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STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN

(*NATIONAL OCCUPATIONAL SKILLS STANDARD*)

STANDARD PRACTICE & STANDARD CONTENT FOR

ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION LEVEL 3

JPK
JABATAN PEMBANGUNAN KEMAHIRAN
KEMENTERIAN SUMBER MANUSIA
MALAYSIA

CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

Department of Skills Development (DSD)

Ministry of Human Resources

62530 PUTRAJAYA, MALAYSIA

STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN
(NATIONAL OCCUPATIONAL SKILL STANDARD)

FOR

ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION
LEVEL 3

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STANDARD PRACTICE
NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR
ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION
LEVEL 3

1. INTRODUCTION

A road is a thoroughfare, route, or way on land between two places, which has been paved or otherwise improved to allow travel by some conveyance, including a horse, cart, or motor vehicle. Roads consist of one, or sometimes two, roadways each with one or more lanes and also any associated sidewalks and road verges. Roads that are available for use by the public may be referred to as public roads or highways.

Road construction requires the creation of a continuous right-of-way, overcoming geographic obstacles and having grades low enough to permit vehicle or foot travel and may be required to meet standards set by law or official guidelines. The process is often begun with the removal of earth and rock by digging or blasting, construction of embankments, bridges and tunnels, and removal of vegetation (this may involve deforestation) and followed by the laying of pavement material. A variety of road building equipment is employed in road building.

After design, approval, planning, legal and environmental considerations have been addressed alignment of the road is set out by a surveyor. The radii and gradient are designed and staked out to best suit the natural ground levels and minimize the amount of cut and fill. Great care is taken to preserve reference Benchmarks.

Roads are designed and built for primary use by vehicular and pedestrian traffic. Storm drainage and environmental considerations are a major concern. Erosion and sediment controls are constructed to prevent detrimental effects. Drainage lines are laid with sealed joints in the road easement with runoff coefficients and characteristics adequate for the land zoning and storm water system. Drainage systems must be capable of carrying the ultimate design flow from the upstream catchment with approval for the outfall from the appropriate authority to a watercourse, creek, river or the sea for drainage discharge.

A borrow pit (source for obtaining fill, gravel, and rock) and a water source should be located near or in reasonable distance to the road construction site. Approval from local authorities may be required to draw water or for working (crushing and screening) of materials for construction needs. The top soil and vegetation is removed from the borrow pit and stockpiled for subsequent rehabilitation of the extraction area. Side slopes in the excavation area not steeper than one vertical to two horizontal for safety reasons.

Old road surfaces, fences, and buildings may need to be removed before construction can begin. Trees in the road construction area may be marked for retention. These protected trees should not have the topsoil within the area of the tree's drip line removed and the area should be kept clear of construction material and equipment. Compensation or replacement may be required if a protected tree is damaged. Much of the vegetation may be mulched and put aside for use during reinstatement. The topsoil is usually stripped and stockpiled nearby for rehabilitation of newly constructed embankments along the road. Stumps and roots are removed and holes filled as required before the earthwork begins. Final rehabilitation after road construction is completed will include seeding, planting, watering and other activities to reinstate the area to be consistent with the untouched surrounding areas.

Processes during earthwork include excavation, removal of material to spoil, filling, compacting, construction and trimming. If rock or other unsuitable material is discovered it is removed, moisture content is managed and replaced with standard fill compacted to meet the design requirements (generally 90-95% relative compaction). Blasting is not frequently used to excavate the road bed as the intact rock structure forms an ideal road base. When a depression must be filled to come up to the road grade the native bed is compacted after the topsoil has been removed. The fill is made by the "compacted layer method" where a layer of fill is spread then compacted to specifications, the process is repeated until the desired grade is reached.

The lower fill generally comprises sand or a sand-rich mixture with fine gravel, which acts as an inhibitor to the growth of plants or other vegetable matter. The compacted fill also serves as lower-stratum drainage. Select second fill (sieved) should be composed of gravel, decomposed rock or broken rock below a specified Particle size and be free of large lumps of clay. Sand clay fill may also be used. The road bed must be "proof rolled" after each layer of fill is compacted. If a roller passes over an area without creating visible deformation or spring the section is deemed to comply.

Geosynthetics such as geotextiles, geogrids and geocells are frequently used in the various pavement layers to improve road quality. Geosynthetics perform four main functions in roads: separation, reinforcement, filtration and drainage; which increase the pavement performance, reduce construction costs and decrease maintenance.

The completed road way is finished by paving or left with a gravel or other natural surface. The type of road surface is dependent on economic factors and expected usage. Safety improvements like Traffic signs, Crash barriers, Raised pavement markers, and other forms of Road surface marking are installed.

When a single carriageway road is converted into dual carriageway by building a second separate carriageway alongside the first, it is usually referred to as duplication, twinning or doubling. The original carriageway is changed from two-way to become one-way, while the new carriageway is one-way in the opposite direction. In the same way as converting railway lines from single track to double track, the new carriageway is not always constructed directly alongside the existing carriageway.

Like all structures, roads deteriorate over time. Deterioration is primarily due to accumulated damage from vehicles, however environmental effects such as frost heaves, thermal cracking and oxidation often contribute. Potholes on roads are caused by rain damage and vehicle braking or related construction works.

Maintenance is considered in the whole life cost of the road with service at 10, 20 and 30 year milestones. Roads can be and are designed for a variety of lives (8-, 15-, 30-, and 60-year designs). When pavement lasts longer than its intended life, it may have been overbuilt, and the original costs may have been too high. When a pavement fails before its intended design life, the owner may have excessive repair and rehabilitation costs. Some asphalt pavements are designed as perpetual pavements with an expected structural life in excess of 50 years.

Virtually all roads require some form of maintenance before they come to the end of their service life. Pro-active agencies use pavement management techniques to continually monitor road conditions and schedule preventive maintenance treatments as needed to prolong the lifespan of their roads. Technically advanced agencies monitor the road network surface condition with sophisticated equipment. These measurements include road curvature, cross slope, asperity, roughness, rutting and texture. This data is fed into a pavement management system, which recommends the best maintenance or construction treatment to correct the damage that has occurred.

Maintenance treatments for asphalt concrete generally include thin asphalt overlays, crack sealing, surface rejuvenating, fog sealing, micro-milling and surface treatments. Thin surfacing preserves, protects and improves the functional condition of the road while reducing the need for routing maintenance, leading to extended service life without increasing structural capacity.

2. OCCUPATIONAL STRUCTURE (OS)

Occupational Structure

SECTOR	BUILDING & CONSTRUCTION			
SUB SECTOR	CIVIL ENGINEERING			
AREA	ROAD CONSTRUCTION	ROAD TRAFFIC MANAGEMENT	ROAD TESTING	ROAD WORK MACHINERY
LEVEL 5	SITE MANAGER	TRAFFIC MANAGEMENT MANAGER	Road Testing Manager	Road Work Machinery Manager
LEVEL 4	SITE EXECUTIVE	TRAFFIC MANAGEMENT OFFICER	Road Testing Executive	Road Work Machinery Executive
LEVEL 3	SITE SUPERVISOR	TRAFFIC MANAGEMENT SUPERVISOR	Road Testing Supervisor	Plant foreman
LEVEL 2	SITE TECHNICIAN	TRAFFIC MANAGEMENT TECHNICIAN	Road Testing Technician	Operator
LEVEL 1	GENERAL WORKER			

Figure 1.1: Occupational Structure of Road Construction & Maintenance Sector of Building and Construction – Sub Sector of Civil Engineering

Occupational Area Structure

SECTOR	BUILDING & CONSTRUCTION			
SUB SECTOR	CIVIL ENGINEERING			
AREA	ROAD CONSTRUCTION	ROAD TRAFFIC MANAGEMENT	ROAD TESTING	ROAD MACHINERIES
LEVEL 5	ROAD CONSTRUCTION AND MAINTENANCE MANAGEMENT		ROAD TESTING MANAGEMENT	ROAD MACHINERIES MANAGEMENT
LEVEL 4	ROAD CONSTRUCTION AND MAINTENANCE COORDINATION		ROAD TESTING MANAGEMENT	ROAD MACHINERIES MANAGEMENT
LEVEL 3	ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION		ROAD TESTING OPERATION	ROAD MACHINERIES OPERATION
LEVEL 2	ROAD CONSTRUCTION OPERATION		ROAD TESTING OPERATION	ROAD MACHINERIES OPERATION
LEVEL 1	NO LEVEL			

Figure 1.2: Occupational Area Structure for Road Construction & Maintenance Sector of Building and Construction – Sub Sector of Civil Engineering

3. DEFINITION OF COMPETENCY LEVELS

The NOSS is developed for various occupational areas. Candidates for certification must be assessed and trained at certain levels to substantiate competencies. Below is a guideline of each NOSS Level as defined by the Department of Skills Development, Ministry of Human Resources, Malaysia.

