



**THE REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARDS**

**FOR**

**BUILDING TECHNICIAN**

**LEVEL 6**



**TVET CDACC**  
**P.O BOX 15745-00100**  
**NAIROBI**

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## **FOREWORD**

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blueprint, Vision 2030 and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution of Kenya 2010 and this resulted to the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET shall be competency based, curriculum development shall be industry led, certification shall be based on demonstration of competence and mode of delivery shall allow for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that these Occupational Standards were developed for the purpose of developing a competency-based curriculum for Building technician. These Occupational Standards will also be the bases for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the Building and Construction sector's growth and sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING  
MINISTRY OF EDUCATION**

## **PREFACE**

Kenya Vision 2030 aims to transform the country into a newly industrializing, “middle-income country providing a high-quality life to all its citizens by the year 2030”. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification in TVET. This called for shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Building Sector Skills Advisory Committee (SSAC), have developed these Occupational Standards for a Building Technician. These standards will be the bases for development of competency-based curriculum for Building Technician level 6.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to the Council members, Council Secretariat, Building SSAC, expert workers and all those who participated in the development of these occupational standards.

**Prof. CHARLES M. M. ONDIEKI, PhD, FIET (K), Con. EngTech.**  
**CHAIRMAN, TVET CDACC**

## **ACKNOWLEDGMENT**

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVETCDACC) for providing guidance on the development of these Standards. My gratitude goes to Building Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I thank all the individuals and organizations who participated in the validation of these Standards.

I acknowledge all other institutions which in one way or another contributed to the development of these standards.

**CHAIRMAN**

**BUILDING AND CONSTRUCTION SECTOR SKILLS ADVISORY  
COMMITTEE**

## ACRONYMS

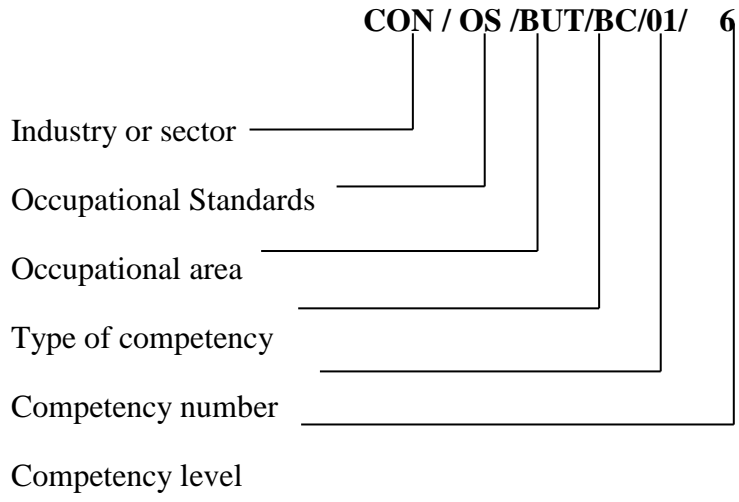
CDACC	Curriculum Development Assessment and Certification Council
PPE	Personal Protective Equipment
CCTV	Closed-Circuit Television (surveillance)
BS	British Standards
ICT	Information Computer Technology
IEE	International Electrical Engineering
BQS	Bill of Quantities
CAD	Computer Aided Design
CGA	County Government Approvals
DTP	Desktop Publishing
EHS	Environment, health and safety
EMS	Environmental Management System
IFCE	The International Federation of Consulting Engineers <sup>1</sup>
HRD	Human Resources Development
ICT	Information Computer Technology
JBC	Joint building council
KCSE	Kenya Certificate of Secondary Education
KEBS	Kenya Bureau of Standards
KNQA	Kenya National Qualification Authority
NCA	National Construction Authority
NEMA	National Environment Management Authority
NOS	National Occupational Standards
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
TES	Teach Elite's Shop
TVET	Technical and vocational education and training
BRC	British reinforcement concrete
ASTM	American society for testing and materials
PPR	Polypropylene pipes
DPM	Damp proof membrane
DPC	Damp proof course
IEE	Institute of electrical engineers
GI	Galvanized iron

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<sup>1</sup> Commonly known as FIDIC, acronym for its French name Federation Internationale Des Ingénieurs-Conseils



## KEY TO UNIT CODE



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# OVERVIEW

Building Technician Level 6 qualification consists of competencies that a person must achieve to enable him/her to be certified as a Building Technician. The units of competency comprising Building Technician certificate level 6 qualifications include the following basic and core competencies:

## **BASIC COMPETENCIES**

1. Demonstrate communication skills
2. Demonstrate Numeracy Skill
3. Demonstrate Digital Literacy
4. Demonstrate Entrepreneurial Skills
5. Demonstrate Employability Skills
6. Demonstrate Environmental literacy

## **COMMON COMPETENCIES**

1. Technical Drawing
2. Applied Mathematics
3. Apply building materials science
4. Apply workshop technology practices
5. Perform Building Temporary works

## **CORE COMPETENCIES**

1. Produce building drawings
2. Perform site preliminary works
3. Manufacture masonry units
4. Manage materials, tools and equipment
5. Perform substructure works
6. Perform superstructure works
7. Perform building finishes
8. Perform building external works
9. Install building services
10. Install building doors and windows
11. Manage construction project

## **BASIC UNITS OF COMPETENCY**

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# DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: CON/OS/BUT/BC/01/6

## UNIT DESCRIPTION

This unit covers the competencies required in meeting communication needs of clients and colleagues; developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interview, facilitating group discussion and representing the organization in various forums.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>Bold and italicized terms are elaborated in the Range</i>
1. Meet communication needs of clients and colleagues	1.1. Specific communication needs of clients and colleagues are identified and met 1.2. Different approaches are used to meet communication needs of clients and colleagues 1.3. Conflict is addressed promptly and in a timely way and in a manner, which does not compromise the standing of the organization.
2. Develop communication strategies	2.1. Strategies for effective internal and external dissemination of information are developed to meet the organization's requirements 2.2. Special communication needs are considered in developing strategies to avoid discrimination in the workplace 2.3. <b>Communication strategies</b> are analysed, evaluated and revised where necessary to make sure they are effective
3. Establish and maintain communication pathways	3.1. Pathways of communication are established to meet requirements of organization and workforce 3.2. Pathways are maintained and reviewed to ensure personnel are informed of relevant information
4. Promote use of communication strategies	4.1. Information is provided to all areas of the organization to facilitate implementation of the strategy 4.2. Effective communication techniques are articulated and modelled to the workforce 4.3. Personnel are given guidance about adapting

	communication strategies to suit a range of contexts
5. Conduct interview	<p>5.1. A range of appropriate communication strategies are employed in <i>interview situations</i></p> <p>5.2. Records of interviews are made and maintained in accordance with organizational procedures</p> <p>5.3. Effective questioning, listening and nonverbal communication techniques are used to ensure that required message is communicated</p>
6. Facilitate group discussion	<p>6.1. Mechanisms which enhance <i>effective group interaction</i> is defined and implemented</p> <p>6.2. Strategies which encourage all group members to participate are used routinely</p> <p>6.3. Objectives and agenda for meetings and discussions are routinely set and followed</p> <p>6.4. Relevant information is provided to group to facilitate outcomes</p> <p>6.5. Evaluation of group communication strategies is undertaken to promote participation of all parties</p> <p>6.6. Specific communication needs of individuals are identified and addressed</p>
7. Represent the organization	<p>7.1. When participating in internal or external forums, presentation is relevant, appropriately researched and presented in a manner to promote the organization</p> <p>7.2. Presentation is clear and sequential and delivered within a predetermined time</p> <p>7.3. Appropriate media is utilized to enhance presentation</p> <p>7.4. Differences in views are respected</p> <p>7.5. Written communication is consistent with organizational standards</p> <p>7.6. Inquiries are responded in a manner consistent with organizational standard</p>

### **RANGE**

This section provides work environment and conditions to which the performance criteria apply.

It allows for different work environment and situations that will affect performance.

<b>Variable</b>	<b>Range</b> includes but not limited to:
1. <i>Communication strategies</i>	<p>1.1 Language switch</p> <p>1.2 Comprehension check</p>

	1.3 Repetition 1.4 Asking confirmation 1.5 Paraphrase 1.6 Clarification request 1.7 Translation 1.8 Restructuring 1.9 Approximation 1.10 Generalization
<b>2. Interview situations</b>	2.1 Establishing rapport 2.2 Eliciting facts and information 2.3 Facilitating resolution of issues 2.4 Developing action plans 2.5 Diffusing potentially difficult situations
<b>3. Effective group interaction</b>	3.1 Identifying and evaluating what is occurring within an interaction in a non-judgmental way 3.2 Using active listening 3.3 Making decision about appropriate words, behaviour 3.4 Putting together response which is culturally appropriate 3.5 Expressing an individual perspective 3.6 Expressing own philosophy, ideology and background and exploring impact with relevance to communication

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Effective communication
- Active listening
- Giving/receiving feedback
- Interpretation of information
- Role boundaries setting
- Negotiation
- Establishing empathy
- Openness and flexibility in communication
- Communication skills required to fulfil job roles as specified by the organization
- Writing communications strategy
- Applying key elements of communications strategy

## Required Knowledge

The individual needs to demonstrate knowledge of:

- Communication process
- Dynamics of groups and different styles of group leadership
- Communication skills relevant to client groups
- Flexibility in communication
- Communication skills relevant to client groups
- Key elements of communications strategy

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Developed communication strategies to meet the organization requirements and applied in the workplace 1.2 Established and maintained communication pathways for effective communication in the workplace 1.3 Used communication strategies involving exchanges of complex oral information
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation/Demonstration with Oral Questioning 3.2 Written Examination
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

# DEMONSTRATE DIGITAL LITERACY

**UNIT CODE:** CON/OS/BUT/BC/02/6

## UNIT DESCRIPTION

This unit covers the competencies required to effectively use digital devices such as smartphones, tablets, laptops and desktop PCs. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop PCs for purposes of communication, work performance and management at the work place.

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b> These describe the key outcomes which make up workplace function	<b>PERFORMANCE CRITERIA</b> These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify appropriate computer software and hardware	1.1 Concepts of ICT are determined in accordance with computer equipment 1.2 Classifications of computers are determined in accordance with manufacturers specification 1.3 <i>Appropriate computer software</i> is identified according to manufacturer's specification 1.4 <i>Appropriate computer hardware</i> is identified according to manufacturer's specification 1.5 Functions and commands of operating system are determined in accordance with manufacturer's specification
2. Apply security measures to data, hardware, and software in automated environment.	2.1 <i>Data security and privacy</i> are classified in accordance with the prevailing technology 2.2 <i>Security threats</i> are identified, <i>and control measures</i> are applied in accordance with laws governing protection of ICT 2.3 Computer threats and crimes are detected. 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT
3. Apply computer software in	3.1 Word processing concepts are applied in



<p><b>ELEMENT</b></p> <p>These describe the key outcomes which make up workplace function</p>	<p><b>PERFORMANCE CRITERIA</b></p> <p>These are assessable statements which specify the required level of performance for each of the elements.</p> <p><i><b>Bold and italicized terms are elaborated in the Range</b></i></p>
<p>solving tasks.</p>	<p>resolving workplace tasks, report writing and documentation</p> <p>3.2 Word processing utilities are applied in accordance with workplace procedures</p> <p>3.3 Worksheet layout is prepared in accordance with work procedures</p> <p>3.4 Worksheet is built, and data manipulated in the worksheet in accordance with workplace procedures</p> <p>3.5 Continuous data manipulated on worksheet is undertaken in accordance with work requirements</p> <p>3.6 Database design and manipulation is undertaken in accordance with office procedures</p> <p>3.7 Data sorting, indexing, storage, retrieval and security is provided in accordance with workplace procedures</p>
<p>4. Apply internet and email in communication at workplace</p>	<p>4.1 Electronic mail addresses are opened and applied in workplace communication in accordance with office policy</p> <p>4.2 Office internet functions are defined and executed in accordance with office procedures</p> <p>4.3 <i><b>Network configuration</b></i> is determined in accordance with office operations procedures</p> <p>4.4 Official World Wide Web is installed and managed according to workplace procedures</p>
<p>5. Apply Desktop publishing in official assignments</p>	<p>5.1 Desktop publishing functions and tools are identified in accordance with manufactures specifications</p> <p>5.2 Desktop publishing tools are developed in</p>

<b>ELEMENT</b> These describe the key outcomes which make up workplace function	<b>PERFORMANCE CRITERIA</b> These are assessable statements which specify the required level of performance for each of the elements. <i><b>Bold and italicized terms are elaborated in the Range</b></i>
	<p>accordance with work requirements</p> <p>5.3 Desktop publishing tools are applied in accordance with workplace requirements</p> <p>5.4 Typeset work is enhanced in accordance with workplace standards</p>
6. Prepare presentation packages	<p>6.1 Types of presentation packages are identified in accordance with office requirements</p> <p>6.2 Slides are created and formulated in accordance with workplace procedures</p> <p>6.3 Slides are edited and run in accordance with work procedures</p> <p>6.4 Slides and handouts are printed according to work requirements</p>

### **RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

<b>Variable</b>	<b>Range</b> may include but not limited to:
1. <i>Appropriate computer software</i>	1.1 A collection of instructions or computer tools that enable the user to interact with a <i>computer</i> , its hardware, or perform tasks.
2. <i>Appropriate computer hardware</i>	2.1 Collection of physical parts of a computer system such as; <ul style="list-style-type: none"> <li>• Computer case, monitor, keyboard, and mouse</li> <li>• All the parts inside the computer case, such as the hard disk drive, motherboard and video card</li> </ul>
3. <i>Data security and privacy</i>	3.1 Confidentiality of data 3.2 Cloud computing 3.3 Integrity -but-curious data surfing
4. <i>Security and control measures</i>	4.1 Counter measures against cyber terrorism 4.2 Risk reduction 4.3 Cyber threat issues 4.4 Risk management

	4.5 Pass-wording
5. <i>Security threats</i>	5.1 Cyber terrorism 5.2 Hacking
6. <i>Word processing concepts</i>	6.1 Using a special program to create, edit and print documents
7. <i>Network configuration</i>	7.1 Organizing and maintaining information on the components of a computer network

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Interpretation
- Typing
- Communication
- Computing (applying fundamental operations such as addition, subtraction, division and multiplication)
- Using calculator
- Basic ICT skills

### Required Knowledge

The individual needs to demonstrate knowledge of:

- Software concept
- Functions of computer software and hardware
- Data security and privacy
- Computer security threats and control measures
- Technology underlying cyber-attacks and networks
- Cyber terrorism
- Computer crimes
- Detection and protection of computer crimes
- Laws governing protection of ICT
- Word processing;
- Functions and concepts of word processing.
- Documents and tables creation and manipulations
- Mail merging
- Word processing utilities
- Spread sheets;

