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RED SEAL · SCEAU ROUGE

National Occupational Analysis

Ironworker (Structural/ Ornamental)

2015

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Ironworker (Structural/Ornamental)

2015

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis as the national standard for the occupation of ironworker (structural/ornamental).

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Employment and Social Development Canada (ESDC) sponsors a program, under the guidance of the CCDA, to develop a series of National Occupational Analyses (NOAs).

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

The CCDA and ESDC wish to express sincere appreciation for the contribution of the many tradespersons, industrial establishments, professional associations, labour organizations, provincial and territorial government departments and agencies, and all others who contributed to this publication.

Special acknowledgement is extended by ESDC and the CCDA to the representatives from the trade across Canada who contributed to the development of this document.

This 2015 edition of the NOA was reviewed, updated and validated by industry representatives from across Canada to ensure that it continues to represent the skills and knowledge required in this trade. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division of ESDC. The host jurisdiction of Alberta also participated in the development of this NOA.

Comments or questions about National Occupational Analyses may be forwarded to:

Trades and Apprenticeship Division
Labour Market Integration Directorate
Employment and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9
Email: redseal-sceaurouge@hrsdc-rhdcc.gc.ca

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To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

Blocks	the largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Supporting Knowledge and Abilities	the elements of skill and knowledge that an individual must acquire to adequately perform the sub-task

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	a list of products, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	a non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	a list of acronyms used in the analysis with their full name
Appendix D — Block and Task Weighting	the block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	a graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from ESDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

BLOCKS	Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a block.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis Not Validated by a province/territory
ND	trade Not Designated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGES %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties are aware of circumstances and conditions that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that a safety-conscious attitude and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Material Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

SCOPE OF THE IRONWORKER (STRUCTURAL/ORNAMENTAL) TRADE

"Ironworker (Structural/Ornamental)" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by an ironworker (structural/ornamental) whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Ironworker (Structural/Ornamental)	✓	✓	✓						✓	✓			
Ironworker - Structural and Ornamental						✓							
Ironworker Structural								✓					

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.

Technology continues to contribute to many changes in equipment design and construction materials. These innovations require constantly changing methods and techniques governed by appropriate attitudes towards the current high standards for fabrication, erection and installation of structural and ornamental components. Maintaining updated knowledge of these changes presents a daily challenge to the people of this trade.

The work of an ironworker (structural/ornamental), by its nature, possesses inherent hazards. Safe work procedures, best practices and job hazard analysis assist in controlling or eliminating hazards. However, errors in judgment or in practical application of trade knowledge can be costly, both in terms of injury to workers and damage to equipment or materials. Workers must maintain constant attention to the application of safety and accident prevention at all times.

Equipment such as fall protection equipment, aerial work platforms, breathing apparatus and fume extraction equipment have become an integral part of all worksites and places of employment.

Ironworkers (Structural/Ornamental) are increasingly being called on to document and maintain records due to more stringent laws and regulations. The end products in industrial and other applications must be appropriately installed, inspected and documented. This places more responsibility on supervisors, quality control personnel and the individuals who perform the installation and assembly of components. The tremendous variety in equipment and methods means that the ironworker (structural/ornamental) must be more knowledgeable and adaptable than ever before.

Trends

There is greater emphasis on training and retraining of ironworkers (structural/ornamental). There is also a greater awareness of safety and safer working conditions and an increased emphasis on job coordination and scheduling. Also, there have been significant changes in the engineering and technology of ironworker (structural/ornamental) tools and equipment such as laser levels and electronic measuring instruments. Aerial work platforms and specialty access equipment technology is constantly improving and are widely used.

Task 1 Interprets occupational documentation.

Related Components (including, but not limited to)

Drawings (structural, architectural, mechanical, engineering, detail and layout), codes (American National Standards Institute [ANSI], Canadian Standards Association [CSA], American Standard for Testing Materials [ASTM], and Workplace Hazardous Materials Information System [WHMIS]), specifications, shipping documentation, manufacturers' manuals and occupational health and safety (OH&S) legislation.

Tools and Equipment

Architectural scales, calculator, measuring tape.

Sub-task

A-1.01 Interprets drawings and specifications.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-1.01.01	knowledge of types of drawings such as structural erection, architectural, precast shop and fabrication
A-1.01.02	knowledge of welding symbols
A-1.01.03	knowledge of abbreviations and technical vocabulary
A-1.01.04	knowledge of drafting techniques
A-1.01.05	ability to interpret drawing symbols

A-1.01.06	ability to correlate types of drawings such as structural drawings, architectural drawings, engineering drawings, detail drawings and erection drawings
A-1.01.07	ability to distinguish types of views
A-1.01.08	ability to relate drawings to worksite

Sub-task

A-1.02 Interprets standards, regulations and procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-1.02.01	knowledge of standards such as CSA, ANSI and ASTM
A-1.02.02	knowledge of regulations such as OH&S Act, WHMIS, fall protection, mobile equipment and confined space
A-1.02.03	knowledge of the location of standards, regulations and procedures
A-1.02.04	ability to apply procedures such as assembly, welding, placing, hoisting, tensioning and grouting
A-1.02.05	ability to apply written work procedures

Task 2 — Communicates in the workplace.

Related Components (including, but not limited to)	Manufacturers' documentation, manuals, record books.
Tools and Equipment	Communication devices (fax, cellular phone, telephone, photocopier, computer, cameras, headsets, two-way radios, printers), flags, signage.