Malaysia Skills Certificate Level 1: (Operation Level)	Competent in performing a range of varied work activities, most of which are routine and predictable.
Malaysia Skills Certificate Level 2: (Operation Level)	Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy.
Malaysia Skills Certificate Level 3: (Supervisory Level)	Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.
Malaysia Skills Diploma Level 4: (Executive Level)	Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.
Malaysia Skills Advanced Diploma Level 5: (Managerial Level)	Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation.

4. MALAYSIAN SKILL CERTIFICATION

Candidates after being assessed verified and fulfilled Malaysian Skill Certification requirements shall be awarded with Sijil Kemahiran Malaysia (SKM) for 3 as for Level 4 and 5 shall be awarded with Diploma Kemahiran Malaysia and Diploma Lanjutan Kemahiran Malaysia respectively.

Assessment must be in accordance with the following:

The road construction and maintenance operation working environment as required by the industry and has been developed and documented following extensive collaboration across key Malaysian organisations. To meet the requirements of this industry, it is imperative that the duties and tasks outlined follow a high standard as well as maintenance of consistency throughout the assessment process. This can only be done by stipulating a precise framework in which the assessment of duties and tasks must be conducted. The training & assessment of a demolition work operation practitioner must be deployed in accordance with JPK policy.

5. JOB COMPETENCIES

Road Construction and Maintenance Operation (Level 3) is competent in

- Traffic management supervision
- Road earthworks supervision
- Drainage works supervision
- Pavement works supervision
- Road furniture installation supervision
- Slope protection work supervision
- Road maintenance supervision

6. WORKING CONDITIONS

They may be required to work extra hours to fulfil internal and external requirement. In road construction and maintenance work operation, they need to use / wear appropriate attire during the commencement of their jobs. They may work in a modular group in a conducive and ventilated environment. The unavoidable, externally imposed conditions under which the work must be performed and which create hardship for the incumbent including the frequency and duration of occurrence of physical demands, environmental conditions, demands on one’s senses.

7. EMPLOYMENT PROSPECTS

There are excellent prospect in private sectors due to shortage of hands-on expert in road construction and maintenance operation. In public sector there are lacking of professional and well experience of demolition work operator. This area has a very good job market potential abroad for skilled personnel due to shortage of such highly skilled personnel in this region. Excellent prospects in road construction and maintenance operator related industries such as construction industry, architecture industry and training industry.

8. TRAINING, INDUSTRIAL RECOGNITION, OTHER QUALIFICATION AND ADVANCEMENT

Most competent demolition work operation gain their competency through working experience. Certification may increase their chances of career advancement. Thus with additional formal training/education and certification, this competent demolition work operation can advance become a certified trainer for demolition work operation or can be promoted to a specialist level.

9. SOURCES OF ADDITIONAL INFORMATION

- Jabatan Kerja Raya
  Ibu Pejabat,
  Jabatan Kerja Raya,
  Jalan Sultan Salahuddin,
  50582 Kuala Lumpur.
  Telephone: 603-26919011
  Fax: 603-26988187
  Homepage: http://www.jkr.gov.my

- Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB)
  Tingkat 10, Menara Dato' Onn,
  Pusat Dagangan Dunia Putra,
  No 45, Jalan Tun Ismail
  50480 Kuala Lumpur
  Tel: 03-4047 7000
  Fax : 03-4047 7070
  email: cidb@cidb.gov.my

- Jabatan Perancangan Bandar Dan Desa Semenanjung Malaysia
  Aras Bawah, Blok Tanjung,
  Jalan Cenderasari, 50646, Kuala Lumpur
  Tel : 03-2699 2111
  Faks : 03-2692 9994

10. ACKNOWLEDGEMENT

The Director General of DSD would like to extend his gratitude to the organisations and individuals who have been involved in developing this standard.

This standard has been checked by the Standard Technical Evaluation Committee (STEC). Panel members of STEC are listed below.

NO.	NAME	COMPANY
1.		
2.		
3.		

11. COMMITTEE MEMBERS FOR DEVELOPMENT OF STANDARD PRACTICE (SP), COMPETENCY PROFILE CHART (CPC), COMPETENCY PROFILE (CP), CURRICULUM OF COMPETENCY UNIT (CoCU)

PANEL		
1.	Ir. Hamzah Bin Hashim	Assistant Director (Civil) Cawangan Kejuruteraan Jalan dan Geoteknik Jabatan Kerja Raya (JKR)
2.	Mohd Khairul Azman Bin Hambali	Jurutera Awam Lembaga Lebuhraya Malaysia
3.	Gopal Krishnan A/L S. Narayanansamy	Managing Director Gopitrah Sdn. Bhd.
4.	Marimuthu A/L Jaganathan	Manager Persatuan Kontraktor India Malaysia
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6.	Kumaran R. Muthiah	Pengarah Urusan Pembinaan Muthiah & Sons (M) Sdn. Bhd.
7.	Ganesan A/L Krishnan	Director Syarikat Pembinaan Gama (M) Sdn. Bhd
8.	Ahmad Rahimi Yunus	General Manager Plus Bhd
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10.	Mohamad Yazid Mohd Yunus	General Manager Soil Centralab (CSL) Sdn Bhd
11.	Yusman Bin Yusop	Manager Soil Centralab (CSL) Sdn Bhd.
12.	Tahir Bin Ahmad	Head Of Engineering YP Maintenance Sdn. Bhd.
13.	Awang Irwan Abdullah	Lecturer- Civil Engineering Akademi Binaan Malaysia Wilayah Sarawak
14.	Ismail Bin Yusof	Lecturer- Civil Engineering Universiti Tun Hussein Onn
15.	Daud Bin Mohamad	Lecturer- Civil Engineering Universiti Tenaga Nasional (UNITEN)
16.	Poulin Bin Bondion @ Fringki	Lecturer- Civil Engineering Akademi Binaan Malaysia Wilayah Sabah
17.	Norhafizah Binti Manap	Pegawai Pendidikan-Civil Engineering Ministry of Education Malaysia
18.	Mohd Zakwan Bin Ramli	Lecturer-Civil Engineering Universiti Tenaga Nasional (UNITEN)

FACILITATOR	
1.	En. Harris Iskandar bin Nordin
DOCUMENTOR	
2.	En. Khairul Nizan Bin Yusoff

COMPETENCY PROFILE CHART (CPC)

SECTOR	BUILDING & CONSTRUCTION		
SUB SECTOR	CIVIL ENGINEERING		
JOB AREA	ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT		
NOSS TITLE	ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION		
JOB LEVEL	THREE (3)	NOSS CODE	BC-063-3:2015

COMPETENCY ← → COMPETENCY UNIT

CORE	TRAFFIC MANAGEMENT SUPERVISION	ROAD EARTHWORKS SUPERVISION	DRAINAGE WORKS SUPERVISION	PAVEMENT WORKS SUPERVISION
	BC-063-3:2015 C01	BC-063-3:2015 C02	BC-063-3:2015 C03	BC-063-3:2015 C04
	ROAD FURNITURE INSTALLATION SUPERVISION	SLOPE PROTECTION WORK SUPERVISION	ROAD MAINTENANCE SUPERVISION	
	BC-063-3:2015 C05	BC-063-3:2015 C06	BC-063-3:2015 C07	

COMPETENCY PROFILE (CP)

