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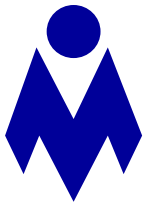
STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN
(NATIONAL OCCUPATIONAL SKILLS STANDARD)

ROAD CONSTRUCTION OPERATION
LEVEL 2

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 OPERATION
LEVEL 2

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STANDARD PRACTICE
NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR
ROAD CONSTRUCTION OPERATION
LEVEL 2

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) Level 2 and as for Level 3, 4 and 5 shall be awarded with Sijil Kemahiran Malaysia (SKM) Level 3, 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 Operation (Level 2) is competent in

- Traffic management implementation
- Road earthworks coordination
- Drainage works coordination
- Pavement works coordination
- Road furniture installation
- Slope work coordination

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).

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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14.	Ismail Bin Yusof	Lecturer- Civil Engineering Universiti Tun Hussein Onn
15.	Daud Bin Mohamad	Lecturer- Civil Engineering Universiti Tenaga Nasional (UNITEN)
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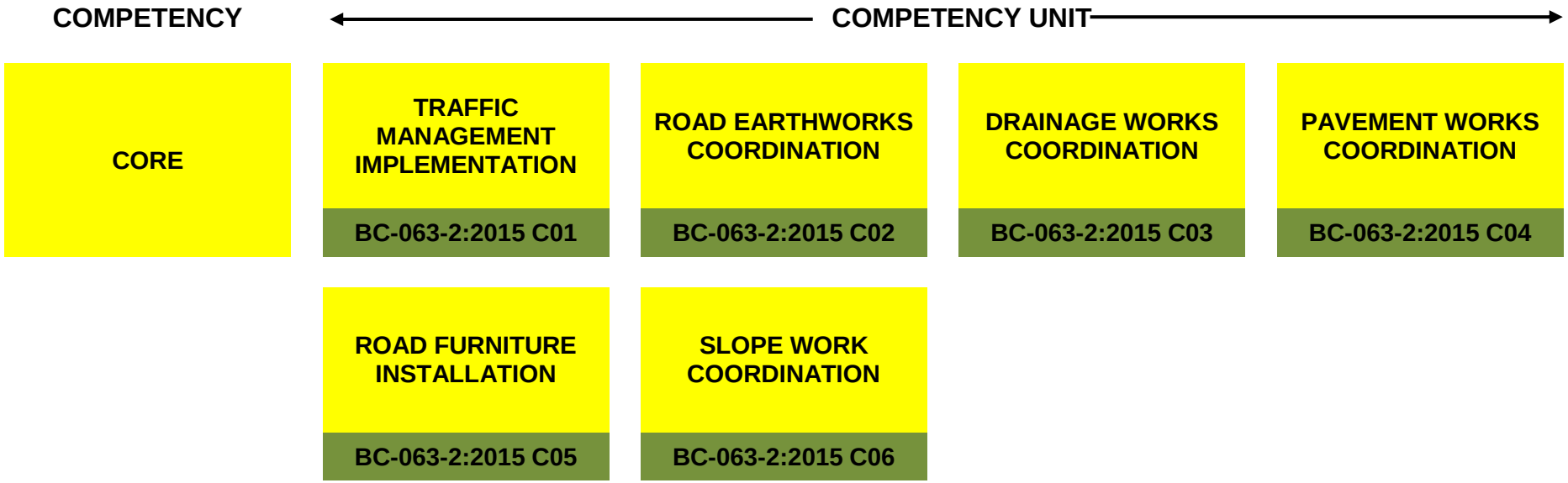
17.	Norhafizah Binti Manap	Pegawai Pendidikan-Civil Engineering Ministry of Education Malaysia
18.	Mohd Zakwan Bin Ramli	Lecturer-Civil Engineering Universiti Tenaga Nasional (UNITEN)
FACILITATOR		
1.	En. Harris Iskandar bin Nordin	
DOCUMENTOR		

2.	En. Khairul Nizan Bin Yusoff

COMPETENCY PROFILE CHART (CPC)

SECTOR	**BUILDING & CONSTRUCTION**		
SUB SECTOR	**CIVIL ENGINEERING**		
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**		
NOSS TITLE	**ROAD CONSTRUCTION OPERATION**		
JOB LEVEL	**TWO (2)**	**NOSS CODE**	**BC-063-2:2015**



COMPETENCY PROFILE (CP)

Sub Sector	**CIVIL ENGINEERING**
Job Area	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**
NOSS Title	**ROAD CONSTRUCTION OPERATION**
Level	**TWO (2)**

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
1. Traffic management implementation	BC-063-2:2015 C01	Site traffic management involves directing vehicle and pedestrian traffic around a construction zone, accident or other road disruption, thus ensuring the safety of emergency response teams, construction workers and the general public. The person who is competent in this CU shall be able to perform traffic management demarcation work, execute traffic management setup and perform mobilisation & demobilisation activities. The outcome of this competency is to properly direct traffic in working area so that the working personnel, road user and public are safe.	1. Perform traffic management demarcation work 2. Execute traffic management setup 3. Perform mobilisation & demobilisation activities	1.1 Traffic management plan interpreted 1.2 Start and end location of road closure marked 1.3 Disparity of traffic management plan reported 2.1 Equipment, transport, workers and PPE organised according to SOP and traffic management plan 2.2 Traffic management setup executed according to SOP and traffic management plan 2.3 Minimum disruption to traffic flow during setup ensured 2.4 Traffic control devices setup and functionality monitored during road closure 3.1 Equipment, transport, workers and PPE organised 3.2 Mobilise & demobilise activities conducted according to SOP

