



IRONWORKER (REINFORCING)

2017

Based on the CCDA Harmonization Recommendations and
the Interprovincial Program Guide
(pg. 10 for Program Structure)



Preface

This Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Ironworker (Reinforcing) Apprenticeship Program.

This document contains all of the technical training elements required to complete the apprenticeship program and has been developed based on the 2015 National Occupational Analysis (NOA) and the Interprovincial Program Guide (IPG). The NOA and IPG can be found on the Red Seal website (www.red-seal.ca),

Implementation of this Apprenticeship Curriculum Standard for apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2016-2017
Level 2	2017-2018

*** The above implementation schedule was current at time of printing. Please **confirm** with Apprenticeship Staff prior to commencing training.*

Table of Contents

Preface.....	2
Introduction	4
User Guide	5
Glossary of Terms	6
Essential Skills Profiles	8
Profile Chart.....	9
Nova Scotia Program Structure	10
2015 NOA Sub-Task to Unit Comparison	12

PROGRAM CONTENT

Level 1	16
Level 2	47
Nova Scotia Document Evaluation Form	62

Introduction

Jurisdictions have long recognized the benefit of pooling resources in the development and maintenance of apprenticeship training standards. A successful example of this is the Interprovincial Standards Red Seal Program, which is administered by the Canadian Council of Directors of Apprenticeship (CCDA). Essential to the establishment of standards is the development of suitable training systems and programs which enable tradespeople to acquire certification based on these standards. While certification is the responsibility of Apprenticeship administrators throughout Canada, the development and delivery of technical training is the responsibility of jurisdictions.

With the support of Employment Services and Development Canada (ESDC), the provinces and territories have been working collaboratively to harmonize apprenticeship training programs across Canada. Four main areas of harmonization include:

- Use of the Red Seal trade name
- Consistent total training hours
- Same number of training levels
- Consistent sequencing of training content (at each level) using the most recent Red Seal Occupational Standard/National Occupational Analysis for the trade

This Apprenticeship Curriculum Standard is in alignment with the national CCDA harmonization recommendations.

Provincial-Territorial Apprentice Mobility Agreement and Protocol

The provincial-territorial apprenticeship mobility agreement and protocol obligates Apprenticeship Authorities across Canada to recognize hours worked and technical training successfully completed by apprentices, regardless of the jurisdiction in which they were completed. The protocol applies to apprentices moving permanently or temporarily, and to recent graduates of college trades program.

User Guide

Apprenticeship Curriculum Standards are developed based on the National Occupational Analysis (NOA) or Red Seal Occupational Standard (RSOS) for the trade, the Interprovincial Program Guide (IPG), if available, and extensive industry consultation. This document represents the minimum content to be delivered for the Apprenticeship Training Program.

The document includes a Level Structure that aligns with trade harmonization recommendations to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the Apprenticeship Curriculum Standard is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, “Demonstrate knowledge of...” acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

The National Occupational Analysis (NOA)/Red Seal Occupational Standard (RSOS) to Apprenticeship Curriculum Standard Comparison chart outlines the relationship between each NOA/RSOS sub-task and ACS units. NOA/RSOS References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which you would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
DIAGNOSE	To analyze or identify a problem or malfunction.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs, and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

Glossary of Terms *(continued)*

SERVICE	<p>Routine inspection and replacement of worn or deteriorating parts.</p> <p>An act or business function provided to a customer in the course of one's profession. (e.g., haircut).</p>
TECHNIQUE	<p>Within a procedure, the manner in which technical skills are applied.</p>
TEST	<p>v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality.</p> <p>n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.</p>
TROUBLESHOOT	<p>To follow a systematic procedure to identify and locate a problem or malfunction and its cause.</p>

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- A brief description of the occupation;
- Examples of tasks that illustrate how each essential skill is applied; and,
- Complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDA) website at www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

OCCUPATIONAL SKILLS			
IRR-100 Safety Awareness	IRR-105 Tools and Equipment	IRR-110 Communication and Trade Documentation	IRR-115 Oxy-fuel Cutting
IRR-120 Plasma Arc Cutting	IRR-125 Welding 1	IRR-140 Introduction to Drawings	IRR-145 Temporary Access Equipment
IRR-150 Structural Components	IRR-210 Rebar Drawings	IRR-215 Work Planning	
RIGGING AND HOISTING			
IRR-130 Hoisting, Lifting and Rigging 1	IRR-200 Hoisting, Lifting and Rigging 2		
CRANES			
IRR-135 Introduction to Cranes	IRR-205 Hydraulic and Conventional Cranes		
REINFORCING			
IRR-155 Reinforcing 1	IRR-220 Reinforcing 2		
PRE-STRESSES/POST-TENSIONS			
IRR-160 Pre-Stressed/Post- Tensioning Systems 1	IRR-230 Pre-Stressed/Post- Tensioning Systems 2		

Program Structure – Nova Scotia Apprenticeship Program

The courses listed below are required technical training in the Nova Scotia Ironworker (Reinforcing) Apprenticeship Program. Apprentices are required to complete all courses in Levels 1 & 2.

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Units To Be Covered			
			Unit #	Unit Title	Sugg. Hrs	Pg.
Level 1 (8 weeks)						
MENT-1801	Integrated Milestone	None	MENT-1801	Workplace Mentoring I		17
IRWA-1801	Safety / Tools & Equipment	None	IRR-100	Safety Awareness	14	18
			IRR-105	Tools and Equipment	14	20
			IRR-110	Communication and Trade Documentation	3	22
IRWA-1831	Cutting and Welding	IRWA-1801	IRR-115	Oxy-fuel Cutting	6	24
			IRR-120	Plasma Arc Cutting	2	26
			IRR-125	Welding 1	22	28
IRWA-1850	Rigging and Cranes 1 * 2 week course	IRWA-1801	IRR-130	Hoisting, Lifting and Rigging 1	30	30
			IRR-135	Introduction to Cranes	30	32
IRWA-1851	Introduction to Drawings	IRWA-1801	IRR-140	Introduction to Drawings	30	34
IRWA-1852	Temporary Access Equipment and Structural Components	IRWA-1850	IRW-145	Temporary Access Equipment	24	36
			IRR-150	Structural Components	15	38
IRWA-1828	Reinforced Concrete 1 (Preparation)	IRWA-1850, 1851	IRR-155	Reinforcing 1	30	41
IRWA-1853	Introduction to Pre-Stressed/Post-Tensioning Systems	IRWA-1801, 1851	IRR-160	Pre-Stressed/Post-Tensioning Systems 1	20	44
Level 2 (7 Weeks)						
MENT-1802	Integrated Milestone	MENT-1801	MENT-1802	Workplace Mentoring II		48
IRWA-1854	Rigging and Cranes 2	IRWA-1850	IRR-200	Hoisting, Lifting and Rigging 2	15	49
			IRR-205	Hydraulic & Conventional Cranes	15	51
IRWA-1855	Rebar Drawings and Work Planning	IRWA-1851	IRR-210	Rebar Drawings	20	53
			IRR-215	Work Planning	10	54
IRWA-1845	Reinforced Concrete 2 (Fabrication)	IRWA-1828	IRR-220	Reinforcing 2 <i>(cover fabrication theory)</i>	30	55
IRWA-1846	Reinforced Concrete 3 (Installation)	IRWA-1845	IRR-220	Reinforcing 2 <i>(cover installation theory)</i>	30	55
IRWA-1847	Pre-Stressed/Post-Tensioning Systems (Unbonded)	IRWA-1851, 1853, 1854	IRR-230	Pre-Stressed/Post-Tensioning Systems 2 <i>(cover unbonded theory)</i>	30	57

Nova Scotia Course No.	Nova Scotia Course Name	Nova Scotia Prerequisites	Units To Be Covered			
			Unit #	Unit Title	Sugg. Hrs	Pg.
IRWA- 1848	Pre-Stressed/Post-Tensioning Systems (Bonded)	IRWA-1847	IRR-230	Pre-Stressed/Post-Tensioning Systems 2 (<i>cover bonded theory</i>)	30	57
IRWA-1830	Program Review	Entire Program	IRR-235	Program Review	30	59
Nova Scotia Ironworker (Reinforcing) Apprenticeship Program: All Courses are Required.						

2015 Ironworker (Reinforcing) NOA Sub-task to Unit Comparison

NOA Sub-task		Unit	
Task 1 - Interprets occupational documentation.			
1.01	Interprets drawings and specifications.	IRR-140	Introduction to Drawings
		IRR-210	Rebar Drawings
1.02	Interprets standards, regulations and procedures.	IRR-110	Communication and Trade Documentation
Task 2 - Communicates in the workplace.			
2.01	Communicates with co-workers.	IRR-110	Communication and Trade Documentation
2.02	Communicates with others.	IRR-110	Communication and Trade Documentation
2.03	Communicates with apprentices.	IRR-110	Communication and Trade Documentation
2.04	Uses hand signals.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
2.05	Communicates electronically.	IRR-110	Communication and Trade Documentation
		IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
Task 3 - Uses and maintains tools and equipment.			
3.01	Uses hand tools and measuring equipment.	IRR-105	Tools and Equipment
3.02	Uses surveying equipment.	IRR-105	Tools and Equipment.
3.03	Uses power tools.	IRR-105	Tools and Equipment
3.04	Uses bending tools and equipment.	IRR-105	Tools and Equipment
		IRR-155	Reinforcing 1
3.05	Uses aerial work platforms.	IRW-145	Temporary Access Equipment
3.06	Uses ladders.	IRW-145	Temporary Access Equipment
3.07	Uses scaffolding.	IRW-145	Temporary Access Equipment
3.08	Uses personal protective equipment (PPE).	IRR-100	Safety Awareness
3.09	Uses welding equipment.	IRR-120	Plasma Arc Cutting
		IRR-125	Welding 1
3.10	Uses oxy-fuel cutting equipment	IRR-115	Oxy-fuel Cutting
Task 4 - Organizes work.			
4.01	Organizes materials and supplies.	IRR-215	Work Planning
4.02	Marks layouts.	IRR-150	Structural Components
4.03	Maintains safe work environment.	IRR-100	Safety Awareness
4.04	Assesses site hazards.	IRR-100	Safety Awareness

NOA Sub-task		Unit	
4.05	Plans work tasks.	IRR-215	Work Planning
Task 5 - Selects rigging equipment.			
5.01	Matches load to lift capability.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
5.02	Inspects rigging equipment.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
5.03	Maintains rigging equipment.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
Task 6 - Uses hoisting and lifting equipment.			
6.01	Uses hoisting equipment.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
6.02	Uses lifting equipment.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
6.03	Attaches rigging to load.	IRR-130	Hoisting, Lifting and Rigging 1
		IRR-200	Hoisting, Lifting and Rigging 2
Task 7 – Selects, assembles and erects cranes and components.			
7.01	Assesses crane site hazards.	IRR-135	Introduction to Cranes
		IRR-205	Hydraulic and Conventional Cranes
7.02	Determines crane position.	IRR-135	Introduction to Cranes
		IRR-205	Hydraulic and Conventional Cranes
7.03	Erects cranes.	IRR-135	Introduction to Cranes
		IRR-205	Hydraulic and Conventional Cranes
Task 8 - Disassembles cranes.			
8.01	Disassembles crane components.	IRR-135	Introduction to Cranes
		IRR-205	Hydraulic and Conventional Cranes
8.02	Prepares crane and components for transport.	IRR-135	Introduction to Cranes
		IRR-205	Hydraulic and Conventional Cranes
Task 9 - Fabricates on-site.			
9.01	Cuts material.	IRR-155	Reinforcing I
		IRR-220	Reinforcing 2
9.02	Bends material.	IRR-155	Reinforcing I
		IRR-220	Reinforcing 2
Task 10 - Installs reinforcing material.			
10.01	Places reinforcing material.	IRR-155	Reinforcing 1
		IRR-220	Reinforcing 2

NOA Sub-task		Unit	
10.02	Ties material.	IRR-155	Reinforcing 1
		IRR-220	Reinforcing 2
10.03	Joins material.	IRR-155	Reinforcing 1
		IRR-220	Reinforcing 2
Task 11 - Places pre-stressed/post-tensioning systems.			
11.01	Lays out profile.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
11.02	Places tendons and accessories.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
11.03	Installs bursting steel and anchorages.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
11.04	Connects tendons to anchors.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
11.05	Protects exposed tendons.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
Task 12 - Stresses tendons.			
12.01	Sets up stressing equipment.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
12.02	Tensions tendons.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
12.03	Cuts and caps tendons.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
12.04	Removes stressing equipment.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1

NOA Sub-task		Unit	
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
12.05	De-stresses tendons.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
Task 13 - Grouts tendons.			
13.01	Sets up grouting equipment.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2
13.02	Installs grouts.	IRR-160	Pre-Stressed/Post-Tensioning Systems 1
		IRR-230	Pre-Stressed/Post-Tensioning Systems 2

LEVEL 1

MENT-1801

Workplace Mentoring I
(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for learning workplace skills.
- Demonstrate strategies to assist in learning skills in the workplace.

Objectives and Content:

Theoretical Objectives

1. Describe the importance of your own experiences.
2. Identify the partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Determine your own learning preferences and explain how these relate to learning new skills.
5. Describe the importance of different types of skills in the workplace.
6. Describe the importance of essential skills in the trade.
7. Identify different ways of learning.
8. Identify your learning preferences.
9. Identify different learning needs and strategies to meet learning needs.
10. Identify techniques for effective communication.
11. Identify strategies to assist in learning a skill.

IRR-100

Safety Awareness

Learning Outcomes:

- Demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

National Occupational Analysis Reference:

- 3.08 Uses personal protective equipment (PPE)
- 4.03 Maintains safe work environment
- 4.04 Assesses site hazards

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications and limitations.
2. Describe the procedures used to care for and maintain PPE.
3. Identify hazards and describe safe work practices.
 - i) personal
 - ii) workplace
 - lockout / tag out
 - confined space awareness
 - trenches and excavations
 - fire
 - heights (fall arrest and protection)
 - marine
 - iii) environmental

4. Identify and describe workplace safety and health regulations.
 - i) federal
 - Workplace Hazardous Material Information System (WHMIS)
 - ii) provincial/territorial
 - occupational health and safety
 - training and certification requirements
 - iii) worksite specific requirements

IRR-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

National Occupational Analysis Reference:

- 3.01 Uses hand tools and measuring equipment
- 3.02 Uses surveying equipment
- 3.03 Uses power tools
- 3.04 Uses bending tools and equipment.

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Identify types of hand tools and describe their applications and procedures for use.
2. Describe the procedures used to inspect, maintain and store hand tools.
3. Identify types of power tools and describe their applications and procedures for use.
 - i) electric
 - ii) hydraulic
 - iii) pneumatic
 - iv) gas
4. Describe the procedures used to inspect, maintain and store power tools.
5. Identify types of measuring and layout tools and equipment and describe their applications and procedures for use.

6. Describe the procedures used to inspect, maintain and store measuring and layout tools and equipment.
7. Identify types of leveling and alignment instruments and describe their applications and procedures for use.
8. Describe the procedures used to inspect, maintain and store leveling and alignment instruments.
9. Identify types of powder actuated equipment and describe their applications.
 - i) certification requirements

IRR-110

Communication and Trade Documentation

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of trade related documentation and its use.
- Demonstrate knowledge of the procedures used to prepare and complete trade documentation.

National Occupational Analysis Reference:

- 1.02 Interprets standards, regulations and procedures
- 2.01 Communicates with co-workers
- 2.02 Communicates with others
- 2.03 Communicates with apprentices.
- 2.05 Communicates electronically
- 4.01 Organizes materials and supplies. (Introduction)
- 4.05 Plans work tasks. (Introduction)

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Describe effective verbal and non-verbal communication.
 - i) other tradespersons
 - ii) co-workers/colleagues
 - iii) supervisors
 - iv) apprentices

2. Identify types of communication devices and describe their applications and operation.
 - i) cellular
 - ii) two-way radio
 - iii) computer

3. Describe the importance of communicating with others to organize materials and supplies on site and effectively plan work tasks.
4. Identify types of trade related documentation and describe their applications and procedures for use.
 - i) manufacturers' specifications
 - ii) codes and standards
 - iii) manuals
 - iv) drawings
 - v) shipping documentation
 - vi) safety documentation
5. Describe the procedures used to prepare and complete trade related documentation.

IRR-115 Oxy-fuel Cutting

Learning Outcomes:

- Demonstrate knowledge of oxy-fuel equipment and accessories.
- Demonstrate knowledge of the procedures used to cut with oxy-fuel equipment.

