



**Skilled
Trades**
Ontario

**Métiers
spécialisés**
Ontario

Apprenticeship
Curriculum Standard

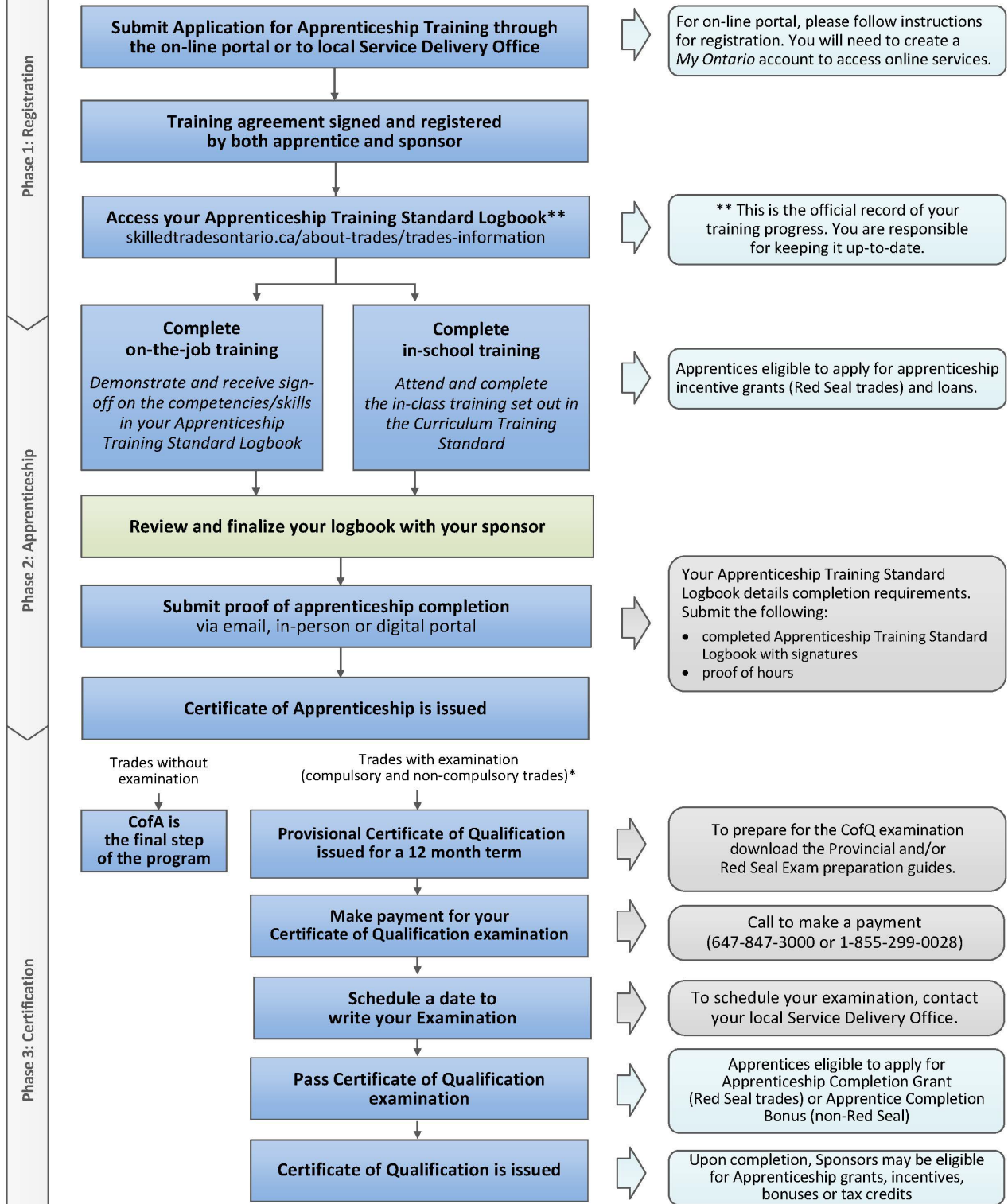
General Carpenter

Levels 1, 2 & 3

403A

2014

Apprenticeship Pathway to a Certificate of Qualification



* For a list of trades subject to a certification examination, visit: skilledtradesontario.ca

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Please Note: This Standard has been revised to reflect the visual identity of Skilled Trades Ontario (STO) which replaced the Ontario College of Trades on January 1, 2022. The content of this Standard may refer to the former organization; however, all trade specific information or content remains relevant and accurate based on the original date of publishing.

Please refer to STO's website: skilledtradesontario.ca for the most accurate and up to date information. For information about BOSTA and its regulations, please visit [**Building Opportunities in the Skilled Trades Act, 2021 \(BOSTA\)**](#).

Any updates to this publication are available on-line; to download this document in PDF format, please follow the link: [Skilled Trades Ontario.ca](https://skilledtradesontario.ca).

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Preface

This curriculum standard for the General Carpenter trade program is based upon the on-the-job performance objectives, located in the industry-approved training standard.

The curriculum is organized into 3 levels of training. The Reportable Subjects Summary chart (located on page 2) summarizes the training hours for each reportable subject.

The curriculum identifies the learning that takes place in-school. The in-school program focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives of the Apprenticeship Training Standards.

