TRAINING REGULATIONS

Heavy Equipment Operation [Concrete Pump] NC II

CONSTRUCTION SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
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TRAINING REGULATIONS FOR

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SECTION 1 HEAVY EQUIPMENT OPERATION - CONCRETE PUMP NC II

The **HEAVY EQUIPMENT OPERATION - CONCRETE PUMP NC II** qualification consists of competencies that workers must achieve to enable them to perform tasks such as pumping ready-mixed concrete to high-rise structures or buildings in construction sites or in similar locations.

This qualification is packaged from the competency map of Construction - Heavy Equipment sub-sector as shown in Annex A.

The units of competency comprising this qualification include the following:

CODE NO.	BASIC COMPETENCIES
	Units of Competency
500311105	Participate in workplace communication
500311106	Work in a team environment
500311107	Practice career professionalism
500311108	Practice occupational health and safety procedures

CODE NO.	COMMON COMPETENCIES
	Units of Competency
CON931201	Prepare construction materials and tools
CON311201	Observe procedures, specifications and manuals of instruction
CON311202	Interpret technical drawings and plans
CON311203	Perform mensurations and calculations
CON311204	Maintain tools and equipment

CODE NO.	CORE COMPETENCIES
CON833321	Perform pre- and post-operation procedures for concreting and asphalting equipment
CON833322	Perform basic preventive maintenance servicing for concreting and asphalting equipment
CON833324	Perform productive operation for concrete pump

A person who has achieved this Qualification is competent to be a -

- Concrete pump operator

SECTION 2 COMPETENCY STANDARDS

This section gives the details and contents of the core units of competency required in **HEAVY EQUIPMENT OPERATION - CONCRETE PUMP NC II**. These units of competency are categorized into basic, common and core competencies.

BASIC COMPETENCIES

UNIT OF COMPETENCY:	**PARTICIPATE IN WORKPLACE COMMUNICATION**
UNIT CODE :	**500311105**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources*** 1.2 Effective questioning , active listening and speaking skills are used to gather and convey information 1.3 Appropriate ***medium*** is used to transfer information and ideas 1.4 Appropriate non- verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed 1.6 Defined workplace procedures for the location and ***storage*** of information are used 1.7 Personal interaction is carried out clearly and concisely
2. Participate in workplace meetings and discussions	2.1 Team meetings are attended on time 2.2 Own opinions are clearly expressed and those of others are listened to without interruption 2.3 Meeting inputs are consistent with the meeting purpose and established ***protocols*** 2.4 ***Workplace interactions*** are conducted in a courteous manner 2.5 Questions about simple routine workplace procedures and maters concerning working conditions of employment are asked and responded to 2.6 Meetings outcomes are interpreted and implemented

3. Complete relevant work related documents	3.1 Range of ***forms*** relating to conditions of employment are completed accurately and legibly 3.2 Workplace data is recorded on standard workplace forms and documents 3.3 Basic mathematical processes are used for routine calculations 3.4 Errors in recording information on forms/ documents are identified and properly acted upon 3.5 Reporting requirements to supervisor are completed according to organizational guidelines

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	1.1. Team members 1.2. Suppliers 1.3. Trade personnel 1.4. Local government 1.5. Industry bodies
2. Medium	2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information discussion 2.5. Follow-up or verbal instructions 2.6. Face to face communication
3. Storage	3.1. Manual filing system 3.2. Computer-based filing system
4. Forms	4.1. Personnel forms, telephone message forms, safety reports
5. Workplace interactions	5.1. Face to face 5.2. Telephone 5.3. Electronic and two way radio 5.4. Written including electronic, memos, instruction and forms, non-verbal including gestures, signals, signs and diagrams
6. Protocols	6.1. Observing meeting 6.2. Compliance with meeting decisions 6.3. Obeying meeting instructions

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using communication equipment 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting the formal or informal communication
2. Underpinning Knowledge and Attitudes	2.1. Effective communication 2.2. Different modes of communication 2.3. Written communication 2.4. Organizational policies 2.5. Communication procedures and systems 2.6. Technology relevant to the enterprise and the individual's work responsibilities
3. Underpinning Skills	3.1. Follow simple spoken language 3.2. Perform routine workplace duties following simple written notices 3.3. Participate in workplace meetings and discussions 3.4. Complete work related documents 3.5. Estimate, calculate and record routine workplace measures 3.6. Basic mathematical processes of addition, subtraction, division and multiplication 3.7. Ability to relate to people of social range in the workplace 3.8. Gather and provide information in response to workplace Requirements
4. Resource Implications	4.1. Fax machine 4.2. Telephone 4.3. Writing materials 4.4. Internet
5. Methods of Assessment	5.1. Direct Observation 5.2. Oral interview and written test
6. Context of Assessment	6.1. Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY:	**WORK IN TEAM ENVIRONMENT**
UNIT CODE :	**500311106**
UNIT DESCRIPTOR :	This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Describe team role and scope	1.1. The ***role and objective of the team*** is identified from available ***sources of information*** 1.2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources
2. Identify own role and responsibility within team	2.1. Individual role and responsibilities within the team environment are identified 2.2. Roles and responsibility of other team members are identified and recognized 2.3. Reporting relationships within team and external to team are identified
3. Work as a team member	3.1. Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives 3.2. Effective and appropriate contributions made to complement team activities and objectives, based on individual skills and competencies and ***workplace context*** 3.3. Observed protocols in reporting using standard operating procedures 3.4. Contribute to the development of team work plans based on an understanding of team's role and objectives and individual competencies of the members.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Operated in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job 1.6. Reported outcomes
2. Underpinning Knowledge and Attitude	2.1. Communication process 2.2. Team structure 2.3. Team roles 2.4. Group planning and decision making
3. Underpinning Skills	3.1. Communicate appropriately, consistent with the culture of the workplace
4. Resource Implications	The following resources MUST be provided: 4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or tasks
5. Methods of Assessment	Competency may be assessed through: 5.1. Observation of the individual member in relation to the work activities of the group 5.2. Observation of simulation and or role play involving the participation of individual member to the attainment of organizational goal 5.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
6. Context for Assessment	6.1. Competency may be assessed in workplace or in a simulated workplace setting 6.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY:	**PRACTICE CAREER PROFESSIONALISM**
UNIT CODE :	**500311107**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes in promoting career growth and advancement.

ELEMENT	**PERFORMANCE CRITERIA** ***Italicized*** terms are elaborated in the Range of Variables
1. Integrate personal objectives with organizational goals	1.1 Personal growth and work plans are pursued towards improving the qualifications set for the profession 1.2 Intra- and interpersonal relationships are maintained in the course of managing oneself based on performance ***evaluation*** 1.3 Commitment to the organization and its goal is demonstrated in the performance of duties
2. Set and meet work priorities	2.1 Competing demands are prioritized to achieve personal, team and organizational goals and objectives. 2.2 ***Resources*** are utilized efficiently and effectively to manage work priorities and commitments 2.3 Practices along economic use and maintenance of equipment and facilities are followed as per established procedures
3. Maintain professional growth and development	3.1 ***Trainings and career opportunities*** are identified and availed of based on job requirements 3.2 ***Recognitions*** are sought/received and demonstrated as proof of career advancement 3.3 ***Licenses and/or certifications*** relevant to job and career are obtained and renewed

RANGE OF VARIABLES

VARIABLE	RANGE
1. Evaluation	1.1 Performance Appraisal 1.2 Psychological Profile 1.3 Aptitude Tests
2. Resources	2.1 Human 2.2 Financial 2.3 Technology 2.3.1 Hardware 2.3.2 Software
3. Trainings and career opportunities	3.1 Participation in training programs 3.1.1 Technical 3.1.2 Supervisory 3.1.3 Managerial 3.1.4 Continuing Education 3.2 Serving as Resource Persons in conferences and workshops
4. Recognitions	4.1 Recommendations 4.2 Citations 4.3 Certificate of Appreciations 4.4 Commendations 4.5 Awards 4.6 Tangible and Intangible Rewards
5. Licenses and/or certifications	5.1 National Certificates 5.2 Certificate of Competency 5.3 Support Level Licenses 5.4 Professional Licenses

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Attained job targets within key result areas (KRAs) 1.2 Maintained intra - and interpersonal relationship in the course of managing oneself based on performance evaluation 1.3 Completed trainings and career opportunities which are based on the requirements of the industries 1.4 Acquired and maintained licenses and/or certifications according to the requirement of the qualification
2. Underpinning Knowledge	2.1 Work values and ethics (Code of Conduct, Code of Ethics, etc.) 2.2 Company policies 2.3 Company-operations, procedures and standards 2.4 Fundamental rights at work including gender sensitivity 2.4 Personal hygiene practices
3. Underpinning Skills	3.1 Appropriate practice of personal hygiene 3.2 Intra and Interpersonal skills 3.3 Communication skills
4. Resource Implications	The following resources **MUST** be provided: 4.1 Workplace or assessment location 4.2 Case studies/scenarios
5. Methods of Assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Simulation/Role-plays 5.4 Observation 5.5 Third Party Reports 5.6 Exams and Tests
6. Context of Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY :	**PRACTICE OCCUPATIONAL HEALTH AND SAFETY PROCEDURES**
UNIT CODE :	**500311108**
UNIT DESCRIPTOR :	This unit covers the outcomes required to comply with regulatory and organizational requirements for occupational health and safety.