Sub Sector	**CIVIL ENGINEERING**
Job Area	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**
NOSS Title	**ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION**
Level	**THREE (3)**

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
1. Traffic management supervision	BC-063-3:2015 C01	Site traffic management supervision has specific duties and has ultimate responsibility for overall traffic management at the worksite and to coordinate the traffic management implementation according to Standards Operating Procedures. The person who is competent in this CU shall be able to coordinate traffic management demarcation work, coordinate traffic management setup and coordinate mobilisation & demobilisation. The outcome of this competency is to properly supervise traffic management implementation in working area so that the working personnel, road user and public are safe.	1. Coordinate traffic management demarcation work 2. Coordinate traffic management setup	1.1 Traffic Management Plan (TMP) obtained 1.2 Traffic Management Plan (TMP) interpreted 1.3 Start and end location of road closure marked 1.4 Disparity of traffic management plan reported / amended according to traffic condition 2.1 Traffic control devices, transport, workers and PPE arrangement supervised according to SOP and traffic management plan 2.2 Traffic management inspection form filled up 2.3 Traffic management setup monitored according to SOP and Traffic Management Plan 2.4 Minimum disruption to traffic flow during setup ensured 2.5 Traffic management activities inspected and recorded

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
			3. Coordinate mobilisation & demobilisation	3.1 Traffic control devices, transport, workers and PPE arrangement supervised 3.2 Mobilise & demobilise activities conducted according to SOP 3.3 Minimum disruption to traffic flow during mobilise & demobilise activities confirmed 3.4 Equipment storage arranged and equipment hand over report filled up
2. Road earthworks supervision	BC-063-3:2015 C02	Earthwork (road) is a scope of competency to move or process parts of the earth's surface involving soil or unformed rock so that the earth surface can be use for road and drainage construction in accordance with Standard Operating Procedure (SOP). The person whom is competent in earthwork (road) must be able to supervise surveying work, supervise site clearing and supervise earthwork activities in accordance with earthwork standard procedure. The outcome of this competency is to properly supervise preparation of the earth surface for road layer to be able to be pave onto it and also for the	1. Supervise surveying work	1.1 Construction drawing provided to surveyor 1.2 Earthwork demarcation work confirmed according to construction drawings 1.3 Site clearing work supervised within Right of Way (ROW) 1.4 Level pegging work confirmed according to construction drawings 1.5 Formation level checked according to construction drawing 1.6 Road alignment checked according to construction drawing 1.7 Surveying work record verified and compiled according to construction drawing
			2. Supervise site clearing	2.1 Traffic management team coordinated according to safety requirement 2.2 Equipment, machinery, material, workers and PPE arrangement supervised

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
		drainage to be installed later on.		2.3 Construction of approved temporary access road coordinated according to construction requirement and site condition 2.4 Top soil removal works coordinated according to construction drawing 2.5 Trees and vegetation removal works coordinated according to construction drawing 2.6 Relocation work for utilities (water pipe, gas pipe, existing road, waterway, amenities etc) coordinated according to construction drawing 2.7 Encumbrances removal work (house etc) coordinated according to construction drawing 2.8 Site clearing daily work report compiled and submitted to superior
			3. Supervise earthwork activities	3.1 Equipment, machinery, material, workers and PPE arrangement supervised 3.2 Cut and fill work coordinated according to construction drawing 3.3 Cart away surplus and unsuitable material coordinated according to construction drawing and specification 3.4 Geotechnical treatment coordinated according to construction drawing and

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				specification 3.5 Removal of rock and hard material work coordinated 3.6 Formation level checked and coordinated according to construction drawing and specification 3.7 Compaction work coordinated according to construction drawing and specification 3.8 Temporary drainage work coordinated according to construction drawing and specification 3.9 Earthwork testing coordinated according to specification 3.10 Compliance with Environmental Sedimentation Control Plan (ESCP) and Environmental Impact Assessment (EIA) requirement ensured 3.11 Earthwork activities inspected 3.12 Earthwork daily work report compiled and submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
3. Drainage works supervision	BC-063-3:2015 C03	Drainage work supervision is a scope of competency to supervise drainage construction for the road in accordance with Standard Operating Procedure (SOP). The person whom is competent in drainage work must be able to supervise surface drainage work, supervise culvert and sump work and supervise sub soil drainage work in accordance with drainage construction procedure. The outcome of this competency is to properly supervise drainage construction so that the road pavement performs satisfactorily. Drainage functions are to prevent flooding of the road and ponding on the road surface, to protect the bearing capacity of the pavement and the subgrade material and also to avoid the erosion of side slopes.	1. Supervise surface drainage work 2. Supervise culvert and sump work	1.1 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 1.2 Traffic management team coordinated according to safety requirement 1.3 Disparity of traffic management plan reported / amended according to traffic condition 1.4 Surface drainage construction work supervised according to construction drawing 1.5 Housekeeping supervised according to safety requirement 1.6 Surface drainage work report compiled and submitted to superior 2.1 Drainage level and alignment obtained from construction drawing 2.2 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 2.3 Traffic management team coordinated according to safety requirement 2.4 Disparity of traffic management plan reported / amended according to traffic condition 2.5 Culvert and sump construction and installation work supervised

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				according to construction drawing 2.6 Housekeeping supervised according to safety requirement 2.7 Culvert and sump work inspected 2.8 Culvert and sump work compiled and submitted to superior
			3. Supervise sub soil drainage work	3.1 Drainage level and alignment obtained from construction drawing 3.2 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 3.3 Traffic management team coordinated according to safety requirement 3.4 Disparity of traffic management plan reported / amended according to traffic condition 3.5 Sub soil drainage construction and installation work supervised according to construction drawing 3.6 Housekeeping supervised according to safety requirement 3.7 Sub soil drainage work inspected 3.8 Sub soil drainage work report compiled and submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
4. Pavement works supervision	BC-063-3:2015 C04	Pavement works supervision is a scope of competency to supervise the road pavement works according to Standard Operating Procedure (SOP). The person whom is competent in pavement works supervision must be able to supervise formation level hand over, supervise sub base work, supervise road base work, supervise flexible pavement surface layer work, supervise rigid pavement layer work and supervise interlocking pavement block work in accordance with pavement work procedure. The outcome of this competency is to properly supervise pavement work.	1. Supervise formation level hand over	1.1 Formation level record obtained from earthwork team 1.2 Field density test (FDT) and relevant test result interpreted 1.3 Formation level and compaction checked and compared according to construction drawing and specification 1.4 Formation level recorded and accepted
			2. Supervise sub base work	2.1 Pavement design interpreted according to construction drawing 2.2 QA/QC test for material arranged according to requirement 2.3 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 2.4 Traffic management team coordinated according to safety requirement 2.5 Sub base course laying and compaction works supervised 2.6 Sub base work inspected and recorded 2.7 Daily report compiled and submitted to superior
			3. Supervise road base work	4.1 Pavement design interpreted according to construction specification 4.2 QA/QC test result for material interpreted 4.3 Tools, equipment, machinery,

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				materials, workers and PPE arranged according to construction requirement 4.4 Traffic management team coordinated according to safety requirement 4.5 Road base course laying and compaction works supervised 4.6 QA/QC test result for compaction interpreted 4.7 Road base thickness and gradient result interpreted 4.8 Daily report compiled and submitted to superior
			4. Supervise flexible pavement surface layer work	4.1 Pavement design mix obtained according to construction specification 4.2 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 4.3 Trial lay works coordinated according to specification 4.4 Rolling pattern from trial lay confirmed 4.5 QA/QC test for trial lay result interpreted 4.6 Traffic management team coordinated according to safety requirement 4.7 Bituminous coat spraying work supervised according to specification 4.8 Material temperature confirmed

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				according to specification 4.9 Bituminous laying and compacting works supervised 4.10 Laying thickness confirmed according to specification 4.11 Longitudinal and transverse gradient confirmed according to specification 4.12 QA/QC post laying test result interpreted according to specification 4.13 Daily report and QA/QC report compiled and reported to superior
			5. Supervise rigid pavement layer work	5.1 Concrete design mix obtained according to construction specification 5.2 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 5.3 Traffic management team coordinated according to safety requirement 5.4 QA/QC test result for material interpreted according to requirement 5.5 Waterproof membrane installation works on road base supervised according to construction drawing 5.6 Laying thickness confirmed according to construction drawing