Employers/Sponsors are expected to extend the apprentice's knowledge and skills through practical training on a work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to verify that all apprentices have achieved the learning outcomes identified in the curriculum standard.

It is not the intent of the in-school curriculum to perfect on-the-job skills. The practical portion of the in-school program is used to reinforce theoretical knowledge. Skill training is provided on the job.

Please refer to Skilled Trades Ontario website (www.skilledtradesontario.ca) for the most accurate and up-to-date information about Skilled Trades Ontario. For information on *Building Opportunities in the Skilled Trades Act, 2021 (BOSTA)* and its regulations, please visit [Building Opportunities in the Skilled Trades Act, 2021, S.O. 2021, c. 28 - Bill 288 \(ontario.ca\)](http://www.skilledtradesontario.ca/building-opportunities-in-the-skilled-trades-act-2021-s.o.-2021-c.-28-bill-288)

Pre-requisites

In order to advance to Level 2 of the apprenticeship program, an individual must have completed all of the units outlined in Level 1. Similarly, in order to advance to Level 3 of the program, an individual must have completed all of the units outlined in Level 1 and 2.

Hours Disclaimer (if applicable)

It is agreed that Training Delivery Agents (TDAs) may need to make slight adjustments (with cause) according to particular apprentice needs and may deviate from the unit sequencing and the prescribed practical and theoretical hours shown within the standard. However, all TDAs will comply with the hours at the reportable subject level.

Suggested Equipment for Training Delivery Agencies

The listing of tools on pages 13–16 and page 18 does not list minimum quantities based on the understanding that the delivering TDA is in the best position to determine the need based on its delivery methodology.

Personal and Safety Equipment: Personal protective equipment is at the discretion of the TDA who must conform to Ontario Provincial Health and Safety Regulations.

General Carpenter apprentices must supply their own work clothing, boots, hard hat and safety glasses.

Please note that all construction practices described in this standard will be done according to the appropriate building codes and industry best practice.

Program Summary of Reportable Subjects

Number	Reportable Subjects	Hours Theory	Hours Practical	Hours Total
Level 1				
1	Safety, Materials & Tools	64	104	168
2	Plans, Specifications & Codes 1	24	0	24
3	Residential - Estimating, Calculation & Layout 1	33	0	33
4	Welding	3	12	15
	Level 1 Totals	124	116	240
Level 2				
1	Residential Construction	76	116	192
2	Plans, Specifications & Codes 2	24	0	24
3	Estimating, Calculation & Layout 2	24	0	24
	Level 2 Totals	124	116	240
Level 3				
1	ICI Construction	76	116	192
2	Plans, Specifications & Codes 3	24	0	24
3	Estimating, Calculation & Layout 3	24	0	24
	Level 2 Totals	124	116	240

Level 1

Reportable Subject Summary – Level 1

		Hours			Evaluation		
Number	Reportable Subjects	Theory	Practical	Total	Theory	Practical	Total
3101: Safety, Materials & Tools							
3101.1	Trade Introduction	1	0	1	1%	0%	1%
3101.2	Health and safety	8	0	8	12%	0%	5%
3101.3	Types of Materials	5	0	5	8%	0%	3%
3101.4	Wood and Wood Products	6	0	6	9%	0%	4%
3101.5	Joints and Fasteners	5	5	20	8%	19%	15%
3101.6	Hand Tools	12	12	34	19%	33%	27%
3101.7	Power Tools	12	12	37	19%	36%	29%
3101.8	Rigging	12	12	0	19%	0%	7%
3101.9	Access Structures	3	3	13	5%	12%	9%
Sub-Totals		64	104	168	100%	100%	100%
3102: Plans, Specifications & Codes 1							
3102.1	Related Services & Authorities	5	0	5	20%	0%	21%
3102.2	Drawing: Related Equipment & Identification	5	0	5	20%	0%	21%
3102.3	Reading: Plans & Sketching	3	0	3	14%	0%	12%
3102.4	Drawing: Plans & Sketching	11	0	11	46%	0%	46%
Sub-Totals		24	0	24	100%	0	100%
3103: Residential - Estimating, Calculation & Layout 1							
3103.1	Trade Calculations	21	0	21	64%	0%	64%
3103.2	Construction Layout Principles	12	0	12	36%	0%	36%
Sub-Totals		33	0	33	100%	0%	100%
3104: Welding							
3104.1	Basic Oxy-Acetylene & Shielded Metal Arc Welding (SMAW)	3	12	15	100%	100%	100%
Sub-Totals		3	12	15	100%	100%	100%
Level 1 Totals		124	116	240			

Level 1 Suggested Shop Projects

Safety, Materials & Tools

Wood Joints Picture Frame

Bench Hook

Mitre Box

Line Holder

Framing Square Fence

Tote Box

Tool Box (suitcase)

Saw Horse

Trestle Bench

Vanity - laminate top - melamine unit

Oil Stone Box

Nail Box

T Bevel

Mallet

Push stick

Scaffold Bays

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.1		
Title:	Trade Introductions		
Duration:	Total Hours: 1	Theory: 1	Practical: 0
Cross-Reference to Training Standard: None			

General Learning Outcomes

Upon successful completion the apprentice will be able to develop knowledge in the trade of Carpentry and its related regulations and organizations.