ELEMENT	**PERFORMANCE CRITERIA** ***Italicized*** terms are elaborated in the Range of Variables
1. Identify hazards and risks	1.1 ***Safety regulations*** and workplace safety and hazard control practices and procedures are clarified and explained based on organization procedures 1.2 ***Hazards/risks*** in the workplace and their corresponding indicators are identified to minimize or eliminate risk to co-workers, workplace and environment in accordance with organization procedures 1.3 ***Contingency measures*** during workplace accidents, fire and other emergencies are recognized and established in accordance with organization procedures
2. Evaluate hazards and risks	2.1 Terms of maximum tolerable limits which when exceeded will result in harm or damage are identified based on threshold limit values (TLV) 2.2 Effects of the hazards are determined 2.3 OHS issues and/or concerns and identified safety hazards are reported to designated personnel in accordance with workplace requirements and relevant workplace OHS legislation

3. Control hazards and risks	3.1 Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace are consistently followed 3.2 Procedures for dealing with workplace accidents, fire and emergencies are followed in accordance with organization OHS policies 3.3 ***Personal protective equipment (PPE)*** is correctly used in accordance with organization OHS procedures and practices 3.4 Appropriate assistance is provided in the event of a workplace emergency in accordance with established organization protocol
4. Maintain OHS awareness	4.1 ***Emergency-related drills and trainings*** are participated in as per established organization guidelines and procedures 4.2 ***OHS personal records*** are completed and updated in accordance with workplace requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Safety regulations	May include but are not limited to: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Philippine Occupational Safety and Health Standards 1.6 DOLE regulations on safety legal requirements 1.7 ECC regulations
2. Hazards/Risks	May include but are not limited to: 2.1 Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation 2.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects 2.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors 2.4 Ergonomics 2.4.1 Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles 2.4.2 Physiological factors – monotony, personal relationship, work out cycle
3. Contingency measures	May include but are not limited to: 3.1 Evacuation 3.2 Isolation 3.3 Decontamination 3.4 (Calling designed) emergency personnel
4. PPE	May include but are not limited to: 4.1 Mask 4.2 Gloves 4.3 Goggles 4.4 Hair Net/cap/bonnet 4.5 Face mask/shield 4.6 Ear muffs 4.7 Apron/Gown/coverall/jump suit 4.8 Anti-static suits

5. Emergency-related drills and training	5.1 Fire drill 5.2 Earthquake drill 5.3 Basic life support/CPR 5.4 First aid 5.5 Spillage control 5.6 Decontamination of chemical and toxic 5.7 Disaster preparedness/management
6. OHS personal records	6.1 Medical/Health records 6.2 Incident reports 6.3 Accident reports 6.4 OHS-related training completed

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Explained clearly established workplace safety and hazard control practices and procedures 1.2 Identified hazards/risks in the workplace and its corresponding indicators in accordance with company procedures 1.3 Recognized contingency measures during workplace accidents, fire and other emergencies 1.4 Identified terms of maximum tolerable limits based on threshold limit value- TLV. 1.5 Followed Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace 1.6 Used Personal Protective Equipment (PPE) in accordance with company OHS procedures and practices 1.7 Completed and updated OHS personal records in accordance with workplace requirements
2. Underpinning Knowledge and Attitude	2.1 OHS procedures and practices and regulations 2.2 PPE types and uses 2.3 Personal hygiene practices 2.4 Hazards/risks identification and control 2.5 Threshold Limit Value -TLV 2.6 OHS indicators 2.7 Organization safety and health protocol 2.8 Safety consciousness 2.9 Health consciousness
3. Underpinning Skills	3.1 Practice of personal hygiene 3.2 Hazards/risks identification and control skills 3.3 Interpersonal skills 3.4 Communication skills
4. Resource Implications	The following resources must be provided: 4.1 Workplace or assessment location 4.2 OHS personal records 4.3 PPE 4.4 Health records
5. Methods of Assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Case Study/Situation
6. Context for Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

COMMON COMPETENCIES

UNIT OF COMPETENCY:	**PREPARE CONSTRUCTION MATERIALS AND TOOLS**
UNIT CODE :	**CON931201**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes on identifying, requesting and receiving construction materials and tools based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variable
1. Identify materials	1.1 ***Materials*** are listed as per job requirements 1.2 Quantity and ***description of materials*** conform with the job requirements 1.3 Tools and accessories are identified according to job requirements
2. Request materials	2.1 Materials and tools needed are requested according to the list prepared 2.2 Request is done as per ***company standard operating procedures (SOP)*** 2.3 Substitute materials and tools are provided without sacrificing cost and quality of work
3. Receive and inspect materials	3.1 Materials and tools issued are inspected as per quantity and specification 3.2 Tools, accessories and materials are checked for damages according to enterprise procedures 3.3 Materials and tools are set aside to appropriate location nearest to the workplace

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials and Tools	1.1 Electrical supplies 1.2 Structural 1.3 Plumbing 1.4 Welding/pipefitting 1.5 Carpentry 1.6 Masonry
2. Description of Materials and Tools	2.1 Brand name 2.2 Size 2.3 Capacity 2.4 Kind of application
3. Company standard procedures	3.1 Job order 3.2 Requisition slip 3.3 Borrower slip

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Listed materials and tools according to quantity and job requirements 1.2 Requested materials and tools according to the list prepared and as per company SOP 1.3 Inspected issued materials and tools as per quantity and job specifications 1.4 Tools provided with appropriate safety devices
2. Underpinning knowledge	2.1 Types and uses of construction materials and tools 2.2 Different forms 2.3 Requisition procedures
3. Underpinning skills	3.1 Preparing materials and tools 3.2 Proper handling of tools and equipment 3.3 Following instructions
4. Resource implications	The following resources should be provided: 4.1 Workplace location 4.2 Materials relevant to the unit of competency 4.3 Technical plans, drawings and specifications relevant to the activities
5. Methods of assessment	Competency in this unit must be assessed through: 5.1 Direct observation and oral questioning
6. Context of assessment	6.1 Competency may be assessed in the workplace or in a simulated workplace 6.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY:	**OBSERVE PROCEDURES, SPECIFICATIONS AND MANUALS OF INSTRUCTIONS**
UNIT CODE :	**CON311201**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes on identifying, interpreting, applying services to specifications and manuals and storing manuals.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Identify and access specification/manuals	1.1 Appropriate manuals are identified and accessed as per job requirements 1.2 Version and date of manual are checked to ensure that correct specification and procedures are identified
2. Interpret manuals	2.1 Relevant sections, chapters of specifications/ manuals are located in relation to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance with industry practices
3. Apply information in manual	3.1 ***Manual*** is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer's specification 3.3 Manual data are applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications
4. Store manuals	4.1 Manual or specification is stored appropriately to prevent damage, ready access and updating of information when required in accordance with company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Procedures, Specifications and Manuals of Instructions	Kinds of Manuals: 1.1 Manufacturer's Specification Manual 1.2 Repair Manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Identified and accessed specification/manuals as per job requirements 1.2 Interpreted manuals in accordance with industry practices 1.3 Applied information in manuals according to the given task 1.4 Stored manuals in accordance with company requirements
2. Underpinning knowledge	2.1 Types of manuals used in construction sector 2.2 Identification of symbols used in the manuals 2.3 Identification of units of measurements 2.4 Unit conversion
3. Underpinning skills	3.1 Reading and comprehension skills required to identify and interpret construction manuals and specifications 3.2 Accessing information and data
4. Resource implications	The following resources should be provided: 4.1 All manuals/catalogues relative to construction sector
5. Methods of assessment	Competency should be assessed through: 5.1 Direct observation 5.2 Questions/interview Assessment of underpinning knowledge and practical skills may be combined
6. Context of assessment	6.1 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment may be conducted in the workplace or a simulated environment