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				3.3 Minimum disruption to traffic flow during mobilise & demobilise activities confirmed 3.4 Traffic management activities inspected and recorded 3.5 Equipment storage arranged and equipment hand over report filled up
2. Road earthworks coordination	BC-063-2:2015 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 coordinate surveying work, coordinate site clearing and coordinate earthwork activities in accordance with earthwork standard procedure. The outcome of this competency is to properly prepare the earth surface for road layer to be able to be pave onto it and also for the drainage to be installed later on.	1. Coordinate surveying work 2. Coordinate site clearing	1.1 Earthwork demarcation work confirmed according to construction drawings 1.2 Site clearing work arranged within Right of Way (ROW) 1.3 Level pegging work confirmed according to construction drawings 1.4 Formation level checked according to construction drawing 1.5 Road alignment checked according to construction drawing 1.6 Surveying work record verified and compiled according to construction drawing 2.1 Equipment, machinery, material, workers and PPE arranged 2.2 Construction of approved temporary access road carried out according to

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				superior instruction 2.3 Top soil removal works carried out according to superior instruction 2.4 Trees and vegetation removal works carried out according to superior instruction 2.5 Relocation work for utilities (water pipe, gas pipe, existing road, waterway, amenities etc) carried out according to superior instruction 2.6 Encumbrances removal work (house etc) carried out according to superior instruction 2.7 Site clearing daily work report recorded and submitted to superior
			3. Coordinate earthwork activities	3.1 Equipment, machinery, material, workers and PPE arranged 3.2 Cut and fill work carried out according to superior instruction 3.3 Cart away surplus and unsuitable material carried out according to superior instruction 3.4 Geotechnical treatment carried out according to superior instruction 3.5 Removal of rock and hard material work carried out

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				according to superior instruction 3.6 Formation level checked and carried out according to superior instruction 3.7 Compaction work carried out according to superior instruction 3.8 Temporary drainage work carried out according to superior instruction 3.9 Earthwork testing arranged according to superior instruction 3.10 Environmental Sedimentation Control Plan (ESCP) and Environmental Impact Assessment (EIA) requirement complied 3.11 Earthwork daily work report recorded and submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
3. Drainage works coordination	BC-063-2:2015 C03	Drainage work is a scope of competency to construct drainage for the road in accordance with Standard Operating Procedure (SOP). The person whom is competent in drainage work must be able to coordinate surface drainage work, coordinate culvert and sump work and coordinate sub soil drainage work in accordance with drainage construction procedure. The outcome of this competency is to properly coordinate 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. Coordinate surface drainage work	1.1 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement 1.2 Traffic management setup executed according to SOP and traffic management plan 1.3 Minimum disruption to traffic flow during setup ensured 1.4 Surface drainage construction work carried out according to superior instruction 1.5 Trenching work carried out according to superior instruction 1.6 Foundation work carried out according to superior instruction 1.7 Drainage installation work carried out according to superior instruction 1.8 Housekeeping carried out according to superior instruction 1.9 Surface drainage work recorded and submitted to superior
			2. Coordinate culvert and sump work	2.1 Drainage level and alignment pegging carried out according to surveyor point and superior instruction 2.2 Tools, equipment, machinery, materials, workers and PPE

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				arranged according to site requirement 2.3 Traffic management setup executed according to SOP and traffic management plan 2.4 Minimum disruption to traffic flow during setup ensured 2.5 Excavation and back filling work carried out according to superior instruction 2.6 Foundation work carried out according to superior instruction 2.7 Culvert and sump construction and installation work carried out according to superior instruction 2.8 Wing wall construction work carried out according to superior instruction 2.9 Housekeeping carried out according to superior instruction 2.10 Culvert and sump work recorded and submitted to superior
			3. Coordinate sub soil drainage work	3.1 Drainage level and alignment pegging carried out according to surveyor point and superior instruction 3.2 Tools, equipment, machinery, materials, workers and PPE arranged according to site

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				requirement 3.3 Traffic management setup executed according to SOP and traffic management plan 3.4 Excavation work carried out according to superior instruction 3.5 Foundation work carried out according to superior instruction 3.6 Sub soil drainage installation work carried out according to superior instruction 3.7 Back filling work carried out according to superior instruction 3.8 Housekeeping carried out according to superior instruction 3.9 Sub soil drainage work recorded and submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
4. Pavement works coordination	BC-063-2:2015 C04	Pavement works coordination is a scope of competency to coordinate and monitor the road pavement works according to Standard Operating Procedure (SOP). Sub base and road base are optional for rigid pavement The person whom is competent in pavement break up must be able to coordinate sub base work, coordinate road base work, coordinate flexible pavement surface layer work, coordinate rigid pavement layer work and coordinate interlocking pavement block work in accordance with pavement works procedure. The outcome of this competency is to properly coordinate the pavement works.	1. Coordinate sub base work	1.1 Pavement design obtained according to specification 1.2 Formation level record obtained from superior 1.3 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement 1.4 Traffic management setup executed according to SOP and traffic management plan 1.5 Sub base course laying and compaction works carried out according to superior instruction 1.6 Sub base thickness checked according to construction drawing 1.7 Daily report recorded and submitted to superior
			2. Coordinate road base work	2.1 Pavement design obtained according to specification 2.2 Sub base level record obtained from superior 2.3 QA/QC test for material arranged according to requirement 2.4 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement 2.5 Traffic management setup executed according to SOP