Learning Outcomes and Content

- 1.1.1 Identify the history of the carpenter trade and trace it to the present time. State current trends in the trade and list the reasons for continuous training towards a well-rounded General Carpenter.
- 1.1.2 Identify the *Ontario College of Trades and Apprenticeship Act, 2009*, and state the apprentice's rights and responsibilities found therein including mandatory apprentice membership at the Ontario College of Trades.

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.2		
Title:	Health and Safety		
Duration:	Total Hours: 8	Theory: 8	Practical: 0
Cross-Reference to Training Standard:	1451		

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge of the health hazards and safety risks that are present on the job site and to equip themselves with personal protection and general safety.

Learning Outcomes and Content

- 1.2.1 Apply safety legislation found in the *Occupational Health & Safety Act* (OHSA), Workers Compensation Act, and the Environmental Protection Act, and apply the prescribed procedure when reporting an accident or hazard.
- 1.2.2 State individual rights and responsibilities with regards to personal health and fitness, general safety, and work refusal.
- 1.2.3 Select, wear, and maintain personal protective devices, making sure of proper fit and optimum protection in accordance with manufacturers' instructions and OHSA.
- 1.2.4 Identify WHMIS labels and data sheets, use safe handling and disposal techniques, and report hazards to supervisor.
- 1.2.5 Apply safety measures in the shop and on the job site by using appropriate measures for lifting and handling material and equipment, using electrical protection and safety devices on tools and equipment, and by following good housekeeping practices.
- 1.2.6 Identify common temporary safety components such as guard rails, barricades, ramps, stairs, hoarding, etc.
- 1.2.7 Apply fire safety practices in the workplace, select appropriate fire extinguishers for class A, B, C, and D fires, activate alarms, and communicate the danger to others. Identify propane licensing requirements.

- 1.2.8 Describe environmental awareness throughout a renovation such as:
- A need for an audit
 - Hazardous materials uncovered
 - Protection
 - Recycling/elimination/disposal

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.3		
Title:	Types of Materials		
Duration:	Total Hours: 5	Theory: 5	Practical: 0
Cross-Reference to Training Standard: 1452, 1458, 1459, 1460, 1462, 1463, 1464			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge in the use and application of materials used in residential and commercial construction.

Learning Outcomes and Content

- 1.3.1 Identify the different types of sealants, adhesives, caulking, and state their intended use and application.
- 1.3.2 Identify the different types of finish coatings and preservatives and state their intended use and application.
- 1.3.3 Identify the different types of metal, plastic and composite products and state their intended use and application.
- 1.3.4 Identify interior and exterior finishing material used in both residential and commercial construction and state their intended use and application.
- 1.3.5 Identify materials used in air, moisture, sound and thermal control for all types of buildings and state their intended use and application.

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.4		
Title:	Wood and Wood Products		
Duration:	Total Hours: 6	Theory: 6	Practical: 0
Cross-Reference to Training Standard: 1452, 1454, 1456, 1458			

General Learning Outcomes

Upon successful completion the apprentice will be able to identify and describe wood and wood products.

Learning Outcomes and Content

- 1.4.1 Identify the characteristics of wood and lumber according to species, grade, and moisture content.
- 1.4.2 State the different methods used to saw and cut trees into lumber and determine their respective effects on its function, performance and conservation practices.
- 1.4.3 State the proper methods for safely handling and storing lumber in order to minimize damage.
- 1.4.4 Identify the different types of panel products such as plywood, OSB, particle board, MDF, etc. and state their intended use and application.
- 1.4.5 Identify the different types of structural engineered products (such as PSL, LVL, truss joists, and similar products) and state their intended use and application.

Number: 3101

Title: Safety, Materials & Tools

Number: S3101.5

Title: Joints and Fasteners

Duration: Total Hours: 25 Theory: 5 Practical: 20

Cross-Reference to Training Standard: 1455, 1456, 1457, 1459

General Learning Outcomes

Upon successful completion the apprentice will be able to identify, select and construct wood joints. Select and use fasteners and adhesives as appropriate.

Learning Outcomes and Content

- 1.5.1 Identify common types of wood joints and state their respective applications.
- 1.5.2 Identify, select and use appropriate fasteners, adhesives, and glues in accordance with materials, joints, and manufacturers' specifications.
- 1.5.3 Use measuring, layout, and cutting tools to produce specified wood joints and connections.

Number: 3101

Title: Safety, Materials & Tools

Number: S3101.6

Title: Hand Tools

Duration: Total Hours: 46 Theory: 12 Practical: 34

Cross-Reference to Training Standard: 1452

General Learning Outcomes

Upon successful completion the apprentice will be able to select, identify, use and maintain hand tools.

Learning Outcomes and Content

- 1.6.1 Identify and state the use of common hand tools listed below.
- 1.6.2 Select, maintain and correctly use the appropriate tools listed on pages 13–16.

