NATIONAL CERTIFICATE (VOCATIONAL)

SUBJECT GUIDELINES

ROADS
NQF Level 3

September 2007
ROADS – LEVEL 3

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INTRODUCTION

A. What is Roads?
Roads provides students with training on the construction and maintenance of roads. This subject will enhance students’ employability and career advancement in road construction and other related activities in the building and civil construction industry.

B. Why is Roads important in the Building and Civil Construction programme?
Activities in this specialised discipline play an important role in the building and civil construction industry as they help students to realise the need for roads in communities.

C. The link between Roads Learning Outcomes and the Critical and Developmental Outcomes
Students will be able to identify the different activities carried out to construct and maintain roads. They will work actively with the team to interpret health and safety programmes, interpret drawings and sketches and calculate quantities required.

D. Factors that contribute towards achieving the Roads Learning Outcomes
- Thorough preparation for teaching and learning activities
- An environment conducive to teaching and learning through effective learner support, motivation, commitment and a positive attitude
- An interest in the Roads programme
1 DURATION AND TUITION TIME
This is a one-year instructional programme comprising 200 teaching and learning hours (20 credits). The subject may be offered on a part-time basis provided all of the assessment requirements set hereunder are adhered to. Provision for learners with special education needs (LSEN) must be made in a way that eliminates any barriers to learning activities.

2 SUBJECT LEVEL FOCUS
The student will be able to:
• Adhere to health and safety requirements when working in a road construction environment.
• Interpret road construction drawings and calculate quantities required based on these drawings.
• Perform road construction activities.

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment (50 percent)
Internal assessment refers to continuous assessment, which is college-based assessment. The achievement of Learning Outcomes contributes towards the achievement of the qualification. All internal assessments must be finalised by an assessor who has been declared competent by an accredited provider.

3.1.1 Theoretical Component
The theoretical component will form 70 percent if the internal assessment, based on the fact that the subject requires a broad base of theoretical knowledge. Evidence of the theoretical assessment must be reflected in the PoE.

3.1.2 Practical Component
The practical component will form 30 percent if the internal assessment. All learners must have a Portfolio of Evidence (PoE) for the purpose of assessment.

The practical component of this subject is likely to take place in a college workshop, or at a workplace where the relevant equipment is available.

• Some examples of practical assessments include, but are not limited to:
  - Presentations (lectures, demonstrations, group discussions and activities, practical work, observation, role play, self activity, judging and evaluation)
  - Use of aids
  - Exhibitions
  - Visits
  - Guest speaker presentations
  - Research
  - Structured environment

• Definition of the term “Structured Environment”
“Structured environment” for the purposes of assessment refers to an actual or simulated workplace, or workshop environment.

Evidence of the practical component must be provided in the form of a Logbook with a clear listing of the competencies to be assessed. The following information must be contained in the logbook:

- Date
- Task
- Summary of Task
- Supervisor’s signature
- Learner’s signature
- Date of completion of task

For the Logbook to be regarded as valid evidence it must be reflected in the learner’s Portfolio of Evidence. An officially assigned supervisor must sign this work off.
• Evidence in practical assessments
All evidence pertaining to evaluation of practical work must be reflected in the learners’ Portfolio of Evidence. The tools and instruments constructed and used for the purpose of conducting such assessments must be clear from evidence contained in the Portfolio of Evidence.

3.1.3 Processing of internal assessment mark for the year
A year mark out of 100 is calculated by adding the marks of the theoretical component and the practical component of the internal continuous assessment.

3.1.4 Moderation of internal assessment mark
Internal assessment is subject to internal and external moderation procedures as set out in the national Examinations Policy for Further Education and Training College Programmes.

3.2 External assessment (50 percent)
A national examination is conducted annually in October or November by means of a paper set externally and marked and moderated internally.

4 WEIGHTED VALUES OF THE TOPICS

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>WEIGHTED VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Construction of roads</td>
<td>10%</td>
</tr>
<tr>
<td>2. Unsurfaced road shoulders</td>
<td>15%</td>
</tr>
<tr>
<td>3. Directional signs</td>
<td>10%</td>
</tr>
<tr>
<td>4. Installation of road markers</td>
<td>10%</td>
</tr>
<tr>
<td>5. Erection of signposts</td>
<td>10%</td>
</tr>
<tr>
<td>6. Compaction of hot mix asphalt</td>
<td>15%</td>
</tr>
<tr>
<td>7. Pre-cast kerbs and concrete channels on road works construction site</td>
<td>30%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

5 CALCULATION OF FINAL MARK
Continuous Assessment: Student’s mark/100 x 50/1 = a mark out of 50 (a)
Theoretical Examination Mark: Student’s mark/100 x 50/1 = a mark out of 50 (b)
Final Mark: (a) + (b) = a mark out of 100

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, purposes of moderation and verification.

