TRAINING REGULATIONS

Structural Erection NC II

CONSTRUCTION SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

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STRUCTURAL ERECTION NC II

TRAINING REGULATIONS FOR STRUCTURAL ERECTION NC II

SECTION 1 STRUCTURAL ERECTION NC II QUALIFICATION

The **Structural Erection NC II** Qualification consists of competencies that a person must achieve to enable him to position and fit-up structural framework in any construction sites.

This Qualification is packaged from the competency map of Construction 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
	Units of Competency
CON713344	Position structural member
CON713345	Fit-up structural member
CON713346	Perform tack welding

CODE NO.	ELECTIVE COMPETENCIES
	Units of Competency
CON713346	Lay-out structural member
CON713347	Build low spot or remove high spot

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

- Structural Steel Erector

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the competency standards required for **STRUCTURAL ERECTION NC II**. These are categorized into basic, common and core units of competency.

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 ***Bold and 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 matters 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 Demonstrates ability to prepare written communication following standard format of the organization 1.2 Demonstrates ability to access 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 5.3 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 ***Bold and 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 teamwork 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 judgment 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 Demonstrates ability to operate in a team to complete workplace activity 1.2 Demonstrates ability to work effectively with others 1.3 Demonstrates ability to convey information in written or oral form 1.4 Demonstrates ability to select and use appropriate workplace language 1.5 Demonstrates ability to follow designated work plan for the job 1.6 Demonstrates ability to report 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 ***Bold and 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 ~~is~~ 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 ***Training and career opportunities*** are identified and availed of based on job requirements 3.2 ***Recognition*** is 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. Training 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. Recognition	4.1 Recommendations 4.2 Citations 4.3 Certificate of Appreciation 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 Demonstrates ability to attain job targets within key result areas (KRAs) 1.2 Demonstrates ability to maintain intra - and interpersonal relationship in the course of managing oneself based on performance evaluation 1.3 Demonstrates ability to complete training and career opportunities which are based on the requirements of the industries 1.4 Demonstrates ability to acquire and maintain 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 2.5 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 ***Bold and 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 training*** 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 1.8 Hot work permit 1.9 Confined space entry permit
2. Hazards/Risks	May include but are not limited to: 2.1 Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation, ventillation, falling objects 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 4.9 Full body safety harness

VARIABLE	RANGE
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 Demonstrates ability to explain clearly established workplace safety and hazard control practices and procedures 1.2 Demonstrates ability to identify hazards/risks in the workplace and its corresponding indicators in accordance with company procedures 1.3 Demonstrates ability to recognize contingency measures during workplace accidents, fire and other emergencies 1.4 Demonstrates ability to identify terms of maximum tolerable limits based on threshold limit value- TLV 1.5 Demonstrates ability to follow 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 ***Bold and 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	May include but not limited to: 1.1 Electrical supplies 1.2 Structural steel 1.2.1 Building framing 1.2.2 Stair tower 1.2.3 Bridge crane support 1.2.4 Pipe racks 1.3 Embedded items 1.3.1 Cast-in place anchor bolts 1.3.2 Steel plates, frames and curb angles 1.3.3 Steel sleeve for piping, conduit or anchor bolt penetrations 1.3.4 Embedded piping 1.3.5 Electrical raceway commodities 1.4 Plumbing 1.5 Welding/pipefitting 1.6 Carpentry 1.7 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 ***Bold and italicized*** terms are elaborated in the Range of Variables
1. IIdentify 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:	**INTERPRET TECHNICAL DRAWINGS AND PLANS**
UNIT CODE :	**CON311202**
UNIT DESCRIPTOR :	This unit covers the knowledge, skills and attitudes in analyzing and interpreting symbols, data and work plan based on the required performance standards.

ELEMENTS	PERFORMANCE CRITERIA ***Bold and 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

VARIABLES	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) 1.6 Steel erection plans 1.6.1 Sequence, priority 1.6.2 Bolted versus welded connections 1.6.3 Method of bolting 1.6.4 Bolt tightening requirement 1.6.5 Modularization requirement 1.6.6 Shop and site pre-assembly requirements 1.6.7 Shop applied fireproofing 1.6.8 Hold-out steel requirements 1.6.9 Rigging attachment holes in column web to support steel erection 1.6.10 Heavy lift rigging methods 1.6.11 Equipment access to work site 1.6.12 Steel erection equipment 1.6.13 Handling of structural material 1.6.14 Lay down and pre-assembly areas 1.6.15 Temporary braces and guys 1.6.16 Scaffolding and stairways access 1.6.17 Tripping hazards 1.6.18 Fall protection 1.6.19 Tools required 1.6.20 Work permit required 1.6.21 Inspection and testing 1.6.21.1 Material damage 1.6.21.2 Material distortions 1.6.21.3 Improper fit and alignment 1.6.21.4 Unauthorized alteration 1.6.21.5 Improper installation methods 1.6.21.6 Inadequate walking clearance 1.6.21.7 Incorrect bolting material 1.6.21.8 Improper torquing method 1.6.21.9 Inadequate thread protection 1.6.21.10 Defective welds 1.6.21.11 Unqualified welders 1.6.22 Coating repair and touch-up

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 4.4 Front view 4.5 Right side view/left side view 4.6 Top view 4.7 Pictorial 4.8 Schematic diagram 4.9 Electrical drawings 4.10 Structural drawings 4.11 Plumbing drawings 4.12 Water 4.13 Sewerage/Drainage 4.14 Ventilation 4.15 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 work plan following specifications 1.5 Demonstrated ability to determine 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

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 ***Bold and 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 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 ***Bold and 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

CORE COMPETENCIES

UNIT OF COMPETENCY: **POSITION STRUCTURAL MEMBERS**
UNIT CODE : **CON713344**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to perform position procedure for structural members

ELEMENT	PERFORMANCE CRITERIA ***Bold and italized*** terms are elaborated in the Range of Variable
1. Plan and prepare for work	1.1 Work instruction is secured according to standard operating procedures 1.2 Work instruction is interpreted according to job specifications 1.3 ***Occupational health and safety standards*** and ***regulatory requirements*** are identified according to job requirements 1.4 ***Personal protective equipment*** is identified and selected in line with job requirements 1.5 ***Guiding methods*** are identified in line with job requirements. 1.6 Basic ***hand tools and materials*** are identified in line with job requirements
2. Prepare hand tools	2.1 Occupational health and safety standards are complied with. 2.2 PPE is used in line with job requirements. 2.3 Basic hand tools and materials are selected and prepared in line with job requirements.
3. Move hoisted structural members into designated location	3.1 Relevant occupational health and safety standards are complied with. 3.2 ***Positioning procedure*** for ***structural members*** is performed in line with job requirements 3.3 ***Alignment procedure*** for hoisted structural member is performed following job requirements 3.4 Installation of ***supports*** procedure is performed according to work plan 3.5 ***Initial connecting procedure*** for fit-up is performed for structural members according to job specification

RANGE OF VARIABLES

VARIABLE	RANGE
1. Occupational health and safety standards	May include but not limited to: 1.1 Working at heights 1.2 Ergonomics
2. Regulatory requirements	2.1 Cold work permit 2.2 Hot work permit
3. PPE	May include but not limited to: 3.1 Full body harness 3.2 Safety helmet 3.3 Safety gloves 3.4 Safety shoes 3.5 Safety goggles 3.6 Ear plugs
4. Guiding methods	4.1 Hand signal 4.2 Using ropes 4.3 Handset radio
5. Hand tools and materials	May include but not limited to: 5.1 Pry bar 5.2 Sledgehammer 5.3 Adjustable wrench or ratchet 5.4 Cold chisel 5.5 Hydraulic jack 5.6 Turnbuckle 5.7 Metal marker 5.8 Soft stone 5.9 Rope 5.10 Chain block
6. Positioning procedure	6.1 Mechanical raising or hoisting 6.2 Manual raising or hoisting 6.3 Placing

7. Alignment procedure	May include but not limited to: 7.1 Using jack 7.2 Using turnbuckles 7.3 Using wedges 7.4 Using drift pins 7.5 Using pry bars 7.6 Using hammer 7.7 Chain block and comalong
8. Structural members	May include but not limited to: 8.1 Iron girders 8.2 Steel girders 8.3 Columns 8.4 Trusses 8.5 Pre-fabricated metal buildings 8.6 Braces 8.7 Plate 8.9 Sog rod / purlins
9. Supports	May include but not limited to: 9.1 Bridging 9.2 Guy wire 9.3 Jigs 9.4 Brace
10. Initial connecting procedure	10.1 Bolting 10.2 Riveting 10.3 Tack welding