UNIT OF COMPETENCY:	**PERFORM MENSURATIONS AND CALCULATIONS**
UNIT CODE :	**CON311203**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes on identifying and measuring objects based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized** terms* are elaborated in the Range of Variable
1. Select measuring instruments	1.1 Object or component to be measured is identified, classified and interpreted according to the appropriate regular ***geometric shape*** 1.2 Measuring tools are selected/identified as per object to be measured or job requirements 1.3 Correct specifications are obtained from relevant sources 1.4 Appropriate measuring instruments are selected according to job requirements 1.5 Alternative measuring tools are used without sacrificing cost and quality of work
2. Carry out measurements and calculations	2.1 Accurate **measurements** are obtained according to job requirements 2.2 Alternative measuring tools are used without sacrificing cost and quality of work 2.3 **Calculation** needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x) and division (/) including but not limited to: trigonometric functions, algebraic computations 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool 2.7 Systems of measurement identified and converted according to job requirements/ISO 2.8 Workpieces are measured according to job requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Geometric shape	Including but is not limited to: 1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical
2. Measuring instruments	Including but not limited to: 2.1 Micrometer (In-out, depth) 2.2 Vernier caliper (out, inside) 2.3 Dial gauge with mag, std. 2.4 Straight edge 2.5 Thickness gauge 2.6 Torque gauge 2.7 Small hole gauge 2.8 Telescopic gauge 2.9 Try-square 2.10 Protractor 2.11 Combination gauge 2.12 Steel rule 2.13 Voltmeter 2.14 Ammeter 2.15 Mega-ohmeter 2.16 Kilowatt hour meter 2.17 Gauges 2.18 Thermometers
3. Measurements and calculations	3.1 Linear 3.2 Volume 3.3 Area 3.4 Wattage 3.5 Voltage 3.6 Resistance 3.7 Amperage 3.8 Frequency 3.9 Impedance

VARIABLE	RANGE
	3.10 Conductance 3.11 Capacitance 3.12 Displacement 3.16 Inside diameter 3.17 Circumference 3.18 Length 3.19 Thickness 3.20 Outside diameter 3.21 Taper 3.22 Out of roundness 3.23 Oil clearance 3.24 End play/Thrust clearance

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Selected and prepared appropriate measuring instruments in accordance with job requirements 1.2 Performed measurements and calculations according to job requirements/ ISO
2. Underpinning knowledge	TRADE MATHEMATICS / MENSURATION 2.1 Four fundamental operation 2.2 Linear measurement 2.3 Dimensions 2.4 Unit conversion 2.5 Ratio and proportion 2.6 Trigonometric functions 2.8 Algebraic equations
3. Underpinning skills	3.1 Performing calculation by addition, subtraction, multiplication and division; trigonometric functions and algebraic equations 3.2 Visualizing objects and shapes 3.3 Interpreting formulas for volume, areas, perimeters of plane and geometric figures 3.4 Proper handling of measuring instruments
4. Resource implications	The following resources should be provided: 4.1 Workplace location 4.2 Problems to solve 4.3 Measuring instrument appropriate to carry out tasks 4.4 Instructional materials relevant to the propose activity Assessment of underpinning knowledge and practical skills may be combined
5. Methods of assessment	Competency should be assessed through: 5.1 Actual demonstration 5.2 Direct observation 5.3 Written test/questioning related to underpinning knowledge
6. Context of assessment	6.1 Competency assessment may occur in workplace or any appropriate simulated environment 6.2 Assessment shall be observed while task are being undertaken whether individually or in group 6.3 Competency assessment must be undertaken in accordance with the TESDA assessment guidelines

UNIT OF COMPETENCY:	**MAINTAIN TOOLS AND EQUIPMENT**
UNIT CODE :	**CON311204**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes on checking condition, performing preventive maintenance and storing of tools and equipment based on the required performance standards.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Check condition of tools and equipment	1.1 ***Materials, tools and equipmen***t are identified according to classification and job requirements 1.2 Non-functional tools and equipment are segregated and labeled according to classification 1.3 Safety of tools and equipment are observed in accordance with manufacturer's instructions 1.4 Condition of ***PPE*** are checked in accordance with manufacturer's instructions
2. Perform basic preventive maintenance	2.1 Appropriate lubricants are identified according to types of equipment 2.2 Tools and equipment are lubricated according to preventive maintenance schedule or manufacturer's specifications 2.3 Measuring instruments are checked and calibrated in accordance with manufacturer's instructions 2.4 Tools are cleaned and lubricated according to standard procedures 2.5 Defective instruments, equipment and accessories are inspected and replaced according to manufacturer's specifications 2.6 Tools are inspected, repaired and replaced after use 2.7 Work place is cleaned and kept in safe state in line with OHSA regulations

3. Store tools and equipment	3.1 Inventory of tools, instruments and equipment are conducted and recorded as per company practices 3.2 Tools and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or company procedures

RANGE OF VARIABLES

VARIABLES	RANGE
1. Materials	Including but not limited to: 1.1 Lubricants 1.2 Cleaning materials 1.3 Rust remover 1.4 Rugs 1.5 Spare parts
2. Tools and equipment	Including but not limited to: 2.1 Tools Cutting tools - hacksaw, crosscut saw, rip saw Boring tools - auger, brace, grinlet, hand drill Holding tools - vise grip, C-clamp, bench vise Threading tools - die and stock, taps 2.2 Measuring instruments/equipment
3. PPE	Including but not limited to: 3.1 Goggles 3.2 Gloves 3.3 Safety shoes 3.4 Aprons/Coveralls
4. Forms	4.1 Maintenance schedule forms 4.2 Requisition slip 4.3 Inventory Form 4.4 Inspection Form 4.5 Procedures

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Selected and used appropriate processes, tools and equipment to carry out task 1.2 Identified functional and non-functional tools and equipment 1.3 Checked, lubricated and calibrated tools, equipment and instruments according to manufacturer's specifications 1.4 Replaced defective tools, equipment and their accessories 1.5 Observed and applied safe handling of tools and equipment and safety work practices 1.6 Prepared and submitted inventory report, where applicable 1.7 Maintained workplace in accordance with OHSA regulations 1.8 Stored tools and equipment safely in appropriate locations and in accordance with company practices
2. Underpinning knowledge	2.1 SAFETY PRACTICES 2.1.1 Use of PPE 2.1.2 Handling of tools and equipment 2.1.3 Good housekeeping 2.2 MATERIALS, TOOLS AND EQUIPMENT 2.2.1 Types and uses of lubricants 2.2.2 Types and uses of cleaning materials 2.2.3 Types and uses of measuring instruments and equipment 2.3 PREVENTIVE MAINTENANCE 2.3.1 Methods and techniques 2.3.2 Procedures
3. Underpinning skills	3.1 Preparing maintenance materials, tools and equipment 3.2 Proper handling of tools and equipment 3.3 Performing preventive maintenance 3.4 Following instructions
4. Resource implications	The following resources should be provided: 4.1 Workplace 4.2 Maintenance schedule 4.3 Maintenance materials, tools and equipment relevant to the proposed activity/task
5. Methods of assessment	Competency should be assessed through: 5.1 Direct observation 5.2 Written test/questioning relevant to Underpinning knowledge

6. Context of assessment	6.1 Competency assessment may occur in workplace or any appropriate simulated environment 6.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY:	**INTERPRET TECHNICAL DRAWINGS AND PLANS**
UNIT CODE :	**CON311202**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes on analyzing and interpreting symbols, data and work plan based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Analyze signs, symbols and data	1.1 ***Technical plans*** are obtained according to job requirements 1.2 Signs, symbols and data are identified according to job specifications 1.3 Signs symbols and data are determined according to ***classification*** or as appropriate in ***drawing***
2. Interpret technical drawings and plans	2.1 Necessary ***tools, materials*** and equipment are identified according to the ***plan*** 2.2 Supplies and materials are listed according to specifications 2.3 Components, assemblies or objects are recognized as required 2.4 Dimensions are identified as appropriate to the plan 2.5 Specification details are matched with existing/available resources and in line with job requirements 2.6 Work plan is drawn following the specifications
3. Apply freehand sketching	3.1 Where applicable, correct freehand sketching is produced in accordance with the job requirements

RANGE OF VARIABLES

VARIABLE	**RANGE**
1. Technical plans	Including but not limited to: 1.1 Electrical plans 1.2 Structural plans 1.3 Architectural plans 1.4 Plumbing plans 1.5 Welding Procedures Specifications (WPS)
2. Work plan	2.1 Job requirements 2.2 Installation instructions 2.3 Components instruction
3. Classification	Including but not limited to: 3.1 Electrical 3.2 Mechanical 3.3 Plumbing
4. Drawing	4.1 Drawing symbols 4.2 Alphabet of lines 4.3 Orthographic views - Front view - Right side view/left side view - Top view - Pictorial 4.4 Schematic diagram 4.5 Electrical drawings 4.6 Structural drawings 4.7 Plumbing drawings - Water - Sewerage/Drainage - Ventilation 4.8 Welding symbols
5. Tools and materials	Including but not limited to: 5.1 Compass 5.2 Divider 5.3 Rulers 5.4 Triangles 5.5 Drawing tables 5.6 Computer

