

**MINISTRY OF EDUCATION**

**OCCUPATION STANDARS**

**FOR**

**ROAD CONSTRUCTOR**

**LEVEL 5**

**PROGRAMME CODE: 0732 454 A**

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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 Kenya’s development blue print 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 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. The policy document requires that training in TVET shall be competency based, occupation standards 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 programs.

These reforms demand that Industry takes a leading role in occupation standards development to ensure the occupation standards addresses its competence needs. It is against this background that this Occupation standards has been developed for the purpose of informing development of a competency-based Road Constructor Level 5 Occupation standards. This Occupation standards will also form the basis for assessment of an individual for competency certification.

It is my conviction that this Occupation standards will play a great role towards development of a competent human resource for the Construction Sector’s growth and sustainable development.

**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 the Sessional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need toreform occupation standards development, assessment and certification. This called for a shift to CBET 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 industry in conjunction with national polytechnics and other national agencies have developed this Road Constructor Level 5 Occupation standards. The Standard is designed and organized with clear performance criteria for each element of a unit of competency. It also outlines the required knowledge and skills for the performance of prescribed tasks as well as evidence guide for assessment purposes.

# ABBREVIATIONS AND ACRONYMS

TVET - TECHNICAL VOCATIONAL EDUCATION AND TRAINING

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

CADD Computer aided design drawings

CGA County Government Approvals

DTP Desktop Publishing

EHS Environment, health and safety

EMCA Environmental management and coordination act

EMS Environmental Management System

IFCE The International Federation of Consulting Engineers

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

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

Institute of electrical engineers

GI Galvanized iron

OSH Occupational safety and health

OSHA Occupation safety and health act

SOPS Standard operating procedure

CBET Competency-based education and training

# KEY TO UNIT CODE

**Sector / Industry**

**Sub Sector**

**Occupational Area**

**Version Control**

**Unit of Competence Number**

**ISCED level, Programme Orientation and Level of Completion**

xx

x

xxx

x

xx

x

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# OVERVIEW

These are the occupation standards s that define the minimum level of practice expected of a building Technician. The aim of developing these standards is to guide the occupation standards developer to package the quality training for the building Technician. The key elements of quality training and learning are described in the standards. They articulate what a building Technician is expected to know and be able to practice.

This defines the work of a building technician and make explicit the elements of high-quality and effective training delivery that will improve the learning outcomes for the trainee. Packaging rules for the qualification is based on the formats provided by TVETA guidelines on Competency Based Education Training and Assessment Standards.

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **BASIC UNITS OF COMPETENCY** | |
| **UNIT CODE** | **UNIT TITLE** |
| 0611 441 01A | APPLY DIGITAL LITERACY |
| 0031 441 02A | APPLY COMMUNICATION SKILLS |
| 0417 441 05A | APPLY WORK ETHICS AND PRACTICES |
| 0413 441 11A | APPLY ENTREPRENEURIAL SKILLS |
| **COMMON UNITS OF COMPETENCY** | |
| 0732 441 09A | APPLY MATHEMATICS PRINCIPLES |
| 0732 441 07A | PREPARE AND INTERPRET TECHNICAL DRAWINGS |
| 0732 441 03A | APPLY CONSTRUCTION MATERIAL SCIENCE I |
| 0732 441 08A | APPLY CONSTRUCTION MATERIAL SCIENCE II |
| 0732 441 10A | DEMONSTRATE WORKSHOP TECHNOLOGY SKILLS |
| **CORE UNITS OF COMPETENCY** | |
| 0732 551 06A | PREPARE FOR MATERIALS TESTING |
| 0732 551 13A | CONDUCT MATERIAL TESTING I |
| 0732 551 04A | CARRY OUT SITE SURVEY |
| 0732 551 14A | EXECUTE ROAD MAINTENANCE WORKS |
| 0732 551 12A | CARRY OUT ROAD CONSTRUCTION WORKS I |
| 0732 551 15A | CARRY OUT CIVIL WORKS |

# 

# BASIC UNITS OF COMPETENCY

## APPLY DIGITAL LITERACY

**UNIT CODE:** 0611 441 01A

**UNIT DESCRIPTION:**

This unit covers the competencies required to demonstrate digital literacy. It involves operating computer devices, solving tasks using the Office suite, managing data and information, performing online communication and collaboration, applying cyber security skills, and performing jobs online.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| --- | --- |
| 1. Operate computer devices | * 1. C***omputer device*** usage is determined as per workplace requirements.   2. ***Computer hardware*** is identified according to job requirements   3. ***Computer software*** is identified according to workplace requirements   4. Computer devices are turned on or off as per the correct workplace procedure.   5. ***Mouse techniques*** are applied in solving tasks as per workplace requirements   6. Keyboardtechniques are applied in solving tasks as per workplace requirements   7. Computer files and folders are created and managed as per workplace requirements   8. ***Internet connection option***s are identified and applied in connecting computer devices to the Internet   9. ***External devices*** are identified and connected to the computer devices as per the job requirement |
| 1. Solve tasks using Office suite | 1. ***Word processing concepts***are applied in solving workplace tasks as per job requirements 2. Worksheet data is entered and prepared in accordance with work procedures 3. Worksheet data is built and edited in accordance with workplace procedures 4. ***Data manipulation*** on a worksheet is undertaken in accordance with work requirements 5. Worksheets are saved and printed in accordance with job requirements 6. ***Electronic presentation concepts***are applied in solving workplace tasks as per job requirements |
| 1. Manage data and information | * 1. Office ***internet services*** are identified and applied in accordance with office procedures   2. ***Internet access applications*** are determined in accordance with office operation procedures   3. Internet search is performed as per job requirements   4. Online digital content is downloaded in accordance with workplace requirements   5. Digital content is identified and backed up in accordance with workplace procedures |
| 1. Perform online communication and collaboration | * 1. Netiquette principles are observed as per work requirements   2. Electronic mail communication is executed in accordance with workplace policy   3. Digital content copyright and licenses are identified and applied according to workplace policies and regulatory requirements   4. ***Online*** ***collaboration tools*** are applied in accordance with workplace policies and regulatory requirements |
| 1. Apply cyber security skills | * 1. ***Data protection*** and ***privacy*** is classified in accordance with workplace policies and regulatory requirements   2. ***Internet security threats*** are identified as per workplace policies and regulatory requirements   3. Computer threats and crimes are detected in accordance to Information Management security guidelines   4. ***Cyber security control measures*** are applied in accordance with workplace policies and regulatory requirements |
| 1. Perform online jobs | * 1. ***Online job platforms*** are identified as per the job requirements   2. Online accounts and profiles are created in accordance with the work requirements   3. Online jobs are identified according to the bidder’s skillset   4. Online digital identity is managed according to industry best practices   5. Online job bidding is done as per the specific job requirements   6. Online tasks are executed according to the job requirements   7. Personal online payment account is managed in accordance with financial regulations |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Computer devices may include but are not limited to: | 1. Desktops 2. Laptops 3. Smartphones 4. Tablets 5. Smart watches |
| 1. Computer hardware may include but are not limited to: | * 1. The System Unit E.g. Motherboard, CPU, casing,   2. Input Devices e.g. pointing, keying, scanning, voice/speech recognition, direct data capture devices.   3. Output Devices e.g. hardcopy output and softcopy output   4. Storage Devices e.g. main memory e.g. RAM, secondary storage (Solid state devices, Hard Drives, CDs & DVDs, Memory cards, Flash drives   5. Computer Ports e.g. HDMI, DVI, VGA, USB type C etc. |
| 1. Computer software may include but are not limited to: | * 1. System software e.g. Operating System (Windows, Macintosh, Linux, Android, iOS)   2. Application Software e.g. Word Processors, Spreadsheets, Presentations etc.   3. Utility Software e.g. Antivirus programs |
| 1. External devices may include but are not limited to: | * 1. Printers   2. Projectors   3. Smart Boards   4. Speakers   5. External storage drives   6. Digital/Smart TVs |
| 1. Word processing concepts may include but are not limited to: | * 1. Creating word documents   2. Editing word documents   3. Formatting word documents   4. Saving word documents   5. Printing word documents |
| 1. Mouse techniques may include but are not limited to: | * 1. Clicking   2. drop Double-clicking   3. Right-clicking   4. Drag and |
| 1. Internet connection options may include but are not limited to: | * 1. Mobile Networks/Data Plans   2. Wireless Hotspots   3. Cabled (Ethernet/Fiber)   4. Dial-Up   5. Satellite   6. ISDN (Integrated Services Digital Network) |
| 1. Data manipulation may include but are not limited to: | * 1. Use of formulae   2. Use of functions   3. Sorting   4. Filtering   5. Visual representation using charts |
| 1. Electronic presentation concepts may include but are not limited to: | * 1. Creating slides   2. Editing slides   3. Formatting slides   4. Applying slide effects and transitions   5. Creating and playing slideshows   6. Saving presentations   7. Printing slides and handouts |
| 1. Internet services may include but are not limited to: | * 1. Communication Services   2. Information Retrieval Services   3. File Transfer   4. World Wide Web Services   5. Web Services   6. Directory Services   7. Automatic Network Address Configuration   8. Newsgroup   9. Ecommerce |
| 1. Internet access applications/software may include but are not limited to: | * 1. Browsers   2. Email Apps   3. ecommerce Apps |
| 1. Online collaboration tools may include but are not limited to: | * 1. Online Storage   2. Online productivity applications   3. Online meetings,   4. Online learning environments,   5. Online calendars   6. Social networks |
| 1. Data protection and privacy may include but not limited to: | * 1. Confidentiality of data/information   2. Integrity of data/information   3. Availability of data/information |
| 1. Internet security threats may include but not limited to: | * 1. Malware attacks   2. Social engineering attacks   3. Software supply chain attacks   4. Advanced persistent threats (APT)   5. Distributed denial of service (DDoS)   6. Man-in-the-middle attack (MitM)   7. Password attacks   8. IoT Attacks   9. [Phishing Attacks](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#phishing-attacks)   10. [Ransomware](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#ransomware) |
| 1. Security threats control measures may include but not limited to: | * 1. Counter measures against cyber terrorism   2. Physical Controls   3. Technical/Logical Controls   4. Operational Controls |
| 1. Online job platforms may include but are not limited to: | * 1. Remotask   2. Data annotation.tech   3. Cloudworker   4. Upwork   5. Oneforma   6. Appen |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

The individual needs to demonstrate knowledge of:

1. Computer Hardware and Software Concepts
2. Computer Security Concepts (Data security and privacy)
3. Cyber security threats and control measures
4. Understanding Computer Crimes
5. Detection and protection against computer crimes
6. Laws governing protection of ICT in Kenya
7. Digital Identity Management
8. Netiquette Principles
9. Fundamentals of Copyright and Licenses
10. Word processing;
    1. Functions and concepts of word processing;
    2. Documents and tables creation and manipulations;
    3. Document editing;
    4. Document formatting;
    5. Word processing utilities
11. Spread sheets;
    1. Meaning, types and importance of spreadsheets;
    2. Components of spreadsheets;
    3. Functions, formulae, and charts, uses and layout;
    4. Data formulation, manipulation and application to cells;
    5. Editing & formatting spreadsheets;
12. Presentation Packages;
    1. Types of presentation Packages.
    2. Creating, formulating, running, editing, printing and presenting slides and handouts
13. Networking and Internet;
    1. Internet connectivity.
    2. Browser and digital content management;
    3. Managing data, information, and digital content
    4. Electronic mail and World Wide Web
14. Fundamentals of Online Working;
    1. Online Profile Management;
    2. e-Portfolio Management;
    3. Online Jobs Bidding;
    4. Online Payment Systems;

**Required skills**

The individual needs to demonstrate the following skills:

* Active listening
* Keyboard Skills
* Mouse Skills
* Analytical skills
* Creativity
* Interpretation Skills
* Communication
* Spread sheet operations (applying fundamental operations such as addition, subtraction, division and multiplication)
* Computer Use Safety Skills
* Document Editing Skills
* Document Formatting Skills
* Document Printing Skills
* Netiquette Skills
* Internet Browsing Skills
* Problem Solving Skills
* Online Collaboration Skills
* Cyber security Skills
* CV writing
* grooming

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | ***Assessment requires evidence that the candidate:***   * 1. Operated computer devices as per workplace policies and regulations   2. Solved tasks using the office suite as per workplace policies and regulations   3. Manage data and information as per workplace policies and regulations   4. Performed online communication and collaboration as per workplace policies and regulations   5. Applied cyber security skills in accordance with workplace policies and regulations   6. Executed online tasks according to the job requirements   7. Searched for job opportunity based on competencies   8. Prepared job requirement documentations based on job opportunity   9. Demonstrated interview skills based on the job opportunity. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environments where assessment can take place   3. Resources relevant to the proposed activities or task |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral assessment   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written assessment   7. Practical assessment   8. Projects |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace or simulated workplace |
| 1. Guidance information for assessment | * 1. Holistic assessment with other units relevant to the industry sector and workplace job role is recommended |

## APPLY COMMUNICATION SKILLS

**UNIT CODE:** 0031 441 02A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate communication skills. It involves applying communication channels, written, non-verbal, oral, and group communication skills.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace function | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements  ***Bold and italicized terms are elaborated in the Range*** |
| --- | --- |
| 1. Apply communication channels | 1. Specific communication channels are identified and applied based on workplace requirements 2. Challenges are identified and addressed as per the operational standads of the organization 3. Communication channels are evaluated to meet workplace needs |
| 1. Apply written communication skills | * 1. Types of written communication are identified and applied according to the workplace requirements   2. Written communication needs are identified and implemented according to workplace procedures   3. Written communication guidelines are analyzed, evaluated, and revised based on workplace needs |
| 1. Apply non-verbal communication skills | * 1. Existing non-verbal communication techniques are identified based on organization policy   2. Existing non-verbal communication techniques are applied based on organization policy   3. Non-verbal communication techniques are articulated to enhance inclusivity according to workplace requirement   4. Non-verbal communication techniques are modelled to enhance inclusivity according to workplace requirement |
| 1. Apply oral communication skills | * 1. Types of oral communication are identified and established as per organization policy   2. Pathways of oral communication are identified and established as per organization policy   3. Pathways of oral communication are reviewed according to organization procedures.   4. Pathways of oral communication are maintained according to the organization standards. |
| 1. Apply group communication skills | 1. Group communication strategies are appliedbased on the workplace needs 2. Groups are organized in accordance with workplace procedures 3. Effective questioning, listening and non-verbal communication techniques are used as per needs. 4. Group communication challenges are identified and addressed according to the workplace needs |

**RANGE**

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

| **Variable** | **Range** |
| --- | --- |
| 1. Communication strategies may include but are not limited to: | * Language switch * Comprehension check * Repetition * Asking confirmation * Paraphrasing * Clarification request * Translation * Restructuring * Generalization |
| 1. Effective group interaction may include but not limited to: | * Identifying and evaluating what is occurring within an interaction in a non-judgmental way. * Using active listening * Making decision about appropriate words, behaviour * Putting together response which is culturally appropriate * Expressing an individual perspective * Expressing own philosophy, ideology and background and exploring impact with relevance to communication |
| 1. Situations may include but are not limited to: | * Establishing rapport * Eliciting facts and information * Facilitating resolution of issues * Developing action plans |

**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:

1. Active listening
2. Interpretation
3. Negotiation
4. Writing
5. Oral skills
6. Creative thinking
7. Critical thinking
8. Decision making
9. Analytical
10. Innovation
11. Conflict skills
12. Leadership
13. Problem solving skills
14. Management
15. Organizational
16. Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

1. Communication process
2. Dynamics of groups
3. Styles of group leadership
4. Key elements of communications strategy
5. Principles of effective communication
6. Turn-taking techniques
7. Conflict resolution techniques
8. Work planning
9. Work organization
10. Company policies
11. Company operations and procedure standards
12. Fundamental rights at the workplace
13. Personal hygiene
14. Accountability
15. Workplace problems and how to deal with them

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of Competency | Assessment requires evidence that the candidate:   * 1. Identified and applied specific communication channels based on workplace requirements   2. Identified and applied specific written communication correspondence according to the workplace requirements.   3. Applied and developed non-verbal strategies to communicate in all areas of the workplace requirements.   4. Established pathways of oral communication as per workplace policy   5. Applied group communication strategies based on workplace needs. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral assessment   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written assessment   7. Practical assessment   8. Projects |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