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				5.7 Steel reinforcement installation works supervised according to construction drawing 5.8 Expansion joint installation supervised according to specification 5.9 Concrete laying works supervised 5.10 Longitudinal and transverse gradient confirmed according to specification 5.11 Curing works supervised according to specification 5.12 Grooving works supervised according to specification 5.13 QA/QC post laying test result interpreted according to specification 5.14 Daily report and QA/QC report compiled and reported to superior
			6. Supervise interlocking pavement block work	6.1 Interlocking pavement block type and design obtained according to construction specification 6.2 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 6.3 Traffic management team coordinated according to safety requirement 6.4 Block laying pattern confirmed according to construction

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				drawing 6.5 Edging block installation supervised 6.6 Longitudinal and transverse gradient confirmed according to edging block level 6.7 Sand bedding laying work supervised according to specification 6.8 Sand bedding level confirmed according to specification 6.9 Pavement block installation works supervised 6.10 Joint sand spreading work supervised according to specification 6.11 Pavement block compaction work supervised according to specification 6.12 Brooming work supervised 6.13 Housekeeping work supervised 6.14 Daily report compiled and reported to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
5. Road furniture installation supervision	BC-063-3:2015 C05	Road furniture installation supervision is a competency to supervise installation of road furniture such as streetlights, benches, traffic barriers, bollards, etc according to authority requirement. The person who is competent in this CU shall be able to plan road furniture installation work, supervise civil road furniture installation works, coordinate M&E road furniture installation works and prepare report for road furniture works. The outcome of this competency is to properly supervise the road furniture installation and meet the authority and road design requirement.	1. Plan road furniture installation work	1.1 Work instruction and work program interpreted 1.2 Road furniture type and location confirmed according to construction drawing 1.3 Tools, equipment, machinery, materials, workers and PPE organised according to construction requirement
			2. Supervise civil road furniture installation works	2.1 Traffic management team coordinated according to safety requirement 2.2 Road furniture location confirmed according to construction drawing 2.3 Excavation work supervised according to construction drawing 2.4 Foundation work supervised according to construction drawing 2.5 Installation work supervised according to construction drawing 2.6 Laying, painting and finishing works supervised according to construction drawing 2.7 QA/QC inspection and testing result interpreted according to specification
			3. Coordinate M&E road furniture installation works	3.1 Traffic management plan executed according to superior instruction 3.2 M&E road furniture location marked 3.3 Excavation work carried out

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				according to construction drawing 3.4 Foundation work carried out according to construction drawing 3.5 Installation work carried out according to construction drawing 3.6 Laying, painting and finishing works carried out according to construction drawing 3.7 QA/QC inspection and testing arranged in accordance with installation requirement
			4. Prepare report for road furniture works	4.1 Daily work progress recorded 4.2 Road furniture installation report submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
6. Slope protection work supervision	BC-063-3:2015 C06	Slope protection work supervision is a competency to supervise construction of slope protection. Slope work is to protect from collapse, erosion and weathering by application of frame work, shotcrete or pitching work. The person who is competent in this CU shall be able to prepare slope protection work, coordinate slope protection and prepare report for slope protection The outcome of this competency is to properly coordinate the slope work and meet the authority and road design requirement.	1. Plan slope protection 2. Supervise slope protection 3. Prepare report for slope protection	1.1 Work instruction and work program interpreted 1.2 Type of slope protection, drainage system and location confirmed according to construction drawing 1.3 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 2.1 Traffic management team coordinated according to safety requirement 2.2 Slope protection and drainage location marked 2.3 Excavation work carried out according to construction drawing 2.4 Berm drain and cascade drain constructed according to construction drawing 2.5 Foundation work carried out according to construction drawing 2.6 Installation work carried out according to construction drawing 2.7 Laying, turfing and finishing works carried out according to construction drawing 2.8 QA/QC inspection and testing arranged in accordance with installation requirement 3.1 Daily work progress recorded 3.2 Road furniture installation report submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
7. Road maintenance supervision	BC-063-3:2015 C07	Road maintenance supervision is a competency to supervise all type of road maintenance work such as drainage maintenance, pavement maintenance, road furniture maintenance, slope maintenance etc. The person who is competent in this CU shall be able to supervise drainage maintenance works, supervise pavement maintenance works, supervise road furniture maintenance works, supervise slope maintenance works and supervise emergency remedial works. The outcome of this competency is to properly coordinate the road maintenance work and meet the authority requirement.	1. Supervise drainage maintenance works	1.1 Work instruction and work program interpreted 1.2 Drainage defect confirmed according to Notification Of Defect (NOD) 1.3 Site visit performed to confirm area of defect 1.4 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 1.5 Traffic management team coordinated according to safety requirement 1.6 Drainage defect remedial work supervised according to construction drawing 1.7 Drainage functionality inspected 1.8 Daily report compiled and reported to superior
			2. Supervise pavement maintenance works	2.1 Work instruction and work program interpreted 2.2 Pavement defect confirmed according to Notification Of Defect (NOD) 2.3 Site visit performed to confirm area of defect 2.4 Testing activities arranged according to Inspection and Testing Plan (ITP) 2.5 Testing result interpreted 2.6 Tools, equipment, machinery, materials, workers and PPE

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				arranged according to construction requirement 2.7 Traffic management team coordinated according to safety requirement 2.8 Pavement defect remedial work supervised according to Notification Of Defect (NOD) 2.9 Daily report compiled and reported to superior
			3. Supervise road furniture maintenance works	3.3 Work instruction and work program interpreted 3.4 Road furniture defect confirmed according to Notification Of Defect (NOD) 3.5 Site visit performed to confirm area of defect 3.6 QA/QC inspection and testing arranged in accordance with installation requirement 3.7 QA/QC inspection and testing result interpreted 3.8 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 3.9 Traffic management team coordinated according to safety requirement 3.10 Road furniture remedial work supervised according to Notification Of Defect (NOD) 3.11 Road furniture functionality

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				inspected 3.12 Daily report compiled and reported to superior
			4. Supervise slope maintenance works	4.1 Work instruction and work program interpreted 4.2 Slope defect confirmed according to Notification Of Defect (NOD) 4.3 Site visit performed to confirm area of defect 4.4 Testing activities arranged according to specification 4.5 Testing result interpreted 4.6 Tools, equipment, machinery, materials, workers and PPE arranged according to construction requirement 4.7 Traffic management team coordinated according to safety requirement 4.8 Slope and drainage system remedial work supervised according to Notification Of Defect (NOD) 4.9 Slope and drainage system inspected 4.10 Daily report compiled and reported to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
			5. Supervise emergency remedial works	5.1 Work instruction interpreted 5.2 Site visit performed to confirm location, type and extend of defect 5.3 Defect confirmed according to Notification Of Emergency (NOE) 5.4 Tools, equipment, machinery, materials, Emergency Respond Team (ERT) and PPE arranged according to Notification Of Emergency (NOE) 5.5 Traffic management team coordinated according to Emergency Respond Plan (ERP) 5.6 Remedial work supervised according to work instruction 5.7 Emergency report compiled and reported to superior

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION**						
COMPETENCY UNIT TITLE	**TRAFFIC MANAGEMENT SUPERVISION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to properly supervise traffic management implementation in working area so that the working personnel, road user and public are safe. Upon completion of this competency unit, trainees will be able to:- • Coordinate traffic management demarcation work • Coordinate traffic management setup • Coordinate mobilisation & demobilisation						
PRE-REQUISITE (if appreciable)	**ROAD EARTHWORK SUPERVISION**						
COMPETENCY UNIT ID	BC-063-3:2015 C01	**LEVEL**	3	**TRAINING DURATION**	120	**SKILL CREDIT**	12

