Ironworker (Structural/Ornamental)

Guide to Course Content

2022

1-877-363-0536
apprenticeship@gov.sk.ca
saskapprenticeship.ca

Saskatchewan Apprenticeship and Trade Certification Commission

Online: www.saskapprenticeship.ca

Recognition:
To promote transparency and consistency, this document has been adapted from the 2015 Ironworker (Structural/Ornamental) National Occupational Analysis (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE GUIDE TO COURSE CONTENT

To facilitate understanding of the occupation, this on-the-job training guide contains the following sections:

Description of the Ironworker (Structural/Ornamental) trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Harmonization: a brief description on the pan-Canadian Harmonization Initiative for the Ironworker (Structural/Ornamental) trade.

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

Training Profile Chart: a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

Technical Training Course Content for the Ironworker (Structural/Ornamental) trade: a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

Appendix A: Post Harmonization Training Profile Chart: a chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

The Red Seal Ironworker (Structural/Ornamental) Curriculum Outline, which provides additional detail of the Harmonized technical training, can be found at www.red-seal.ca.

DESCRIPTION OF THE IRONWORKER (STRUCTURAL/ORNAMENTAL) TRADE

(An overview of the trade's description, duties and training requirements)

Ironworker (Structural/Ornamental) workers field fabricate, weld, cut, erect and dismantle structural, miscellaneous and ornamental metal work. They also erect and place pre-cast concrete, and rig and place machinery and equipment

Ironworkers (structural/ornamental) install and reinforce structural/ornamental steel components, precast structural concrete members and glued laminated timber products (glulam) in commercial, industrial, institutional and large residential buildings, towers, bridges and stadiums. They erect pre-engineered buildings, wind turbines, solar panels and ornamental ironwork such as curtain walls, metal stairways, catwalks, railings and metal doors. They also erect scaffolding, cranes, hoists and derricks on the construction site. Ironworkers (structural/ornamental) also install conveyors, machinery and automated material handling systems. They are also involved in demolition and salvage duties involving all types of construction.

They prepare the construction site by assembling the hoisting equipment. They unload structural and ornamental components and organize the material for hoisting as needed. They organize and sequence the hoisting of the components by connecting cables and slings to the components and directing crane operators. They position, align and secure components according to blueprints using a variety of fastening methods.

Ironworkers (structural/ornamental) generally work outside in all weather, although some work indoors in manufacturing plants. They generally travel to and from the work site which may be in a variety of locations ranging from remote areas where they could be working on dams, bridges or mining projects to urban environments where they could work on high rise buildings or stadiums. The work often requires considerable standing, bending, crawling, lifting, climbing, pulling and reaching, and is often conducted in cramped, confined spaces or at heights. Hazards include injury from falls or falling objects. Ironworkers (structural/ornamental) typically work a 40-hour week; however, inclement weather such as rain, snow or high winds may shut down projects for extended periods and deadlines and priorities may involve overtime.

They are required to have good mechanical aptitude, the ability to lift heavy objects, the ability to maintain balance working at heights in varying extreme climates, a thorough knowledge of the principles of lifting, rigging and hoisting, and a familiarity with a variety of metal fastening and joining methods. They are all required to be competent in the use and care of a variety of hand and power tools and equipment such as wrenches, pry bars, torches, levelling and welding equipment. They also use crane charts and must be able to estimate and reconcile crane ability with load sizes.

Because of the nature of the work, a primary concern of ironworkers (structural/ornamental) is workplace safety; therefore, ironworkers (structural/ornamental) must be thoroughly familiar with the applicable sections of local, provincial and federal building and safety standards.

Ironworkers (structural/ornamental) tend to work in teams and team coordination is a large component of the occupation especially when hoisting and placing large, heavy components high above the ground.

Ironworkers (structural/ornamental) interact and work cooperatively with a wide variety of construction tradespeople such as ironworkers (reinforcing), crane operators, welders, carpenters, metal fabricators, millwrights, labourers and glaziers.

Training Requirements: 5400 hours (3 years) including: two 8 week and one 7 week technical training sessions delivered by Saskatchewan Polytechnic in Moose Jaw.

There are three levels of technical training delivered by Saskatchewan Polytechnic in Moose Jaw.

Level One: 8 weeks
Level Two: 8 weeks
Level Three: 7 weeks

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

The content of the technical training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcript (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program, and receive journeyperson certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	**Math Credit** at the Indicated Grade Level❶	**Science Credit** at Grade Level
Ironworker(Structural/Ornamental)	Grade 10	Grade 10

❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).

*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.

For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#

Individuals not meeting the entrance requirements will be subject to an assessment and any required training.

ESSENTIAL SKILLS SUMMARY

(How each of the nine essential skills is applied in this trade)

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The most important essential skills for each sub-task have also been identified. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

READING

Ironworkers (Structural/Ornamental) require strong reading skills to consult installation procedures, reference manuals, Safety Data Sheets (SDS), and industry standards and safety requirements when installing, precast structural concrete members, pre-engineered buildings, wind turbines, solar panels and ornamental ironwork. They also refer to project specifications and work orders when planning a job.

DOCUMENT USE

Document use is important in the work of Ironworkers (Structural/Ornamental). Ironworkers (Structural/Ornamental) interpret diagrams to ensure compliance with regulatory standards. They interpret schematics and working drawings when planning the installation of recast structural concrete members, pre-engineered buildings, wind turbines, solar panels and ornamental ironwork. Ironworkers (Structural/Ornamental) read assembly drawings to install precast structural concrete members and pre-engineered buildings. They prepare sketches and drawings to plan a job.

WRITING

Writing skills are used by Ironworkers (Structural/Ornamental) to perform tasks such as writing lists of materials required for a job, completing order forms to request materials, and keeping daily logs to track work status and reminders. When required, they must write incident or accident reports. They may be required to communicate in writing to other trade professionals such as engineers and architects.

ORAL COMMUNICATION

Ironworkers (Structural/Ornamental) require good oral communication skills to interact with colleagues, apprentices, supervisors, suppliers, inspectors, clients and other tradespersons when coordinating work, resolving problems and ensuring safety.

NUMERACY

Ironworkers (Structural/Ornamental) work in both imperial and metric systems of measurement. They perform calculations pertaining to rigging equipment safe working loads and breaking strength. They perform a variety of calculations such as performing area, perimeter and volume calculations.

THINKING

Ironworkers (Structural/Ornamental) diagnose and solve problems. They decide on work priorities and plan and organize their work accordingly. Ironworkers (Structural/Ornamental) may determine the most cost effective way to use materials and supplies.

WORKING WITH OTHERS

During the course of a work day, Ironworkers (Structural/Ornamental) must interact with others such as co-workers, suppliers, clients and other trades.

DIGITAL TECHNOLOGY

Ironworkers (Structural/Ornamental) use computers and other digital devices more commonly as sources of resource information, communication and cost reporting. They are also used as a tool for design, layout, research, system diagnosis and estimating.

CONTINUOUS LEARNING

Advances in technology are also changing the design, applications and materials of systems. There is an increased emphasis on worker health and safety. These changes mean that related training and certification is often mandatory for both apprentices and journeypersons.