EVIDENCE GUIDE

1. Critical aspect of competency	Evidence must show the candidate can: 1.1 Demonstrates ability to comply with occupational health and safety standards 1.2 Demonstrates ability to use basic hand tools and materials 1.3 Demonstrates ability to perform positioning procedures for structural members
2. Underpinning knowledge	2.1 Relevant occupational health and safety standards 2.2 Types and uses of basic hand tools and materials 2.3 Procedures for positioning structural members 2.4 Types of structural member 2.5 Basic metallurgy 2.6 Inspection of rigging gears 2.7 Installation of rigging gears 2.8 Guide crane operator 2.9 Company rules & regulations 2.10 Work in a team
3. Underpinning skills	3.1 Following occupational health and safety standards 3.2 Using basic hand tools and materials 3.3 Following procedures for guiding and positioning structural members 3.4 Identifying types of structural member 3.5 Inspecting rigging gears 3.6 Installation of rigging gears 3.7 Guiding crane operator 3.8 Following company rules & regulations 3.9 Working in a team
4. Resource implications	The following resources MUST be provided 4.1 Structural member 4.2 Relevant tools and materials 4.3 Hoisting equipment 4.4 Work place
5. Methods of Assessment	Competencies maybe assessed using the following 5.1 Observation of practical skills with oral questioning 5.2 Demonstration of skills in a simulated venue 5.3 Portfolio 5.4 Third party report
6. Context of assessment	6.1 Assessment maybe conducted in TESDA accredited assessment center

UNIT OF COMPETENCY: **FIT-UP STRUCTURAL MEMBERS**
UNIT CODE : **CON713345**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to fit-up structural members for permanent position.

ELEMENT	PERFORMANCE CRITERIA ***Bold and italized*** terms are elaborated in the Range of Variable
1. Plan and prepare for work	1.1 Work instruction is secured according to standard operating procedures 1.2 Work instruction is interpreted according to job specifications 1.3 ***Occupational health and safety standards*** and ***regulatory requirements*** are identified according to job requirements 1.4 ***Personal protective equipment*** is identified and selected in line with job requirements 1.5 Basic ***hand tools and materials*** are identified in line with job requirements
2. Prepare hand tools	2.1 PPE is used in line with job requirements. 2.2 Basic hand tools and materials are selected and prepared in line with job requirements. 2.3 Basic hand tools are used in line with job requirements
3. Fit-up structural members	3.1 Relevant occupational health and safety standards are complied with. 3.2 ***Fit-up structural framework procedure*** for permanent erection is performed following job specifications.
4. Perform housekeeping	4.1 ***Waste materials*** are disposed following occupational health and safety standards 4.2 Tools and ***unused materials*** are returned to storage area following company SOP 4.3 Work accomplishment report is prepared and submitted to immediate superior in line with company SOP.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Occupational health and safety standards	May include but not limited to: 1.1 Working at heights 1.2 Ergonomics
2. Regulatory requirements	2.1 Cold work permit 2.2 Hot work permit
3. PPE	May include but not limited to: 3.1 Full body harness 3.2 Safety helmet 3.3 Safety gloves 3.4 Safety shoes 3.5 Safety goggles 3.6 Ear plugs
4. Basic hand tools and materials	May include but not limited to: 4.1 Sledgehammer 4.2 Adjustable wrench or ratchet 4.3 Rivet 4.4 Stud 4.5 Bolts and nuts
5. Fit-up structural framework procedure	5.1 Bolting 5.2 Riveting
6. Waste materials	May include but not limited to: 6.1 Damaged bolts and nuts 6.2 Damaged rivets 6.3 Temporary supports and braces
7. Unused materials	7.1 Bolts and nuts 7.2 Rivets

EVIDENCE GUIDE

1. Critical aspect of competency	Evidence must show the candidate can: 1.1 Demonstrates ability to comply with occupational health and safety standards 1.2 Demonstrates ability to use basic hand tools and materials 1.3 Demonstrates ability to perform fit-up structural framework procedures for structural member
2. Underpinning knowledge	2.1 Relevant occupational health and safety standards 2.2 Types and uses of basic hand tools and materials 2.3 Fit-up procedure for structural members
3. Underpinning skills	3.1 Following occupational health and safety standards 3.2 Using basic hand tools and materials 3.3 Performing fit-up procedures for structural member
4. Resource implications	The following MUST be provided 4.1 Positioned structural member 4.2 Relevant tools and materials 4.3 Work place
5. Methods of Assessment	Competencies maybe assessed using the following 5.1 Observation of practical skills with oral questioning 5.2 Demonstration of skills in a simulated venue 5.3 Portfolio 5.4 Third party report
6. Context of assessment	6.1 Assessment maybe conducted in any TESDA accredited assessment centers

UNIT OF COMPETENCY: **PERFORM TACK WELDING**
UNIT CODE : **CON713346**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to perform tack welding on structural members.