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				and traffic management plan 2.6 Road base course laying and compaction works carried out according to superior instruction 2.7 QA/QC test for compaction arranged according to requirement 2.8 Road base thickness and gradient checked according to construction drawing 2.9 Daily report recorded and submitted to superior
			3. Coordinate flexible pavement surface layer work	3.1 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement 3.2 Trial lay works carried out according to superior instruction 3.3 Rolling pattern checked according to superior instruction 3.4 QA/QC test for trial lay arranged according to superior instruction 3.5 Traffic management setup executed according to SOP and traffic management plan 3.6 Road base surface cleaning work carried out according to superior instruction 3.7 Bituminous coat spraying

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				work carried out according to superior instruction 3.8 Material temperature checked according to superior instruction 3.9 Bituminous laying and compacting works carried out according to superior instruction 3.10 Laying thickness checked according to superior instruction 3.11 Longitudinal and transverse gradient checked according to superior instruction 3.12 QA/QC post laying test arranged according to superior instruction 3.13 Daily report recorded and submitted to superior
			4. Coordinate rigid pavement layer work	4.1 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement 4.2 Traffic management plan executed according to superior instruction 4.3 QA/QC test for material arranged according to superior instruction 4.4 Waterproof membrane installation works on road base carried out according to

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				superior instruction 4.5 Laying thickness checked according to superior instruction 4.6 Steel reinforcement installation works carried out according to superior instruction 4.7 Expansion joint installation carried out according to superior instruction 4.8 Longitudinal and transverse gradient checked according to superior instruction 4.9 Concrete laying works carried out according to superior instruction 4.10 Curing works carried out according to superior instruction 4.11 Grooving works carried out according to superior instruction 4.12 QA/QC post laying test arranged according to superior instruction 4.13 Daily report and QA/QC report recorded and submitted to superior
			5. Coordinate interlocking pavement block work	5.1 Tools, equipment, machinery, materials, workers and PPE arranged according to site requirement

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
				5.2 Traffic management plan executed according to superior instruction 5.3 Block laying pattern followed according to superior instruction 5.4 Edging block installation carried out according to superior instruction 5.5 Longitudinal and transverse gradient checked according to superior instruction 5.6 Sand bedding laying work carried out according to superior instruction 5.7 Sand bedding level checked according to superior instruction 5.8 Pavement block installation works carried out according to superior instruction 5.9 Joint sand spreading work carried out according to superior instruction 5.10 Pavement block compaction work carried out according to superior instruction 5.11 Brooming work carried out according to superior instruction 5.12 Housekeeping work carried out according to superior instruction 5.13 Daily report recorded and submitted to superior

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
5. Road furniture installation	BC-063-2:2015 C05	Road furniture installation is a competency to install streetlights, benches, traffic barriers, bollards, etc according to authority requirement. The person who is competent in this CU shall be able to prepare road furniture installation work, coordinate 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 install the road furniture and meet the authority and road design requirement.	1. Prepare road furniture installation work 2. Coordinate civil road furniture installation works	1.1 Work instruction and work program obtained 1.2 Road furniture type and location checked according to construction drawing and surveyor pegging 1.3 Tools, equipment, machinery, materials, workers and PPE received according to superior instruction 2.1 Traffic management plan executed according to superior instruction 2.2 Road furniture location marked 2.3 Excavation work carried out according to construction drawing 2.4 Foundation work carried out according to construction drawing 2.5 Installation work carried out according to construction drawing 2.6 Laying, painting and finishing works carried out according to construction drawing 2.7 QA/QC inspection and testing arranged in accordance with installation requirement

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
			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 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 work coordination	BC-063-2:2015 C06	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 work and prepare report for slope protection work. The outcome of this competency is to properly coordinate the slope work and meet the authority and road design requirement.	1. Prepare slope protection work 2. Coordinate slope protection work	1.1 Work instruction and work program obtained 1.2 Type of slope protection, drainage system and location checked according to construction drawing 1.3 Tools, equipment, machinery, materials, workers and PPE received according to superior instruction 2.1 Traffic management plan executed according to superior instruction 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

CU Title	CU Code	CU Descriptor	CU Work Activities	Performance Criteria
			3. Prepare report for slope protection work	3.1 Daily work progress recorded 3.2 Road furniture installation report submitted to superior

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**TRAFFIC MANAGEMENT IMPLIMENTATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to properly direct traffic 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:- • Perform traffic management demarcation work • Execute traffic management setup • Perform mobilisation & demobilisation activities						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-2:2015 C01	**LEVEL**	2	**TRAINING DURATION**	90	**SKILL CREDIT**	9

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Perform traffic management demarcation work	i. Traffic management plan • Location • Time • Permit to work • Nature of work • Work schedule ii. Traffic management demarcation work safety requirement such as • PPE	i. Interpret traffic management plan ii. Prepare demarcation work tools and material iii. Evaluate site condition iv. Execute mark start and end location of road closure	*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. Construction drawing explained ii. Evaluate site condition explained iii. Mark start and end location of road closure demonstrated

