Comments/Notes:					
Evaluator's Signature:					

INFORMATION SHEET UNIT 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

INFORMATION SHEET:

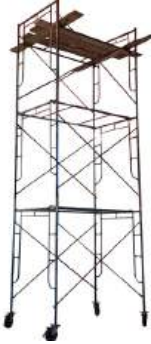
Tools and equipment needed for stair construction

EQUIPMENT NEEDED FOR CONSTRUCTING CONCRETE MASONRY WALLS	
Tool/ Equipment	Description
TAPE MEASURE 	Used to measure the dimensions of the stairs' components accurately.
CARPENTER'S SQUARE 	Helps in marking and checking right angles during layout and construction.
CHALK LINE 	Used for marking straight lines on the floor or walls to guide the construction process.
CIRCULAR SAW 	Used to cut the stair stringer, treads and risers to the required dimensions.
JIGSAW 	Used for marking curved or intricate cuts on stair components, such as handrails or balusters.

EQUIPMENT NEEDED FOR CONSTRUCTING CONCRETE MASONRY WALLS

Tool/ Equipment	Description
POWER DRILL 	Required for drilling holes for screws, fasteners, and attaching stair components.
CHISEL 	Used for shaping and fine-tuning joints and mortises in the stair components.
LEVEL 	Ensures that the stairs are accurately levelled during installation.
CARPENTER'S PENCIL 	Used for marking cut lines and measurements on the stair components.
CARPENTER'S CLAMP 	Helps hold the stair components securely in place during assembly and installation.
WORKBENCH 	Provides a stable surface for cutting and assembling stair components.

EQUIPMENT NEEDED FOR CONSTRUCTING CONCRETE MASONRY WALLS

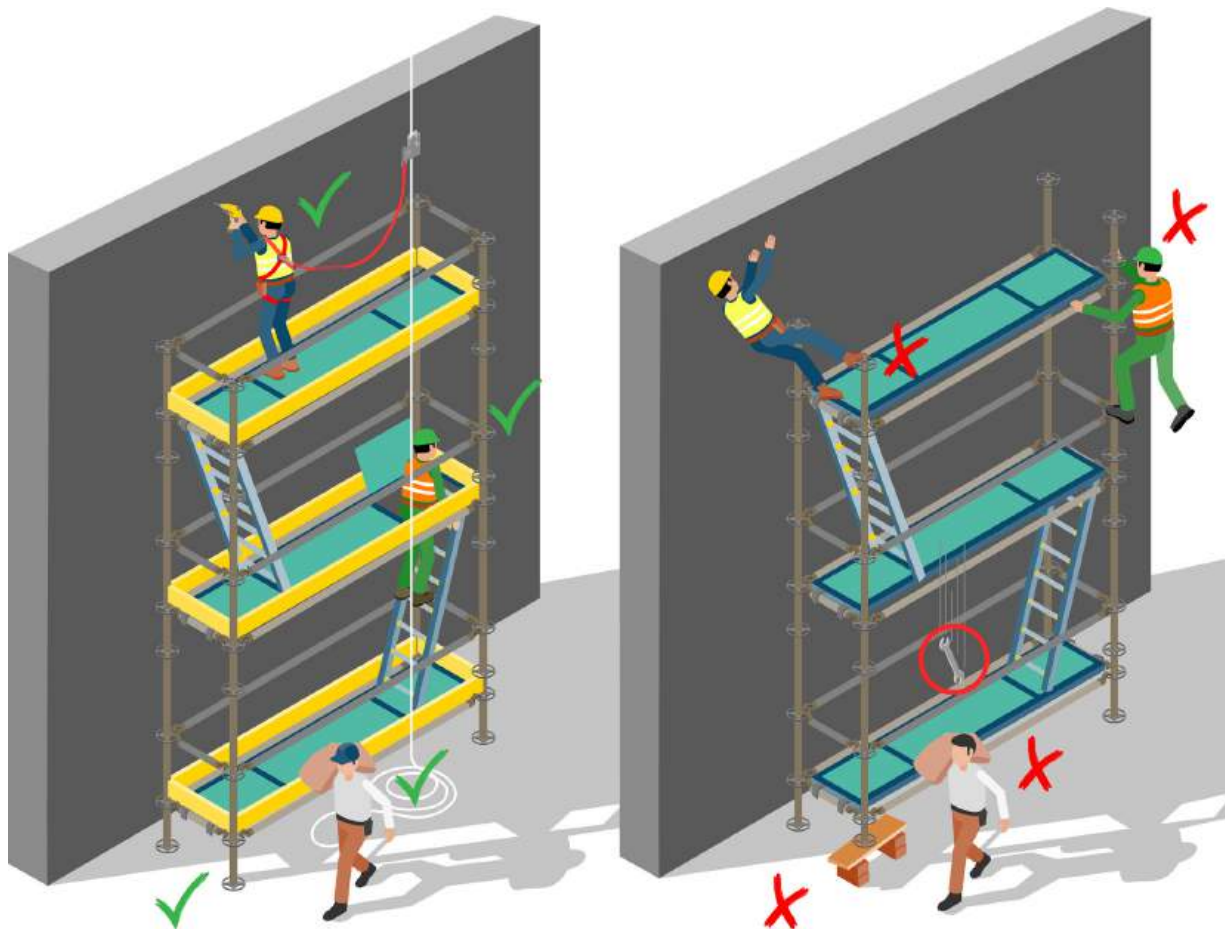
Tool/ Equipment	Description
SCAFFOLDING 	Necessary for accessing higher areas of the staircase during construction and installation.
LADDER 	Necessary for accessing higher areas of the staircase during construction and installation.

INFORMATION SHEET UNIT 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

INFORMATION SHEET:

Do's and don'ts of using scaffolding

Scaffolds increase the efficiency and productivity of construction. However, only if it is used safely. Therefore, pay attention to these do's and don'ts of scaffolding use.



DO's

- Wear good PPE like anti-slip shoes, safety jacket and a helmet.
- Wear a harness that can save your life if you fall.
- Have the scaffolding inspected by an expert before its use to check if it is properly supported, anchored and braced.

DON'Ts

- Erect scaffolding on uneven ground.
- Disregard safety rules.
- Overload a scaffold by loading above its manufactured load rating.

INFORMATION SHEET: Ladder Safety

Six Safety Rules Use Of Ladders



1 Use A Ladder Of The Correct Length



2 Inspect The Ladder Carefully



3 Transport Ladder Carefully



4 Set On A Reliable Surface



5 Install The Ladder Correctly



6 Secure The Ladder At The Top

Check Also



Pay Attention To Your Health



Use A Tool Belt



Check Your Shoes

LEARNING ACTIVITY UNIT 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

LEARNING ACTIVITY: DESIGNING SPECIFICATIONS FOR THE AGED AND PHYSICALLY HANDICAPPED

When designing stairs for the aged and physically handicapped, it is essential to prioritise accessibility, safety and ease of use. Here are some design specifications to consider:

1. **Slope and Rise/Run:**

- Keep the slope of the stairs gentle to minimise exertion and fatigue. The recommended slope is around 1:20 (1 unit rise every 20 units run).
- Ensure consistent and comfortable rise and run dimensions, typically with a maximum rise of 7 inches (178 mm) and a minimum of 11 inches (279 mm).

2. **Handrails:**

- Install continuous and sturdy handrails on both sides of the stairs for support and stability.
- The handrails should be positioned at a comfortable height, typically between 34-38 inches (864-965 mm) above the nosing of the stair tread.
- Use materials that are easy to grip and provide adequate support, such as rounded or ergonomically designed handrail profiles.

3. **Treading or Nosing:**

- Ensure that the stair treads are slip-resistant and have non-glare surface to prevent accidents.
- Provide contrasting colour or tactile indicators on the nosing of the treads to aid visually impaired individuals in identifying the edge of each step.

4. **Width and clearance:**

- Design the stairs with sufficient width to accommodate individuals with mobility aids, such as walkers or wheelchairs.
- The minimum clear width for straight stairs should be at least 36 inches (914 mm), while wider widths are preferred.
- Maintain adequate clearance around the stairs to allow easy maneuverability and provide space for people to rest if needed.

5. Landings:

- Incorporate intermediate landings at appropriate intervals to provide resting spots for individuals who may have difficulty climbing a long flight of stairs.
- Ensure the landings have sufficient size and clear spaces for wheelchair users to make turns comfortable.

6. Lightning and Visibility:

- Install adequate lighting along the stairs to ensure good visibility, especially for individuals with visual impairments.
- Use contrasting colours for the stairs and handrails to enhance visibility and assist individuals with depth perception.

7. Markings and Signage:

- Provide clear and prompt markings or signage to indicate the location of stairs, including tactile indicators or visually impaired individuals.
- Include signs with directional arrows and clear labels for different levels or destinations.

8. Accessibility Standards:

- Adheres to local accessibility standards and building codes specific to designing stairs for the aged and physically handicapped.
- Consult relevant guidelines, such as the disability unit.

LEARNING ACTIVITY UNIT 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

LEARNING ACTIVITY: FORMWORK FOR BUILDING STAIRS

Formwork is essential for creating the shape and structure of the stairs during construction. Here are some steps to build formwork for stair construction:

1. **Understand the design:** Study the architectural plans or stair design to understand the dimensions, shape, and layout of the stairs. Note the number of steps, raiser height, tread depth, and any other relevant specifications.
2. **Gather Materials:** Collect the necessary materials for building formwork, including plywood, or timber boards, formwork braces, screws, nails and formwork ties.
3. **Determine the Slab Thickness:** Determine the required thickness of the slab based on structural and load requirements. This can vary depending on the use of the slab.
4. **Prepare the Construction Area:** Clear the construction area and ensure it is level and stable. Remove any debris, rocks, or obstacles that may interfere with the formwork installation.
5. **Measure and Cut the Formwork Boards:** Measure and cut the plywood or timber boards to the required dimensions based on the stair design. Use a circular saw or handsaw to make accurate cuts.
6. **Install Bottom Formwork:** Begin by installing the bottom formwork, which will create the shape and support for the bottom of the stairs. Attach the formwork boards securely to the ground using stakes or screws. Ensure they are level and aligned with the stair design.
7. **Install the Side formwork:** Proceed to install the side formwork, which will create the sides or edges of the stairs. Measure and cut the boards to the appropriate dimensions, ensuring they fit securely between the side formwork. Use screws or nails to fasten them in place.
8. **Install Risers and Tread Formwork:** Install additional formwork boards to create the risers and treads of the stairs. Measure and cut boards to the appropriate dimensions, ensuring they fit securely between the side formwork. Use screws or nails to fasten them in place.