Sub-task

A-2.01 Communicates with co-workers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-2.01.01	knowledge of types of communication
A-2.01.02	knowledge of interpersonal communication techniques
A-2.01.03	knowledge of trade vocabulary
A.2.01.04	knowledge of barriers to communication
A.2.01.05	ability to write clearly and concisely
A.2.01.06	ability to actively listen
A.2.01.07	ability to check to confirm understanding

Sub-task

A-2.02 Communicates with others.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-2.02.01	knowledge of job-related terminology
A-2.02.02	knowledge of report formats
A-2.02.03	ability to actively listen

A-2.02.04	ability to translate technical terms into layperson language
A-2.02.05	ability to address others' concerns
A-2.02.06	ability to write reports in prescribed formats
A-2.02.07	ability to check to confirm understanding

Sub-task

A-2.03 Communicates with apprentices.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-2.03.01	knowledge of capability of apprentice
A-2.03.02	ability to listen, teach, coach and mentor
A-2.03.03	ability to supervise
A-2.03.04	ability to assess and record ongoing progress

Sub-task

A-2.04 Uses hand signals.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-2.04.01	knowledge of types of signals such as crane signals
A-2.04.02	knowledge of hand signals
A-2.04.03	knowledge of signal terminology
A-2.04.04	ability to select types of signals
A-2.04.05	ability to interpret signals
A-2.04.06	ability to select signals for type of equipment

Sub-task

A-2.05 Communicates electronically.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-2.05.01	knowledge of types of electronic communication devices such as cellular/smart phones, two-way radios, lap-top computers and tablets
A-2.05.02	knowledge of communication protocols and company reporting policies
A-2.05.03	ability to operate electronic communication devices
A-2.05.04	ability to send, receive and retrieve information from computers
A-2.05.05	ability to communicate through two-way radios and cellular phones

Task 3 Uses and maintains tools and equipment.

Related Components (including, but not limited to) Manufacturers' manuals, cleaning supplies, lubricating supplies.

Tools and Equipment See Appendix A.

Sub-task

A-3.01 Uses hand tools and measuring equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.01.01	knowledge of types and uses of hand tools
A-3.01.02	knowledge of hand tool safety
A-3.01.03	knowledge of manufacturers' specifications on the use and care of hand tools
A.3.01.04	knowledge of types of measuring equipment

A.3.01.05	ability to select hand tools required for a task
A.3.01.06	ability to identify damaged, worn or otherwise unsafe hand tools
A.3.01.07	ability to clean and store hand tools
A.3.01.08	ability to maintain hand tools

Sub-task

A-3.02 Uses power tools.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.02.01	knowledge of types and uses of power tools such as pneumatic, electric, gas powered and hydraulic
A-3.02.02	knowledge of power tool components
A-3.02.03	knowledge of operating procedures for power tools
A-3.02.04	knowledge of power tool safety
A-3.02.05	knowledge of manufacturers' recommended uses, limitations and maintenance of power tools
A-3.02.06	ability to select power tools required for a task
A-3.02.07	ability to identify damaged, worn or otherwise unsafe power tools
A-3.02.08	ability to clean and store power tools
A-3.02.09	ability to maintain power tools

Sub-task

A-3.03 Uses powder-actuated tools.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	no	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.03.01	knowledge of types and uses of powder-actuated tools
A-3.03.02	knowledge of powder-actuated tool components
A-3.03.03	knowledge of operating procedures for powder-actuated tools
A-3.03.04	knowledge of powder-actuated tool safety

A-3.03.05	knowledge of manufacturers' recommended uses and limitations
A-3.03.06	knowledge of powder-actuated tool regulations and certification requirements.
A-3.03.07	ability to select powder-actuated charges and fasteners required for a task
A-3.03.08	ability to identify damaged, worn or otherwise unsafe powder-actuated tools
A-3.03.09	ability to clean and lubricate powder-actuated tools
A-3.03.10	ability to store powder-actuated tools

Sub-task

A-3.04 Uses aerial work platforms.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.04.01	knowledge of types and uses of aerial work platforms
A-3.04.02	knowledge of aerial work platform safety
A-3.04.03	knowledge of aerial work platform regulations and certification requirements
A-3.04.04	knowledge of aerial work platform components and accessories
A-3.04.05	knowledge of operating procedures of aerial work platforms
A-3.04.06	knowledge of manufacturers' specifications for use of aerial work platforms
A-3.04.07	ability to identify damaged, worn or otherwise unsafe aerial work platforms and equipment
A-3.04.08	ability to position aerial work platforms
A-3.04.09	ability to store aerial work platforms

Sub-task

A-3.05 Uses ladders.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.05.01	knowledge of types and uses of ladders
A-3.05.02	knowledge of safe operating procedures for ladders
A-3.05.03	knowledge of manufacturers' specifications for use and care of ladders
A-3.05.04	ability to position ladders
A-3.05.05	ability to secure ladders
A-3.05.06	ability to dismantle and store ladders
A-3.05.07	ability to identify worn, damaged or otherwise unsafe ladders

Sub-task

A-3.06 Uses scaffolding.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.06.01	knowledge of regulations pertaining to scaffolding
A-3.06.02	knowledge of types of scaffolding
A-3.06.03	knowledge of installation and dismantling procedures
A-3.06.04	knowledge of manufacturers' recommended uses and limitations of scaffolding
A-3.06.05	ability to position, level and erect scaffolding and install planking, guardrails and toe plates
A-3.06.06	ability to secure scaffolding, planking, guardrails, toe plates and related components
A-3.06.07	ability to dismantle and store scaffolding
A-3.06.08	ability to identify damaged, worn or otherwise unsafe scaffolding and planking

Sub-task

A-3.07 Uses personal protective equipment (PPE).