## APPLY WORK ETHICS AND PRACTICES

**UNIT CODE:** 0417 441 05A

**UNIT DESCRIPTION**

This unit covers competencies required to; effectively apply work ethics and practices. It involves the ability to: conduct self-management, promote ethical work practices and values, promote teamwork, manage workplace conflicts, maintain professional and personal development, apply problem-solving and promote customer care

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in Range*** |
| --- | --- |
| 1. Apply self-management skills | 1. Personal vision, mission and goals are formulated based on potential and concerning organization objectives and strategic plan 2. Self-esteem and a positive self-image are developed and maintained based on value 3. Emotional intelligence and stress management are demonstrated as per workplace requirements 4. Assertiveness is developed and maintained based on the requirements of the job. 5. Accountability and responsibility for one's actions are demonstrated based on workplace instructions 6. Time management, attendance and punctuality are observed as per the organization’s policy 7. Personal goals are managed as per the organization’s objective 8. Self-strengths and weaknesses are identified based on personal objectives 9. Motivation, initiative and proactivity are utilized as per the organization policy 10. Individual performance is evaluated and monitored according to the agreed targets |
| 1. Promote ethical work practices and values | 1. Integrity is demonstrated as per acceptable norms 2. Codes of conduct is applied as per the workplace requirements 3. Policies and guidelines are observed as per the workplace requirements 4. Professionalism is exercised in line with organizational policies |
| 1. Promote Team work | * 1. Teams are formed to enhance productivity based on organization’s objectives   2. Duties are assigned to teams under the organization policy   3. Team activities are managed and coordinated as per set objectives   4. Team performance is evaluated based on set targets as per workplace policy   5. Conflicts are resolved between team members in line with organization policy.   6. Gender and diversity-related issues are identified and mainstreamed in accordance with workplace policy   7. Healthy relationships are developed and maintained in line with the workplace.   8. Adaptability and flexibility are applied in dealing with team members as per workplace policies |
| 1. Maintain professional and personal development | * 1. Personal growth and development needs are identified and assessed in line with the requirements of the job   2. Training and career opportunities are identified and utilized based on job requirements   3. Resources for training are mobilized and allocated based on organizations and individual skills needs   4. Licenses and certifications relevant to the job and career are obtained and renewed as per policy   5. Recognitions are sought as proof of career advancement in line with professional requirements   6. Work priorities and personal commitments are balanced and managed based on the requirements of the job and personal objectives   7. Dynamism and on-the-job learning are embraced in line with the organization’s goals and objectives |
| 1. Apply Problem solving skills | * 1. Creative, innovative and practical solutions are developed based on the problem   2. Independence and initiative in identifying and solving problems are demonstrated based on the requirements of the job.   5.3 Team problems are solved as per the workplace guidelines  5.4 Problem-solving strategies are applied as per the workplace guidelines  5.5 Problems are analyzed and assumptions tested as per the context of data and circumstances |
| 1. Promote Customer Care | 6.1 Customers' needs are identified based on their characteristics  6.2 Customer ***feedback*** is allowed and facilitated in line with organization policies  6.3 Customer concerns and complaints are analyzed and resolved in line with the set organizational culture  6.4 Proactive customer outreach programs are implemented as per organizational policies  6.5 Customer retention strategies are developed and implemented in line with the organizational policy |

**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** |
| --- | --- |
| 1. Feedback may include but not limited to: | * Verbal * Written * Informal * Formal |
| 1. Conflicts include but are not limited to: | * Interpersonal Conflict * Intrapersonal Conflict * Intergroup Conflict * Intragroup Conflict |
| 1. Relationships may include but not limited to: | * Man/Woman * Trainer/trainee * Employee/employer * Client/service provider * Husband/wife * Boy/girl * Parent/child * Sibling relationships |
| 1. Team may include but not limited to: | * Small work group * Staff in a section/department * Inter-agency group * Virtual teams |
| 1. Personal growth may include but not limited to: | * Growth in the job * Career mobility * Gains and exposure the job gives * Net workings * Benefits that accrue to the individual as a result of noteworthy performance |
| 1. Personal objectives may include but not limited to: | * Long term * Short term * Broad * Specific |
| 1. Trainings and career opportunities may include but not limited to | * Participation in training programs * Serving as Resource Persons in conferences and workshops * Capacity building |
| 1. Resource may include may but not limited to: | * Human * Financial * Technology |
| 1. Creative and innovative may include but not limited to: | * New ideas * Original ideas * Different ideas * Methods/procedures * Processes * New tools |
| 1. Emerging issues may include but not limited to: | * Artificial Intelligence * Data confidentiality * National cohesion * 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:

* Active listening
* Critical thinking
* Organizational
* Negotiation
* Monitoring
* Evaluation
* Problem solving
* Decision Making
* Leadership
* Creative/innovative thinking
* Adaptability
* Conflict management
* Emotional intelligence
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Work values and ethics
* Company policies and procedures
* Company operations, procedures and standards
* Flexibility and adaptability
* Concept of time and leisure time
* Decision making
* Work planning
* Organizing work
* Monitoring and evaluation
* Record keeping
* Gender and diversity mainstreaming
* Drug and substance abuse
* Professional growth and development
* creativity
* Innovation
* problem solving
* customer care
* Mentoring and coaching.
* Emerging 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 require evidence that the candidate:   * 1. Applied self-management skills as per organizational procedures   2. Promoted ethical practices and values as per organizational procedures   3. Promoted Teamwork as per workplace assignments   4. Maintained professional and personal development as per organizational procedures   5. Applied Problem-solving skills based on work requirements.   6. Identified customer needs based on their characteristics   7. Gave back Customer feedback in line with organization policies |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Written test 4. Portfolio of Evidence 5. Interview 6. Third party report |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

## APPLY ENTREPRENEURIAL SKILLS

**UNIT CODE :** 0413 441 11A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate an understanding of entrepreneurship. It involves demonstrating an understanding of financial literacy, applying entrepreneurial concepts identifying entrepreneurship opportunities, applying business legal aspects, developing business innovative strategies, and developing business plans.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements  ***Bold and italicized terms are elaborated in Range*** |
| --- | --- |
| 1. Apply Financial Literacy Skills | 1. **Sources of personal and business** ***funds*** are identified as per financial procedures and standards 2. Personal finances are managed as per financial procedures and standards 3. Savings are managed as per financial procedures and standards 4. Debts are managed as per financial procedures and standards 5. Investments are undertaken as per financial procedures and standards 6. Insurance services are procured as per financial procedures and standards |
| 1. Apply entrepreneurial concept | 1. Entrepreneurs and Business persons are distinguished as per principles of entrepreneurship 2. ***Types of entrepreneurs*** are identified as per principles of entrepreneurship 3. Ways of becoming an entrepreneur are identified as per principles of Entrepreneurship 4. ***Characteristics of Entrepreneurs*** are identified as per principles of Entrepreneurship 5. Salaried employment and self-employment are distinguished as per principles of entrepreneurship 6. ***Requirements for entry into self-employment*** are identified according to business procedures and standards 7. Roles of an Entrepreneur in an enterprise are determined according to business procedures and standards 8. **Contributions of entrepreneurship** to National development are identified as per business procedures and standards |
| 1. Identify entrepreneurial opportunities | 1. Business ideas are identified as per business procedures and standards 2. Factors to consider when evaluating business opportunity viability are explored based on business procedure and standards 3. Entrepreneurial opportunities are evaluated as per business procedures and standards 4. Business ideas and opportunities are generated as per business procedures and standards 5. Business life cycle is analysed as per business procedures and standards |
| 1. Apply business legal aspects | 1. ***Forms of business ownership*** are identified as per legal procedures and practices 2. Business Registration and Licensing processes are identified as per legal procedures and practices 3. Types of Contracts and Agreements are analysed as per legal procedures and practices 4. Employment Laws are identified as per legal procedures and practices 5. Taxation laws are identified as per legal procedures and practices |
| 1. Innovate Business strategies | 1. Business innovation strategies are determined by the organization standards 2. Creativity in business development is demonstrated in accordance with business standards 3. ***Innovative business standards***  are developed as per business principles 4. Linkages with other entrepreneurs are created as per best practice 5. ICT is incorporated in business growth and development as per best practice |
| 1. Develop Business Plan | 1. Business idea is described as per business procedures and standards 2. Business description is developed as per business plan format 3. Marketing plan is developed as per business plan format 4. Organizational/Management plan is prepared in accordance with business plan format 5. Production/operation plan is prepared in accordance with business plan format 6. Financial plan is prepared in accordance with the business plan format 7. Executive summary is prepared in accordance with business plan format 8. Business plan is presented as per best practice 9. Business ideas are incubated as per institutional policy |