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Coordinate traffic management demarcation work	i. Traffic Management Plan (TMP) ii. Traffic condition iii. Start and end location of road closure marking procedure	i. Obtain Traffic Management Plan (TMP) ii. Interpret Traffic Management Plan (TMP) iii. Identify traffic condition iv. Mark start and end location of road closure v. Check disparity of traffic management	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 9 Related Skills 21	Lecture Demonstration & Observation	i. Traffic Management Plan (TMP) Interpreted ii. start and end location of road closure Marking demonstrated iii. disparity of traffic management

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		plan vi. Report disparity of traffic management plan				plan explained
2. Coordinate traffic management setup	i. Traffic management SOP ii. Traffic management plan iii. Traffic control devices arrangement iv. Traffic control transport arrangement v. Traffic control workers arrangement vi. Traffic control PPE arrangement vii. Traffic management inspection form viii. Traffic management setup requirement ix. Traffic management activities recording format	i. Identify traffic management SOP ii. Identify traffic management plan iii. Supervise arrangement of traffic control devices iv. Supervise arrangement of transport v. Supervise arrangement of traffic control workers vi. Supervise arrangement of traffic control PPE vii. Fill up Traffic management inspection form viii. Monitor traffic management setup ix. Ensure minimum disruption to traffic flow during setup x. Inspect traffic control activities xi. Record traffic management activities	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Traffic management SOP explained ii. Traffic management plan explained iii. Arrangement of traffic control devices supervision demonstrated iv. Arrangement of transport supervision demonstrated v. Arrangement of traffic control workers supervision demonstrated vi. Arrangement of traffic control PPE supervision demonstrated vii. Traffic

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						management setup monitoring demonstrated
3. Coordinate mobilisation & demobilisation	i. Arrangement of traffic control devices ii. Arrangement of transport iii. Arrangement of workers iv. Arrangement of PPE v. Mobilise & demobilise activities conduction vi. Arrangement of equipment storage vii. Equipment hand over report format	i. Supervise arrangement of traffic control devices ii. Supervise arrangement of transport iii. Supervise arrangement of workers iv. Supervise arrangement of PPE v. Conduct mobilise & demobilise activities vi. Confirm minimum disruption to traffic flow during mobilise & demobilise activities vii. Arrange equipment storage viii. Fill up equipment hand over report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 13 Related Skills 29	Lecture Demonstration & Observation	i. arrangement of traffic control devices Supervision demonstrated ii. arrangement of transport Supervision demonstrated iii. arrangement of workers Supervision demonstrated iv. arrangement of PPE Supervision demonstrated v. mobilise & demobilise activities explained vi. equipment storage Arrangement explained

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of Traffic Management Plan (TMP) 2. Sample of Traffic management SOP 3. Sample of Traffic management inspection form 4. Traffic control PPE	1:1 1:1 1:1 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin
5. J. P. Watson, 1989, Highway Construction and Maintenance, Longman Scientific & Technical, ISBN: 058200523X, 9780582005235

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**ROAD EARTHWORK SUPERVISION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to properly supervise preparation of the earth surface for road layer to be able to be pave onto it and also for the drainage to be installed later on. Upon completion of this competency unit, trainees will be able to:- • Supervise surveying work • Supervise site clearing • Supervise earthwork activities						
PRE-REQUISITE (if appreciable)	**ROAD EARTHWORK SUPERVISION**						
COMPETENCY UNIT ID	BC-063-3:2015 C02	**LEVEL**	3	**TRAINING DURATION**	120	**SKILL CREDIT**	12

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Supervise surveying work	1. Construction and surveying drawings • Location • Kilometre post • Chainage/ distance • Right of way (ROW) • Surveying data • Surveying level 2. Safety hazard 3. Temporary Bench mark (TBM) according to surveying	i. Identify construction and surveying drawings ii. Identify safety hazard iii. Identify temporary bench mark (TBM) according to surveying drawing iv. Identify tools and equipment v. Arrange manpower for level pegging	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 9 Related Skills 21	Lecture Demonstration & Observation	i. Construction and surveying drawings explained ii. Safety hazard explained iii. Temporary bench mark (TBM) explained iv. Tools and equipment listed out

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	drawing 4. Tools and equipment • Measuring tools • String • Survey instrument - Total station - Level instrument 5. Arrangement of manpower for level pegging work 6. Level of pegging works 7. Formation level 8. Check road alignment according to surveyor data 9. Surveying work supervision activity record format	work vi. Confirm level pegging works from surveyor data vii. Check formation level according to surveyor data viii. Check road alignment according to surveyor data ix. Record surveying work supervision activity				v. Level pegging works explained vi. Formation level explained vii. Road alignment explained
2. Supervise site clearing	i. Construction and surveying drawings ii. ROW marking • Location • Work boundary / limit iii. Safety hazard Iv. Site clearing requirement • Work permit from local authority i. Type of machinery • Bulldozer • Excavator • Dump truck • Backhoe	i. Interpret construction and surveying drawings ii. Identify ROW marking iii. Identify safety hazard iv. Identify site clearing requirement ix. Identify type of machinery x. Identify utilities xi. Coordinate temporary assess road construction xii. Coordinate trees	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. ROW marking explained ii. Site clearing requirement explained iii. Type of machinery listed out iv. Type of utilities listed out v. Temporary assess road construction explained vi. Trees and

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Back pusher ii. Utilities such as • Electricity • Water supplies • Gas • Telco iii. Temporary assess road construction Coordination iv. Trees and vegetation removal works Coordination v. Encumbrances removal work Coordination vi. Top soil removal works Coordination vii. Utilities relocation work Coordination viii. Site clearing supervision activities record format	and vegetation removal works xiii. Coordinate encumbrances removal work xiv. Coordinate top soil removal works xv. Coordinate utilities relocation work xvi. Record site clearing supervision activities				vegetation removal works explained vii. Encumbrances removal work explained viii. Top soil removal works explained ix. Utilities relocation work explained
3. Supervise earthwork activities	i. Construction and surveying drawings ii. Safety hazard iii. Arrangement of traffic management such as • Permit from local authority • Approved TMP drawing • Execute TMP iv. Work program v. Arrangement of	i. Interpret construction and surveying drawings ii. Identify safety hazard iii. Arrange traffic management iv. Follow work program v. Arrange equipment, machinery, material and workers vi. Coordinate cut and fill work	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 13 Related Skills 29	Lecture Demonstration & Observation	i. Equipment, machinery, material and workers arrangement explained ii. Cut and fill work explained iii. Cart away surplus and unsuitable

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	equipment, machinery, material and workers vi. Cut and fill work Coordination vii. Cart away surplus and unsuitable material Coordination viii. Geotechnical treatment Coordination ix. Removal of rock and hard material work Coordination x. Formation level Checking technique xi. Compaction work Coordination xii. Temporary drainage work Coordination xiii. Earthwork testing Coordination xiv. Earthwork supervision activities report format	vii. Coordinate cart away surplus and unsuitable material viii. Coordinate Geotechnical treatment ix. Coordinate removal of rock and hard material work x. Check formation level xi. Coordinate compaction work xii. Coordinate Temporary drainage work xiii. Coordinate Earthwork testing xiv. Report earthwork supervision activities				material explained iv. Geotechnical treatment explained v. Removal of rock and hard material work explained vi. Formation level checking demonstrated vii. Compaction work explained viii. Temporary drainage work explained ix. Coordinate earthwork testing

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of construction and surveying drawings 2. Earth work measuring tools 3. Sample of permit from local authority 4. Sample of Approved TMP drawing 5. String 6. Survey instrument 7. Supervision activities report format	1. 1:1 2. 1:5 3. 1:1 4. 1:1 5. 1:5 6. 1:5 7. 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**DRAINAGE WORKS SUPERVISION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to properly supervise drainage construction so that the road pavement performs satisfactorily. Upon completion of this competency unit, trainees will be able to:- • Supervise surface drainage work • Supervise culvert and sump work • Supervise sub soil drainage work						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-3:2015 C03	**LEVEL**	3	**TRAINING DURATION**	180	**SKILL CREDIT**	18