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.07.01	knowledge of types and uses of PPE such as hard hats, safety glasses, hearing protection, high-visibility clothing, welding PPE, safety footwear and fall protection equipment
A-3.07.02	knowledge of PPE safety
A-3.07.03	knowledge of manufacturers' recommended uses, limitations and maintenance of PPE
A-3.07.04	knowledge of workplace rules and regulations
A-3.07.05	ability to select PPE for conditions encountered
A-3.07.06	ability to use fall protection equipment such as harnesses and safety lines
A-3.07.07	ability to identify damaged, worn or otherwise unsafe PPE
A-3.07.08	ability to store PPE
A-3.07.09	ability to access PPE information such as MSDS

Sub-task

A-3.08 Uses surveying equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.08.01	knowledge of types of layout instruments such as theodolite, transit, scales, laser level, total station and builder's level
A-3.08.02	knowledge of measurement techniques
A-3.08.03	knowledge of blueprint interpretation
A-3.08.04	knowledge of marking techniques
A-3.08.05	ability to select equipment for a task
A-3.08.06	ability to calculate angles and distances
A-3.08.07	ability to transfer blueprint information to site

A-3.08.08 ability to set up and check calibration equipment

A-3.08.09 ability to store surveying equipment

Sub-task

A-3.09 Uses welding equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.09.01 knowledge of provincial/territorial and applicable welding regulations

A-3.09.02 knowledge of Canadian Welding Bureau (CWB) and (CSA) standards

A-3.09.03 knowledge of welding processes and procedures

A-3.09.04 knowledge of welding symbols

A-3.09.05 knowledge of welding hazards

A-3.09.06 knowledge of welding equipment

A-3.09.07 knowledge of welding consumables

A-3.09.08 knowledge of welding defects

A-3.09.09 ability to set up welding equipment

A-3.09.10 ability to perform welding processes

A-3.09.11 ability to adjust welding parameters to suit site conditions

A-3.09.12 ability to identify damaged, worn or otherwise unsafe welding equipment

A-3.09.13 ability to store welding equipment

Sub-task

A-3.10 Uses thermal and oxy-fuel cutting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-3.10.01 knowledge of cutting processes

A-3.10.02 knowledge of cutting equipment

A-3.10.03 knowledge of cutting consumables

A-3.10.04	ability to set up equipment
A-3.10.05	ability to inspect equipment
A-3.10.06	ability to adjust cutting parameters
A-3.10.07	ability to recognize cutting hazards
A-3.10.08	ability to identify damaged, worn or otherwise unsafe cutting equipment
A-3.10.09	ability to store cutting equipment and consumables

Task 4 Organizes work.

Related Components (including, but not limited to)	Company standards, safety manuals, company policies, procedures and regulations, schedules/calendars, drawings, specifications.
Tools and Equipment	See Appendix A.

Sub-task

A-4.01 Organizes materials and supplies.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-4.01.01	knowledge of erection sequence
A-4.01.02	knowledge of equipment capabilities and limitations
A-4.01.03	knowledge of site preparation
A-4.01.04	knowledge of shipping documentation
A-4.01.05	knowledge of product specific storage and handling principles
A-4.01.06	knowledge of types of materials and their identification requirements
A-4.01.07	ability to schedule material and supplies required for job
A-4.01.08	ability to unload equipment
A-4.01.09	ability to place and sort materials and supplies

A-4.01.10 ability to reconcile load with shipping documents

A-4.01.11 ability to secure equipment and materials

Sub-task

A-4.02 Marks layouts.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-4.02.01 knowledge of drawings

A-4.02.02 ability to interpret drawings

A-4.02.03 ability to use measuring devices and layout tools

A-4.02.04 ability to apply marking and layout techniques

A-4.02.05 ability to visualize finished product

A-4.02.06 ability to transfer drawing information to accommodate site conditions

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Sub-task

A-4.03 Maintains safe work environment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-4.03.01 knowledge of safety regulations

A-4.03.02 knowledge of building codes

A-4.03.03 knowledge of applications of safety equipment

A-4.03.04 knowledge of safe work practices and limitations

A-4.03.05 ability to apply safety standards applicable to workplace

A-4.03.06 ability to install safety equipment such as guard rails, static lines, lifelines, screens, temporary flooring, warning signs and barriers

A-4.03.07 ability to maintain good housekeeping

Sub-task

A-4.04 Assesses site hazards.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-4.04.01	knowledge of policies and procedures
A-4.04.02	knowledge of codes and regulations
A-4.04.03	ability to recognize hazards such as floor openings, leading edges, obstructions, temporary supports, dowels and chemical/corrosive/UV environments
A-4.04.04	ability to control hazards
A-4.04.05	ability to perform and document a job hazard analysis (JHA) or a task hazard analysis (THA)

Sub-task

A-4.05 Plans work tasks.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

A-4.05.01	knowledge of procedures, specifications and drawings
A-4.05.02	ability to interpret specifications and drawings
A-4.05.03	ability to improvise to suit site conditions
A-4.05.04	ability to maintain schedule
A-4.05.05	ability to select materials and supplies required for task
A-4.05.06	ability to select equipment and tools required for task

Trends

The occupation has seen an increase in the development and deployment of new technologies such as specialty rigging and the use of synthetic materials. The occupation has seen the increased presence of comprehensive regulations, especially in regard to the use of heavy mobile equipment.

Task 5 Selects rigging equipment.

Related Components (including, but not limited to)

Charts, working load limits, safety factors, rigging capacities.

Tools and Equipment

See Appendix A

Sub-task

B-5.01 Matches load to lift capability.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-5.01.01	knowledge of types of lifting equipment
B-5.01.02	knowledge of the capacity of lifting equipment
B-5.01.03	knowledge of basic geometry
B-5.01.04	knowledge of weights and measures
B-5.01.05	ability to calculate weights of loads
B-5.01.06	ability to select rigging equipment
B-5.01.07	ability to calculate choker tension based on choker angle and load

Sub-task

B-5.02 Inspects rigging equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-5.02.01	knowledge of types of rigging equipment
B-5.02.02	knowledge of manufacturers' specifications
B-5.02.03	knowledge of policies and procedures
B-5.02.04	knowledge of tools and materials
B-5.02.05	ability to identify defects and damage
B-5.02.06	ability to report defects and damage

Sub-task

B-5.03 Maintains rigging equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-5.03.01	knowledge of types of rigging equipment
B-5.03.02	knowledge of manufacturers' specifications
B-5.03.03	knowledge of policies and procedures
B-5.03.04	knowledge of tools and materials
B-5.03.05	ability to perform maintenance procedures
B-5.03.06	ability to store rigging equipment

Task 6 — Uses hoisting and lifting equipment.

Related Components (including, but not limited to)	Load charts, lift diagrams, working load limits, safety factors, fabricated members and construction materials.
Tools and Equipment	Hooks, clips, headache ball, wire rope, Tirfor® (cable puller), come-along, fibre rope, blocks, tugger, tag lines, wedge socket (beckett), hydraulic jacks, chain fall, telehandler, derricks, mobile equipment, cranes. Also see Appendix A.

Sub-task

B-6.01 Uses hoisting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-6.01.01	knowledge of provincial/territorial and applicable regulations and certification requirements
B-6.01.02	knowledge of types of hoisting equipment such as come-alongs, Tirfors®, chain block hoists, tuggers and derricks
B-6.01.03	knowledge of anchorage locations and capabilities
B-6.01.04	knowledge of policies and procedures
B-6.01.05	ability to select hoisting equipment
B-6.01.06	ability to select anchorage locations
B-6.01.07	ability to follow manufacturers' specifications
C-6.01.08	ability to participate in engineered (critical) lifts

Sub-task

B-6.02 Uses lifting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-6.02.01	knowledge of types of lifting equipment such as hydraulic jacks, fork lifts and air pallets
B-6.02.02	knowledge of policies and procedures
B-6.02.03	ability to select lifting equipment
B-6.02.04	ability to follow manufacturers' specifications and recommendations

Sub-task

B-6.03 Attaches rigging to load.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

B-6.03.01	knowledge of hoisting procedures such as engineer's plan, multi-member and tandem lift
B-6.03.02	knowledge of placement and attachment location
B-6.03.03	knowledge of hoisting specifications
B-6.03.04	ability to follow lifting procedures
B-6.03.05	ability to use and tie knots, bends and hitches
B-6.03.06	ability to follow rigging procedures
B-6.03.07	ability to use rigging equipment

Trends

Modern cranes have greater lifting capacity and are more precise in the positioning of their loads, often within millimetres of specifications. The erection of cranes has also become more automatic, with modern cranes greatly assisting in their own assembly.

Task 7 Assembles and erects cranes.

Related Components (including, but not limited to)

Mats, pads, dunnage, boom sections and jib, counterweight, pins and cotter pins, bolts, blocks and sheaves, headache ball, clips, hook, anti-two block, wedge socket, mast, outriggers, gantry, cable components (pendant lines, jib lines, guy lines, load lines).

Tools and Equipment

Types of cranes (assist cranes, rough terrain cranes, all terrain, crawler, hydraulic, tower, boom, electric overhead travelling [EOT], heavy lift, gantries, knuckle boom) and specialty heavy lift components.

Also see Appendix A.

Sub-task

C-7.01 Assesses crane site limitations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-7.01.01	knowledge of types of hazards such as overhead power lines, underground services, ground conditions, other workers and obstructions to swing radius
C-7.01.02	knowledge of swing area (radius) of crane
C-7.01.03	knowledge of crane limitations due to inclement weather
C-7.01.04	ability to calculate crane radius
C-7.01.05	ability to identify potential hazards
C-7.01.06	ability to read load charts
C-7.01.07	ability to minimize overhead dangers

Sub-task

C-7.02 Determines crane position.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-7.02.01	knowledge of crane types
C-7.02.02	knowledge of crane capacity
C-7.02.03	knowledge of crane radius
C-7.02.04	knowledge of maximum weight of lifts
C-7.02.05	knowledge of crane limitations due to inclement weather
C-7.02.06	ability to determine weights of components
C-7.02.07	ability to calculate the available headroom
C-7.02.08	ability to select crane for required task

Sub-task

C-7.03 Prepares bases.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-7.03.01	knowledge of gross weight of crane
C-7.03.02	knowledge of composition of base such as soil, concrete and steel
C-7.03.03	knowledge of types of pads
C-7.03.04	ability to select pads such as mats, dunnage and cribbing
C-7.03.05	ability to visually assess ground conditions
C-7.03.06	ability to ensure ground is stable and level
C-7.03.07	ability to install falsework

Sub-task

C-7.04 Erects cranes and components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-7.04.01	knowledge of sequence of assembly
C-7.04.02	knowledge of crane components such as boom sections, counterweights and jibs
C-7.04.03	knowledge of crane signals
C-7.04.04	knowledge of tools used in erection of cranes
C-7.04.05	knowledge of safe rigging practices
C-7.04.06	ability to ensure adequate space for assembly
C-7.04.07	ability to install components
C-7.04.08	ability to reeve/lace blocks
C-7.04.09	ability to participate in engineered (critical) lifts

Task 8 Disassembles cranes.

Related Components (including, but not limited to)	Mats, pads, dunnage, boom sections and jib, counterweight, pins and cotter pins, bolts, blocks and sheaves, headache ball, clips, hook, anti-two block, wedge socket, mast, outriggers, gantry, cable components (pendant lines, jib lines, guy lines, load lines).
Tools and Equipment	Types of cranes (assist cranes, rough terrain cranes, all terrain, crawler, hydraulic, tower, boom, EOT, heavy lift, gantries, knuckle boom) and specialty heavy lift components. Also see Appendix A.