Hand Tools & Equipment

Measuring, Layout and marking

Tape Measure – 25'

Tape Measure – 50 – 100'

Squares - metric/imperial

Steel (rafters) Imperial & metric

Try

Speed

Combination

Square Gauges, Square Guide

Sliding t-bevel

Drywall t-square

Marking Tools

Marking Gauge

Mortise Gauge

Profile Gauge

Butt Marker

Awl

Dividers

Compass

Scriber

Trammel Points

Profile Gauge

Hammers

Curved Claw

Straight Claw

Mallets

Sledge

Dead Blow

Brad Push

Staplers

Staple Gun

Hammer Tacker

Calipers

Inside

Outside

Vernier

Lines

Dry Line

Chalk Line

Plumb Bob

Levels

Line

Carpenter's (hand)

Torpedo

Water

Builder's Level - Automatic Level

Transit (theodolite)

Various Lasers

Total: Station

Sets And Punches

Nail Sets

Drift Pin

Centre Punch

Self-Centering Punch

Hatchets

Drywall

Roofing

Bars

Pry

Flat

Nail Pullers

Cat's Paw

Fastening

Wrenches

Box End
Open End
Combination
Adjustable
Socket (and ratchet)
Pipe
Allen (hex keys)
Nut Drivers
Spud
Speed

Pliers

Slip Joints
C-Joint
Locking
Needle Nose
Side Cutting
Linesman
Fencing
Carpenter's (nippers)
Sheet Metal

Screwdrivers

Phillips
Robertson
Standard (flat)
Stubby
Offset
Ratchet
Security

Sawing And Cutting

Saws

Hand (cross cut and rip)
Compass, keyhole
Coping
Dovetail
Back
Flush Cut Saw
Hack
Nail Saw (pistol grip)
Japanese
Drywall
Snips
Sheet Metal/Aviation
Bolt Cutter
Flooring
Variety of knives
Mitre Shear
Laminate Shear

Chisels

Butt
Paring
Firmer
Mortise
Cold
Framing
Flooring
Corner

Boring And Clamping

Drills

Hand

Bit Brace (ratchet type)

Clamps

C

Bar

Pipe

Spring

Hand Screw (Jorgensen)

Band (strap)

F

Vises

Bench

Woodworking

Saw

Bits

Twist

Auger

Expansive

- Ship auger
- Extension
- Countersink
- (Screw) Pilot
- Spade
- Step
- Masonry
- Taps
- Driver
- Plug Cutter
- Forstner
- Hole Saw

Smoothing, Shaping & Sharpening

Planes

Block (and low angle)

Smoothing

Jack

Fore

Jointer

Rabbet (bullnose and duplex)

Router

Forming (`surform`)

Cornering Tools

Spokeshave

Stones

Oil (whet)

Water

Slip

Scrapers

Hand

Cabinet

Paint

Burnisher

Rasps

Files

Floor

Filecard

Miscellaneous

Saw set

Saw jointer

Drywall Knives and trowels

Concrete Finishing Tools

Wire brush

Sanding blocks

Rivet gun

Caulking gun

Magnet

Safety And Apparel

Nail Apron

Tool Belt

Safety Boots

Visors, Face Masks

Ear Plugs And Muffs

Shop Apron

Coveralls

Fire Extinguisher

Dust Mask

Respirator

Hard Hat

Gloves

Glasses, Goggles

Safety Harness

First Aid Kit

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.7		
Title:	Power Tools and Equipment		
Duration:	Total Hours: 49	Theory: 12	Practical: 37
Cross-Reference to Training Standard:	1452		

General Learning Outcomes

Upon successful completion the apprentice will be able to select, identify and use power tools.

Learning Outcomes and Content

- 1.7.1 Identify and state the function of common portable power tools, drawn from the equipment listed below.
- 1.7.2 Identify and state the function of common stationary power tools drawn from the equipment listed below.
- 1.7.3 Design and use prefabricated and site-fabricated jigs for specific power tools.
- 1.7.4 Select, operate and maintain common portable power tools and equipment drawn from the equipment listed on page 18 for specific applications in accordance with the *Occupational Health and Safety Act* (OHSA) and manufacturers' instructions.
- 1.7.5 Select, operate and maintain stationary power tools and equipment drawn from the equipment listed on page 18 and apply and use with appropriate accessories in accordance with manufacturers' instructions.

Power Tools and Equipment List

Portable

Circular Saws
Planers
Screw Guns
Routers/Laminate Trimmers
Belt Sanders
Oscillating Sanders
Palms Sanders
Sabre Saws
Reciprocating Saw
Cordless Screwdrivers
Electric Drills
Biscuit Joiner
Powder-Actuated Tool (low velocity)
Hammer Drill
Rotary hammer Drill
Door Kit Jig
Chain Saw
Compressor
Generator
Pneumatic Fastening Tools
Quick-cut
Hand Grinders

Stationary

Mitre saws
Compound Mitre Saws
Sliding Compound Mitre Saws
Table Saws
Radial Arm Saws
Drill Press
Belt/Disc Sander
Shaper
Jointer(s)
Thickness Planer(s)
Grinder
Panel
Band Saw
Aluminum Brake
Dry Cutout Tool
Wall
Metal chop Saw

Number:	3101		
Title:	Safety, Materials & Tools		
Number:	S3101.8		
Title:	Rigging		
Duration:	Total Hours: 12	Theory: 12	Practical: 0
Cross-Reference to Training Standard: 1451, 1455, 1458			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate and apply knowledge of proper basic hoisting and rigging procedures including hoisting and rigging hazards, fibre rope, knots and hitches, hardware, wire rope, and slings, rigging tools and devices, and hazard awareness in crane operations.

