DESIGN BASIC PAVEMENT STRUCTURES

UNIT CODE: CON/OS/CET/CR/03/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to design basic pavement structures. It involves conducting site visit, designing highway drainage and hydraulic structures, designing road geometrics, designing pavement structure, designing pedestrian and cyclist path and designing for road furniture.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the **key outcomes** which make up workplace function (to be stated in active)	**PERFORMANCE CRITERIA** These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice) ***Bold and italicized terms are elaborated in the Range***
1. Conduct site visit	1.1 Pavement location is determined based on contract documents 1.2 Preparation for site visit is undertaken as per contact document 1.3 ***On site data*** is collected according to standard procedures
2. Design highway drainage and hydraulic structures	2.1 Preliminary site visit is conducted 2.2 Surface run-off is estimated 2.3 Highway drainage structures are designed as per the design manuals and procedures 2.4 Bridges are designed as per the design manuals and procedures 2.5 Drifts and causeways are designed as per the ***design manuals*** and procedures 2.6 Retaining walls are designed as per the design manuals and procedures 2.7 Construction materials are determined

3. Design road geometrics	3.1 ***Resources*** are acquired in accordance with geometric design requirements 3.2 OGL (Original Ground Levels) are obtained according to standard road construction procedures 3.3 Horizontal alignments are designed based on standard road construction procedures 3.4 Vertical alignments are designed based on standard procedures 3.5 ***Road intersections*** are designed as per standard road construction procedures 3.6 Drawings are produced as per design data 3.7 Report is prepared and presented as per contract document
4. Design pavement structure	4.1 Resources are acquired in accordance with pavement structure requirements. 4.2 Traffic load is estimated as per traffic survey information. 4.3 ***Road/pavement type*** is determined as per client/developer/financier requirements and nature of the ground. 4.4 ***Pavement structures*** are designed based on traffic engineering analysis outputs and material testing results 4.5 Pavement structural drawings are produced as per design outputs 4.6 Materials schedules are developed according to design results 4.7 Detailed report and specifications are prepared and presented as per the contract document
5. Design pedestrian and cyclist paths	5.1 Required resources are identified and gathered as per design requirements 5.2 Pedestrian and cyclist traffic are estimated in accordance with traffic survey information 5.3 Pedestrian and cyclist path location is determined according to road profile 5.4 Pedestrian and cyclist paths are designed as per design manuals and procedures 5.5 Drawings are produced according to design output 5.6 Report and material specifications are prepared and presented according to contract document

6. Design road furniture	6.1 Required resources are gathered according to design needs 6.2 ***Type of road furniture*** is determined based on road type and relevant manuals 6.3 Location of road furniture is determined as per geometric road design 6.4 Road furniture is designed according standard road construction procedures 6.5 Drawings are produced based on design requirements 6.6 Report and material specifications are prepared and presented as per contract document requirement

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
1 Design manuals may include but not limited to:	• Ministry of Works road design manuals • AASHTO Standards
2 On site data may include but not limited to:	• Datum points • Settlement • Natural features • Soil type • Water catchment areas • Accessibility of utility services • Land marks • Road reserve
3 Resources may include but not limited to:	• Geometric tools • Straight edge • Ruler • Compass • Protractor • Computers • Auto Cad Software • Civil 3D • ARCH CAD • GIS

4	Road intersections may include but not limited to:	• Y-junctions • T-junctions • Under-pass • Round about • Overpass • Cross junctions • Interchange
5	Road/pavement type may include but not limited to:	• Rigid • Flexible
6	Pavement structures may include but not limited to:	• Sub-grade • Sub-base • Base • Surface
7	Type of road furniture may include but not limited to:	• Road markings • Information signs • Warning signs • Street lights • Traffic lights • Guard rails

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:

- Technical
- Drawings
- Interpretation
- Creativity
- Innovation
- Time management
- Leadership
- Numerical
- CAD
- Interpersonal

Required Knowledge

The individual needs to demonstrate knowledge of:

- Horizontal alignments
    - Curves

    - Straights
- Interpretation of drawings
- Vertical alignments
- CAD
- Road construction drawings
    - Road Profiles
    - Maps
- Pavement structure
    - Sub-grade
    - Sub-base
    - Base
    - Surfacing
- Types of pavements
- Traffic engineering
- Material testing
- Runways
- Methods of structural designs
- Alternative construction procedures
- Design lifespan
- Behaviour of different pavement materials
- Design manuals and procedures
- Types of paths
- Types of road furniture
    - Road markings
    - Information signs
    - Warning signs
    - Street lights
    - Traffic lights
    - Guard rails
- Relevant manuals
- Engineers Code of Ethics
- Engineer's Act
- Basic Mathematics and Physics

EVIDENCE GUIDE

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

1 Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Designed highway drainage and hydraulic structures 1.2 Conducted preliminary site visit and collected on site data 1.3 Demonstrated understanding of road furniture

		1.4 Developed geometric drawings 1.5 Produced structural drawings 1.6 Designed road furniture 1.7 Designed pavement structure 1.8 Designed pedestrian and cyclist paths 1.9 Prepared and presented report
2	Resource Implications	The following resources should be provided: 2.1 Workstation 2.2 Computer 2.3 Software 2.4 Stationery
3	Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation 3.2 Oral 3.3 Projects 3.4 Written 3.5 Third party report 3.6 Case study 3.7 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 or during industrial attachment.
5	Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.