**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** |
| --- | --- |
| 1. Sources of personal funds mayinclude but not limited to: | * Salary/Wages * Investments * Savings * Inheritance * Government Benefits |
| 1. Sources of business finance mayinclude but not limited to: | * Equity Financing * Debt Financing, * Personal Savings/Investment * Retained Earnings * Grants and Subsidies * Crowdfunding * supplier Credit: * Leasing and Asset Financing: |
| 1. Types of entrepreneurs may include but not limited to: | * Innovators * Imitators * Craft * Opportunistic * Speculators |
| 1. Characteristics of Entrepreneurs may include but not limited to: | * Creative * Innovative * Planner * Risk taker * Networker * Confident * Flexible * Persistent * Patient * Independent * Future oriented * Goal oriented |
| 1. Requirements for entry into self-employment may include but not limited to | * Technical skills * Management skills * Entrepreneurial skills * Resources * Infrastructure |
| 1. Forms of businesses ownership may include but not limited to: | * Sole proprietorship * Partnership * Limited companies * Cooperatives |
| 1. Innovative business standards may include but not limited to: | * New products * New methods of production * New markets * New sources of supplies * Change in industrialization |

**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
* Management
* Problem-solving
* Root-cause analysis
* Communication

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Decision making
* Business communication
* Change management
* Competition
* Risk
* Net working
* Time management
* Leadership
* Factors affecting entrepreneurship development
* Principles of Entrepreneurship
* Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
* Conflict resolution
* Health, safety and environment (HSE) principles and requirements
* Customer care standards
* Basic financial management
* Business strategic planning
* Impact of change on individuals, groups and industries
* Government and regulatory processes
* Local and international market trends
* Product promotion standards
* Market and feasibility studies
* Government and regulatory processes
* Local and international business environment
* Relevant developments in other industries
* Regional/ County business expansion standards

**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. Identified Sources of personal and business finance as per financial procedures and standards 2. Managed Personal finances as per financial procedures and standards 3. Made Investment decisions as per financial procedures and standards 4. GeneratedBusiness ideas and opportunities based on business procedure and standards 5. Analysed business life cycle based on business procedure and standards 6. Determined business innovative standards as per business principles 7. Developed and presented a business plan as per regulatory framework. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place |
| 1. Methods of Assessment | Competency may be assessed through:   1. Written tests 2. Oral questions 3. Third party report 4. Interviews 5. Portfolio |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

# COMMON UNITS OF COMPETENCY

## APPLY MATHEMATICAL PRINCIPLES

**UNIT CODE :** **0441 451 09A**

**UNIT DESCRIPTION :**

This unit describes the competencies required in applying basic mathematics. It involves applying basic arithmetic, applying basic algebra, and applying trigonometry, performing geometrical calculations, carrying out mensuration, applying statistics and applying linear graphs.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements. ***(Bold and italicized terms are elaborated in the Range)*** |
| --- | --- |
| * 1. Apply arithmetical principles | * 1. Identify and use whole numbers and simple fractions, decimals and percentages as per the concepts   2. Understand place value, ranges, rounding off based on appropriate mathematical concepts   3. Rationalize arithmetic percentages and proportions based on the concepts   4. Express numbers decimal and standard form as per concepts |
| * 1. Perform Algebraic calculations | * 1. Performed calculations involving Indices as per the concept   2. Represented linear equations based on the concept   3. Scientific calculator is used in solving mathematical problems in line with the manufacturer’s manual   4. Simultaneous equations are performed as per the rules   5. Solved simple algebraic equations as per the concept   6. Form simple algebraic equations as per the concept |
| * 1. Perform Trigonometry calculations | * 1. Trigonometric calculations are identified based on trigonometric rules   2. Applied trigonometric rules as per the concepts   3. Calculations are performed using trigonometric rules |
| * 1. Perform geometric calculations | 1. Identified geometrical figures based on context 2. Calculated areas of figures as per the given formulae 3. Apply Pythagoras’ theorem based on the concept |
| * 1. Carry out Mensuration calculations | * 1. Identified various ***units of measurement*** as per the course requirements   2. Converted units from one form to another as per mathematical concepts   3. Perimeters and areas of ***figures*** are obtained as per the correct formulae   4. Volume and Surface area of solids are obtained as per the correct formulae   5. Area of irregular figures are obtained as per the correct formulae |
| * 1. Perform statistical calculations | 1. Identified grouped and ungrouped data 2. Organized ungrouped data as per the concept 3. Represented data in frequency tables 4. Calculated the median of grouped and ungrouped data 5. Represented data in a chart form 6. Interpreted data from a given chart |
| * 1. Apply linear graphs | 1. Identify given information as provided in the data set or a problem 2. Appropriate scale is chosen based on quantities or variables 3. Axes are labelled based on appropriate labels 4. ***linear graph*** is plotted based on the given set of data 5. Analyse the graph based on the graph drawn |

**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. Units of measurement may include but not limited to: | * 1. Millimetres   2. Centimetres   3. Inches   4. Feet |
| 1. Figures may include but are not limited to: | * 1. square   2. rectangle   3. triangle   4. polygons   5. circles |
| 1. Linear graphs may include but are not limited to: | * 1. Distance against time   2. Temperature against time   3. Velocity against distance |

**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 tool

**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

**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. Applied basic arithmetic as per the concept applied 2. Demonstrated ability to apply Trigonometry as per the concept 3. Carried out mensuration as per the objects given 4. Performed Simultaneous equations as per the rules 5. Solved simple algebraic equations as per the concept 6. Demonstrated knowledge of Applied statistics as per the concept required 7. Applied linear graphs as per the data set, quantities or variables provided |
| 1. Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Practical 2. Projects 3. Portfolio of evidence 4. Third party reports 5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

PREPARE AND INTERPRET TECHNICAL DRAWINGS

**UNIT CODE: 0732 451 07A**

**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

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT** | **PERFORMANCE CRITERIA**  ***(Bold and italicised terms are elaborated in the Range)*** |
| --- | --- |
| 1. Select, use, and maintain drawing equipment and materials | 1. ***Drawing equipment*** are identified and gathered according to task requirements 2. ***Drawing materials*** are identified and gathered according to task requirements 3. Drawing equipment are used and maintained as per manufacturer’s instructions 4. Drawing materials are used as per job requirements 5. Waste materials are disposed of in accordance with the workplace procedures and ***environmental legislation.*** |
| 1. Produce plane geometry drawings | * 1. Different types of lines used in drawing and their meanings are identified according to standard drawing conventions   2. Different types of geometric forms are constructed according to standard conventions   3. Different types of angles are constructed according to principles of trigonometry   4. Different types of angles are measured using appropriate measuring tools   5. Angles are bisected according to standard conventions   6. Freehand sketching of different types of geometric forms, tools, equipment, diagrams is conducted |
| 1. Produce solid geometry drawings | 1. Drawings of patterns are interpreted according to standard conventions 2. Developed surfaces of truncated and un truncated regular solids |
| 1. Produce orthographic and pictorial drawings | 1. Symbols and abbreviations are identified and their meaning interpreted according to standard drawing conventions 2. First and third angle orthographic drawings are interpreted and produced in accordance with the standard conventions 3. Orthographic elevations are dimensioned in accordance with standard conventions 4. Isometric drawings are interpreted and produced in accordance with standard conventions 5. Oblique drawings are interpreted as per standard conventions |