9. **Secure and Reinforce the Formwork:** Check that all formwork components are securely attached and aligned. Install formwork braces across the formwork to provide additional support and prevent movement during concrete pouring.
10. **Reinforcement Placement:** Install the reinforcement bars (steel) or wire mesh, which add strength and help control cracking. Follow the specifications and layout the reinforcement according to the required spacing and overlap.
11. **Check for Accuracy:** Use a spirit level, tape measure and carpenter's square to check that the formwork is level, plump, and aligned with the desired stair dimensions. Make any necessary adjustments before proceeding.
12. **Waterproof and Release Agent:** Apply a waterproofing solution or coating to the inside surfaces of the formwork to prevent water absorption from the concrete. Additionally, apply a release agent to the formwork to facilitate easier removal once the concrete has cured.

LEARNING ACTIVITY UNIT 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

INFORMATION SHEET: POURING OF CONCRETE IN FORMWORK

1. **Pour concrete:** Once the formwork is complete and checked for accuracy, proceed with pouring the concrete for the stairs. Pour the concrete mixture into the formwork, starting from one end and working towards the other. Use a concrete vibrator to ensure proper consolidation and removal of air bubbles. Fill the formwork to the desired level, taking into account slab thickness. Follow the proper concrete pouring techniques, ensuring it fills the formwork completely and evenly.
2. **Concrete finishing:** After pouring, level the surface of the concrete using a screed board, bull float, or power trowel. This help to achieve a smooth and even surface. Finish the concrete with a broom, trowel or other desired texture for slip resistance, if required.
3. **Allow concrete to cure:** Protect the freshly poured concrete from rapid drying and temperature changes by applying a curing compound or covering it with a curing membrane. Allow the concrete to cure and set as per the manufacturer's recommendations. This typically takes several days. Take care not to disturb or remove the formwork during the curing process.
4. **Remove the formwork:** After the concrete has fully cured, carefully remove the formwork boards, starting with the bottom formwork, then the sides, risers, and treads. Formwork is usually removed around 24 to 48 hours after the pouring of concrete to ensure sufficient strength of the concrete has been obtained. Use a pry bar or hammer to gently loosen and remove the formwork.
5. **Finishing Touches:** After the formwork is removed and the concrete has fully cured, inspect the slab for any imperfections or defects. Perform any necessary repairs or surface treatments to achieve the desired finish.

INFORMATION SHEETS FOR Unit 5 - CONSTRUCT CONCRETE STAIRS IN RESIDENTIAL HOMES

QUALITY ASSURANCE CHECKLIST FOR THE CONSTRUCTION OF STAIRS

The construction of stairs requires careful attention to detail and adherence to quality standards to ensure safety and durability. Use the checklist to ensure your stairs meet quality standards.

Participant's Name:		Date:			
Design Review					
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
The stair design meets the local building codes, regulations.					
The dimensions, slope, and rise/ run calculations are accurate and appropriate for the intended use of the stairs.					
Material Selection					
Material used for the stairs meets the required specifications and quality standards.					
Selected materials are suitable for the environmental conditions and anticipated load.					
Foundation and Support					
The foundation or support structure for the stairs is properly designed and constructed to bear the weight of the stairs.					
The footings or support elements are securely anchored and adequately sized to provide stability.					

Participant's Name:		Date:			
Category	Excellent (4)	Good (3)	Fair(2)	Poor (1)	Comment
Stringers and Treads					
The stringers are cut and shaped correctly.					
The threads and risers are evenly spaced, level and securely attached to the stringers.					
The dimensions of each tread and riser are consistent and complies with building codes.					
Finishing and Surface Treatment					
Does the finish have a smooth and uniform surface.					
Cracks, chips or defects in the stairs' surfaces are free of defects.					
If defects are found they are addressed promptly.					
Evidence of appropriate nonslip coating or sealant used as required for safety and longevity.					
Safety measures.					
Installation of safety features, such as tread nosing, anti-slip material, lighting, to enhance visibility and prevent accidents.					
Additional Comments/ Notes:					
Evaluator's Signature:					

UNIT 6

**INSTALL ROOFS
ON CONCRETE
& TIMBER
STRUCTURES**



CLUSTER 1

UNIT 6 - BCGCSS0063A - INSTALL ROOFS ON CONCRETE AND TIMBER STRUCTURES

SUGGESTED TIME: 120 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on the skills, knowledge and attitudes required for the installing of roofs on timber framed walls.

By the end of this module, learners will be able to:

1. Plan and prepare work.
2. Install roof structure/support
3. Install roof truss.
4. Coordinate clean up.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 6 Information Sheet	Safety Guidelines and Regulations Related to Working at Heights, Handling Materials and Operating Equipment When Working on Roofs	160
Unit 6 Learning Activity	Preventing A Fall	162
Unit 6 Information Sheet	Different Types of Roofs	163
	Reading Information on Roofs	164
	Roof Pitch Calculation Formulas	165
	Hurricane Straps	166
	Sheathing and Tongue-and-Groove Close	169
Unit 6 Performance Assessment	Installing Sheathing and Tongue-And-Groove Close Boards in Roof Construction	170

ROOFS FOR RESIDENTIAL HOMES

↓	KNOWLEDGE OBJECTIVE
	1. Discuss the organisation and planning needed for the installation of roofs.
	2. State the tools and equipment needed for the construction of roofs for residential homes.
	PERFORMANCE OBJECTIVE
	1. Demonstrate ability to organise and prepare work.
	2. Develop a workplan with timelines of building a roof.
	3. Select appropriate tools and equipment.
	4. Perform checks on tools and equipment to determine serviceability to build roofs.

ENABLING OBJECTIVE #1	
1.	Gain knowledge of organising and planning for the installation of roofs.
2.	Gain knowledge of the tools and equipment needed for the construction of roofs for residential homes.
3.	Demonstrate ability to organise and prepare work.
4.	Select appropriate tools and equipment.
5.	Practise performing checks on tools and equipment to determine serviceability.
6.	Practise developing a work plan to complete a roof installation.
LEARNING EXPERIENCE	
Read Section 9 “Roofs” in the Learner’s Guide.	
Make a list of the tools and equipment needed for the construction of roofs.	
Test the tools and equipment to ensure they are in working order.	Instructor will provide building codes and building specification information for installation of roofs.
Discuss the importance of organising and preparing work.	Instructors to provide a list of the tools and equipment needed for the construction of roofs.
Develop a workplan to complete a roof installation.	Instructors will provide examples of a workplan for the construction of a roof.

OCCUPATIONAL HEALTH & SAFETY: CONSTRUCTING A ROOF

KNOWLEDGE OBJECTIVE
1. State the safety guidelines and regulations related to working at heights, handling materials and handling equipment.
2. State the materials and quantities needed for the construction of roofs for residential homes.
3. State the health and safety requirements relevant to the construction of roofs.
PERFORMANCE OBJECTIVE
1. Comply with Occupational Health and Safety requirements.
2. Avoid hazards that can occur while working on a roof.

ENABLING OBJECTIVE #2	
1. Gain knowledge of the hazards that can occur while working on a roof.	
2. Gain knowledge on the safety guidelines and regulations related to working at heights, handling materials and handling equipment.	
3. Gain knowledge of occupational health and safety standard.	
4. Practise implementing and complying with Occupational and Safety requirements, especially working on roofs.	
LEARNING EXPERIENCE	
Read and discuss the hazards that can occur while working on a roof, and the safety guidelines and regulations.	Safety Essentials Residential. (n.d.). 4.1.1 Roof work and falling hazards. https://health.sunnybrook.ca/infographic/ladder-safety-prevent-injury/
Discuss safety guidelines and regulations after reading the handout.	
Examine the poster “What can you do today to prevent a fall” and outline 3 ways to prevent a fall on a roof. Answer the probing questions in the activity.	Instructors provide the poster.
State the practical things to do to install a roof.	
Wear PPE equipment accurately on the worksite.	Participants should have been provided with PPE equipment at the beginning of the course. Facilitators should always have extra PPE equipment on hand.



BUILDING CODES & STANDARDS: RESIDENTIAL HOME ROOF

	KNOWLEDGE OBJECTIVE
	1. Discuss the building code standards and requirements for the construction of roofs in a residential home.
	2. Explain the importance of compliance with safety standards and structural requirements in the construction of roofs.
	PERFORMANCE OBJECTIVE
	1. Identify and apply the structural requirements based on the building codes in the installation of roofs.

ENABLING OBJECTIVE #3	
1. Gain knowledge on building code standards and requirements for the construction of roofs in a residential home.	
2. Gain knowledge on the structural requirements based on the building codes for the installation of roofs.	
3. Practise applying structural requirements that are based on the building codes in the installation of roofs.	
LEARNING EXPERIENCE	
Read the building codes and building specification for roofs.	
State verbally the building code regulations for roof.	Instructors provide the building codes and building specification for roofs.
Develop a checklist of structural requirements for roof installation and use the checklist to check adherence to the structural standards.	This can be a group activity; instructors can show examples of checklists.
Comply with structural requirements based on the building codes for roof construction.	

MATERIALS: CONSTRUCTING ROOFS FOR RESIDENTIAL HOMES

↓	KNOWLEDGE OBJECTIVE
	1. Describe the various roof types, such as gable, hip, flat, shed, or mansard roofs.
	2. State the roof design, dimensions, elevations from a map.
	PERFORMANCE OBJECTIVE
	1. Order and check materials according to job specifications and requirements.
	2. Calculate quantities of materials needed to build a residential roof.

ENABLING OBJECTIVE #4	
1. Gain knowledge on different roof types, such as gable, hip, flat, shed or mansard roofs.	
2. Gain knowledge on the roof design, dimensions, elevations from a map.	
3. Read and interpret architectural and structural drawings to understand the roof design, dimensions, elevations, and relevant details.	
LEARNING EXPERIENCE	
Discuss the different types of roofs by examining an infographic.	
Read dimensions from a site or architectural map.	Instructor will lead this session and provide a site/architectural drawing and review reading information on roofs with the learners.
Record the roof design, dimensions, elevations and relevant details from site or architectural maps.	