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Safety procedure iii. Demarcation work tools and material such as • Marker • Peg iv. Site condition evaluation					
2. Execute traffic management setup	i. Traffic management plan ii. Type of machinery, equipment, number of manpower and type of PPE iii. Traffic management scheme • Diversion • Stop and go • Contra flow • Tidal flow iv. Type of traffic safety devices such as • Safety cone • Signage • Flood lights • Blinkers • Traffic barriers • Baton lights / flag • Whistle v. Flagging technique vi. Communication tools functionalities • Walkie talkie • Flag / baton light	i. Interpret traffic management plan ii. Identify traffic management scheme iii. Prepare traffic safety devices iv. Setup traffic safety devices v. Arrange traffic controller vi. Activate traffic management plan vii. Maintain all traffic safety devices viii. Confirm road user and workers is protected from potential hazards	*Attitude*: i. Calm and composed while execute traffic management setup ii. Teamwork when execute traffic management setup *Safety:* i. Ensure proper handling of traffic safety devices	Related Knowledge 14 Related Skills 32	Lecture Demonstration & Observation	i. Traffic management plan explained ii. Traffic management scheme explained iii. Traffic safety devices explained iv. Traffic controller demonstrated v. Traffic management plan explained vi. Potential hazards explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Whistle vii. Traffic flow identification • Speed • density • queue length viii. Potential hazards identification • accident • driving behaviour • maintenance on devices					
3. Perform mobilisation & demobilisation activities	i. Transportation arrangement procedure ii. Traffic safety devices functionality iii. TMP requirement iv. Traffic safety devices setup procedure v. Road construction potential hazards vi. Traffic safety devices storing SOP vii. Equipment hand over report format	i. Arrange transportation ii. Prepare traffic safety devices according to TMP requirement iii. Setup traffic safety devices iv. Maintain minimum disruption to traffic flow v. Confirm road user and workers is protected from potential hazards vi. Arrange storage of traffic safety devices according to SOP vii. Fill up equipment hand over report	*Attitude*: i. Teamwork when perform mobilisation & demobilisation activities *Safety:* i. Ensure proper handling of traffic safety devices ii. Understanding well the safety requirement	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. TMP requirement explained ii. Minimum disruption to traffic flow 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 2. PPE 3. Demarcation work tools and material 4. Traffic safety devices 5. Communication tools	1:1 1:1 1:5 1:5 1:5

REFERENCES

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

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**ROAD EARTHWORKS COORDINATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to prepare 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:- • Coordinate surveying work • Coordinate site clearing • Coordinate earthwork activities						
PRE-REQUISITE (if appreciable)	**ROAD EARTHWORK SUPERVISION**						
COMPETENCY UNIT ID	BC-063-2:2015 C02	**LEVEL**	2	**TRAINING DURATION**	90	**SKILL CREDIT**	9

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Coordinate surveying work	i. Construction and surveying drawings • Location • Kilometre post • Chainage/ distance • Right of way (ROW) • Surveying data • Surveying level ii. Safety hazard iii. Temporary bench mark (TBM) iv. Surveying work	i. Identify construction and surveying drawings ii. Identify safety hazard iii. Identify temporary bench mark (TBM) iv. Identify surveying work tools and equipment v. Coordinate level pegging work vi. Check level pegging works from construction drawings vii. Check formation level	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. Construction and surveying drawings explained ii. Safety hazard explained iii. Temporary bench mark (TBM) explained iv. Surveying

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	coordination tools and equipment • Measuring tools • String • Survey instrument - Total station - Level instrument v. Level pegging work vi. Formation level vii. Road alignment viii. Surveying work coordination recording format and technique	viii. Check road alignment ix. Record surveying work coordination activity				work tools and equipment listed out v. Level pegging work explained vi. Formation level explained vii. Road alignment explained
2. Coordinate site clearing	i. Site clearing requirement • Equipment • Machinery • Material • Workers • PPE ii. Approved temporary access road iii. Top soil removal works iv. Trees and vegetation removal works v. Relocation work for utilities such as • Water pipe • Gas pipe • Existing road • Waterway • Amenities vi. Encumbrances removal work	i. Arrange site clearing requirement ii. Identify approved temporary access road iii. Carry out construction of temporary access road iv. Carry out top soil removal works v. Carry out trees and vegetation removal works vi. Carry out relocation work for utilities vii. Carry out encumbrances removal work viii. Record site clearing daily work report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. Site clearing requirement explained ii. Approved temporary access road explained iii. Temporary access road explained iv. Top soil removal works explained v. Trees and vegetation removal works explained vi. Relocation work for

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	vii. Site clearing daily work report and record format					utilities explained vii. Encumbrances removal work explained
3. Coordinate earthwork activities	i. Environmental Sedimentation Control Plan (ESCP) and Environmental Impact Assessment (EIA) requirement ii. Earth work activities requirement such as • Equipment • Machinery • Material • Workers • PPE iii. Cut and fill work iv. Cart away surplus and unsuitable material v. Geotechnical treatment work vi. Removal of rock and hard material work vii. Formation level work viii. Compaction work ix. Temporary drainage work x. Earthwork testing work xi. Earthwork daily work report format	i. Arrange earth work activities requirement ii. Carry out cut and fill work iii. Carry out cart away surplus and unsuitable material iv. Carry out geotechnical treatment v. Carry out removal of rock and hard material work vi. Check formation level vii. Carry out compaction work viii. Carry out temporary drainage work ix. Arrange earthwork testing x. Record earthwork daily work activities	*Attitude*: ii. 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. Earth work activities requirement explained ii. Cut and fill work explained iii. Cart away surplus and unsuitable material explained iv. Geotechnical treatment explained v. Removal of rock and hard material work explained vi. Formation level checking demonstrated vii. Carry out compaction work

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						viii. Temporary drainage work explained ix. Earthwork testing 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 and surveying drawings 2. Surveying work coordination tools and equipment 3. PPE 4. Sample of Environmental Sedimentation Control Plan (ESCP)	1:1 1: 5 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

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**DRAINAGE WORKS COORDINATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to coordinate drainage construction so that the road pavement performs satisfactorily. Upon completion of this competency unit, trainees will be able to:- • Coordinate surface drainage work • Coordinate culvert and sump work • Coordinate sub soil drainage work						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-2:2015 C03	**LEVEL**	2	**TRAINING DURATION**	90	**SKILL CREDIT**	9

