Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

SURVEYING DATA COLLECTION AND SETTING OUT

PWOSC401

Perform Surveying Data Collection and Setting Out

Competence

RQF Level: 4

Learning Hours 40

Credits: 4

Sector: Construction and Building Services

Trade: Public Works

Module Type: Specific

Curriculum: CBSPWO4001-TVET Certificate IV in Public Works

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<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the knowledge, skills and attitudes required to collect surveying data and structure set out. It is intended for learners pursuing RQF level IV in Public Works. At the end of this module the learners will be able to collect surveying data, and perform surveying data set out record as built data.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Technical Drawing</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. Collect surveying data	1.1. Surveying instruments and tools are appropriately selected according to the work to be done
	1.2. Starting points are appropriately selected according to the work to be done
	1.3. Surveying instruments are correctly adjusted according to the regulation manual
	1.4. Surveying data are properly recorded as per specifications
	1.5. Tools and instruments are properly stored according to the regulation manual
2. Interpret surveying data and set out	2.1. Types of data are correctly identified according to the work to be done
	2.2. Surveying instruments and tools are appropriately selected according to the work to be done
	2.3. Bench marks are properly checked as per specifications
	2.4. Starting points are appropriately selected according to the work to be done
	2.5. Data are properly Set out as per design and specifications

	2.6. Work implementation is effectively checked as per design and specifications
3. Record as-built data	3.1. Surveying instruments and tools are appropriately selected according to the work to be done
	3.2. Starting points are appropriately selected according to the work to be done
	3.3. Surveying instruments are correctly adjusted according to the regulation manual
	3.4. Surveying data of completed structures are correctly recorded according to the design and specification
	3.5. Surveying instruments and tools are appropriately stored according to the regulation manual

Intended Knowledge, Skills, and Attitude

Knowledge	Skills	Attitude
✓ Describe surveying technics and standards ✓ Identify surveying tools and equipment ✓ Identify units of measurement ✓ Differentiate data collection methods	✓ Collect surveying data ✓ Perform surveying data set out ✓ Record as-built data ✓ Analyze tests results ✓ Set out ✓ Interpret Optics in collecting data ✓ Make report ✓ Apply ICT in reporting	✓ Communicate actively at workplace ✓ Demonstrate professionalism in using surveying instruments ✓ Be careful while setting out surveying instruments

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Collect surveying data 2. Perform surveying data set out 3. Record as built data
Learning outcome 1: Collect surveying data	**Learning hours: 15**

Indicative content

- **Selection of surveying instruments and tools**
  - ✓ Types of surveying tools and instruments
  - ✓ Use surveying tools and instruments
- **Selection of starting point**
  - ✓ Types of work
  - ✓ Types of surveying data
  - ✓ Select reference point
- **Adjustment of surveying instruments**
  - ✓ Set up surveying instruments
  - ✓ Levelling surveying instruments
  - ✓ Eliminate parallax
- **Record surveying data**
  - ✓ Method of surveying
  - ✓ Method of data recording
- **Store surveying instruments and tools**
  - ✓ Transport and handle surveying instruments
  - ✓ Storing techniques
  - ✓ Storing instructions

Resources required for the learning outcome	
Equipment	GPS, DGPS, dumpy level, levelling staff, tripod, plumb bob, PPE, Total station, Theodolite.
Materials	Pegs, Maps, drawings, papers, strings, nails, paints, marker pens, pens, pencils, books, flip chat.
Tools	Hammer, tape measure, surveying rope, Machette, range rod, calculator, radio communicator.
Facilitation techniques	Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion
Formative assessment methods /(CAT)	Written assessment, oral presentation, performance assessment, Project based assessment

Learning outcome 2: interpret surveying data and set out	**Learning hours: 15**
Indicative content	

- **Identification of surveying data**
  - ✓ Interpret surveying data
  - ✓ Types of surveying data
- **Selection of surveying instruments and tools**
  - ✓ Types of surveying tools and instruments
  - ✓ Use surveying tools and instruments
- **Check bench mark**
  - ✓ Set up the instrument
  - ✓ Verify bench mark
- **Selection of starting point**
  - ✓ Types of work

- ✓ Types of data
- ✓ Select reference point

- **Set out data**
  - ✓ Interpret working drawing
  - ✓ Data demarcation
    - Set out the profile
    - Set out different shapes
- **Check work implementation**
  - ✓ Methods of checking difference of elevation
  - ✓ Check latitude and longitude

Resources required for the learning outcome	
Equipment	GPS and its accessories, DGPS and its accessories, dumpy level and its accessories, PPE, Total station and its accessories, Theodolite and its accessories.
Materials	Pegs, Maps, drawings, papers, strings, nails, paints, marker pens, pens, pencils, books, flip chat.
Tools	Hammer, tape measure, surveying rope, Machette, range rod, calculator, radio communicator, compass
Facilitation techniques	Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion
Formative assessment methods /(CAT)	Written assessment, oral presentation, performance assessment, Project based assessment