- Meaning, formulae, function and charts, uses and layout
- Data formulation, manipulation and application to cells
- Database;
- Database design, data manipulation, sorting, indexing, storage retrieval and security
- Desktop publishing;
- Designing and developing desktop publishing tools
- Manipulation of desktop publishing tools
- Enhancement of typeset work and printing documents
- Presentation Packages;
- Types of presentation Packages
- Creating, formulating, running, editing, printing and presenting slides and handouts
- Networking and Internet;
- Computer networking and internet.
- Electronic mail and world wide web
- Emerging trends and issues in ICT;
- Identify and integrate emerging trends and issues in ICT
- Challenges posed by emerging trends and issues

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: <ul style="list-style-type: none"> <li>1.1 Identified and controlled security threats</li> <li>1.2 Detected and protected computer crimes</li> <li>1.3 Applied word processing in office tasks</li> <li>1.4 Designed, prepared work sheet and applied data to the cells in accordance to workplace procedures</li> <li>1.5 Opened electronic mail for office communication as per workplace procedure</li> <li>1.6 Installed internet and World Wide Web for office tasks in accordance with office procedures</li> <li>1.7 Integrated emerging issues in computer ICT applications</li> <li>1.8 Applied laws governing protection of ICT</li> </ul>
2. Resource Implications	<ul style="list-style-type: none"> <li>2.1 Tablets</li> <li>2.2 Laptops and</li> <li>2.3 Desktop PCs</li> <li>2.4 Desktop computer</li> <li>2.5 Lap top</li> <li>2.6 Calculator</li> </ul>

	<p>2.7 Internet</p> <p>2.8 Smart phone</p> <p>2.9 Operations Manuals</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Written Test</p> <p>3.2 Demonstration</p> <p>3.3 Practical assignment</p> <p>3.4 Interview/Oral Questioning</p> <p>3.5 Demonstration</p>
4. Context of Assessment	Competency may be assessed in an off and on the job setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# DEMONSTRATE ENTREPRENEURIAL SKILLS

UNIT CODE : CON/OS/BUT/BC/03/6

## UNIT DESCRIPTION

This unit covers the outcomes required to build and develop the enterprise to be more competitive within a changing business environment, specifically responding to consumer demands while maintaining product quality and accessibility, building a customer base and employee motivation.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Develop business Innovative strategies	1.1 Business innovation strategies are determined in accordance with the organization strategies 1.2 Business innovative strategies are implemented for the Purpose of business growth 1.3 Track record and normative capability profile of enterprise and similar businesses are reviewed and considered in setting <i>strategic directions</i> . 1.4 Strengths, weaknesses, opportunities and threats are considered when developing new ideas, approaches, goals and directions 1.5 Decisions about enterprise strategies/directions are made after careful consideration of all relevant information 1.6 <b>Business/corporate plan</b> is developed that sets out tactics, resource implications, timeframes, production and sales target
2. Develop new products/ markets	2.1 Alternative product/service offerings are canvassed and studied for feasibility 2.2 Potential and new sources/sellers of supplies and raw materials are identified and canvassed. 2.3 Target markets and buyers are identified and surveyed as to their preferences and brand loyalties.
3. Expand customers and product lines	3.1 Enterprise is built up and sustained through responsiveness to market demands and the regulatory environment. 3.2 Competitive advantage of existing products and services is maintained/enhanced through responsive advocacies and strategies.

ELEMENT	PERFORMANCE CRITERIA
	3.3 Constant listening to stakeholder/client feedback is ensured to maintain loyal client base.
4. Motivate staff/workers	4.1 Regular dialogue is established and maintained in all levels and relevant sections of the enterprise 4.2 Flow of communications in both directions is encouraged 4.3 <i>Helpful mechanisms</i> and benefits are implemented 4.4 Issues/problems are proactively resolved through win-win solutions wherever practicable
5. Expand employed capital base	5.1 Capital employed in business is continuously reviewed as per the strategic plan 5.2 Business share holdings are reviewed in accordance with the type of business 5.3 Capital employed is expanded according to organization procedures 5.4 Types of shares are determined according to strategic plan 5.5 Shares diversification process is undertaken as per office procedures 5.6 Role of shareholders is determined and implemented in accordance organization procedures
6. Undertake county/regional business expansion	6.1 Regions for expansion are continuously reviewed in accordance with strategic plan and company's expansion plan 6.2 County business regulations are reviewed and adhered to in accordance with set procedures 6.3 Regional laws and regulations are adhered to in accordance with set procedures 6.4 County/regional business expansion is undertaken in accordance with organization's growth/ expansion plan

### RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
	include but not limited to:
<i>1. Strategic directions</i>	1.1. Business continuity and succession 1.2. Resource access security 1.3. Core competencies development 1.4. New developments e.g. technological change, new

<b>Variable</b>	<b>Range</b> include but not limited to:
	products
<b>2. <i>Business/Corporate plan</i></b>	2.1 Action steps and responsibilities of departments and individual workers 2.2 Resource requirements and budget 2.3 Tactics and strategies to achieve objectives
<b>3. <i>Helpful mechanisms</i></b>	3.1 Wage and non-wage benefits 3.2 Employee awards and recognition systems 3.3 Employee rights and welfare policies 3.4 Full-disclosure/transparency policies

## **REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

### **Required Skills**

The individual needs to demonstrate the following skills:

- Assessing a range of alternative products and strategies
- Critically analyzing information, summarizing and making sense of previous and current market trends
- Identifying changing consumer preferences and demographics
- Thinking “outside the box”
- Ensuring quality consistency
- Reducing lead time to product/service delivery
- Managing operations/ production
- Using formal problem-solving procedures, e. g., root-cause analysis, six sigmas
- Communication skills
- Applying motivational principles, e. g., positive stroking, behavior modification
- Assessing range of alternatives rather than choosing the easiest option
- Achieving ownership and credibility for the enterprise vision
- Critically analyzing information, summarizing and making sense of previous and current market trends
- Developing solutions and practical strategies which are “outside the box”

### **Required Knowledge**

The individual needs to demonstrate knowledge of:

- Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
- Conflict resolution



- Health, safety and environment (HSE) principles and requirements
- Public-relations strategies
- Basic cost-benefit analysis
- Basic financial management
- Business strategic planning
- Impact of change on individuals, groups and industries
- Employee assistance
- Government and regulatory processes
- Local and international market trends
- Product promotion strategies
- Mechanisms in the enterprise
- Market and feasibility studies
- Local and global supply chains Business models and strategies
- Government and regulatory processes
- Local and international business environment
- Concepts of change management
- Relevant developments in other industries
- Capital employed
- Regional/ County business expansion
- Innovation in business

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: <ol style="list-style-type: none"> <li>1.1. Demonstrated ability to maintain a profitable and stable enterprise as shown by stakeholder feedback, employee testimonies and company financial statements</li> <li>1.2. Demonstrated ability to conceptualize and plan a micro/small enterprise</li> <li>1.3. Demonstrated ability to manage/operate a micro/small-scale business</li> <li>1.4. Demonstrated basic marketing skills</li> </ol>
2. Resource Implications	2.1 The following resources should be provided: <ol style="list-style-type: none"> <li>2.2 Interview guide for entrepreneurs</li> <li>2.3 Enterprise workers and third parties</li> <li>2.4 Materials and location relevant to the proposed activity and tasks</li> </ol>
3. Methods of	3.1 Case problems

Assessment	3.2 Interview 3.3 Portfolio 3.4 Third part reports
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# DEMONSTRATE EMPLOYABILITY SKILLS

**UNIT CODE:** CON/OS/BUT/BC/04/6

## UNIT DESCRIPTION

This unit covers competencies required to demonstrate employability skills. It involves competencies for exuding self-awareness and dealing with everyday life challenges; demonstrating critical safe work habits and leading a workplace team; planning and organizing work activities; applying learning, creativity and innovativeness in workplace functions; pursuing professional growth and managing time effectively in the workplace.

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <b>Bold and italicized terms are elaborated in the Range</b>
1. Develop self-awareness and understanding of every day demands and challenges in the workplace	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives 1.2 Emotions are managed as per workplace requirements 1.3 Thoughts, feelings and beliefs are expressed in direct, honest and appropriate ways. 1.4 Feelings are shared with others according to personal issues for healthy relations. 1.5 Individual performance is evaluated and monitored according to the agreed targets. 1.6 Assertiveness is developed and maintained based on the requirements of the job. 1.7 Own ideas and visions that generates excitement, enthusiasm and commitment are articulated. 1.8 Accountability and responsibility for own actions are demonstrated. 1.9 Self-esteem and a positive self-image are developed and maintained.

ELEMENT	PERFORMANCE CRITERIA <b>Bold and italicized terms are elaborated in the Range</b>
2. Demonstrate critical safe work habits for employees in the workplace	2.1 Stress is managed at the workplace in accordance with workplace procedures. 2.2 Punctuality and time consciousness are demonstrated in line workplace policy. 2.3 <b><i>Personal objectives</i></b> are integrated with organization goals in accordance with organization's strategic plan. 2.4 <b><i>Resources</i></b> are effectively utilized in accordance with workplace policy. 2.5 Work priorities are set and met in according to workplace procedures. 2.6 Leisure time is recognized and used productively in line with organization policy. 2.7 Abstinence from <b><i>drug and substance abuse</i></b> is demonstrated as per workplace policy. 2.8 Awareness of HIV and AIDS is demonstrated in line with workplace requirements. 2.9 Safety consciousness is demonstrated in the workplace based on organization safety policy. 2.10 <b><i>Emerging issues</i></b> are dealt with in accordance with organization policy.
3. Lead a workplace team	3.1 Role and objectives of the <b><i>team</i></b> are determined in accordance workplace policy. 3.2 Team parameters and relationships are identified according to set rules and regulations. 3.3 Individual responsibilities are identified in accordance with work procedures. 3.4 Effective and appropriate forms of communication in a team are established according to office policy. 3.5 Business communication is carried out as

ELEMENT	PERFORMANCE CRITERIA <b>Bold and italicized terms are elaborated in the Range</b>
	<p>per workplace place policy and requirements of the job.</p> <p>3.6 Team activities are complemented in accordance with office procedures.</p> <p>3.7 Team building activities are planned for in line with organization policy.</p> <p>3.8 Conflicts are resolved between team members in line with organization rules and regulations.</p> <p>3.9 <b><i>Gender mainstreaming</i></b> is undertaken in accordance with set regulations.</p> <p>3.10 Human rights are adhered to in accordance with existing protocol.</p> <p>3.11 Healthy <b><i>relationships</i></b> are developed and maintained for harmonious co-existence in line with workplace.</p>
4. Plan and organize work	<p>4.1 Work schedules are developed for accomplishing given tasks within the set time lines and based on workplace policy.</p> <p>4.2 Time is managed achieve workplace set goals and objectives.</p> <p>4.3 Clear project goals and deliverables are established according to company set policies and regulations.</p> <p>4.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables.</p> <p>4.5 Work activities are monitored and evaluated in line with organization procedures.</p> <p>4.6 Situations that require decision making are identified within the work place and decision made in accordance with workplace policy.</p> <p>4.7 Steps required in making effective decisions are applied within the workplace.</p>

ELEMENT	PERFORMANCE CRITERIA <b>Bold and italicized terms are elaborated in the Range</b>
	<p>4.8 Problems arising in the course of working are identified and solved or reported according the workplace policies and procedures.</p> <p>4.9 Values required in problem solving process are demonstrated at the work place.</p> <p>4.10 Situations within the workplace that require negotiation identified and negotiations done to create win-win situations.</p> <p>4.11 Negotiation techniques are developed and applied at workplace to meet clientele’s satisfaction and organizations’ objectives.</p>
<p>5. Maintain professional growth and development in the workplace</p>	<p>5.1 Personal training needs are assessed and identified in line with the requirements of the job.</p> <p>5.2 <b><i>Training and career opportunities</i></b> are identified and availed based on job requirements.</p> <p>5.3 Resources for training are mobilized and allocated based organizations skills needs.</p> <p>5.4 Licenses and certifications relevant to job and career are obtained and renewed.</p> <p>5.5 <b><i>Personal growth</i></b> is pursued towards improving the qualifications set for the profession.</p> <p>5.6 Work priorities and commitments are managed based on requirement of the job and workplace policy.</p> <p>5.7 Recognitions are sought as proof of career advancement in line with professional requirements.</p>
<p>6. Demonstrate learning, creativity and innovativeness in the workplace</p>	<p>6.1 Time and effort are invested in learning new skills-based job requirements.</p> <p>6.2 Willingness to learn in different context is demonstrated based on available learning</p>

ELEMENT	PERFORMANCE CRITERIA <b>Bold and italicized terms are elaborated in the Range</b>
	<p>opportunities arising in the workplace.</p> <p>6.3 Learning opportunities are sought and allocated based on job requirement and in line with organization policy.</p> <p>6.4 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job.</p> <p>6.5 Application of a range of basic IT skills is demonstrated based on requirements of the job.</p> <p>6.6 Awareness of Occupational Health and Safety procedures are demonstrated in use of technology in the workplace.</p> <p>6.7 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy.</p> <p>6.8 New systems are developed and maintained in accordance with the requirements of the job.</p> <p>6.9 Opportunities that are not obvious are identified and exploited in line with organization objectives.</p> <p>6.10 Opportunities for performance improvement are identified proactively in area of work.</p> <p>6.11 Awareness of personal role in workplace <b><i>innovation</i></b> is demonstrated.</p>

### RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Range	Variable includes but not limited to:
1. <b><i>Drug and substance abuse</i></b>	Commonly abused <ul style="list-style-type: none"> <li>• Alcohol, Tobacco, Miraa, Over-the-counter drugs, Cocaine, Bhang, Glue</li> </ul>

<b>Range</b>	<b>Variable</b> includes but not limited to:
<b>2. Feedback</b>	2.1 Verbal 2.2 Written 2.3 Informal 2.4 Formal
<b>3. Clients</b>	3.1 New clients 3.2 Existing clients 3.3 Internal clients 3.4 External clients
<b>4. Relationships</b>	4.1 Man/Woman 4.2 Trainer/trainee 4.3 Employee/employer 4.4 Client/service provider 4.5 Husband/wife 4.6 Boy/girl 4.7 Parent/child 4.8 Sibling relationships
<b>5. Communication methods</b>	5.1 Written 5.2 Talk/presentation 5.3 Video 5.4 Audio 5.5 Graphical 5.6 Modelling
<b>6. Team</b>	6.1 Small work group 6.2 Staff in a section/department 6.3 Inter-agency group
<b>7. Personal growth</b>	7.1 Growth in the job 7.2 Career mobility 7.3 Gains and exposure the job gives 7.4 Net workings 7.5 Benefits that accrue to the individual as a result of noteworthy performance
<b>8. Personal objectives</b>	11.1 Long term 11.2 Short term 11.3 Broad 11.4 Specific
<b>9. Trainings and career opportunities</b>	9.1 Participation in training programs <ul style="list-style-type: none"> <li>○ Technical</li> <li>○ Supervisory</li> </ul>



