# PERFORM HIGHWAY SURVEY

**UNIT CODE:** CON/OS/CET/CR/02/6/A

**UNIT DESCRIPTION**

This unit specifies the competencies required to Perform Highway Survey**.** It involves undertaking preliminary site survey, performing levelling activities, conducting tacheometry works and drafting road cross-sections. It also includes carrying out setting out activities, performing traversing works and performing traffic engineering survey.

It applies in Road construction sector.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**<br>These describe the **key outcomes** which make up workplace function (to be stated in active) | **PERFORMANCE CRITERIA**<br>These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice)<br>***Bold and italicized terms are elaborated in the Range*** |
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| 1. Undertake preliminary site survey | 1.1 Preliminary site survey plan is prepared in accordance with contract document<br>1.2 ***Survey resources*** are identified and mobilized as per the contract document<br>1.3 Survey drawings are obtained and interpreted as per the contract document<br>1.4 ***Site conditions*** are assessed, and findings recorded according to standard road construction procedures<br>1.5 Original ground level (OGL) is established and documented as per standard road construction procedures<br>1.6 Reference points are established based on standard road construction procedures<br>1.7 Preliminary survey report is prepared according to SOPs |
| 2 Perform levelling activities | 2.1 ***Levelling tools and equipment*** are identified and selected according to contract document<br>2.2 Levelling tools and equipment are calibrated according to manufacturer's manual<br>2.3 Road levels are set according to the design data<br>2.4 Monitoring and control of road levels is carried out as per the standard construction requirements |

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| 3 Conduct tacheometry works | 3.1 ***Tacheometry tools and equipment*** are identified and selected according to contract document<br>3.2 Calibration of tools and equipment is carried out according to manufacturer's manual<br>3.3 Horizontal distances are determined based on datum coordinates<br>3.4 Vertical distances are determined based on datum coordinates<br>3.5 Tacheometry data is collected based on standard procedures<br>3.6 Data collected is documented based on standard road construction procedures |
| 4 Draft road cross-sections | 4.1 Road levels are recorded and computed based on SOPs<br>4.2 Reduced levels are produced based on computed road levels<br>4.3 ***Road cross-sections*** are drafted based on road levels<br>4.4 Road cross-sections are interpreted as per standard procedures<br>4.5 Road designs is established based on interpreted road cross-sections and profiles |
| 5 Carry out setting out activities | 5.1 ***Setting out tools and equipment*** are identified and selected according to contract documents<br>5.2 Calibrations of equipment is carried out according to manufacturer's manual<br>5.3 Proposed alignment is determined in accordance with preliminary survey report<br>5.4 Horizontal alignment is set out based on OGL<br>5.5 Vertical alignment is set out based on OGL<br>5.6 Alignment data is booked and computed as per the standard construction procedures |
| 6 Perform traversing works | 6.1 ***Traversing tools and equipment*** are identified and selected according to contract documents<br>6.2 Tools and equipment are calibrated according manufacturers manual<br>6.3 Horizontal and vertical angles are determined based on datum bearings and datum coordinates respectively.<br>6.4 Bearings are determined according to standard procedures<br>6.5 Distances are measured according to standard procedures |

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| | 6.6 Traverses are plot according to bearings and distances |
| 7 Perform traffic engineering survey | 7.1 Pavement location is identified<br>7.2 Traffic survey is prepared for as per SOPs<br>7.3 Traffic counts are carried out<br>7.4 Traffic and road characteristics are estimated |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

| VARIABLE | RANGE |
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| 1. Survey resources may include but not limited to: | • Human resources<br>• Tools<br>  • Driving hammers<br>  • Pegs<br>  • Measuring tapes<br>  • Cutting tools<br>• Equipment<br>  • Electric Distance Measurement (EDM) machines<br>  • Theodolite (CWT)<br>  • Total Station (TS)<br>  • Dumpy level<br>  • Levelling staff<br>• Stationery<br>  • Surveyors filed notebooks<br>  • Pencil<br>  • Grid papers<br>• Legal documents<br>  • Field permits<br>  • Registration certificates<br>• Power back-ups<br>• Location maps |

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| 2. Site conditions may include but not limited to: | • Topography<br>• Soil type and profiles<br>• Vegetation<br>• Settlements<br>• Drainage<br>• Weather conditions<br>• Utility services<br>  • Underground electric cables<br>  • Pipe lines<br>  • Data cables<br>• Water table |
| 3. Setting out tools and equipment may include but not limited to: | • Strings<br>• Tape measures<br>• Ranging rods<br>• Pegs<br>• Cutting tools<br>• Driving tools<br>• Angle measuring tools<br>• Plumb bob<br>• Marking tools and equipment |
| 4. Tacheometry tools and equipment may include but not limited to: | • Theodolite<br>• Levelling staff<br>• Total station and accessories<br>• Cutting tools<br>• Driving tools |
| 5 Traversing tools and equipment may include but not limited to: | • Traverse kits<br>• Compass<br>• GPS Survey equipment |
| 6 Levelling tools and equipment may include but not limited to: | • Dumpy level, tilting levels and automatic levels<br>• Levelling staff<br>• Tilting levels<br>• Automatic levels<br>• Tape measure<br>• Pegs<br>• Ranging rods |
| 7 Road cross-sections | • Cut and fill |



**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

- Drafting skills
- Drawings
- Computer literacy
- Leadership
- Reporting
- Communication
- Creativity and innovation
- Interpersonal
- Problem solving
- Interpretation
- Analytical

**Required Knowledge**

The individual needs to demonstrate knowledge of:



- Type and use of different survey tools and equipment
- Care and maintenance of survey equipment
- Road construction site conditions
- Standard road construction procedures
- Contract document
- Legal and statutory requirements
- Survey drawings
- Setting out tools and equipment
- Setting out methods
- Manufacturer's manual
- Survey data booking and computation
- Documentation of data
- Tacheometry tools and equipment
- SOPs
- Levelling tools and equipment
- Road levels
- Quality control operations
- Road cross-sections

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

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| 1 | Critical Aspects of Competency | Assessment requires evidence that the candidate:<br>1.1 Prepared preliminary site survey plan<br>1.2 Conducted successful preliminary survey<br>1.3 Prepared preliminary survey report<br>1.4 Carried out setting out activities<br>1.5 Conducted tacheometry works<br>1.6 Booked and computed tacheometry data<br>1.7 Set road levels<br>1.8 Established road designs from road cross-sections and profiles<br>1.9 Demonstrated ability to use different engineering survey tools and equipment<br>1.10 Carried out traffic survey |
| 2 | Resource Implications | The following resources should be provided:<br>2.1 Workstation<br>2.2 Stationery<br>2.3 Manuals and guidelines<br>2.4 Standard of specifications |
| 3 | Methods of Assessment | Competency in this unit may be assessed through:<br>3.1 Observation<br>3.2 Oral questioning<br>3.3 Projects<br>3.4 Written tests<br>3.5 Third party<br>3.6 Portfolio |
| 4 | Context of Assessment | Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment. |
| 5 | Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |