



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

PWOUM301

UNPAVED ROAD MAINTENANCE

PERFORM UNPAVED ROAD MAINTENANCE

Competence

RQF Level: 3

Learning Hours



40

Credits: 4

Sector: Construction and Building Services

Trade: Public works

Module Type: Specific

Curriculum: CBSPWO3001- TVET Certificate III in Public works

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1200

Purpose statement	This module describes the skills and knowledge required to maintain an unpaved road. It is intended for level three learners. At the end of this module, learners will be able to prepare for unpaved road maintenance work, plan for emergency maintenance, routine maintenance and periodic maintenance. Qualified learners deemed competent to this competency shall have the ability to carry out a range of defined road maintenance activities under directive supervision.					
Learning assumed to be in place	Safety, Health and environment at workplace; Basic technical drawing; Public works resources; Set out road alignment; Field excavation works; Masonry works; Drainage structure Construction; Establishment of Road Signs, road marking and crash barriers; Retaining wall Construction; Unpaved Roads construction.					
Delivery modality	Training delivery		100%	Assessment	Total 100%	
	Theoretical content		30%	Formative assessment	30%	
	Practical work:		70%		70%	50%
	• Group project and presentation	20%				
	• Individual project /Work	50%				
		Summative Assessment		50%		

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Prepare for work	1.1. Maintenance problems are properly identified according to the level of defects.
	1.2. Damaged areas are precisely marked with respect to types of marking.
	1.3. Materials, tools and equipment are appropriately selected according to the level of maintenance problem.
2. Perform Routine maintenance	2.1. Grasses are adequately cut according to the safety measures.
	2.2. Potholes are properly repaired according to the causes of damage.
	2.3. Flood debris is adequately removed according to the debris types.
3. Perform periodic maintenance	3.1. Road surface is appropriately reshaped according to road maintenance plan.
	3.2. Culverts are properly repaired and replaced according to the maintenance plan.
	3.3. Side ditches are properly repaired according to the maintenance plan.
4. Perform emergency maintenance	4.1. Road section blocked by landslide is adequately cleared in line with landslide warning signs.
	4.2. Culverts blocked by branches and soil materials are adequately cleaned according to safety measures and the quantity of materials blocking the culvert.
	4.3. Fallen trees in road section are adequately removed according to the safety measures.

Learning outcomes	<p>At the end of the module the learner will be able to:</p> <ol style="list-style-type: none"> 1. Prepare for work 2. Perform routine maintenance 3. Perform periodic maintenance 4. Perform emergency maintenance
Learning outcome 1: Prepare for work.	Learning hours:10
Indicative content	
<p>(Based on the performance criteria and the extent of learning outcomes: what, up to, how)</p> <ul style="list-style-type: none"> • Road defects (Refer to RS 267-1; RS 267-2; RS 292; RS 262; RS 312; RS 373) <ul style="list-style-type: none"> ✓ Types of defects ✓ Main causes of defects • Marking damaged areas <ul style="list-style-type: none"> ✓ Types of marking tools <ul style="list-style-type: none"> ✚ Symbols ✚ Sign posts ✓ Marking techniques <ul style="list-style-type: none"> ✚ Signalization, ✚ Looping area ✚ Localization ✓ Marking materials <ul style="list-style-type: none"> ✚ Warning tape ✚ Painting ✚ Traffic cones • Selection of materials, tools and equipment for road maintenance. <ul style="list-style-type: none"> ✓ Materials used for unpaved road maintenance ✓ Tools used for unpaved road maintenance ✓ Equipment used for unpaved road maintenance 	

 PPE

 Digital camera

Resources required for the learning outcome

Equipment	Digital camera, PPE(safety shoes, gloves, overall, warning signs, dusk mask, helmet)
Materials	Notebook, pen, pictures, color paint, chalks, sand, branches, lateritic soil, gravelly soil, planting trees, stones, cement.
Tools	Tape measure, local sign trees, traffic cone, warning tape, stone hammer, wheel barrow, bucket, chisel, strings, straight edge, spirit level, reference book, video aids.
Facilitation techniques	<ul style="list-style-type: none">Lectures, Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion, Brainstorming, Site visit
Formative assessment methods	<ul style="list-style-type: none">Written assessment, Oral presentation, Performance assessment, Project based assessment

Learning outcome 2: Perform routine maintenance

Learning hours: 10

Indicative content

(Based on the performance criteria and the extent of learning outcomes: what, up to, how)

- **Cutting grasses** (Refer to RS 267-1; RS 267-2; RS 292; RS 262; RS 312; RS 373; RS EAS 293-1)
 - ✓ Tools for cutting grasses
 - ✓ Using PPEs
 - ✓ Routine maintenance working procedure
 -  Setting out clearing width using pegs and string line to set the area to be cleared.
 -  Calculating the quantity of work to be done for one day
 -  Calculating the number of labourers to carry out the work accordingly
 -  Removal of material outside of the clearing width
- **Repairing potholes**
 - ✓ Causes of potholes
 - ✓ Effects of potholes
 - ✓ Tools for repairing potholes
 - ✓ Repair potholes procedures
- **Removal of flood debris**
 - ✓ Common causes of blockage by debris