<b>Range</b>	<b>Variable</b> includes but not limited to:
	<ul style="list-style-type: none"> <li>○ Managerial</li> <li>○ Continuing Education</li> </ul> 9.2 Serving as Resource Persons in conferences and workshops
<b>10. Resources</b>	10.1 Human 10.2 Financial 10.3 Technology <ul style="list-style-type: none"> <li>○ Hardware</li> <li>○ Software</li> </ul>
<b>11. Innovation</b>	11.1 New ideas 11.2 Original ideas 11.3 Different ideas 11.4 Methods/procedures 11.5 Processes 11.6 New tools
<b>12. Emerging issues</b>	12.1 Terrorism 12.2 Social media 12.3 National cohesion 12.4 Open offices

## **REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

### **Required Skills**

The individual needs to demonstrate the following skills:

- Personal hygiene practices
- Intra and Interpersonal skills
- Communication skills
- Knowledge management
- Interpersonal skills
- Critical thinking skills
- Observation skills
- Organizing skills
- Negotiation skills
- Monitoring skills
- Evaluation skills
- Record keeping skills
- Problem solving skills
- Decision Making skills

- Resource utilization skills
- Resource mobilization skills

### **Required Knowledge**

The individual needs to demonstrate knowledge of:

- Work values and ethics
- Company policies
- Company operations, procedures and standards
- Occupational Health and safety procedures
- Fundamental rights at work
- Personal hygiene practices
- Workplace communication
- Concept of time
- Time management
- Decision making
- Types of resources
- Work planning
- Resources and allocating resources
- Organizing work
- Monitoring and evaluation
- Record keeping
- Workplace problems and how to deal with them
- Negotiation
- Assertiveness
- Team work
- Gender mainstreaming
- HIV and AIDS
- Drug and substance abuse
- Leadership
- Safe work habits
- Professional growth and development
- Technology in the workplace
- Learning
- Creativity
- Innovation
- Emerging issues
- Social media
- Terrorism
- National cohesion

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Attained job targets within key result areas. 1.2 Maintained intra- and inter-personal relationship in the course of managing oneself. 1.3 Completed trainings and career progression opportunities in time. 1.4 Was punctual and time conscious. 1.5 Acquired and maintained licenses and/or certifications required for the job. 1.6 Planned and organized resources to achieve organization goals and objectives. 1.7 Monitored and evaluated work activities. 1.8 Identified, analysed and solved problem arising in the course of working. 1.9 Was conscious of health and safety while carrying out work functions. 1.10 Maintained a mentorship and coaching program for employees. 1.11 Innovatively made work processes and procedures more efficient. 1.12 Mainstreamed gender issues in the workplace. 1.13 Build a strong team of workers in the workplace. 1.14 Sought and allocated learning opportunities and resources in the workplace. 1.15 Demonstrated awareness of HIV and AIDS. 1.16 Abstained from drug and substance abuse. 1.17 Demonstrated ability to cope with emerging issues.
2. Resource Implications	The following resources should be provided: 2.1 Workplace or assessment location 2.2 Case studies/scenarios
3. Methods of Assessment	Competency in this unit may be assessed through: <ul style="list-style-type: none"><li>• Oral Interview</li><li>• Observation</li><li>• Third Party Reports</li><li>• Written</li></ul>
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting

	4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# DEMONSTRATE ENVIRONMENTAL LITERACY

**UNIT CODE :** CON/OS/BUT/BC/05/6

## UNIT DESCRIPTION

This unit specifies the competencies required to follow procedures for environmental hazard control, follow procedures for environmental pollution control, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, develop and adhere to environmental protection principles/strategies/guidelines, analyze resource use, develop resource conservation plans and implement selected plans.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>Bold and italicized terms are elaborated in the Range</i>
1. Control environmental hazard	1.1. Storage methods for environmentally hazardous materials are strictly followed according to environmental regulations and OSHS. 1.2. Disposal methods of hazardous wastes are followed at all times according to environmental regulations and OSHS. 1.3. <b>PPE (Personal Protective Equipment)</b> is used according to OSHS.
2. Control environmental Pollution control	2.1. Environmental pollution <b>control measures</b> are compiled following standard protocol. 2.2. Procedures for solid waste management are observed according Environmental Management and Coordination Act 1999 2.3. Methods for minimizing <b>noise pollution</b> complied following environmental regulations.
3. Demonstrate sustainable resource use	3.1. Methods for minimizing wastage are complied with. 3.2. <b>Waste management procedures</b> are employed following principles of 3Rs (Reduce, Reuse, Recycle) 3.3. Methods for economizing or reducing resource consumption are practiced.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Bold and italicized terms are elaborated in the Range</i>
4. Evaluate current practices in relation to resource usage	4.1. Information on resource efficiency systems and procedures are collected and provided to the work group where appropriate. 4.2. Current resource usage is measured and recorded by members of the work group 4.3. Current purchasing strategies are analysed and recorded according to industry procedures 4.4. Current work processes to access information and data is analysed following enterprise protocol.
5. Identify Environmental legislations/conventions for environmental concerns	5.1. Environmental <b>legislations/conventions</b> and local ordinances are identified according to the different <b>environmental aspects/impact</b> 5.2. Industrial standard/environmental practices are described according to the different environmental concerns
6. Implement specific environmental programs	6.1. <b>Programs/Activities</b> are identified according to organizations policies and guidelines. 6.2. Individual roles/responsibilities are determined and performed based on the activities identified. 6.3. Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines 6.4. Stakeholders are consulted based on company guidelines
7. Monitor activities on Environmental protection/Programs	7.1. Activities are <b>periodically</b> monitored and Evaluated according to the objectives of the environmental program 7.2. Feedback from stakeholders are gathered and considered in Proposing enhancements to the program based on consultations 7.3. Data gathered are analysed based on Evaluation requirements

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Bold and italicized terms are elaborated in the Range</i>
	7.4. Recommendations are submitted based on the findings 7.5. Management support systems are set/established to sustain and enhance the program 7.6. Environmental incidents are monitored and reported to concerned/proper authorities
8. Analyse resource use	8.1. All resource consuming processes are Identified 8.2. Quantity and nature of Resource consumed is determined 8.3. Resource flow is analysed through different parts of the process. 8.4. Wastes are classified for possible source of <b><i>resources.</i></b>
9. Develop resource Conservation plans	9.1. Efficiency of use/conversion of resources is determined following industry protocol. 9.2. Causes of low efficiency of use of resources are determined based on industry protocol. 9.3. Plans for increasing the efficiency of resource use are developed based on findings.

### **RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. <b><i>PPE (Personal Protective Equipment)</i></b>	1.1 Mask 1.2 Gloves 1.3 Goggles 1.4 Safety hat 1.5 Overall 1.6 Hearing protector

<b>2. Environmental pollution control measures</b>	2.1 Methods for minimizing or stopping spread and ingestion of airborne particles 2.2 Methods for minimizing or stopping spread and ingestion of gases and fumes 2.3 Methods for minimizing or stopping spread and ingestion of liquid wastes
<b>3. Wastes</b>	3.1 Unnecessary waste 3.2 Necessary waste
<b>4. Waste management Procedures</b>	4.1 Sorting 4.2 Storing of items 4.3 Recycling of items 4.4 Disposal of items
<b>5. Resources</b>	5.1 Electric 5.2 Water 5.3 Fuel 5.4 Telecommunications 5.5 Supplies 5.6 Materials
<b>6. Workplace environmental hazards</b>	6.1 Biological hazards 6.2 Chemical and dust hazards 6.3 Physical hazards
<b>7. Organizational systems and procedures</b>	7.1 Supply chain, procurement and purchasing 7.2 Quality assurance 7.3 Making recommendations and seeking approvals
<b>8. Legislations/Conventions</b>	8.1 EMCA 1999 8.2 Montreal Protocol 8.3 Kyoto Protocol



<b>9. Environmental aspects/impacts</b>	9.1 Air pollution 9.2 Water pollution 9.3 Noise pollution 9.4 Solid waste 9.5 Flood control 9.6 Deforestation/Denudation 9.7 Radiation/Nuclear /Radio Frequency/ Microwaves 9.8 Situation 9.9 Soil erosion (e.g. Quarrying, Mining, etc.) 9.10 Coral reef/marine life protection
<b>10. Industrial standards / Environmental practices</b>	10.1 ISO standards 10.2 Company environmental management systems 10.3 (EMS)
<b>11. Periodically</b>	11.1 hourly 11.2 daily 11.3 weekly 11.4 monthly 11.5 quarterly 11.6 yearly
<b>12. Programs/Activities</b>	12.1 Waste disposal (on-site and off-site) 12.2 Repair and maintenance of equipment 12.3 Treatment and disposal operations 12.4 Clean-up activities 12.5 Laboratory and analytical test 12.6 Monitoring and evaluation 12.7 Environmental advocacy programs

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Controlled environmental hazard 1.2 Controlled environmental pollution 1.3 Demonstrated sustainable resource use 1.4 Evaluated current practices in relation to resource usage
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	<p>1.5 Demonstrated knowledge of environmental legislations and local ordinances according to the different environmental issues /concerns.</p> <p>1.6 Described industrial standard environmental practices according to the different environmental issues/concerns.</p> <p>1.7 Resolved problems/ constraints encountered based on management standard procedures</p> <p>1.8 Implemented and monitored environmental practices on a periodic basis as per company guidelines</p> <p>1.9 Recommended solutions for the improvement of the program</p> <p>1.10 Monitored and reported to proper authorities any environmental incidents</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>2.1 Workplace with storage facilities</p> <p>2.2 Tools, materials and equipment relevant to the tasks (e.g. Cleaning tools, cleaning materials, trash bags)</p> <p>2.3 PPE, manuals and references</p> <p>2.4 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection</p> <p>2.5 Case studies/scenarios relating to environmental Protection</p>
3 Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1 Demonstration</p> <p>3.2 Oral questioning</p> <p>3.3 Written examination</p> <p>3.4 Interview/Third Party Reports</p> <p>3.5 Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad)</p> <p>3.6 Simulations and role-play</p>
4 Context of Assessment	<p>Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.</p>
5 Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Following storage methods of environmentally hazardous materials
- Following disposal methods of hazardous wastes
- Using PPE
- Practicing OSHS
- Complying environmental pollution control
- Observing solid waste management
- Complying methods of minimizing noise Pollution
- Complying methods of minimizing wastage
- Employing waste management procedures
- Economizing resource consumption
- Listing of resources used
- Measuring current usage of resources
- Identifying and reporting workplace environmental hazards
- Conveying all environmental issues
- Following environmental regulations
- Identifying environmental regulations
- Assessing procedures for assessing compliance
- Collecting information on environmental and resource efficiency systems and procedures, and Providing information to the work group
- Measuring and recording current resource usage
- Analysing and recording current purchasing strategies.
- Analysing current work processes to access information and data and Assisting identifying areas for improvement
- Analysing resource flow
- Determining efficiency of use/conversion of resources
- Determining causes of low efficiency of use
- Developing plans for increasing the efficiency of resource use
- Checking resource use plans
- Complying to regulations/licensing requirements
- Determining benefit/cost of plans
- Ranking proposals based on benefit/cost compared to limited resources
- Checking proposals meet regulatory requirements
- Monitoring implementation
- Making adjustments to plans and implementation
- checking new resource usage

### **Required Knowledge**

The individual needs to demonstrate knowledge of:

- Storage methods of environmentally hazardous materials

- Disposal methods of hazardous wastes
- Usage of PPE Environmental regulations
- OSHS
- Types of pollution
- Environmental pollution control measures
- Different solid wastes
- Solid waste management
- Different noise pollution
- Methods of minimizing noise pollution
- Methods of minimizing wastage
- Waste management procedures
- Economizing of resource consumption
- Principle of 3Rs
- Types of resources
- Techniques in measuring current usage of resources
- Calculating current usage of resources
- Types of workplace environmental hazards
- Environmental regulations
- Environmental regulations applying to the enterprise.
- Procedures for assessing compliance with environmental regulations.
- Collection of information on environmental and resource efficiency systems and procedures,
- Measurement and recording of current resource usage
- Analysis and recording of current purchasing strategies.
- Analysis current work processes to access information and data Analysis of data and information
- Identification of areas for improvement
- Resource consuming processes
- Determination of quantity and nature of resource consumed
- Analysis of resource flow of different parts of the resource flow process
- Use/conversion of resources
- Causes of low efficiency of use
- Increasing the efficiency of resource use
- Inspection of resource use plans
- Regulations/licensing requirements
- Determine benefit/cost for alternative resource sources
- Benefit/costs for different alternatives
- Components of proposals

- Criteria on ranking proposals
- Regulatory requirements
- Proposals for improving resource efficiency
- Implementation of resource efficiency plans
- Procedures in monitor implementation
- Adjustments of implementation plan
- Inspection of new resource usage

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# DEMONSTRATE OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** CON/OS/BUT/BC/06/6

## UNIT DESCRIPTION

This unit specifies the competencies required to lead the implementation of workplace's safety and health program, procedures and policies/guidelines.