Learning Outcomes and Content

- 1.8.1 Identify and describe hazards associated with rigging.
- 1.8.2 Describe and apply various rigging and hoisting techniques including manual handling and hoisting with fibre and wire ropes.
- 1.8.3 Identify and tie common knots used in rigging.
- 1.8.4 Identify and apply international hand signals.

Number: 3101

Title: Safety, Materials & Tools

Number: S3101.9

Title: Access Structures

Duration: Total Hours: 16 Theory: 3 Practical: 13

Cross-Reference to Training Standard: 1451

General Learning Outcomes

Upon successful completion the apprentice will be able to select and safely erect and dismantle access equipment.

Learning Outcomes and Content

- 1.9.1 Identify and select various types of ladders.
- 1.9.2 Identify and select scaffold access equipment.
- 1.9.3 Demonstrate the safe use of ladders.
- 1.9.4 Demonstrate the safe erection and dismantle of scaffold equipment.
- 1.9.5 Describe the requirements pertaining to ladders and scaffold equipment in accordance with the *Occupational Health and Safety Act (OHSA)*.

Number:	3102		
Title:	Plans, Specifications, & Codes I		
Number:	S3102.1		
Title:	Related Services & Authorities		
Duration:	Total Hours: 5	Theory: 5	Practical: 0
Cross-Reference to Training Standard: 1453, 1454			

General Learning Outcomes

Upon successful completion the apprentice will be familiar with the relationship between owner, architect, engineer, contractor, and sub-contractors, as well as with controlling authorities, regulations and codes.

Learning Outcomes and Content

- 2.1.1 Identify the relationship between owner and architect, contractor, and tradespeople.
- 2.1.2 Identify various types of plans and specifications used in construction industry.
- 2.1.3 Identify the construction controlling authorities, regulations, codes, and by-laws.
- 2.1.4 Identify relevant provisions of the Ontario Building Code (OBC).

Number:	3102		
Title:	Plans, Specifications, & Codes I		
Number:	S3102.2		
Title:	Drawing: Related Equipment and Identification		
Duration:	Total Hours: 5	Theory: 5	Practical: 0
Cross-Reference to Training Standard: 1452, 1453			

General Learning Outcomes

Upon successful completion the apprentice will be able to identify and interpret the different types and aspects of architectural drawings and related equipment.

Learning Outcomes and Content

2.2.1 Identify drawings as:

- Perspective
- Isometric
- Oblique
- Orthographic

2.2.2 Identify views and sections:

- Front view
- Side view
- Plan (top) view
- Sections & Details
- Abbreviations
- Title Blocks

2.2.3 Identify the Alphabet of Lines:

- Object lines
- Hidden lines
- Extension lines
- Centre lines
- Cutting Plane lines
- Break lines

2.2.4 Identify Drafting Equipment:

- Scales: Architectural and Metric
- Drafting Tables, boards & equipment

Number: 3102

Title: Plans, Specifications, & Codes I

Number: S3102.3

Title: Plans and Sketches: Reading

Duration: Total Hours: 3 Theory: 3 Practical: 0

Cross-Reference to Training Standard: 1453

General Learning Outcomes

Upon successful completion the apprentice will be able to read and interpret drawings and sketches.

Learning Outcomes and Content

2.3.1 Read and interpret orthographic drawings in:

- One view
- Two views
- Three views

2.3.2 Read and interpret isometric drawings.

Number: 3102

Title: Plans, Specifications, & Codes I

Number: S3102.4

Title: Plans and Sketches: Drawing

Duration: Total Hours: 11 Theory: 11 Practical: 0

Cross-Reference to Training Standard: 1453

General Learning Outcomes

Upon successful completion the apprentice will be able to draw and/or freehand sketch objects.

Learning Outcomes and Content

2.4.1 Draw and/or sketch drawings in:

- Oblique
- Isometric
- Perspective
- Orthographic
- Detail Views

Number:	3103		
Title:	Estimating, Calculation, & Layout I		
Number:	S3103.1		
Title:	Trade Calculations		
Duration:	Total Hours: 21	Theory: 21	Practical: 0
Cross-Reference to Training Standard: 1453			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate an understanding of trade calculations (in Metric and Imperial units) and an ability to solve trade related problems.

Learning Outcomes and Content

- 3.1.1 Add, subtract, multiply, and divide whole numbers, exponents, square-roots and use order of operations when applying these operations to trade related problems.
- 3.1.2 Define:
 - proper and improper fractions,
 - mixed numbers,
 - lowest common denominator and brackets, Add, subtract, multiply, and divide fractions in Imperial measure applications.
- 3.1.3 Add, subtract, multiply, and divide decimals in metric applications, using the concepts of:
 - rounding of decimals,
 - conversion of decimals to fractions and vice versa, and
 - equivalent tables
- 3.1.4 Convert linear, area, volume, weight/mass measures from Imperial to Metric and vice versa.
- 3.1.5 State and apply the Pythagorean Theorem to right angle triangles using the operations of squaring numbers and finding the square root of numbers, both by estimation and calculation.
- 3.1.6 Explain the concept of area and square units. Calculate the areas of common and complex shapes in the trade.

- 3.1.7 Explain the concept of volume and cubic units. Calculate the volumes of common and complex objects.
- 3.1.8 Explain the concepts of similar triangles and ratio & proportion as applied to carpentry.
- 3.1.9 Calculate simple and compound interest and percentage increase and decrease.