**RANGE**

| **Variable** | **Range** |
| --- | --- |
| 1. Drawing equipment may include but is not limited to: | * 1. Drawing boards   2. T and set squares   3. drawing sets, |
| 1. Drawing materials may include but is not limited to: | * 1. Drawing papers   2. Pencils   3. Erasers   4. masking tapes   5. paper clips |
| 1. Environmental legislations may include but is not limited to: | * 1. EMCA 1999 |
| 1. Personal Protective Equipment may include but is not limited to: | * 1. Dust coats   2. closed leather shoes |
| 1. Geometric forms may include but is not limited to: | * 1. Circles   2. Triangles   3. Rectangles   4. Parallelogram   5. Polygons   6. Pyramids   7. conic sections   8. prisms, loci |

**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:

1. Critical thinking
2. Drawing
3. Interpretation
4. Drawing equipment handling
5. Communication
6. Interpersonal

**Required knowledge**

The individual needs to demonstrate knowledge of:

1. Drawing equipment and materials
2. Freehand sketching
3. Lettering
4. Geometrical constructions
5. Types of drawings
6. Types of lines
7. Isometric drawing conventions, features, characteristics, components
8. Orthographic drawing conventions, features, characteristics, components
9. 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.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Selected, used, and maintained drawing equipment and materials appropriately 2. Was able to produce plain geometry drawings 3. Conducted freehand sketching of different types of geometric forms, tools, equipment, diagrams 4. Produced solid geometry drawings 5. Developed surfaces of truncated and un truncated regular solids 6. Produced pictorial and orthographic drawings correctly |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2. Measuring equipment 3. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency may be assessed through:   * 1. Practical tests   2. Observation |
| 1. Context of Assessment | Competency may be assessed   1. On-the-job 2. Off-the –job 3. During Industrial attachment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY CONSTRUCTION MATERIAL SCIENCE I

**UNIT CODE: 0722 451 03A**

**UNIT DESCRIPTION**

This unit describes the competence in applying Construction materials science. It involves identifying essential construction materials and their properties, selecting quality construction materials.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  This describes the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice)  ***Bold and italicized terms*** ***are elaborated in the Range*** |
| 1. Identify essential construction materials | * 1. Use of construction material is identified based on its properties   2. Bills of quantities and working drawings are obtained and interpreted   3. Essential ***construction materials*** are identified based on construction requirements and project scope |
| 1. Identify properties of construction materials | * 1. ***Physical properties*** of construction materials are identified based on the type of construction material and codes of practice   2. ***Chemical properties*** of construction materials are identified based on the type of construction material and codes of practice   3. ***Mechanical properties*** of construction materials are identified based on the type of construction material and codes of practice |
| 1. Select quality construction materials | * 1. Cost implications of construction materials are evaluated and analyzed   2. Quality construction materials are selected based on their costs, availability and project requirements   3. Selection criteria recorded as per work place procedures |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| 1. Construction materials may include but not limited to: | * 1. Stones   2. bricks   3. clay and clay products   4. lime   5. cement   6. timber and timber products   7. metals and alloys   8. paints and varnishes   9. roofing materials   10. Aggregates   11. Glass and glass products   12. Bitumen and bituminous products |
| 1. Physical properties may include but are not limited to: | * 1. Porosity   2. Surface texture   3. Strength   4. Density   5. Thermal conductivity   6. Wear and tear |
| 1. Chemical properties may include but are not limited to: | * 1. Corrosion resistance   2. Chemical resistance |
| 1. Mechanical properties may include but not limited to: | * 1. Toughness   2. Hardness   3. Fatigue   4. Stress and strain   5. Creep and stress rapture   6. Strength |

**SKILLS**

1. Analytical
2. Quality control analysis
3. Complex problem solving
4. Critical thinking
5. Engineering drawings interpretation
6. Monitoring
7. Numeracy
8. Communication

**REQUIRED KNOWLEDGE**

1. Applied science
2. Construction materials
3. Materials testing
4. Quality assurance
5. Management of material resources
6. Engineering mathematics
7. Bills of quantities
8. Materials handling safety procedures

**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. Identified essential construction materials based on its properties   2. Selected quality construction materials based on their costs, availability and project requirements   3. Tested construction materials as per the construction requirements and engineer’s instructions   4. Identified properties of construction materials as per the type of construction material and codes of practice   5. Handled construction materialsbased on the safety requirements and type of materials |
| 1. Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY CONSTRUCTION MATERIAL SCIENCE II

**UNIT CODE: 0722 451 08A**

**UNIT DESCRIPTION**

This unit describes the competence in testing construction materials and demonstrating knowledge in the handling and use of construction materials. It involves carrying out earthwork activities, constructing pavement layers and transportation infrastructure.

**ELEMENT AND PERFOMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  This describes the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice)  ***Bold and italicized terms*** ***are elaborated in the Range*** |
| 1. Test construction materials | 1. Construction materials are sampled randomly as per job requirement 2. ***Test parameters*** are identified as per the construction requirements and engineer’s instructions 3. Construction materials are tested as per the job requirement |
| 1. Handle construction materials | 1. Construction materials to be handled are identified according to their uses 2. Safety requirements are identified based on the construction materials 3. Construction materials are handled safely based on the safety requirements |
| 1. Use construction materials | 1. Construction materials, tools and equipment are assembled based on construction methods 2. construction materials are prepared based on purpose 3. Construction materials are used based on construction process |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| 1. Test parameters may include but not limited to: | * + Compression   + Weathering   + Durability   + Water absorption   + Impurity tests   + Tensile tests   + Workability   + Plasticity   + Aggregates crushing value   + Optimum moisture content |

**SKILLS**

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

**REQUIRED KNOWLEDGE**

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

**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. Tested construction materials as per the construction requirements and engineer’s instructions 2. Identified properties of construction materials as per the type of construction material and codes of practice 3. Handled construction materials based on the safety requirements and type of materials |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Practical 2. Projects 3. Portfolio of evidence 4. Third party reports 5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## DEMONSTRATE WORKSHOP TECHNOLOGY SKILLS

**UNIT CODE: 0732 451 10A**

**Unit Description**

This unit describes the competencies required to demonstrate workshop technology skills. It involves demonstrating workshop safety awareness, demonstrating masonry skills, demonstrating carpentry skills, performing electrical operations and managing workshop waste.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the keyoutcomes which make up  workplace function | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| --- | --- |
| 1. Demonstrate workshop safety awareness | * 1. ***Personal Protective Equipment*** are donned as per job requirements   2. Personal safety rules and regulations are complied with according to Occupational Safety and Health (OSH) Act 2012   3. Workshop machine, tools and equipment safety procedures are complied with as per OSH Act 2012   4. Workplace safety practices are complied with in accordance to Occupational Safety and Health (OSH) Act 2012   5. Appropriate fire extinguishers are used as per manufacturer’s instruction. |
| 1. Demonstrate masonry skills | * 1. ***Workshop safety hazards*** are identified and neutralized based on their nature   2. ***Masonry tools, equipment*** and ***consumable materials*** are identified and used as per job requirements   3. ***Working drawings*** are obtained and interpreted based on design   4. Setting out is conducted based on design as per standard procedure   5. ***Masonry procedures*** are undertaken based on job specification   6. ***Masonry works*** are finished based on job specification   7. Masonry works are tested for functionality as per procedure |
| 1. Demonstrate carpentry skills | * 1. ***Workshop safety hazards*** are identified and neutralized based on their nature   2. ***carpentry tools, equipment*** and ***consumable materials*** are used as per job requirements   3. ***Working drawings*** are selected based on job requirement.   4. Setting out is conducted based on design as per standard procedure   5. ***Carpentry procedures*** are undertaken based on job specification |
| 4.Perform electrical operations | * 1. Safety requirements in the workshop environment are adhered to as per OSHA 2012   2. Working drawings are selected based on job requirement.   3. Electrical tools, equipment and consumable materials are used as per job requirements   4. Power supply sources are used as per the job requirement   5. Basic electrical circuits are installed and maintained as per IEE regulations |
| 5.Manage workshop waste | 1. PPEs are donned as per OSHA 2012. 2. ***Waste management tools*** and ***equipment*** are used as per the job requirement. 3. Waste is collected as per environmental management authority guidelines 4. Solid waste disposal is carried out according to NEMA guidelines 5. ***Waste management procedures*** are employed as per the workplace policy |