ELEMENTS OF HARMONIZATION FOR APPRENTICESHIP TRAINING

At the request of industry, the Harmonization Initiative was launched in 2013 to *substantively align* apprenticeship systems across Canada by making training requirements more consistent in the Red Seal trades. Harmonization aims to improve the mobility of apprentices, support an increase in their completion rates and enable employers to access a larger pool of apprentices.

As part of this work, the Canadian Council of the Directors of Apprenticeship (CCDA) identified four main harmonization priorities in consultation with industry and training stakeholders:

1. Trade name

The official Red Seal name for this trade is Ironworker (Structural/Ornamental).

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Ironworker (Structural/Ornamental) trade is 3.

3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Ironworker (Structural/Ornamental) trade is 5400.

4. Consistent sequencing of training content (at each level) using the most recent Occupational Standard

Implementation for harmonization took place progressively with Level 1 implemented in 2016/2017, Level 2 in 2017/2018, and Level 3 in 2018/2019. See Appendix A for the finalized curriculum comparisons.

White boxes are “Topics,” grey boxes are “In Context”. In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

Level 1	Level 2	Level 3
Safety Awareness		
Tools and Equipment		
Access Equipment		
Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging
Communication & Trade Documentation		
Welding I		Welding II
Oxy-fuel Cutting		
	Work Planning	Work Planning
Drawings	Drawings	Drawings
Introduction to Cranes	Cranes	Cranes
Structural Steel components	Structural Steel components	Structural Steel components
Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling
	Pre-Engineered Structures	Pre-Engineered Structures
	Pre-cast Concrete Erection and Dismantling	Pre-cast Concrete Erection and Dismantling
	Machinery and Equipment	Machinery and Equipment
	Miscellaneous Ironwork	Miscellaneous Ironwork
		Ornamental Ironwork

IRONWORKER (STRUCTURAL/ORNAMENTAL)

TASK MATRIX

This chart outlines the major work activities, tasks and sub-tasks from the 2015 Ironworker (Structural/Ornamental) Red Seal National Occupational Analysis (NOA). Each sub-task details the corresponding essential skill and level of training where the content is covered. *

* Sub-tasks with numbers in the boxes is where the content will be delivered in training. Implementation for harmonization took place progressively with Level 1 implemented in 2016/2017, Level 2 in 2017/2018, and Level 3 in 2018/2019.

A - OCCUPATIONAL SKILLS

A-1 Performs occupational documentation	**A-1.01 Interprets drawings and specifications.** 1, 2, 3	**A-1.02 Interprets standards, regulations and procedures.** 1 (2, 3 In Context)	**A-1.03 Performs lock-out and tag-out procedures.** (2, 3 In Context)		
A-2 Communicates in the workplace	**A-2.01 Communicates with co-workers.** 1	**A-2.02 Communicates with others.** 1	**A-2.03 Communicates with apprentices.** 1	**A-2.04 Uses hand signals.** 1, 2, 3	**A-2.05 Communicates electronically.** 1, 2, 3
A-3 Uses and maintains tools and equipment.	**A-3.01 Uses hand tools and measuring equipment.** 1 (2, 3 In Context)	**A-3.02 Uses power tools.** 1 (2, 3 In Context)	**A-3.03 Uses powder-actuated tools.** 1 (2, 3 In Context)	**A-3.04 Uses aerial work platforms.** 1 (2, 3 In Context)	**A-3.05 Uses ladders** 1 (2, 3 In Context)
	A-3.06 Uses scaffolding 1 (2, 3 In Context)	**A-3.07 Uses Personal Protective Equipment (PPE).** 1 (2, 3 In Context)	**A-3.08 Uses surveying equipment.** 1, 2, 3	**A-3.09 Uses welding equipment.** 1,3 (2 In Context)	**A-3.10 Uses thermal and oxy-fuel cutting equipment.** 1 (2, 3 In Context)
A-4 Organizes work.	**A-4.01 Organizes materials and supplies.** 1, 2, 3	**A-4.02 Marks layouts.** 1, 2, 3	**A-4.03 Maintains safe work environment.** 1 (2, 3 In Context)	**A-4.04 Assesses site hazards.** 1 (2, 3 In Context)	**A-4.05 Plans work Tasks.** 1, 2, 3

B – RIGGING AND HOISTING

B-5 Selects rigging equipment.	B-5.01 Matches load to lift capability. 1, 2 (3 In Context)	B-5.02 Inspects rigging equipment. 1, 2 (3 In Context)	B-5.03 Maintains rigging equipment. 1, 2 (3 In Context)
B-6 Uses hoisting and lifting equipment.	B-6.01 Uses hoisting equipment. 1, 2 (3 In Context)	B-6.02 Uses lifting equipment. 1, 2 (3 In Context)	B-6.03 Attaches rigging to load. 1, 2 (3 In Context)

C – CRANES

C-7 Assembles and erects cranes.	C-7.01 Assesses crane site limitations. 1, 2, 3	C-7.02 Determines crane position. 1, 2, 3	C-7.03 Prepares bases. 1, 2, 3	C-7.04 Erects cranes and components. 1, 2, 3
C-8 Disassembles Cranes.	C-8.01 Disassembles crane components. 1, 2, 3	C-8.02 Prepares crane for transport. 1, 2, 3		

D – ERECTION, ASSEMBLY AND INSTALLATION

D-9 Installs primary and secondary structural members.	D-9.01 Erects falsework. 1, 2, 3	D-9.02 Attaches structural members 1, 2, 3	D-9.03 Levels, plumbs and aligns structural members. 1, 2, 3	D-9.04 Completes installation of structural members. 1, 2, 3

D-10 Installs ornamental components and systems.	**D-10.01 Installs curtain walls and window walls.** 2, 3	**D-10.02 Installs miscellaneous components.** 3	
D-11 Installs conveyors, machinery and equipment.	**D-11.01 Installs material handling systems.** 2, 3	**D-11.02 Aligns material handling systems.** 2, 3	**D-11.03 Places machinery and equipment.** 2, 3

E – MAINTENANCE AND UPGRADING

E-12 Repairs components.	**E-12.01 Assesses current condition of components.** 1, 2, 3	**E-12.02 Field fabricates components.** 1, 2, 3	**E-12.03 Replaces components.** 1, 2, 3	**E-12.04 Performs preventative maintenance.** 1, 2, 3
E-13 Decommissions disassembles and removes structural, mechanical and miscellaneous components.	**E-13.01 Ensures decommissioning of structure or components.** 1, 2, 3	**E-13.02 Plans sequence of disassembly.** 1, 2, 3	**E-13.03 Removes components.** 1, 2, 3	

TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level. Implementation for harmonization took place progressively.