- ✓ Effects of blockage by debris
- ✓ Examples of debris
- ✓ Techniques for removing debris

Resources required for the indicative content

Equipment	PPE, digital camera
Materials	Notebook, pens, pictures, bags, lateritic soil, gravelly soil, cement, stones, sand, water.
Tools	Hill hook, sickle, hoe, machete, pruning shears, pruning knife, reference books, video aid, wooden post, rake, shovel, small garden tools, wheel barrow, stone hammer, trowels, spirit levels.
Facilitation techniques	<ul style="list-style-type: none"> • Lectures ,Brainstorming, Demonstration and simulation ,Individual and group work, Practical exercise ,Individualized ,Trainer guided ,Group discussion, Site visit
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment ,Oral presentation, Performance assessment ,Project based assessment

Learning outcome 3: Perform periodic maintenance

Learning hours: 10

Indicative content

(Based on the performance criteria and the extent of learning outcomes: what, up to, how)

- **Reshaping /regravelling road surface** (Refer to RS 267-1; RS 267-2; RS 292; RS 262; RS 312; RS 373; RS EAS 293-1)
 - ✓ Purpose of graveling
 - ✓ Equipment required for regravelling:
 - ✓ Procedures of regravelling
- **Repairing and replacing culverts**
 - ✓ Inspection of culverts
- **Repairing side ditches**
 - ✓ Types side drains
 - ✓ Objectives of repairing side drains
 - ✓ Inspection of side drains along unpaved road
 - ✓ Techniques of repairing side drains

Resources required for the indicative content	
Equipment	Tipping lorries, loading shovel, grader, bulldozer, digital camera.
Materials	Notebook, pens, pictures, bags, lateritic soil, gravely soil, cement, sand, water.
Tools	Rake, shovel, small garden tools, tape measure, stone hammer, wheel barrow, spirit level, mallet, chisels, metal straight edge, trowels, masonry tools, spades, masonry hammer, square, jointers, mixing tools, brushes, tape measure.
Facilitation techniques	<ul style="list-style-type: none"> Lectures, Brainstorming ,Demonstration and simulation, Individual and group work, Practical exercise ,Individualized ,Trainer guided ,Group discussion, Site visit
Formative assessment methods	<ul style="list-style-type: none"> Written assessment Oral presentation, Performance assessment, Project based assessment

Learning outcome 4: Perform emergency maintenance	Learning hours: 10
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Indicative content

(Based on the performance criteria and the extent of learning outcomes: what, up to, how)

- Clearing road section blocked by landslide with respect to landslide warning signs (Refer to RS 267-1; RS 267-2; RS 292; RS 262; RS 312; RS 373; RS EAS 293-1)**
 - ✓ Landslide warning signs
 - ✓ Methods of removing landslide in the road
 - ✚ Manually
 - ✚ Mechanically
- Cleaning culverts blocked by branches and soil materials.**
 - ✓ Techniques of cleaning inside culverts
- Removal of fallen trees in road section.**
 - ✓ Tools required for removing trees
 - ✓ Equipment required for removing trees

Resources required for the indicative content

Equipment	Digital camera, PPE (safety shoes, gloves, overall, warning signs, dust mask).
Materials	Notebook, pens, pictures, color paints, chalks, branches, sand.
Tools	Hoe, machete , rake, spades, shovel, local sign trees, traffic cone, warning tape, chain saw, hack saw, wheel barrow, axe, pruning saw, bow saw, chopping ax, hatchet, two man cross-cut saw, cross-cut saw, reference book, video aid.

Facilitation techniques	<ul style="list-style-type: none"> Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise ,Site visit ,Individualized ,Trainer guided ,Group discussion
Formative assessment methods	<ul style="list-style-type: none"> Written assessment ,Oral presentation ,Performance assessment, Project based assessment

Integrated/Summative assessment (For specific module)

Integrated situation

The unpaved road from Nyamirama to Mukarange in Kayonza District was damaged and need to be repaired urgently due to the movement stoppage. Kayonza district launch the tender to maintain up said road , NTMM COMPANG LTD won the tender of solving the problems of unpaved road which is facing the following issues :

1. The road is passable with difficulties.
2. The area damaged by heavy loads
3. Presence of potholes
4. Water is not well drained through culverts.
5. The area susceptible to landslide
6. Presence of grasses around the road section
7. Damaged side drains on road section.

As an assistant road maintainer in that company, you are required to maintain the damaged sections as indicated in 8 hours, so that the road become passable by both sectors. In addition, also water should be well drained alongside drains and culverts as well.

Note:

1. All materials, tools and equipment are available on site.
2. Maintenance plan is available
3. Site safety precautions are mandatory
4. The excavated soil and or other materials found at site could be used, if found good.
5. The case study to be selected should be well described by trainer near by the school.