**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. Personal Protective Equipment (PPE) output may include but is not limited to: | * Dust coat/overall * Safety boots * Helmet * Safety gloves * Safety goggles * Reflector jackets * Hear muffs * Face musk |
| 1. Waste management tools and equipmentmay include but is not limited to: | * Dust bin * Shovel * Brooms * Dust blower * Dust pan * Wheel barrow * trowel |
| 1. Masonry tools and equipment may include but is not limited to: | Fabrication tools and equipment:   * Wire brush * Saws * Hammers * Trowels * Mason square * Builder’s line * Tape measure * Floats * shovel * Levels * Plumb bob * Drilling machines * Wheel barrows |
| 1. Workshop hazards may include but not limited to: | * Fire * Explosion * Fumes and gases * Electric shock * Spilt oil/water |
| 1. Consumable materials may include but not limited to: | * Blocks * Adhesives * Sand paper * Electric cables * Conduits * Patress * Couplers * Switches * bulbs * Switch boxes * Stones * Sand * Cement * Timber * Lime * Hoop iron * Reinforcement bars * Jointing cement * Clips * Sheet metal * nails |
| 1. Working drawings may include but not limited to: | * structural * architectural * mechanical * electrical |
| 1. carpentry tools and equipment may include but is not limited to: | * planes * saws * chisels * clamps * vices * gauges * files * drills * screw drivers * spanners |
| 1. Electrical tools and equipment may include but is not limited to: | * Pliers * Tester * Draw wire * Bending spring * Electric meters * Ladder * Drilling machine * Screw drivers * Hammer |
| 1. Waste management procedures may include but is not limited to: | * Reduce * Recycle * reuse |

**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:

* Numerical
* Documentation
* Accident and incident reporting
* Workplace hazards
* First aid
* Measurement
* Electrical
* Carpentry
* masonry
* maintenance

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Tools and equipment handling
* Troubleshooting
* Electrical
* Masonry
* Waste disposal
* Occupational health and safety
* Maintenance
* Conservation
* Record keeping
* House keeping
* Computer skills
* carpentry
* Decision making
* Workplace hazards
* Time management
* Communication

**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. Selected and donned personal protective equipment (PPE) 2. Interpreted working drawings based on design 3. Complied with workshop safety hazards 4. Compliedwith workshop machine, tools and equipment safety procedures 5. Carried out masonry procedures 6. Performed electrical procedures 7. Performed carpentry procedures 8. Carried out machine fault diagnosis 9. Performed housekeeping activities |
| 1. Resource Implications. | The following resources should be provided:   * 1. Access to relevant workplace where assessment can take place   2. Appropriately simulated environment where assessment can take place   3. Materials relevant to the proposed assessment activity or tasks |
| 1. Methods of Assessment. | Competency may be assessed through:   * 1. Observation   2. Written Tests   3. Oral Questioning   4. Portfolio of evidence   5. Third Party Report   6. Interviews |
| 1. Context of Assessment. | Competency may be assessed:   * 1. On-the-job   2. Off-the-job   3. During industrial attachment |
| 1. Guidance information for assessment. | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# CORE UNITS OF COMPETENCY

## PREPARE FOR MATERIALS TESTING

**UNIT CODE : 0732 451 06A**

**UNIT DESCRIPTION :**

This unit describes the competencies required in preparing for materials testing. It involves organizing for material testing, sampling construction materials and preparing samples for testing.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the keyoutcomes which make up  workplace function | **Performance criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| 1. Organize for material testing | * 1. Preliminary site investigations are conducted as per work requirements.   2. Material laboratory is provided and maintained as per the work requirement   3. Material testing manuals and contract documents are obtained as per job requirement   4. Material testing equipment are acquired as per job requirement   5. Material laboratory personnel are identified according to expertise and qualifications   6. Types of material tests are determined according to test procedures and requirements   7. ***Testing equipment*** are maintained as per the manufacturer’s instructions |
| 1. Sample construction materials | * 1. Sources of construction materials are identified as per job requirement   2. Sampling procedures are obtained as per the work specifications   3. ***Sampling tools and equipment*** are assembled as per the job requirements   4. Sampling is carried out as per job requirement   5. Samples awaiting analysis are stored as per job requirement   6. Testing equipment are maintained as per job requirement |
| 1. Prepare samples for testing | * 1. ***Sample tests*** are identified as per job requirement   2. Standard manuals and procedures are obtained as per job requirement   3. ***Sample testing tools and apparatus*** are assembled as per job requirement   4. Samples are obtained as per job specification   5. Testing equipment are maintained as per job requirement |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| ***1. Testing equipment*** may include but not limited to: | 1. Moulds 2. Tamping rods 3. CBR test machine 4. Rammer 5. Ruffle box 6. Casagrande apparatus 7. Penetrometer 8. Weighing machine 9. Oven 10. Measuring cylinder 11. Cone cups 12. Bowl 13. Stirring stick 14. Crushing machine 15. Moisture bags 16. Funnels 17. Standard sieves |
| ***2. Sampling tools and equipment*** may include but are not limited to: | * 1. Spade   2. Trowel   3. Jembe   4. Mattock   5. Circular cutters   6. Spatula   7. Chisel   8. Bowls |
| ***3. Sample tests*** may include but are not limited to: | 1. Atterberg limit 2. Proctor/compaction 3. slump test |

**Required SKILL**

1. Quality control analysis
2. Complex problem solving
3. Critical thinking
4. Engineering drawings interpretation
5. Monitoring
6. Numeracy
7. Communication

**REQUIRED KNOWLEDGE**

1. Applied science
2. Construction materials
3. Materials testing
4. Quality assurance
5. Management of material resources
6. Engineering mathematics
7. Bills of quantities
8. Materials handling safety procedures

**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. Conducted Preliminary site investigations as per work requirements.   2. Obtained Material testing manuals and contract documents as per job requirement   3. Prepared Material testing equipment as per job requirement   4. Identified Types of material tests according to test procedures and requirements   5. Obtained Sampling procedures as per the work specifications   6. Assembled Sampling tools and equipment as per the job requirements   7. Carried out Sampling as per job requirement   8. Stored Samples awaiting analysis as per job requirement   9. Maintained Testing equipment as per job requirement |
| 1. Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## CONDUCT MATERIAL TESTING I

**UNIT CODE: 0732 551 13A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to Conduct Material Testing. It involves preparing for material testing, sampling construction materials, and performing tests on alignment soils, concrete, structural steel, bitumen materials and timber.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| ELEMENT  These describe the key outcomes which make up workplace function | PERFORMANCE CRITERIA  These are assessable statements, which specify the required level of performance for each of the elements.  *(Bold and italicized terms are elaborated in the Range)* |
| 1. Perform soil tests | 1. *Soil tests* are identified according to contract document 2. Standard manuals and procedures are obtained in accordance with test requirement 3. Soil testing tools and apparatus are assembled based on test requirements 4. Soil samples are obtained according to test requirement 5. Soil tests are conducted as per laboratory manual 6. Results are analyzed as per the soil analysis manual 7. Report is prepared and presented based on contract document requirement 8. Testing equipment are maintained as per the manufacturer’s instructions |
| 1. Perform concrete tests | 1. *Concrete tests* are identified according to contract document 2. Concrete testing tools and apparatus are gathered based on test requirements 3. *Concrete materials* are tested as per test requirement 4. Samples are cast and cured as per concrete testing manual 5. Samples are tested and results recorded according to concrete testing manual 6. Analysis of test result is carried out and reported according to contract document 7. Concrete testing equipment are maintained as per the manufacturer’s instructions |

**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. Soil Tests may include but not limited to: | * 1. CBR   2. Atterberg limit   3. Liquid limit   4. Plastic limit   5. Proctor/compaction   6. Field density   7. Particle size distribution |
| 1. Concrete Tests may include but not limited to: | * 1. Compressive strength   2. Slump   3. Cleanliness   4. Particle size distribution |

**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:

* Technical
* Interpretation
* Reporting
* Analytical
* Sample handling
* Interpersonal
* Observation
* Time management
* Leadership
* Numeracy
* Computer