National Occupational Analysis Reference:

3.10 Uses oxy-fuel cutting equipment

Suggested Hours:

6 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with oxy-fuel cutting.
2. Identify hazards and describe safe work practices pertaining to oxy-fuel cutting.
 - i) personal
 - ii) shop/facility
 - iii) equipment
 - iv) ventilation
 - v) storage/handling
3. Identify and interpret codes and regulations pertaining to oxy-fuel equipment.
4. Identify oxy-fuel equipment and accessories and describe their applications.
5. Identify types of fuels and gases used in oxy-fuel cutting operations and describe their characteristics and applications.

6. Identify types of cutting flames and describe their application and the procedures for flame adjustment.
 - i) oxidizing
 - ii) carburizing
 - iii) neutral
7. Describe the procedures used to set-up, adjust and shut-down oxy-fuel equipment.
8. Describe the procedures used to inspect, maintain and store oxy-fuel equipment.
9. Describe the procedures used to cut materials using oxy-fuel equipment.
10. Identify common cutting faults and describe the procedures to prevent and correct them.
11. Set-up, operate and shut-down oxy-fuel equipment.

IRR-120

Plasma Arc Cutting

Learning Outcomes:

- Demonstrate knowledge of plasma arc cutting equipment and accessories.
- Demonstrate knowledge of procedures used to cut with plasma arc cutting equipment.

National Occupational Analysis Reference:

3.09 Uses welding equipment

Suggested Hours:

2 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plasma arc cutting.
2. Identify hazards and describe safe work practices pertaining to plasma arc cutting.
 - i) personal
 - ii) shop/facility
 - iii) equipment
 - iv) ventilation
 - v) storage/handling
3. Describe the plasma arc cutting process and its applications.
4. Identify plasma arc cutting equipment and accessories and describe their applications.
5. Describe the procedures used to set-up, adjust and shut-down plasma arc cutting equipment.

6. Describe the procedures used to inspect, maintain and store plasma arc cutting equipment.
7. Describe the procedures used to cut using plasma arc cutting equipment.
 - i) free hand
 - ii) straight edge
8. Identify common cutting faults and describe the procedures used to prevent and correct them.
9. Set-up, operate and shut-down plasma arc cutting equipment.

IRR-125

Welding 1

Learning Outcomes:

- Demonstrate knowledge of Shielded Metal Arc Welding (SMAW) equipment and accessories.
- Demonstrate knowledge of SMAW welding processes.

National Occupational Analysis Reference:

3.09 Uses welding equipment

Suggested Hours:

22 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with SMAW welding.
2. Interpret information pertaining to SMAW welding found on drawings.
 - i) symbols
 - ii) abbreviations
3. Identify hazards and describe safe work practices pertaining to SMAW welding.
 - i) personal
 - ii) shop/facility
 - iii) equipment
 - iv) ventilation
 - v) storage/handling
4. Identify codes and standards pertaining to welding.
 - i) Canadian Welding Bureau (CWB)
5. Identify the SMAW welding processes and describe their characteristics and basic applications.

6. Identify SMAW welding equipment, consumables and accessories and describe their application.
7. Describe the procedures used to set-up and adjust SMAW welding equipment.
8. Describe the procedures used to inspect and maintain SMAW welding equipment.
9. Identify types of welds performed using SMAW welding equipment.
10. Identify welding positions and describe their applications.
11. Describe the procedures used to weld using SMAW welding equipment.
12. Identify common weld faults and describe the procedures to prevent and correct them.
13. Set-up, operate and shut-down SMAW welding equipment

IRR-130

Hoisting, Lifting and Rigging 1

Learning Outcomes:

- Demonstrate knowledge of hoisting, lifting and rigging equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of the procedures used to rig material and equipment for hoisting and lifting.
- Demonstrate knowledge of the procedures used to communicate during hoisting and lifting operations.

National Occupational Analysis Reference:

2.04	Uses hand signals.
2.05	Communicates electronically.
5.01	Matches load to lift capability.
5.02	Inspects rigging equipment.
5.03	Maintains rigging equipment.
6.01	Uses hoisting equipment.
6.02	Uses lifting equipment.
6.03	Attaches rigging to load.

Suggested Hours:

30 hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hoisting, lifting and rigging.
2. Identify hazards and describe safe work practices pertaining to hoisting, lifting and rigging.
3. Identify codes and regulations pertaining to hoisting, lifting and rigging.
4. Identify types of rigging equipment and accessories and describe their limitations, applications and procedures for use.

5. Identify types of hoisting and lifting equipment and accessories and describe their applications and procedures for use.
6. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.
7. Identify types of knots, hitches and bends and describe their applications and the procedures used to tie them.
8. Describe the procedures used to rig material/equipment for hoisting and lifting.
9. Describe the procedures used to ensure the work area is safe for hoisting and lifting.
 - i) supervision of lift
 - ii) securing work area
 - iii) communication
10. Identify and describe procedures used to communicate during hoisting, lifting and rigging operations.
 - i) hand signals
 - ii) electronic communications
 - iii) audible/visual
 - iv) relay of signals
11. Perform hand signals used in hoisting, lifting and rigging operations.

IRR-135 Introduction to Cranes

Learning Outcomes:

- Demonstrate knowledge of cranes, their applications and limitations.
- Demonstrate knowledge of crane lifting operations.