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
<p>These describe the key outcomes which make up workplace function.</p> <p>1. Identify workplace hazards and risk</p>	<p>These are assessable statements which specify the required level of performance for each of the elements.</p> <p><i><b>Bold and italicized terms are elaborated in the Range</b></i></p> <p>1.1 <i><b>Hazards</b></i> in the workplace and/or its <i><b>indicators</b></i> of its presence, are identified</p> <p>1.2 <i><b>Evaluation and/or work environment</b></i> measurements of OSH hazards/risk existing in the workplace is conducted by Authorized personnel or agency</p> <p>1.3 <i><b>OSH issues and/or concerns</b></i> raised by workers are Gathered</p>
<p>2. Identify and implement appropriate control measures</p>	<p>2.1 Prevention <i><b>and control measures</b></i>, including use of <i><b>safety gears / PPE (personal protective equipment)</b></i> for specific hazards  identified and implemented</p> <p>2.2 <i><b>Appropriate risk controls</b></i> based on result of OSH hazard evaluation is recommended.</p> <p>2.3 <i><b>Contingency measures</b></i>, including <i><b>emergency procedures</b></i> during workplace <i><b>incidents and</b></i></p>

	<i>emergencies</i> are recognized and established in accordance with organization procedures.
3. Implement OSH programs, procedures and policies/ guidelines	<p>3.1 Information to work team about company OSH program, procedures and policies/guidelines are provided</p> <p>3.2 Implementation of OSH procedures and policies/ guidelines are participated</p> <p>3.3 Team members are trained and advised on OSH standards and procedures</p> <p>3.4 Procedures for maintaining <i>OSH-related records</i> are implemented</p>

### RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. <i>Hazards may include</i> but are not limited to:	<p>1.1. Physical hazards – impact, illumination, pressure, noise, vibration, extreme temperature, radiation</p> <p>1.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects</p> <p>1.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors</p> <p>1.4 Ergonomics Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles</p> <p>1.5 Physiological factors – monotony, personal relationship, work out cycle</p> <p>1.6 Safety hazards (unsafe workplace condition) - confined space, excavations, falling objects, gas leaks, electrical, poor storage of materials and waste, spillage, waste and debris</p> <p>1.7 Unsafe workers’ act (Smoking in off-limited areas, Substance and alcohol abuse at work)</p>

<p>2. <i>Indicators may include but are not limited to:</i></p>	<p>2.1 Increased of incidents of accidents, injuries  2.2 Increased occurrence of sickness or health complaints/ symptoms  2.3 Common complaints of workers related to OSH  2.4 High absenteeism for work-related reasons</p>
<p>3. <i>Evaluation and/or work environment measurements may include but are not limited to:</i></p>	<p>3.1 Health Audit  3.2 Safety Audit  3.3 Work Safety and Health Evaluation  3.4 Work Environment Measurements of Physical and Chemical Hazards</p>
<p>4. <i>OSH issues and/or concerns may include but are not limited to:</i></p>	<p>4.1 Workers' experience/observance on presence of work hazards  4.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks)  4.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines</p>
<p>5. <i>Prevention and control measures may include but are not limited to:</i></p>	<p>5.1 Eliminate the hazard (i.e., get rid of the dangerous machine)  5.2 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off)  5.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one)  5.4 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signages, rotation/shifting work schedule)  5.5 Use engineering controls to reduce the risk (i.e. use safety guards to machine)  5.6 Use personal protective equipment  5.7 Safety, Health and Work Environment Evaluation  5.8 Periodic and/or special medical examinations of workers</p>



<p>6. <i>Safety gears /PPE (Personal Protective Equipment) may include but are not limited to:</i></p>	<p>6.1 Arm/Hand guard, gloves          6.2 Eye protection (goggles, shield)          6.3 Hearing protection (ear muffs, ear plugs)          6.4 Hair Net/cap/bonnet          6.5 Hard hat          6.6 Face protection (mask, shield)          6.7 Apron/Gown/coverall/jump suit          6.8 Anti-static suits          High-visibility reflective vest</p>
<p>7. <i>Appropriate risk controls</i></p>	<p>Appropriate risk controls in order of impact are as follows:          7.1 Eliminate the hazard altogether (i.e., get rid of the dangerous machine)          7.2 Isolate the hazard from anyone who could be harmed (i.e., keep the machine in a closed room and operate it remotely; barricade an unsafe area off)          7.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one)          7.4 Use administrative controls to reduce the risk (i.e., train workers how to use equipment safely; train workers about the risks of harassment; issue signage)          7.5 Use engineering controls to reduce the risk (i.e., attach guards to the machine to protect users)          7.6 Use personal protective equipment (i.e., wear gloves and goggles when using the machine)</p>
<p>8. <i>Contingency measures may include but are not limited to:</i></p>	<p>8.1 Evacuation          8.2 Isolation          8.3 Decontamination          8.4 (Calling designed) emergency personnel</p>
<p>9. <i>Emergency procedures may include but are not limited to:</i></p>	<p>9.1 Fire drill          9.2 Earthquake drill          9.3 Basic life support/CPR          9.4 First aid          9.5 Spillage control          9.6 Decontamination of chemical and toxic          9.7 Disaster preparedness/management          9.8 use of fire-extinguisher</p>

<p>10. <i>Incidents and emergencies</i> may include but are not limited to:</p>	<p>10.1 Chemical spills  10.2 Equipment/vehicle accidents  10.3 Explosion  10.4 Fire  10.5 Gas leak  10.6 Injury to personnel  10.7 Structural collapse  10.8 Toxic and/or flammable vapours emission.</p>
<p>11. <i>OSH-related Records</i> may include but are not limited to:</p>	<p>11.1 Medical/Health records  11.2 Incident/accident reports  11.3 Sickness notifications/sick leave application  11.4 OSH-related trainings obtained</p>

## **REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

### **Required Skills**

The individual needs to demonstrate the following skills:

- Skills on preliminary identification of workplace hazards/risks
- Knowledge management
- Critical thinking skills
- Observation skills
- Coordinating skills
- Communication skills
- Interpersonal skills
- Troubleshooting skills
- Presentation skills
- Training skills

### **Required Knowledge**

The individual needs to demonstrate knowledge of:

- General OSH Principles

- Occupational hazards/risks recognition
- OSH organizations providing services on OSH evaluation and/or work environment measurements (WEM)
- National OSH regulations; company OSH policies and protocols
- Systematic gathering of OSH issues and concerns
- General OSH principles
- National OSH regulations
- Company OSH and recording protocols, procedures and policies/guidelines
- Training and/or counselling methodologies and strategies

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Identifies hazards/risks in the workplace and/or its indicators</li> <li>1.2 Requests for evaluation and/or work environment measurements of OSH hazards/risk in the workplace</li> <li>1.3 Gathers OSH issues and/or concerns raised by workers</li> <li>1.4 Identifies and implements prevention and control measures, including use of PPE (personal protective equipment) for specific hazards</li> <li>1.5 Recommends appropriate risk controls based on result of OSH hazard evaluation and OSH issues gathered</li> <li>1.6 Establish contingency measures, including emergency procedures in accordance with organization procedures</li> <li>1.7 Provides information to work team about company OSH program, procedures and policies/guidelines</li> <li>1.8 Participates in the implementation of OSH procedures and policies/guidelines</li> <li>1.9 Trains and advises team members on OSH standards and procedures</li> <li>1.10 Implements procedures for maintaining OSH-related records</li> </ul>
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> <li>2.1 Workplace or assessment location</li> <li>2.2 OSH personal records</li> <li>2.3 PPE</li> <li>2.4 Health records</li> </ul>

3. Methods of Assessment	Competency may be assessed through: 3.1 Portfolio Assessment 3.2 Interview 3.3 Case Study/Situation 3.4 Observation/Demonstration and oral questioning
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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## COMMON UNITS OF COMPETENCY

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# APPLY ENGINEERING MATHEMATICS

**UNIT CODE:**CON/OS/BUT/CC/1/6

## UNIT DESCRIPTION:

This unit describes the competencies required by a technician in order to apply algebra apply trigonometry and hyperbolic functions, apply complex numbers, apply coordinate geometry, carry out binomial expansion, apply calculus, solve ordinary differential equations, carry out mensuration, apply power series, apply statistics, apply numerical methods, apply vector theory and apply matrix.

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b>  These describe the key outcomes which make up workplace function.	<b>PERFORMANCE CRITERIA</b>  These are assessable statements which specify the required level of performance for each of the elements.  <i><b>Bold and italicized terms are elaborated in the Range.</b></i>
1. Apply Algebra	1.1 Calculations involving Indices are performed as per the concept 1.2 Calculations involving Logarithms are performed as per the concept 1.3 Scientific calculator is used in solving mathematical problems in line with manufacturer's manual 1.4 Simultaneous equations are performed as per the rules 1.5 Quadratic equations are calculated as per the concept
2. Apply Trigonometry and hyperbolic functions	2.1 Calculations are performed using trigonometric rules 2.2 Calculations are performed using hyperbolic functions

<p><b>ELEMENT</b></p> <p>These describe the key outcomes which make up workplace function.</p>	<p><b>PERFORMANCE CRITERIA</b></p> <p>These are assessable statements which specify the required level of performance for each of the elements.</p> <p><i><b>Bold and italicized terms are elaborated in the Range.</b></i></p>
<p>3. Apply complex numbers</p>	<p>1.1 Complex numbers are represented using Argand diagrams</p> <p>1.2 Operations involving complex numbers are performed</p> <p>1.3 Calculations involving complex numbers are performed using De Moivre's theorem</p>
<p>4. Apply Coordinate Geometry</p>	<p>4.1 Polar equations are calculated using coordinate geometry</p> <p>4.2 Graphs of given polar equations are drawn using the Cartesian plane</p> <p>4.3 Normal and tangents are determined using coordinate geometry</p>
<p>5. Carry out Binomial Expansion</p>	<p>1.1 Roots of numbers are determined using binomial theorem</p> <p>1.2 Errors of small changes are determined using binomial theorem</p>
<p>6. Apply Calculus</p>	<p>6.2 Derivatives of functions are determined using Differentiation</p> <p>6.3 Derivatives of hyperbolic functions are determined using Differentiation</p> <p>6.4 Derivatives of inverse trigonometric functions are determined using Differentiation</p> <p>6.5 Rate of change and small change are determined using Differentiation.</p> <p>6.6 Calculation involving stationery points of functions of two variables are performed using differentiation.</p> <p>6.7 Integrals of algebraic functions are determined using integration</p> <p>6.8 Integrals of trigonometric functions are determined using integration</p> <p>6.9 Integrals of logarithmic functions are determined using integration</p> <p>6.10 Integrals of hyperbolic and inverse functions are determined using integration</p>

<p><b>ELEMENT</b></p> <p>These describe the key outcomes which make up workplace function.</p>	<p><b>PERFORMANCE CRITERIA</b></p> <p>These are assessable statements which specify the required level of performance for each of the elements.</p> <p><b><i>Bold and italicized terms are elaborated in the Range.</i></b></p>
<p>7. Solve Ordinary differential equations</p>	<p>6.1 First order and second order differential equations are solved using the method of undetermined coefficients</p> <p>7.2 First order and second order differential equations are solved from given boundary conditions</p>
<p>8. Carry out Mensuration</p>	<p>8.1 Perimeter and areas of figures are obtained</p> <p>8.2 Volume and of Surface area of solids are obtained</p> <p>8.3 Area of irregular figures are obtained</p> <p>8.4 Areas and volumes are obtained using Pappus theorem</p>
<p>9. Apply Power Series</p>	<p>1.1 Power series are obtained using Taylor's Theorem</p> <p>1.2 Power series are obtained using McLaurin's 's theorem</p>
<p>10. Apply Statistics</p>	<p>10.1 Mean, median ,mode and Standard deviation are obtained from given data</p> <p>10.2 Calculations are performed based on Laws of probability</p> <p>10.3 Calculation involving <b><i>probability distributions</i></b> , mathematical expectation sampling distributions are performed</p> <p>10.4 Sampling distribution methods are applied in data analysis</p> <p>10.5 Calculations involving use of standard normal table, sampling distribution, T-distribution and Estimation are done</p> <p>10.6 Confidence intervals are determined</p>
<p>11. Apply Numerical methods</p>	<p>1.1 Roots of polynomials are obtained using iterative <b><i>numerical methods</i></b></p> <p>1.2 Interpolation and extrapolation are performed using numerical methods</p>



<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements.  <i><b>Bold and italicized terms are elaborated in the Range.</b></i>
12. Apply Vector theory	12.1 Vectors and scalar quantities are obtained in two and three dimensions 12.2 <i><b>Operations</b></i> on vectors are performed 12.3 Position of vectors is obtained 12.4 Resolution of vectors is done
13. Apply Matrix	13.1 Determinant and inverse of 3x3 matrix are obtained 13.2 Solutions of simultaneous equations are obtained 13.3 Calculation involving Eigen values and Eigen vectors are performed

## **RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

<b>Variable</b>	<b>Range</b>
	<i><b>May include but not limited to:</b></i>
1. Operations	1.1. Addition 1.2. Subtraction
2. Hyperbolic functions	2.1. Sinh x 2.2. Cosh x 2.3. Cosec x 2.4. Coth x 2.5. Tanh x 2.6. Sech x
3. Probability Distributions	3.1. Binomial 3.2. Poisson 3.3. Normal
4. Numerical Methods	4.1. Newton Raphson

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Applying fundamental operations (addition, subtraction, division, multiplication)
- Using and applying mathematical formulas
- Logical thinking
- Problem solving
- Applying statistics
- Drawing graphs
- Using different measuring tools

### Required knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions
- Types of tables and graphs
- Presentation of data in tables and graphs
- Vector operations
- Matrix operations

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <p>1.4 Applied Trigonometry and hyperbolic functions</p> <p>1.5 Applied complex numbers</p> <p>1.6 Applied Calculus</p>
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	<p>1.7 Solved Ordinary differential equations</p> <p>1.8 Carried out mensuration</p> <p>1.9 Applied Power Series</p> <p>1.10 Applied Vector theory</p> <p>1.11 Applied Matrix</p> <p>1.12 Applied Numerical methods</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place</p> <p>2.2 Measuring equipment</p> <p>2.3 Materials relevant to the proposed activity or tasks</p>
2. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>1.1 Direct Observation</p> <p>1.2 Demonstration with Oral Questioning</p> <p>1.3 Written tests</p>
Context of Assessment	<p>Competency may be assessed individually in the actual workplace or through accredited institution</p>
Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

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# PREPARE AND INTERPRET TECHNICAL DRAWINGS

UNIT CODE: CON/OS/BUT/CC/02/6

## UNIT DESCRIPTION

This unit covers the competencies required to prepare and interpret technical drawings. It involves competencies to select, use and maintain drawing equipment and materials. It also involves producing plain geometry drawings, solid geometry drawings, pictorial and orthographic drawings and application of Computer Aided Design (CAD) packages.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Use and maintain drawing equipment and materials	1.1 <b><i>Drawing equipment</i></b> are identified and gathered according to task requirements 1.2 <b><i>Drawing materials</i></b> are identified and gathered according to task requirements 1.3 Drawing equipment are used and maintained as per manufacturer's instructions 1.4 Drawing materials are used as per workplace procedures 1.5 Waste materials are disposed in accordance with workplace procedures and <b><i>environmental legislations</i></b> 1.6 <b><i>Personal Protective Equipment</i></b> is used according to occupational safety and health regulations
2. Produce plane geometry drawings	2.1 Different types of lines used in drawing and their meanings are identified according to standard drawing conventions 2.2 Different types of <b><i>geometric forms</i></b> are constructed

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicised terms are elaborated in the Range)</i>
	according to standard conventions 2.3 Different types of angles are constructed according to principles of trigonometry 2.4 Different types of angles are measured using appropriate measuring tools 2.6 Angles are bisected according to standard conventions 2.7 Freehand sketching of different types of geometric forms, tools, equipment, diagrams is conducted
3. Produce solid geometry drawings	3.1 Drawings of patterns are interpreted according to standard conventions 3.2 Patterns are developed in accordance with standard conventions
4. Produce orthographic and pictorial drawings	4.1 Symbols and abbreviations are identified and their meaning interpreted according to standard drawing conventions 4.2 First and third angle orthographic drawings are interpreted and produced in accordance with the standard conventions 4.3 Orthographic elevations are dimensioned in accordance with standard conventions 4.4 Isometric drawings are interpreted and produced in accordance with standard conventions
5. Apply CAD packages	5.1 CAD packages are selected according to task requirements 5.2 CAD packages are applied in production of electrical drawings