SATCC Level One	Transcript Code	Hours
Safety Awareness	SFTY 134	18
Access Equipment	EQPT 157	15
Tools and Equipment	EQPT 156	20
Hoisting Lifting and Rigging 1	RIGG 130	33
Welding 1	WLDR 133	18
Drawing Interpretation	BPRT 130	40
Cranes 1	EQPT 158	18
Structural Components	STRU 130	36
Building Erection 1	STRU 131	12
Ironworker Mathematics (Exceed)	MATH 118	30
		240

SATCC Level Two	Transcript Code	Hours
Hoisting Lifting and Rigging 2	RIGG 200	22
Drawing Interpretation	BPRT 202	48
Cranes 2	EQPT 200	60
Erection and Dismantling	STRU 204	12
Pre-engineered Structures	STRU 208	20
Building Erection 2	STRU 205	18
Reinforcing Rebar	MATE 200	12
Ironworker Mathematics (Exceed)	MATH 221	30
Welding 2	WELD 217	18
		240

SATCC Level Three	Transcript Code	Hours
Pre-engineered Structures	STRU 300	26
Welding 3	WELD 307	6
Cranes 3	EQPT 303	40
Machinery and Equipment	EQPT 304	30
Pre-cast Concrete	MATE 301	24
Building, Dismantling and Storage	STRU 301	18
Miscellaneous and Ornamental Ironwork	MATE 300	54
Equipment Certifications	EQPT 302	12
		210

Exceed Topics

Throughout this guide to course content there are topics, which exceed the scope of work set out by the Ironworker Structural/Ornamental National Occupational Analysis (NOA). Industry in Saskatchewan has deemed certain topics to fall within the scope of work of Ironworker Structural/Ornamental trade and therefore require technical training to also cover these topics.

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal National Occupational Analysis (NOA) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Level One — 8 weeks — 240 hours

Safety Awareness — 18 hours

- demonstrate the use of safety equipment, their applications, maintenance, and procedures for use
- demonstrate safe work practices
- discuss regulatory requirements pertaining to safety
- you will able to use fall arrest equipment

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.07 Uses personal protective equipment (PPE)

- safety equipment
- safe work practices
- regulatory requirements

A-4 Organizes work
A-4.03 Maintains safe work environment

- safety standards applicable to workplace
- safe work practices and limitations
- building codes
- good housekeeping

A-4.04 Assesses site hazards

- codes and regulations
- recognizes hazards
- controls hazards
- performing job hazard analysis (JHA) or a task hazard analysis (THA)

Tools and Equipment — 20 hours

- identify types of hand, electric, hydraulic, pneumatic and gas tools, and levelling and alignment instruments
- demonstrate the use of tools and equipment, their applications, maintenance, and storage, and procedures for use
- use explosive actuated tools

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.01 Uses hand tools and measuring equipment

- types and uses of hand tools
- hand tool safety
- manufacturers' specification on the use and care of tools
- measuring equipment
- selecting appropriate hand tools for required tasks

- identifying damaged, worn or otherwise unsafe hand tools
- demonstrating hand tool maintenance

A-3.02 Uses power tools

- types and uses of power tools
- power tool safety
- manufacturers' specification on the use and care of power tools
- power tool operating procedures
- selecting appropriate power tools for required tasks
- identifying damaged, worn or otherwise unsafe power tools
- power tool maintenance

A-3.03 Uses powder-actuated tools

- types and uses of powder-actuated tools
- powder-actuated tool components
- operating procedures for powder-actuated tools
- powder-actuated tool safety

A-3.09 Uses welding equipment

- provincial/territorial and applicable welding regulations
- Canadian Welding Bureau (CWB) and (CSA) standards
- welding symbols
- welding hazards
- setting up welding equipment
- performing welding process
- adjusting welding parameters to suit site conditions
- identifying damaged, worn or otherwise unsafe welding equipment
- storing welding equipment

Access Equipment **15 hours**

- demonstrate the use of ladders, scaffolding and aerial work platforms, their applications, limitations, and procedures for use
- demonstrate safe work practices concerning the set up and use of scaffolds, ladders, and angel wings
- discuss the use of swing stages and sky climbers
- discuss the use of crane man baskets
- describe the use of aerial work platform operation

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment

A-3.04 Uses aerial work platforms

- types and uses of aerial work platforms
- aerial work platform safety
- aerial work platform regulations and certification requirements
- aerial work platform components and accessories
- operating procedures of aerial work platforms
- manufacturers' specifications for use of aerial work platforms
- identifying damaged, worn or otherwise unsafe aerial work platforms and equipment
- positioning aerial work platforms
- storing aerial work platforms

A-3.05 Uses ladders

- types and use of ladders
- safe operating procedures for ladders
- manufacturers' specifications for use and care of ladders
- positioning ladders

- dismantling ladders
- identifying worn, damaged or otherwise unsafe ladders

A-3.06 Uses scaffolding

- regulations pertaining to scaffolding
- types of scaffolding
- manufacturers' recommended uses and limitations of scaffolding
- positioning, levelling and erecting scaffolding and installing planking, guardrails and toe plates
- securing scaffolding, planking, guardrails, toe plates and related components
- dismantling and storing scaffolding
- identifying damaged, worn or otherwise unsafe scaffolding and planking

---

Hoisting, Lifting, and Rigging 1 — 33 hours

- describe hoisting, lifting, and rigging equipment, their applications, limitations, and procedures for use
- discuss the procedures used to perform hoisting and lifting operations
- perform calculations required when hoisting and lifting
- demonstrate international crane hand signals

NOA subtasks covered in this section of training:

A - Occupational Skills
A-2 Communicates in the workplace

A-2.04 Uses hand signals

- types of signs such as crane signals
- hand signals
- signal terminology
- using correct signals
- interpreting signals
- signalling for type of equipment

A-2.05 Communicates electronically

- types of electronic communication devices such as cellular/smart phones, two-way radios, lap-top computers and tablets
- communication protocols and company reporting policies
- operating electronic communication devices
- sending, receiving and retrieving information from computers
- communicating through two-way radios and cellular phones

B – Rigging and Hoisting
B-5 Selects rigging equipment

B-5.01 Matches load to lift capability

- lifting equipment
- capacity of lifting equipment
- basic geometry
- weights and measures
- calculating weights of loads
- selecting rigging equipment
- calculating choker tension based on choker angle and load

B-5.02 Inspects rigging equipment

- identifying types of rigging equipment
- using manufacturers' specifications
- following policies and procedures
- tools and materials
- identifying defects and damage
- reporting defects and damage

B-5.03 Maintains rigging equipment

- types of rigging equipment
- using manufacturers' specifications
- following policies and procedures
- tools and materials
- performing maintenance procedures
- storing rigging equipment

B-6 Uses hoisting and lifting equipment

B-6.01 Uses hoisting equipment

- provincial/territorial and applicable regulations and certification requirements
- identifying types of hoisting equipment such as come-alongs, Tirfors®, chain block hoists, tuggers and derricks
- anchorage locations and capabilities
- policies and procedures
- selecting hoisting equipment
- selecting anchorage locations
- following manufacturers' specifications
- participating in engineered (critical) lifts

B-6.02 Uses lifting equipment

- types of lifting equipment such as hydraulic jacks, fork lifts and air pallets
- following policies and procedures
- selecting lifting equipment
- following manufacturers' specifications and recommendations

B-6.03 Attaches rigging to load

- hoisting procedures such as engineer's plan, multi-member and tandem lift
- placement and attachment location
- hoisting specifications
- following lifting procedures
- using and ties knots, bends and hitches
- following rigging procedures
- using rigging equipment

Welding 1 — 18 hours

- describe knowledge of oxy-fuel equipment and accessories
- perform oxy-fuel cutting
- describe SMAW equipment and accessories
- perform SMAW welding

NOA subtasks covered in this section of training:

A - Occupational Skills

A-3 Uses and maintains tools and equipment

A-3.09 Uses welding equipment

- provincial/territorial and applicable welding regulations
- Canadian Welding Bureau (CWB) and (CSA) standards
- explaining welding symbols
- explaining welding hazards
- setting up welding equipment
- performing welding process
- adjusting welding parameters to suit site conditions
- identifying damaged, worn or otherwise unsafe welding equipment
- storing welding equipment

A-3.10 Uses thermal and oxy-fuel cutting equipment

- cutting process

- cutting equipment
- cutting consumables
- setting up equipment
- inspecting equipment
- adjusting cutting parameters
- recognizing cutting hazards
- identifying damaged, worn or otherwise unsafe cutting equipment
- storing cutting equipment and consumables

Drawing Interpretation and Work Planning **40 hours**

- identify types of drawings, knowledge of drawings and their applications
- explain the procedures used to interpret and extract information from drawings
- prepare trade related documentation and its use
- demonstrate knowledge of the procedures used to prepare and complete trade documentation
- organize work tasks to facilitate effective handling of work materials
- demonstrate effective communication practices

NOA subtasks covered in this section of training:

A - Occupational Skills
A-1 Interprets occupational documentation
A-1.01 Interprets drawings and specifications

- types of drawings such as structural erection, architectural, precast shop and fabrication
- welding symbols
- abbreviations and technical vocabulary
- drafting techniques
- interpreting drawing symbols
- correlating types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
- distinguishing types of views
- relating drawings to worksite

A-1.02 Interprets standards, regulations and procedures

- standards such as CSA, ANSI and ASTM
- regulations such as OH&S Act, WHMIS, fall protection, mobile equipment and confined space
- locating standards, regulations and procedures
- applying procedures such as assembly, welding, placing, hoisting, tensioning and grouting
- applying written work procedures

A-2 Communicates in the workplace
A-2.01 Communicates with co-workers

- types of communication
- interpersonal communication techniques
- trade vocabulary
- barriers to communication
- writing clearly and concisely
- active listening
- checking to confirm understanding

A-2.02 Communicates with others

- job-related terminology
- report formats
- active listens
- translating technical terms into layperson language
- addressing others' concerns

- writing report in prescribed formats
- checking to confirm understanding

A-2.03 Communicates with apprentices
- capabilities of apprentice
- listening, teaching, coaching and mentoring
- supervising
- assessing and recording ongoing progress

A-2.04 Uses hand signals
- types of signals such as crane signals
- hand signals
- signal terminology
- selecting types of signals
- interpreting signals
- selecting signals for type of equipment

A-2.05 Communicates electronically
- types of electronic communication devices such as cellular/smart phones, two-way radios, laptop computers and tablets
- communication protocols and company reporting policies
- operating electronic communication devices
- sending, receiving and retrieving information from computers
- communicating through two-way radios and cellular phones

A-4 Organizes work

A-4.01 Organizes materials and supplies
- erection sequence
- equipment capabilities and limitations
- site preparation
- shipping documentation
- product specific storage and handling principles
- types of materials and their identification requirements
- scheduling material and supplies required for job
- unloading equipment
- placing and sorting materials and supplies
- reconciling load with shipping documents
- securing equipment and materials

A-4.05 Plans work tasks
- procedures, specifications and drawings
- interpreting specifications and drawings
- improvising to suit site conditions
- maintaining schedule
- selecting materials and supplies required for task
- selecting equipment and tools required for task

Cranes 1 **18 hours**

- describe types of cranes, their applications, and limitations
- perform crane lifting operations
- interpret basic load charts

NOA subtasks covered in this section of training:

C – Cranes

C-7 Assembles and erects cranes

C-7.01 Assesses crane site limitations
- types of hazards such as overhead power lines, underground services, ground conditions, other workers and obstructions to swing radius

- swing area (radius) of crane
- crane limitations due to inclement weather
- calculating crane radius
- identifying potential hazards
- reading load charts
- minimizing overhead dangers

C-7.02 Determines crane position

- crane types
- crane capacity
- crane radius
- maximum weight of lifts
- crane limitations due to inclement weather
- determining weights of components
- calculating the available headroom
- selecting crane for required task

C-7.03 Prepares bases

- gross weight of crane
- composition of base such as soil, concrete and steel
- types of pads
- selecting pads such as mats, dunnage and cribbing
- visually assesses ground conditions
- ensuring ground is stable and level
- installing falsework

C-7.04 Erects cranes and components

- sequence of assembly
- crane components such as boom sections, counterweights and jibs
- crane signals
- tools used in erection of cranes
- safe rigging practices
- ensuring adequate space for assembly
- installing components
- reeve's/laces blocks
- participating in engineered (critical) lifts

C-8 Disassembles cranes

C-8.01 Disassembles crane components

- method of disassembly
- sequence of disassembly
- equipment and tools required for task
- rigging
- recognizing hazards of disassembly such as tensioned pins and overloads
- disconnecting components
- rigs crane components
- blocks boom sections

C-8.02 Prepares crane for transport

- safe rigging practices
- selecting type of rigging
- placing and securing components on transportation deck

*Includes hydraulic, conventional, tower and electric overhead travelling cranes.

Structural Components — 36 hours

- explain structural components, their characteristics, and applications
- perform fastening methods relating to structural steel erection
- describe knowledge of falsework, their characteristics, and applications
- discuss the procedures used to erect and dismantle falsework

NOA subtasks covered in this section of training:

A - Occupational Skills
A-4 Organizes work
A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members
D-9.01 Erects falsework

- types and applications of falsework
- supports and bracing
- capacity and limitations of falsework
- determining need for falsework
- laying out and constructing falsework
- placing and securing falsework

D-9.02 Attaches structural members

- types of structural members
- crane signals
- bolts and pin types
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

Building Erection 1 — 12 hours

- demonstrate the full erection and dismantling of a structural steel structure using a crane (dismantle to exterior skeleton)
- interpret drawings
- identify structural components
- demonstrate safe worksite practices
- demonstrate rigging techniques

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques

- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- demonstrating knowledge of drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation

D-9 Installs primary and secondary structural members

D-9.02 Attaches structural members

- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members

- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and uses surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading

E-12 Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fitting components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritizing required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Ironworker Mathematics (Exceed) **30 hours**

- use whole numbers, and common and decimal fractions
- perform conversions and comparisons with fractions, decimals, and percent
- perform calculations and conversions with the metric and imperial systems
- perform calculations for average, perimeter, area, and volume
- solve basic problems involving common and decimal fractions

This section of training exceeds the minimum sequencing as set out in the Ironworker (Structural/Ornamental NOA).

Level 1 subtasks from the NOA that are taught in context:

A-1 Interprets occupational documentation

A-2 Communicates in the workplace

A-3 Uses and maintains tools and equipment

B-5 Selects rigging equipment

B-6 Uses hoisting and lifting equipment

C-7 Assembles and erects cranes

C-8 Disassembles cranes

For details regarding the In Context Topic, see pages 49.