Number: 3103

Title: Estimating, Calculation, & Layout I

Number: S3103.2

Title: Construction Layout Principles

Duration: Total Hours: 12 Theory: 12 Practical: 0

Cross-Reference to Training Standard: 1454 to 1465 inclusive, 1467

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the application of the basic principles of geometry for construction layout.

Learning Outcomes and Content

3.2.1 Identify and apply basic geometric procedures to layout:

- Straight lines
- Angles
- Triangles
- Quadrilaterals
- Circles
- Ellipses
- Polygons (hexagons, octagons, etc.)
- Arches

Number:	3104		
Title:	Welding		
Number:	S3104.1		
Title:	Basic Oxy-Acetylene & Shielded Metal Arc Welding (SMAW)		
Duration:	Total Hours: 15	Theory: 3	Practical: 12
Cross-Reference to Training Standard: 1468			

General Learning Outcomes

Upon successful completion the apprentice will understand general safety practices and operating principles of oxy-acetylene cutting and SMAW. Demonstrate basic cutting and welding for non-structural components (such as metal door frame, anchor bolts, rebar, etc.).

Learning Outcomes and Content

- 4.1.1 Identify oxy-acetylene gases and equipment such as cylinders, valves, regulators, manifolds, torches, tips, and lighters.
- 4.1.2 Interpret and apply safety practices related to:
- Personal deportment in the welding shop
 - Protective Equipment - welding gloves, goggles, helmets, filter & cover lenses, safety footwear, aprons, etc.
 - Cylinder care - moving, lifting, securing, safety devices, construction and operation or valves, methods of detecting leaks, etc.
 - Hose care - testing for leaks, methods of repairing, colour codes, hose connections
 - Arc welding equipment – site set-up, ventilation, toxic fumes, arc radiation, etc.
 - Oxy-acetylene – site set-up, equipment, flame adjustment, lighting procedures, material handling, etc.
- 4.1.3 Define common welding and joining processes such as arc, flux-core, etc.
- 4.1.4 Explain oxy-acetylene cutting principles used in common practice.
- 4.1.5 Recognize types, causes, and methods of controlling distortion due to metal expansion and contraction.

- 4.1.6 Identify the parts and operating principles of basic power sources such as transformers, circuits, AC/DC input/output, polarity, amperage/duty cycle, cables & connectors, electrode, holders, and grounding.
- 4.1.7 Torch-cut manually, both freehand and guided, including piercing holes.
- 4.1.8 Weld fillet, butt, lap, tee, and corner joints in flat and horizontal positions using various types and sizes of electrodes.

Level 2

Reportable Subject Summary – Level 2

Number	Reportable Subjects	Hours			Evaluation		
		Theory	Practical	Total	Theory	Practical	Total
3105: Foundations, Floors, Walls, Ceilings, Roofs & Finishes							
3105.1	Building Layout 1	2	4	6	3%	3%	3%
3105.2	Excavation	2	0	2	3%	0%	1%
3105.3	Footings	3	3	0	4%	0%	2%
3105.4	Foundations	4	0	4	5%	0%	2%
3105.5	Drainage Systems	2	0	2	3%	0%	1%
3105.6	Sill Plates	1	1	2	1%	1%	1%
3105.7	Floor Beams	3	0	3	4%	0%	2%
3105.8	Columns	1	0	1	1%	0%	1%
3105.9	Floor Systems	6	10	16	8%	9%	8%
3105.10	Wall Framing	8	10	18	10%	9%	9%
3105.11	Ceiling Framing	1	2	3	1%	2%	2%
3105.12	Equal & Unequal Slope Roofs	21	46	67	28%	39%	34%
3105.13	Trusses	3	4	7	4%	3%	4%
3105.14	Exterior Finish	6	15	21	8%	13%	11%
3105.15	Interior Finish	10	24	34	13%	21%	17%
3105.16	Building Envelope	3	0	3	4%	0%	2%
Sub-Totals		76	116	192	100%	100%	100%
3106: Plans, Specifications & Codes 2							
3106.1	P.S.C. for Residential Construction	24	0	24	100%	0%	100%
Sub-Totals		24	0	24	100%	0%	100%
3107: Estimating, Calculation & Layout 2							
3107.1	E.C.L. for Residential Construction	24	0	24	100%	0%	100%
Sub-Totals		24	0	24	100%	0%	100%
Level 1 Totals		124	116	240			

Level 2 Suggested Shop Projects

Building Layout: batterboards, building lines

Sill Plates: Install sill plates

Floor Systems: headers, trimmer joists, bridging, subfloor,

Wall Framing: lintels, RSO's, diagonal bracing, sheathing, corners, rake stud walls

Ceiling Framing: attic access, ribbon, strongback, stub joists, backing

Truss Project: Install gable and hip roof trusses

Roof Framing: shed, gable, hip, intersecting roofs, dormers, equal & unequal pitch

Exterior Finish: sidings, cornices, soffit, fascia, shingles (roofing)

Interior Finish: wall finish, horizontal and vertical trim and various door installations

Number: 3105
Title: **Residential Construction**

Number: S3105.1
Title: **Building Layout**

Duration: Total Hours: 6 Theory: 2 Practical: 4
Cross-Reference to Training Standard: 1453 to 1465 inclusive, 1467

General Learning Outcomes

Upon successful completion the apprentice will understand building site requirements and perform basic layout operations.