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Identified and determined signs, symbols and data according to work plan, job requirements and classifications 1.2 Identified tools and equipment in accordance with job requirements 1.3 Listed supplies and materials according to blueprint specifications 1.4 Drawn workplan following specifications 1.5 Determined job specifications based on working/technical drawing
2. Underpinning knowledge	**2.1 TRADE MATHEMATICS** 2.1.1 Linear measurement 2.1.2 Dimension 2.1.3 Unit conversion 2.2 **BLUEPRINT READING AND PLAN SPECIFICATION** 2.2.1 Electrical, mechanical plan, symbols and abbreviations 2.2.2 Drawing standard symbols **2.3 TRADE THEORY** 2.3.1 Basic technical drawing 2.3.2 Types technical plans 2.3.3 Various types of drawings 2.3.4 Notes and specifications
3. Underpinning skills	3.1 Interpreting drawing/orthographic drawing 3.2 Interpreting technical plans 3.3 Matching specification details with existing resources 3.4 Following instructions 3.5 Handling of drawing instruments
4. Resource implications	The following resources should be provided: 4.1 Workplace 4.2 Drawings and specification relevant to task 4.3 Materials and instrument relevant to proposed activity
5. Methods of assessment	Competency should be assessed through: 5.1 Direct observation 5.2 Questions/interview 5.3 Written test related to underpinning knowledge

6. Context of assessment	6.1 Competency assessment may occur in the workplace or in any appropriate simulated environment 6.2 Assessment shall be observed while task are being undertaken whether individually or in group 6.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

CORE COMPETENCIES

UNIT OF COMPETENCY:	**PERFORM PRE- AND POST OPERATION PROCEDURES FOR CONCRETING AND ASPHALTING EQUIPMENT**
UNIT CODE:	**CON833321**
UNIT DESCRIPTOR:	This unit describes the outcomes required in performing procedures before and after productive operation of concreting and asphalting equipment.

ELEMENT	PERFORMANCE CRITERIA ***Bold and Italicized*** *terms are elaborated in the* *Range of Variables*
1. Perform visual check of equipment	1.1 ***Concreting and asphalting*** equipment is selected based on job ***volume requirements / job specifications***. 1.2 ***Operator serviceable (OS) parts*** are checked in accordance with equipment checklist and manufacturer's procedures. 1.3 ***Walk-around check*** is performed with equipment checklist and with engine stopped/not running.
2. Perform "B L O W A F" check	2.1 ***"BLOWAF" check*** is performed with checklist form and with engine stopped/not running. 2.2 Deficiencies in ***fluid levels*** are identified and if below normal level are refilled/topped up in accordance with equipment maintenance manual. 2.3 Abnormal conditions are noted in checklist and reported to ***authorized person***.

3. Perform operation check	3.1 ***Starting/running check*** is performed with checklist and in accordance with manufacturer's recommendations. 3.2 Normal functions of brake, steering and PTO for Transit Mixer; main hydraulic pump / accumulator for Concrete Pump; and ***controls*** and ***attachments*** are checked based on manufacturer's operation manual 3.3 Normal functions of ***hydraulic implements*** for Concrete Pump are inspected following ***established checking procedure*** and as per manufacturer's operation manual; and ***drum working components*** for Transit Mixer are checked as per manufacturer's operation manual. 3.4 ***Auxiliary units***, if available are checked for normal functions in Concrete Pump. 3.5 ***Hydraulic pump load test*** is performed following recommended procedure for Concrete Pump 3.6 Walk-around check is re-conducted with equipment checklist and with engine running. 3.7 ***Safety devices and equipment*** are checked for proper functions in accordance with safe operating procedures.

4. Perform post-operation procedures	4.1 Equipment is parked on firm and level ground after productive operation in accordance with company rules and regulations. 4.2 Equipment controls are set into neutral position and parking brakes are engaged according to manufacturer's operations manual. 4.3 Pump is set in reverse control to remove pressure on delivery line by pumping the minimum stroke in reverse 4.4 ***Reverse and cleaning procedure*** is performed following recommended / established practices 4.5 Implement ***safety locks*** and brakes are all set/engaged in accordance with operator's manual. 4.6 Walk-around inspection check is re-conducted while doing engine cool down 4.7 Daily equipment time record/report (DETR) is accomplished/submitted according to company rules and regulations

RANGE OF VARIABLES

VARIABLE	RANGE
1. Concreting and Asphalting	1.1 Paver 1.1.1 Asphalt 1.1.2 Concrete 1.2 Transit Mixer 1.3 Concrete Pump 1.3.1 Stationary 1.3.2 Truck mounted with placing boom (mobile)
2. Volume requirements / Job specifications	2.1 Volume requirements 2.1.1 10 cubic meters 2.1.2 8 cubic meters 2.1.3 6 cubic meters 2.1.4 5 cubic meters 2.2 Job specifications 2.2.1 Concrete type 2.2.1.1 Normal 3,000 psi PCD 2.2.1.2 High strength PCD 2.2.1.3 Fast setting PCD 2.2.1.4 Light weight concrete 2.2.1.5 Other concrete recipes

3. Operator-serviceable (OS) parts	3.1 Air cleaner 3.2 Battery terminals/Connection 3.3 Belt 3.4 Grease/lube points <u>Concrete Pump and Transit Mixer</u> 3.5 Hoses 3.6 Tires 3.7 Lights 3.8 Water / fuel separator 3.9 Fluid caps 3.10 Wiper blades 3.11 Mirrors <u>Concrete Pump</u> 3.12 Proximity switch 3.13 Accumulator charging <u>Transit Mixer</u> 3.14 Gate valves <u>Paver</u> 3.15 Tracks 3.16 Sensor 3.17 Conveyor belt 3.18 Tamping belt 3.19 Cross joints 3.20 Cylinders

4. Walk-around check	4.1 Engine off 4.1.1 Leaks 4.1.2 Worn out/damaged parts 4.1.3 Fluid levels 4.1.4 Loose parts/connections <u>Concrete Pump and Transit mixer</u> 4.1.5 Tire condition 4.1.5.1 Crack / thread separation 4.1.5.2 Air pressure 4.1.5.3 Thread wear 4.1.5.4 Imbedded materials 4.1.5.5 Damaged rim <u>Concrete Pump</u> 4.1.6 Pipelines and accessory condition 4.1.6.1 Delivery pipes 4.1.7 Delivery elbows 4.1.8 Clamps 4.1.9 Seals 4.1.10 Tee piece 4.1.11 Welding rings 4.1.12 End flexible hose 4.1.13 Sponge ball (hard and soft) 4.1.14 Catch basket 4.1.15 Reduction set 4.1.16 Shut-off valves 4.1.16.1 Hydraulic 4.1.16.2 Manual shut-off valves 4.1.17 Placing body 4.1.17.1 Pin 4.1.17.2 Hydraulic cylinders 4.1.18 Upper structure (turntable) <u>Transit Mixer</u> 4.1.19 Side mirror 4.1.20 Cab condition / windshield 4.1.21 Wiper bottle / blade 4.1.22 Underchassis component 4.1.23 Drum, roller, spiral fins, roller guide 4.1.24 Discharge chute and lever cylinder <u>Paver</u> 4.1.25 Missing parts

	4.2 Engine on <u>Transit Mixer and Concrete pump</u> 4.2.1 Gauge, alert / warning indicators and controls 4.2.2 Oil and air leaks 4.2.3 Safety devices 4.2.4 Working implement function 4.2.5 Lights and horns <u>Transit Mixer</u> 4.2.6 Water condensation in air tank <u>Concrete Pump</u> 4.2.7 Remote and control function <u>Paver</u> 4.2.8 Unusual sound
5. <u>B L O W A F</u> check	5.1 **B**attery (starting and charging system) 5.2 **L**ight (lighting system) 5.3 **O**il (lubricating system) 5.4 **W**ater (cooling system) 5.5 **F**uel (fuel system) <u>Concrete Pump and Transit mixer</u> 5.6 **A**ir (intake and exhaust system)
6. Fluid levels	6.1 Battery electrolyte (maintenance type) 6.2 Engine oil 6.3 Hydraulic oil 6.4 Coolant 6.5 Fuel <u>Transit Mixer</u> 6.5 Wiper fluid 6.6 Brake fluid 6.7 Steering oil 6.8 Water tank <u>Concrete Pump</u> 6.9 Forming grease 6.10 Water (cleaning and spraying)