## **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Drawing equipment	Drawing boards, T and set squares, drawing sets, computers with CAD packages
2. Drawing materials	Drawing papers, pencils, erasers, masking tapes, paper clips
3. Environmental legislations	EMCA 1999
4. Personal Protective Equipment	Dust coats, closed leather shoes
5. Geometric forms	Circles, triangles, rectangles, parallelogram, polygons, pyramids, conic sections, prisms, loci
6. Standard conventions	<ul style="list-style-type: none"> <li>• Anatomy of engineering drawing (title block, coordinate grid system, revision block, notes and legends)</li> <li>• Drawing scale (paper size and drawing symbols)</li> <li>• International drawing standards</li> </ul>

## **REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

### **Required skills**

The individual needs to demonstrate the following skills:

- Critical thinking
- Drawing
- Interpretation
- Drawing equipment handling
- Analysis and synthesis
- Communication
- Inter personal

### **Required knowledge**

The individual needs to demonstrate knowledge of:

- Drawing equipment and materials
- Freehand sketching
- Lettering
- Geometrical constructions
- Types of drawings
- Types of lines
- Isometric drawing conventions, features, characteristics, components
- Orthographic drawing conventions, features, characteristics, components
- Sketches and drawings of simple patterns

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

<p>2. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <p>2.1 Applied and adhered to safety procedures</p> <p>2.2 Cared and maintained drawing equipment</p> <p>2.3 Interpreted circuit, assembly and lay out diagrams</p> <p>2.4 Applied appropriate technical standards, used proper tools and equipment for a given task</p> <p>2.5 Produced sketches and drawings</p> <p>2.6 Applied CAD packages in production of drawings</p>
<p>3. Resource Implications</p>	<p>Resources the same as that of workplace are advised to be applied.</p> <p>3.1 Drawing room</p> <p>3.2 Drawing equipment and materials</p> <p>3.3 Computers</p> <p>3.4 CAD packages</p>
<p>4. Methods of Assessment</p>	<p>Competency may be assessed through:</p> <p>4.1 Practical tests</p> <p>4.2 Observation</p>



5. Context of Assessment	Competency may be assessed individually in the actual workplace or a simulated work place setting
6. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# APPLY BUILDING MATERIALS SCIENCE

UNIT CODE: CON/OS/BUT/CC/03/6

## UNIT DESCRIPTION

This unit describes the competence in applying building materials science. It involves identifying essential construction materials, selecting quality construction materials, testing construction materials and demonstrating knowledge in use of construction materials.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ( <i>Bold and italicized terms are elaborated in the Range</i> )
1 Identify essential construction materials	1.1 Bills of quantities and working drawings are obtained and interpreted 1.2 Essential <b><i>construction materials</i></b> are identified based on construction requirements and project scope
2 Identify properties of construction materials	2.1 <b><i>Physical properties</i></b> of construction materials are identified based on the type of construction material and codes of practice 2.2 <b><i>Chemical properties</i></b> of construction materials are identified based on the type of construction material and codes of practice 2.3 <b><i>Mechanical properties</i></b> of construction materials are identified based on the type of construction material and codes of practice
3 Manufacture construction materials	3.1 Raw materials are identified based on construction materials to be produced 3.2 Construction materials are manufactured as per manufacturing procedures
4 Select quality construction materials	4.1 Cost implications of construction materials are evaluated and analyzed 4.2 Quality construction materials are selected based on their costs and project requirements
5 Use construction materials appropriately	5.1 Construction materials, tools and equipment are assembled based on construction methods 5.2 Construction materials are used based on construction process
6 Test	6.1 Construction materials are sampled randomly as per SOPs

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
construction materials	6.2 <b><i>Test parameters</i></b> are identified as per the construction requirements and engineer's instructions 6.3 Construction materials are tested as per the SOPs
7 Handle construction materials safely	7.1 Construction materials to be handled are identified 7.2 Safety requirements are identified based on the construction materials 7.3 Construction materials are handled safely based on the safety requirements

### **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Construction materials	1.1 stones 1.2 bricks 1.3 clay and clay products 1.4 lime 1.5 cement 1.6 timber and timber products 1.7 metals and alloys 1.8 paints and varnishes 1.9 roofing materials
2. physical properties	2.1 porosity 2.2 surface texture 2.3 strength 2.4 density 2.5 thermal conductivity 2.6 wear and tear
3. chemical properties	3.1 corrosion resistance 3.2 chemical resistance
4. Mechanical properties	4.1 Toughness 4.2 Hardness 4.3 Fatigue 4.4 Stress and strain 4.5 Creep and stress rapture
5. Test parameters	5.1 Compression 5.2 Weathering 5.3 Durability 5.4 Water absorption

	5.5 Impurity tests 5.6 Tensile tests
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### REQUIRED KNOWLEDGE

- Applied science
- Construction materials
- Materials testing
- Quality assurance
- Management of material resources
- Engineering mathematics
- Bills of quantities
- Materials handling safety procedures

### SKILLS

- Analytical
- Quality control analysis
- Complex problem solving
- Critical thinking
- Engineering drawings interpretation
- Monitoring
- Numeracy

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified essential construction materials 1.2 Selected quality construction materials 1.3 Tested construction materials 1.4 Manufactured construction materials 1.5 Identified properties of construction materials 1.6 Appropriately used construction materials 1.7 Handled construction materials safely
2. Resource Implications	The following resources should be provided: 2.1 Samples of construction materials 2.2 Material Testing Laboratories 2.3 Safety equipment 2.4 Computers 2.5 Calculators 2.6 Materials testing tools and equipment

3. Methods of Assessment	Competency may be assessed through: 3.1 Written text 3.2 Interview 3.3 Observation
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# APPLY WORKSHOP TECHNOLOGY PRACTICES

UNIT CODE: CON/OS/BUT/CC/04/6

## UNIT DESCRIPTION

This unit describes the competence in applying workshop technology practices. It entails performing masonry, plumbing and carpentry tasks. It also involves performing electrical and mechanical operations.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ( <i>Bold and italicized terms are elaborated in the Range</i> )
1 Perform masonry tasks	1.1 Safety requirements in the workshop environment are identified 1.2 <b>Masonry hand tools</b> are used appropriately to perform tasks in masonry workshop 1.3 <b>Masonry machine tools</b> are used appropriately to perform tasks in masonry workshop 1.4 Masonry tools used in construction works are maintained as per manufacturer's specifications
2 Perform plumbing tasks	2.1 Safety requirements in the workshop environment are identified 2.2 <b>Plumbing hand tools</b> are used appropriately to perform tasks in plumbing workshop 2.3 <b>Plumbing machine tools</b> are used appropriately to perform tasks in plumbing workshop 2.4 Plumbing tools used in construction works are maintained as per manufacturer's specifications
3 Perform carpentry tasks	3.1 Safety requirements in the workshop environment are identified 3.2 <b>Carpentry hand tools</b> are used appropriately to perform tasks in carpentry workshop 3.3 <b>Carpentry machine tools</b> are used appropriately to perform tasks in carpentry workshop 3.4 Carpentry tools used in construction works are maintained as per manufacturer's specifications
4 Perform electrical operations	4.1 Safety requirements in the workshop environment are identified as per SOPs 4.2 <b>Conventional tools</b> used in electrical workshop are identified

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
	<p>as per SOPs</p> <p>4.3 Power supply sources are identified as per SOPs</p> <p>4.4 Basic electrical circuits are installed and maintained as per IEE regulations</p>
5 Perform mechanical operations	<p>5.1 Safety requirements in the workshop environment are identified as per SOPs</p> <p>5.2 <b><i>Mechanical hand tools</i></b> are used appropriately to perform tasks in mechanical workshop</p> <p>5.3 Diesel and petrol engine components are identified based on their functions and engine system</p> <p>5.4 Diesel and petrol engines are operated based on manufacturer's manual</p> <p>5.5 Simple engine maintenance is performed as per manufacturer's specifications</p> <p>5.6 <b><i>Water pumps</i></b> are identified based on working principle</p> <p>5.7 Basic maintenance is performed on water pumps as per SOPs</p>

### **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Masonry hand tools	<p>1.1 Masons trowel</p> <p>1.2 Wood float</p> <p>1.3 Cold chisels</p> <p>1.4 Masons square</p> <p>1.5 Spade</p> <p>1.6 Shovel</p> <p>1.7 Plumb bob</p>
2. Masonry machine tools	<p>2.1 Concrete mixer</p> <p>2.2 Block cutter</p> <p>2.3 Vibrator</p> <p>2.4 Pneumatic hammer</p> <p>2.5 compactors</p>
3. Plumbing hand tools	<p>3.1 Bench shears</p> <p>3.2 Anvil</p> <p>3.3 Pipe wrench</p> <p>3.4 Pliers</p>
4. Plumbing machine tools	<p>4.1 Bending machine</p> <p>4.2 Welding</p>

	<p>4.3 Sheet metal holding machine</p> <p>4.4 Portable power drill</p> <p>4.5 Hand grinder</p>
5. Carpentry hand tools	<p>5.1 Saws</p> <p>5.2 Planes</p> <p>5.3 Hammer</p> <p>5.4 Carpenter square</p> <p>5.5 Marking gauges</p> <p>5.6 Hand drill</p> <p>5.7 Screw drivers</p>
6. Carpentry machine tools	<p>6.1 circular saw</p> <p>6.2 Thicknesser</p> <p>6.3 Portable sander</p> <p>6.4 Close cut saw</p> <p>6.5 Portable drill machine</p>
7. Conventional tools	<p>7.1 phase tester</p> <p>7.2 screw driver</p> <p>7.3 pliers</p> <p>7.4 long nose</p> <p>7.5 side cutter</p> <p>7.6 draw in wire</p> <p>7.7 electrical knife</p> <p>7.8 electrical hammer</p>
8. Mechanical hand tools	<p>8.1 Arc welding shields</p> <p>8.2 Leather gloves</p> <p>8.3 Chipping hammers</p> <p>8.4 Welding goggles</p> <p>8.5 Tongs</p> <p>8.6 Hand vices</p> <p>8.7 Mole punch</p> <p>8.8 Pliers</p> <p>8.9 Vernier callipers</p> <p>8.10 Scribes</p> <p>8.11 Hacksaw</p> <p>8.12 Tinsnips</p> <p>8.13 Pullers</p>
9. Water pumps	<p>9.1 Centrifugal</p> <p>9.2 Submersible</p> <p>9.3 Reciprocating pump</p> <p>9.4 Hand pumps</p>



## REQUIRED KNOWLEDGE

- Tools and equipment
- Safety regulations
- Mathematics
- Electrical installation
- Power supply
- Engine operations
- Plumbing
- Water pump operation
- Masonry
- Mortar mixing
- Carpentry and joinery
- Firefighting
- Circuit interpretation

## SKILLS

- Analytical
- Critical thinking
- Problem solving
- Firefighting
- Quality control
- Circuit interpretation

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified safety requirements in the workshop environment 1.2 Performed masonry tasks 1.3 Performed plumbing tasks 1.4 Performed carpentry tasks 1.5 Identified power supply sources 1.6 Installed basic electrical circuits 1.7 Identified diesel and petrol engine components 1.8 Operated diesel and petrol engines 1.9 Identified water pumps 1.10 Demonstrated knowledge on maintenance of water pumps and engines 1.11 Appropriately used workshop tools
2. Resource	The following resources should be provided:

Implications	<p>2.1 Working tools and equipment</p> <p>2.2 Diesel and petrol engines</p> <p>2.3 Water pumps</p> <p>2.4 Electrical appliances</p> <p>2.5 Training Workshops</p> <p>2.6 Plumbing materials</p> <p>2.7 Masonry materials</p> <p>2.8 Carpentry materials</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <p>3.1 Written text</p> <p>3.2 Interview</p> <p>3.3 Observation</p>
4. Context of Assessment	<p>Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

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# EXECUTE BUILDING TEMPORARY WORKS

UNIT CODE: CON/OS/BUT/CC/05/6

## UNIT DESCRIPTION

This Unit describes the competencies required to perform building temporary works. It involves erecting and dismantling building scaffolds and building shores, constructing and dismantling building formwork/shuttering and trench timbering.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ( <i>Bold and italicized terms are elaborated in the Range</i> )
1. Construct and dismantle trench timbering	1.1 <b>Trench timbering materials and tools</b> are determined according to the construction rules and regulations 1.2 Personal protective equipment is selected, fitted and used according to safety rules and regulations 1.3 Trench timbering is constructed as per <b>soil type</b> and site topography 1.4 Trench timbering is dismantled according to site procedures and critical structural safety requirements
2. Construct and dismantle building formwork/shuttering	2.1 <b>Formwork material</b> is identified as per structure complexity, job drawings or supervisor instructions 2.2 Formwork dimensions are determined as per the structural elements to be supported 2.3 Personal protective equipment is selected, fitted and used according to safety rules and regulations 2.4 <b>Formwork type</b> is erected according to the structural element to be cast 2.5 Oiling of timber formwork surface is carried out for easy dismantling after concrete setting 2.6 Formwork is fixed into position in accordance with the construction rules and regulations 2.7 Formwork is dismantled according to site procedures and critical structural safety requirements

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
3. Erect and dismantle building scaffold	3.1 <b>Scaffold system</b> is determined as per complexity of the building, engineering design, job drawings or supervisor instructions 3.2 <b>Personal protective equipment</b> is selected, fitted and used according to safety rules and regulations and job specifications 3.3 Scaffolds are erected to plan according to safe work practices and engineers' specifications 3.4 Scaffolds are dismantled according to engineers' specifications, site procedures and critical structural safety requirements 3.5 Site cleaned and cleared of all tools, excess material and waste
4. Erect and dismantle building shores	4.1 <b>Type of shore</b> is selected according to the nature of the work 4.2 <b>Shoring materials</b> are selected according to the construction rules and regulations 4.3 Personal protective equipment is selected, fitted and used according to safety rules and regulations 4.4 Shoring is erected as per site conditions and building construction rules and regulations 4.5 Shoring is dismantled according to site procedures and critical structural safety requirements

### **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Scaffold system	1.1 Quick stage 1.2 Cup lock
2. Personal protective equipment	2.1 Helmets 2.2 Safety boots 2.3 Gloves 2.4 Overall 2.5 Reflectors
3. Formwork material	3.1 Timber 3.2 Metal plates

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
	3.3 Plastic
4. Formwork type	4.1 column formwork 4.2 beam formwork 4.3 Slab formwork 4.4 staircase formwork
5. Trench timbering materials and tools	5.1 Timber 5.2 Hammer 5.3 Metal plates 5.4 Pliers 5.5 Nails 5.6 binding wires
6. Soil type	6.1 unconsolidated soils 6.2 consolidated soils
7. Type of shore	7.1 Raking/Inclined shore 7.2 Flying/horizontal shore 7.3 Dead/vertical shore
8. Shoring materials	8.1 timber 8.2 steel tubes

## **REQUIRED KNOWLEDGE AND SKILLS**

### **Knowledge**

- Measurement
- Formwork
- Scaffolding
- Soil properties
- Wall construction
- Trench excavation
- Basic arithmetic
- Technical drawings
- Design forces
- Timber properties

### **Skills**

- Measurement skills
- Basic mathematic skills
- Reading skills
- Communication skills

- Management skills
- Design skills
- Problem solving skills
- Critical thinking
- Construction tools handling skills
- Technical drawing skills

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Erected and dismantled building scaffolds 1.2. Constructed and dismantled building formwork/shuttering 1.3. Constructed and dismantled trench timbering 1.4. Erected and dismantled building shores 1.5. Observed occupational health and safety procedures to create a safe working environment
2. Resource Implications	The following resources should be provided: 2.1 Training workshops 2.2 Construction tools and equipment 2.3 Occupational Safety and health manuals 2.4 Construction manuals 2.5 Reference textbooks 2.6 Qualified trainers 2.7 Personal protective equipment
3. Methods of Assessment	Competency may be assessed through: 3.1. Practical assignment 3.2. Written 3.3. Oral interview 3.4. Demonstrations
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

## **CORE COMPETENCIES**

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# PRODUCE BUILDING DRAWINGS

**UNIT CODE :** CON/OS/BUT/CR/01/6

## UNIT DESCRIPTION

This unit describes the competence required to produce building drawings. It involves designing architectural drawings and plumbing layouts, preparing structural, electrical and mechanical drawings.

## ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements <i>(Bold terms are elaborated in the Range)</i>
1. Design/prepare architectural drawings	1.1. <b>Construction dimensions</b> are identified according to the size of the proposed site, construction regulations, planning requirements and client specifications 1.2. Proposed project plan is sketched according to the construction dimensions 1.3. Architectural drawings are produced in accordance with the architectural code of design, <b>building code</b> , local authority by laws, regulatory requirements and client specification
2. Prepare structural and civil drawings	2.1. <b>Structural elements</b> are designed according to the codes of practice 2.2. Detailed plans and sections of designed elements are drawn as per dimensions and relevant standards 2.3. Bar bending schedule is prepared as per the code of practice
3. Prepare electrical drawings	3.1. Electrical circuits drawings are sketched in accordance with the electrical code of practice and the architectural layout 3.2. Electrical connection layout is drawn in accordance with the electrical code of practice
4. Prepare plumbing layout	4.1. Building dimensions are identified as per the architectural drawings, structural and electrical drawings 4.2. Pipe sizes are determined as per <b>consumption</b>



<b>ELEMENTS</b>	<b>PERFORMANCE CRITERIA</b>
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements <i>(Bold terms are elaborated in the Range)</i>
	<b>requirements</b> and design requirements 4.3. <b>Pipe types</b> are determined according to the design requirements 4.4. <b>Pipe fittings</b> are determined according to the mode of connection or the pipe layout plan 4.5. Pipe layout plan is drawn as per the building design
5. Prepare mechanical drawings	5.1. Mechanical component dimensions are obtained as per structural and architectural drawings 5.2. <b>Mechanical components</b> are sketched as per architectural and structural drawings 5.3. Mechanical designs are drawn as per specifications

### RANGE

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Construction dimensions	1.1 vertical dimensions 1.2 horizontal dimensions
2. building codes	2.1 BS 8110 2.2 Eurocodes 2.3 Kenya Building Codes, 1968 2.4 Civil engineering codes
3. structural elements	3.1 Slabs 3.2 Beams 3.3 Columns 3.4 Foundation 3.5 Stairs
4. Consumption requirements	4.1 Residential 4.2 Commercial 4.3 Institution 4.4 Hospitals
5. Pipe types	5.1 PVC 5.2 GI pipes 5.3 Mild steel 5.4 PPR
6. Pipe fittings	6.1 Union

Variable	Range <i>May include but is not limited to:</i>
	6.2 Bends 6.3 Sanitary fittings
7. Mechanical components	7.1 Gas supply 7.2 Cold and hot water supply systems 7.3 Plumbing layout 7.4 Sewer system 7.5 Firefighting 7.6 Ventilation system 7.7 Water treatment system 7.8 Refrigeration 7.9 Building automation system

## REQUIRED KNOWLEDGE AND SKILLS

### Knowledge

- Construction dimensions
- Architectural drawing
- Local authority by-laws
- Building code
- Structural elements
- Codes of practice
- Basic arithmetic
- Measurement
- Engineering drawing
- Plumbing
- Structural design
- Mechanical systems
- Engineering software
- Civil engineering drawings

### Skills

- Measurement
- Basic arithmetic
- Design
- Computer
- Computer aided design
- planning

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Designed architectural drawings 1.2 Prepared structural drawings 1.3 Prepared civil engineering drawings 1.4 Prepared electrical drawings 1.5 Designed plumbing layout 1.6 Interpreted architectural and structural drawings 1.7 Identified mechanical service requirements 1.8 Sketched mechanical drawings 1.9 Prepared sections, layout, elevations and as fixed drawings of mechanical items
2. Resource Implications	2.1 Measuring and drawing tools 2.2 Laptops 2.3 Desktop PCs 2.4 Printer/plotting device 2.5 Calculator 2.6 Internet 2.7 Codes of practice 2.8 Mechanical conventions
3. Methods of Assessment	Competency may be assessed through: 3.1 Demonstration 3.2 Practical assignment/project 3.3 Interview/Oral Questioning 3.4 Written
4. Context of Assessment	Competency may be assessed in an off and/or on the job setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the building sector workplace and job role is recommended.

# EXECUTE SITE PRELIMINARY WORKS

**UNIT CODE:** CON/OS/BUT/CR/02/6

## UNIT DESCRIPTION

This Unit describes the competencies required to perform site preliminary works. It involves determining site boundaries, clearing building site, hoarding/screening the site, surveying the building site, preparing site layout, testing building materials, demolishing unwanted structures and preparing site preliminary report.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Determine site boundary and clear building site	1.1 Site boundary is identified as per local authority land survey maps 1.2 <b><i>Clearing method</i></b> is selected depending on <b><i>site conditions</i></b> 1.3 Safety requirements are identified according to clearing methods and site conditions 1.4 Site is cleared as per set procedures and safety regulations 1.5 Debris disposal is carried out as per supervisor's instructions
2. Hoard/screen building site	2.1 Hoarding/screening materials are identified 2.2 Building site is screened/hoarded as per client specifications and safety regulations
3. Survey building site	3.1 <b><i>Survey method</i></b> is selected according to the building design and client specifications 3.2 <b><i>Survey instruments</i></b> are identified according to the survey method 3.3 Reduced levels are obtained as per the site conditions 3.4 Ground contours are prepared according to the reduced levels 3.5 <b><i>Services</i></b> are located in relation to the site in accordance with set procedures
4. Prepare site layout	4.1 Site dimensions are measured according to architectural drawings 4.2 <b><i>Site facilities</i></b> location are identified as per site plan

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
	4.3 Site layout is prepared as per the site plan
5. Demolish unwanted structures	5.1 Area to be demolished is identified as per client needs 5.2 Demolition method is determined according to area to be demolished and environmental conditions 5.3 Local authorities and surrounding occupants are informed of the demolition work 5.4 <b><i>Building and structural surveys</i></b> are carried out in accordance with building standards 5.5 Hazardous materials are removed according to safety regulations 5.6 Demolition plan is prepared according to the demolition method adopted 5.7 Safety procedures are adopted as per the demolition method 5.8 Unwanted structures are demolished and disposed as per set procedures
6. Prepare site preliminary report	6.1 Cost of preliminary site activities are analysed 6.2 Data on challenges and achievements are recorded and documented 6.3 Site preliminary report is prepared

## **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Clearing method	1.1 Manual 1.2 Mechanical 1.3 Explosives and detonators
2. Site conditions	2.1 Shrubs 2.2 rock outcrops 2.3 Forests/thickets 2.4 Marshy/wetlands
3. Survey method	3.1 chain survey 3.2 Tacheometry
4. Survey instruments	4.1 Dumpy level 4.2 Theodolite

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
	4.3 levelling staff 4.4 Ranging rod 4.5 Tripod stand 4.6 total station 4.7 GPS 4.8 Digital survey equipment
5. Services	5.1 water 5.2 power 5.3 sewer
6. Sampling methods	6.1 Random sampling 6.2 Stratified sampling 6.3 Cluster sampling
7. Site facilities	7.1 Site office 7.2 Welfare facilities 7.3 Storage facilities 7.4 Garage/filling station
8. Building and structural surveys	8.1 type of construction 8.2 building use 8.3 Construction method 8.4 Drainage conditions 8.5 Building accessibility

## **REQUIRED KNOWLEDGE AND SKILLS**

### **Knowledge**

- Estimation and costing
- Survey
- Report writing
- Sampling methods
- Basic arithmetic
- Plan interpretation
- Occupational safety and health
- Codes of practice
- Materials science
- Concrete mix ratio
- Construction machines, tools and equipment
- Demolition techniques
- Geology

- National laws

### Skills

- Estimation and costing
- Basic mathematic skills
- Reading skills
- Communication skills
- Management skills
- Problem solving skills
- Critical thinking
- Construction tools handling skills

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Determined the site boundary and screened the building site 1.2. Cleared the building site 1.3. Surveyed the building site 1.4. Prepared site layout 1.5. Demolished unwanted structures 1.6. Prepared site preliminary report
2. Resource Implications	The following resources should be provided: 2.1 Training workshops 2.2 Construction tools and equipment 2.3 Occupational Safety and health manuals 2.4 Construction manuals 2.5 Construction materials 2.6 Reference textbooks 2.7 Qualified trainers 2.8 Survey instruments
3. Methods of Assessment	Competency may be assessed through: 3.1. Practical assignment 3.2. Written 3.3. Oral interview 3.4. Demonstrations

4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# PRODUCE MASONRY UNITS

UNIT CODE: CON/OS/BUT/CR/03/6

## UNIT DESCRIPTION

This unit describes the competences required to manufacture masonry units. It involves producing masonry bricks, preparing concrete and clay products and dressing building stones

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Produce masonry bricks	1.1. Bricks moulds are prepared as per client specification 1.2. Brick earth /clay is prepared as per <b>building code</b> 1.3. Bricks are moulded depending on the <b>prescribed size</b> and customer specifications. 1.4. Bricks are dried as per the building codes 1.5. Bricks are baked/fired as per <b>baking procedures</b>
2. Prepare concrete products	2.1 Concrete moulds are prepared as per the customer specifications. 2.2 <b>concrete constituents</b> are gathered as per concrete mix design 2.3 Concrete constituent are batched as per <b>batching methods</b> 2.4 Concrete ingredients are mixed as per ASTM standards 2.5 Concrete mix is placed in moulds as per placing convections 2.6 Concrete is cured as per laid down procedures 2.7 Moulds are dismantled and stored as per laid down procedures.
3. Dress building stones	3.1 Building stones are acquired as per prescribed size and quality. 3.2 Stones surfaces are dressed as per the <b>method</b> and <b>type of dressing</b> .
4. Prepare clay products	4.1 <b>Clay products</b> are produced as per manufactures guidelines/specification. 4.2 Clay products are tested as per manufactures standards. 4.3 Clay products are packaged according to type, size, shape, quantity and environmental requirements.

## RANGE

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Building code	1.1 BS 8110
2. Prescribed size	225x102.5x65mm
3. Baking procedure	3.1 Dehydration 3.2 oxidation 3.3 Vitrification 3.4 Burning 3.5 Cooling
4. Concrete constituents	4.1 Fine Aggregates 4.2 Coarse Aggregates 4.3 Cement 4.4 Water 4.5 Admixtures
5. batching methods	5.1 batching by weight 5.2 batching by volume
6. Method of stone dressing	6.1 Manual dressing 6.2 Mechanical dressing
7. Type of stone finish	7.1 Combed finish 7.2 Punched finish 7.3 Tooled finish 7.4 Bush finish
8. Clay products	8.1 Tiles 8.2 Bricks 8.3 Cills 8.4 Ventilators

## REQUIRED KNOWLEDGE

- Concrete and mortar mix ratios
- Soil testing
- Curing
- strength of materials
- use of building tools and equipment
- concrete aggregate
- Basic arithmetics
- Batching
- packaging

## SKILLS

- moulding
- concrete mixer operation
- dressing
- Batching
- Measuring
- Modelling

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared brick moulds. 1.2 Moulded bricks 1.3 Dried bricks 1.4 Burned bricks 1.5 Prepared concrete moulds 1.6 Mixed concrete constituents 1.7 Placed concrete mix 1.8 Cured concrete 1.9 Dismantled and stored concrete moulds 1.10 Dressed stones 1.11 Prepared clay 1.12 Produced clay products 1.13 Packaged clay products
2. Resource Implications	2.1 ASTM document 2.2 Desktop PCs 2.3 Printer/plotting device 2.4 Calculator 2.5 Calibration tools 2.6 Internet 2.7 Operations Manuals 2.8 Concrete and clay moulds 2.9 Water 2.10 Stone blocks 2.11 Wheel barrows 2.12 Building tools and equipment

	2.13 Qualified trainers
3. Methods of Assessment	Competency may be assessed through: 5.1 Written Test 5.2 Demonstration 5.3 Practical assignment 5.4 Interview/Oral Questioning
6. Context of Assessment	Competency may be assessed in an off and on the job setting
7. Guidance information for assessment	Holistic assessment with other units relevant to the building sector, workplace and job role is recommended.