Learning outcome 3: Record as built data	**Learning hours: 10**
Indicative content	

- **Selection of surveying instrument and tools**
  - ✓ Types of surveying tools and instruments

- ✓ Use surveying tools and instruments

- **Selection of starting point**
  - ✓ Types of work
  - ✓ Types of surveying data
  - ✓ Select reference point
- **Adjustment of surveying instrument**
  - ✓ Set up surveying instruments
  - ✓ Levelling surveying instruments
  - ✓ Eliminate parallax
- **Record surveying data**
  - ✓ Methods of surveying
  - ✓ Data recording method
- **Store surveying instrument and tools**
  - ✓ Transport and handle surveying instrument
  - ✓ Storing techniques
  - ✓ Storing instruction

Resources required for the learning outcome	
Equipment	GPS, DGPS, dumpy level, levelling staff, tripod, plumb bob, PPE, Total station, Theodolite.
Materials	Pegs, Maps, drawings, papers, strings, nails, paints, marker pens, pens, pencils, books, flip chat.
Tools	Hammer, tape measure, surveying rope, Machette, range rod, calculator, radio communicator, compass
Facilitation techniques	▪ Brainstorming, demonstration and simulation, individual and group work, practical exercise, trainer guided and group discussion
Formative assessment methods /(CAT)	▪ Written assessment, oral presentation, performance assessment, Project based assessment

Integrated situation

Your company **ABC** Ltd wins a Design & Build tender of 100m Asphalt Concrete Road and production of a built plan tender of one classroom within KING CHARLES TVET. Hence as public work surveyor, your company has appointed you to collect surveying data for that 100m road to be used by designer and to do setting out during project implementation. By assuming that your company machine operator would come on site to perform earthwork, do necessary calculation which will help you to guide him/her whether he/she will do cutting or filling based on provided working drawing and site condition. And finally to collect a built data for the purpose of providing a built plan of the constructed classroom.

All drawings are provided as attachments.

Resources

Tools	GPS, DGPS, dumpy level, levelling staff, tripod, plumb bob, PPE, Total station, Theodolite.
Equipment	Pegs, Maps, drawings, papers, strings, nails, paints, marker pens, pens, pencils, books, flip chat.
Materials/ Consumables	Hammer, tape measure, surveying rope, Machette, range rod, calculator, radio communicator, compass

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Collect surveying data 30%	Surveying instruments and tools are appropriately selected according to the work to be done	Surveying tools are selected			3
		Surveying instruments are selected			3
	Starting points are appropriately selected according to the work to be done	Starting point is selected			3

	Surveying instruments are correctly adjusted according to the regulation manual	Surveying instruments are adjusted			5
	Surveying data are properly recorded as per specifications	Surveying data are recorded			5
	Tools and instruments are properly stored according to the regulation manual	Surveying tools are stored			2
		Surveying instruments are stored			2
2. Interpret surveying data and set out 40%	Types of data are correctly identified according the work to be done	Surveying data are interpreted			5
	Surveying instruments and tools are appropriately selected according to the work to be done	Surveying tools are selected			2
		Surveying instruments are selected			2
	Bench marks are properly checked as per specifications	Bench marks are checked			4
	Starting points are appropriately selected according to the work to be done	Starting points are selected			3
	Data are properly Set out as per design and specifications	Data are set			5
		Data point are marked on the site			6
	Work implementation is effectively checked as per design and specifications	Data sheet is presented			5
3. Record as built	Surveying instruments	Surveying tools are selected			3

data 30%	and tools are appropriately selected according to the work to be done				
		Surveying instruments are selected			3
	Starting points are appropriately selected according to the work to be done	Starting points are selected			3
	Surveying instruments are correctly adjusted according to the regulation manual	Surveying instruments are adjusted			5
	Surveying data of completed structures are correctly recorded according to the design and specification	Data of constructed classroom are recorded			5
	Surveying instruments and tools are appropriately stored according to the regulation manual	Surveying instrument are handled			2
		Surveying instructions are stored			2
Total marks					78
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

1. Crawford, W. G. (2002). *Construction Surveying and Layout.* Texas: Creative Construction Publishing.
2. Gillins, D. T. (2022). *Surveying and Geomatics Engineering: Principles, Technologies, and Applications.* New york: American Society of Civil Engineers.
3. Irvine, W. H. (1995). *Surveying for ConstructionSurveying for Construction.* Scotland: McGraw-Hill.
4. Jerry Nathanson, M. L. (2017). *Surveying Fundamentals and Practices.* New York: Pearson.
5. W Schofield, M. B. (2019). *Engineering Surveying.* Nottingham: CRC Press.