7. Authorized person	7.1 Maintenance personnel <u>Transit Mixer and Concrete pump</u> 7.2 Equipment maintenance supervisor <u>Paver</u> 7.3 Maintenance supervisor 7.4 Equipment dispatcher / foreman <u>Concrete Pump</u> 7.5 Ground supervisor

8. Starting/ Running check	May include but not limited to: 8.1 Controls <u>Concrete Pump</u> 8.1.1 Remote control 8.1.2 Pump on and off 8.1.3 Output regulator 8.1.4 engine RPM 8.1.5 Engine switch over 8.1.6 Reverse pump 8.1.7 Cooling fan 8.1.8 Reset switch 8.1.9 Emergency shut off switch 8.1.10 Accumulator valve 8.1.11 Gate valve connection 8.1.12 Agitator control 8.1.13 Manual greasing 8.1.14 Push over valve <u>Transit Mixer</u> 8.1.15 PTO 8.1.16 Steering 8.1.17 Shifting lever 8.1.18 Mixing / discharging lever 8.1.19 Differential lock 8.2 Gauges 8.2.1 Battery charging 8.2.2 Pressure (oil and air) 8.2.3 Temperature (oil and water) <u>Concrete Pump and Transit Mixer</u> 8.2.4 Fuel level <u>Transit Mixer and Paver</u> 8.2.5 Hour meter <u>Concrete Pump</u> 8.2.6 Vacuum pressure <u>Transit Mixer</u> 8.2.7 Tachometer

Continuation	8.3 Indicator <u>Concrete Pump</u> 8.3.1 Hour meter 8.3.2 Stroke count 8.3.3 Reset horn 8.3.4 Proximity lit <u>Transit Mixer</u> 8.3.5 Differential and inter axle lock 8.3.6 PTO 8.3.7 Parking brake 8.3.8 Engine / exhaust brake 8.4 Leaks 8.4.1 Coolant 8.4.2 Fuel <u>Concrete Pump and Transit Mixer</u> 8.4.3 Air 8.4.4 Hydraulic <u>Concrete Pump</u> 8.4.5 Form grease 8.4.6 Water <u>Transit Mixer</u> 8.4.7 Suspension charge 8.4.8 Lubricating 8.4.9 Washer fluid 8.4.10 Exhaust pipes <u>Paver</u> 8.4.11 Fuel 8.4.12 Oil

	8.5 Electrical/ switches 8.5.1 Lights 8.5.2 Horn <u>Concrete Pump and Transit Mixer</u> 8.5.3 Safety devices <u>Concrete Pump</u> 8.6 Grout leaks 8.6.1 Water box 8.6.2 Transfer tube 8.6.3 Agitator paddle shaft bearing 8.6.4 Pressure connection Transit Mixer 8.7 Steering and brakes

9. Controls	<u>Paver</u> 9.1 Steering 9.2 Brake 9.3 Directional (forward and reverse) 9.4 Leveling
10. Attachments	<u>Paver</u> 10.1 Hopper 10.2 Screed 10.3 Conveyor 10.4 Auger 10.5 Tamper 10.6 Electrical / hydraulic vibrator / circuits
11. Hydraulic implements	<u>Concrete Pump</u> 11.1 Accumulator hydraulic pump 11.2 Drive cylinder 11.3 Concrete cylinder 11.4 Plunger cylinder 11.5 Transfer tube /sliding valve / s-valve / c-trunk / rock valve 11.6 Agitator motor
12. Established checking procedure	<u>Concrete Pump</u> 12.1 Set delivery piston in action by closing the output regulator (if available) and increase the speed of the drive engine 12.2 Check transfer tube timing on different engine speeds at different output regulations 12.3 Check pistons timing on different engine speeds at different output regulations 12.4 Check stroke time for 10 strokes and compare value in the machine card
13. Auxiliary units	<u>Concrete Pump</u> 13.1 Flushing water pump 13.2 Air compressor
14. Hydraulic load pump test	<u>Concrete Pump</u> 14.1 Blocking test 14.2 Water test

15. Safety devices and equipment	<u>Transit Mixer and Paver</u> 15.1 Seat belt 15.2 Fire extinguisher 15.3 Blinkers and beacon lights <u>Concrete Pump</u> 15.4 Shut off valve 15.5 Proximity switch 15.6 Agitator shut off switch 15.7 Accumulator pressure relief valve 15.8 Overload indicator <u>Transit Mixer</u> 15.9 Emergency brake 15.10 Anti lock brake system 15.11 Wheel choke 15.12 Early warning device (EWD) <u>Paver</u> 15.13 Back-up alarm 15.14 Parking brake 15.15 Railing light 15.16 Neutral lock switch 15.17 Battery disconnect switch
16. Reverse and cleaning procedure	<u>Concrete Pump</u> 16.1 Open hopper flap to let out rest of concrete 16.2 By use of water jet (min. 25 bar) clean delivery cylinder, hopper, agitator and all parts of the machine which are in contact with the medium 16.3 Fill agitator with water and push two or three sponge ball and switch forward pumping 16.4 Discharge grout in the proper discharge point (crane bucket) or back to transit mixer 16.5 Open hopper flap to remove remaining concrete and discharge it to the proper grout pan 16.6 Fully empty the hopper and water box
17. Safety locks	17.1 Hopper lock 17.2 Control lever 17.3 Engine gull wing lock 17.4 Implement lock switch

EVIDENCE GUIDE

1. Critical aspects of evidence to be considered	Assessment requires evidence that the candidate: 1.1 Demonstrates ability to select concreting and asphalting equipment based on the job requirements / specifications 1.2 Demonstrates ability to check operator-serviceable (OS) parts 1.3 Demonstrates ability to perform walk-around and "BLOWAF" inspection following equipment checklist and with engine stopped/not running. 1.4 Demonstrates ability to perform walk-around check while engine is running. 1.5 Demonstrates ability to observe risk-control/safe procedures 1.6 Demonstrates ability to perform post-operation checking procedures 1.7 Demonstrates ability to accomplish and submit daily equipment time record/report (DETR) 1.8 Demonstrates ability to perform hydraulic pump load test for Concrete Pump
2. Underpinning (related) knowledge and attitude	2.1 Types and uses of personal protective equipment (PPE) 2.2 Controls, instruments, indicators, gauges, safety devices, hydraulic implements and their uses and functions 2.3 Start-up and shutdown procedures 2.4 Familiarity with manufacturer's operation and basic maintenance manual 2.5 Familiarity with pre- and post-operation checking procedure 2.6 Positive work values (cost, time, quality conscious, etc.)
3. Underpinning skills	3.1 Performing pre- and post-operation checking procedures of equipment 3.2 Using personal protective equipment 3.3 Maintaining equipment records 3.4 Communicating with work site personnel and clients 3.5 Complying with the manufacturer's operation manual 3.6 Performing start-up and shut down procedure
4. Resource implications	Things necessary for the conduct of assessment include 4.1 Appropriate work area for concreting and asphalting equipment 4.2 Access to concreting and asphalting equipment and corresponding manuals. 4.3 PPE

5. Method of assessment	Competency in this unit must be assessed through 5.1 Written/oral questioning 5.2 Observation of practical demonstration 5.3 Work record and documents
6. Context for assessment	6.1 Competency shall be assessed in a normal or a simulated work place environment and in accordance with safe work procedures. 6.2 Competency shall be assessed while work is being undertaken independently.

UNIT OF COMPETENCY:	**PERFORM BASIC PREVENTIVE MAINTENANCE SERVICING FOR CONCRETING AND ASPHALTING EQUIPMENT**
UNIT CODE:	**CON833322**
UNIT DESCRIPTOR:	This unit describes the outcomes required in the routine preventive maintenance for concreting asphalting equipment.