Sub-task

C-8.01 Disassembles crane components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-8.01.01	knowledge of method of disassembly
C-8.01.02	knowledge of sequence of disassembly
C-8.01.03	knowledge of equipment and tools required for task
C-8.01.04	knowledge of rigging
C-8.01.05	ability to recognize hazards of disassembly such as tensioned pins and overloads
C-8.01.06	ability to disconnect components
C-8.01.07	ability to rig crane components
C-8.01.08	ability to block boom sections

Sub-task

C-8.02 Prepares crane for transport.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-8.02.01	knowledge of safe rigging practices
C-8.02.02	ability to select type of rigging
C-8.02.03	ability to place and secure components on transportation deck

BLOCK D ERECTION, ASSEMBLY AND INSTALLATION

Trends

The occupation has seen steady advancements in the development of safer work environments. Pre-assembled, modular and composite components are becoming common in the occupation. Hi-tech machine movers with greater precision are also a factor in the changes taking place within the occupation.

Task 9 Installs primary and secondary structural members.

Related Components (including, but not limited to)

Steel members (I and H beams, angles, channels, trusses, tees, columns, girts, joists, Hollow Structural Sections [HSS] tubing, decking [Q]), precast members (panels, beams, columns, single tees , twin tees, American Association of State Highway and Transportation Officials [AASHTO] beams and joists), glue-lam beams, composite members, seismic reinforcement supports, corrugated metal decking.

Tools and Equipment

Cables, connectors, sledge hammer, turnbuckles, wire rope, surveying instruments, impact gun, pins (drift, bull), welding machine, clip wrench, rigging hardware, spud wrench, sleever bars, torch, cable clips, plumb bob, come-along, reamer, wedges and jacks, chain fall, clamps, scaffolding, thimble.

Sub-task

D-9.01 Erects falsework.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-9.01.01	knowledge of types and applications of falsework
D-9.01.02	knowledge of supports and bracing
D-9.01.03	knowledge of capacity and limitations of falsework
D-9.01.04	ability to determine need for falsework
D-9.01.05	ability to determine location of falsework

D-9.01.06 ability to lay out and construct falsework

D-9.01.07 ability to place and secure falsework

Sub-task

D-9.02 Attaches structural members.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-9.02.01 knowledge of types of structural members

D-9.02.02 knowledge of crane signals

D-9.02.03 knowledge of types of bolts and pins

D-9.02.04 knowledge of installation techniques and methods

D-9.02.05 knowledge of tools and equipment capabilities

D-9.02.06 ability to manoeuvre at heights

D-9.02.07 ability to fit, place and modify members

D-9.02.08 ability to determine minimum fastening requirements to secure the member

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Sub-task

D-9.03 Levels, plumbs and aligns structural members.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-9.03.01 knowledge of plumbing and alignment equipment such as cables and surveying equipment

D-9.03.02 knowledge of plumbing and aligning techniques and tolerances

D-9.03.03 knowledge of temporary bracing techniques

D-9.03.04 ability to attach tools and equipment such as cables, jacks and temporary bracing

D-9.03.05 ability to set up and use surveying equipment such as levels, plumb bobs, transits and laser levels

D-9.03.06 ability to determine direction of pull or push

D-9.03.07 ability to place shims to the desired elevation

Sub-task

D-9.04 Completes installation of structural members.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-9.04.01 knowledge of welding, fitting, tensioning and tightening procedures and practices

D-9.04.02 knowledge of installation of fasteners

D-9.04.03 knowledge of specifications and tolerances such as for welding and torque

D-9.04.04 ability to tighten bolts

D-9.04.05 ability to align holes using equipment such as pins, bars and reamers

D-9.04.06 ability to fabricate connections in place

D-9.04.07 ability to select fasteners

D-9.04.08 ability to fit and weld members

Task 10 — Installs ornamental components and systems.

Related Components (including, but not limited to)	Steel members (I and H beams, angles, channels, trusses, tees, columns, girts, joists, HSS tubing, decking [Q]), precast members (panels, beams, columns, single and double tee, joists), timber products, composite members, curtain walls, masonry support lintels, seismic reinforcement supports, stairs (structural and ornamental), hand rails, finishing products, coverings.
Tools and Equipment	Hand tools, cables, connectors, turnbuckles, wire rope, surveying instruments, impact gun, pins (drift, bull), welding machine, clip wrench, rigging hardware, spud wrench, sleever bars, torch, cable clips, plumb bob, come-along, reamer, wedges and jacks, chain fall, clamps, scaffolding, squares, ratchet set, level, tap and dies, grinder, rivet gun, glass and power cups, caulking, sealant, shims. Also see Appendix A.

Sub-task

D-10.01 Installs curtain walls and window walls.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	no	no	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-10.01.01	knowledge of types of curtain walls and window walls
D-10.01.02	knowledge of curtain wall and window wall installation procedures
D-10.01.03	knowledge of sealants
D-10.01.04	knowledge of layout procedures
D-10.01.05	knowledge of glazing techniques
D-10.01.06	ability to establish benchmarks and control lines
D-10.01.07	ability to apply sealants
D-10.01.08	ability to install as per specifications

Sub-task

D-10.02 Installs miscellaneous components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-10.02.01	knowledge of types of miscellaneous components such as stairs, railings and coverings
D-10.02.02	knowledge of miscellaneous component installation procedures
D-10.02.03	ability to determine installation sequence such as sub-assembly and order of installation
D-10.02.04	ability to fit, weld and finish a variety of materials
D-10.02.05	ability to field-fabricate and modify components
D-10.02.06	ability to follow manufacturers' specifications
D-10.02.07	ability to finish installation such as polishing and painting

Task 11 — Installs conveyors, machinery and equipment.

Related Components (including, but not limited to)	Crushers, conveyors, ball mills, guards, rollers, hydraulic gantries, jacking towers, multi-bearing rollers, belts, platework, bearings, pillow block, trunions, hangers, rails, chains, floats, supports, headers, take-ups, chutes, vessels, hoppers, tanks, bins, lubricants.
Tools and Equipment	See Appendix A.

Sub-task

D-11.01 Installs material handling systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-11.01.01	knowledge of types of material handling systems and components
D-11.01.02	knowledge of material handling installation procedures
D-11.01.03	ability to assemble components
D-11.01.04	ability to sequence installation of various components such as supports, headers and rails
D-11.01.05	ability to establish work points with surveying equipment

Sub-task

D-11.02 Aligns material handling systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-11.02.01	knowledge of specifications and tolerances
D-11.02.02	knowledge of methods of alignment
D-11.02.03	ability to determine tolerances from drawings to verify locations
D-11.02.04	ability to use precision tools and measuring instruments

D-11.02.05	ability to transfer benchmarks and control lines
D-11.02.06	ability to rig and jack components to specifications
D-11.02.07	ability to troubleshoot for defects and malfunctions
D-11.02.08	ability to secure components

Sub-task

D-11.03 Places machinery and equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

D-11.03.01	knowledge of types of machinery and equipment
D-11.03.02	knowledge of machinery installation procedures
D-11.03.03	knowledge of specifications and tolerances
D-11.03.04	ability to determine weights of machines and components
D-11.03.05	ability to assemble components of machinery
D-11.03.06	ability to insert shims and use adjusting screws for setting and levelling
D-11.03.07	ability to assess best travel path
D-11.03.08	ability to transfer loads to various floats and rollers
D-11.03.09	ability to determine centre of gravity
D-11.03.10	ability to use precision instruments to set machines

Trends

The occupation has seen an increased awareness for the need to develop and implement techniques for reuse and recycling of dismantled structural, mechanical and miscellaneous components.

The occupation continues to promote safe working conditions by raising the level of awareness of environmental hazards such as asbestos and silica.

Task 12 Repairs components.

Related Components (including, but not limited to)

Structural, mechanical and finishing.

Tools and Equipment

See Appendix A.

Sub-task

E-12.01 Assesses current condition of components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-12.01.01	knowledge of manufacturers' specifications
E-12.01.02	knowledge of policies and procedures
E-12.01.03	ability to confirm components meet specifications
E-12.01.04	ability to communicate observed defects
E-12.01.05	ability to use diagnostic tools such as calipers and torque wrenches

Sub-task

E-12.02 Field-fabricates components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-12.02.01 knowledge of layout techniques
E-12.02.02 knowledge of manufacturers' specifications
E-12.02.03 knowledge of policies and procedures
E-12.02.04 ability to fabricate and fit components

Sub-task

E-12.03 Replaces components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-12.03.01 knowledge of policies and regulations
E-12.03.02 knowledge of removal techniques
E-12.03.03 knowledge of installation techniques
E-12.03.04 knowledge of temporary and permanent support techniques
E-12.03.05 ability to remove defective components
E-12.03.06 ability to install replacement components
E-12.03.07 ability to verify conditions of repair
E-12.03.08 ability to install temporary and permanent supports

Sub-task

E-12.04 Performs preventative maintenance.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	no	no	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-12.04.01	knowledge of manufacturers' specifications
E-12.04.02	knowledge of policies and procedures
E-12.04.03	knowledge of materials used such as reinforcing, lubrication and hard surfacing
E-12.04.04	knowledge of maintenance logs and schedules
E-12.04.05	knowledge of maintenance techniques
E-12.04.06	ability to interpret maintenance schedules
E-12.04.07	ability to perform maintenance techniques such as reinforcing, lubrication and hard surfacing

Task 13 — Decommissions, disassembles and removes structural, mechanical and miscellaneous components.

Related Components (including, but not limited to)	Structural, mechanical, finishing.
Tools and Equipment	See Appendix A.

Sub-task

E-13.01 Ensures decommissioning of structure or components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-13.01.01	knowledge of policies and procedures such as lock-out, tagging procedures, hot work procedures and WHMIS
E-13.01.02	knowledge of sequence of decommissioning
E-13.01.03	knowledge of temporary support techniques
E-13.01.04	ability to review decommissioning documentation and keep records

Sub-task

E-13.02 Plans sequence of disassembly.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

E-13.02.01	knowledge of disassembly sequence
E-13.02.02	knowledge of disassembly techniques
E-13.02.03	knowledge of temporary support techniques
E-13.02.04	ability to determine and prioritize required tasks

Sub-task

C-13.03 Removes components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	ND	NV	yes	ND	yes	yes	yes	ND	ND	ND

Supporting Knowledge and Abilities

C-13.03.01	knowledge of sequence of tasks
C-13.03.02	knowledge of storage and placement of components
C-13.03.03	knowledge of stored energy and dynamic loads within the structure
C-13.03.04	ability to follow sequence of disassembly

APPENDICES

APPENDIX A TOOLS AND EQUIPMENT

Hand Tools

adjustable wrench
aligning bar (sleever bar)
Allen key set
B&O hammer
bar clamps
beam clamps
bolt bag
bolt cutters
button pump
cable cutters
centre punch
chalk line
chipping hammer
cold chisel
combination square
combination wrench set
drill bits
files
finger clamps
flashlight
grease gun
hack saw
hammers
hickey bar
hoses (grout, air, water)
knives
knocker wrench
marlinspike
measuring tape
needle nose pliers
nut drivers
pins (drift, bull)
pipe cutters
pipe wrench
pliers
prybar
punch
reamers
reel holder
rod bag
scrapers
screwdrivers — Robertson; Phillips, flat blades
shears
side/diagonal cutters
sledge hammer
slip joint pliers
socket set
spud wrench
tap set
tarps
tie wire reel
tin snips
tool belt
tool bucket
wire brush

Safety Equipment

air movers (fans)
anchor points
cables
eye wash facilities
fire blankets
fire extinguishers
first aid equipment
fume and toxic gas detector
guard rails life lines
perimeter cables
portable lighting
ropes (fibre, wire)
safety barriers
screens
signage
stanchion posts
warning tape
welding flash screens

Personal Protective Equipment (PPE)

breathable air pack
chin straps
coveralls (fire retardant)
ear plugs
face shields
fall arresters
full body harness
gloves
goggles
hard hat
insulated gloves
knee pads
lock-out kit
respirators
retractable lanyard
rope grabs
rubber gloves
safety belt
safety glasses
safety vest
steel toe boots
welding apron
welding gloves
welding helmet
welding jacket
welding shield

Power Tools and Equipment

air chisel
band saw
chop saw
circular saw
compressor
disk
electric hacksaw
gas cut-off saw
gas deck saw
generator
grinder
grouting machine
hammer drill
hydraulic jacks (and accessories)
impact drill
impact gun
mag drill
peening tool
pencil grinder
percussion drill
pneumatic gun
porta band
powder actuated tool
power cords
power drill
power wrench
reciprocating saw
rivet buster
riveting gun
tension control gun

Measuring and Layout Equipment

bevel squares
builders level
chalk
chalk line
crayon
distometers
laser level
laser square
measuring chain
measuring tape
micrometers
optical levels
paint pen
pencil
piano wire
plumb line
prism
rod level

Measuring and Layout Equipment (continued)

scale
soapstone
spirit levels
spraypaint
squares (framing, ombination)
straight edges
string line
torpedo level
total station
tripods
Vernier
water level

Specialty Tools and Equipment (Welding and Cutting Tools)

arc air (gouger)
air lance
arc welding machine
chipping hammer
cutting tools (oxygen, acetylene, propane)
plasma cutter
radiograph
stud welding equipment
stud welding gun
submerged arc machine
thermal cutting machine
thermite welding machine
tiger torch

Scaffolding and Access Equipment

aerial work platforms
aluminium framed platform
aluminium planks
boom lifts
bosun chair
electrical articulated boom lift
electrical scissor lifts
electrical vertical lifts
end frames
extension ladder
floats (angel's wings)
gas powered articulated boom lift
gas powered scissor lifts
ladder jack scaffolds
ladders
mechanical scaffolds
ramps
rolling scaffolds
sawhorses
scissor-lift
stationary scaffolds
stepladders
swing stages
temporary access/freight elevator
tube and clamps

Rigging Equipment

beam clamps
binders
blocks
bridle hitch
cable clamps
chain
chain falls
clips
come-alongs
dunnage
equalizer beam
eye bolts
fibre rope
guy lines
hooks
mechanical/hydraulic jacks
multi-bearing rollers
multiple-leg bridle sling
ring and lines
rope clips
shackles
sheaves
simple roller
softeners
spreader beam
spreaders
swivel
synthetic slings
tackle blocks
tag lines
thimbles
Tirfor® (cable puller)
Tugger
turnbuckles
wedge sockets
winches
wire rope
wire rope slings

Handling Equipment

boom trucks
chain falls
come-alongs
cradle
forklifts (telescopic, electric, gas powered)
glass cups
multi-bearing rollers
pallet jack
power cups
rollers
stretcher
tugger

APPENDIX B GLOSSARY

accessories	items used in conjunctions with reinforcing steel such as bar chairs, slab bolsters, etc.
curtain wall	an enclosing wall which provides no structural support
dunnage	wooden boards and timbers used to hold material in place when being transported
falsework	temporary steel or wooden supports upon which final steel is erected
girts	horizontal or vertical framing member to which sash, siding or other finished material is attached
grating	an arrangement of parallel or latticed bars which serve as the floor of a platform, walkway, etc.
miscellaneous iron products	any steel product or component that is not main structural supporting member
ornamental components	non-structural steel, precast or composite members

APPENDIX C ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
CSA	Canadian Standards Association
CWB	Canadian Welding Bureau
HSS	Hollow Structural Sections
JHA	Job hazard analysis
OH&S	Occupational Health and Safety
PPE	personal protective equipment
PTI	Post Tensioning Institute
THA	Task hazard analysis
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D — BLOCK AND TASK WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	15	12	10	ND	NV	12	ND	5	20	10	ND	ND	ND	12%

Task 1 Interprets occupational documentation.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	28	30	15	ND	NV	17	ND	20	30	30	ND	ND	ND	24%

Task 2 Communicates in the workplace.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	21	15	15	ND	NV	17	ND	20	10	10	ND	ND	ND	16%

Task 3 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	29	25	35	ND	NV	50	ND	40	50	30	ND	ND	ND	37%

Task 4 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	22	30	35	ND	NV	16	ND	20	10	30	ND	ND	ND	23%

BLOCK B RIGGING AND HOISTING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	20	25	25	ND	NV	28	ND	30	20	25	ND	ND	ND	25%

Task 5 Selects rigging equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	50	50	ND	NV	39	ND	60	50	40	ND	ND	ND	48%

Task 6 Uses hoisting and lifting equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	50	50	ND	NV	61	ND	40	50	60	ND	ND	ND	52%

BLOCK C CRANES

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	20	15	15	ND	NV	10	ND	10	10	10	ND	ND	ND	13%

Task 7 Assembles and erects cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	53	60	50	ND	NV	60	ND	65	65	80	ND	ND	ND	62%

Task 8 Disassembles cranes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	47	40	50	ND	NV	40	ND	35	35	20	ND	ND	ND	38%

BLOCK D ERECTION, ASSEMBLY AND INSTALLATION

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	35	40	40	ND	NV	40	ND	45	40	45	ND	ND	ND	40%

Task 9 Installs primary and secondary structural members.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	44	50	25	ND	NV	40	ND	60	60	65	ND	ND	ND	49%

Task 10 Installs ornamental components and systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	27	30	60	ND	NV	30	ND	10	30	20	ND	ND	ND	30%

Task 11 Installs conveyors, machinery and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	29	20	15	ND	NV	30	ND	30	10	15	ND	ND	ND	21%

BLOCK E MAINTENANCE AND UPGRADING

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	10	8	10	ND	NV	10	ND	10	10	10	ND	ND	ND	10%

Task 12 Repairs components.