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Coordinate surface drainage work	i. Surface drainage work coordination requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ii. Traffic management SOP iii. Traffic management plan	i. Arrange surface drainage work coordination requirement ii. Identify traffic management plan iii. Setup traffic management iv. Ensured minimum disruption to traffic flow v. Carry out surface drainage construction work vi. Carry out trenching	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. Surface drainage work coordination requirement explained ii. Traffic management plan explained iii. Traffic management setup demonstrate

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	iv. Surface drainage construction work v. Trenching work vi. Foundation work vii. Drainage installation work viii. Housekeeping work ix. Surface drainage work Recording format	work vii. Carry out foundation work viii. Carry out drainage installation work ix. Carry out housekeeping work x. Record surface drainage work				d iv. Minimum disruption to traffic flow explained v. Surface drainage construction work explained vi. Trenching work explained vii. Foundation work explained viii. Drainage installation work explained ix. Housekeeping work explained
2. Coordinate culvert and sump work	i. Surveyor point ii. Drainage level and alignment pegging work iii. Culvert and sump work requirement • Tools • Equipment • Machinery • Materials • Workers	i. Identify surveyor point ii. Carry out drainage level iii. Carry out alignment pegging iv. Arranged culvert and sump work requirement v. Identify traffic management plan vi. Setup traffic	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Surveyor point explained ii. Drainage level explained iii. Alignment pegging explained iv. Culvert and sump work

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• PPE iv. Traffic management SOP v. Traffic management plan vi. Excavation and back filling work requirement vii. Foundation work requirement viii. Culvert and sump construction / installation procedure ix. Wing wall construction requirement x. Housekeeping work requirement xi. Culvert and sump work recording format	management vii. Ensure minimum disruption to traffic flow viii. Carry out excavation and back filling work ix. Carry out foundation work x. Carry out culvert and sump construction / installation xi. Carry out wing wall construction xii. Carry out housekeeping work xiii. Record culvert and sump work	handling of traffic safety devices			requirement explained v. Traffic management plan explained vi. Traffic management setup demonstrated vii. Minimum disruption to traffic flow explained viii. Excavation and back filling work explained ix. Foundation work explained x. Culvert and sump construction / installation explained xi. Wing wall construction explained xii. Housekeeping work explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
3. Coordinate sub soil drainage work	i. Surveyor point ii. Drainage level and alignment pegging work iii. Sub soil drainage work requirement • Tools • Equipment • Machinery • Materials • Workers • PPE iv. Traffic management plan v. Excavation work vi. Foundation work vii. Sub soil drainage installation work viii. Back filling work ix. Housekeeping work x. Sub soil drainage work recording format	i. Identify surveyor point ii. Carry out drainage level work iii. Carry out alignment pegging work iv. Arrange sub soil drainage work requirement v. Identify traffic management plan vi. Setup traffic management vii. Ensure minimum disruption to traffic flow viii. Carry out excavation work ix. Carry out foundation work x. Carry out sub soil drainage installation work xi. Carry out back filling work xii. Carry out housekeeping work xiii. Record sub soil drainage work	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. Surveyor point explained ii. Drainage level work explained iii. Alignment pegging work explained iv. Sub soil drainage work requirement explained v. Traffic management plan explained vi. Traffic management setup demonstrated vii. Minimum disruption to traffic flow explained viii. Excavation work explained ix. Foundation work explained x. Sub soil

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						drainage installation work explained xi. Back filling work explained xii. Housekeeping 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. Drainage works hand tools 2. Drainage works equipment 3. Drainage works machinery 4. Drainage works materials 5. Drainage works PPE	1:5 1:5 1:25 as required 1:1

REFERENCES

1. Kenneth U. Flood, 1975, Traffic Management, W. C. Brown Company, ISBN: 0697085104, 9780697085108
2. Laurence Olivo, 2007, Traffic Management, Emond Montgomery Publications, ISBN: 1552391558, 9781552391556John E. Tyworth, Joseph L. Cavinato, 1987, Traffic management: planning, operations, and control, C. John Langley, ISBN: 0201065045, 9780201065046
3. 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 / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**PAVEMENT WORKS COORDINATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to coordinate and monitor the road pavement works according to Standard Operating Procedure (SOP). Upon completion of this competency unit, trainees will be able to:- • Coordinate sub base work • Coordinate road base work • Coordinate flexible pavement surface layer work • Coordinate rigid pavement layer work • Coordinate interlocking pavement block work						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-2:2015 C04	**LEVEL**	2	**TRAINING DURATION**	180	**SKILL CREDIT**	18

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Coordinate sub base work	i. Construction drawing ii. Pavement design specification iii. Formation level record iv. Sub base work requirement • Tools • Equipment • Machinery	i. Obtained pavement design ii. Identify pavement design specification iii. Obtain formation level record iv. Arrange sub base work requirement v. Identify traffic management plan	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Pavement design explained ii. Formation level record explained iii. Sub base work requirement explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Materials • Workers • PPE v. Traffic management SOP vi. Traffic management plan vii. Sub base course laying and compaction works viii. Sub base thickness requirement ix. Sub base work daily reporting format	vi. Setup traffic management vii. Carry out sub base course laying works viii. Carry out compaction works ix. Check sub base thickness x. Record sub base work daily report	ii. Ensure proper handling of traffic safety devices			iv. Traffic management plan explained v. Traffic management setup demonstrated vi. Sub base course laying works explained vii. Compaction works explained viii. Sub base thickness checking demonstrated
2. Coordinate road base work	i. Construction drawing ii. Pavement design specification iii. Sub base level record iv. QA/QC material test requirement v. Road base work requirement • Tools • Equipment • Machinery • Materials	i. Obtained pavement design ii. Identify pavement design specification iii. Obtain sub base level record iv. Arrange QA/QC test for material v. Arrange road base work requirement vi. Identify traffic management plan	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Pavement design explained ii. QA/QC test for material explained iii. Road base work requirement explained iv. Setup traffic manageme