ELEMENT	PERFORMANCE CRITERIA ***Bold and Italicized*** *terms are elaborated in the* *Range of Variables*
1. Perform adjustments/ replacements	1.1 ***Minor defects*** are identified and remedied in accordance with company/manufacturer's procedures. 1.2 Tools are selected based on job requirements. 1.3 ***Major defects*** are identified with checklist and referred to ***appropriate personnel.***
2. Perform basic preventive maintenance servicing (PMS)	2.1 ***OS parts***/***standards*** are identified and serviced according to manufacturer's recommendations. 2.2 ***Fluids and lubricants*** are used based on manufacturer's manual. 2.3 ***Basic hand tools and equipment*** are identified and used in accordance with site requirements. 2.4 ***Basic preventive maintenance servicing (PMS)*** is carried out in accordance with manufacturer's and/or ***site conditions/requirements***.
3. Prepare equipment reports	3.1 Daily checklist form is properly accomplished in accordance with manufacturer's/company requirements. 3.2 Minor/major equipment defects are reported to concerned personnel.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Minor defects	May include but not limited to: 1.1 Clogged air cleaner 1.2 Loose clamps, bolts and mountings 1.3 Weak battery <u>Concrete Pump and Transit Mixer</u> 1.4 Defective filler caps (radiator, fuel, hydraulic) 1.5 Presence of water in the fuel separator 1.6 Incorrect tire inflation / worn-out / flat tires 1.7 Loose belts <u>Paver</u> 1.8 Incorrect track tension 1.9 Misaligned conveyor belt 1.10 Stuck-up rollers 1.11 Busted bulbs

2. Major defects	May include but not limited to: 2.1 Excessive engine oil / fuel / water / fluid <u>Concrete Pump and Transit Mixer</u> 2.2 Poor engine performance (low power, hard starting) 2.3 Poor working hydraulic implement <u>Transit Mixer and Paver</u> 2.4 Defective electrical system 2.4.1 Charging 2.4.2 Lighting 2.4.3 Starting 2.4.4 Monitoring / gauges 2.5 Leakage on 2.5.1 Air 2.5.2 Fuel 2.5.3 Cooling 2.5.4 Hydraulic system 2.5.5 Gas <u>Transit Mixer</u> 2.6 Weak / defective brakes <u>Paver</u> 2.7 Busted hydraulic hose 2.8 Worn-out track group
3. Appropriate personnel	May include but not limited to: 3.1 Operation equipment maintenance supervisor 3.2 Maintenance Personnel <u>Paver</u> 3.3 Equipment Foreman

4. Operator-Serviceable (OS) parts	4.1 Filters 4.1.1 Air cleaner 4.1.2 Water fuel separator 4.2 All caps (oil, water, fluid and fuel) <u>Transit Mixer and Concrete Pump</u> 4.3 Battery distilled water, clamps and holders 4.4 Tire inflation <u>Concrete Pump and Paver</u> 4.5 Belts <u>Paver</u> 4.6 Battery terminal / connection 4.7 Track tension 4.8 Grease / lube points 4.9 Cylinders 4.10 Electrical and electronic components 4.10.1 Sensors 4.10.2 Switches, relays 4.10.3 Fuses

5. Fluid and Lubricants	May include but not limited to: 5.1 Engine oil 5.2 Hydraulic oil 5.3 Battery distilled water 5.4 Coolant <u>Concrete Pump and Transit Mixer</u> 5.5 Cleaning solutions 5.6 Water <u>Transit Mixer and Paver</u> 5.7 Multi-purpose grease <u>Concrete Pump</u> 5.8 Forming grease <u>Transit Mixer</u> 5.9 Washer fluids 5.10 Brake fluid oil 5.11 Steering oil 5.12 Gear oil 5.13 Automatic Transmission Fluid

6. Basic hand tools and equipment	6.1 Hand tools 6.1.1 Wrenches 6.1.2 Mechanical pliers 6.1.3 Screw driver (Philips and flat) 6.1.4 Hammer 6.1.5 Vice grip <u>Concrete Pump and Transit Mixer</u> 6.1.6 Tire gauge (instrument) 6.1.7 Steel brush 6.1.8 Pry bar 6.1.9 Electrical tape 6.1.10 Spatula <u>Concrete Pump</u> 6.1.11 Blunt chisel <u>Transit Mixer</u> 6.1.12 Paint brush <u>Paver</u> 6.1.13 Grease gun 6.1.14 Multi-scale kit 6.2 Equipment 6.2.1 High pressure washer 6.2.2 Air compressor <u>Concrete Pump and Transit Mixer</u> 6.2.3 Hydroblast 6.2.4 Grease gun 6.2.5 Hydraulic jack 6.2.6 Lube pump 6.2.7 Trouble light

7. Basic preventive maintenance servicing (PMS)	May include but not limited to: 7.1 Check / tighten battery clamps / holders 7.2 Adjust belt tension 7.3 Grease lubricating points 7.4 Clean filters <u>Concrete Pump, Paver and Transit Mixer</u> 7.4.1 Fuel water separator <u>Concrete Pump and Transit Mixer</u> 7.4.2 Air filter <u>Concrete Pump</u> 7.4.3 Vacuum filter 7.4.4 High pressure filter <u>Paver</u> 7.4.5 Vacuator valve <u>Concrete Pump and Transit Mixer</u> 7.5 Check / replace minor defective parts (external) 7.6 tire inflation pressure 7.7 Check BLOWAF <u>Transit Mixer</u> 7.8 Clean internal / external walls 7.8.1 Drum 7.8.2 Chute 7.8.3 Chassis 7.8.4 Hopper <u>Paver</u> 7.9 Adjust track tension 7.10 Replace defective fluid caps 7.11 Loose bolts and nuts

8. Site conditions/ requirements	8.1 Instructions 8.2 Signages 8.3 Work schedules 8.4 Work bulletin boards <u>Concrete Pump and Transit Mixer</u> 8.5 Vicinity / rerouting chart 8.6 Environmental / site conditions 8.6.1 Dusty 8.6.2 Toxic / hazardous fluids 8.6.3 Rainy / windy 8.6.4 Muddy / slippery ground 8.6.5 Site obstruction <u>Paver</u> 8.7 Chart 8.8 Memo

EVIDENCE GUIDE

1. Critical aspects of evidence to be considered	Assessment requires evidence that the candidate: 1.1 Demonstrates ability to identify minor defects using checklist and service them following company standard operating procedures 1.2 Demonstrates ability to identify major defects using check list and report them to appropriate personnel 1.3 Demonstrates ability to identify OS parts/standards from manufacturer's reference books/manuals 1.4 Demonstrates knowledge of recommended fluids and lubricants 1.5 Demonstrates ability to use basic hand tools and equipment 1.6 Demonstrates ability to accomplish and submit preventive maintenance checklist report in accordance with company procedures 1.7 Demonstrates ability to observe safe work practices
2. Underpinning (related) knowledge and attitude	2.1 Knowledge of equipment minor and major defects 2.2 Service procedures for minor defects 2.3 Types and uses of basic hand tools and equipment 2.4 Knowledge of OS parts 2.5 Knowledge of fluids and lubricants 2.6 Familiarity with maintenance procedures / checklist form 2.7 Types and uses of PPE 2.8 Understand operation and maintenance manual 2.9 Positive work values
3. Underpinning skills	3.1 Identifying minor and major defects 3.2 Performing servicing procedures for minor defects 3.3 Using basic hand tools and equipment 3.4 Identifying and servicing OS parts 3.5 Using personal protective equipment (PPE) 3.6 Using fluids and lubricants 3.7 Using PPE 3.8 Following operation and maintenance manual 3.9 Accomplishing preventive maintenance checklist

4. Resource implications	Things necessary for the conduct of assessment 4.1 Access to concreting and asphalting equipment and the corresponding manual 4.2 Basic hand tools and equipment 4.3 Fluids and lubricants 4.4 PPE 4.5 Safety signages/barricades
5. Method of assessment	Competency in this unit must be assessed through 5.1 Written and/or oral questioning 5.2 Observation of practical demonstration 5.3 Work record and documents
6. Context for assessment	6.1 Competency shall be assessed in a normal or simulated workplace environment and in accordance with safe work procedures 6.2 Competency shall be assessed while work is being undertaken independently

UNIT TITLE:	**PERFORM PRODUCTIVE OPERATION FOR CONCRETE PUMP**
UNIT CODE:	**CON833324**
UNIT DESCRIPTOR:	This unit deals with the knowledge, skills and attitude required for performing productive operation for concrete pump. It covers the skills required to set pumping station, check laid pipes, and perform pumping operation.