ROOF DESIGN

	KNOWLEDGE OBJECTIVE
	1. State the materials and quantities needed for the construction of roofs for residential homes.
	PERFORMANCE OBJECTIVE
	1. Read and interpret architectural and structural drawings to understand the roof design, dimensions, elevations and relevant details.

ENABLING OBJECTIVE #5	
1. Gain knowledge of the material and quantities needed for the construction of roofs for residential homes	
2. Practise calculating quantities of materials needed to build a residential roof.	
3. Practise ordering and checking materials according to job specifications and requirements	
LEARNING EXPERIENCE	
Discuss the materials and quantities needed for the construction of roofs.	
Use the calculation sheet to calculate the materials and quantities to construct .	Instructors see the calculation roof sheet.

ROOF INSTALLATION

	KNOWLEDGE OBJECTIVE
	1. Describe the various roof types, such as gable, hip, flat, shed, or mansard roofs.
	2. Describe the process of determining the roof pitch.
	PERFORMANCE OBJECTIVE
	1. Calculate the required materials of a concrete roof.

ENABLING OBJECTIVE #6	
1. Gain knowledge on different roof types, such as gable, hip, and flat roofs.	
2. Gain knowledge on determining the roof pitch.	
3. Gain knowledge for roof installation of timber and concrete roofs.	
4. Practise calculating the required materials of a concrete roof.	
LEARNING EXPERIENCE	
Participate in a demonstration lecture on roof pitch.	Instructors conduct an interactive session on roof pitch explaining the concept and its importance in roof design. Ensure Caribbean examples are utilised.
Listen to a roofing expert include discussion on materials, tools, safety measures and best practices.	Measuring Roof Pitches By Ground Plan is a useful resource that can be made available to the learners. Instructors, please see the following link as a guide: https://help.groundplan.com/docs/measuring-roof-pitches .
Read and examine the information sheet on different types of roofs and answer the attached questions.	
Watch the video, Slope the Pitch of the Roof.	Brandford Craft. (2016). Video, Slope the Pitch of the Roof. https://www.youtube.com/watch?v=bwfOSV5jKlc
Use the roof pitch calculator and formula to calculate in determine pitch of the roof.	Instructors will create practice worksheets to calculate pitch of roofs.



MEASURING & CUTTING TIMBER

	KNOWLEDGE OBJECTIVE
	1. State the materials and quantities needed for the construction of roofs for residential homes.
	2. State the roof design, dimensions, elevations from a map.
	PERFORMANCE OBJECTIVE
	1. Measure and cut timber members accurately to the required dimensions.

ENABLING OBJECTIVE #7	
1. Gain knowledge of measuring and cutting members accurately to the required dimensions.	
2. Practise explaining how to measure and cut timber material accurately to required dimensions.	
LEARNING EXPERIENCE	
Watch a demonstration of measuring and cutting roofing materials.	See https://www.buildsafe.cdema.org
Discuss the measuring and cutting materials accurately to the required dimensions.	
Visit a construction site where the measuring and cutting of roofing materials can be observed.	Instructor should organise the visit to a construction site.
Practise measuring and cutting timber materials accurately.	
Explain the process of measuring and cutting timber materials to a subordinate.	
Demonstrate measuring and cutting timber materials.	



SECURING ROOFS

KNOWLEDGE OBJECTIVE

1. Explain the purpose or function of key components, including roof trusses, rafters, purlins, ridge boards, and fascia boards.

PERFORMANCE OBJECTIVE

1. Attach and secure roof rafters and ridge members in accordance with structural design plans.

ENABLING OBJECTIVE #8

1. **Gain** knowledge on the purpose and function of key components, including roof trusses, rafters, purlins, ridge boards, and fascia boards.
2. **Gain** knowledge on the importance of hurricane straps to protect roofs.
3. **Practise** attaching and securing roof rafters and ridge membrane in accordance with structural design plans.
4. **Practise** installing roofing materials on timber or concrete structures.
5. **Practise** installing hurricane straps.
6. **Practise** installing purlins.

LEARNING EXPERIENCE

Discuss the purpose and function of roof trusses, rafters, purlins, ridge board and fascia boards.	UNDP Multicountry Office in Jamaica. (2021, March 5). Trusses: Building A Hurricane Roof To The Bahamas Building Code. https://www.youtube.com/watch?v=1VFjsp5x27o&list=PL8d3DnGxyIVY3PF-AvDGK6Ubkv9MIR46M&index=9
Read and discuss the importance of hurricane straps to protect roofs.	CDEMA. (2024). The Learner's Guide- Construction Supervision of Houses. https://www.youtube.com/results?search_query=Rwanda+Polytechnic+roofs
Watch a video on Trusses: Building, hurricane roof to the Bahamas Building code.	https://youtu.be/1VFjsp5x27o?si=ncbKeTFPYvtzi7C
Read Section 9 of the CDEMA Learner's Guide, on rafters.	Rwanda Polytechnics. (2020, August 6). Rwanda Polytechnic- carpentry-level 5-Constructing a roof-1 of 3. https://www.youtube.com/watch?v=G-YOhR3hAtk
Discuss the requirements for installing rafters, purlins, ridgeboards and fascia boards.	Rwanda Polytechnics. (2020, August 6). Rwanda Polytechnic- carpentry-level 5- constructing a roof- 3 of 3. https://www.youtube.com/watch?v=0RIBz8sPRPM&t=109s
Visit the construction site and watch the demonstration of the installation of roof trusses/rafters, purlins, ridgeboards and fascia. Pay attention to how instructions about the work are given by the construction site supervisor.	See https://www.buildsafe.cdema.org
Participate as an apprentice supervisor in the installation of roof trusses/rafters, purlins, ridgeboards and fascia.	
Write a reflective piece, or create a reflective video on this experience.	Reflective videos, or writings can be uploaded to an LMS/ collected for review as part of portfolio.



WATERPROOFING & INSTALLATION

	KNOWLEDGE OBJECTIVE
	1. Explain the role of sheathing and roofing materials in providing waterproofing and insulation.
	PERFORMANCE OBJECTIVE
	1. Apply roof sheathing panels, ensuring proper alignment and fastening according to standard practices.

ENABLING OBJECTIVE #9
1. Gain knowledge on the purpose of sheathing and roofing materials in providing waterproofing and insulation.
2. Practise sheathing panels, according to proper alignment and fastening according to standard practices.
3. Practise installing tongue and groove close boards or plywood.
LEARNING EXPERIENCE
Discuss the purpose of sheathing and roofing materials.
Observe the installation of sheathing and tongue and groove close boards.
Participate in the installation of sheathing and tongue and groove close boards.
Discuss how you would ensure the sheathing and tongue and groove close boards are installed correctly as a construction

QUALITY ASSURANCE

KNOWLEDGE OBJECTIVE

1. Discuss the building code standards and requirements for the construction of roofs in a residential home.
2. Discuss the organisation and planning needed for the installation of roofs.
3. State the safety guidelines and regulations related to working at heights, handling materials and handling equipment.
4. State the health and safety requirements relevant to the construction of roofs.

PERFORMANCE OBJECTIVE

1. Adhere to quality assurance requirements and structural requirements and procedures.
2. Demonstrate ability to organise and prepare work.

ENABLING OBJECTIVE #10

1. **Gain** knowledge on quality assurance standards.
2. **Implement** quality assurance and inspection procedures.

LEARNING EXPERIENCE

Research quality assurance standards for roof construction.

Develop an inspection checklist for the construction of roofs in groups.

Instructors highlight quality standards through the process.

Upload your construction checklist for the other team to comment.

Tutors provide a sample roof inspection checklist.
https://www.inf.gov.nt.ca/sites/inf/files/roof_inspection_checklist.pdf

Comment on another team's post. Suggest what is missing and what should be in the checklist.



INFORMATION SHEET FOR Unit 6 - INSTALL ROOFS ON TIMBER AND CONCRETE STRUCTURES

INFORMATION SHEET:

Safety guidelines and regulations related to Working at heights, handling materials and operating equipment when working on roofs

1. Working at Heights:

- a. Ensure proper fall protection measures are in place, such as guardrails, safety nets or personal fall arrest systems (PFAS).
- b. Use appropriate access equipment, such as ladders and scaffolding that are in good condition and properly secured.
- c. Follow proper ladder safety practices, including maintaining three points of contact, using a stable base, and not exceeding the ladder's weight capacity.
- d. Take weather conditions into account, avoiding working at heights during high winds, and heavy rain conditions.



2. Handling Materials:

- a. Use proper lifting techniques when handling heavy or bulky materials to prevent back injuries and strains.
- b. Use mechanical lifting equipment, such as cranes or hoists, for heavy to large materials whenever possible.
- c. Ensure materials are stacked and secured properly to prevent them from falling or shifting during transportation or storage.
- d. Wear appropriate personal protective equipment (PPE), such as gloves and safety boots, to protect against hazards related to handling materials.

3. Operating Equipment:

- a. Ensure staff members are able and trained to operate equipment, such as power tools, nail guns, or machinery used for roofing work.
- b. Conduct regular inspections of equipment to ensure they are in good working condition, and free from defects and damage.
- c. Use appropriate guards and safety features on equipment to prevent accidental contact with moving parts.

4. Electrical Safety:

- a. Identify and avoid overhead power lines when working on roofs to prevent electrocution hazards.
- b. Use insulated tools and equipment when working near electrical components or conducting tasks that may come into contact with electrical sources.
- c. Follow proper procedures for temporary electrical connections, including grounding and protection against electrical overloads.

5. Hazard Communication:

- a. Ensure proper labelling and storing of hazardous materials, such as adhesives, solvents and roofing chemicals.
- b. Use appropriate ventilation when working with or in the vicinity of hazardous substances to prevent inhalation of fumes or vapours.
- c. Recognise the potential hazards associated with roofing materials, including asbestos-containing products, and follow proper handling and disposal procedures.

6. Personal Protective Equipment (PPE):

- a. Wear appropriate PPE, including hard hats, safety glasses, hearing protection and respiratory protection, as necessary for the specific roofing tasks.
- b. Inspect PPE before each use to ensure it is in good condition and provides the necessary protection.
- c. Ensure workers are able to properly use, fit and maintain PPE equipment and enforce use on the job site.

7. Emergency Preparedness:

- a. Establish an emergency action plan that includes procedures for responding to accidents, injuries, or other emergencies on the roof.
- b. Provide workers with training on emergency procedures, including evacuation routes, first aid and reporting mechanisms.
- c. Keep appropriate emergency response equipment readily available, such as first aid, fire extinguishers, and emergency communication devices.