Hoisting, Lifting and Rigging 2 **22 hours**

- calculate weights of beams, angles, channels, and hollow structural steel
- perform calculations related to inclined planes and mechanical advantage
- describe the use of hoisting chains, rollers, hydraulic jacks, beam clamps, air castors, tuggers, and tirfors
- describe hydraulic gantry systems ad their components

NOA subtasks covered in this section of training:

A - Occupational Skills
A-2 Communicates in the workplace
A-2.04 Uses hand signals

- types of signs such as crane signals
- hand signals
- explaining signal terminology
- using correct signals
- interpreting signals
- selecting signals for type of equipment

A-2.05 Communicates electronically

- types of electronic communication devices such as cellular/smart phones, two-way radios, lap-top computers and tablets
- communication protocols and company reporting policies
- operating electronic communication devices
- sending, receiving and retrieving information from computers
- communicating through two-way radios and cellular phones

B – Rigging and Hoisting
B-5 Selects rigging equipment
B-5.01 Matches load to lift capability

- lifting equipment
- capacity of lifting equipment
- basic geometry
- weights and measures
- calculating weights of loads
- selecting rigging equipment
- calculating choker tension based on choker angle and load

B-5.02 Inspects rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- knowledge of tools and materials
- identifying defects and damage
- reporting defects and damage

B-5.03 Maintains rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- knowledge of tools and materials
- performing maintenance procedures
- storing rigging equipment

B-6 Uses hoisting and lifting equipment
B-6.01 Uses hoisting equipment

- provincial/territorial and applicable regulations and certification requirements
- types of hoisting equipment such as come-alongs, Tirfors®, chain block hoists, tuggers and derricks
- anchorage locations and capabilities
- policies and procedures
- selecting hoisting equipment
- selecting anchorage locations
- following manufacturers' specifications
- participating in engineered (critical) lifts

B-6.02 Uses lifting equipment

- types of lifting equipment such as hydraulic jacks, fork lifts and air pallets
- policies and procedures
- selecting lifting equipment
- following manufacturers' specifications and recommendations

B-6.03 Attaches rigging to load

- hoisting procedures such as engineer's plan, multi-member and tandem lift
- placement and attachment location
- hoisting specifications
- following lifting procedures
- using and tying knots, bends and hitches
- following rigging procedures
- using rigging equipment

Drawing Interpretation **48 hours**

- interpret specifications and details on various structural steel drawings
- interpret specifications and details on drawings depicting miscellaneous steel components, handrails, platforms, and stairs
- interpret welding symbols
- interpret specifications and shop fabrication drawings
- interpret ornamental drawings
- interpret reinforcing rebar drawings

NOA subtasks covered in this section of training:

A - Occupational Skills

A-1 Interprets occupational documentation

A-1.01 Interprets drawings and specifications`

- types of drawings such as structural erection, architectural, precast shop and fabrication
- welding symbols
- abbreviations and technical vocabulary
- drafting techniques
- interpreting drawing symbols
- correlating types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
- distinguishing types of views
- relates drawings to worksite

A-4 Organizes work

A-4.01 Organizing materials and supplies

- erection sequence
- equipment capabilities and limitations
- site preparation
- shipping documentation
- product specific storage and handling principles
- types of materials and their identification requirements

- scheduling material and supplies required for job
- unloading equipment
- placing and sorting materials and supplies
- reconciling load with shipping documents
- securing equipment and materials

A-4.05

- procedures, specifications and drawings
- interpreting specifications and drawings
- improvising to suit site conditions
- maintaining schedule
- selecting materials and supplies required for task
- selecting equipment and tools required for task

Cranes 2 **60 hours**

- define terminology associated with cranes and lifting operations
- describe safe work practices pertaining to cranes and crane lifting operations
- interpret codes and regulations pertaining to cranes and crane lifting operations
- interpret information pertaining to crane lifting operations found on drawings and specifications
- Interpret tables and charts to lift and move loads
- explain the principle of leverage and their application to cranes
- identify types of cranes and describe their components, characteristics, and applications

NOA subtasks covered in this section of training:

C – Cranes
C-7 Assembles and erects cranes

C-7.01 Assesses crane site limitations

- types of hazards such as overhead power lines, underground services, ground conditions, other workers and obstructions to swing radius
- swing area (radius) of crane
- crane limitations due to inclement weather
- calculating crane radius
- identifying potential hazards
- reading load charts
- minimizing overhead dangers

C-7.02 Determines crane position

- crane types
- crane capacity
- crane radius
- maximum weight of lifts
- crane limitations due to inclement weather
- determining weights of components
- calculating the available headroom
- selecting crane for required task

C-7.03 Prepares bases

- gross weight of crane
- composition of base such as soil, concrete and steel
- types of pads
- selecting pads such as mats, dunnage and cribbing
- visually assessing ground conditions

- ensuring ground is stable and level
- installing falsework

C-7.04 Erects cranes and components

- sequence of assembly
- crane components such as boom sections, counterweights and jibs
- crane signals
- selecting tools used in erection of cranes
- safe rigging practices
- ensuring adequate space for assembly
- installing components
- reeve's/laces blocks
- participating in engineered (critical) lifts

C-8 Disassembles cranes

C-8.01 Disassembles crane components

- method of disassembly
- sequence of disassembly
- equipment and tools required for task
- rigging
- recognizing hazards of disassembly such as tensioned pins and overloads
- disconnecting components to rigging crane components
- blocking boom sections

C-8.02 Prepares crane for transport

- safe rigging practices
- selecting type of rigging
- placing and securing components on transportation deck

*Includes hydraulic, conventional, tower and electric overhead travelling cranes.

Erection and Dismantling

12 hours

- identify knowledge of structural steel members, their characteristics, and applications
- erect structural steel members and components
- demonstrate the procedures used to dismantle, remove, and store structural steel members and components

NOA subtasks covered in this section of training:

A - Occupational SkillsA-3 Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product

- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members
D-9.01 Erects falsework
- types and applications of falsework
- supporting and bracing
- capacity and limitations of falsework
- determining need for falsework
- laying out and constructing falsework
- placing and securing falsework

D-9.02 Attaches structural members
- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members
- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and using surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members
- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading
E-12 Repairs components
E-12.01 Assesses current condition of components
- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components
- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fitting components

E-12.03 Replaces components
- policies and regulations
- removal techniques

- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequencing of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Pre-engineered Structures

20 hours

- read and review blueprints
- describe pre-engineered structures and their components
- review safe assembly of pre-engineered structures

NOA subtasks covered in this section of training:

A - Occupational Skills

A-3 Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings

- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members
9.02 Attaches structural members
- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

9.03 Levels, plumbs and aligns structural members
- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and using surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members
- welding, fitting, tensioning and tightening procedures and practices
- installing fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading
E-12 Repairs components
12.01 Assesses current condition of components
- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components
- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fitting components

E-12.03 Replaces components
- policies and regulations
- removal techniques

- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritizing required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Building Erection 2 — 18 hours

- erect an interior structural steel component using power rigging equipment
- interpret drawings
- identify structural components
- demonstrate safe worksite practices
- demonstrate rigging techniques
- use power rigging equipment

NOA subtasks covered in this section of training:

A - Occupational Skills

A-3 Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task

- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation

D-9 Installs primary and secondary structural members

D-9.02 Attaches structural members

- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvers at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members

- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and using surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading

E-12 Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fitting components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Reinforcing Rebar — 12 hours

- identify types of reinforcing materials and accessories
- describe the procedures to prepare for reinforcing concrete
- demonstrate reinforcing rebar installation and tying techniques

NOA subtasks covered in this section of training:

A - Occupational Skills

A-3 Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members

D-9.02 Attaches structural members

- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tool and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members

- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and using surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading
E-12 Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fit components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques

- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Ironworker Mathematics (Exceed) — 30 hours

- use scientific numbers
- perform conversions and comparisons with percent's, rates, ratios and proportions
- perform angle measurement and calculations
- perform calculations involving circles and partial circles
- perform basic geometry observations
- solve basic problems involving perimeter, area and volume

This section of training exceeds the minimum sequencing as set out in the Ironworker (Structural/Ornamental NOA).