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Workers • PPE arranged vi. Traffic management plan vii. Road base course laying works viii. Compaction works ix. QA/QC compaction test requirement x. Road base thickness and gradient checking technique xi. Road base work daily reporting format	vii. Setup traffic management viii. Carry out road base course laying works ix. Carry out compaction works x. Arrange QA/QC test for compaction xi. Check road base thickness and gradient xii. Record road base work daily report	safety devices			nt demonstrated v. Road base course laying works explained vi. Compaction works explained vii. QA/QC test for compaction explained viii. Road base thickness and gradient checking demonstrated
3. Coordinate flexible pavement surface layer work	i. Flexible pavement surface layer work requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ii. Trial lay works iii. Rolling pattern checking technique	i. Arrange flexible pavement surface layer work requirement ii. Carried out trial lay works iii. Check rolling pattern iv. Arrange QA/QC test for trial lay v. Identify traffic management plan vi. Setup traffic	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic	Related Knowledge 14 Related Skills 32	Lecture Demonstration & Observation	i. Flexible pavement surface layer work explained ii. Trial lay works explained iii. Rolling pattern explained iv. QA/QC test

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	iv. QA/QC trial lay test requirement v. Traffic management SOP vi. Traffic management plan vii. Road base surface cleaning work requirement viii. Bituminous coat spraying work requirement ix. Material temperature checking technique x. Bituminous laying and compacting works xi. Laying thickness checking technique xii. Longitudinal and transverse gradient checking technique xiii. QA/QC post laying test requirement xiv. Flexible pavement surface layer work daily reporting format	management vii. Carry out road base surface cleaning work viii. Carry out bituminous coat spraying work ix. Check material temperature x. Carry out bituminous laying and compacting works xi. Check laying thickness xii. Check longitudinal and transverse gradient xiii. Arrange QA/QC post laying test xiv. Record flexible pavement surface layer work daily report	safety devices			for trial lay explained v. Traffic management plan explained vi. Traffic management setup demonstrated vii. Road base surface cleaning work explained viii. Bituminous coat spraying work explained ix. Material temperature checking demonstrated x. Bituminous laying and compacting works explained xi. Laying thickness checking demonstrat

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						ed xii. Longitudinal and transverse gradient explained xiii. QA/QC post laying test explained
4. Coordinate rigid pavement layer work	i. Rigid pavement layer work requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ii. Traffic management SOP iii. Traffic management plan iv. QA/QC material test procedure v. Waterproof membrane installation works vi. Laying thickness checking technique vii. Steel reinforcement installation works viii. Expansion joint installation works ix. Longitudinal and	i. Arrange rigid pavement layer work requirement ii. Identify traffic management plan iii. Setup traffic management iv. Arrange QA/QC material test v. Carry out waterproof membrane installation works on road base vi. Check laying thickness vii. Carry out steel reinforcement installation works viii. Carry out expansion joint installation ix. Check longitudinal and transverse gradient x. Carry out concrete	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Rigid pavement layer work explained ii. Traffic management plan explained iii. Traffic management setup demonstrated iv. QA/QC material test explained v. Waterproof membrane installation works on road base explained vi. Laying

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	transverse gradient checking technique x. Concrete laying works xi. Curing works xii. Grooving works xiii. QA/QC post laying testing requirement xiv. Daily and QA/QC reporting format	laying works xi. Carry out curing works xii. Carry out Grooving works xiii. Arrange QA/QC post laying test xiv. Record Daily and QA/QC report				thickness checking demonstrated vii. Steel reinforcement installation works explained viii. Expansion joint installation explained ix. Longitudinal and transverse gradient checking demonstrated x. Concrete laying works explained xi. Curing works explained xii. Grooving works explained xiii. QA/QC post laying test explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
5. Coordinate interlocking pavement block work	i. Interlocking pavement block work requirement • Tools • Equipment • Machinery • Materials • Workers • PPE ii. Traffic management plan iii. Block laying pattern requirement iv. Edging block installation work v. Longitudinal and transverse gradient checking technique vi. Sand bedding laying work vii. Sand bedding level checking technique viii. Pavement block installation works ix. Joint sand spreading work x. Pavement block compaction work xi. Brooming work xii. Housekeeping work xiii. Interlocking pavement block work daily reporting format	i. Arrange interlocking pavement block work requirement ii. Identify traffic management plan iii. Setup traffic management iv. Ensure block laying pattern v. Carry out edging block installation work vi. Check longitudinal and transverse gradient vii. Carry out sand bedding laying work viii. Check sand bedding level ix. Carry out pavement block installation works x. Carry out joint sand spreading work xi. Carry out pavement block compaction work xii. Carry out brooming work xiii. Carry out housekeeping work xiv. Record interlocking pavement block work daily report	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 8 Related Skills 19	Lecture Demonstration & Observation	i. Interlocking pavement block work explained ii. Traffic management plan explained iii. Traffic management setup demonstrated iv. Block laying pattern explained v. Edging block installation work explained vi. Longitudinal and transverse gradient checking demonstrated vii. Sand bedding laying work explained viii. Sand bedding level

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						checking demonstrated ix. Pavement block installation works explained x. Joint sand spreading work explained xi. Pavement block compaction work explained xii. Brooming work explained xiii. Carry out housekeeping 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. Pavement works hand tools 2. Pavement works equipment 3. Pavement works machinery 4. Pavement works materials 5. Pavement works PPE	1. 1:5 2. 1:5 3. 1:25 4. As required 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