LEARNING ACTIVITY: PREVENTING A FALL

Examine the diagram below before answering the following questions.

What Can You Do Today to Prevent a Fall?

Protect yourself and your crew by following these tips.



Join the Campaign to
Stop Construction Falls!
www.stopconstructionfalls.com



Scan me



*Use the free NIOSH ladder app to determine the correct angle: <https://www.cdc.gov/niosh/topics/falls/mobileapp.html>

#StandDown4Safety

Source: Center for Construction Research and Training.
<https://www.cpwr.com/research>

Questions

1. How should ladders be used safely to prevent falls?
2. When should you use fall protection equipment?
3. What is the purpose of guardrails?
4. What is a screw jack and what is its purpose?
5. What safety equipment should you use to prevent falls?

INFORMATION SHEET: DIFFERENT TYPES OF ROOFS

ROOF TYPES



Gable Roof



Hip Roof



Dormer



Pyramid Hip Roof



M Shaped



Combination



Hexagonal



Dutch Gable



Mansard Roof



Gambrel Roof



Salbox Roof



Shed Roof



Flat Roof



Overland Hip Roof



Cross Hipped Roof



Skillion Roof

Further information describing roof shapes may be found at the following link.

<https://roofgnome.com/blog/roofing/types-of-roof-styles/>

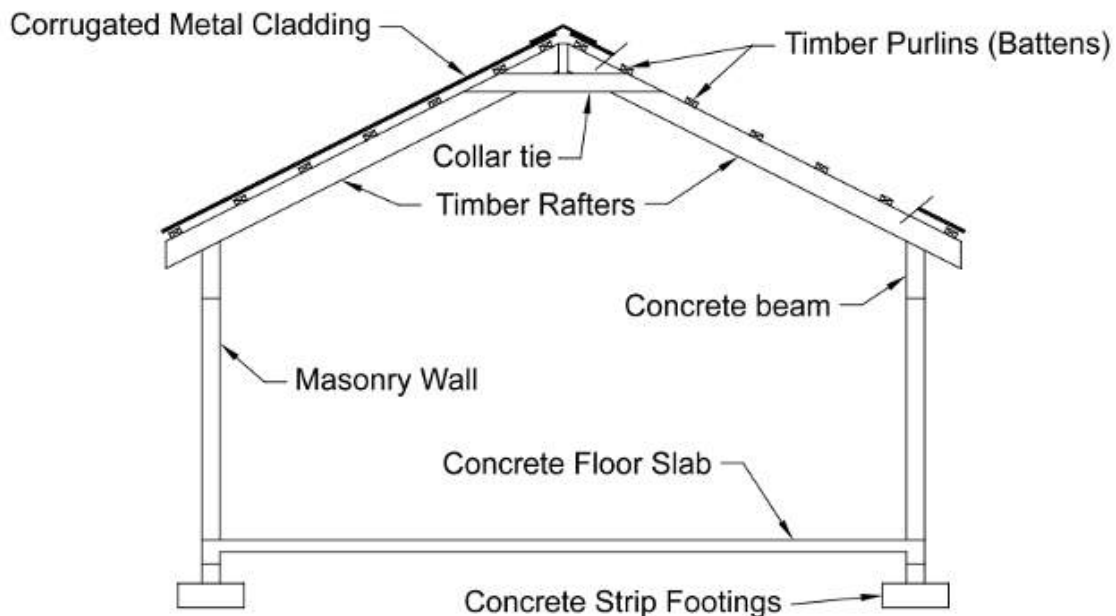
Questions

1. Which roofs are found mainly in the Caribbean?
2. Which roofs are best suited for the Caribbean weather and climate situation?
3. Which roof can withstand Category 3 hurricanes?

INFORMATION SHEET FOR Unit 6 - INSTALL ROOFS ON TIMBER AND CONCRETE STRUCTURES

INFORMATION SHEET: READING INFORMATION ON ROOFS

A roof is a covering of the top of a building, serving to protect against rain, snow, sunlight, wind, and extremes of temperature. When reading information on roofs from architectural drawings or site maps, there are several key aspects to consider. Here are some points to focus on:



Note. Adapted from the CDEMA Learner's Guide (2024).

1. **Roof Design:** Examine the architectural drawings or site maps to understand the overall design of roofs. Look at the shape, slope, and configuration of the roof, as well as any specific architectural features or elements.
2. **Roof Dimensions:** Pay attention to the dimensions provided on the drawings or maps, including the length, width, and height of the roof. Take note of any variations or irregularities in the dimensions that would affect the construction process.
3. **Roof Materials:** Identify the specified roofing materials indicated on the drawings or maps. This may include details on the type of roofing materials (such as shingles, tiles or metal sheets), their colours or patterns, and any special requirements or finishes.
4. **Roof Openings:** Look at the information regarding roof openings, such as skylights, vents, or chimneys. Note their location, dimensions, and any specific installation instructions or considerations.
5. **Roof Slope and Pitch:** Determine the slope and pitch of the roof, which will impact the drainage and overall functionality of the roof. Check for any provided measurements of specifications related to the slope and pitch.
6. **Roof Penetrations:** Identify any roof penetrations, such as pipes, conduits, or HVAC equipment. Understand their locations, dimensions, and any requirements for integration into the roof system.
7. **Roof Load-Bearing Capacity:** Determine the load-bearing capacity of the roof, which is essential for ensuring the proper design and construction of the supporting structure. Look for any load limits or requirements.
8. **Roof Insulation and Ventilation:** Review any insulation or ventilation requirements.
9. **Road Access and Safety:** Pay attention to a designated access points, walkways, or safety features specified for the roof, such as handrails, anchor points, or fall protection systems.

INFORMATION SHEET FOR Unit 6 - INSTALL ROOFS ON TIMBER AND CONCRETE STRUCTURES

INFORMATION SHEET: ROOF PITCH CALCULATION FORMULAS

1. Number of Rafters = (Length of Longest Wall Elevation + (2 x Roof Overhang))/Rafter Spacing
2. Length of rafter = Horizontal Length/Cos(slope)
Select a Timber Length with a multiple of 600 mm (2.ft)
3. Area of roof covering. Area = Roof Plan Area/Cos(slope)

ROOF PITCH CALCULATOR		
reference for roof pitch and multipliers		
ROOF PITCH	ANGLE	ROOF PITCH MULTIPLIER
1/12	4.76'	1.0035
2/12	9.46'	1.0138
3/12	14.04'	1.0308
4/12	18.43'	1.0541
5/12	22.62'	1.0833
6/12	26.57	1.1180
7/12	30.26'	1.1577
8/12	33.69'	1.2019
9/12	36.37'	1.2500
10/12	39.81	1.3017
11/12	42.51'	1.3566
12/12	45.00'	1.4142

INFORMATION SHEET: HURRICANE STRAPS

Hurricane straps, also known as hurricane ties or wind straps, are crucial components in protecting roofs during severe weather events, particularly hurricanes or strong windstorms. These metal connectors are installed at specific points on the roof structure to enhance its resistance against uplift forces caused by high winds.

Here are some key points highlighting the importance of hurricane straps:



1. **Structural Integrity:** Hurricanes and strong winds generate powerful uplift forces that can exert significant pressure on the roof structure. Hurricane straps help reinforce the connections between the roof trusses or rafters and the walls, ensuring the structural integrity of the entire roof system. By securing the roof components together, they reduce the risk of roof failure and structural collapse during a severe weather event.
2. **Prevents Roof Lifting:** One of the primary dangers during hurricanes is the lifting of the roof due to the upward force created by strong winds. Hurricane straps provide a secure connection between the roof and the walls, resisting the lifting process and preventing the roof from being torn off or displaced. This helps maintain the overall stability and integrity of the building.

3. **Code Compliance:** Many building codes in hurricane-prone regions require the use of hurricane straps or other approved methods of wind resistance for roof construction. Compliance with these codes is essential for ensuring the safety and resilience of the building against extreme weather events. By incorporating hurricane straps into the roof design and construction, builders adhere to these regulations and contribute to the overall safety of the structure.
4. **Mitigates Water Damage:** When roofs are comprised or lifted during a hurricane, it increases the likelihood of water penetration and subsequent water damage to the interior building. Properly installed hurricane straps help keep the roof intact, minimising the risk of water infiltration and reducing the potential for costly water-related repairs or mould growth.
5. **Enhanced Resilience:** Investing in hurricane straps is a proactive measure to enhance the resilience of the roof and use of the overall building. By strengthening the roof-to-wall connections, the likelihood of significant damage or failure during a hurricane is significantly reduced. This can lead to lower insurance costs, decreased repair expenses and increased occupant safety. Consulting with structural engineers or building professional familiar with local codes is crucial to ensure effective implementation of hurricane straps and maximize the protection they provide.

Please note: The proper positioning, type, and number of straps required may vary depending on the specific roof design and local wind load requirements.

Implementing Hurricane Straps

Installing hurricane straps is an important step in reinforcing the roof structure and protecting it against the uplift forces generated by high winds, particularly during hurricanes or severe windstorms. Here is a general overview of the process.

1. **Plan and Prepare:**
 - a. Know the building codes and regulations in your country regarding hurricane strap installation. Ensure compliance with the required specifications and guidelines.
 - b. Gather the necessary tools and materials for the installation, which may include hurricane straps, nails, screws, a hammer or drill, and appropriate safety equipment.
2. **Identify the attachment points:**
 - a. Inspect the roof trusses or rafters and the walls to determine the suitable attachment points for the hurricane straps.
 - b. Typically, the straps are secured to the top plate of the wall and the corresponding point on the roof structure, such as the truss hell or the rafter tail.

3. Position and install the Hurricane Straps:

- a. Position the hurricane strap over the designated attachment points, ensuring it is aligned properly and centred.
- b. Secure strap to the top plate to the wall using nails or screws, following the manufacturer's recommendations and the local building codes.
- c. Attach the other end of the strap to the roof structure, such as the truss hell or rafter tail, using the appropriate fasteners. Make sure to drive the fasteners through the pre-drilled holes in the strap.

4. Repeat the Installation:

- a. Install the hurricane straps at regular intervals, as specified by the building codes and structural engineer's recommendations. The frequency of installation may vary depending on the wind load requirements and the design of the roof structure.
- b. Pay attention to the corners and area prone to the higher wind loads, as they may require additional reinforcement with extra straps.