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# MANAGE CONSTRUCTION MATERIALS, PLANT, TOOLS AND EQUIPMENT

**UNIT CODE:** CON/OS/BUT/CR/04/6

## UNIT DESCRIPTION

This unit describes the competence in Managing Construction Materials, Tools and Equipment. It involves preparation of site facility for storage, building material and equipment scheduling, ordering and receiving materials and equipment and preparing periodic construction material and equipment report.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Prepare site facility for storage	1.1 Building materials, tools, plant and equipment are assembled as per facility specifications. 1.2 Facility site is cleared and levelled 1.3 Storage facility is erected as per working drawing
2. Prepare building material schedule	2.1 <b><i>Types of materials</i></b> to be used are identified and listed. 2.2 Building materials are quantified and recorded on a standard schedule 2.3 Quoted rates are included in the material schedule
3. Prepare building equipment schedule	3.1 <b><i>Types of equipment</i></b> to be used are identified and listed. 3.2 Building equipment are numbered and recorded on a standard schedule. 3.3 Quoted rates are included in the equipment schedule
4. Procure building materials and equipment	4.1 List of materials and equipment scheduled are verified. 4.2 Best suppliers are identified as per their price lists and catalogues. 4.3 Building materials and equipment are ordered. 4.4 Supplied building materials and equipment are verified. 4.5 Building materials and equipment are received. 4.6 Received building materials are recorded and stored.
5. Issue building materials and equipment	5.1 Site material and equipment requirement list is obtained 5.2 Required materials and equipment are issued. 5.3 Issued materials and equipment are recorded

## RANGE

Variable	Range
	<i>May include but is not limited to:</i>
6. <i>Types of materials</i>	1.1. Roofing 1.2. Walling 1.3. Flooring 1.4. Finishing 1.5. Reinforcing
7. <i>Types of equipment</i>	2.1 Excavation 2.2 Lifting 2.3 Transporting

## REQUIRED KNOWLEDGE

- Record Keeping
- Construction Material
- Building Tools And Equipment
- Site Management
- Safety rules and precautions
- Bills of quantities
- Concrete mixing
- Batching
- Compacting concrete

## SKILLS

- Record Keeping
- Management
- Use of tools and equipments
- Safety
- Procurement
- Concrete mixing
- Batching
- Compacting concrete

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

6. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared building site facility 1.2. Prepared building material and equipment schedule 1.3. Ordered building materials and equipment. 1.4. Received building materials and equipment. 1.5. Record and store received materials and equipment 1.6. Issued building materials and equipment.
7. Resource Implications	The following resources should be provided: 7.1 Stationery 7.2 Computers 7.3 Calculators 7.4 Printers 7.5 Telephone 7.6 Price list and catalogue
8. Methods of Assessment	Competency may be assessed through: 3.4 Written text 3.5 Interview 3.6 Observation
9. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
10. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

# EXECUTE SUBSTRUCTURE WORKS

UNIT CODE: CON/OS/BUT/CR/05/6

## UNIT DESCRIPTION

This unit describes the competences required to perform substructure works. It involves setting out the building, excavating foundation, laying building foundation, erecting foundation, constructing solid ground floor and finishing substructure works.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENTS	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Set out the building	1.1 Building drawings are interpreted as per <b><i>working drawings</i></b> 1.2 Grounds measurement are taken as per the working drawings 1.3 Position of walls and columns are marked as per foundation plan 1.4 Profile boards are erected and marked as per the plan 1.5 Accuracy of setting out is determined as per architectural and structural details
2. Excavate building foundation	2.1 Foundation is excavated as per working drawings 2.2 Foundation timbering is done as per soil analysis report 2.3 Dewatering is carried out as per <b><i>dewatering method</i></b>
3. Lay building foundation	3.1 Foundations levels are taken according to <b><i>type of foundation</i></b> and structural specifications 3.2 Foundation blinding is laid according to building specifications 3.3 Foundation formwork is erected as per specifications 3.4 Foundation reinforcement is positioned as per the structural details 3.5 Concreting is carried out according to design requirements
4. Erect foundation walls	4.1 Foundation wall is set out as per working drawing 4.2 Foundation walling is constructed as per structural specifications
5. Construct solid ground floor	5.1 Floor base is levelled and compacted according to building code requirement 5.2 Hard-core layer is laid and compacted as per specifications and building code 5.3 Blinding layer is laid and compacted as per building code



	<p>5.4 Anti- termite is sprayed as per building code and manufacturers specifications</p> <p>5.5 DPM is laid as per building code</p> <p>5.6 BRC is laid as per building code</p> <p>5.7 Spacer blocks are positioned as per specifications</p> <p>5.8 Formwork to edges of slab is erected</p> <p>5.9 Concrete is placed according to building code</p>
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## RANGE

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
<b>1. Dewatering method</b>	<p>1.1 Sump</p> <p>1.2 Electrol osmosis</p> <p>1.3 Freezing</p> <p>1.4 Furrow</p> <p>1.5 Pumping out</p>
<b>2. Type of foundation</b>	<p>2.1 Strip</p> <p>2.2 Pile</p> <p>2.3 Pad</p> <p>2.4 Raft</p> <p>2.5 Piers</p>
<b>3. Working drawings</b>	<p>3.1 Architectural</p> <p>3.2 Structural</p> <p>3.3 Plumbing</p> <p>3.4 Mechanical</p> <p>3.5 Electrical</p> <p>3.6 Services</p> <p>3.7 Civil engineering drawings</p>
<b>4. Building code</b>	<p>4.1 BS 8110</p> <p>4.2 BS 449</p>

## REQUIRED KNOWLEDGE

- Surveying/levelling
- Basic arithmetic
- Masonry
- Concrete technology
- Structural reinforcement
- Methods of setting out
- Types of foundations

- Scheduling
- Concreting
- Bar bending and fixing

### SKILLS

- Levelling
- Concrete and Mortar mixing
- Wall construction
- Measuring
- Bar bending and fixing
- Computation
- Concreting

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Interpreted building drawings</li> <li>1.2 Recorded ground measurements</li> <li>1.3 Set building</li> <li>1.4 Excavated foundation trenches</li> <li>1.5 Timbered foundation trenches</li> <li>1.6 Dewatered foundation trenches</li> <li>1.7 Prepared bar bending schedule</li> <li>1.8 Positioned foundation reinforcement</li> <li>1.9 Placed foundation concrete</li> <li>1.10 Constructed foundation wall</li> <li>1.11 Constructed solid ground floor</li> <li>1.12 Finished substructure works</li> </ul>
<p>2. Resource Implications</p>	<ul style="list-style-type: none"> <li>2.1 Measuring tools</li> <li>2.2 Working drawing</li> <li>2.3 Laptops</li> <li>2.4 Desktop PCs</li> <li>2.5 Printer/plotting device</li> <li>2.6 Calculator</li> <li>2.7 Surveying tools</li> <li>2.8 Internet</li> <li>2.9 Masonry tools and equipment</li> <li>2.10 Timber/steel boards and nails</li> <li>2.11 Concrete constituents</li> </ul>

	2.12 Stationery
3. Methods of Assessment	Competency may be accessed through: 3.1 Written TEXT 3.2 Practical assignment 3.3 Interview/Oral Questioning
4. Context of Assessment	Competency may be assessed in an off and on the job setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the building sector, workplace and job role is recommended.

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## EXECUTE SUPERSTRUCTURE WORKS

**UNIT CODE:** CON/OS/BUT/CR/06/6

### UNIT DESCRIPTION

This Unit describes the competencies required to perform superstructure works. It involves setting out and erecting superstructure walls, constructing superstructure columns, stairs, beams and upper floors, erecting building roof, constructing fire place and installing fixtures and fittings.

### ELEMENTS AND PERFORMANCE CRITERIA

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Set out and construct superstructure columns	1.1 Kickers are positioned and cast as per specifications 1.2 Reinforcement bars are positioned as per structural design drawings 1.3 Column formwork is erected and aligned as per construction regulations 1.4 Concrete is mixed as per design requirements 1.5 Concrete is cast and compacted into forms as per construction regulations
2. Set out and erect superstructure walling	2.1 Wall dimensions and door openings are marked on the solid ground floor according to the design details 2.2 Building wall mortar is prepared as per building codes of practice 2.3 Wall screeding is laid in accordance with the plan layout and construction methods 2.4 Damp proof course is laid as per specifications 2.5 Building wall courses are laid according to prescribed <b>bonding methods</b> , building regulations and design details 2.6 Window and ventilator openings are determined as per the design details 2.7 Wall openings are bridged according to building codes and client specification
3. Set and construct	3.1 Beam, stairs and upper floor formwork is

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> ( <i>Bold and italicized terms are elaborated in the Range</i> )
1. Set out and construct superstructure columns	1.1 Kickers are positioned and cast as per specifications 1.2 Reinforcement bars are positioned as per structural design drawings 1.3 Column formwork is erected and aligned as per construction regulations 1.4 Concrete is mixed as per design requirements 1.5 Concrete is cast and compacted into forms as per construction regulations
superstructure beams, stairs and upper floors	constructed as per construction regulations and design dimensions 3.2 Props are erected in accordance to construction regulations 3.3 Reinforcement bars are positioned as per structural design drawings 3.4 <b>Concrete materials</b> are mixed as per design ratio requirements 3.5 Mixed concrete is placed and compacted as per construction regulations
4. Set and erect building roof	4.1 <b>Type of roof</b> is identified as per building design 4.2 <b>Roofing materials</b> are determined according to the building design 4.3 <b>Roof truss</b> is constructed according to the building design 4.4 Roof cover is laid according to construction regulations
5. Construct fire place	5.1 Fireplace foundation is constructed as per construction methods 5.2 Brickwork to ground floor level is built up according to building regulations 5.3 <b>Fireplace elements</b> are constructed according to the <b>ground floor type</b> and construction regulations 5.4 Fireplace is lined with fireback as per building regulations 5.5 Metal baskets are installed as per construction requirements

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Set out and construct superstructure columns	1.1 Kickers are positioned and cast as per specifications 1.2 Reinforcement bars are positioned as per structural design drawings 1.3 Column formwork is erected and aligned as per construction regulations 1.4 Concrete is mixed as per design requirements 1.5 Concrete is cast and compacted into forms as per construction regulations
6. Install fixtures and fittings	6.1 <b><i>Fixtures</i></b> are selected and installed according to the design specifications 6.2 <b><i>Fittings</i></b> are selected and installed according to the design specifications

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## RANGE

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Bonding methods	1.1 Stretcher bond 1.2 English bond 1.3 Flemish bond 1.4 Header bond
2. Concrete materials	2.1 Cement 2.2 Sand 2.3 Ballast 2.4 Admixtures and additives
3. Type of roof	3.1 Flat 3.2 Pitched
4. Roofing materials	4.1 Tiles 4.2 Iron sheets 4.3 Concrete 4.4 Wood shingles/shakes 4.5 any other approved covering materials
5. Roof truss	5.1 Timber truss 5.2 Steel truss
6. Fireplace elements	6.1 5.1 Jamb 6.2 Lintels 6.3 Rendering 6.4 Hearth 6.5 Throat
7. Ground floor type	7.1 6.1 Concrete floor 7.2 Timber floor 7.3 Glass floor
8. Fixtures	8.1 7.1 electric sockets 8.2 light fixtures 8.3 plumbing installations 8.4 Security and fire alarm systems
9. Fittings	9.1 Furniture 9.2 hand driers 9.3 soap dispensers 9.4 towel hangers 9.5 cabinets

## **REQUIRED KNOWLEDGE AND SKILLS**

### **Knowledge**

- Measurement
- Formwork
- Scaffolding
- Wall construction
- Basic arithmetic
- Technical drawings
- Structural design
- Timber properties
- Steel properties
- Plan interpretation
- Occupational safety and health
- Codes of practice
- Roofing materials
- Types of roofs
- Materials science
- Concrete mix ratio
- Construction machines, tools and equipment
- Types of bonds
- Carpentry and joinery
- Waterproofing
- Types of fireplace
- Admixtures and additives
- Fixtures and fittings

### **Skills**

- Estimating and costing
- Measurement
- Basic mathematic
- Communication
- Management
- Design
- Problem solving
- Critical thinking
- Construction tools handling
- Technical drawing



- Bonding
- Bar bending
- Interpreting
- Cutting and fixing

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Set out and erected superstructure walls 1.2. Constructed columns, beams, stairs and upper floors 1.3. Erected building roof 1.4. Constructed fire place 1.5. Installed fixtures and fittings
2. Resource Implications	The following resources should be provided: 2.1 Training/assessment workshops 2.2 Construction tools and equipment 2.3 Occupational Safety and health manuals 2.4 Construction manuals 2.5 Construction materials 2.6 Qualified trainers
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical assignment 3.2 Written 3.3 Oral interview
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

# EXECUTE BUILDING FINISHES

UNIT CODE: CON/OS/BUT/CR/07/6

## UNIT DESCRIPTION

This unit describes the competences required to perform building finishes. It entails plastering building walls (internal and external) applying floor finishes, painting building surfaces, applying building facings, wall mastering, lining wall surfaces, carrying out pointing and jointing, cladding building walls and performing rough cast.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ( <i>Bold and italicized terms are elaborated in the Range</i> )
1. Apply floor finishes	1.1 Finishing materials are selected as per client specifications and building code. 1.2 Finishing tools and equipment are assembled 1.3 Floor backgrounds are prepared to receive <b><i>floor finish</i></b> . 1.4 Floor finish is applied as per client specification and building code
2. Paint Building Surfaces	2.1 Painting materials are selected as per client specification. 2.2 Painting tools and equipment are assembled as per <b><i>painting method</i></b> . 2.3 Painting surface is prepared as per the building code 2.4 Paint is mixed as per client specification and producer specification. 2.5 Paint is applied as per the painting procedure. 2.6 Painted surfaces are protected.
3. Apply building facings	3.1 <b><i>Facing materials</i></b> , tools and equipment are selected and assembled. 3.2 Facing materials are prepared as per the building code. 3.3 Facing background is prepared. 3.4 Facing are fixed on the prepared background.
4. Apply wall finishes	4.1 Finishing materials are selected as per client specifications and building code. 4.2 Finishing tools and equipment are assembled 4.3 Wall backgrounds are prepared to receive <b><i>wall finish</i></b> . 4.4 Wall finish is applied as per client specification and building code
5. Apply ceiling	5.1 Finishing materials are selected as per client

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
finishes	<p>specifications and building code.</p> <p>5.2 Finishing tools and equipment are assembled</p> <p>5.3 Ceiling backgrounds are prepared to receive <b><i>ceiling finish.</i></b></p> <p>5.4 Ceiling finish is applied as per client specification and building code</p>
6. Carry out pointing and jointing	<p>6.1 Jointing and pointing materials, tools and equipment are identified and assembled</p> <p>6.2 Materials for pointing and jointing are prepared</p> <p>6.3 Pointing and jointing background is prepared</p> <p>6.4 Pointing and jointing is carried out as per client specification</p>
7. Perform building rough casting	<p>7.1 Tools and equipment for rough casting are assembled</p> <p>7.2 Materials for rough casting are selected and prepared depending on rough casting surface</p> <p>7.3 Background for rough casting is prepared</p> <p>7.4 Rough cast is applied as per the building code</p>

### **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Floor finish	<p>1.1 Tiles</p> <p>1.2 Cement sand screed</p> <p>1.3 Terrazzo</p> <p>1.4 Wood parquets</p> <p>1.5 Carpets</p>
2. Painting method	<p>2.1 Manual</p> <p>2.2 Mechanical</p>
3. Facing materials	<p>3.1 bricks</p> <p>3.2 Wooden blocks</p>
4. Wall finish	<p>4.1 wall mastering</p> <p>4.2 wall lining</p> <p>4.3 clad building walls</p>
5. Ceiling finish	<p>5.1 boards</p> <p>5.2 T and G</p> <p>5.3 Gypsum board</p> <p>5.4 Acoustic ceilings</p>

## REQUIRED KNOWLEDGE

- Mortar mixing
- Construction materials
- Building Tools And Equipments
- Safety
- Masonry
- Plastering/rendering

## SKILLS

- Plastering
- Painting
- Facing
- Lining
- Pointing and jointing
- Cladding
- Rough casting

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Assembled tools and equipment 1.2 Prepared backgrounds for finishes 1.3 Plastered walls 1.4 Finished floors 1.5 Mixed paints 1.6 Painted walls 1.7 Faced walls 1.8 Mastered walls 1.9 Lined walls 1.10 Pointed and jointed walls 1.11 Cladded walls 1.12 Rough casted walls
2. Resource Implications	The following resources should be provided: 2.1 Workplace or assessment location 2.2 Paint Mixing buckets 2.3 Masonry tools and equipment 2.4 Paints 2.5 Finishing units