National Occupational Analysis Reference:

- 7.01 Assesses crane site limitations.
- 7.02 Determines crane position.
- 7.03 Erects cranes and components.
- 8.01 Disassembles crane components.
- 8.02 Prepares crane and components for transport.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with cranes and crane lifting operations.
2. Identify hazards and describe safe work practices pertaining to cranes and crane lifting operations.
3. Explain the principles of leverage and their application to cranes.
4. Interpret codes and regulations pertaining to cranes and crane lifting operations.
5. Interpret information pertaining to crane lifting operations found on drawings and specifications.
6. Interpret tables and charts to lift and move loads.
 - i) crane limitations
 - tipping/stability failure
 - structural failure

7. Identify types of cranes and describe their components, characteristics and applications.
- i) hydraulic
 - ii) conventional
 - iii) tower
 - iv) electric overhead travelling (EOT)
 - v) crawler
 - vi) carrier mounted
 - vii) rough terrain
 - viii) all terrain
 - ix) high capacity
 - x) knuckle boom
 - xi) boom truck
8. Identify the considerations for crane assembly and disassembly.
- i) site hazard assessment
 - overhead powerlines
 - underground services
 - obstructions
 - soil/ground conditions
 - ii) crane position
 - crane radius/swing area
 - headroom
 - iii) crane and components
 - assembly
 - disassembly
 - transport

IRR-140 Introduction to Drawings

Learning Outcomes:

- Demonstrate knowledge of drawings and their applications.
- Demonstrate knowledge of the procedures to interpret and extract information from drawings.

National Occupational Analysis Reference:

1.01 Interprets drawings and specifications.

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with drawings.

2. Identify types of drawings and describe their applications.
 - i) civil/site/plot
 - ii) architectural
 - iii) mechanical
 - iv) structural
 - v) shop/detail drawings
 - vi) sketches

3. Identify drawing projections and views and describe their applications.
 - i) orthographic
 - ii) oblique
 - iii) isometric
 - iv) section
 - v) auxiliary

4. Interpret and extract information from drawings.
 - i) lines
 - ii) legend
 - iii) welding symbols
 - iv) abbreviations
 - v) title block
 - vi) notes and specifications
 - vii) tolerances/allowances
 - viii) bill of materials
 - ix) schedules
 - x) metric and imperial dimensioning
 - xi) revisions
 - xii) scales

IRW-145 Temporary Access Equipment

Learning Outcomes:

- Demonstrate knowledge of temporary access equipment, their applications, limitations and procedures for use.

National Occupational Analysis Reference:

- 3.05 Uses aerial work platforms
- 3.06 Uses ladders
- 3.07 Uses scaffolding

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with temporary access equipment.
2. Identify hazards and describe safe work practices pertaining temporary access equipment.
3. Identify codes and regulations pertaining to temporary access equipment.
4. Identify types of temporary access equipment and describe their characteristics and applications.
 - i) aerial work platforms
 - ii) ladders
 - iii) scaffolding
5. Identify types of work positioning, fall arrest and protection equipment and describe their applications and procedures for use.
6. Describe the procedures used to position aerial work platforms.

7. Describe the procedures used to erect, secure and dismantle ladders and scaffolding.
8. Describe the procedures used to inspect and maintain ladders, scaffolding and aerial work platforms.

IRR-150 Structural Components

Learning Outcomes:

- Demonstrate knowledge of structural components, their characteristics and applications.
- Demonstrate knowledge of fastening methods relating to structural steel erection.
- Demonstrate knowledge of falsework, their characteristics and applications.
- Demonstrate knowledge of the procedures used to erect and dismantle falsework.

National Occupational Analysis Reference:

4.02 Marks layouts.

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with structural components.
2. Identify hazards and describe safe work practices pertaining to structural components.
3. Interpret codes, regulations and standards pertaining to structural components.
 - i) industry standards
 - ii) codes of practice
 - iii) government regulations
4. Interpret information pertaining to structural components found on drawings and specifications.
5. Identify types of structures and describe their characteristics.

6. Identify structural steel shapes and describe their designations, characteristics and applications.
 - i) I-beam
 - ii) H-beam
 - iii) wide flange
 - iv) welded wide flange
 - v) angle
 - vi) channel
 - vii) tee
 - viii) hollow structural steel (HSS)
 - ix) miscellaneous shapes

7. Identify types of structural components and their purpose.
 - i) columns
 - ii) girders
 - iii) beams
 - iv) trusses
 - v) joists
 - vi) secondary steel
 - vii) decking
 - viii) girts
 - ix) purlins
 - x) sag rods
 - xi) bracing
 - xii) bridging
 - xiii) lintels
 - xiv) pre-cast
 - xv) glued laminated timber products
 - xvi) composite

8. Identify fastening methods associated with structural steel and describe their characteristics, applications and limitations.
 - i) install fasteners/bolts
 - ii) welding

9. Describe the procedures used to install fasteners for securing structural steel members.

10. Identify types of falsework and describe their characteristics and applications.

11. Describe the procedures used to erect and dismantle falsework.

IRR-155 Reinforcing 1

Learning Outcomes:

- Demonstrate knowledge of reinforcing materials and accessories.
- Demonstrate knowledge of the procedures to prepare for reinforcing concrete.
- Demonstrate knowledge of the procedures used to cut and bend reinforcing material.

National Occupational Analysis Reference:

- 3.04 Uses bending tools and equipment.
- 9.01 Cuts material
- 9.02 Bends material
- 10.01 Places reinforcing material
- 10.02 Ties material
- 10.03 Joins material

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Explain the purpose of reinforcing concrete.
2. Define terminology associated with reinforced concrete.
3. Explain the forces and stresses associated with reinforced concrete.
 - i) compression
 - ii) tension
 - iii) shear
 - iv) live and dead loads

4. Identify hazards and describe safe work practices pertaining to reinforcing.
 - i) fall arrest and protection
 - ii) dowel protection
 - iii) work positioning (belly hook)
 - iv) repetitive strain injuries
 - v) proper packing/carrying techniques
5. Interpret codes and regulations pertaining to reinforcing.
6. Interpret information pertaining to reinforcing found on drawings and specifications.
7. Identify standards and identification systems relating to reinforcing steel.
 - i) grades and diameters
 - ii) mill standards
 - iii) Concrete Reinforcing Steel Institute (CRSI)
 - iv) colour codes and tags
 - v) American Concrete Institute (ACI)
8. Perform calculations relating to reinforcing concrete.
 - i) lengths
 - ii) cover
 - iii) splices
 - iv) weights
 - v) quantities
 - vi) bar spacing
9. Identify tools and equipment related to reinforcing and describe their applications and procedures for use.
 - i) bending
 - ii) cutting
 - iii) placing
 - iv) tying
 - v) splicing

10. Identify types of reinforcing materials and describe their properties, characteristics and applications.
 - i) rebar
 - ii) embedded plates
 - iii) welded wire mesh
 - iv) composite material

11. Explain the importance of maintaining proper reinforcing clearances and tolerances for reinforcing materials.
 - i) protecting reinforcing steel
 - ii) structural integrity

12. Identify reinforcing material accessories and describe their characteristics and applications.
 - i) tie wires
 - ii) bar supports
 - iii) coupling devices

13. Describe the procedures used to cut and bend reinforcing materials.

14. Describe the procedures used to join rebar using the exothermic welding (Cadweld) process.

15. Describe the procedures used to prepare for reinforcing concrete.
 - i) site preparation
 - ii) interpretation of drawings and specifications
 - iii) selection and setup of equipment
 - iv) off-loading steel

IRR-160

Pre-Stressed/Post-Tensioning Systems 1

Learning Outcomes:

- Demonstrate knowledge of pre-stressed/post-tensioning systems and their components.
- Demonstrate knowledge of the procedures used to place pre-stressed/post-tensioning systems.

National Occupational Analysis Reference:

- 11.01 Lays out profile
- 11.02 Places tendons and accessories
- 11.03 Installs bursting steel and anchorages
- 11.04 Connects tendons to anchors
- 11.05 Protects exposed tendons
- 12.01 Sets up stressing equipment
- 12.02 Tensions tendons
- 12.03 Cuts and caps tendons
- 12.04 Removes stressing equipment
- 12.05 De-stresses tendons
- 13.01 Sets up grouting equipment
- 13.02 Installs grout

Suggested Hours:

20 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pre-stressed/post-tensioning systems.
 - i) pre-stressed
 - ii) post-tensioning
 - iii) pre-tensioning
2. Explain the purpose and effects of pre-stressed/post-tensioning on structures.

3. Identify types of pre-stressed/post-tensioning systems and describe their characteristics and applications.
 - i) bonded
 - strand
 - wire
 - bar
 - ii) unbonded
 - strand
 - wire
 - bar

4. Identify pre-stressed/post-tensioning materials, components and accessories and describe their characteristics and applications.
 - i) tendons
 - ii) bursting steel
 - iii) anchoring devices
 - iv) conduits
 - v) supports
 - vi) grout
 - vii) connectors

5. Identify hazards and describe safe work practices pertaining to pre-stressing/post-tensioning.

6. Identify tools and equipment relating to pre-stressing/post-tensioning and describe their applications.
 - i) layout tools and equipment
 - ii) stressing equipment
 - single strand jacks
 - multi-strand jacks
 - pumps
 - gauges
 - iii) grouting equipment
 - mixer
 - storage hopper
 - screen
 - pump
 - pressure gauges
 - hoses
 - iv) prepping equipment
 - stapler
 - pocket formers
 - wedge seating tool
 - sheath
 - stripper
 - v) finishing equipment
 - pocket shear
 - plasma cutter
 - oxy-fuel torch

7. Describe the procedures used to inspect, maintain and store pre-stressed/post-tensioning equipment.

8. Describe the procedures used to place pre-stressed/post-tensioning systems.
 - i) layout profile
 - ii) place tendons and accessories
 - iii) install bursting steel and anchorage
 - iv) connect tendons to anchors
 - v) protect exposed tendons

LEVEL 2

Learning Outcomes:

- Identify and explain strategies for teaching workplace skills.
- Demonstrate strategies to assist in teaching skills in the workplace

Objectives and Content:

Theoretical Objectives

1. Describe the impact of your own experiences in teaching skills.
2. Identify the different roles played by a workplace mentor.
3. Describe the six-step approach to teaching skills.
4. Explain the importance of identifying the point of the lesson.
5. Identify how to choose a good time to present a lesson.
6. Explain the importance of linking the lessons.
7. Identify the components of the skill (the context).
8. Describe considerations for demonstrating a skill.
9. Identify types of skill practice.
10. Describe considerations in setting up opportunities for skill practice.
11. Explain the importance of providing feedback.
12. Identify techniques for giving effective feedback.
13. Describe a skill assessment.
14. Identify methods of assessing progress.
15. Explain how to adjust a lesson to different situations.

IRR-200

Hoisting, Lifting and Rigging 2

Learning Outcomes:

- Demonstrate knowledge of the procedures to rig material and equipment for hoisting and lifting.
- Demonstrate knowledge of the procedures used to perform hoisting and lifting operations.
- Demonstrate knowledge of calculations required when performing hoisting and lifting operations.

National Occupational Analysis Reference:

- | | |
|------|----------------------------------|
| 2.04 | Uses hand signals. |
| 2.05 | Communicates electronically. |
| 5.01 | Matches load to lift capability. |
| 5.02 | Inspects rigging equipment. |
| 5.03 | Maintains rigging equipment. |
| 6.01 | Uses hoisting equipment. |
| 6.02 | Uses lifting equipment. |
| 6.03 | Attaches rigging to load. |

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Perform calculations pertaining to rigging equipment.
 - i) safe working loads
 - ii) breaking strength
2. Calculate sling tension and sling angle when preparing for hoisting and lifting operations.

3. Describe the procedures used to determine the weight and weight distribution of loads.
 - i) reference load charts
 - ii) determine types of loads
 - iii) engineered lifts

4. Identify the factors to consider when selecting rigging equipment.
 - i) load characteristics
 - weight
 - size
 - shape
 - center of gravity
 - ii) environment

5. Describe the procedures used to perform a basic lift.
 - i) secure work area
 - ii) load determination
 - iii) selection of rigging hardware
 - iv) communication methods
 - v) pre-lift checks
 - vi) placement of load
 - vii) post-lift inspection

IRR-205

Hydraulic and Conventional Cranes

Learning Outcomes:

- Demonstrate knowledge of hydraulic and conventional cranes, their components and accessories.
- Demonstrate knowledge of the procedures used to erect, set-up and disassemble hydraulic and conventional cranes.

National Occupational Analysis Reference:

- 7.01 Assesses crane site limitations
- 7.02 Determines crane position
- 7.03 Erects cranes and components
- 8.01 Disassembles crane components
- 8.02 Prepares crane and components for transport

Suggested Hours:

15 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with hydraulic and conventional cranes.
2. Identify and describe the procedures used to communicate during hydraulic and conventional crane operations.
 - i) hand signals
 - ii) electronic communications
 - iii) audible/visual
3. Identify hydraulic crane components, accessories and attachments and describe their characteristics and applications.
4. Identify conventional crane components, accessories and attachments and describe their characteristics and applications.

5. Identify the considerations for hydraulic and conventional crane assembly/installation on-site.
 - i) site hazard assessment
 - overhead powerlines
 - underground services
 - obstructions
 - soil/ground conditions
 - environmental conditions
 - ii) crane position
 - crane radius/swing area
 - quadrants of operation
 - headroom
 - iii) crane and components
 - assembly
 - disassembly
 - transport
6. Describe the procedures used to assemble and set-up hydraulic cranes.
7. Describe the procedures used to assemble and set-up conventional cranes.
8. Describe the procedures used to disassemble hydraulic cranes, their components, accessories and attachments.
9. Describe the procedures used to disassemble conventional cranes, their components, accessories and attachments.
10. Describe the procedures used to prepare hydraulic cranes for transport.
11. Describe the procedures used to prepare conventional cranes for transport.

Learning Outcomes:

- Demonstrate knowledge of rebar drawings and their applications.
- Demonstrate knowledge of the procedures to interpret and extract information from rebar drawings.

National Occupational Analysis Reference:

1.01 Interprets drawings and specifications

Suggested Hours:

20 Hours

Objectives and Content:*Theoretical Objectives*

1. Define terminology associated with rebar drawings.
2. Identify types of rebar drawings and describe their applications.
3. Identify rebar projections and views and describe their applications.
4. Interpret and extract information from rebar drawings.
 - i) lines
 - ii) legend
 - iii) symbols and abbreviations
 - iv) title block
 - v) notes and specifications
 - vi) tolerances/allowances
 - vii) bill of materials
 - viii) schedules
 - ix) metric and imperial dimensioning
 - x) revisions
 - xi) scales

IRR-215 Work Planning

Learning Outcomes:

- Demonstrate knowledge of the procedures used to plan and organize work tasks and handle work materials.

National Occupational Analysis Reference:

- 4.01 Organizes materials and supplies
- 4.05 Plans work tasks.

Suggested Hours:

10 Hours

Objectives and Content:

Theoretical Objectives

1. Identify sources of information relevant to work task planning.
 - i) documentation
 - ii) drawings
 - iii) related professionals
 - iv) clients

2. Describe the procedures used to plan work tasks.
 - i) scheduling
 - ii) material/equipment selection
 - iii) weight calculation
 - iv) bar place order/sequence

3. Describe the procedures used to organize and store tools, equipment, materials and supplies on-site.
 - i) select location for material lay down
 - ii) offload/unload and sort materials and supplies
 - iii) set up equipment

IRR-220 Reinforcing 2

Learning Outcomes:

- Demonstrate knowledge of the procedures used to fabricate reinforcing material.
- Demonstrate knowledge of the procedures used to install reinforcing material.

Suggested Hours:

60 Hours

National Occupational Analysis Reference:

- 9.01 Cuts material
- 9.02 Bends material
- 10.01 Places reinforcing material
- 10.02 Ties material
- 10.03 Joins material

Suggested Hours:

60 Hours

Objectives and Content:

Theoretical Objectives

1. Interpret standards relating to reinforcing materials fabrication and placing/installation.
 - i) Concrete Reinforcing Steel Institute (CRSI)
 - ii) American Concrete Institute (ACI)

2. Perform calculations relating to reinforcing concrete.
 - i) lengths
 - ii) cover
 - iii) splices
 - iv) weights
 - v) quantities
 - vi) bar spacing

3. Describe the procedures used to fabricate reinforcing materials.
 - i) layout materials
 - ii) cut, bend, tie and splice materials
4. Describe the procedures used to assemble reinforced members.
5. Describe the procedures used to install reinforcing materials.
 - i) place materials
 - ii) secure materials
6. Describe the procedures used to ensure reinforcing materials remain stable during pouring operations.

Learning Outcomes:

- Demonstrate knowledge of pre-stressed/post-tensioning systems and their components.
- Demonstrate knowledge of the procedures used to place pre-stressed/post-tensioning systems.
- Demonstrate knowledge of the procedures used to stress tendons.
- Demonstrate knowledge of the procedures used to grout tendons.