ELEMENT	PERFORMANCE CRITERIA ***Bold and italized*** terms are elaborated in the Range of Variable
1. Prepare welding materials and tools	1.1 Work instruction is secured and interpreted according to job specifications 1.2 ***Occupational health and safety standards*** are identified and complied with 1.3 ***Company regulatory requirements*** are identified in line with job requirements 1.4 ***Personal protective equipment*** is selected and used following job requirements 1.5 ***Welding materials and tools*** are identified as per specifications
2. Set-up welding equipment	2.1 Company regulatory requirements are complied with in line with job requirements 2.2 Welding materials, tools and equipment are prepared as per standard operating procedures (SOP) 2.3 Welding equipment set-up procedure is performed as per manufacturer's recommendations
3. Perform tack welding	3.1 ***Tack welding procedure*** is performed following job specifications 3.2 ***Visual check-up procedure*** is performed following job specifications
4. Perform housekeeping	4.1 ***Waste materials*** are disposed following occupational health and safety standards 4.2 ***Unused materials*** are returned to storage area following company SOP 4.3 Completion report is prepared and submitted to ***personnel*** as per SOP.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Occupational health and safety requirements	May include but not limited to: 1.1 Availability of fire extinguisher / fire watch 1.2 Functionality of exhaust fan 1.3 Availability of PPE
2. Company regulatory requirements	May include but not limited to: 2.1 Company authorized 1F welder 2.2 Company authorized 2F welder 2.3 Company authorized 3F welder 2.4 Company authorized 4F welder
3. PPE	May include but not limited to: 3.1 Safety gloves 3.2 Safety goggles, glass and face shield 3.3 Safety helmet 3.4 Safety harness 3.5 Safety clothes 3.6 Safety shoes 3.7 Dust masks 3.8 Ear plug
4. Welding materials, tools and equipment	May include but not limited to: 4.1 Welding materials 4.1.1 Electrodes 4.1.2 Welding cable 4.1.3 Stinger 4.1.4 Welding masks 4.1.5 Metal pipes or plates 4.2 Tools and equipment 4.2.1 Welding machine 4.2.2 Air compressor 4.2.3 Exhaust fan 4.2.4 Welding gloves 4.2.5 Chipping hammer 4.2.6 Portable grinder
5.Tack welding procedure	5.1 Direct tacking 5.2 Bridge tacking 5.3 Fabrication of temporary support

6. Visual check-up procedure	6.1 Dimensional check-up 6.2 Squareness and levelness
7. Waste materials	May include but not limited to: 7.1 Metal scraps 7.2 Grinding discs 7.3 Metal flux 7.4 Electrodes 7.5 Fabricated temporary supports
8. Unused materials	8.1 Structural steel member 8.2 Electrodes

EVIDENCE GUIDE

1. Critical aspect of competency	Evidence must show the candidate can: 1.1 Demonstrates ability to comply occupational health and safety standards and other regulatory requirements in tack welding 1.1 Demonstrates ability to set-up welding equipment 1.2 Demonstrates ability to perform tack welding procedure and basic fabrication of temporary support 1.3 Demonstrates ability to follow manufacturer's recommendations
2. Underpinning knowledge	2.1 Types of metal 2.2 Manufacturer's manual 2.3 Occupational health and safety standards for welding 2.4 Tack welding procedures
3. Underpinning skills	3.1 Following manufacturer's recommendations 3.2 Identifying types of metal 3.3 Complying occupational health and safety standards in welding 3.4 Performing tack welding procedures
4. Resource implications	The following maybe provided 4.1 Welding materials, tools and equipment relevant to the activity 4.2 Workplace or simulated workplace 4.3 Exhaust fan
5. Methods of Assessment	Competencies maybe assessed using the following 5.1 Observation with oral questioning 5.2 Demonstration of practical skills in a simulated environment 5.2 Portfolio 5.3 Third party report
6. Context of assessment	6.1 Assessment maybe conducted in any TESDA accredited assessment centers

ELECTIVE COMPETENCIES

UNIT OF COMPETENCY: **LAY-OUT STRUCTURAL MEMBERS**
UNIT CODE : **CON713346**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to measure and attach connector plates and angles on structural members.