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Supervise surface drainage work	i. Surface drainage work requirement • PTW • Approved dumping site from local authority ii. Construction drawing • Location • Drainage type • Level • Alignment iii. Type of drainage such as	i. Identify surface drainage work requirement ii. Interpret construction drawing iii. Identify type of drainage iv. Identify type of drainage work machine and equipment v. Arrange disposal of excavated material vi. Monitor drainage work	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 16 Related Skills 38	Lecture Demonstration & Observation	i. Surface drainage work requirement explained ii. Construction drawing explained iii. Type of drainage listed out iv. Type of drainage work machine and equipment

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria

	• Shape
	• Dimension
	• Purpose / function
	• Design
	  ○ Weep hole
	iv. Type of drainage work machine and equipment
	• Excavator
	• Backhoe
	• Bucket
	  ○ Size
	  ○ Shape
	v. Disposal of excavated material arrangement
	• Excavated material transportation
	• Excavated material dumping area
	vi. Drainage work monitoring
	• Toolbox briefing
	• Safety hazard
	• TMP
	vii. Trenching work monitoring
	viii. Foundation work monitoring such as
	• Compaction work
	• Bedding
	ix. Drainage installation work monitoring such as
	• Precast drain
		vii. Monitor trenching work
		viii. Monitor foundation work
		ix. Monitor drainage installation work
		x. Monitor Housekeeping work
		xi. Report surface drainage supervision work
						listed out
						v. Disposal of excavated material explained
						vi. Drainage work monitoring demonstrated
						vii. Trenching work monitoring demonstrated
						viii. Foundation work monitoring demonstrated
						ix. Drainage installation work monitoring demonstrated
						x. Housekeeping work monitoring demonstrated

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	○ Joint • Cast in-situ ○ Reinforcement ○ Form work ○ Concrete • Sub soil drain ○ Precast ○ Geotextile x. Housekeeping work monitoring xi. Supervise surface drainage work report format					
2. Supervise culvert and sump work	i. Safety requirement ii. Traffic management plan iii. Construction drawing iv. Drainage level and alignment requirement v. Arrangement of tools, equipment, machinery, materials, workers and PPE vi. Traffic management team coordination vii. Disparity of traffic management plan reporting procedure viii. Culvert and sump construction and installation work supervision ix. Housekeeping supervision x. Culvert and sump work	i. Obtain drainage level and alignment from construction drawing ii. Arranged tools, equipment, machinery, materials, workers and PPE iii. Coordinate traffic management team iv. Reported disparity of traffic management plan v. Supervise culvert and sump construction and installation work vi. Supervise housekeeping vii. Inspect culvert and sump work viii. Compile culvert and sump work record	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 19 Related Skills 44	Lecture Demonstration & Observation	i. Tools, equipment, machinery, materials, workers and PPE listed out ii. Traffic management team coordination demonstrated iii. Disparity of traffic management plan explained iv. Culvert and sump construction and installation work explained v. Housekeeping activity

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	inspection technique					explained vi. Culvert and sump work inspection work explained
3. Supervise sub soil drainage work	i. Drainage level and alignment ii. Tools, equipment, machinery, materials, workers and PPE arrangement iii. Traffic management team coordination iv. Disparity of traffic management v. Sub soil drainage construction and installation work supervision vi. Housekeeping supervision vii. Sub soil drainage work inspection viii. Sub soil drainage work report format	i. Obtain drainage level and alignment from construction drawing ii. Arrange tools, equipment, machinery, materials, workers and PPE iii. Coordinate traffic management team iv. Report disparity of traffic management plan v. Supervise sub soil drainage construction and installation work vi. Supervise housekeeping vii. Inspect sub soil drainage work viii. Compile sub soil drainage work record	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 19 Related Skills 44	Lecture Demonstration & Observation	i. Tools, equipment, machinery, materials, workers and PPE listed out ii. Disparity of traffic management plan explained iii. Sub soil drainage construction and installation work explained iv. Sub soil drainage work explained

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of Permit To Work 2. Sample of construction drawing 3. Sample of construction drawing 4. PPE 5. Sample of report format	1. 1:1 2. 1:1 3. 1:1 4. 1:1 5. 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin
5. J. P. Watson, 1989, Highway Construction and Maintenance, Longman Scientific & Technical, ISBN: 058200523X, 9780582005235

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**PAVEMENT WORKS SUPERVISION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able supervise the road pavement works according to Standard Operating Procedure (SOP). Upon completion of this competency unit, trainees will be able to:- • Supervise formation level hand over • Supervise sub base work • Supervise road base work • Supervise flexible pavement surface layer work • Supervise rigid pavement layer work • Supervise interlocking pavement block work						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-3:2015 C04	**LEVEL**	3	**TRAINING DURATION**	240	**SKILL CREDIT**	24

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Supervise formation level hand over	i. Formation level record from earthwork team ii. Field density test (FDT) and relevant test result interpretation iii. Formation level and compaction checking technique iv. Formation level	i. Obtain formation level record from earthwork team ii. Interpret field density test (FDT) and relevant test result iii. Checked formation level and compaction iv. Accept formation level v. Record formation level	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 7 Related Skills 17	Lecture Demonstration & Observation	i. Field density test (FDT) and relevant test explained ii. Formation level and compaction explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	acceptance procedure v. Formation level record format					
2. Supervise sub base work	i. Construction drawing requirement ii. Safety requirement iii. Pavement design requirement iv. QA/QC test for material arrangement v. Tools, equipment, machinery, materials, workers and PPE arrangement vi. Traffic management team coordination vii. Sub base course laying and compaction works supervision viii. Sub base work inspected record format	i. Identify construction drawing ii. Identify safety requirement iii. Interpret pavement design iv. Arrange QA/QC test for material v. Arrange tools, equipment, machinery, materials, workers and PPE vi. Coordinate traffic management team vii. Supervise sub base course laying and compaction works viii. Record sub base work inspected and ix. Compile daily report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Construction drawing ii. Identify explained safety requirement iii. Pavement design explained iv. QA/QC test for material explained v. Tools, equipment, machinery, materials, workers and PPE listed out vi. Sub base course laying and compaction works explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
3. Supervise road base work	i. Safety requirement ii. Pavement design requirement iii. QA/QC test for material iv. Tools, equipment, machinery, materials, workers and PPE arrangement v. Traffic management team coordination vi. Road base course laying and compaction works Supervision vii. QA/QC test for compaction viii. Road base thickness and gradient ix. Daily report format	i. Identify road base work safety requirement ii. Interpreted pavement design iii. Interpret QA/QC test result for material iv. Arrange tools, equipment, machinery, materials, workers and PPE v. Coordinate traffic management team vi. Supervised road base course laying and compaction works vii. Interpret QA/QC test result for compaction viii. Interpret road base thickness and gradient result ix. Compiled daily report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Road base work safety requirement explained ii. Interpret QA/QC test for material explained iii. Tools, equipment, machinery, materials, workers and PPE listed out iv. road base course laying and compaction works explained v. QA/QC test for compaction described vi. road base thickness and gradient result described