Welding 2 — 18 hours

- describe welding and gouging equipment and accessories
- describe safe welding practices
- perform the Flux Cored Arc Welding (FCAW)

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment

A-3.09 Uses welding equipment

- provincial/territorial and applicable welding regulations
- using Canadian Welding Bureau (CWB) and (CSA) standards
- explaining welding symbols
- explaining welding hazards
- setting up welding equipment
- performing welding process
- adjusting welding parameters to suit site conditions
- identifying damaged, worn or otherwise unsafe welding equipment
- storing welding equipment

***This section of training exceeds the minimum sequencing as set out in the Ironworker (Structural/Ornamental NOA).**

Level Two topics from the NOA that are taught in context:

A-1 Interprets occupational documentation

A-2 Communicates in the workplace

A-4 Organizes work

B-5 Selects rigging equipment

B-6 Uses hoisting and lifting equipment

C-7 Assembles and erects cranes

C-8 Disassembles cranes

For details regarding the In Context Topic, see pages 49.

Pre-engineered Structures **26 hours**

- perform interpretation of drawings specific to engineered structures
- describe pre-engineered structures and their components
- erect pre-engineered structure

NOA subtasks covered in this section of training:

A - Occupational Skills
A-1 Interprets occupational documentation
A-1.01 Interprets drawings and specifications

- types of drawings such as structural erection, architectural, precast shop and fabrication
- welding symbols
- abbreviations and technical vocabulary
- drafting techniques
- interprets drawing symbols
- correlating types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
- distinguishing types of views
- relating drawings to worksite

A-2 Communicates in the workplace
A-2.04 Uses hand signals

- types of signs such as crane signals
- hand signals
- explaining signal terminology
- using correct signals
- interpreting signals
- selecting signals for type of equipment

A-2.05 Communicates electronically

- types of electronic communication devices such as cellular/smart phones, two-way radios, lap-top computers and tablets
- communication protocols and company reporting policies
- operating electronic communication devices
- sending, receiving and retrieving information from computers
- communicating through two-way radios and cellular phones

A-4 Organizes work
A-4.01 Organizes materials and supplies

- erection sequence
- equipment capabilities and limitations
- site preparation
- shipping documentation
- product specific storage and handling principles
- types of materials and their identification requirements
- scheduling material and supplies required for job
- unloading equipment
- placing and sorting materials and supplies
- reconciling load with shipping documents
- securing equipment and materials

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques

- visualizing finished product
- transferring drawing information to accommodate site conditions

A-4.05 Plans work tasks

- procedures, specifications and drawings
- interpreting specifications and drawings
- improvising to suit site conditions
- maintaining schedule
- selecting materials and supplies required for task
- selecting equipment and tools required for task

B – Rigging and Hoisting

B-5 Selects rigging equipment

B-5.01 Matches load to lift capability

- lifting equipment
- capacity of lifting equipment
- basic geometry
- weights and measures
- calculating weights of loads
- selecting rigging equipment
- calculating choker tension based on choker angle and load

B-5.02 Inspects rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- tools and materials
- identifying defects and damage
- reporting defects and damage

B-5.03 Maintains rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- tools and materials
- performing maintenance procedures
- storing rigging equipment

B-6 Uses hoisting and lifting equipment

B-6.01 Uses hoisting equipment

- provincial/territorial and applicable regulations and certification requirements
- types of hoisting equipment such as come-alongs, Tirfors®, chain block hoists, tuggers and derricks
- anchorage locations and capabilities
- policies and procedures
- selecting hoisting equipment
- selecting anchorage locations
- following manufacturers' specifications
- participating in engineered (critical) lifts

B-6.02 Uses lifting equipment

- types of lifting equipment such as hydraulic jacks, fork lifts and air pallets
- policies and procedures
- selecting lifting equipment
- following manufacturers' specifications and recommendations

B-6.03 Attaches rigging to load

- hoisting procedures such as engineer's plan, multi-member and tandem lift
- placement and attachment location
- hoisting specifications

- following lifting procedures
- using and ties knots, bends and hitches
- following rigging procedures
- using rigging equipment

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members
D-9.01 Erects falsework
- types and applications of falsework
- supports and bracing
- capacity and limitations of falsework
- determining need for falsework
- laying out and constructing falsework
- placing and securing falsework

D-9.02 Attaches structural members
- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

---

Welding 3 — 6 hours

- demonstrate knowledge of plasma arc cutting equipment and accessories
- use plasma arc cutting equipment

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Organizes work
A-3.09 Uses welding equipment
- provincial/territorial and applicable welding regulations
- uses Canadian Welding Bureau (CWB) and (CSA) standards
- explaining welding symbols
- explaining welding hazards
- setting up welding equipment
- performing welding process
- adjusting welding parameters to suit site conditions
- identifying damaged, worn or otherwise unsafe welding equipment
- storing welding equipment

Cranes 3 — 40 hours

- define the terminology associated with EOT cranes
- describe the procedures used to communicate during EOT crane operations
- describe hazards and safe work practices pertaining to EOT cranes and EOT crane operations
- identify EOT crane components, accessories, and attachments
- identify types of EOT controls
- describe the procedures used to assemble and install EOT cranes

NOA subtasks covered in this section of training:

C – Cranes

C-7 Assembles and erects cranes

C-7.01 Assesses crane site limitations

- types of hazards such as overhead power lines, underground services, ground conditions, other workers and obstructions to swing radius
- swing area (radius) of crane
- crane limitations due to inclement weather
- calculating crane radius
- identifying potential hazards
- reading load charts
- minimizing overhead dangers

C-7.02 Determines crane position

- crane types
- crane capacity
- crane radius
- maximum weight of lifts
- crane limitations due to inclement weather
- components
- calculating the available headroom
- selecting crane for required task

C-7.03 Prepares bases

- gross weight of crane
- composition of base such as soil, concrete and steel
- types of pads
- selecting pads such as mats, dunnage and cribbing
- visually assessing ground conditions
- ensuring ground is stable and level
- installing falsework

C-7.04 Erects cranes and components

- sequence of assembly
- crane components such as boom sections, counterweights and jibs
- crane signals
- tools used in erection of cranes
- safe rigging practices
- ensuring adequate space for assembly
- installing components
- reeve's/laces blocks
- participating in engineered (critical) lifts

C-8 Disassembles cranes

C-8.01 Disassembles crane components

- method of disassembly
- sequence of disassembly
- equipment and tools required for task
- rigging
- recognizes hazards of disassembly such as tensioned pins and overloads
- disconnecting components
- rigging crane components
- blocking boom sections

C-8.02 Prepares crane for transport

- safe rigging practices
- selecting type of rigging
- placing and securing components on transportation deck

*Includes hydraulic, conventional, tower and electric overhead travelling cranes.