5. Inspect and Secure:

- a. Once the hurricane straps are installed, conduct a thorough inspection to ensure they are properly secured, aligned and tightly fastened
- b. Double-check that all the straps are securely attached to both the wall top plate and the roof structure.
- c. Make any necessary adjustments or corrections to ensure the straps provide the intended reinforcement.

The Installation process may vary depending on the specific type of hurricane strap being used and the roof design. It is essential to follow the manufacturer's instructions and consult with professional experienced in construction.

INFORMATION SHEET: SHEATHING AND TONGUE-AND-GROOVE CLOSE BOARDS

1. **Ensure safety:** Prioritise safety by wearing appropriate protective gear, including gloves, safety glasses, and a hard hat. Use caution when working at heights and follow proper ladder safety protocols.
2. **Prepare the roof:** Ensure that the roof structure, including the rafters or trusses, is properly constructed and in accordance with building codes and engineering specifications. The roof structure should be strong, level, and securely fastened.
3. **Determine the sheathing material:** Choose the appropriate sheathing material for your project. Common options include plywood or oriented strand board (OSB). Consider the thickness, strength, and weather resistance of the sheathing material based on the requirements of your specific roofing system.
4. **Install the sheathing:**
 - a. Start at one corner of the roof and lay the first sheathing panel perpendicular to the roof rafters or trusses. Leave a small gap, typically around 1/8 inch, between panels to allow for expansion.
 - b. Align the sheathing panel with the roof edge and ensure it is flush with the eave. Secure it to the rafters or trusses using appropriate nails or screws, placed according to local building codes and manufacturer recommendations.
 - c. Continue installing subsequent sheathing panels, ensuring they are tightly butted together. Stagger the seams between panels to enhance structural integrity.
 - d. Check the sheathing periodically with a level to ensure it is level and properly aligned.
5. **Install the tongue and groove close boards or plywood:**
 - a. Measure and cut the tongue and groove boards or plywood to fit the remaining open areas of the roof. Start at one end and insert the tongue of the first board into the groove of the adjacent board, ensuring a tight fit.
 - b. Align the boards properly and secure them to the sheathing using appropriate nails or screws. Place fasteners at recommended intervals, typically along the edges of the boards and at each rafter or truss.
 - c. Check the alignment and levelness of the boards regularly throughout the installation process.
6. **Inspect the installation:**

Thoroughly inspect the sheathing and tongue and groove boards or plywood for any defects, loose connections, or areas that may require additional fasteners. Make any necessary adjustments to ensure a secure and uniform installation.

**PERFORMANCE ASSESSMENT: INSTALLING SHEATHING AND TONGUE AND GROOVE CLOSE
BOARDS IN ROOF CONSTRUCTION**

This can be either an oral or written assessment.

Part 1: Material Selection:

- Describe the factors you consider when selecting sheathing materials for a roof construction project.
- Explain the differences between plywood and oriented standard board (OSB) and when each is most suitable for roofing applications.
- How do you determine the appropriate thickness of sheathing materials for a specific roof project?

Part 2: Installation Process:

- Outline the step-by-step process of installing sheathing on a roof, from preparation to completion.
- What are the recommended gap allowances between sheathing panels, and why is it important to leave gaps?
- Describe the proper fastening techniques and recommended spacing for attaching sheathing to roof rafters or trusses.
- How do you ensure proper alignment and levelness of sheathing panels during installation?

Part 3: Tongue and Groove Close Boards:

- Explain the purpose and advantages of using tongue and groove close boards in roof construction.
- Describe the steps involved in installing tongue and groove close boards on top sheathing.
- What considerations should be taken into account when fastening tongue and groove boards to the underlying sheathing?

Part 4: Safety and Compliance:

- Discuss the safety precautions that should be followed during the installation of sheathing and tongue and groove boards.
- Discuss the local building codes and regulations related to roof construction.
- Provide examples of code requirements that pertain to sheathing and tongue and groove board installation.
- What measures do you take to inspect the completed installation for defects or potential problems?

Part 5: Communication and Team Management:

- How do you communicate instructions to your team during the installation of sheathing and tongue and groove boards?
- Describe a situation where you had to manage conflicts or challenges within your roofing team during the installation process? How did you handle it?

INFORMATION RESOURCE

Roof Inspection Checklist Resources.

https://cdn.fortunebuilders.com/lms-documents/Updated_Documents_Library/Inspection-Checklist.pdf

UNIT

7

READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS



CLUSTER 2

UNIT 7 - BCGCOR1583C - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

SUGGESTED TIME: 60 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

Focuses on the skills, knowledge and attitudes required to read and interpret plans and specifications applicable to low rise residential and commercial projects in order to inform estimation, planning and supervisory activities. This unit of competency supports the needs of site managers, forepersons, estimators, builders, managers and other building and construction industry personnel responsible for ensuring the currency of plans and specifications and for reading and interpreting these for application to estimation, planning and related supervisory activities.

By the end of this module, learners will be able to:

1. Identify types of drawings and symbols used in construction.
2. Locate and identify key features on a site plan and drawings.
3. Read, interpret building plans and specifications.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 7 Learning Activity	The Construction Contract	178
Unit 7 Information Sheet	Information Sheet: Provisional Sum and Prime Cost	179
	Identifying Provisional Sums and Prime Cost Items in a Construction Contract	180
Unit 7 Learning Activity	Provisional Sum and Prime Cost Scenario	181
	Provisional Sum and Prime Cost Worksheet	182
	Reading and Interpreting Plans	184
	Reading and Interpreting the Construction Site Map	185

IDENTIFYING KEY FEATURES

KNOWLEDGE OBJECTIVE

1. Describe the main types of drawings and symbols used in building construction.
2. Outline the key features of site plans, especially building site location.
3. Identify symbols and abbreviations commonly used on different drawings.
4. Identify the types of buildings.

PERFORMANCE OBJECTIVE

1. Locate key features of plans, elevations and sections of a site.
2. Locate building site, and services from location drawings.

ENABLING OBJECTIVE #1

1. **Gain** knowledge on the key features of plans, elevations and sections.
2. **Gain** knowledge on the main types of drawings and symbols used in building construction.
3. **Identify** symbols and abbreviations commonly used on different drawings.
4. **Practise** locating the key features of site plans, especially building site location.
5. **Practise** locating building sites and services from location drawings.

LEARNING EXPERIENCE

Watch a video of one storey residential building plans.

Read Understanding Construction Drawings, and complete self-check 1.1

Mattbangswood. (n.d.). How To: Reading Construction Blueprints & Plans #1.

Complete Section 5, Abbreviations and Symbols, and Section 7, Finding Information On Drawings in Read And Interpret Plans And Specifications Learner's Guide

Koga, K. (n.d.). How To Read Construction Drawings: Beginners Guide To Blueprint Readings.

Discuss the importance of plans for construction projects.

ICS Canada. (n.d.). Understanding Construction Drawings .

Read the Information sheet.

Demonstrate the reading and interpreting of construction plans in groups by completing the learning activity on Reading and Interpreting Maps on page 10 of 'Read and Interpret Plans and Specifications: Learner's Guide'.

VET. (2012). Read And Interpret Plans and Specification: Learner's Guide (Self check page 10).

IDENTIFYING SERVICES

	KNOWLEDGE OBJECTIVE
	1. Outline the services found on a site plan.
	2. Explain the techniques used to read and interpret plans, drawings/specifications.
	PERFORMANCE OBJECTIVE
	1. Read and interpret drawings, plans and specifications.
	2. Locate access roadways to worksite on drawings or construction plans.

ENABLING OBJECTIVE #2	
1. Gain knowledge on the techniques used to interpret plans, drawings and specifications.	
2. Gain knowledge of services on the worksite.	
3. Gain knowledge of the roadways on the worksite.	
4. Practise locating access roadways to construction site.	
5. Practise reading and interpreting drawings, plans and specifications.	
LEARNING EXPERIENCE	
Read Section 6 in 'Read and Interpret Plans and Specifications', and complete accompanying activities.	VET (2012). Read and Interpret Plans and Specifications.

SPECIFICATIONS & MODIFICATIONS

	KNOWLEDGE OBJECTIVE
	1. Outline the purpose of specifications and the details that they convey.
	2. Explain the steps in modifying a site map.
	PERFORMANCE OBJECTIVE
	1. Identify client's modification to standard plans on drawings

ENABLING OBJECTIVE #3
1. Gain knowledge on the purpose of specifications and the details that they convey.
2. Practise client's modification to standard plans on drawings.
LEARNING EXPERIENCE
Listen to a guest speaker from an architectural firm on the modification of site/ construction map.
Practise modification of a site map.

CONSTRUCTION CONTRACTS

	KNOWLEDGE OBJECTIVE
	1. Identify key features of plans, elevations and sections.
	2. Explain the purpose of a construction contract.
	PERFORMANCE OBJECTIVE
	1. Solve provisional sum (PS) and prime cost (PC) values correctly.
	2. Identify key features of products included in the specification design, purpose, aesthetics and cost relationship.

ENABLING OBJECTIVE #4	
1. Gain knowledge on construction contracts.	
2. Gain knowledge of provisional sum and prime cost values and apply correctly.	
3. Identify provisional sum (PS) and prime cost (PC) values correctly.	
4. Practise identifying key features of products included in the specification design, purpose, aesthetics and cost relationship.	
5. Calculate labour hours, costs and material quantity and cost.	
LEARNING EXPERIENCE	
Watch the video “Understanding Different Types of Construction contracts” and complete the worksheet “Construction contracts”.	Civil Mentors. (2020, Sept 11). Understanding The Different Types of Construction Contracts. https://www.youtube.com/watch?v=KE-FGYOXg6Y
Read the Information Sheet “Provisional Sum (PS) and Prime Cost (PC).”	
Obtain a sample construction contract that includes provisional sums and prime cost items.	
Review the construction contract in groups-look for times or works in the contract that are labelled as provisional sums and make a list.	
Determine the prime cost by examining the specifications and any sections of the contract related to prime cost allowances. Note the prime cost.	
Complete a scenario on prime cost and provisional sum to develop the skills of prime cost and provisional sum.	



LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

Specifications

LEARNING ACTIVITY: THE CONSTRUCTION CONTRACT

After watching the video on “Types of Construction Contracts”, complete the worksheet below.

1. Define the term “contract”
2. What are two benefits of construction contracts?
3. List at least four different types of contracts.
4. For each type of contract listed, explain each type of contract.

INFORMATION SHEET: PROVISIONAL SUM AND PRIME COST

Provisional sum and prime cost are terms commonly used in construction contracts to account for certain items or works whose exact cost is uncertain at the time of contract signing.

Provisional Sum

A provisional sum is an allowance included in the contract to cover the cost of specific works or items that cannot be accurately determined at the time of contract signing. These can include items like unforeseen site conditions, specialized equipment, or additional scope of work that may be required but cannot be precisely quantified at the start of the project. The provisional sum acts as an estimate or placeholder, and the actual cost is determined and adjusted as the project progresses. It is important to note that provisional sums are typically subject to variations and may impact the final contract price.

Prime Cost

Prime cost refers to an allowance allocated in the contract for the cost of materials, fixtures, or fittings that have not been selected or specified in detail at the time of contract signing. It is an estimated value set aside to account for the future purchase of these items. The prime cost value is typically based on average or standard rates for similar items and is subject to adjustment based on the actual selection made by the project owner. The final cost items are determined during the construction process, and any differences between the estimated allowance and the actual cost are usually accounted for as variations.

The Purpose of Provisional Sum and Prime Cost

These are used to provide flexibility in construction contracts when there is uncertainty about certain elements of the project at the time of agreement. They allow the parties involved to account for these uncertainties and make the necessary adjustments as more accurate information becomes available during the course of the project.

LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

INFORMATION SHEET: IDENTIFYING PROVISIONAL SUMS AND PRIME COST ITEMS IN A CONSTRUCTION CONTRACT

In order to identify provisional sums and prime cost items, it is important to review the contract documents and specifications provided.

Steps to take to identify provisional sums and prime cost items:

1. **Review Bill of Quantities:** The Bill of Quantities is a detailed document that lists the quantities and descriptions of all the items and works included in the project. It is often provided as part of the contract documents. Look for any items or works that are labelled as provisional sums or prime cost items. These will usually be indicated with specific notations or headings.
2. **Examine the Specifications:** The specifications outline the technical requirements, materials, and finishes for the project. Pay attention to any sections or clauses that mention the provisional sums or prime cost allowances. They may specify the types of items or works covered and provide additional details about how they will be handled during the project.
3. **Consult the Schedule of Rates:** If a schedule of rates is provided, it can be a useful reference to identify provisional sums and prime cost items. Look for any rates or prices associated with provisional sums or prime cost allowances. These rates can provide an indication of the estimated costs associated with these items or works.
4. **Analyse the Contract Documents:** In addition to the Bill of Quantities and Specifications thoroughly review the entire contract, including the appendices or schedule. Look for any sections or clauses that explicitly mention provisional sums or prime cost allowances. These clauses may outline the rights and responsibilities of the parties regarding these items and the process for adjusting the costs as the project progresses.
5. **Seek Clarification:** If you are unsure about the presence or details of provisional sums or prime cost items in the contract, it is advisable to seek clarification from the project owner, contractor, or any relevant professional involved. They can provide additional information and guidance regarding the specific allowances and their implications.

Provisional sums and prime cost items are crucial to ensure proper cost management and avoid misunderstandings during the project.

LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

LEARNING ACTIVITY: PROVISIONAL SUM AND PRIME COST SCENARIO

Below is a scenario that assists the learner to understand how the prime cost and provisional sums are used in a construction contract to account for uncertain costs and variations. Read the scenario and use the information it provides to complete the worksheet.

Prime Cost Item:

The contract specifies a prime cost item for kitchen cabinets. The estimated allowance for the kitchen cabinets is \$10, 000. This means that the contractor will provide an allowance of \$10, 000 for the cost of purchasing and installing the kitchen cabinets. The homeowner will have the flexibility to select the cabinets within this allowance.

Provisional Sum Item:

The contract includes a provisional sum for excavation and site preparation. Since the exact scope and conditions of the site are uncertain at the time of signing, an allowance of \$20,000 is included as a provisional sum. This amount is an estimate to cover any unforeseen site conditions or additional excavation work that may be required.

Adjustments and Variations:

During the construction process, it is discovered that the site has rocky soil, which requires additional excavation and rock removal. The contractor completes the additional work, and the actual cost incurred for the excavation exceeds the provisional sum. The revised cost for the excavation work is \$25 000. The owner approves the variation and agrees to pay the additional \$5000.

Contract clauses and procedures:

The contract specifies that any variation to the provisional sum or prime cost item must be documented and approved by both parties. The contractor is required to provide detailed documentation of the additional excavation work, including the reason for the change, the revised cost, and any supporting documentation.

LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

LEARNING ACTIVITY: PROVISIONAL SUM AND PRIME COST WORKSHEET

Project Name:
Contractor:
Owner
1. List of Provisional Sum Items:
a. Item Description: Estimated Cost:
b. Item Description: Estimated Cost:
c. Item Description: Estimated Cost:
d. Item Description: Estimated Cost:
2. List of Prime Cost Items
a. Item Description: Estimated Allowance:
b. Item Description: Estimated Allowance:
c. Item Description: Estimated Cost:
3. Adjustments and Variations:
Document any changes or variations that may affect the provisional sum or prime cost items. Include the description of the change, the revised cost/allowance, and the reasons for the change. Change Description/Revised cost/Allowance/Reasons:

4. Contract clauses and procedures:

Identify relevant clauses or sections in the contract that address the provisional sums and prime cost items.

Summarise the key points and requirements related to these allowances:

Provisional sum clauses/Sections:

Prime Cost Clauses/Sections

5. Reflect on implications:

Consider the potential impact of provisional sums and prime cost items on the project. Reflect on how accurately managing and documenting these allowances can affect the project's cost, schedule and scope.

LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

LEARNING ACTIVITY: READING AND INTERPRETING PLANS

When you are reading a map consider the following:

1. Plan Views:
 - Review the plan to understand the layout of structures, roads, utilities and other features.
 - Identify key elements like buildings, roads, parking areas, and major landmarks.
2. Elevations and Cross-sections:
 - Analyse elevation views and cross sections to understand vertical dimensions and details of the construction.
3. Contour Lines:
 - Identify the contour lines to understand the topography and elevation changes of the site. Note: The closer the contour lines, the steeper the land.
4. Utilities and Infrastructure:
 - Locate utility lines, such as water, sewer, gas and electrical lines.
 - Understand how these utilities are interconnected and their routing.
5. Land Use:
 - Identify any restrictions or requirements based on zoning requirements.
 - Note areas with vegetation, trees and landscaping elements.
 - Understand how landscaping contributes to the aesthetics and functionality of the site.
6. Access and Circulation:
 - Identify access points, driveways, roads and pathways.
 - Understand the parking areas and pedestrian walkways.
7. Grading and Drainage:
 - Analyse grading plans to understand how water will flow across the site.
 - Identify drainage features such as ditches, wells, retention ponds, etc.

8. Structural Elements:

- Locate foundation details, columns, beams and other structural components on the plan.
- Understand how these elements contribute to the stability of buildings.

9. Additional Considerations:

- Review notes, labels, and callouts that provide additional information about materials, standards and instructions
- Check for any revision notes or dates to ensure you're working with the latest version of the map
- Communicate with designers, engineers and other stakeholders if you have questions and need clarification.

10. Project Phase:

- Understand whether the map represents a specific construction phase and how it fits into the overall project.

LEARNING ACTIVITY FOR Unit 7 - READ AND INTERPRET BUILDING PLANS AND SPECIFICATIONS

LEARNING ACTIVITY: READING AND INTERPRETING THE CONSTRUCTION SITE MAP

Using your understanding of construction site plans for residential homes, use a construction site map to answer the following questions.

1. What is the title of the map? _____
2. Identify at least three key elements on the map, using the legend:

3. State the scale of the map: _____
4. Use the scale of the map, to measure the following distances:
 - a. The length of the driveway _____
 - b. The width of a building _____
 - c. The distance between the road and the house _____
5. Convert the distances captured in no. 4 above, to real-world distances:
 - a. The length of the driveway _____
 - b. The width of the building _____
 - c. The distance between the road and the house _____

PART 2 – ADDITIONAL MODULES IN THE CONSTRUCTION SITE SUPERVISION CURRICULUM

Clusters 2-5 of Level 3 in Construction Site Supervision (CCBCM30122) can be found in 'Heart Trust Building Construction: Construction Site Supervision Curriculum Level 3'. The references to this document follow.

Unit Code (CCBCM30122)	Unit Title (CCBCM30122)	Model (Heart Trust)	Page No. (Heart Trust)
Cluster 2	Carry out Substructures and Super Structures Activities		
BCGBCD0053B	Prepare drawings, specifications and schedules using computer aided design (CAD) systems	Module 5	97-125
BCMCS0133A	Supervise the planning of on-site single rise building or construction work	Module 6	126-158
BCMCS0823B	Procure and store construction materials for low rise projects	Module 7	169-179
Cluster 3	Apply Quality Standards and Conduct Work Site Supervision		
BCMOHSS013B	Apply OHS requirements, policies and procedures in the construction industry	Module 4	68-94
BCGOR1693B	Prepare for potential disasters at the workplace	Module 6	150-158
BCMCS0123B	Conduct on-site supervision of building and construction projects	Module 6 & 7	126-177
BCMQUA0013B	Supervise and apply quality standards for selecting of building and construction materials	Module 6	150-158
BCGTES0023E	Monitor concrete slump and cube test	Module 9	209-216
BCGMP0013B	Apply legal requirements to building and construction projects	Module 8	180-188
THHGCS0023E	Deal with conflict situations	Module 8	180-188

Unit Code (CCBCM30122)	Unit Title (CCBCM30122)	Model (Heart Trust)	Page No. (Heart Trust)
Cluster 4	Supervise Concrete Work Safely		
BCGFLS0063C	Coordinate site layout and preparation	Module 6	136-150
BCGSTW933C	Coordinate the erection and dismantling of advanced scaffolding	Module 4	76-82
BCGSTW933C	Apply reinforcement schedule	Module 7	160
BCMCSS073B	Coordinate the placement of concrete	Module 9	216-224
BCMCSS0833A	Supervise tilt-up work	Module 4	82-87
BCGMFLS0063C	Co-ordinate servicing and maintenance of tools and equipment	Module 4	76
BCGBCD0203B	Demonstrate knowledge of building services systems	Module 7	169
Cluster 5	Develop Life and Career Skills		
CRICM0013B	Apply advance language and communication skills	Absent	-
BCGCUS0013B	Provide customer service in construction	Absent	-
CRIMAT0013B	Provide advance mathematical computations	Module 5	105
ITICOR003B	Apply information technology to support work role	Module 1	1-17

The following two additional units in Cluster 5 were not included in the Heart Trust curriculum.