Learning Outcomes and Content

- 5.1.1 Identify permits and locates required.
- 5.1.2 Identify site conditions affecting building location and elevation such as easements, services, adjacent buildings, safety requirements, grades, and type and size of building in question.
- 5.1.3 Locate lot lines and establish building lines using stakes and diagonal measure for square.
- 5.1.4 Locate, build, and erect batterboards after determining off-sets and working clearance.

Number: 3105

Title: **Residential Construction**

Number: S3105.2

Title: **Excavation**

Duration: Total Hours: 2 Theory: 2 Practical: 0

Cross-Reference to Training Standard: 1454

General Learning Outcomes

Upon successful completion the apprentice will be able to identify proper excavation requirements and procedures.

Learning Outcomes and Content

- 5.2.1 Determine factors affecting depth of excavation such as foundation type, frost-line, depth of services, surrounding grade, and Ontario Building Code (O.B.C.) requirements.
- 5.2.2 Determine requirements of shoring and/or sloping of excavation sites depending on adjacent foundations, soil types, excavation depth, and the O.H.S.A.
- 5.2.3 Establish the best location for excavated material based on access to excavation, incoming services, backfilling, and grading.
- 5.2.4 Identify procedures required to excavate for renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.3		
Title:	Footings		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Training Standard: 1456			

General Learning Outcomes

Upon successful completion the apprentice will be able to identify the types and properties of residential concrete footings.

Learning Outcomes and Content

- 5.3.1. Identify O.B.C. requirements for different soil types and bearing capabilities.
- 5.3.2 Calculate strip and column footing dimensions according to O.B.C.
- 5.3.3 Identify construction techniques for placing footing forms in excavations.
- 5.3.4 Identify stepped footings and bulkheads required for elevation changes as per O.B.C.
- 5.3.5 Identify procedures for altering existing structures to accommodate renovations.

Number: 3105

Title: **Residential Construction**

Number: S3105.4

Title: **Foundations**

Duration: Total Hours: 4 Theory: 4 Practical: 0

Cross-Reference to Training Standard: 1454, 1456

General Learning Outcomes

Upon successful completion the apprentice will be able to identify foundation types and conditions related to sizing.

Learning Outcomes and Content

- 5.4.1 Identify and compare the different types of foundation walls such as poured concrete, piers, screw piles, concrete block, PWF, ICF, and other innovations.
- 5.4.2 Identify and select the size requirements for all foundation walls based on O.B.C. requirements.
- 5.4.3 Identify damp-proofing and waterproofing requirements for all types of foundation walls.
- 5.4.4 Determine requirements for backfilling and grading based on O.B.C. requirements.
- 5.4.5 Identify procedures for altering existing structures to accommodate renovations.

Number: 3105

Title: **Residential Construction**

Number: S3105.5

Title: **Drainage Systems**

Duration: Total Hours: 2 Theory: 2 Practical: 0

Cross-Reference to Training Standard: 1454

General Learning Outcomes

Upon successful completion the apprentice will be able to identify the requirements for foundation drainage.

Learning Outcomes and Content

- 5.5.1 Identify the function and location requirements for drainage systems such as tile/pipe, drainage layers, sewers, sump pits, drainage ditches, soil gas venting and dry wells as per O.B.C. requirements.
- 5.5.2 Identify the causes of hydrostatic forces and capillary action.
- 5.5.3 Identify storm water management requirements.
- 5.5.4 Identify procedures to accommodate drainage systems for renovations.

Number: 3105

Title: **Residential Construction**

Number: S3105.6

Title: **Sill Plates**

Duration: Total Hours: 2 Theory: 1 Practical: 1

Cross-Reference to Training Standard: 1456

General Learning Outcomes

Upon successful completion the apprentice will be able to identify the purpose, requirements, and installation of sill plates.

Learning Outcomes and Content

- 5.6.1 Identify the purpose and layout and installation techniques for sill plates.
- 5.6.2 Determine O.B.C. requirements for sill plate size and anchorage.
- 5.6.3 Determine the factors affecting the location of sill plates on the foundation wall.
- 5.6.4 Establish moisture, insect infestation and air leakage control requirements as found in the O.B.C.

Number: 3105

Title: **Residential Construction**

Number: S3105.7

Title: **Floor Beams**

Duration: Total Hours: 3 Theory: 3 Practical: 0

Cross-Reference to Training Standard: 1455

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge of the types of floor beams, installation practices, and beam span tables.

Learning Outcomes and Content

- 5.7.1 Describe the basic principles of beam design and factors affecting beam size such as clear span, supported joist length, loads and forces.
- 5.7.2 Identify and compare beam types and characteristics such as steel, L.V.L., Glulam, P.S.L., box beam, built-up, solid wood, etc.
- 5.7.3 Identify beam bearing requirements as per O.B.C.
- 5.7.4 Determine beam size according to O.B.C. tables and manufacturers' charts.
- 5.7.5 Identify construction methods and requirements for beams considering crowns; location of joints, and size, spacing and number of fasteners.
- 5.7.6 Identify procedures for altering existing structures to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.8		
Title:	Columns		
Duration:	Total Hours: 1	Theory: 1	Practical: 0
Cross-Reference to Training Standard: 1455, 1466			

General Learning Outcomes

Upon successful completion the apprentice will be able to identify the types, sizes, and installation practices of support columns.