ELEMENT	PERFORMANCE CRITERIA ***Bold and Italicized*** *terms are elaborated in the* *Range of Variables*
1. Set pumping station and check pipes laid	1.1 ***Safe work practices*** are observed in accordance with company and government rules and regulations. 1.2 Concrete pump is positioned in good and stable ground bearing area accessible by transit mixer discharge chute. 1.3 Outriggers are secured with pins in accordance with manufacturer's recommendations. 1.4 Pipes are laid / positioned for effective bends with respect to job specifications 1.5 Communication is established and maintained with pumping crew using ***acoustic signals***. 1.6 Pipes installed are checked in accordance with ***established procedures***.
2. Perform pumping operation	2.1 Communication is established and maintained with the transit mixer operator. 2.2 ***Pumping procedure*** is performed following safe work practices. 2.3 ***Blockage*** during pumping operation is detected, identified, removed and / or prevented, if necessary. 2.4 ***Unexpected situations*** are responded to in line with company rules and regulations.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Safe work practices	1.1 Wear proper PPE 1.2 Observed 3-point contact for embarking on equipment 1.3 Observed proper housekeeping
2. Acoustic signals	2.1 Horn 2.2 Radio 2.3 Light signal
3. Established procedure	3.1 Securing the machine by blocks / anchors 3.2 Sufficient illuminations are provided for night operation. 3.3 Enough space is provided around the machine for service and emergency repair work. 3.4 Selected pipelines are suited for concrete pump's output. 3.5 Pipes used are consistent with pump manufacturer specifications. 3.6 Delivery lines should be placed on supports thoroughly bolted down and installed free from strain, tight and easily accessible. 3.7 For delivery pipes of the stationary concrete pump and that will remain for a longer period in its position, the use of wooden prismatic wedges will be required. 3.8 For stationary concrete pump delivery lines, u-bolts are used on fixing point at intervals of 3 meters maximum. 3.9 The delivery line should be accessible at any point. 3.10 For stationary concrete pump delivery lines, vertical lines should have new pipes and anchored with u-bolts into walls, shafts, and tower cranes.
4. Pumping procedure	4.1 Pour several bucket of grout mix into the hopper. 4.2 Insert two sponge balls for the grout mix to moisten the pipeline completely. 4.3 Pump slowly until full flow of grout mix comes out of the end hose. 4.4 Ensure the concrete mix is uniform. 4.5 Do not allow hopper to remain empty in case the next transit mixer is delayed. Maintain concrete mix in the hopper ¾ filled and stop pumping. Keep the agitator running so as to avoid concrete setting. 4.6 In case of delay in the delivery of concrete mix, perform short reverse operation.

5. Blockage	5.1 Grout too lean 5.2 Not enough grout used 5.3 Leaky transfer tube, pipelines and rubber sealing 5.4 Remains of concrete in transfer tube and pipelines installed 5.5 Unfavorable mix design and non-pumpable design
6. Unexpected situations	May include but are not limited to: 6.1 Sudden engine breakdown 6.2 Sudden main hydraulic pump breakdown 6.3 Busted hydraulic hose and oil leakages 6.4 Pipeline explosion 6.5 Collapse of ground foundation 6.6 Force majeure e.g., earthquake, fire, tornado 6.7 Sudden busted tires 6.8 Accidents

EVIDENCE GUIDE

1. Critical aspects of evidence	Assessment must confirm evidence that the candidate: 1.1 Demonstrates ability to comply with company and government rules and regulations. 1.2 Demonstrates ability to operate concrete pump in accordance with the established procedures. 1.3 Demonstrates ability to carry out safe work practices. 1.4 Demonstrates knowledge of functions of instrument panel gauges, controls, indicators and hydraulic implements. 1.5 Demonstrates ability to determine and observe setting-up of pumping station for concrete pump. 1.6 Demonstrates ability to observe safe and efficient concrete pumping based on job requirement. 1.7 Demonstrates familiarity with the characteristics of design mixes of ready mixed concrete. 1.8 Demonstrates ability to communicate. 1.9 Demonstrates ability to prevent, detect and / or remove blockage during pumping operation.
2. Underpinning knowledge, attitudes	2.1 Familiarity with company and government rules and regulations 2.2 Familiarity with the concrete pump operating procedures and its operating conditions 2.3 Safe work procedures and practices 2.4 Concrete pump functions of instrument panel gauges, controls, indicators, and hydraulic implements and their usage. 2.5 Understand concrete pump operations and maintenance. 2.6 Follow set-up procedure for pumping station 2.7 Positive work values (time and cost conscious, etc.) 2.8 Knowledge of properties of pumpable concrete 2.9 Reverse pumping procedure 2.10 Familiarity with the reaction of concrete pump when there is blockage 2.11 Basic knowledge of laying and dismantling of pipelines and accessories. 2.12 Basic driving rules and regulations

3. Underpinning skills	3.1 Following company and government rules and regulations 3.2 Performing concrete pump operating procedures and interpreting its operating conditions and performance. 3.3 Following safe work procedures and practices. 3.4 Understanding/using concrete pump functions of instrument panel gauges, controls, indicators, and hydraulic implements. 3.5 Understanding/using concrete pump operations and maintenance manual. 3.6 Following set-up procedure for pumping station 3.7 Performing reverse pumping procedure 3.8 Determining and removing/preventing blockage 3.9 Basic knowledge of laying and dismantling of pipelines and accessories. 3.10 Determining type and load capacity of concrete pump 3.11 Determining characteristics of properties of pumpable concrete 3.12 Driving techniques
4. Resource implications	Things necessary for the conduct of assessment 4.1 Access to stationary concrete pump and work site 4.2 Operation and maintenance manual 4.3 PPE 4.4 Ready mixed concrete 4.5 Transit mixer
5. Method of assessment	Competency in this unit must be assessed through 5.1 Written/Oral questioning 5.2 Observation/ practical demonstration 5.3 Third Party report 5.3 Work record and documents
6. Context for assessment	6.1 Assessment maybe conducted in the normal work site venue. 6.2 Competency shall be assessed while work is being undertaken in a team environment.

SECTION 3TRAINING STANDARDS

These guidelines are set to provide the Technical and Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for **HEAVY EQUIPMENT OPERATION (CONCRETE PUMP) NC II**.

3.1 CURRICULUM DESIGN

Course Title: HEAVY EQUIPMENT OPERATION - CONCRETE PUMP
NC Level: NC II

BASIC COMPETENCIES
Nominal Training Hours: 18 Hours (Basic) + 24 Hours (Common)
Course Description:

This course is designed to equip individual with the basic, common and core competencies in Construction Sector particularly in Heavy Equipment Operation.

To obtain this, all units prescribed for this qualification must be achieved:

BASIC COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Participate in workplace communication	1.1 Obtain and convey workplace information 1.2 Complete relevant work related documents 1.3 Participate in workplace meeting and discussion	Group discussion Interaction	• Demonstration • Observation • Interviews/ questioning
2. Work in a team environment	2.1 Describe and identify team role and responsibility in a team 2.2 Describe work as a team member	Discussion Interaction	• Demonstration • Observation • Interviews/ questioning

3. Practice career professionalism	3.1 Integrate personal objectives with organizational goals 3.2 Set and meet work priorities 3.3 Maintain professional growth and development	Discussion Interaction	• Demonstration • Observation • Interviews/ questioning
4. Practice occupational health and safety	4.1 Evaluate hazard and risks 4.2 Control hazards and risks 4.3 Maintain occupational health and safety awareness	Discussion Plant tour Symposium	• Observation • Interview

COMMON COMPETENCIES

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Interpret technical drawings and plans	1.1 Read / Interpret blueprints and plans 1.2 Perform freehand sketching	Lecture Demonstration Practical exercises	Demonstration and oral questioning Written test
2. Observe procedures, specifications and manuals of instructions.	2.1 Identify and access specifications / technical manuals 2.2 Interpret technical manuals 2.3 Apply information in technical manual 2.4 Store technical manual	Lecture Demonstration Practical exercises	Demonstration and oral questioning Written test
3. Perform mensurations and calculations	3.1 Select measuring instruments 3.2 Carryout measurement and calculations	Lecture Demonstration Practical exercises	Demonstration and oral questioning Written test
4. Maintain tools and equipment	4.1 Check condition of tools and equipment 4.2 Perform preventive maintenance 4.3 Store tools and equipment	Lecture Demonstration Practical exercises	Demonstration and oral questioning Written test
5. Prepare construction materials and tools	5.1 Identify Materials 5.2 Request Materials 5.3 Receive and inspect materials	Audio Visual Simulation Discussion Practical Exercise Demonstration	Direct observation Questions or interview Portfolio (credentials) Written / Oral Test Demonstration

CORE COMPETENCIES

Course Title : HEAVY EQUIPMENT OPERATION Level: NC II
CONCRETE PUMP

Nominal Training Hours: 80 Hours

Course Description:

This course is designed to enhance the knowledge, desirable attitudes and skills in the use of concrete pump in accordance with industry standards. It covers core competencies such as: perform pre- and post operation procedure, perform equipment operation, perform basic preventive maintenance on a given concrete pump.

To obtain this, all units prescribed for this qualification must be achieved:

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Perform pre- and post-operation procedures for Concrete Pump	1.1 Identify and explain the functions of controls, gauges, instruments, safety devices and hydraulic implements 1.2 Explain the importance of and elaborate on equipment cleaning and checking procedures 1.3 Perform checking, testing and cleaning procedures	Lecture Practical Demonstration	• Observation • Demonstration with oral questioning • Written test

2. Perform productive operation for Concrete Pump	2.1 Identify and explain the importance of safe work practices 2.2 Identify and explain procedures for checking pipes laid and pumping 2.3 Set pumping station 2.4 Perform checking of pipes laid procedures 2.5 Perform pumping procedure 2.6 Identify and explain the effects of blockage 2.7 Identify and explain possible unexpected situations during productive operation	Lecture Practical demonstration	• Observation • Demonstration with oral questioning • Written test
3. Perform basic preventive maintenance servicing for Concrete Pump	3.1 Differentiate between minor and major equipment defects 3.2 Identify and explain the use of basic hand tools and consumables 3.3 Use basic hand tools in servicing minor defects and OS parts 3.4 Prepare equipment report 3.5 Perform good housekeeping	Lecture Practical demonstration	• Observation • Demonstration with oral questioning • Written test

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.

- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3 TRAINEE ENTRY REQUIREMENTS

This section specifies the qualifications of trainees and educational experience. Other requirements like health and physical requirements are also stated.

- Can communicate both oral and written (English or Tagalog)
- Physically and mentally fit
- Can perform basic mathematical computation.

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS

Recommended list of tools, equipment and materials for the training of 25 trainees for the operation of concrete pump.

TOOLS		EQUIPMENT		MATERIALS	
QTY		**QTY**		**QTY**	
2 sets	• Standard mechanical hand tools	2 pcs	• Two-way radio	3 units	• Sponge ball (soft)
25 pcs.	• Hard hat	1 unit	• Concrete Pump	3 units	• Sponge ball (hard)
25 pcs.	• Ear guards				• Ready mixed concrete*
25 pairs	• Safety shoes			500 liters	• Water
2 pcs.	• Plier			18 liters	• Engine oil
1 unit	• Fire extinguisher			800 liters	• Diesel fuel
25 pcs.	• Eye goggles			50 liters	• Hydraulic oil
25 pcs.	• Cover alls			10 kilos	• Forming grease
25 pcs.	• Eye goggles			3 pcs.	• Suction filter
1 set	• Pressure gauge			2 pcs.	• Air filter
5 pcs.	• Hammer			25 kilos	• Waste rags
5 pcs.	• Blunt chisel				

*__Quantity will depend on actual training consumption__

3.5 TRAINING FACILITIES

The concrete pump operation workshop must be of concrete structure. Based on class size of 25 students/trainees the space requirements for the teaching/learning and circulation areas are as follows:

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	QTY	TOTAL AREA IN SQ. METERS
• Lecture area	8.0 x 6.0 meters	48M^2	1	48M^2
• Learning resource area	4.0 x 6.0 meters	24M^2	1	24M^2
• Tool room / Storage area	3.0 x 3.0 meters	9M^2	1	9M^2
• Wash, toilet and locker room	8.0 x 4.0 meters	32M^2	1	32M^2
TOTAL	-	-		113M^2
Facilities / Equipment / Circulation*	-			**1,000M^2**
TOTAL AREA				**1,113M^2**

Area requirement is equivalent to 30 percent of total teaching / learning areas
***Equipment maneuvering area near concrete pump location and concrete pump (MOA)**

3.6 TRAINERS' QUALIFICATION
HEAVY EQUIPMENT OPERATION (CONCRETE PUMP)

TRAINER QUALIFICATION (TQ II)

- Must be a holder of **Heavy Equipment Operation (Concrete Pump) NC II**
- Must have undergone training on Training Methodology III (TM III) or its equivalent
- Must be physically and mentally fit
- Must have at least 5 years job/industry experience*
- Must be a civil service eligible (for government position only)

*Optional. Only when required by the hiring institution.

Reference: TESDA Board Resolution No. 2004 03

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of **HEAVY EQUIPMENT OPERATION (Concrete Pump) NC II**, the candidate must demonstrate competence in all the units of competency in Section 1. The successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 The qualification of **HEAVY EQUIPMENT OPERATION (Concrete Pump) NC II** maybe attained through demonstration of competence in a project-type assessment covering the following core units.

4.3.1 CONCRETE PUMP OPERATION

- Perform pre-and post operation for Asphalting and Concreting equipment
- Perform productive operation for Concrete Pump
- Perform basic preventive maintenance servicing for Concreting and Asphalting equipment

4.3 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

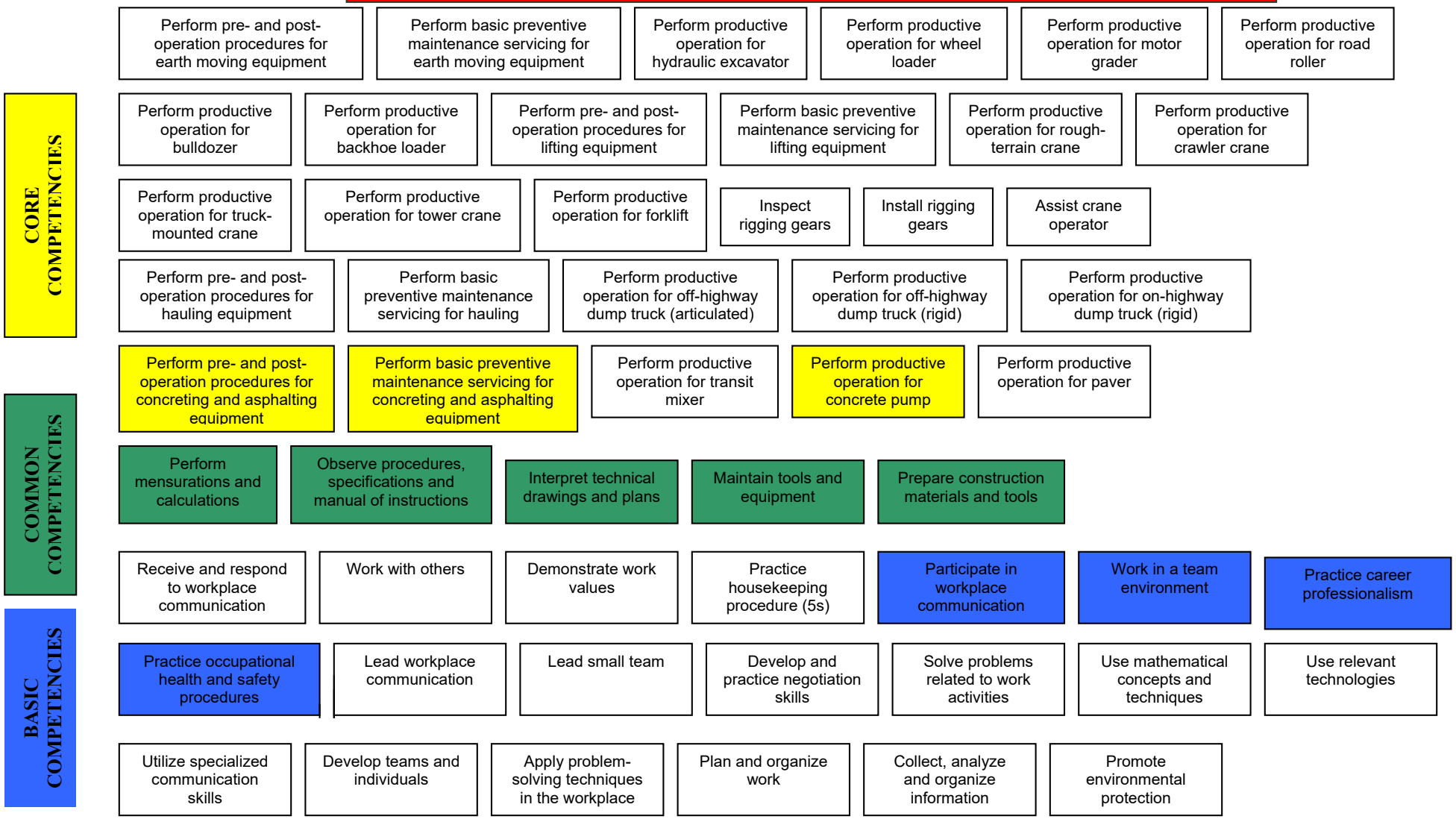
4.4 The following are qualified to apply for assessment and certification:

4.4.1 Graduates of formal, non-formal and/or informal training including enterprise-based training programs

4.4.2 Experienced Workers (wage-employed or self-employed)

The guidelines on assessment and certification are discussed in detail in the "Procedures Manual on Assessment and Certification" and "guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTQCS)."

COMPETENCY MAP
CONSTRUCTION-HEAVY EQUIPMENT OPERATION - SUB- SECTOR



Definition of Terms

For the purpose of this Competency Standard, the words

Concrete pump	Refers to equipment used to pump ready mixed concrete.
Pumpable concrete design (PCD)	Refers to flowability of concrete measured in centimeters.
Blocking test	It refers to performance testing for hydraulic pump.
Water test	It refers to performance testing for hydraulic pump, including all implements using water as medium.

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