



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

PWORS301

ROAD SIGNS, ROAD MARKING AND CRASH BARRIERS

Establish Road Signs, Road Marking and Crash Barriers

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 Building Construction

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1200

Purpose statement	This module describes the skills, knowledge and attitudes required to Establish Road Signs, Road Marking and Crash Barriers. It is intended for level III learners in public works or applying for recognition of prior learning or other related qualifications. At the end of this module, learners will be able to apply road marking, to install road signs, to install Crash barriers and to clean up the Workplace. Qualified learners deemed competent to this competency shall have ability to take responsibility for the carrying out of a range of defined activities in Public works under minimum 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; Unpaved road construction.				
Delivery modality	Training delivery	100%	Assessment	Total 100%	
	Theoretical content	30%	Formative assessment	30%	
	Practical work:	70%		70%	50%
	<ul style="list-style-type: none"> Group project and presentation 				
	<ul style="list-style-type: none"> Individual project /Work 	70%			
Summative Assessment				50%	

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Apply road marking	1.1. Road marking tools, equipment and materials are properly selected in accordance with job requirements
	1.2. Road marking Workplace is properly prepared in accordance with job requirements
	1.3. Road paint and solvents are properly mixed relevant to the job specifications
	1.4. Road paint is properly applied in accordance with job specifications
2. Install road signs	2.1. Road signs tools, equipment and materials are properly prepared in accordance with job requirements
	2.2. Road signs Workplace is properly prepared in accordance with job requirements
	2.3. Road signs materials are carefully transported to the site in accordance with packaging techniques
	2.4. Road signs are correctly fixed in accordance with installation standard techniques
	2.5. Pavement light reflectors are well installed in accordance with installation standard techniques
3. Install Crash barriers	3.1. Crash barriers tools, equipment and materials are properly prepared in accordance with job requirements
	3.2. Crash barriers Workplace is properly prepared in accordance with job requirements

	3.3. Crash barriers materials are carefully transported to the site in accordance with packaging techniques
	3.4. Crash barriers are correctly installed in accordance with installation standard techniques
	3.5. Light reflectors are well installed on Crash barriers in accordance with installation standard techniques
4. Clean up	4.1. The work area is carefully cleaned in accordance with environmental impact assessment
	4.2. Tools and Equipment are properly maintained in accordance with manufacturer recommendations and standard work practices
	4.3. Materials are carefully removed in accordance with manufacturer recommendations and standard work practices

Course content

Learning outcomes	At the end of the module the learner will be able to: <ol style="list-style-type: none"> 1. Apply road marking 2. Install road signs 3. Install Crash barriers 4. Clean up
Learning outcome 1: Apply road marking	Learning hours: 10

Indicative content

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

- **Selection of road marking tools, equipment and materials** (Refer to RS EAS 293-1; RS EAS 927; RS EAS 928-1; RS EAS 928-2; RS EAS 999; RS EAS 999; RS EAS 854)
 - ✓ Tools identification
 - ✓ Equipment identification
 - ✓ Materials identification
- **Preparation of road marking Workplace**
 - ✓ Methods used to prepare workplace
 - ✓ Tools used in cleaning the workplace
 - ✓ Equipment used in cleaning the workplace
- **Mixing road marking paints and solvents**
 - ✓ Identification of road paints and solvent types
 - ✓ Paint mixing procedures
- **Application of road paint**
 - ✓ Classification of road markings
 - ✓ Location for road marking (pre-marking)
 - ✓ Methods of road painting
 - ✓ Identification of paint defects

Resources required for the learning outcome

Equipment	Air spray, High-pressure airless spray, Compressor, Sprayer gun, PPE (warning sign, warning tape, musk, gloves, helmet, safety shoes)
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Materials	<ul style="list-style-type: none"> ✓ Road paints Water-based road paint, thermo-plastic road paint, Latex road paint, Solvent-based paints (oil-based paints) ✓ Solvents Paraffin and thinner ✓ Glass beads High index reflective glass beads, anti-water all weather glass beads, drop on glass beads and intermix glass beads
Tools	Strings (Road marking line), Brushes, Paint Scrapper, Marking tape, Roller, Roller tray, Bucket/pan
Facilitation techniques	Group discussion, Trainer guided, Simulation
Formative assessment methods	Written assessment, Performance assessment