ELEMENT	PERFORMANCE CRITERIA ***Bold and italized*** terms are elaborated in the Range of Variable
1. Plan and prepare for work	1.1 Work instruction is secured according to standard operating procedures 1.2 ***Blueprint*** is interpreted according to work instruction. 1.3 ***Occupational health and safety standards*** and ***regulatory requirements*** are identified according to job requirements 1.4 ***Personal protective equipment*** is identified and selected in line with job requirements 1.5 Basic ***hand tools*** are identified in line with job requirements
2. Prepare hand tools	2.1 PPE is used in line with job requirements. 2.2 Basic hand tools are selected and prepared in line with job requirements. 2.3 Basic hand tools are used in line with job requirements
3. Lay-out structural members	3.1 Relevant occupational health and safety standards are complied with. 3.2 Measuring and marking procedure is performed for ***structural member materials*** 3.3 ***Lay out*** procedure is performed following job specifications 3.4 Structural member materials are cut using oxy-acetylene according to job requirements.
4. Perform housekeeping	4.1 ***Waste materials*** are disposed following occupational health and safety standards 4.2 Tools and ***unused materials*** are returned to storage area following company SOP 4.3 Work accomplishment report is prepared and submitted to immediate superior in line with company SOP.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Blueprint	May include but not limited to: 1.1 Locations 1.2 Quantities 1.3 Bill of materials 1.4 Welding symbol and process
2. Occupational health and safety standards	May include but not limited to: 2.1 Availability of PPE 2.2 Availability of fire extinguisher
3. Regulatory requirements	3.1 Cold work permit 3.2 Hot work permit
4. PPE	May include but not limited to: 4.1 Safety helmet 4.2 Safety gloves 4.3 Safety shoes 4.4 Safety goggles 4.5 Ear plugs
5. Basic hand tools	May include but not limited to: 5.1 Push-pull rule 5.2 Portable grinder 5.3 Soapstone 5.4 Hammer 5.5 Try square 5.6 Adjustable wrench or ratchet 5.7 Tool box
6. Structural member materials	May include but not limited to: 6.1 Beam 6.2 Plates 6.3 Steel bars
7. Lay-out	May include but not limited to: 7.1 Columns 7.2 Beams 7.3 Trusses 7.4 Girders

8. Waste materials	May include but not limited to: 8.1 Scraped metals Damaged bolts and nuts 8.2 Grinding discs 8.3 Cutting discs 8.4 Metal dusts
9. Unused materials	May include but not limited to: 9.1 Plates 9.2 Soapstone

EVIDENCE GUIDE

1. Critical aspect of competency	Evidence must show the candidate can: 1.1 Demonstrates ability to interpret blueprint as per work instructions 1.2 Demonstrates ability to comply with occupational health and safety standards 1.3 Demonstrates ability to use basic hand tools 1.4 Demonstrates ability to lay-out structural members
2. Underpinning knowledge	2.1 Relevant occupational health and safety standards 2.2 Types and uses of basic hand tools and structural member components 2.3 Procedures for lay-out procedures for structural members 2.4 Isometric / orthographic drawings and sketches 2.5 Mensuration and trade Mathematics 2.6 Procedure for cutting metals using oxy-acetylene
3. Underpinning skills	3.1 Following occupational health and safety standards 3.2 Using basic hand tools and structural member components 3.3 Performing lay-out procedures for structural members 3.4 Applying mensuration and trade Mathematics 3.5 Interpreting isometric / orthographic drawings and sketches 3.6 Performing procedure for cutting metal using oxy-acetylene
4. Resource implications	The following MUST be provided 4.1 Blueprint 4.2 Relevant hand tools and structural member materials 4.3 Work place
5. Methods of Assessment	Competencies maybe assessed using the following 5.1 Observation of practical skills with oral questioning 5.2 Demonstration of skills in a simulated venue 5.3 Portfolio 5.4 Third party report
6. Context of assessment	6.1 Assessment maybe conducted in any TESDA accredited assessment centers

UNIT OF COMPETENCY: **BUILD LOW SPOTS OR REMOVE HIGH SPOTS**
UNIT CODE : **CON713347**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to build low spots or remove high spots

ELEMENT	PERFORMANCE CRITERIA ***Bold and italized*** terms are elaborated in the Range of Variable
1. Plan and prepare for work	1.1 Work instruction is secured from immediate superior according to standard operating procedures 1.2 ***Occupational health and safety standards*** and ***regulatory requirements*** are identified according to job requirements 1.3 ***Personal protective equipment*** is identified and selected in line with job requirements 1.4 Basic ***hand tools and equipment*** are identified in line with job requirements
2. Prepare hand tools and equipment	2.1 PPE is used in line with job requirements. 2.2 Basic hand tools and equipment are selected and prepared in line with job requirements. 2.3 Basic hand tools are used in line with job requirements
3. Build up low spots or remove high spots	3.1 Relevant occupational health and safety standards are complied with. 3.2 Build-up procedure for low spots is performed in line with job instruction 3.3 Removal procedure for high spots is performed according to job instruction
4. Perform housekeeping	4.1 ***Waste materials*** are disposed following occupational health and safety standards 4.2 Tools and ***unused materials*** are returned to storage area following company SOP 4.3 Work completion report is prepared and submitted to immediate superior in line with company SOP.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Occupational health and safety standards	May include but not limited to: 1.1 Availability of PPE 1.2 Working at heights
2. Regulatory requirements	2.1 Cold work permit 2.2 Hot work permit
3. PPE	May include but not limited to: 3.1 Full body harness 3.2 Safety helmet 3.3 Safety gloves 3.4 Safety shoes 3.5 Safety goggles 3.6 Ear plugs
4. Basic hand tools and equipment	May include but not limited to: 4.1 Grinder 4.1.1 Pencil 4.1.2 Angle 4.2 Welding machine 4.3 Chipping hammer
5. Waste materials	May include but not limited to: 5.1 Electrode butts 5.2 Electrodes 5.3 Discs 5.3.1 Grinding 5.3.2 Cutting
6. Unused materials	6.1 Excess electrodes 6.2 Excess discs