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
4. Supervise flexible pavement surface layer work	i. Flexible pavement surface layer specification ii. Safety requirement iii. Pavement design mix iv. Tools, equipment, machinery, materials, workers and PPE arrangement v. Trial lay works coordination vi. Rolling pattern from trial lay vii. QA /QC test for trial lay viii. Traffic management team coordination ix. Bituminous coat spraying work supervision x. Material temperature specification xi. Bituminous laying and compacting works supervision xii. Laying thickness specification xiii. Longitudinal and transverse gradient specification xiv. QA/QC post laying test xv. Daily report and QA/QC report format	i. Identify flexible pavement surface layer specification ii. Safety requirement iii. Obtain pavement design mix iv. Arrange tools, equipment, machinery, materials, workers and PPE v. Coordinate trial lay works vi. Confirm rolling pattern from trial lay vii. Interpret QA /QC test for trial lay result viii. Coordinate traffic management team ix. Supervise bituminous coat spraying work x. Confirm material temperature xi. Supervise bituminous laying and compacting works xii. Confirm laying thickness xiii. Confirm Longitudinal and transverse gradient xiv. Interpret QA/QC post laying test result xv. Compile Daily report and QA/QC report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. flexible pavement surface layer described ii. trial lay works explained iii. QA /QC test for trial lay explained iv. bituminous coat spraying work described v. material temperature explained vi. bituminous laying and compacting works explained vii. laying thickness explained viii. Longitudinal and transverse gradient explained ix. QA/QC post laying test explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
5. Supervise rigid pavement layer work	i. Construction specification ii. Safety requirement iii. Concrete design mix specification iv. Tools, equipment, machinery, materials, workers and PPE arrangement v. Traffic management team coordination vi. QA/QC test for material vii. Waterproof membrane installation works on road base supervision viii. Laying thickness specification ix. Steel reinforcement installation works supervision x. Expansion joint installation supervision xi. Concrete laying works supervision xii. Longitudinal and transverse gradient specification xiii. Curing works supervision xiv. Grooving works supervision xv. QA/QC post laying test xvi. daily report and QA/QC report format	i. Construction specification ii. Safety requirement iii. Obtain concrete design mix iv. Arrange tools, equipment, machinery, materials, workers and PPE v. Coordinate traffic management team vi. Interpret QA/QC test result for material vii. Supervise waterproof membrane installation works on road base viii. Confirm laying thickness ix. Supervise steel reinforcement installation works x. Supervise expansion joint installation xi. Supervise concrete laying works xii. Confirm longitudinal and transverse gradient xiii. Supervise curing works xiv. Supervise grooving works xv. Interpret QA/QC post laying test result xvi. Compile daily report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Waterproof membrane installation works on explained ii. Laying thickness explained iii. Steel reinforcement installation works explained iv. Expansion joint installation explained v. Concrete laying works explained vi. Longitudinal and transverse gradient explained vii. Curing works explained viii. Grooving works explained ix. QA/QC post laying test explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
		and QA/QC report				
6. Supervise interlocking pavement block work	i. Interlocking pavement block type and design specification ii. Tools, equipment, machinery, materials, workers and PPE arrangement iii. Traffic management team coordination iv. Block laying pattern specification v. Edging block installation supervision vi. Edging block level specification vii. Longitudinal and transverse gradient specification viii. Sand bedding laying work supervision ix. Sand bedding level specification x. Pavement block installation works supervision xi. Joint sand spreading work supervision xii. Pavement block compaction work supervision xiii. Brooming work supervision	i. Obtain interlocking pavement block type and design ii. Arrange tools, equipment, machinery, materials, workers and PPE iii. Coordinate traffic management team iv. Confirm block laying pattern v. Supervise edging block installation vi. Confirm to edging block level vii. Confirm longitudinal and transverse gradient viii. Supervise sand bedding laying work ix. Confirm sand bedding level x. Supervise pavement block installation works xi. Supervise joint sand spreading work xii. Supervise pavement block compaction work xiii. Supervise brooming work xiv. Supervise housekeeping work	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. block laying pattern explained ii. edging block installation explained iii. longitudinal and transverse gradient described iv. sand bedding laying work described v. sand bedding level described vi. pavement block installation works explained vii. joint sand spreading work described viii. pavement block compaction work

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	xiv. Housekeeping work supervision xv. Daily report format	xv. Compile daily report				described ix. brooming work described x. housekeeping work described

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of Permit To Work 2. Sample of field density test (FDT) and result 3. Sample of construction drawing 4. Sample of construction drawing 5. PPE 6. Sample of report format	1. 1:1 2. 1:1 3. 1:1 4. 1:1 5. 1:1 6. 1:1

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1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION SUPERVISION**						
COMPETENCY UNIT TITLE	**ROAD FURNITURE INSTALLATION SUPERVISION**						
LEARNING OUTCOME	The outcome of this competency is to properly coordinate the slope work and meet the authority and road design requirement. Upon completion of this competency unit, trainees will be able to:- • Plan road furniture installation work • Supervise civil road furniture installation works • Coordinate M&E road furniture installation works • Prepare report for road furniture works						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-3:2015 C05	**LEVEL**	3	**TRAINING DURATION**	120	**SKILL CREDIT**	12

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Plan road furniture installation work	i. Safety requirement ii. Construction drawing iii. Work instruction and work program iv. Road furniture type and function v. Road furniture installation requirement • Tools • Equipment • Machinery	i. Interpreted work instruction and work program ii. Confirmed road furniture type iii. Confirm road furniture installation location iv. Organise road furniture installation requirement	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 7 Related Skills 17	Lecture Demonstration & Observation	i. Work instruction and work program described ii. Road furniture type listed out iii. Tools, equipment, machinery, materials,

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Materials • Workers • PPE					workers and PPE listed out
2. Supervise civil road furniture installation works	i. Civil road furniture installation safety requirement ii. Construction drawing and specification iii. traffic management requirement iv. Excavation work requirement v. foundation work requirement vi. Laying, painting and finishing works requirement vii. QA/QC inspection and testing result	i. Coordinate traffic management team ii. Confirm road furniture location iii. Supervise excavation work iv. Supervise foundation work v. Supervise installation work vi. Supervise laying, painting and finishing works vii. Interpret QA/QC inspection and testing result	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 13 Related Skills 29	Lecture Demonstration & Observation	i. Excavation work described ii. Foundation work described iii. Installation work described iv. Laying, painting and finishing works described v. QA/QC inspection and testing explained
3. Coordinate M&E road furniture installation works	i. Construction drawing requirement ii. M&E road furniture installation works requirement iii. Traffic management plan requirement iv. M&E road furniture location marking technique and method v. Excavation work	i. Execute traffic management plan ii. Mark M&E road furniture location iii. Carry out excavation work iv. Carry out foundation work v. Carry out installation work vi. Carry out laying,	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 13 Related Skills 29	Lecture Demonstration & Observation	i. Traffic management plan explained ii. M&E road furniture location marking explained iii. QA/QC inspection

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	requirement vi. Foundation work requirement vii. Installation work requirement viii. Laying, painting and finishing works requirement ix. QA/QC inspection and testing arrangement	painting and finishing works vii. Arrange QA/QC inspection and testing				and testing explained
4. Prepare report for road furniture works	i. Daily work progress recording format ii. Road furniture installation report format	i. Record daily work progress ii. Compile road furniture installation record and submit to superior	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 4 Related Skills 8	Lecture Demonstration & Observation	i. Daily work progress record described

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of QA/QC inspection and testing result 2. Road furniture marking tools 3. Sample of M&E road furniture 4. Excavation tools and equipment 5. PPE 6. Road furniture installation report format	1. 1:1 2. 1:5 3. 1:5 4. 1:5 5. 1:1 6. 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION SUPERVISION**						
COMPETENCY UNIT TITLE	**SLOPE PROTECTION WORK SUPERVISION**						
LEARNING OUTCOME	The outcome of this competency is to properly coordinate the slope work and meet the authority and road design requirement. Upon completion of this competency unit, trainees will be able to:- • Plan slope protection • Supervise slope protection • Prepare report for slope protection						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-3:2015 C06	**LEVEL**	3	**TRAINING DURATION**	180	**SKILL CREDIT**	18

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Plan slope protection	i. Construction drawing ii. Work instruction and work program requirement iii. Type of slope protection iv. Slope protection work requirement • Tools • Equipment • Machinery • Materials • Workers	i. Interpret work instruction and work program ii. Confirm type of slope protection iii. Confirm drainage system iv. Confirm slope protection work location v. Arrange slope protection work requirement	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 19 Related Skills 44	Lecture Demonstration & Observation	i. Work instruction and work program explained ii. Type of slope protection listed out iii. Drainage system described iv. Slope protection

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• PPE					work location described v. Slope protection work requirement explained
2. Supervise slope protection	i. According to safety requirement ii. Construction drawing iii. Traffic management requirement iv. Slope protection and drainage location marking technique and method v. Excavation work requirement vi. Berm drain and cascade drain construction requirement vii. Foundation work requirement viii. Installation work requirement ix. Laying, turfing and finishing works requirement x. QA/QC inspection and testing	i. Coordinate traffic management team ii. Mark slope protection and drainage location iii. Carry out excavation work iv. Construct berm drain and cascade drain v. Carry out foundation work vi. Carry out installation work vii. Carry out laying, turfing and finishing works viii. Arrange QA/QC inspection and testing	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 30 Related Skills 69	Lecture Demonstration & Observation	i. slope protection and drainage location Marking work demonstrated ii. berm drain and cascade drain system explained iii. laying, turfing and finishing works described iv. QA/QC inspection and testing described