Unit Code (CCBCM30122)	Unit Title (CCBCM30122)
CRICM0013B	Apply advance language and communication skills
BCGCUS0013B	Provide customer service in construction

These units follow.

2

PART TWO



ADDITIONAL MODULES

UNIT 8

**APPLY ADVANCED
LANGUAGE AND
COMMUNICATION
SKILLS**



CLUSTER 2

UNIT 8 - BCGCOR1583C - APPLY ADVANCED LANGUAGE SKILLS AND COMMUNICATION SKILLS

SUGGESTED TIME: 30 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

This unit is benchmarked against the occupational standard CCBCM30122 *Construction Site Supervision Level 3* unit CRICOM0013B *Apply Advanced Language Skills and Communication Skills to Support Work Role*. It is designed to enable learners to develop the requisite knowledge, skills and attitudes to use communication effectively and resolve conflict and build relationships with key stake holders.

Apply Advance Language Skills and Communication Skills focuses on the competencies required to effectively communicate information in different forms that facilitate smooth business operations. The areas of focus are communicating effectively using written and oral communication to facilitate smooth site operations.

By the end of this module, learners will be able to:

1. Write using grammatical rules, punctuation rules and sentence structure rules.
2. Conduct meetings.
3. Read and Interpret construction documents.
4. Respond in oral and written form to communication.
5. Present information orally in different settings.
6. Write smart goals.

LIST OF SUPPLEMENTAL MATERIALS		
UNIT & TYPE	TITLE	PAGE
Unit 8 Information Sheet	Construction Incident Reporting Form	202

GRAMMAR & COMMUNICATON

ENABLING OBJECTIVE #1	
1. Gain knowledge on grammatical rules, punctuation rules and spelling rules and sentence structure to effectively communicate information in different forms.	
2. Use grammatical rules, punctuation rules, rules and sentence structure when communicating.	
LEARNING EXPERIENCE	
Engage in the activities below to strengthen your grammar, spelling, punctuation and sentence structure.	English Writing Essentials. 8 Comma Rules. https://www.youtube.com/watch?v=tLlfulAjaC0
Watch a YouTube video on Basic Grammar lessons 101: Rules for beginners.	https://www.youtube.com/watch?v=PZvqsySmRg
Read the article entitled “9 English Grammar Rules to Remember.”	
Watch a YouTube video on “13 Basic Punctuation Rules in English.”	https://www.youtube.com/watch?v=zVu-XvULZNg
Watch a video on 4 Sentence Structures. (2022).	https://www.youtube.com/watch?v=zZslAVsBBGE
Read the article entitled “Five Spelling Rules to Know.”	https://www.grammarly.com/blog/spelling/
Complete worksheets on sentences, grammar rules, spelling and punctuation, after watching the videos and reading the article on spelling rules.	Instructor creates a worksheet/worksheets on using punctuation rules, sentence structures. These can be posted on an LMS.
Apply the sentence construction, grammar, spelling and punctuation rules to write 500-word essay on the role and characteristics of a construction site supervisor.	Instructor to provide feedback on essays to learners.



WRITING REPORTS & LETTERS

	KNOWLEDGE OBJECTIVE	
	1. State the different types of reports and letters.	
	2. State the principles of writing effective resumes, reports and letters.	
	PERFORMANCE OBJECTIVE	
	1. Prepare notices for dissemination on the worksite, using standard English.	
	2. Produce written documents such as reports, resumes and letters using business language.	
	3. Complete forms accurately for the construction industry.	

ENABLING OBJECTIVE #2	
1. Gain knowledge of preparing notices.	
2. Gain knowledge of preparing resumés, reports, business letters.	
3. Gain knowledge of completing forms related to the construction industry.	
4. Practise writing notices, resumés, reports and business letters.	
5. Practise completing forms.	
LEARNING EXPERIENCE	
Read the article entitled “Notices” https://www.toppr.com/guides/english/writing/notice/	EDPM Made Simple.(n.d.). Notice and Agenda of a meeting with Deidre-Ann Barrett-Whyte. https://www.youtube.com/watch?v=cxfbFuZ2ITc
Create a notice announcing the beginning of construction to the neighbourhood which is to be published in the newspaper.	Keilling, H. (2023, Feb 27). Business letter format (with template and example). https://www.indeed.com/career-advice/career-development/business-letter-format-and-example
Write a resumé and read “Tips for creating a great resumé.”	https://www.businessnewsdaily.com/3207-resume-writing-tips.html
Review a sample resumé of a construction site supervisor.	
Create a resumé that highlights skills, experience, construction jobs, and achievement.	
Read the article entitled “How to Write A Report: A Guide”.	https://www.grammarly.com/blog/how-to-write-a-report/
Read “Report writing: Types, formats, structures and relevance”.	https://northcampus.uok.edu.in/notices/20200321160810370.pdf
Watch a video on incident report writing.	https://www.youtube.com/watch?v=2zYZDdD0w9c
Participate in a scenario: A 55-year-old man died on a construction site whilst digging a well on a new home build at 252 Mongoose Road, Moorland, St. Lucy.	Sample Incident Form can be used and can be placed on a Learning Management System as a resource.
Write an incident report based on the scenario above, in groups of four.	
Review the construction incident template.	
Complete the construction incident form template giving the Scenario above.	
Write a business letter to the bank requesting a loan for a construction project	Business Letters: Review article business letter format (with templates and examples). https://www.indeed.com/career-advice/career-development/business-letter-format-and-example
Basic Principles of a Business letter. https://egyankosh.ac.in/bitstream/123456789/72749/1/Unit-6.pdf Letter formats (2021, Feb 8th). How to write a cover letter for tender submission. https://www.youtube.com/watch?v=CfBGb-S8bTY	



ORAL PRESENTATION TECHNIQUES

KNOWLEDGE OBJECTIVE
1. Outline the characteristics of effective oral delivery and techniques.
2. Discuss the techniques to analyse presentations.
3. Compare oral and written presentation formats, styles, techniques and delivery.
PERFORMANCE OBJECTIVE
1. Demonstrate oral and written presentation techniques.

ENABLING OBJECTIVE #3	
1. Gain knowledge of oral presentation techniques.	
2. Practise oral presentation techniques.	
LEARNING EXPERIENCE	
Read Phillip Bourne's article on "Ten Simple Rules for Making Good Oral Presentations".	Bourne, P. (2007). Ten Simple Rules for Making Good Oral Presentations. PLoS Computational Biology, 3 (4). https://doi.org/10.1371%2Fjournal.pcbi.0030077
Discuss the rules for making good presentations after watching the speech: Mia Mottley, Prime minister of Barbados at the Opening of #COP26 World Leaders summit. In your discussion state the rules identified, and the limitations of the presentation. Answer the questions: How is the speaker talking to the audience? How is the presenter making her main points pertinent? Is there a clear beginning, middle and end? How is she captivating the audience?	UN Climate Change. (2021, Nov 1). Speech: Mia Mottley, Prime Minister of Barbados at the Opening of the #COP 26 world leaders. https://www.youtube.com/watch?v=PN6THYZ4ngM
Record a simple presentation on a topic of choice using the good presentation techniques. The oral presentation should be no more than 5 minutes.	
Share oral presentation to classmates and instructor for feedback (in discussion forum).	
Give feedback on one classmate's oral presentation.	



CONDUCTING MEETINGS

KNOWLEDGE OBJECTIVE
1. Discuss the required competencies and techniques for presenting and responding to differencing lines of reasoning.
2. State the principles of conducting face-to-face meetings.
PERFORMANCE OBJECTIVE
1. Conduct onsite meetings to convey information or explain a process to staff members or manager.
2. Conduct an online meeting with different persons.

ENABLING OBJECTIVE #4	
1. Gain knowledge on conducting onsite meetings	
2. Gain Knowledge on conducting online meetings.	
3. Practise conducting onsite meetings and online meetings.	
LEARNING EXPERIENCE	
Read the article, "Holding a meeting- Business essentials."	https://www.masterclassmanagement.com/ManagementCourse-HoldingAMeeting.html
Create a meeting agenda.	Schwarz, R. (2015). How to design an agenda for an effective meeting. https://hbr.org/2015/03/how-to-design-an-agenda-for-an-effective-meeting
Participate in an in-class demonstration of conducting an onsite meeting.	
Onsite video demonstration on facilitating a meeting on the construction worksite by the learners.	
Watch a YouTube video on Virtual Meeting Etiquette (Do's & Don't). Girdler, A. (2020, June 10)	https://www.youtube.com/watch?v=HYUVXQfaVp0
Discuss the key points in conducting an online meeting.	
Role play conducting an online meeting using a communication app.	



EFFECTIVE LISTENING SKILLS

	KNOWLEDGE OBJECTIVE
	1. Discuss the principles of effective listening skills.
	PERFORMANCE OBJECTIVE
	1. Demonstrate effective listening skills when interacting with staff, and customers. 2. Conduct an online meeting with different persons.

ENABLING OBJECTIVE #5	
1. Gain knowledge of effective listening skills.	
2. Gain Knowledge of communicating effectively over the telephone.	
3. Use listening skills to communicate over the telephone.	
LEARNING EXPERIENCE	
Research effective listening skills. Hear a guest speaker presentation on the principles of effective listening skills.	Additional Resources that can be given to the learners by the instructor. Chad Fisher Construction. (2021). 5 Essential Job Site Communication Skills. https://www.cfisherconstruction.com/5-essential-job-site-communication-skills/
Practise effective listening skills among the learners.	
Watch a demonstration of communicating effectively over the telephone.	
Participate in a scenario using listening skills to communicate over the phone.	



VISUAL COMMUNICATION

	KNOWLEDGE OBJECTIVE
	1. Discuss the lateral and vertical lines in visual communication.
	PERFORMANCE OBJECTIVE
	1. Demonstrate lateral and vertical lines in visual communication.