EVIDENCE GUIDE

1. Critical aspect of competency	Evidence must show the candidate can: 1.1 Demonstrates ability to comply with occupational health and safety standards 1.2 Demonstrates ability to use basic hand tools and materials 1.3 Demonstrates ability to perform build-up procedure for low spot and removal procedure high spot
2. Underpinning knowledge	2.1 Relevant occupational health and safety standards 2.2 Types and uses of basic hand tools and materials 2.3 Build-up procedures for low spot 2.4 Removal procedures for high spot
3. Underpinning skills	3.1 Following occupational health and safety standards 3.2 Using basic hand tools and materials 3.3 Performing build-up procedures for low spot 3.4 Performing removal procedure for high spot
4. Resource implications	The following MUST be provided 4.1 Erected structural member 4.2 Relevant tools and materials 4.3 Work place
5. Methods of Assessment	Competencies maybe assessed using the following 5.1 Observation of practical skills with oral questioning 5.2 Demonstration of skills in a simulated venue 5.3 Portfolio 5.4 Third party report
6. Context of assessment	6.1 Assessment maybe conducted in any TESDA accredited assessment centers

SECTION 3 TRAINING STANDARDS

These guidelines are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for **STRUCTURAL ERECTION NC II.**

3.1 CURRICULUM DESIGN

Course Title: STRUCTURAL ERECTION **NC Level:** NC II

Nominal Training Duration: **18 Hours (Basic)**
24 Hours (Common)

Course Description:

This course is designed to enhance the knowledge, skills and attitude in structural erection in accordance with industry standards. It covers the basic, common and core competencies required for structural erector to demonstrate.

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. Prepare construction materials and tools	1.1 Identify materials 1.2 Request materials 1.3 Receive and inspect materials	• Audio Visual • Simulation • Discussion • Practical exercises	• Direct observation • Written / Oral Test • Demonstration
2. Observe procedures, specifications and manuals of instructions	2.1 Identify and access specification / manuals 2.2 Apply information in manual 2.3 Store manual	• Audio Visual • Simulation • Discussion practical laboratory	• Direct observation • Written test or examination • Third party report • Demonstration
3. Interpret technical drawing	3.1 Analyze sign, symbols and data 3.2 Interpret technical drawing and plans 3.3 Apply freehand sketching	• Audio Visual • Simulation • Discussion • Practical exercises	• Direct observation • Oral questioning • Written test or examination • Third party report • Demonstration
4. Perform mensurations and calculation	4.1 Select measuring instruments 4.2 Carry out measurements and calculations	• Audio Visual • Simulation • Discussion • Practical exercises	• Direct observation • Oral questioning • Written test or examination • Third party report • Demonstration
5. Maintain tools and equipment	5.1 Check condition of tools and equipment 5.2 Perform basic preventive maintenance 5.3 Store tools and equipment	• Audio Visual • Simulation • Discussion • Practical exercises	• Direct observation of application of tasks. • Oral questioning • Written test or examination • Third party report • Demonstration

CORE COMPETENCIES
(120 hours)

Unit of Competency	Learning Outcome	Methodology	Assessment Approach
1. Position structural members	1.1 Plan and prepare for work 1.2 Prepare hand tools and materials 1.3 Move hoisted structural members into designated position	• Discussion / lecture • Self-paced instruction • Practical exercises	• Observation / demonstration with questioning • Written / examination
2. Fit-up structural members	2.1 Plan and prepare for work 2.2 Fit-up structural members	• Discussion/ lecture • Self-paced instruction • Practical exercises	• Observation/ demonstration with questioning • Written / examination
3. Perform tack welding	3.1 Prepare welding tools and materials 3.2 Set-up welding equipment 3.3 Perform tack welding	• Discussion/ lecture • Self-paced instruction • Practical exercises	• Observation/ Demonstration with questioning • Written / Examination

ELECTIVE COMPETENCIES
(32 hours)

Unit of Competency	Learning Outcome	Methodology	Assessment Approach
1. Layout structural members	1.1 Plan and prepare for work 1.2 Layout structural members	• Discussion/ lecture • Self-paced instruction • Practical exercises	• Observation/ Demonstration with questioning • Written / Examination
2. Build low spots or remove high spots	2.1 Plan and prepare for work 2.2 Build low spots or remove high spots	• Discussion/ lecture • Self-paced instruction • Practical exercises	• Observation/ Demonstration with questioning • Written / Examination

3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery shall 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 learner-centered and should accommodate individualized and self-paced learning strategies;
- 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;
- Training program allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Training programs are registered with the UTPRAS.