National Occupational Analysis Reference:

- 11.01 Lays out profile
- 11.02 Places tendons and accessories
- 11.03 Installs bursting steel and anchorages
- 11.04 Connects tendons to anchors
- 11.05 Protects exposed tendons
- 12.01 Sets up stressing equipment
- 12.02 Tensions tendons
- 12.03 Cuts and caps tendons
- 12.04 Removes stressing equipment
- 12.05 De-stresses tendons
- 13.01 Sets up grouting equipment
- 13.02 Installs grouts

Suggested Hours:

60 Hours

Objectives and Content:*Theoretical Objectives*

1. Interpret codes and regulations pertaining to pre-stressing/post-tensioning.
2. Interpret information pertaining to pre-stressing/post-tensioning found on drawings and specifications.

3. Describe the procedures used to set-up, operate and dismantle pre-stressing/post-tensioning equipment.
4. Describe the procedures used to inspect, maintain and store pre-stressing/post-tensioning equipment.
5. Describe the procedures used to place pre-stressed/post-tensioning systems.
 - i) layout profile
 - ii) place tendons and accessories
 - iii) install bursting steel and anchorage
 - iv) connect tendons to anchors
 - v) protect exposed tendons
6. Describe the procedures used to stress tendons.
 - i) tension tendons
 - ii) short tail tendon stressing
 - iii) document elongation and gauge pressure
 - iv) de-pressurize and remove equipment
7. Explain the de-stressing process and its associated requirements and hazards.
 - i) requirements
 - engineered procedures and specifications
 - restricted work zone access
 - ii) hazards
 - danger zones
 - structural failure
 - equipment failure
8. Describe procedures used to finish tendons.
 - i) bonded
 - ii) unbonded
9. Describe the procedures used to grout tendons in bonded systems.
 - i) verifying post-tensioning duct system
 - ii) batching and mixing grout
 - iii) testing grout
 - iv) injecting grout
 - v) releasing trapped air
 - vi) post-grouting inspection
 - vii) sealing of grout inlets and outlets

Learning Outcomes:

- Demonstrate knowledge of the National Occupational Analysis and its relationship to the Interprovincial Red Seal Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Interprovincial Red Seal Examination.

2015 National Occupational Analysis Reference:

Entire National Occupational Analysis (NOA)

Suggested Hours:

30 Hours

Objectives and Content:*Theoretical Objectives*

1. Define terminology associated with an NOA.
 - i) blocks
 - ii) tasks
 - iv) sub-tasks
2. Explain how an NOA is developed and the link it has with the Interprovincial Red Seal Examination.
 - i) development
 - ii) validation
 - iii) block and task weighting
 - iv) examination breakdown (pie-chart)
3. Identify Red Seal products and describe their use for preparing for the Interprovincial Red Seal Examination.
 - i) Red Seal website
 - ii) examination preparation guide
 - iii) sample questions
 - iv) examination counselling sheets

4. Explain the relationship between the NOA and the Apprenticeship Curriculum Standard.
5. Review Occupational Skills for the Ironworker (Reinforcing) trade as identified in the NOA.
 - i) safety awareness
 - personal protective equipment (PPE)
 - safety work environment
 - site hazards
 - ii) tools and equipment
 - hands tools and measuring equipment
 - surveying equipment
 - power tools
 - bending tools and equipment
 - cutting and welding equipment
 - iii) access equipment
 - aerial work platforms
 - ladders
 - scaffolding
 - iv) communication and trade documentation
 - drawings and specifications
 - standards, regulations and procedures
 - communication
 - electronic communication
 - v) organizes work
6. Review Rigging and Hoisting for the Ironworker (Reinforcing) trade as identified in the NOA.
 - i) hand signals
 - ii) load to lift capacity
 - iii) rigging equipment
 - iv) hoisting equipment
 - v) lifting equipment
 - vi) rigging/load

7. Review Cranes for the Ironworker (Reinforcing) trade as identified in the NOA.
 - i) site hazards
 - ii) crane position
 - iv) cranes and components
 - hydraulic and conventional
 - tower
 - electric overhead travelling
 - v) assembly
 - vi) disassembly
 - vi) transport

8. Review Reinforcing Material for the Ironworker (Reinforcing) trade as identified in the NOA.
 - i) cutting
 - ii) bending
 - iii) placing
 - iv) joining

9. Review Pre-stressed/Post-Tensioning Systems for the Ironworker (Reinforcing) trade as identified in the NOA.
 - i) profile
 - ii) tendons and accessories
 - iii) bursting steel and anchorages
 - iv) stressing point
 - v) tendons
 - vi) stressing equipment
 - vi) de-stressing
 - vii) grouting equipment
 - viii) grouts (installs)

Nova Scotia Document Evaluation Form

Thank you for your interest in the development and revision of this document. Upon review of the document, please record your feedback in relation to the following items:

- course division and organization
- relevancy of the content
- errors or omissions
- other suggestions for improvement and consideration

Overall comments are to be entered on this evaluation form and specific changes are to be entered directly on the document in the relevant area(s). When making proposed corrections(s) in the document, please use red ink. When all feedback has been recorded, return this evaluation form along with the document to the Apprenticeship Office noted at the bottom of the page.

(PLEASE PRINT)

Trade: Ironworker (Reinforcing) _____

Full Name: _____

Type of Position: (Trade Practitioner, Instructor, etc.): _____

Company: _____

Address: _____

Telephone: _____

Comments: (Use a separate sheet of paper if necessary)

Return Evaluation Form and Document to:
Nova Scotia Apprenticeship Agency
PO Box 578
Halifax, NS B3J 2S9