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Material testing laboratory
* Sampling procedures
* Standard manuals and procedures
* Contract documents
* Material testing equipment
* Road construction materials
  + Types
  + Sources
  + Properties
* Material sampling
* Test parameters
* Analysis and interpretation
* Sample preparation
* SOPs

**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. Conducted soil tests as per laboratory manual   2. Carried out analysis of test result and reported according to contract document   3. Testing equipment are maintained as per the manufacturer’s manual |
| 1. Resource Implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant assessment environment   3. Resources relevant to the proposed assessment activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be accessed through:   * 1. Practical tests   2. Project   3. Portfolio of evidence   4. Third party report   5. Written tests |
| 1. Context of Assessment | This competency may be assessed in a work place or in a simulated work place |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended |

## CARRY OUT SITE SURVEY

**UNIT CODE: 0732 451 04A**

**UNIT DESCRIPTION:**

This unit describes the competencies required in carrying out site survey. It involves undertaking preliminary site survey, setting out civil structures and establishing survey control points.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **EMENT**  These describe the keyoutcomes which make up  workplace function | **Performance criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| 1. Undertake preliminary site survey | * 1. Preliminary site survey plan is prepared in as per job requirement   2. ***Survey resources*** are mobilized as per the contract document   3. ***Working drawings*** are interpreted as per job requirement   4. ***Site conditions*** are recorded as per job requirement procedures   5. Original ground level (ogl) is established and documented as per job requirement   6. Reference points are established as per job requirement Preliminary survey report is prepared according to findings |
| 1. Set out civil structures | * 1. ***Setting out*** ***tools and equipment*** are selected according to job requirement.   2. Setting out equipment are calibrated according to manufacturer’s manual   3. Proposed alignment is determined as per job requirement   4. Horizontal and vertical alignment is set out as per job requirement as per job requirement   5. Alignment data is computed as per the job requirements   6. Setting out tools and equipment are maintained as per job requirement |
| 3.Establish survey control points  (LEVELLING) | 1. ***Survey tools and equipment*** are selected according to job requirement. 2. Survey tools and equipment are calibrated as per job requirement 3. ***Site survey control points*** are established as per job requirement 4. ***Levelling works*** is carried out as per work requirements 5. survey tools and equipment are maintained as per job requirement |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Range**   |  |  | | --- | --- | | **Variable** | **Range**  *May include but is not limited to:* | | 1. ***Survey resources*** may include but not limited to: | 1..1 Human resources   * 1. Tools      1. Driving hammers      2. Pegs      3. Measuring tapes      4. Cutting tools   2. Equipment      1. Electric Distance Measurement (EDM) machines      2. Theodolite (CWT)      3. Total Station (TS)      4. Dumpy level      5. Levelling staff   3. Stationery      1. Surveyors filed notebooks      2. Pencil      3. Grid papers   4. Legal documents      1. Field permits      2. Registration certificates   5. Power back-ups   6. Location maps | | 1. ***Working drawings*** may include but are not limited to: | * 1. Topographic maps   2. Site plan   3. Profile drawings | | 1. ***Site conditions*** may include but are not limited to: | * 1. Topography   2. Soil type and profiles   3. Vegetation   4. Settlements   5. Drainage   6. Weather conditions   7. Utility services      1. Underground electric cables      2. Pipe lines      3. Data cables   8. Water table | | 1. ***Setting out*** ***tools and equipment*** may include but not limited to: | * 1. Strings   2. Tape measures   3. Ranging rods   4. Pegs   5. Cutting tools   6. Driving tools   7. Angle measuring tools   8. Plumb bob   9. Marking tools and equipment | | 1. ***Survey tools and equipment*** are may include but not limited to: | * 1. Dumpy level, tilting levels and automatic levels   2. Levelling staff   3. Tilting levels   4. Automatic levels   5. Tape measure   6. Pegs   7. Ranging rods | | 1. ***Site survey control points*** may include but not limited to: | * 1. TBM (temporary benchmark)   2. BM (permanent benchmark)   3. Arbitrary | | 1. ***Levelling works*** may include but not limited to: | * 1. Temporary adjustment   2. Booking levels   3. Calculation of reduced levels   4. Arithmetic checks |   **Required SKILLS**   1. Analytical 2. Quality control analysis 3. Complex problem solving 4. Critical thinking 5. Engineering drawings interpretation 6. Monitoring 7. Numeracy 8. Communication   **REQUIRED KNOWLEDGE**   1. Applied science 2. Construction materials 3. Materials testing 4. Quality assurance 5. Management of material resources 6. Engineering mathematics 7. Bills of quantities 8. Materials handling safety procedures   **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. Mobilized Survey resources as per the contract document   2. Interpreted Working drawings as per job requirement   3. Recorded Site conditions as per job requirement procedures   4. Established Original ground level (ogl) as per job requirement   5. Set out Horizontal and vertical alignment as per job requirement as per job requirement   6. Computed Alignment data as per the job requirements   7. Maintained Setting out tools and equipment as per job requirement   8. Selected Survey tools and equipment according to job requirement. | | * + 1. Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks | | * + 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests | | * + 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace | | * + 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. | |

## CARRY OUT ROAD CONSTRUCTION WORKS I

**UNIT CODE :0732 451 12A**

**UNIT DESCRIPTION :**

This unit describes the competencies required in carry out pavement construction works. It involves Carrying out Earthwork Activities, constructing pavement layers, constructing transportation infrastructure and applying emerging trends in road construction

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the keyoutcomes which make up  workplace function | **Performance criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| 1. Carry out earthwork activities | * 1. ***Earthwork resources*** are mobilized as per the work requirement   2. ***Site clearance*** activities are carried out based on job requirement   3. Drawings are interpreted as per site layout   4. Setting out for earthworks is conducted based on design output   5. Ground levels are documented according to site level reports   6. Volumes of cut and fill materials is determined in accordance to the ground levels   7. Disposal of waste material is carried out as per the waste disposal regulations   8. Construction tools and equipment are operated and maintained as per the manufacturer’s instruction |
| 1. Construct pavement layers | * 1. Required road construction resources are mobilized as per job requirement.   2. Drawings are interpreted as per the site layout   3. Levelling activities are carried out as per ground levels   4. ***Profile layers*** are laid as per job requirements   5. Maintenance of road structure is undertaken as per maintenance procedures   6. Construction tools and equipment are maintained as per the manufacturer’s instructions |
| 1. Construct transportation infrastructure | * 1. Required resources are mobilized as per contract document   2. Drawings are interpreted as per site layout   3. ***Transportation infrastructure*** is constructed as per the structural and architectural designs   4. Levelling activities are carried out as per standard construction requirements   5. Quality control operations are carried out according to standard construction requirements   6. Transportation infrastructure maintenance is undertaken as per maintenance requirements   7. Construction tools and equipment are maintained as per the manufacturer’s instructions |
| 1. Apply emerging strategies for Road Construction | * 1. ***Emerging trends*** are identified based on recent developments   2. Road construction site is prepared as per job requirement   3. Road construction works are conducted based on the job requirements |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| 1. ***Earthwork resources*** may include but not limited to: | * 1. Bull dozers   2. Graders   3. Back hoes   4. Tippers   5. Shovels   6. Excavators   7. Grabbers   8. Rollers   9. Compactors      1. Cranes      2. Dump trucks      3. Off-highway dumpers |
| 1. ***Site clearance*** may include but are not limited to: | 1. Tree felling and stump removal 2. Boulders removal 3. Bush clearing 4. Grass cutting 5. Stripping 6. Removal cotton soil 7. Isolation and diversion of live services 8. Demolition of buildings, walls and bridges 9. Removal of existing pipelines, public and privately-owned services or supplies 10. Removal of fencing and hedges |
| 1. ***Profile layers*** may include but are not limited to: | 1. Subgrade 2. Sub base 3. Base course 4. binder 5. Wearing course |
| 1. ***Transportation infrastructure*** may include but not limited to: | 1. parking 2. walk ways 3. cyclist lanes 4. foot bridges 5. bus bays |

**Required SKILLS**

1. Analytical
2. Quality control analysis
3. Complex problem solving
4. Critical thinking
5. Engineering drawings interpretation
6. Monitoring
7. Numeracy
8. Communication