Learning outcome 2: Install road signs	Learning hours: 15
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"> • Preparation of road signs tools, equipment and materials (Refer to RS EAS 1020; RS ISO 45001; RS ISO 13688; ISO7010; RS 426-1; RS EAS 18-1; RS 107; RS 373; RS EAS 134) <ul style="list-style-type: none"> ✓ Types of tools ✓ Types of equipment ✓ Types of materials • Preparation of road signs Workplace <ul style="list-style-type: none"> ✓ Tools used in clearing the workplace ✓ Equipment used in clearing the workplace ✓ Handling of road signs • Fixation of road signs <ul style="list-style-type: none"> ✓ Assembling elements of road signs ✓ Excavation of support hole ✓ Construction of footing • Installation of road reflectors <ul style="list-style-type: none"> ✓ Types of road reflectors 	

- ✓ Installation procedures of road reflectors

Resources required for the indicative content

Equipment	Vibrator, PPE(mask dust, safety shoes, gloves)
Materials	Cement, sand and gravel, screws
Tools	Trowel, spade, hoe, pick, Screw drivers
Facilitation techniques	Practical exercise, Simulation
Formative assessment methods	Written assessment, Performance assessment, Product based assessment

Learning outcome 3: Install Crash barriers

Learning hours: 10

Indicative content

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

- **Types of Crash barrier**
 - ✓ Based on material
 - ✓ Based on size and shape
 - ✓ Based on method of construction.
- **Preparation of Crash barriers tools, equipment and materials (Refer to RS EAS 196; RS EAS 415; RS 426-1; RS EAS 18-1; RS 107; RS 373; RS ISO 1461,RS ISO 45001)**
 - ✓ Types of tools
 - ✓ Types of equipment
 - ✓ Types of materials
- **Preparation of Crash barriers Workplace**
 - ✓ Tools used in clearing the workplace
 - ✓ Equipment used in clearing the workplace
 - ✓ Handling of crash barriers
 - ✚ Precautions
 - ✚ Determine available loading/unloading equipment

✚ Incidents prevention during loading, transporting & unloading of Crash barriers and equipment

- **Installation of Crash barrier**

- ✓ Assemble element of Crash barriers
- ✓ Excavate hole of support
- ✓ Construct footing
- ✓ Install Crash barriers

Resources required for the indicative content

Equipment	PPE,
Materials	Cement, Sand, aggregates, water, trowel,
Tools	Pickaxe, spade, wheelbarrow,
Facilitation techniques	<ul style="list-style-type: none"> • Lectures, Demonstration and simulation, Individual and group work ,Practical exercise, Individualized, Trainer guide ,Group discussion .
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment.

Learning outcome 4: Clean up

Learning hours: 5

Indicative content

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

- **Cleaning the work area**

- ✓ Clearing methods
 - ✚ manual clearing method
 - ✚ mechanized clearing method

- **Maintaining Tools and Equipment (Refer to RS EAS 854; RS ISO 3219; RS ISO 45001; RS ISO 13688;RS ISO 14001)**

- ✓ Storage process
- ✓ Importance of maintaining tools and equipment

- **Remove wastes materials**

- ✓ Identify wastes materials
- ✓ Ways of disposing wastes materials

Resources required for the indicative content

Equipment	PPE,
Materials	Paraffin, thinner
Tools	Scraper, broom, metallic brush
Facilitation techniques	Lectures, and simulation, Individual and group work, Practical exercise, Individualized, Trainer guided, Group discussion,
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Integrated/Summative assessment (For specific module)

Integrated situation

SAGE CONSTRUCTION & SUPPLY Ltd has finished constructing a new asphalt road located in Gasabo district, Remera sector. PWO Ltd won a tender to establish road signs, road marking and Crash barriers in order to guide, warn and regulate the road users. As a road technician from PWO Ltd, you are required to perform the following tasks in 7hours:

- ✓ Paint (road mark) at least a surface area equivalent to 1m²
- ✓ Install one vertical signs (warning sign) with standard measurement
- ✓ Install Crash barrier in one of hazardous areas

Drawing, materials, tools and equipment are available

Resources

Tools	Strings (Road marking line), Brushes, Paint Scraper, Roller, Roller tray Bucket/pan
Equipment	Air spray, High-pressure airless spray, Compressor, Sprayer gun, Personal protective equipment,
Materials/ Consumables	Road paints, solvents and glass beads, Cement, sand and gravel, Paraffin, thinner,

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1:	1.1. Road marking tools, equipment and materials are	Ind.1. Tools, equipment and materials are properly selected			5