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 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.

- Project-based instruction is an authentic instructional model or strategy in which students plan, implement and evaluate projects that have real world applications.

3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- Can communicate both oral and written
- Can perform basic mathematical computation
- Good moral character; and
- Physically and mentally fit

The list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS FOR STRUCTURAL ERECTION NC II

Below is the recommended list of tools, equipment and materials for the training of 25 trainees for **STRUCTURAL ERECTION NC II**.

TOOLS		EQUIPMENT		MATERIALS	
QTY	**DESCRIPTION**	**QTY**	**DESCRIPTION**	**QTY**	**DESCRIPTION**
5 pcs.	Sledge hammer,	1unit	Arc Welding machine	1 box	Soapstone
5 pcs.	Ball peen hammer, 16 oz.	1 unit	Electric drill	2 boxes.	Cut-off disc
5 pcs.	Center punch	5 units	Portable grinder	2 boxes	Grinding disc
5 pcs.	C-clamp, 12”	2 sets	Oxy-acetylene cutting outfit	4 pcs	Structural members (I-beam)
5 pcs.	C-clamp, 6”	3 units	Fire extinguishers	1 box	Electrodes
5 pcs.	Pull & push rule	2 units	Working bench with vise	64 sets	Bolts and nuts and washers
5 pcs.	Steel rule,1 meter	3 units	Chain block	25 pairs	Gloves
5 pcs.	Try square	1 set	Scaffolding	25 pcs.	Hard hat
10 pcs.	Steel square	1 unit	A frame (gantry)	25 pairs.	Safety shoes
5 pcs.	Adjustable wrench, 8”			25 pcs.	Goggles
5 pcs.	Adjustable wrench,12 “			5 pcs.	Face shield
5 pcs.	Files (assorted)			2 pcs.	Welding mask
5 pcs.	Steel brush			5 pcs.	Metal marker
5 pcs.	Pry bar			15 meters	Tag line (1 inch dia.)
5 pcs.	Ratchet				
3 pcs.	Hydraulic jack				
5 pcs.	Turnbuckle				
1 box	Drill bits (assorted sizes)				

3.5 TRAINING FACILITIES STRUCTURAL ERECTION NC II

The space requirement is based on the class intake of 25 trainees.

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
• Lecture Room/Demo Room		25	25
• Wash Room		5	5
• Tool Room		5	5
• Work area (open)		300	300
		335	**335**
		TOTAL	**335**

3.6 TRAINER'S QUALIFICATIONS FOR STRUCTURAL ERECTION NC II

- Must have completed a Trainers Training Methodology Course (TM II) or its equivalent
- Must be a holder of CSC Professional eligibility (for government position)
- Must be a holder of Structural Erection National Certificate II
- Must be physically and mentally fit
- *Minimum of 2 years industry experience

*Optional. Only when required by the hiring institution
Reference: TESDA Board Resolution No. 2004-03

3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1. To attain the National Qualification of **Structural Erection NC II**, the candidate must demonstrate competence through project-type assessment covering all the units listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 The qualification of **Structural Erection NC II** can be attained through demonstration of competence in a project-type assessment covering the following core units.

4.1.1 Position structural members
4.1.2 Fit-up structural framework
4.1.3 Perform tack welding

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:

4.3.1 Graduates of formal, non-formal and informal including enterprise-based training programs

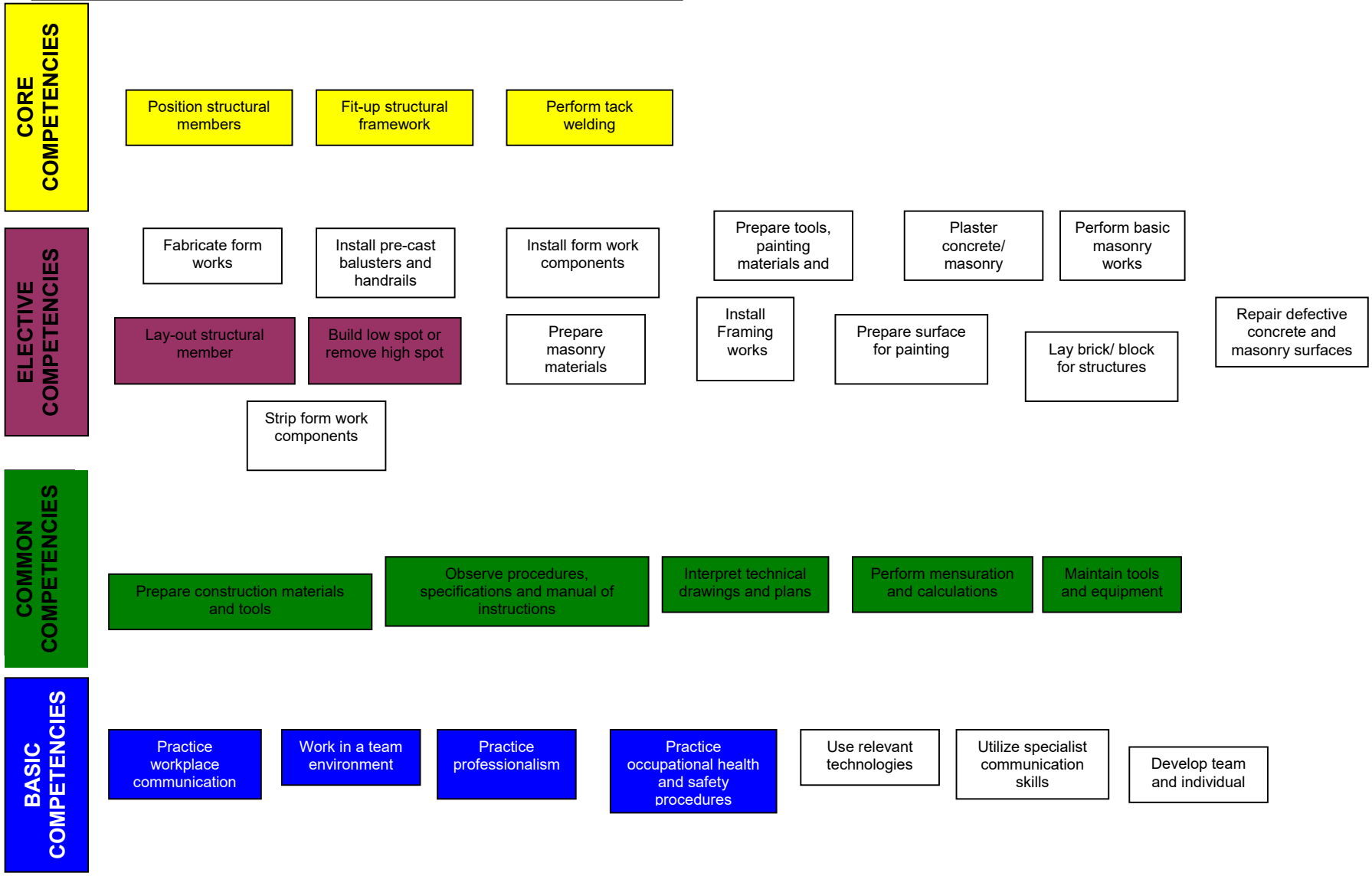
4.4.2. Experienced Workers (wage employed or self-employed)

4.5. 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).

ANNEX A

COMPETENCY MAP
CIVIL SUB-SECTOR

STRUCTURAL ERECTION NC II



DEFINITION OF TERMS

1. Competency	Is the application of knowledge, skills and attitudes to perform work activities to the standard expected in the workplace.
2. Certification	Refers to the process of verifying and validating competencies of a person through assessment.
3. Element	Refers to the building blocks of a unit of competency. It describes in outcome terms the functions that a person who works in a particular area of work is able to perform.
4. Evidence Guide	It is a guide for assessment that provides information on critical aspects of competency, underpinning knowledge, underpinning skills, resource implications, context of assessment and assessment method.
5. Philippine TVET Qualification Framework	Refers to a comprehensive, nationally consistent framework for qualifications in the TVET sector. It also provides the parameter for the integration of learning and assessment in the middle skills development.
6. Qualification	Refers to the national certificate issued by the TESDA or its accredited industry organizations in recognition that a person has achieved competencies relevant to a trade or industry.
7. Range of Variable	It describes the circumstances or context in which the work is to be performed.
8. Riveting	Refers to the permanent joining of two or more machine parts or structural members, usually plates by means of rivets
9. Structural riveting	Refers to riveting structural members by using punched holes
10. Structural steel	Refers to a steel used in engineering usually manufactured by electric furnace process
11. Unit of Competency	Refers to a discrete aspect of work, which would normally be performed by only one person.
12. Columns	Is a vertical shaft designed to bear axial loads in compression.
13. Girders	Is a large beam normally made of metal or concrete.
14. Beams	Refers to a body with one large dimension compared with other dimensions whose function is to carry lateral movement.
15. Truss	Refers to a frame generally of steel, timber, concrete or light alloy, built from members in tension and compression.
16. Purlins	Refers to a horizontal roof beam, perpendicular to the trusses or rafters; supports the roofing material or the common rafters.

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