**REQUIRED KNOWLEDGE**

1. Applied science
2. Construction materials
3. Materials testing
4. Quality assurance
5. Management of material resources
6. Engineering mathematics
7. Bills of quantities
8. Materials handling safety procedures

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| Critical Aspects of Competency | Assessment requires evidence that the candidate:   * 1. Mobilised earthwork resources as per the work requirement   2. Carried out site clearance activities based on job requirement   3. Conducted setting out for earthworks based on design output   4. Determined volumes of cut and fill materials in accordance to the ground levels   5. Maintained construction tools and equipment as per the manufacturer’s instruction   6. Mobilized required road construction resources as per job requirement.   7. Carried out levelling activities as per ground levels   8. Laid profile layers as per job requirements   9. Constructed transportation infrastructure as per the working drawings   10. Carried out quality control operations according to standard construction requirements   11. Undertook transportation infrastructure maintenance as per maintenance requirements |
| Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks |
| Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests |
| Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## EXECUTE ROAD MAINTENANCE WORKS

**UNIT CODE: 0732 451 14A**

**UNIT DESCRIPTION:**

This unit describes the competencies required in execute road maintenance works. It involves preparing for road maintenance works, executing right of way maintenance, executing Road Furniture maintenance Works and applying emerging strategies for Road maintenance.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the keyoutcomes which make up  workplace function | **Performance criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| 1. Prepare for road maintenance works | * 1. ***Road condition survey*** is conducted based on the specifications and scope of work.   2. Road maintenance work plan is prepared based on road inventory and scope of work   3. Road maintenance desktop study is carried out based on existing information.   4. Road systems maintenance tools, equipment, materials and supplies are identified and assembled based on reconnaissance reports.   5. Safety kits are identified and assembled based on activities and OSH regulations.   6. Labour is identified based on the scope of work and job requirements. |
| 1. Execute right of way maintenance | * 1. Safety precautions are applied as per the OSH Act and OEM manuals   2. ***Roads maintenance resources*** are mobilized based on work plans.   3. ***Existing services*** are identified and re-located as per Road Design Manual Part 5   4. Road maintenance site is secured as Road Design Manual Part 5   5. Road systems are maintained as per the identified defects   6. Quality of maintenance work is assured based on contract specifications.   7. Road maintenance environment is reinstated based on contract specifications. |
| 1. Execute Road Furniture maintenance Works | * 1. Safety precautions are applied as per the OSH Act and OEM manuals   2. ***Road furniture condition*** survey is carried out as per Road Design Manual Part 5   3. ***Road furniture maintenance resources*** are mobilized based on work plans.   4. Existing services are identified as per Road Design Manual Part 5   5. Road furniture maintenance site is secured as per Road Design Manual Part 5   6. Road furniture is maintained as per Road Design Manual Part 5   7. Quality of maintenance work is assured based on the contract specifications.   8. Road maintenance environment is reinstated based on contract specifications. |
| 1. Apply emerging strategies for Road maintenance | * 1. Road maintenance works are prepared based on the maintenance schedules   2. Road maintenance works are executed based on job schedules   3. Road maintenance completion activities are conducted based on standard specifications. |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| 1. ***Road condition survey*** may include but not limited to: | * + 1. Potholes     2. Edge failures     3. Cracking     4. Surface deterioration     5. Rutting and subsidence     6. Recarpeting |
| 1. ***Road maintenance resources*** may include but are not limited to: | * + 1. Human resource     2. Hand sprayer     3. Pedestrian roller     4. Bitumen distributor     5. Chips spreader     6. Pneumatic roller     7. Paver     8. Circular saw cutter |
| 1. ***Existing services*** may include but not limited to: | * + 1. Underground electric cables     2. Pipe lines     3. Data cables |
| 1. ***Road furniture condition*** may include but not limited to: | * 1. Vandalised road signs   2. Worn out road markings   3. Dilapidated information signs   4. Damaged guard rails |
| 1. ***Road furniture maintenance resources*** may include but not limited to: | * 1. Human resource   2. Guard rails   3. Concrete   4. Road signage   5. Paint |

**Required SKILLS**

1. Analytical
2. Quality control analysis
3. Complex problem solving
4. Critical thinking
5. Engineering drawings interpretation
6. Monitoring
7. Numeracy
8. Communication

**REQUIRED KNOWLEDGE**

1. Applied science
2. Construction materials
3. Materials testing
4. Quality assurance
5. Management of material resources
6. Engineering mathematics
7. Bills of quantities
8. Materials handling safety procedures

**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. Conducted road condition survey based on the specifications and scope of work.   2. Prepared road maintenance work plan based on road inventory and scope of work   3. Carried out road maintenance desktop study based on existing information.   4. Assembled road systems maintenance tools, equipment, materials and supplies based on reconnaissance reports.   5. Identified labour based on the scope of work and job requirements.   6. Applied safety precautions as per the OSH Act and OEM manuals   7. Identified existing services as per Road Design Manual Part 5   8. Assured Quality of maintenance work based on contract specifications.   9. Carried out road furniture condition survey as per Road Design Manual Part 5   10. Mobilised road furniture maintenance resources based on work plans.   11. Executed road maintenance works based on job schedules   12. Conducted road maintenance completion activities based on standard specifications.   13. Applied Environmental conservation measures as per the EMCA (Cap 387) |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## CARRY OUT CIVIL WORKS

**UNIT CODE: 0732 451 15A**

**UNIT DESCRIPTION:**

This unit describes the competencies required in carry out civil works. It involves carrying out site preliminary work, performing civil temporary works and executing substructure works.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the keyoutcomes which make up  workplace function | **Performance criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the Range)*** |
| 1. Carry out site preliminary works | * 1. Site is surveyed as per job requirement   2. Site boundary is determined as per site layout   3. Site is cleared as per standard construction procedures   4. Site preliminary report is prepared as per standard construction procedures   5. ***Site utilities*** are constructed as per standard construction procedures |
| 1. Perform civil temporary works | * 1. . Trench timbering are constructed and dismantled according to standard construction procedures   2. formwork/shuttering is constructed and dismantled as per job requirement   3. scaffold is erected and dismantled as per job requirement   4. shores are erected and dismantled as per job requirement |
| 1. Execute substructure works | * 1. ***Foundation type is*** identified as per the job requirement   2. setting out is carried out as per the job requirement   3. foundation is excavated as per the job requirement   4. foundation is laid as per the job requirement   5. ***structural elements*** are erected as per the job requirement |

**Range**

|  |  |
| --- | --- |
| **Variable** | **Range**  *May include but is not limited to:* |
| 1. ***Site utilities*** may include but not limited to: | * 1. Temporary washrooms   2. Source of water   3. Storage   4. Site office |
| 1. ***Foundation type*** may include but are not limited to: | 1. Strip footing 2. Pad footing 3. Raft |
| 1. ***structural elements*** may include but not limited to: | * 1. Column   2. Beam   3. Staircase   4. slab |
| 1. ***Resources*** | * 1. Human labour   2. Tools   3. Equipment   4. Plants |

**Required SKILLS**

1. Analytical
2. Quality control analysis
3. Complex problem solving
4. Critical thinking
5. Engineering drawings interpretation
6. Monitoring
7. Numeracy
8. Communication

**REQUIRED KNOWLEDGE**

1. Applied science
2. Construction materials
3. Materials testing
4. Quality assurance
5. Management of material resources
6. Engineering mathematics
7. Bills of quantities
8. Materials handling safety procedures

**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. Surveyed site as per job requirement   2. Cleared site as per standard construction procedures   3. Prepared site layout as per standard construction procedures   4. Constructed site utilities as per standard construction procedures   5. Constructed and dismantled trench timbering according to standard construction procedures   6. Constructed and dismantled formwork/shuttering as per job requirement   7. Erected and dismantled scaffold as per job requirement   8. Erected and dismantled shores as per job requirement   9. Carried out setting out as per the job requirement   10. Laid foundation as per the job requirement |
| 1. Resource Implications | The following resources should be provided:   * 1. Access to relevant workplace or appropriately simulated environment where assessment can take place   2. Materials relevant to the proposed activity or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Portfolio of evidence   4. Third party reports   5. Written tests |
| 1. Context of Assessment | The competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |