Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

BUILDING STRUCTURES SETTING OUT

LSVSB402

Set Out Building Structures

Competence

RQF Level: 4

Learning Hours

80

Credits: 8

Sector: Construction and Building Services

Trade: Land Surveying

Module Type: Specific

Curriculum: CBSLSV4001 –TVET Certificate IV in Land Surveying

Issue date May, 2023

<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the knowledge, skills, and attitudes required to set out building structures by using total station and DGNSS equipment. It is designed for students pursuing RQF Level 4 in Land Surveying.

At the end of this module, the students will be able to perform preliminary works for setting out, interpret drawings and perform building structures setting out.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Coordinate measurement, Surveying computation and adjustment, Earthwork computation, and AutoCAD and Covadis software in surveying.</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group work and presentation</td><td>30%</td></tr>
<tr><td>• Individual work</td><td>40%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Perform Preliminary Works	1.1. Materials, tools and equipment are properly selected according to the work to be done.
	1.2. Survey equipment is properly checked according to the manufacturer's specifications.
	1.3. Building structures setting out costs are adequately estimated according to the project activities.
2. Interpret Drawings	2.1. Technical drawings are properly identified with respect to the type of the building to be set out.
	2.2. Drawing scales and dimensions are properly interpreted according to the design.
	2.3. Drawing symbols and notes are correctly interpreted according to design.
3. Perform Building Structures Setting Out	3.1. Building setting out methods are properly identified according to the type of instruments to be used.
	3.2. Control points and reference line are correctly established according to project specifications.
	3.3. Building setting out data computations are correctly done based on the setting out method selected
	3.4. Building elements are correctly set out based on the detailed drawings.
	3.5. Accuracy of set out detail points is checked as per setting out verification methods.

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Intended Knowledge, Skills and Attitude

Knowledge	Skills	Attitude
✓ Identify types of setting out data ✓ Read instrument manual ✓ Identify instruments and tools ✓ Describe methods of setting out ✓ Identify the building structure ✓ Describe the drawing scale ✓ Identify the drawing dimensions ✓ Identify the control stations	✓ Check instrument functionality ✓ Interpret instrument manual ✓ Apply methods of setting out ✓ Demonstrate drawing skills ✓ Interpret drawing dimensions ✓ Apply analytical skills ✓ Use appropriate scale ✓ Use appropriate control stations ✓ Check accuracy of dimensions ✓ Perform S/O of building elements ✓ Perform estimation and costing ✓ Demonstrate computation skills ✓ Apply CAD Skills	✓ Apply wearing of PPE ✓ Demonstrate punctuality ✓ Demonstrate attention to detail ✓ Use resources efficiently ✓ Apply teamwork spirit ✓ Use Decision making attitude ✓ Demonstrate self-motivation ✓ Communicate efficiently

Course content

Learning outcomes	At the end of this module the learner will be able to: 1. Perform preliminary works 2. Interpret drawings 3. Perform building structures setting out
Learning outcome 1: Perform preliminary works	**Learning hours: 13**
Indicative content	

- **Selection of materials, tools and equipment.**
  - ✓ Selection factors
  - ✓ Materials
    - Pegs
    - Timber board
    - Nails
    - Building line
    - Warning tape
    - Marker pen
  - ✓ Tools
    - Claw hammer
    - Club hammer
    - Panga
    - Tape measure
    - Steel tape
    - Tripod
    - Reflective prism
    - Hoe
    - Spade
    - Pick
    - Shovels
    - Pick axes
    - Spirit level
  - ✓ Equipment
    - Total station
    - DGPS/GNSS receiver
    - PPE
- **Checking Surveying equipment.**
  - ✓ Functionality of instrument parts and its accessories
- **Estimation of building structures setting out costs**
  - ✓ Building setting out items
  - ✓ Calculation of direct costs
  - ✓ Calculation of indirect costs
  - ✓ Calculation of contingency costs

Resources required for the learning outcome	
Equipment	Total station, DGPS/GNSS receiver, PPE.
Materials	Pegs, building line, nails, chalk, pens / pencil, field book, warning tape.

Tools	Claw hammer, club hummer, machete, steel tape, tripod, reflective prism, hoe, spade, builder's square, pick, shovels, pick axes, marker pen.
Facilitation techniques	Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided, Group discussion.
Formative assessment methods /(CAT)	Written assessment, Oral assessment, Performance assessment, Product based assessment.

Learning outcome 2: Interpret drawings	**Learning hours: 22**
Indicative content	
• **Identification of technical drawings** ✓ Cadastral plan ✓ Site plan ✓ Floor plan and foundation plan ✓ Detailed drawings ✓ Views and sections • **Interpretation of drawing scales and dimensions** ✓ Drawing scales ✓ Drawing dimensions • **Interpretation of drawing symbols and notes** ✓ Symbols and notes ✓ Legend / Title Block	
Resources required for the learning outcome	
Equipment	Drawing table, projector, computer.
Materials	Drafting tape/scotch, flip chart, eraser, drawing pen, markers.
Tools	Pin, clipboard, ruler.
Facilitation techniques	Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided, Group discussion.
Formative assessment methods /(CAT)	Written assessment, Oral assessment, Performance assessment, Product based assessment.

Learning outcome 3: Perform building structures setting out	Learning hours: 45

Indicative content

- **Identification of building setting out methods**
  - ✓ Total station methods
    - Coordinates
    - Offsets
    - Intersection
  - ✓ DGPS/GNSS methods
    - Coordinate staking out
    - Offsets
- **Establishment of control points and reference line.**
  - ✓ Horizontal control point
  - ✓ Vertical control point
  - ✓ Reference line
- **Computation of building setting out data**
  - ✓ Coordinates of detail points
  - ✓ Angles and distances
  - ✓ Bearings
- **Setting out of building elements**
  - ✓ Identification of building structure elements
    - Foundation
    - Wall
    - Footing
    - Column
    - Beams
    - Stairs
    - Slab
    - Roof
  - ✓ Selection of setting out method
  - ✓ Procedure for setting out
- **Checking the accuracy of set out detail points**
  - ✓ Distances
  - ✓ Angles

✓ Dimensions ✓ Polygons ✓ Vertical elevation	
Resources required for the learning outcome	
Equipment	Total station, DGPS/GNSS receiver, PPE.
Materials	Pegs, building line, nails, chalk, pens / pencil, field book, warning tape, drafting tape/scotch, flip chart, eraser, marker pen.
Tools	Claw hammer, club hammer, machete, steel tape, tripod, reflective prism, hoe, spade, builder's square, pick, shovels, pick axes.
Facilitation techniques	Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided, Group discussion.
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Integrated/Summative assessment

Integrated situation

Rwamagana District intends to build new offices in Kigabiro sector. SGT Ltd Company has been assigned to build it. As a qualified building setting out technician of the company, you have been requested to set out the foundation and columns of the building as indicated in the detailed drawings and specifications provided by client, using a total station or DGPS/GNSS receiver.

Instructions:

- Materials including drawings, tools, equipment and the working site are provided.
- The setback site distance is 12metres from the centre of the road.
- Building dimensions (12 x 14) m
- Setting out should be performed by using coordinate method
- The work should be done within 8 hours.

Resources

Tools	Claw hammer, club hammer, machete, steel tape, tripod, reflective prism, hoe, spade, builder's square, pick, shovels, pick axes.
Equipment	Total station, DGPS/GNSS receiver, PPE.
Materials/ Consumables	Drawings, pegs, building line, nails, chalk, pens / pencil, field book, warning tape, drafting tape/scotch, flip chart, eraser, marker, pen.

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Perform	1.1. Materials, tools and equipment are	1. Materials are well selected.			4

Preliminary Works (20 %)	properly selected.	2. Tools are well selected.			3
		3. Equipment is well chosen			3
	1.2 Survey equipment are properly checked	1. Total station is properly checked			5
		2. DGPS/GNSS receiver is properly checked			5
2. Interpret Drawings (20 %)	2.1. Technical drawings are properly identified.	1. Building plans are well identified			5
	2.2. Drawing scale and dimensions are properly interpreted	1.Scales are correctly interpreted			4
		2.Dimensions are correctly interpreted			4
	2.3. Drawing symbols and notes are correctly interpreted	1. Drawing symbols are correctly interpreted			4
		2.Drawing notes are correctly interpreted			3
3. **Perform Building Structures Setting Out (60 %)**	3.1 Building setting out methods are properly identified	1. Building setting out methods are properly identified			5
	3.2 Control points and reference line are correctly established	1. Control points are correctly established.			5
		2. Reference line is correctly established.			5
	3.3 Building setting out data computations are correctly done	1. Data computations are correctly done.			6
	3.4 Setting out building elements is correctly done	1. Foundation is correctly set			5
		2. Walls are correctly set			5
		3. Footings are correctly set			5
		4 Columns are correctly set			5

		5 Beams are correctly set			5
	3.5. Accuracy of set out detail points is checked as per setting out verification methods	1. Independent checking of each point is well done.			5
		2. Cleaning of the working site is well done.			4
		3. Time is respected			5
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

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6. Williams, J. (27 Apr 2009). Surveying & Field work: A practical Text-book on Surveying, Leveling & Setting out Intended for the use of Students in Technical schools and for surveyors, Engineers and Architect, Paperback.

7. Buckner, R.B. (1983). Surveying Measurements and Their Analysis, First Edition, Landmark Enterprises, Rancho Cordova, California.