ENABLING OBJECTIVE #6
1. Gain knowledge of lateral and vertical lines in visual communication.
2. Create visual communication using lateral and vertical lines.
LEARNING EXPERIENCE
Research lateral and vertical lines in visual communication.
Listen to a guest speaker of visual communication with a focus on lateral and vertical lines.
Create an advertisement using lateral and vertical lines.

SETTING GOALS

	KNOWLEDGE OBJECTIVE
	1. Discuss the principles of effective communication.
	2. Identify barriers that hinder effective communication.
	PERFORMANCE OBJECTIVE
	1. Write smart goals to accomplish tasks.

ENABLING OBJECTIVE #7	
1. Gain knowledge on setting goals to accomplish a task.	
2. Demonstrate the ability to write smart goals to accomplish a task.	
LEARNING EXPERIENCE	
Listen to a guest facilitator on goal setting.	Goal Setting Worksheet. https://20923534.fs1.hubspotusercontent-na1.net/hubfs/20923534/Goal%20Setting%20Worksheet.pdf
Use a smart role worksheet to set goals for a construction job.	SMART Role Worksheet. https://www.maynoothuniversity.ie/sites/default/files/-assets/document/SMART%20Goal%20Worksheet.pdf
Create an advertisement using lateral and vertical lines.	



INFORMATION SHEET: CONSTRUCTION INCIDENT REPORTING FORM

Use this form to report accidents, injuries, medical situations, criminal activities, traffic incidents, or other incidents that may happen on the construction site. If possible, a report should be completed within 24 hours of the event.

CONSTRUCTION INCIDENT REPORTING FORM

PERSON INVOLVED			
Full Name:		Address:	
Identification	Driver's License No.	Passport No.	Other
Phone No.:		Email:	
THE INCIDENT			
Date of Incident:		Time	am pm
Location:			
Location of Incident:			
INJURIES			
Was anyone injured?:		Yes	No
If Yes, describe the injuries:			
WITNESSES			
Were there witnesses to the incident?:		Yes	No
If Yes, enter the witnesses' names and contact information:			
POLICE/ MEDICAL SERVICES			
Were the police notified?:		Yes	No
If Yes, was a report filed?:		Yes	No
Was medical treatment provided:	Yes	No	Refused
If Yes, where was medical treatment provided:	On Site	Hospital	Other
PERSON FILING REPORT			
Signature:		Date:	
Print Name:			
OFFICAL USE ONLY			
Report Received by:	Name:	Date:	
Follow-up action taken:			
Describe Action Taken:			

UNIT 9

**PROVIDE CUSTOMER
SERVICE IN
CONSTRUCTION**



CLUSTER 2

UNIT 9 - BCGCUS0013B - PROVIDE CUSTOMER SERVICE IN CONSTRUCTION

SUGGESTED TIME: 30 HOURS

KNOWLEDGE OBJECTIVES which focus primarily on the theoretical aspect of the module:

This unit focuses on the knowledge, skills and attitudes required to provide customer service in construction. It includes contributing to customer service systems, delivering reliable customer service and monitoring customer service.

By the end of this module, learners will be able to:

1. Develop and implement customer service standards.
2. Develop customer service satisfaction tools.
3. Collect customer service data.
4. Analyse customer service data to improve service.
5. Use feedback data to improve customer service standards and delivery.
6. Resolve customer service problems.
7. Communicate changes to construction plans or procedures.

CUSTOMER SERVICE STANDARDS

	KNOWLEDGE OBJECTIVE
	1. Define the term 'customer service.'
	2. Discuss the characteristics of good customer service.
	3. Research and state the customer service legislation within your country.
	PERFORMANCE OBJECTIVE
	1. Read customer service legislation and procedures that establishes customer service standards in your country.
	2. Develop a customer charter.
	3. Develop mechanism to obtain customer feedback on service delivery.
	4. Use customer feedback to improve service delivery.

ENABLING OBJECTIVE #1	
1. Gain knowledge of customer service legislation, standards and procedures.	
2. Create customer service standards and procedures for a construction site.	
LEARNING EXPERIENCE	
Research customer service standards and procedures in the construction industry.	Tutors can prepare a short presentation on customer service standards, giving examples.
Discuss in groups of four, service standards and procedures.	
Create a customer service standards and procedures document.	

CUSTOMER CHARTERS

	KNOWLEDGE OBJECTIVE
	1. Explain the purpose of a customer service charter.
	2. Examine a customer service charter.
	PERFORMANCE OBJECTIVE
	1. Handle customers effectively.
	2. Establish mechanisms to monitor existing systems to identify repeat customer service problems.

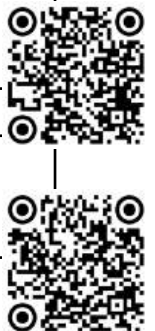
ENABLING OBJECTIVE #2	
1. Gain knowledge on customer charter.	
2. Write a customer charter that establishes customer service standards for delivery for a construction job.	
LEARNING EXPERIENCE	
Research customer services standards Use the customer service standards procedures document to create a customer charter.	The consumer Council. (n.d.) Customer charter. https://www.consumerCouncil.org.uk/about-us/who-we-are/customer-charter#:~:text=Monday%20to%20Friday).-,What%20is%20the%20Customer%20Charter%3F,The%20expected%20timescales
Create a customer charter.	UK Parliament. (n.d.). Customer service charter. https://www.parliament.uk/mps-lords-and-offices/offices/commons/house-of-commons-enquiries-service/customer-service-charter/
Share the customer charter with your site manager to obtain feedback.	
Document feedback from site manager.	
Modify customer charter based on feedback.	



CUSTOMER FEEDBACK METHODS

	KNOWLEDGE OBJECTIVE
	1. Discuss the different ways to establish good customer service.
	2. Identify methods to obtain customer feedback.
	PERFORMANCE OBJECTIVE
	1. Record changes to the customer service system or procedures to reduce the chance of the problem reoccurring.

ENABLING OBJECTIVE #3	
1. Gain knowledge of methods to obtain customer feedback.	
2. Gain knowledge using customer feedback to improve service.	
3. Develop customer feedback methods and instruments.	
LEARNING EXPERIENCE	
Read an article entitled "Customer Feedback Strategy: The Only Guide You'll Ever Need."	The instructor should provide guidance. https://www.hubspot.com/customer-feedback
Research customer service feedback strategies.	
Watch a YouTube video on Excellent customer service survey questions.	https://www.youtube.com/watch?v=cPyFrkhlNoI
Create a customer service feedback survey for a construction business using the information from the video on customer service survey questions.	
Implement the customer service survey for a construction business.	
Record customer service results using Microsoft technology tools.	
Present findings from the survey using PowerPoint.	The presentations should be short. Facilitators create a rubric for the presentations. These presentations can be included in the e-portfolio.



HANDLING CUSTOMER COMPLAINTS

	KNOWLEDGE OBJECTIVE
	1. Discuss the characteristics of good customer service.
	2. Discuss standards or procedures to deal with customer problems.
	PERFORMANCE OBJECTIVE
	1. Solve provisional sum (PS) and prime cost (PC) values correctly.
	2. Identify key features of products included in the specification design, purpose, aesthetics and cost relationship.

ENABLING OBJECTIVE #4	
1. Gain knowledge on how to change customer service systems or procedures.	
2. Gain knowledge of communicating changes in customer service procedures to staff.	
3. Practise communicating customer service changes to staff.	
LEARNING EXPERIENCE	
Review customer service feedback.	Special Instructions: Tutors create a scenario that participants have to respond to.
Share customer service feedback and suggest modifications with manager.	
Modify customers service systems or procedures established.	
Communicate customer changes to staff in writing and verbally.	

IDENTIFY REPEAT CUSTOMER SERVICE PROBLEMS

	KNOWLEDGE OBJECTIVE
	1. Discuss standards or procedures to deal with customer problems.
	PERFORMANCE OBJECTIVE
	1. Establish mechanisms to monitor existing systems to identify repeat customer service problems.

ENABLING OBJECTIVE #5	
1. Gain knowledge on how to identify repeat problems in customer service.	
2. Establish procedures to monitor customer problems.	
LEARNING EXPERIENCE	
Watch a YouTube video, Handling customer complaints.	https://youtu.be/WphIXqTp_es
Watch a YouTube video, Telephone Techniques: Handling Angry Callers-ej4 customer service.	https://youtu.be/pt8K8WHCMok
Discuss the principles of handling customer complaints from the video.	
Role play different situations to handle customer complaints using the principles of handling customer complaints.	



CUSTOMER SERVICE CHANGES

	KNOWLEDGE OBJECTIVE
	1. Discuss how to monitor customer service systems within the construction industry.
	PERFORMANCE OBJECTIVE
	1. Record changes to the customer service system or procedures to reduce the chance of the problem reoccurring. 2. Communicate information on changes with staff members responsible for customer service and delivery.

ENABLING OBJECTIVE #6	
1.	Gain knowledge on how to change customer service systems or procedures.
2.	Gain knowledge of communicating changes in customer service procedures to staff.
3.	Practise communicating customer service changes to staff.
LEARNING EXPERIENCE	
Read an article on Complaints Procedures.	CPR. (n.d.). Complaints procedure. https://www.cprbuildingcontrol.co.uk/complaints/
Write your own complaints procedure.	
Create a Record of Complaints form to capture customer complaints.	



REFERENCES

Exforsys. (2006, October 11). *The duties and responsibilities of a building contractor.*

Retrieved from Exforsys: <https://www.exforsys.com/career-center/career-tracks/the-duties-and-responsibilities-of-a-building-contractor.html>

Knutson, T. (2022, July 12). *Global Warming and hurricanes: An overview of current*

research results. Retrieved from Geophysical Fluid Dynamics Laboratory: <https://www.gfdl.noaa.gov/global-warming-andhurricanes/>

SAS Consulting. (2018). *Negligence in construction in understanding duty of care.*

Retrieved from SAS Consulting:

<https://www.youtube.com/watch?v=JPBdxV0mZi8>

Sisttermans, I. (2020). *Integrating competency-based education with a casebased or problem based learning approach in online health sciences*

Asia Pacific Education Review, 21, 683-696. <https://doi.org/10.1007/s12564-020-09658.6>

United Nations. (2022, April 4). *UN Climate report: It's 'now or never' to limit global*

warming to 1.5 degrees. Retrieved from United Nations: <https://news.un.org/en/story/2022/04/1115452>

CDEMA. (2024). *Learner's Guide: Construction Site Supervision of Houses.*

<https://www.buildsafe.cdema.org>



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