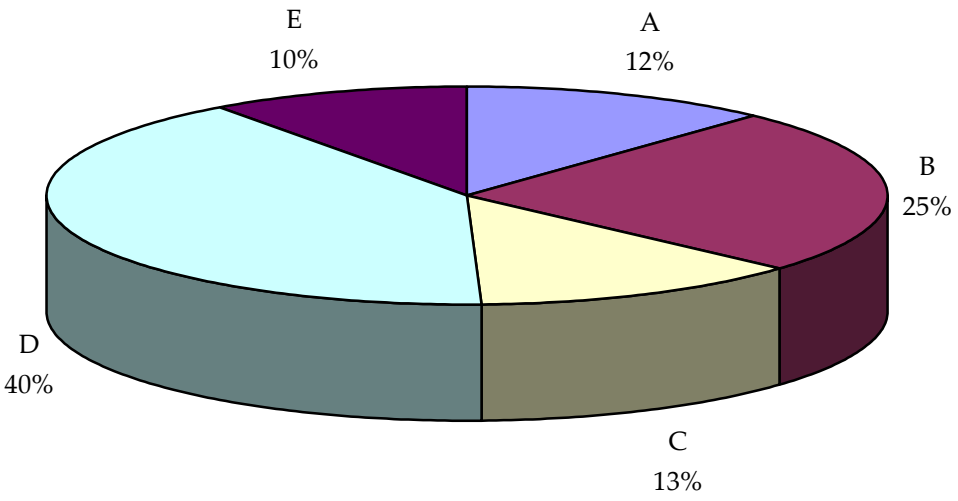
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	31	40	40	ND	NV	70	ND	40	50	60	ND	ND	ND	47%

Task 13 Decommissions, disassembles and removes structural, mechanical and miscellaneous components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	69	60	60	ND	NV	30	ND	60	50	40	ND	ND	ND	53%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Occupational Skills	BLOCK D	Erection, Assembly and Installation
BLOCK B	Rigging and Hoisting	BLOCK E	Maintenance and Upgrading
BLOCK C	Cranes		

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. The Interprovincial examination for this trade has 120 questions.

APPENDIX F

TASK PROFILE CHART — Ironworker (Structural/Ornamental)

BLOCKS	TASKS	SUB-TASKS				
A - OCCUPATIONAL SKILLS	1. Interprets occupational documentation.	1.01 Interprets drawings and specifications.	1.02 Interprets standards, regulations and procedures.			
	2. Communicates in the workplace.	2.01 Communicates with co-workers.	2.02 Communicates with others.	2.03 Communicates with apprentices.	2.04 Uses hand signals.	2.05 Communicates electronically.
	3. Uses and maintains tools and equipment.	3.01 Uses hand tools and measuring equipment.	3.02 Uses power tools.	3.03 Uses powder-actuated tools.	3.04 Uses aerial work platforms.	3.05 Uses ladders.
		3.06 Uses scaffolding.	3.07 Uses personal protective equipment (PPE).	3.08 Uses surveying equipment.	3.09 Uses welding equipment.	3.10 Uses thermal and oxy-fuel cutting equipment.
	4. Organizes work.	4.01 Organizes materials and supplies.	4.02 Marks layouts.	4.03 Maintains safe work environment.	4.04 Assesses site hazards.	4.05 Plans work tasks.
B - RIGGING AND HOISTING	5. Selects rigging equipment.	5.01 Matches load to lift capability.	5.02 Inspects rigging equipment.	5.03 Maintains rigging equipment.		
	6. Uses hoisting and lifting equipment.	6.01 Uses hoisting equipment.	6.02 Uses lifting equipment.	6.03 Attaches rigging to load.		

BLOCKS	TASKS	SUB-TASKS			
C - CRANES	7. Assembles and erects cranes.	7.01 Assesses crane site limitations.	7.02 Determines crane position.	7.03 Prepares bases.	7.04 Erects cranes and components.
	8. Disassembles cranes.	8.01 Disassembles crane components.	8.02 Prepares crane for transport.		
D - ERECTION, ASSEMBLY AND INSTALLATION	9. Installs primary and secondary structural members.	9.01 Erects falsework.	9.02 Attaches structural members.	9.03 Levels, plumbs and aligns structural members.	9.04 Completes installation of structural members.
	10. Installs ornamental components and systems.	10.01 Installs curtain walls and window walls.	10.02 Installs miscellaneous components.		
	11. Installs conveyors, machinery and equipment.	11.01 Installs material handling systems.	11.02 Aligns material handling systems.	11.03 Places machinery and equipment.	
E - MAINTENANCE AND UPGRADING	12. Repairs components.	12.01 Assesses current condition of components.	12.02 Field-fabricates components.	12.03 Replaces components.	12.04 Performs preventative maintenance.
	13. Decommissions, disassembles and removes structural, mechanical and miscellaneous components.	13.01 Ensures decommissioning of structure or components.	13.02 Plans sequence of disassembly.	13.03 Removes components.	