Machinery and Equipment **30 hours**

- identify types of machinery and equipment and their characteristics
- describe the procedures used to install and remove machinery and equipment
- describe safe work practices pertaining to the installation and removal of machinery and equipment

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work
A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members
D-9.02 Attaches structural members

- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members

- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and uses surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque

- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

D-10 Installs ornamental components and systems

D-10.01 Installs curtain walls and window walls

- types of curtain walls and window walls
- curtain wall and window wall installation procedures
- sealants
- layout procedures
- glazing techniques
- establishing benchmarks and control lines
- applying sealants
- installing as per specifications

E – Maintenance and Upgrading

E-12 Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fit components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly
- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritizing required tasks

E-13.03 Removes components
- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Precast Concrete — 24 hours

- describe pre-cast concrete members and their components
- describe the procedures used to erect pre-cast concrete
- describe the procedures used to dismantle pre-cast concrete

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.08 Uses surveying equipment
- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selects equipment for a task
- calculates angles and distances
- transfers blueprint information to site

A-4 Organizes work
A-4.02 Marks layouts
- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D-9 Installs primary and secondary structural members
D-9.02 Attaches structural members
- types of structural members
- crane signals
- installation techniques and methods
- tools and equipment capabilities
- maneuvering at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members
- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaches tools and equipment such as cables, jacks and temporary bracing
- setting up and uses surveying equipment such as levels, plumb bobs, transits and laser levels
- determining direction of pull or push

- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E12-Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fit components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E – Maintenance and Upgrading

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keeping records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques

- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Building Dismantling and Storage — 18 hours

- dismantle a structural steel structure using a crane
- interpret information from drawings as pertains to installation of machinery
- identify structural components pertaining to machinery and equipment installation and removal
- demonstrate safe worksite practices
- demonstrate advanced rigging procedures

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-9 Installs primary and secondary structural members

D-9.02 Attaches structural members

- types of structural members
- crane signals
- types of bolts and pins
- installation techniques and methods
- tools and equipment capabilities
- maneuvers at heights
- fitting, placing and modifying members
- determining minimum fastening requirements to secure the member

D-9.03 Levels, plumbs and aligns structural members

- plumbing and alignment equipment such as cables and surveying equipment
- plumbing and aligning techniques and tolerances
- temporary bracing techniques
- attaching tools and equipment such as cables, jacks and temporary bracing
- setting up and using surveying equipment such as levels, plumb bobs, transits and laser levels

- determining direction of pull or push
- placing shims to the desired elevation

D-9.04 Completes installation of structural members

- welding, fitting, tensioning and tightening procedures and practices
- installation of fasteners
- specifications and tolerances such as for welding and torque
- tightening bolts
- aligning holes using equipment such as pins, bars and reamers
- fabricating connections in place
- selecting fasteners
- fitting and welding members

E – Maintenance and Upgrading

E-12 Repairs components

E-12.01 Assesses current condition of components

- manufacturers' specifications
- policies and procedures
- confirming components meet specifications
- communicating observed defects
- using diagnostic tools such as calipers and torque wrenches

E-12.02 Field-fabricates components

- layout techniques
- manufacturers' specifications
- policies and procedures
- fabricating and fitting components

E-12.03 Replaces components

- policies and regulations
- removal techniques
- installation techniques
- temporary and permanent support techniques
- removing defective components
- installing replacement components
- verifying conditions of repair
- installing temporary and permanent supports

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing
- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques

- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Miscellaneous and Ornamental Ironwork — 54 hours

- perform interpretation of shop drawings
- describe the components, characteristics, and applications of miscellaneous and ornamental ironwork
- identify the procedures used to fabricate and install miscellaneous and ornamental ironwork
- identify floor and roof decking procedures
- describe wood glulam handling and erection

NOA subtasks covered in this section of training:

A - Occupational Skills
A-Uses and maintains tools and equipment

A-3.08 Uses surveying equipment

- types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
- measurement techniques
- blueprint interpretation
- marking techniques
- selecting equipment for a task
- calculating angles and distances
- transferring blueprint information to site

A-4 Organizes work

A-4.02 Marks layouts

- drawings
- interpreting drawings
- using measuring devices and layout tools
- applying marking and layout techniques
- visualizing finished product
- transferring drawing information to accommodate site conditions

D – Erection, Assembly and Installation
D-10 Installs ornamental components and systems

D-10.02 Installs miscellaneous components

- types of miscellaneous components such as stairs, railings and coverings
- miscellaneous component installation procedures
- determining installation sequence such as sub-assembly and order of installation
- fitting, welding and finishing a variety of materials
- field-fabricating and modifying components
- following manufacturers' specifications
- finishing installation such as polishing and painting

E – Maintenance and Upgrading
E-12 Repairs components

E-12.04 Performs preventative maintenance

- manufacturers' specifications
- policies and procedures
- materials used such as reinforcing, lubrication and hard surfacing

- maintenance logs and schedules
- maintenance techniques
- interpreting maintenance schedules
- performing maintenance techniques such as reinforcing, lubrication and hard surfacing

E-13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components

E-13.01 Ensures decommissioning of structure or components

- policies and procedures such as lock-out, tagging procedures,
- hot work procedures and WHMIS
- sequence of decommissioning
- temporary support techniques
- reviewing decommissioning documentation and keep records

E-13.02 Plans sequence of disassembly

- disassembly sequence
- disassembly techniques
- temporary support techniques
- determining and prioritize required tasks

E-13.03 Removes components

- sequence of tasks
- storage and placement of components
- stored energy and dynamic loads within the structure
- following sequence of disassembly

Equipment Certifications **12 hours**

- demonstrate the use of aerial work platform
- demonstrate the use of telefork operation

NOA subtasks covered in this section of training:

A - Occupational Skills
A-3 Uses and maintains tools and equipment
A-3.04 Uses aerial work platforms

- types and uses of aerial work platforms
- aerial work platform safety
- explaining aerial work platform regulations and certification requirements
- aerial work platform components and accessories
- operating procedures of aerial work platforms
- manufacturers' specifications for use of aerial work platforms
- identifying damaged, worn or otherwise unsafe aerial work platforms and equipment
- positioning aerial work platforms
- storing aerial work platforms

A-3.05 Uses ladders

- types and uses of ladders
- safe operating procedures for ladders
- manufacturers' specifications for use and care of ladders
- positioning ladders
- dismantles ladders
- identifying worn, damaged or otherwise unsafe ladders

A-3.06 Uses scaffolding

- regulations pertaining to scaffolding
- types of scaffolding
- installation and dismantling procedures
- manufacturers' recommended uses and limitations of scaffolding
- positioning, levelling and erecting scaffolding and installs planking, guardrails and toe plates
- securing scaffolding, planking, guardrails, toe plates and related components
- dismantling and storing scaffolding
- identifying damaged, worn or otherwise unsafe scaffolding and planking

***This section of training exceeds the minimum sequencing as set out in the Ironworker (Structural/Ornamental NOA).**

Level 3 subtasks from the NOA that are taught in context:

A-1 Interprets occupational documentation

A-2 Communicates in the workplace

A-3 Uses and maintains tools and equipment

A-4 Organizes work

B-5 Selects rigging equipment.