	2.6 Cement 2.7 Fine Aggregates
3. Methods of Assessment	Competency may be assessed through: 3.1 Written Test 3.2 Demonstration 3.3 Practical assignment 3.4 Interview/Oral Questioning
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# EXECUTE BUILDING EXTERNAL WORKS

UNIT CODE: CON/OS/BUT/CR/08/6

## UNIT DESCRIPTION

This Unit describes the competency required to perform building external works. It involves laying cabro blocks and paving slabs, performing landscaping, constructing drainage systems, fences and gates.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA ( <i>Bold and italicized terms are elaborated in the Range</i> )
1. Lay external paving	1.1 Paving ground is surveyed to determine topography 1.2 Paving base is prepared in accordance with civil engineers' specifications 1.3 Levelling dust is spread in accordance with civil engineers' specifications 1.4 <b>External paving</b> is laid as per civil engineers' specifications
2. Perform soft landscaping	2.1 Area of the space is determined in accordance with the site layout 2.2 Landscaping ground is prepared as per design specifications 2.3 Irrigation method is determined as per landscape design 2.4 <b>Beautification</b> is carried out as per design specifications
3. Construct drainage system	3.1 <b>Drainage channels</b> are excavated as per civil engineering drawings 3.2 <b>Drainage pipes</b> are laid as per civil engineering drawings 3.3 <b>Collection chambers</b> are constructed according to civil engineering drawings
4. Construct fences and gates	4.1 Gate measurements are determined according to the client specifications 4.2 Gate supporting columns are constructed according to codes of practice 4.3 Gate is installed as per design measurements 4.4 Building <b>perimeter fence</b> is constructed as per client needs and codes of practice

## RANGE

Variable	Range <i>May include but is not limited to:</i>
1. External paving	1.1 tarmac 1.2 concrete blocks 1.3 clay 1.4 ceramic 1.5 rubble stones 1.6 paving slabs
2. Beautification	2.1 Ornamental trees 2.2 Grassing 2.3 Flowers 2.4 Shrubs 2.5 Ground cover 2.6 Garden furniture 2.7 Garden lighting
3. Drainage channels	3.1 Open channels 3.2 Closed channels
4. Drainage pipes	4.1 concrete pipes 4.2 PVC pipes 4.3 GI pipes 4.4 PPR pipes
5. Collection chambers	5.1 Septic tanks 5.2 Soak pits 5.3 Manholes
6. Perimeter fence	6.1 Masonry walls 6.2 Live fence 6.3 Reinforced concrete walling 6.4 Wooden post and chain link/barbed wire 6.5 Steel post and chain link 6.6 Concrete post and chain link

## REQUIRED KNOWLEDGE AND SKILLS

### Knowledge

- Highway technology
- Measurements
- Basic arithmetic
- Mixture ratios
- Reinforced concrete

- Wall construction
- Drainage systems
- Plan interpretation
- Excavation tools and equipment
- Soil properties
- Pipe work
- Health and safety
- Formwork
- Welding
- Plumbing
- Landscape lighting

### Skills

- Measurement skills
- Basic mathematic skills
- Reading skills
- Communication skills
- Management skills
- Design skills
- Problem solving skills
- Critical thinking
- Construction tools handling skills
- Technical drawing skills

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: <ul style="list-style-type: none"> <li>1.1. Laid external paving</li> <li>1.2. Performed soft landscaping and beautification</li> <li>1.3. Constructed drainage system</li> <li>1.4. Constructed fences and gates</li> </ul>
2. Resource Implications	The following resources should be provided: <ul style="list-style-type: none"> <li>2.1 Construction tools and equipment</li> <li>2.2 Construction materials</li> <li>2.3 Codes of practice</li> <li>2.4 Computers</li> <li>2.5 Calculators</li> </ul>



	2.6 Training workshops 2.7 Qualified trainers
3. Methods of Assessment	Competency may be assessed through: 3.5. Practical assignment 3.6. Written 3.7. Oral interview 3.8. Demonstrations
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# INSTALL BUILDING SERVICES

**UNIT CODE:** CON/OS/BUT/CR/09/6

## UNIT DESCRIPTION

This Unit describes the competencies required to install building services. It involves installing ICT and specialised services, installing electrical services and installing mechanical services.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Install ICT and specialised services	1.1 ICT and specialised services drawings are sketched based on architectural and engineering drawings 1.2 Structural cabling layout is drawn as per ICT and specialised services sketches 1.3 CCTV and security service layout is drawn as per sketches 1.4 Internet and cable TV service layout is drawn as per sketches 1.5 ICT and specialised services are installed as per SOPs 1.6 ICT and specialised services are tested as per SOPs
2. Set up electrical system	2.1 Electrical drawings are sketched as per architectural drawings 2.2 <b>Electrical materials</b> are identified and assembled as per the design layout 2.3 <b>Electrical tools and equipment</b> are identified and assembled according to the electrical materials 2.4 Masonry units are hacked according to the electrical layout 2.5 Conduits are laid and connected according to the electrical design layout 2.6 Electrical connections are tested according to IEE regulations 2.7 Exposed conduits are sealed as per construction regulations
3. Install mechanical services	3.1 <b>Mechanical services</b> drawings are sketched as per architectural drawings and structural drawings 3.2 Mechanical service supply materials are identified according to mechanical service drawings

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
	<p>3.3 Mechanical tools and equipment are identified as per materials and job requirements</p> <p>3.4 Mechanical services are fixed according to standard operating procedures</p> <p>3.5 Mechanical services are tested as per SOPs</p>

## **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. Electrical materials	<p>1.1 Sockets</p> <p>1.2 Meter box</p> <p>1.3 Meter</p> <p>1.4 Wires</p> <p>1.5 Bulb holders</p> <p>1.6 Conduits</p>
2. Electrical tools and equipment	<p>2.1 Pliers</p> <p>2.2 Testers</p> <p>2.3 Voltmeter</p> <p>2.4 Ammeter</p>
3. Mechanical services	<p>3.1 Gas supply</p> <p>3.2 Cold and hot water supply systems</p> <p>3.3 Plumbing system</p> <p>3.4 Sewer system</p> <p>3.5 Fire fighting</p> <p>3.6 Ventilation system</p>

## **REQUIRED KNOWLEDGE AND SKILLS**

### **Knowledge**

- Measurement
- Survey
- Basic arithmetic
- Plan interpretation
- Occupational safety and health
- Codes of practice
- Environment Act
- Mechanical systems
- Electrical systems

- Plumbing connections
- Welding and fabrication
- Ducting

### Skills

- Threading, cutting and fixing
- Pipe bending
- Measurement
- Basic mathematic
- Interpretation
- Design
- Communication
- Technical drawing
- Management
- Problem solving
- Critical thinking
- Construction tools handling
- Welding and fabrication
- Ducting

### EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Sketched ICT and specialised services layout</li> <li>1.2 Installed simple ICT and specialised services</li> <li>1.3 Tested simple ICT and specialised services</li> <li>1.4 Sketched simple electrical services layout</li> <li>1.5 Installed simple electrical services</li> <li>1.6 Tested simple electrical services</li> <li>1.7 Sketched simple mechanical services layout</li> <li>1.8 Installed simple mechanical services</li> <li>1.9 Tested simple mechanical services</li> </ul>
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> <li>2.1 Training/assessment workshops</li> <li>2.2 Construction tools and equipment</li> <li>2.3 Occupational Safety and health manuals</li> <li>2.4 Qualified trainers</li> <li>2.5 Codes of practice</li> </ul>

	2.6 Computers
3. Methods of Assessment	Competency may be assessed through: 3.1 Practical assignment 3.2 Written 3.3 Oral interview
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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# INSTALL BUILDING DOORS AND WINDOWS

UNIT CODE: CON/OS/BUT/CR/10/6

## UNIT DESCRIPTION

This Unit describes the competences required to install building windows and doors. It involves preparing window and door schedule, fabricating/ordering building doors and windows, fixing building doors and windows and applying door and window finishes.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Prepare window and door schedule	1.1 Doors and window dimensions and specifications are identified based on the architectural drawings 1.2 Door and window sketches are prepared based on dimensions and specifications 1.3 Window and door schedule is prepared with quantities and quoted prices
2. Fabricate/order doors and windows	2.1 Door and window specifications are obtained from door and window schedule and architectural plan 2.2 Doors and windows are fabricated and ordered as per set procedures 2.3 Doors and windows are delivered to the site as per standard operating procedures
3. Fix doors and windows	3.1 Door and window openings are <b><i>prepared</i></b> for fixing as per SOPs 3.2 <b><i>Connecting iron mongery</i></b> is fixed on the door and window openings as per SOPs 3.3 Doors and windows are fixed as per SOPs
4. Apply door and window finishes	4.1 Windows and doors (where applicable) glazing is fixed as per SOPs 4.2 Windows and doors plastering are applied as per SOPs 4.3 <b><i>Iron mongery (other)</i></b> are fixed as per SOPs 4.4 Windows and doors are painted as per SOPs

## RANGE

Variable	Range
	<i>May include but is not limited to:</i>
1. Prepared	1.1 Hacking 1.2 Drilling
2. Connecting iron mongery	2.1 Hinges
3. Iron mongery (other)	3.1 Stoppers 3.2 Locks 3.3 Stays

## REQUIRED KNOWLEDGE

- Material scheduling
- Types of doors and windows
- Door and window fabrication methods
- Plan interpretation
- Dimensioning
- Sketching
- Iron mongery
- Door and window finishes

## SKILLS

- Sketching
- Planning
- Interpretation
- Critical thinking
- Analytical
- Fixing

## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Prepared simple window and door schedule 1.2 Transferred window and door specification to fabrication workshop 1.3 Fixed simple doors and windows 1.4 Applied door and window finishes
2. Resource Implications	The following resources should be provided:

	<ul style="list-style-type: none"> <li>2.1 Materials and equipment specifications</li> <li>2.2 External workshops/in site workshops</li> <li>2.3 Fabrication tools and equipment</li> <li>2.4 Trained Quality control staff</li> </ul>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> <li>3.1 Interview</li> <li>3.2 Case Study/Situation</li> <li>3.3 Observation/Demonstration and oral questioning</li> <li>3.4 Site visits</li> </ul>
4. Context of Assessment	<p>Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended</p>

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# SUPERVISE CONSTRUCTION PROJECT

**UNIT CODE:** CON/OS/BUT/CR/11/6

## UNIT DESCRIPTION

This Unit describes the competences required to manage a construction project. It involves organizing construction site; interpreting building contract documents; preparing; project work plan, ledgers, journals and final accounts; manage human resource, site records & activities as well as coordinating quality standards and costing construction projects.

## ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Organise construction site	1.1 Construction site map is drawn 1.2 Construction site spaces are allocated as per <b><i>construction site zoning.</i></b> 1.3 <b><i>Site infrastructure</i></b> and traffic routes are identified as per the site map. 1.4 Site plant and equipment are positioned according to the site map. 1.5 <b><i>Site installations</i></b> are placed according to the site map. 1.6 <b><i>Site arrangement</i></b> is checked and re-planned
2. Interpret building contract documents	1 Building contract documents are reviewed. 2 Building contracts are interpreted as per the contract type. 3 Contract information is recorded as per the contract interpretation.
3. Prepare construction work plan	1 Projects scope of work is determined as per the project documents. 3.2 Projects work equipment is allocated as per the time schedule. 3.3 Projects time schedule is prepared as per the scope of work.
4. Prepare project accounts	4.1 Information is obtained from ledgers and journals. 4.2 Income and expense account is prepared. 4.3 Information is balanced and agreed upon 4.4 Method statement for works is prepared
5. Manage projects human resource	5.1 Projects roles and responsibilities are identified. 5.2 Reporting relationship and staffing management plan are documented

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
	5.3 Organisation charts and position descriptions are defined 5.4 Project team is developed as per organisational standards. 5.5 Personnel is identified depending on tasks. 5.6 Project performance is monitored as per laid down organisational standards. 5.7 Project evaluation is carried out. 5.8 Project report and results are analysed.
6. Keep site records	6.1 <b>Record parameters</b> are identified based on project requirements 6.2 Data entry methods are identified and applied 6.3 Regular updates of records are maintained according to the job requirement
7. Monitor site activities	7.1 Construction requirements are identified as per building code, public health act and local government requirements. 7.2 Construction activities progress is noted against performance standards. 7.3 Project status/task performance is analysed against managers specification. 7.4 Efficiency and effectiveness of site activities are analysed. 7.5 Project report is prepared.
8. Coordinate quality standards	8.1 Quality standard manuals are reviewed. 8.2 Samples of materials are taken and Quality tests performed. 8.3 Site work progress is observed through regular visits and errors corrected. 8.4 Qualified staffing is ensured as per their performance. 8.5 Right quality equipment and tools are ensured. 8.6 Technical personnel representative is placed on site
9. Cost construction project	1 Project scope of work is determined as per working drawings. 2 Project work is divided into items and sub items. 3 Project items are described as per mode of performance. 4 Rates are inserted against the items as per building standard costing rates and site location.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>(Bold and italicized terms are elaborated in the Range)</i>
	5 Items rates are totaled to acquire the project total.

### **RANGE**

<b>Variable</b>	<b>Range</b> <i>May include but is not limited to:</i>
1. construction site zoning	1.1 Central zone 1.2 Internal 1.3 Intermediate 1.4 External.
2. Site infrastructure	2.1 Roads 2.2 Walk ways
3. Site Installation	3.1 First aid points 3.2 Protection equipment 3.3 Temporary works 3.4 Fire stations

### **REQUIRED KNOWLEDGE**

- Accounting
- Contracts
- Human resource
- Costing
- Welding and fabrication
- MS projects

### **SKILLS**

- Management Skill
- Installation Skill
- Fixing skills
- Welding and fabrication

### **EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Organised construction site.</li> <li>1.2 Interpreted Contract documents.</li> <li>1.3 Prepared project work plan.</li> <li>1.4 Prepared ledgers and journals.</li> <li>1.5 Prepared project final accounts.</li> <li>1.6 Managed human resource.</li> <li>1.7 Managed site records.</li> <li>1.8 Monitored site activities.</li> <li>1.9 Coordinated quality standards.</li> <li>1.10 Costed construction project.</li> </ul>
2. Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> <li>2.1 Materials and equipment specifications</li> <li>2.2 External Labs/in site labs</li> <li>2.3 Calibrated equipment</li> <li>2.4 Trained Quality control staff</li> </ul>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> <li>3.1 Interview</li> <li>3.2 Case Study/Situation</li> <li>3.3 Observation/Demonstration and oral questioning</li> <li>3.4 Site visits</li> </ul>
4. Context of Assessment	<p>Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.</p>
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>