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	arrangement					
3. Prepare report for slope protection work	i. Daily work progress recording format ii. slope protection work report format	i. Daily work progress recorded ii. slope protection work report submitted to superior	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 5 Related Skills 13	Lecture Demonstration & Observation	i. Daily work progress record explained

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of construction drawing 2. Sample of work instruction and work program requirement 3. PPE 4. Marking tools 5. Excavation tools and equipment 6. Sample of QA/QC inspection and testing result 7. Sample of slope protection work report format	1. 1:1 2. 1:1 3. 1:1 4. 1:5 5. 1:5 6. 1:1 7. 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION SUPERVISION**						
COMPETENCY UNIT TITLE	**ROAD MAINTENANCE SUPERVISION**						
LEARNING OUTCOME	The outcome of this competency is to properly coordinate the road maintenance work and meet the authority requirement. Upon completion of this competency unit, trainees will be able to:- • Supervise drainage maintenance works • Supervise pavement maintenance works • Supervise road furniture maintenance works • Supervise slope maintenance works • Supervise emergency remedial works						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-3:2015 C07	**LEVEL**	3	**TRAINING DURATION**	240	**SKILL CREDIT**	24

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Supervise drainage maintenance works	i. Work instruction and work program ii. Notification Of Defect (NOD) • Clean • Repair/ • Replace iii. Construction requirement iv. Safety requirement v. Permit to work	i. Interpret work instruction and work program ii. Confirm drainage defect iii. Perform site visit to confirm area of defect iv. Arrange drainage maintenance works requirement v. Coordinate traffic	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Work instruction and work program explained ii. Drainage defect explained iii. Drainage maintenance works requirement explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	requirement vi. Type of defect vii. Site visit requirement viii. Drainage maintenance works requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ix. Traffic management requirement x. Drainage defect remedial work procedure xi. Drainage functionality inspection technique and method xii. Drainage maintenance works daily report format	management team vi. Supervise drainage defect remedial work vii. Inspect drainage functionality viii. Compile drainage maintenance works daily report				iv. Drainage defect remedial work described
2. Supervise pavement maintenance works	i. Work instruction and work program ii. Notification Of Defect (NOD) • Clean • Repair/ • Replace iii. Safety requirement iv. Inspection and Testing Plan (ITP) v. Permit to work requirement	i. Interpret work instruction and work program ii. Confirm pavement defect iii. Perform site visit to confirm area of defect iv. Arrange pavement testing work v. Arrange pavement maintenance works requirement	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Pavement defect explained ii. Pavement testing work described iii. Pavement maintenance works requirement explained iv. Pavement

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	vi. Type of defect vii. Site visit requirement xiii. pavement maintenance works requirement • Tools • Equipment • Machinery • Materials • Workers • PPE xiv. Traffic management requirement xv. Pavement defect remedial work procedure xvi. Pavement maintenance works daily report format	vi. Coordinate traffic management team vii. Supervise pavement defect remedial work viii. Compile pavement maintenance works daily report				defect remedial work explained
3. Supervise road furniture maintenance works	i. Work instruction and work program ii. Notification Of Defect (NOD) • Clean • Repair/ • Replace iii. Safety requirement iv. Inspection and Testing Plan (ITP) v. Permit to work requirement vi. Type of defect vii. Site visit requirement viii. Road furniture	i. Interpret work instruction and work program ii. Confirm type of road furniture iii. Confirm road furniture defect iv. Perform site visit to confirm area of defect v. Arrange QA/QC inspection and testing vi. Interpret QA/QC inspection and testing result vii. Arrange road furniture	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. Type of road furniture listed out ii. Road furniture defect explained iii. QA/QC inspection and testing explained iv. Road furniture maintenance works requirement explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	maintenance works requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ix. Traffic management requirement x. Road furniture defect remedial work procedure xi. Road furniture functionality inspection technique and method xii. Road furniture maintenance works daily report format	maintenance works requirement viii. Coordinate traffic management team ix. Supervise road furniture defect remedial work x. Inspect road furniture functionality xi. Compile road furniture maintenance works daily report				
4. Supervise slope maintenance works	i. Work instruction and work program ii. Notification Of Defect (NOD) • Clean • Repair/ • Replace iii. Construction requirement iv. Safety requirement v. Permit to work requirement vi. Type of defect vii. Site visit requirement viii. Slope testing	i. Interpret work instruction and work program ii. Confirm slope defect iii. Perform site visit to confirm area of defect iv. Arrange testing activities v. Interpret testing result vi. Arrange slope maintenance works requirement vii. Coordinate traffic management team viii. Supervise slope defect	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. type of slope defect explained ii. slope maintenance works requirement explained iii. slope defect remedial work explained iv. slope system Inspection demonstrated

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	requirement ix. Slope maintenance works requirement • Tools • Equipment • Machinery • Materials • Workers • PPE x. Traffic management requirement xi. Slope defect remedial work procedure xii. Slope system inspection technique and method xiii. Slope maintenance works daily report format	remedial work ix. Inspect slope system x. Compile slope maintenance works daily report				
5. Supervise emergency remedial works	i. Notification Of Emergency (NOE) ii. Emergency Respond Plan (ERP) iii. work instruction requirement iv. site visit requirement v. Type and extend of defect vi. Emergency remedial works tools, equipment, machinery, materials and PPE vii. Emergency Respond Team (ERT)	i. Interpret work instruction ii. Perform emergency remedial works site visit iii. Confirm emergency remedial works location iv. Confirm type and extend of defect v. Arrange emergency remedial works tools, equipment, machinery, materials and PPE	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* ii. Understanding well the safety requirement	Related Knowledge 14 Related Skills 34	Lecture Demonstration & Observation	i. emergency remedial works site visit explained ii. type and extend of defect listed out iii. emergency remedial works tools, equipment, machinery, materials and PPE listed out

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	arrangement technique viii. Traffic management team Coordination technique	vi. Arrange Emergency Respond Team (ERT) vii. Coordinate Traffic management team viii. Supervise remedial work ix. Compile emergency report and reported to superior				iv. Emergency Respond Team (ERT) explained

Employability Skills

Core Abilities	Social Skills
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1. Sample of work instruction and work program 2. Sample of Notification Of Defect (NOD) 3. Sample of permit to work 4. Sample of Inspection and Testing Plan (ITP) 5. Sample of Emergency Respond Plan (ERP) 6. PPE	1. 1:1 2. 1:1 3. 1:1 4. 1:1 5. 1:1 6. 1:1

REFERENCES

1. John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
2. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
3. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556
4. Charles Albert Taff, 1959, Traffic management: principles and practices, R.D. Irwin
5. J. P. Watson, 1989, Highway Construction and Maintenance, Longman Scientific & Technical, ISBN: 058200523X, 9780582005235

Table 8: Training Hour Summary

SECTOR	: BUILDING & CONSTRUCTION
SUB SECTOR	: CIVIL ENGINEERING
JOB AREA	: ROAD CONSTRUCTION / ROAD TRAFFIC MANAGEMENT
NOSS TITLE	: ROAD CONSTRUCTION AND MAINTENANCE SUPERVISION
JOB LEVEL	: 3

CU ID	Competency Unit	Training Hour
BC-063-3:2015 C01	TRAFFIC MANAGEMENT SUPERVISION	120
BC-063-3:2015 C02	ROAD EARTHWORKS SUPERVISION	120
BC-063-3:2015 C03	DRAINAGE WORKS SUPERVISION	180
BC-063-3:2015 C04	PAVEMENT WORKS SUPERVISION	240
BC-063-3:2015 C05	ROAD FURNITURE INSTALLATION SUPERVISION	120
BC-063-3:2015 C06	SLOPE PROTECTION WORK SUPERVISION	180
BC-063-3:2015 C07	ROAD MAINTENANCE SUPERVISION	240
	Total Training Program Hours	**1200**