Resources

Tools	Tape measure, local sign trees, traffic cone, warning tape, stone hammer, wheel barrow, bucket, chisel, strings, straight edge, spirit level, hill hook, sickle, pruning shears, pruning knife, wooden post, small garden tools, bow saw, hoe, Machete, rake, shovel, warning tape, chain saw, spades, hack saw, axe, pruning saw, chopping ax, hatchet, two man cross-cut saw, cross-cut saw, stone hammer, trowels, masonry tools, spirit level, mallet, metal straight edge, masonry hammer, square, jointers, mixing tools, brushes.
Equipment	Digital camera, PPEs (safety shoes, gloves, overall, warning signs, dusk mask, helmet), tipping lorries, loading shovel, grader, bulldozer.
Materials/ Consumables	Sand, branches, lateritic soil, gravely soil, bags, notebooks, pens/pencils, pictures, color paints, branches, sand, stones, cement, water.

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Prepare for work (20%)	1.1. Maintenance problems are identified according to type of road	Ind.1: Types of defects are identified.			3
		Ind.2: Causes of			3

	defects	defects are identified.			
	1.2. Damaged areas are precisely marked with respect to types of marking.	Ind.1: Types of marking tools are identified.			2
		Ind.2: Marking materials are selected.			2
		Ind.3: Marking techniques are applied.			4
	1.3. Materials, tools and equipment are appropriately selected according to the level of maintenance problem.	Ind.1: Materials for unpaved road maintenance are selected.			2
		Ind.2: Tools for unpaved road maintenance are selected.			2
		Ind.3: Equipment for unpaved road maintenance are selected.			2
Learning outcome 2: Perform routine maintenance (40%)	2.1. Grasses are adequately cut according to the safety measures.	Ind.1: Tools for cutting glasses are selected.			3
		Ind.2: PPE are used			3
		Ind.3: Working methods in cutting glasses are respected			5
	2.2. Potholes are properly repaired according to the causes of damage.	Ind.1: Causes of potholes are identified.			2
		Ind.2: Effects of potholes on unpaved road are identified.			3
		Ind.3: Tools for repairing potholes are selected.			4
		Ind.4: Working methods for repairing potholes are followed.			4
2.3. Flood debris is adequately removed according to the debris	Ind.1: Common causes of blockage by debris are identified.			2	

	types.	Ind.2: effects of blockage by debris are identified.			3
		Ind.3: Examples of debris are given			3
		Ind.4: Tools for removing debris are selected.			3
		Ind.5: Techniques for removing debris are applied.			5
Learning outcome 3: Perform periodic maintenance (20%)	3.1. Road surface is appropriately reshaped according to road maintenance plan.	Ind.1: Purpose of gravelling is described.			2
		Ind.2: Equipments for gravelling are identified.			2
		Ind.3: Procedures for regravelling are followed.			2
	3.2. Culverts are properly repaired and replaced according to the maintenance plan.	Ind.1: Culverts are inspected.			2
		Ind.2: Decision on culvert repairing or replacement is taken.			1
		Ind.3: Techniques for repairing culverts are applied.			1.5
		Ind.4: Techniques for replacing culverts are applied.			1.5
	3.3. Side ditches are properly repaired according the maintenance plan.	Ind.1: Types of side drains are identified.			1
		Ind.2: The objectives for repairing side drains are described			1
		Ind.3: Side drains along the road section are inspected.			2
		Ind.4: Techniques for side drains repairing are applied.			4
	Learning outcome 4:	4.1. Road section blocked by landslide is adequately	Ind.1: Landslide warning signs are		

Perform emergency maintenance (20%)	cleared in line with landslide warning signs.	identified, selected and applied.			
		Ind.2: Strategies for removing landslide in the road are described.			2
		Ind.3: Methods of removing landslide in road are applied.			4
	4.2. Culverts blocked by branches and soil materials are adequately cleaned according to safety measures and the quantity of materials blocking the culvert.	Ind.1: Culverts blocked by branches and soil materials are cleaned.			4
	4.3. Fallen trees in road section are adequately removed according to the safety measures.	Ind.1: Tools for removing fallen trees in road section are selected.			2
		Ind.2: Equipment for removing fallen trees in road section are selected.			1
		Ind.3: Techniques for removing fallen trees are applied.			4
		Ind.4. Time is well respected			1
	Total marks		100		
	Percentage Weightage		100%		
Minimum Passing line % (Aggregate): 70%					

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14. RS 267-2: Feeder road — Guidelines for maintenance;
15. RS 292: Aggregates for surface treatment of roads — Specification;

16. RS 262: Road Kerbs, edges and channels — Specification;
17. RS 312: Road traffic safety — Traffic control devices — Requirements;
18. RS 373: Aggregates for concrete — Specification
19. RS EAS 293-1: Road marking materials — Part 1: Physical properties