6 PASS REQUIREMENTS
A learner must obtain at least fifty (50) percent in ICASS and fifty (50) in the examination.

7 SUBJECT AND LEARNING OUTCOMES
On completion of Roads Level 3 the student should have covered the following topics:

Topic 1: Construction of roads
Topic 2: Unsurfaced road shoulders
Topic 3: Directional signs
Topic 4: Installation of road markers
Topic 5: Erection of signposts
Topic 6: Compaction of hot mix asphalt
Topic 7: Pre-cast kerbs and concrete channels on road works construction site
7.1 Topic 1: Construction of roads

7.1.1 Subject Outcome: Perform road building

Learning Outcomes
- Perform the earthwork activities
- Perform the different base courses
- Perform surface finishing
- Perform drainage work

7.2 Topic 2: Unsurfaced road shoulders

7.2.1 Subject Outcome 1: Explain well maintained gravel road shoulders

Learning Outcome
- Explain the characteristics and benefits of well-maintained gravel road shoulders

7.2.2. Subject Outcome 2: Plan to conduct, repair or do maintenance work on an unsurfaced road shoulder.

Learning Outcome
- Conduct a task evaluation
- Draw up a work plan and obtain materials

Range: personnel, plant and equipment, personnel safety equipment, roadside safety equipment, material quantities, schedule of activities, hazard identification

7.2.3. Subject Outcome 3: Prepare the work areas

Learning Outcome
- Put temporary traffic control devices in place
- Take safety measures with regard to identified hazards
- Assign personnel to specific tasks

7.2.4. Subject Outcome 4: Conduct the shoulder repair task

Learning Outcome
- Excavate, backfill and compact according to specification
- Utilise plant and material as prescribed
- Adhere to safety measures

7.2.5. Subject Outcome 5: Clear the work site on completion of work

Learning Outcome
- Remove excess material
- Remove temporary traffic control signs in correct sequence

7.3 Topic 3: Directional Signs

7.3.1 Subject Outcome 1: Plan and prepare for the assembling and erecting of directional signs

Learning Outcome
- Identify and procure the types of hand tools and plant required for assembling and erecting diagonal sign
- Identify and procure protective clothing and first aid kit that will comply with Occupational Health and Safety Act requirements
- Identify and procure road signs and traffic control devices that will comply safely in a road environment
7.3.2 Subject Outcome 2: Calculate material quantities, procure materials and store

Learning Outcome
- Calculate material quantities
- Procure material
- Transport and store material

7.3.3 Subject Outcome 3: Set out directional sign

Learning Outcome
- Set out directional sign according to project specifications

7.3.4 Subject Outcome 4: Execute the work in a cost-effective manner

Learning Outcome
- Prepare programme of work
- Capture records of labour, material and plant on daily basis
- Execute quality control of work to ensure that work complies with project specification
- Execute productivity control to ensure compliance to targets
- Identify deficiencies in terms of meeting programmes
- Recommend remedial action to supervisor

7.4  Topic 4: Installation of road markers

7.4.1 Subject Outcome 1: Identify and procure the types of tools, plant and equipment required

Learning Outcome
- Identify tools and plant types suitable for assembling and erecting diagonal sign

7.4.2 Subject Outcome 2: Identify and procure clothing, road signs and traffic control devices, first aid kit

Learning Outcome
- Identify and procure protective clothing and first aid kit that will comply with Occupational Health and Safety Act requirements
- Identify and procure road signs and traffic control devices that will comply safely in a road environment

7.4.3 Subject Outcome 3: Calculate material quantities, procure material and store

Learning Outcome
- Calculate material quantities
- Procure material
- Transport and store material

7.4.4 Subject Outcome 4: Execute the work in a cost effective and safe manner

Learning Outcome
- Execute quality control of work to ensure that work complies with project specification
- Execute productivity control to ensure compliance to targets
- Identify deficiencies in terms of meeting programmes
- Recommend remedial action to supervisor

7.5  Topic 5: Erection of Signposts

7.5.1 Subject Outcome 1: Identify and procure the types of hand tools and plant required

Learning Outcome
- Identify tools and plant types suitable for assembling and erecting the signpost
7.5.2 **Subject Outcome 2:** Identify and procure clothing, road signs and traffic control devices and first aid kit

**Learning Outcome**
- Identify and procure protective clothing and first aid kit that will comply with Occupational Health and Safety Act requirements
- Identify and procure road signs and traffic control devices that will comply safely in a road environment

7.5.3 **Subject Outcome 3:** Calculate material quantities, procure and store

**Learning Outcome**
- Calculate material quantities
- Procure material
- Transport and store material

7.5.4 **Subject Outcome 4:** Execute the work in a cost-effective manner

**Learning Outcome**
- Prepare programme of work
- Capture records of labour, material and plant on daily basis
- Execute quality control of work to ensure that work complies with project specification
- Execute productivity control to ensure compliance to targets
- Identify deficiencies in terms of meeting programmes
- Recommend remedial action to supervisor

7.6 **Topic 6: Compaction of hot mix asphalt**

7.6.1 **Subject Outcome 1:** Prepare to compact hot mix asphalt

**Learning Outcome**
- Prepare to compact hot mix asphalt
- Plan work activities to maintain productive workflow
- Check work area for hazards
- Identify and ensure functionality of all tools, equipment and personal protective equipment
- Prepare traffic control plan

7.6.2 **Subject Outcome 2:** Describe in detail compaction equipment

**Learning Outcome**
- Describe compaction equipment in terms of its type and functions
- Describe compaction equipment according to its mass and loading characteristics
- Describe compaction equipment in terms of particular maintenance requirement of equipment used for asphalt paving construction
- Explain vibrating rollers in terms of amplitude and frequency

7.6.3 **Subject Outcome 4:** Explain the particular requirements and techniques for compaction of hot mix asphalt

**Learning Outcome**
- Describe the requirements for effective compaction in terms of the influence of densification on durability, importability and resistance to deformation and cohesion of the material
7.6.4 Subject Outcome 4: Implement the compaction operation

Learning Outcome
- Describe effective compaction in terms of the influence of the material temperature at the time of rolling
- Explain the temperature range in which to achieve compaction for different material thickness
- Describe the rolling operation in terms of its sequence and pattern and number of passes of each roller
- Describe compaction in terms of techniques for jointing
- Explain compaction operation in terms of how to achieve the density, material uniformity, surface finish and readability and uniformity of joints
- Describe compaction operation in terms of how to avoid pick-up, deformation, over rolling and cracking of the material
- Set and communicate rolling sequences and passes to roller operators
- Inspect the condition of the material and the joints
- Obtain the density of material in the compaction window time
- Take remedial actions
- Identify training needs

7.7 Topic 7: Pre-cast kerbs and concrete channels on road works construction site

7.7.1 Subject Outcome 1: Explain the technology of constructing pre-cast kerbs and concrete channels

Learning Outcome
- Explain the technology of constructing pre-cast and concrete channels
- Compare technology of constructing pre-cast kerbs and that of constructing in situ concrete kerbs

7.7.2 Subject Outcome 2: Prepare bedding to receive kerbs

Learning Outcome
- Check work area for hazards
- Identify and ensure functionality of tools, equipment and personal protective equipment
- Prepare foundation in accordance with work requirements
- Note and protect alignment markers according to site procedures

7.7.3 Subject Outcome 3: Lay pre-cast concrete kerbs

Learning Outcome
- Carry out work in accordance with workplace safety requirements
- Make kerb neatly, true and within SABS tolerance
- Space kerb joints evenly and fill them with mortar
- Backfill kerbs in terms of contract specifications
- Use tools and equipment in accordance with their designed purpose
- Use personal protective equipment as required in accordance with OHS Act
- Complete kerb within industry acceptable time frames
- Check kerb on completion to ensure compliance with work instructions

7.7.4 Subject Outcome 4: Lay in-situ concrete channels

Learning Outcome
- Carry work in accordance with workplace safety requirements
- Place and finish concrete in accordance with site requirements
- Clean excess concrete from the kerbs in accordance with industry accepted procedures
- Use tools and equipment in accordance with their designed purpose
- Use personal protective equipment as required in accordance with OHS Act
- Complete channel within industry acceptable time frames
7 RESOURCE NEEDS FOR THE TEACHING OF ROADS - LEVEL 3

7.1 Human Resources
Minimum educator qualifications and training, ongoing upskilling requirements

Physical Resources
Building infrastructure, fixtures, networks, plant, workshops and machinery

Learning and Teaching Materials
Power tools, survey instruments, educator and learner teaching and learning material, teaching and learning aids etc.

Financial resources
Budget, consumables, individual tools/equipment requirements, learning materials/resources)