1. Apply road marking (30%)	properly prepared	Ind.2. Road paint is properly applied in accordance			5
	1.2. Road marking Workplace is properly prepared in accordance with job requirements	Ind.1. Road marking Workplace is properly prepared			5
	1.3. Road paint and solvents are properly mixed relevant to the job specifications.	Ind.1. Road paint and solvents are properly mixed			5
	1.4. Road paint is properly applied in accordance with specification	Ind.1. Road paint is properly applied			10
Learning outcome 2: Install road signs (30%)	2.1. Road signs tools, equipment and materials are properly prepared in accordance with job requirements	Ind.1. Road signs tools, equipment and materials are properly prepared			5
	2.2. Road signs Workplace is properly prepared in accordance with job requirements	Ind.1. Road signs Workplace is properly prepared			5
	2.3. Road signs materials are carefully transported to the site in accordance with packaging techniques	Ind.1. Road signs materials are carefully transported			5
	2.4. Road signs are correctly fixed in accordance with installation standard techniques	Ind.1. Road signs are correctly fixed			15
Learning outcome 3: Install Crash barriers (30%)	3.1. Crash barriers tools, equipment and materials are properly prepared in accordance with job requirements	Ind.1. Tools are properly prepared			2
		Ind.2. Equipment are properly prepared			2
		Ind.3. Materials are properly prepared			2
	3.2. Crash barriers Workplace is properly prepared in accordance with job requirements	Ind.1. Workplace is properly prepared			5
	3.3. Crash barriers materials are carefully transported to the site in accordance with packaging techniques	Ind.1. Crash barriers materials are carefully transported			4
	3.4. Crash barriers are correctly installed in accordance with installation standard techniques	Ind.1. Crash barriers are correctly installed			15
Learning outcome 4:	4.1. The work area is carefully cleaned in accordance with	Ind.1. The work area is carefully cleaned			3

Clean up (10%)	environmental impact assessment.			
	4.2. Tools and Equipment are properly maintained in accordance with manufacturer recommendations and standard work practices.	Ind.1. Tools and Equipment are properly maintained		3
	4.3. Materials are carefully removed in accordance with manufacturer recommendations and standard work practices.	Ind.1. Materials are carefully removed		3
		Ind.2. Time is respected		1
Total marks		100		
Percentage Weightage		100%		
Minimum Passing line % (Aggregate): 70%				

REFERENCES

1. <https://ftp.dot.state.tx.us/pub/txdot-info/trf/tmutcd/2011-rev-2/2c.pdf>
2. <https://trafficsafetyzone.com/blog/2020/08/28/what-each-type-of-road-sign-means/>
3. <https://www.iamexpat.de/expat-info/driving-germany/road-signs>
4. https://www.usa-traffic-signs.com/Test_s/50.htm
5. <https://www.dot.state.mn.us/trafficeng/publ/tem/2009/Chapter-06.pdf>
6. RS EAS 293-1: Road marking materials — Part 1: Physical properties;
7. RS EAS 927: Road marking paints — Specification (1st Edition);
8. RS EAS 928-1: Hot applied thermoplastic road marking paint — Specification, Part 1: Constituent material and mixtures (1st Edition);
9. RS EAS 928-2: Hot applied thermoplastic road marking paint — Specification — Part 2: Road performance Specification (1st Edition);
10. RS EAS 999: Drop-on materials for road marking paint – Specification,
11. RS EAS 854: Thinner for nitrocellulose resin-based paints and lacquers — Specification
12. RS EAS 1020: Shovels and spades specifications,
13. RS ISO 45001: Occupational Health and Safety Management system— Requirements,
14. RS ISO 13688: Protective clothing — General requirements,
15. ISO7010: Graphical Symbols-Safety colours and safety Signs-Registered safety signs,
16. RS 426-1: Masonry Cement — Part 1: Composition, Conformity criteria and Specifications;
17. RS EAS 18-1: Cements — Part 1: Composition, specification and conformity criteria for common cements;
18. RS 107: Building sands — Specifications;
19. RS 373: Aggregates for concrete — Specification;
20. RS EAS 134: Cold rolled steel sections — Specification
21. RS EAS 196: High-strength low-alloy Carbon Steel for hot-rolled sheet and cold-rolled sheet — Specifications;
22. RS EAS 415: Hot-rolled steel sheet of high yield stress structural quality;
23. RS ISO 1461: Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods

24. RS ISO 3219: Plastics — Polymers/resins in the liquid state or as emulsions or dispersions —
Determination of viscosity using a rotational viscometer with defined shear rate;
25. RS ISO 14001: Environmental Management System - Requirements for use