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**ROAD FURNITURE INSTALLATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able to properly install streetlights, benches, traffic barriers, bollards, etc according to authority requirement. Upon completion of this competency unit, trainees will be able to:- • Prepare road furniture installation work • Coordinate 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-063-2:2015 C05	**LEVEL**	2	**TRAINING DURATION**	60	**SKILL CREDIT**	6

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare road furniture installation work	i. Work instruction and work program requirement ii. Construction drawing iii. Surveyor pegging iv. Type and function of road furniture v. Road furniture installation work requirement • Tools	i. Obtain work instruction and work program ii. Obtain construction drawing iii. Obtain surveyor pegging iv. Check road furniture type v. Check road furniture location vi. Arrange road furniture installation work	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement	Related Knowledge 5 Related Skills 11	Lecture Demonstration & Observation	i. Work instruction and work program explained ii. Construction drawing explained iii. Surveyor pegging explained iv. Road

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Equipment • Machinery • Materials • Workers • PPE	requirement				furniture type listed out v. Road furniture location explained vi. Road furniture installation work requirement explained
2. Coordinate civil road furniture installation works	i. Type of civil road furniture such as • Signage • Guard rail • Concrete barrier • Road line marking • Kilometre post ii. Traffic management SOP iii. Traffic management plan iv. Road furniture location marking technique and method v. Excavation work requirement vi. Foundation work requirement • Formwork • Reinforcement • Concreting	i. Identify type of civil road furniture ii. Identify traffic management plan iii. Setup traffic management iv. Mark road furniture location v. Carry out excavation work vi. Carry out foundation work vii. Carry out installation work viii. Carry out laying, painting and finishing works ix. Arrange QA/QC inspection and testing	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 5 Related Skills 11	Lecture Demonstration & Observation	i. Type of civil road furniture listed out ii. Traffic management plan explained iii. Traffic management setup demonstrated iv. Road furniture location marking demonstrated v. Excavation work explained

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Back fill vii. Installation work requirement viii. Laying, painting and finishing works requirement ix. QA/QC inspection arrangement					vi. Foundation work explained vii. Installation work explained viii. Laying, painting and finishing works explained ix. QA/QC inspection and testing explained
3. Coordinate M&E road furniture installation works	i. Type of M&E road furniture such as • street lighting • high mast • traffic light ii. Traffic management plan iii. M&E road furniture location marking method and technique iv. Excavation work requirement v. Foundation work requirement • Formwork • Reinforcement • Concreting • Back fill vi. M&E road furniture	i. Identify type of M&E road furniture ii. Identify traffic management plan iii. Setup traffic management iv. Mark M&E road furniture location v. Carry out excavation work vi. Carry out foundation work vii. Carry out M&E road furniture installation work viii. Carry out laying, painting and finishing works ix. Arrange QA/QC	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 7 Related Skills 17	Lecture Demonstration & Observation	i. Type of M&E road furniture listed out ii. Traffic management plan explained iii. Traffic management setup demonstrated iv. M&E road furniture location marking demonstrated v. Excavation

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	installation work vii. Laying, painting and finishing works requirement viii. QA/QC inspection and testing arrangement	inspection and testing				work explained vi. Foundation work explained vii. M&E road furniture installation work explained viii. Laying, painting and finishing works explained ix. QA/QC inspection 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. Thoroughly in preparing report	Related Knowledge 2 Related Skills 4	Lecture Demonstration & Observation	i. Daily work progress recorded 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. Road furniture installation works hand tools 2. Road furniture installation works equipment 3. Road furniture installation works machinery 4. Road furniture installation works materials 5. Road furniture installation works PPE	1. 1:5 2. 1:5 3. 1:25 4. As required 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

CURRICULUM of COMPETENCY UNIT (CoCU)

SECTOR	**BUILDING & CONSTRUCTION**						
SUB SECTOR	**CIVIL ENGINEERING**						
JOB AREA	**ROAD CONSTRUCTION / TRAFFIC MANAGEMENT**						
NOSS TITLE	**ROAD CONSTRUCTION AND MAINTENANCE OPERATION**						
COMPETENCY UNIT TITLE	**SLOPE WORK COORDINATION**						
LEARNING OUTCOME	The person who is competent in this competency unit shall be able 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:- • Prepare slope protection work • Coordinate slope protection work • Prepare report for slope protection work						
PRE-REQUISITE (if appreciable)							
COMPETENCY UNIT ID	BC-063-2:2015 C06	**LEVEL**	2	**TRAINING DURATION**	90	**SKILL CREDIT**	9

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
1. Prepare slope protection work	i. Work instruction and work program ii. Construction drawing iii. Type of slope protection, drainage system Slope protection work location iv. Slope protection work requirement • Tools • Equipment • Machinery	i. Obtain work instruction and work program ii. Identify construction drawing iii. Confirm type of slope protection, 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:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 11 Related Skills 25	Lecture Demonstration & Observation	i. Work instruction and work program explained ii. Construction drawing explained iii. Type of slope protection, drainage system listed out iv. Slope protection

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
	• Materials • Workers • PPE					work location explained v. Slope protection work requirement explained
2. Coordinate slope protection work	i. Traffic management SOP ii. Traffic management plan iii. Slope protection and drainage location marking technique and method iv. Excavation work requirement v. Berm drain and cascade drain construction requirement vi. Foundation work requirement vii. Laying, turfing and finishing works requirement viii. QA/QC inspection and testing arrangement	i. Identify traffic management plan ii. Setup traffic management iii. Mark slope protection and drainage location iv. Carry out excavation work v. Construct berm drain and cascade drain vi. Carry out foundation work vii. Carry out slope protection installation work viii. Carry out laying, turfing and finishing works ix. Arrange QA/QC inspection and testing	*Attitude*: i. Attentive to details in preparing work instruction requirement *Safety:* i. Understanding well the safety requirement ii. Ensure proper handling of traffic safety devices	Related Knowledge 14 Related Skills 32	Lecture Demonstration & Observation	i. Traffic management plan explained ii. Traffic management setup demonstrated iii. Slope protection and drainage location marking demonstrated iv. Excavation work explained v. Berm drain and cascade drain construction vi. Foundation work explained vii. Slope protection installation work