B-6 Uses hoisting and lifting equipment

C-7 Assembles and erects cranes

C-8 Disassembles cranes

For details regarding the In Context Topics, see page 49.

IN CONTEXT TOPICS

In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

A - Occupational Skills

A-1 Interprets occupational documentation

A-1.01 Interprets drawings and specification**s**

- types of drawings such as structural erection, architectural, precast shop and fabrication
- welding symbols
- abbreviations and technical vocabulary
- drafting techniques
- interpreting drawing symbols
- correlating types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
- distinguishing types of views
- relating drawings to worksite

A-2 Communicates in the workplace

A-2.04 Uses hand signals

- types of signs such as crane signals
- hand signals
- explaining signal terminology
- using correct signals
- interpreting signals
- selecting signals for type of equipment

A-3 Uses and maintains tools and equipment

A-3.09 Uses welding equipment

- provincial/territorial and applicable welding regulations
- using Canadian Welding Bureau (CWB) and (CSA) standards
- explaining welding symbols
- explaining welding hazards
- setting up welding equipment
- performing welding process
- adjusting welding parameters to suit site conditions
- identifying damaged, worn or otherwise unsafe welding equipment
- storing welding equipment

A-4 Organizes work

A-4.01 Organizes materials and supplies.

- erection sequence
- equipment capabilities and limitations
- site preparation
- shipping documentation
- product specific storage and handling principles
- types of materials and their identification requirements
- scheduling material and supplies required for job
- unloading equipment
- placing and sorting materials and supplies
- reconciling load with shipping documents
- securing equipment and materials

A-4.05 Plans work tasks Drawings

- procedures, specifications and drawings
- interpreting specifications and drawings

- improvising to suit site conditions
- maintaining schedule
- selecting materials and supplies required for task
- selecting equipment and tools required for task

B-Rigging and hoisting

B-5 Selects rigging and equipment

B-5.01 Matches load to lift capability

- lifting equipment
- capacity of lifting equipment
- basic geometry
- weights and measures
- calculating weights of loads
- selecting rigging equipment
- calculating choker tension based on choker angle and load

B-5.02 Inspects rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- tools and materials
- identifying defects and damage
- reporting defects and damage

B-5.03 Maintains rigging equipment

- types of rigging equipment
- manufacturers' specifications
- policies and procedures
- tools and materials
- performing maintenance procedures
- storing rigging equipment

B-6 Uses hoisting and lifting equipment

B-6.01 Uses hoisting equipment

- provincial/territorial and applicable regulations and certification requirements
- types of hoisting equipment such as come-alongs, Tirfors®, chain block hoists, tuggers and derricks
- anchorage locations and capabilities
- policies and procedures
- selecting hoisting equipment
- selecting anchorage locations
- following manufacturers' specifications
- participating in engineered (critical) lifts

B-6.02 Uses lifting equipment

- types of lifting equipment such as hydraulic jacks, fork lifts and air pallets
- policies and procedures
- selecting lifting equipment
- following manufacturers' specifications and recommendations

B-6.03 Attaches rigging to load

- hoisting procedures such as engineer's plan, multi-member and tandem lift
- placement and attachment location
- hoisting specifications
- following lifting procedures
- using and tying knots, bends and hitches
- following rigging procedures
- using rigging equipment

C- Cranes

C-7 Assembles and erects cranes

C-7.01 Assesses crane site limitations

- types of hazards such as overhead power lines, underground services, ground conditions, other workers and obstructions to swing radius
- swing area (radius) of crane
- crane limitations due to inclement weather
- calculating crane radius
- identifying potential hazards
- reading load charts
- minimizing overhead dangers

C-7.02 Determines crane position

- crane types
- crane capacity
- crane radius
- maximum weight of lifts
- crane limitations due to inclement weather
- determining weights of components
- calculating the available headroom
- selecting crane for required task

C-7.03 Prepares bases

- gross weight of crane
- composition of base such as soil, concrete and steel
- types of pads
- selecting pads such as mats, dunnage and cribbing
- visually assessing ground conditions
- ensuring ground is stable and level
- installing falsework

C-8 Disassembles cranes

C-8.01 Disassembles crane components

- method of disassembly
- equipment and tools required for task
- rigging
- recognizing hazards of disassembly such as tensioned pins and overloads
- disconnecting components
- rigging crane components
- blocking boom sections

C-8.02 Prepares crane for transport

- safe rigging practices
- selecting type of rigging
- placing and securing components on transportation deck

APPENDIX A: POST HARMONIZATION TRAINING PROFILE CHART

This chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

Implementation for harmonization took place progressively.

SATCC Level One	Transcript Code	Hours	Pan-Canadian Harmonized Level One
Safety Awareness	SFTY 134	18	Safety Awareness
Tools and Equipment	EQPT 156	20	Tools and Equipment
Access Equipment	EQPT 157	15	Access Equipment
Hoisting Lifting and Rigging 1	RIGG 130	33	Hoisting Lifting and Rigging 1
Welding 1	WLDR 133	18	Welding 1
			Oxy-fuel Cutting
Drawing Interpretation and Work Planning	BPRT 130	40	Drawings
			Communication and Trade Documentation
Cranes 1	EQPT 158	18	Introduction to Cranes
Structural Components	STRU 130	36	Structural Components
Building Erection 1	STRU 131	12	Structural Steel Erection and Dismantling
Ironworker Mathematics	MATH 118	30	*Exceed
		240	

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level Two
Hoisting, Lifting and Rigging 2	RIGG 200	22	Hoisting, Lifting, and Rigging
Drawing Interpretation	BPRT 202	48	Drawings
Crane 2	EQPT 200	60	Cranes
Erection and Dismantling	STRU 204	12	Structural Components
			Structural Steel Erection and Dismantling
Building Erection 2	STRU 205	18	Miscellaneous Ironwork
			Machinery and Equipment
			Work Planning (*In Context*)
Pre-engineered Structures	STRU 208	20	Pre-engineered Structures
Reinforcing Rebar	MATE 200	12	Pre-cast Concrete Erection and Dismantling
Welding 2	WELD 217	18	*Exceed
Ironworker Mathematics	MATH 221	30	
		240	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
Welding 3	WELD 307	6	Welding 3
			Work Planning (In Context)
Pre-engineered Structures	STRU 300	26	Pre-engineered Structures
			Structural Components
			Hoisting Lifting and Rigging
			Drawings
			Work Planning
Cranes 3	EQPT 303	40	Cranes 3
Building Dismantling and Storage	STRU 301	18	Structural Steel Erection and Dismantling
Precast Concrete	MATE 301	24	Precast Concrete erection and dismantling
Machinery and Equipment	EQPT 301	30	Machinery and Equipment
			Hoisting, Lifting and Rigging (In Context)
Miscellaneous and Ornamental work	MATE 300	54	Miscellaneous Ironwork
			Drawings (In Context)
Equipment Certifications	EQPT 301	12	*Exceed
		210	

Exceed Topics

Throughout this guide to course content there are topics which exceed the minimum scope of work as set out in the Ironworker (Structural/Ornamental) NOA. Industry in Saskatchewan has deemed certain topics to fall within the scope of work of the Ironworker (Structural/Ornamental) trade in Saskatchewan and therefore require technical training to cover these topics.