Module: Site Surveying Procedures for Construction and the Built Environment *by Edexcel BTEC*

Code: CBE4007

15 credits at level HE4

Description and Purpose of Module

This unit is designed to develop learners' skills in using modern surveying equipment to carry out a range of typical site surveying procedures in the construction and built environment sector. Learners will undertake setting-out and control of alignment of construction work. This unit develops the understanding and skills required to perform surveying calculations. It is intended that the procedures outlined in the specification are performed using semi-manual methods and learners will also gain an understanding of the software available for site surveying. Learners will develop the skills required to produce cartographic details from survey information using a manual approach, alongside the benefits of computer-aided plotting.

Indicative Syllabus Content

1. Understand the principles of site surveying

Linear measurement: errors in using steel tapes; adjustments for tension, sag and
temperature; change of standard length; semi-permanent adjustments to Electromagnetic
Distance Measurement (EDM) instruments (for temperature, pressure, curvature of the Earth)
Levelling: errors in levelling and compensation methods; reciprocal levelling; flying levels;
location of Ordnance Bench Mark (OBM); principle and practice of setting up a Temporary
Bench Mark (TBM); levelling large areas (grid and radial methods); direct and indirect methods
of contouring
Angular measurement: errors and methods for reducing errors; reduction of angular
measurement; horizontal and vertical angles; computation of true horizontal length (from
slope distance and angle of inclination)
Distinction between open, link and closed traverse: traverse for area control; factors affecting
choice of traverse stations; whole circle bearings; distinction between grid, true and magnetic
north; coordinate system; Ordnance Survey (OS); grid references; angular closing error and
correction; Bowditch correction for misclosure errors
Setting out: principles; control of spread of error (working from the whole to the point);
procedure for coordinated setting out; appropriate accuracy; procedures and practices for
setting out ground works; upper floors; road construction; drainage and sewerage works;
embankments and cuttings

2 Be able to use site surveying instruments

Appropriate instruments: linear measuring instruments eg steel bands, sonic measuring
devices, EDMinstruments
Levels: optical (automatic and tilting); water level; general construction laser; pipe alignment
laser; electronic and optical levels; angular measuring instruments; optical and electronic
theodolites; magnetic compasses and compass attachments to theodolites; combined
theodolites and EDMdevices (total station instruments); vertical alignment instruments eg
plumb bob, spirit level, optical plumb, laser alignment
Electronic and laser instruments: electronic reading levels; electronic logging of field data;
laser construction levels; laser alignment levels; EDMs; Global Positioning

Systems (GPS);
digital terrain modelling

3 Understand cartographic detailing of construction works

Raw data and translation for cartographic detail/setting out: levelling; plotting contours by
graphic interpolation; plotting of cross-sections from contoured plans; area measurement
(manual, mechanical, electronic methods); computation of volumes from spot heights; ground sections and contours; calculations of volumes of cut and fill (straight road with
transverse sloping ground)
Angular measurement: correction to measured angles, distances, bearings and coordinates
for a closed traverse, manual and electronic plotting of traverse surveys, survey symbols
Setting out: computation of deflection angles; distances for coordinated setting out

4 Understand the software available for site surveying

Surveying computer software: software for capturing data in the field; dedicated software for
setting out; built-in capabilities of total station instruments; commercial software and programmed spreadsheets to facilitate repetitive surveying calculations; Geographical
Information Systems (GIS) and OS digital data

Learning, Teaching and Assessment

100% Coursework 4No. Assignments

Learning Outcomes and Assessment Criteria

	Learning Outcomes when you have successfully completed this module you will:	Assessment Criteria to demonstrate that you have achieved the learning outcome you will:
1.	Understand the principles of site surveying	1.1 describe procedures and instrumentation for transferring control points 1.2 describe procedures for producing large horizontal curves used in road construction 1.3 explain the use of electronic surveying instruments
2.	Be able to use site surveying instruments	2.1 set up and use appropriate instruments 2.2 record readings to produce contoured plans and traverse surveys 2.3 set out horizontal and vertical controls and small radii horizontal curves 2.4 check the verticality of perpendicular members of construction frames
3.	Understand cartographic detailing of construction works	3.1 evaluate the benefits of computer software to solve typical surveying problems 3.2 explain the use of information taken from digital mapping databases 3.3 evaluate the use of GPS within construction and civil engineering work
4.	Understand the software available for site surveying	4.1 explain how to determine contours and ground sections for an area of ground, using raw survey data 4.2 explain how to determine areas and volumes of cut and fill, using survey data 4.3 explain how to correct coordinate points within control traverse networks 4.4 explain how to determine setting out data for coordinated points

Assessment

Your achievement of the learning outcomes for this module will be tested as follows:

Type	CW	CW	CW	CW
Description	Understand the principles of site surveying	Be able to use site surveying instruments	Understand cartographic detailing of construction works	Understand the software available for site surveying
%age	0	0	0	0
Final Assessment	N	N	N	N
Learning Outcomes	1	2	3	4

Prerequisite Module(s)

There are no prerequisites for this module.

Barred Combinations

No restrictions apply.

Indicative Reading

• Irvine, W. Surveying for Construction 5th 2006 Edition . (McGraw-Hill, 1995)
• Uren, J. and Price W.F. Surveying for Engineers 4th Ed 2006 (Palgrave Macmillan)
• Schofield, W. and Breach, M. Engineering Surveying 6th Ed 2007(Elsevier Ltd)
• Brighty, S revised by Stirling, D . Setting Out: A Guide for Site Engineers 2nd Ed
(BSP Professional, 1989)

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Activity Log

User Name	Date Accessed	Action
LA5EXT	15/05/2013 09:11:28	added
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