Work Activities	Related Knowledge	Related Skills	Attitude/Safety/ Environmental	Training Hours	Delivery Mode	Assessment Criteria
						explained iii. Laying, turfing and finishing works explained ix. QA/QC inspection and testing explained
3. Prepare report for slope protection work	i. Daily work progress recording format ii. Slope protection work report format	i. Record daily work progress ii. Compile slope protection work record and submit to superior	*Attitude*: i. Thoroughly in preparing report	Related Knowledge 3 Related Skills 6	Lecture Demonstration & Observation	i. Daily work progress recording 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. Slope works hand tools 2. Slope works equipment 3. Slope works machinery 4. Slope works materials 5. Slope works PPE	1. 1:5 2. 1:5 3. 1:25 4. As required 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

Table 8: Training Hour Summary

SECTOR	: BUILDING & CONSTRUCTION
SUB SECTOR	: CIVIL ENGINEERING
JOB AREA	: ROAD CONSTRUCTION / TRAFFIC MANAGEMENT
NOSS TITLE	: ROAD CONSTRUCTION OPERATION
JOB LEVEL	: 2

CU ID	Competency Unit	Training Hour
BC-063-2:2015 C01	TRAFFIC MANAGEMENT IMPLEMENTATION	90
BC-063-2:2015 C02	ROAD EARTHWORKS COORDINATION	90
BC-063-2:2015 C03	DRAINAGE WORKS COORDINATION	90
BC-063-2:2015 C04	PAVEMENT WORKS COORDINATION	180
BC-063-2:2015 C05	ROAD FURNITURE INSTALLATION	60
BC-063-2:2015 C06	SLOPE WORK COORDINATION	90
	Total Training Program Hours	**600**

TRAINING HOURS SUMMARY FOR ROAD CONSTRUCTION OPERATION (L2)

HS LEVEL 2					600			HOURS			1 DAY = 8 HOURS		
								0.7	0.3				
CU	MODULE STATEMENT	%	HRS	STEP NO.	STEP STATEMENT	%	HOURS	SKILLS	KNOWLEDGE	TOTAL	Skills	Knowledge	Total
1	TRAFFIC MANAGEMENT IMPLEMENTATION	15%	90.00	1	• Perform traffic management demarcation work	20.00%	18.00	13	5	18.00	2	1	2
				2	• Execute traffic management setup	50.00%	45.00	32	14	45.00	4	2	6
				3	• Perform mobilisation & demobilisation activities	30.00%	27.00	19	8	27.00	2	1	3
						100.00%	**90.00**	**63**	**27**	**90.00**	**8**	**3**	**11**
2	ROAD EARTHWORKS COORDINATION	15%	90.00	1	• Coordinate surveying work	30.00%	27.00	19	8	27.00	2	1	3
				2	• Coordinate site clearing	30.00%	27.00	19	8	27.00	2	1	3
				3	• Coordinate earthwork activities	40.00%	36.00	25	11	36.00	3	1	5
						100.00%	**90.00**	**63**	**27**	**90.00**	**8**	**3**	**11**
3	DRAINAGE WORKS COORDINATION	15%	90.00	1	• Coordinate surface drainage work	30.00%	27.00	19	8	27.00	2	1	3
				2	• Coordinate culvert and sump work	40.00%	36.00	25	11	36.00	3	1	5
				3	• Coordinate sub soil drainage work	30.00%	27.00	19	8	27.00	2	1	3
						100.00%	**90.00**	**63**	**27**	**90.00**	**8**	**3**	**11**
4	PAVEMENT WORKS COORDINATION	30%	180.00	1	• Coordinate sub base work	20.00%	36.00	25	11	36.00	3	1	5
				2	• Coordinate road base work	20.00%	36.00	25	11	36.00	3	1	5
				3	• Coordinate flexible pavement surface layer work	25.00%	45.00	32	14	45.00	4	2	6
				4	• Coordinate rigid pavement layer work	20.00%	36.00	25	11	36.00	3	1	5
				5	• Coordinate interlocking pavement block work	15.00%	27.00	19	8	27.00	2	1	3
						100.00%	**180.00**	**126**	**54**	**180.00**	**16**	**7**	**23**
5	ROAD FURNITURE INSTALLATION	10%	60.00	1	• Prepare road furniture installation work	25.00%	15.00	11	5	15.00	1	1	2
				2	• Coordinate civil road furniture installation works	25.00%	15.00	11	5	15.00	1	1	2
				3	• Coordinate M&E road furniture installation works	40.00%	24.00	17	7	24.00	2	1	3
				4	• Prepare report for road furniture works	10.00%	6.00	4	2	6.00	1	0	1
						100.00%	**60.00**	**42**	**18**	**60.00**	**5**	**2**	**8**
6	SLOPE WORK COORDINATION	15%	90.00	1	• Prepare slope protection work	40.00%	36.00	25	11	36.00	3	1	5
				2	• Coordinate slope protection work	50.00%	45.00	32	14	45.00	4	2	6
				3	• Prepare report for slope protection work	10.00%	9.00	6	3	9.00	1	0	1
						100.00%	**90.00**	**63**	**27**	**90.00**	**8**	**3**	**11**
		100%	**600.00**		**TOTAL**		**600.00**						