Learning Outcomes and Content

- 5.8.1 Identify masonry, steel and wood columns and their appropriate application.
- 5.8.2 Determine size of columns, based on load, height, and location, according to O.B.C.
- 5.8.3 Identify methods of securing columns at top and at bottom.
- 5.8.4 Determine load bearing requirements for columns.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.9		
Title:	Floor Systems		
Duration:	Total Hours: 16	Theory: 6	Practical: 10
Cross-Reference to Training Standard: 1456, 1458			

General Learning Outcomes

Upon successful completion the apprentice will be able to identify, construct and install the components of floor systems.

Learning Outcomes and Content

- 5.9.1 Identify floor system components by type, size, function, method of installation, and related hardware with specific reference to the O.B.C. and other applicable span tables.
- Joist types (solid wood, wood 'I', web, steel, etc.)
 - Joist sizes (span tables, depth & spacing)
 - Joist restraint (bridging, blocking, strapping)
 - Cantilevered joists
 - Outdoor joists
 - Subfloor (types of materials including concrete toppings, thickness, fasteners)
- 5.9.2 Identify floor openings such as fireplaces, chimneys, stairwells, chases, etc.
- 5.9.3 Identify hardware, methods, and O.B.C. requirements for securing joists to sill plates, bearing walls, ledgers and beams.
- 5.9.4 Layout and install a floor system with openings, joist restraints and sheathing.
- 5.9.5 Identify procedures for altering existing structures to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.10		
Title:	Wall Framing		
Duration:	Total Hours: 18	Theory: 8	Practical: 10
Cross-Reference to Training Standard: 1456			

General Learning Outcomes

Upon successful completion the apprentice will be able to layout and frame walls following O.B.C. requirements.

Learning Outcomes and Content

- 5.10.1 Identify all types and components of wall framing systems including platform, balloon, post & beam, double stud, steel and manufactured.
- 5.10.2 Calculate rough stud openings for exterior doors and windows and determine framing sequence and nailing schedule from O.B.C.
- 5.10.3 Determine lintel sizes from O.B.C. tables and identify different methods for their assembly and installation. In addition, determine equivalent engineered product lintel sizes from manufacturers' tables.
- 5.10.4 Determine framing and nailing requirements for interior partitions including R.S.O.'s for slab doors, bifolds, sliding bypass doors, and pocket doors.
- 5.10.5 Identify diagonal bracing and fastening requirements per O.B.C. for stud walls including different types of structural and non-structural wall sheathing, wood let-in braces, metal "T" braces, diagonal stud bracing, and structural siding.
- 5.10.6 Identify the general O.B.C. requirements for backing, blocking, and fire stops and those specific to creating a barrier free residence such as backing, rough opening, swing radius, square footage, minimum clearances, etc.
- 5.10.7 Identify the requirements for backframing such as valances, drop ceilings, bulkheads, utility chases, etc.

- 5.10.8 Layout and construct standard and rake stud walls (interior & exterior), complete with door and window openings, exterior corners, interior junctions, diagonal bracing, lapped double top plates, and application of sheathing, insulation, air and vapour barriers.
- 5.10.9 Identify procedures for altering existing structures to accommodate renovations this includes temporary load bearing walls and bracing.

Number: 3105

Title: **Residential Construction**

Number: S3105.11

Title: **Ceiling Framing**

Duration: Total Hours: 3 Theory: 1 Practical: 2

Cross-Reference to Training Standard: 1457

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the function and installation of ceiling joists.

Learning Outcomes and Content

- 5.11.1 Identify the purpose, location, and method of installation of ceiling joists.
- 5.11.2 Determine the size and spacing of ceiling joists according to O.B.C.
- 5.11.3 Identify special ceiling considerations such as openings, vaults, etc.
- 5.11.4 Layout and cut ceiling joists to suit various roof types.
- 5.11.5 Identify procedures for altering existing structures to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.12		
Title:	Equal & Unequal Slope Roofs (Roof Foundations)		
Duration:	Total Hours: 67	Theory: 21	Practical: 46
Cross-Reference to Training Standard:	1457		

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the layout, cutting, and installation of different types of equal and unequal slope roofs.

Learning Outcomes and Content

- 5.12.1 Identify the different types of roofs and roof structural members such as rafters and intermediate supports.
- 5.12.2 Identify the special characteristics of roofs constructed with steel and I-joists.
- 5.12.3 Calculate the lengths of all the different types of rafters using the rafter square tables and Pythagorean Theorem.
- 5.12.4 Determine rafter length adjustments and angle cuts including bird's mouth, shortenings, droppings, backings, and side/cheek cuts.
- 5.12.5 Layout rafters using several different methods including step-off methods, line length calculations, the speed square, the framing square, and full scale method.
- 5.12.6 Determine, layout and construct equal slope, dormers, gable, hip, and intersecting roofs.
- 5.12.7 Determine, layout, cut and construct rafters, offsets, and raised wall plates for unequal slope roofs.
- 5.12.8 Determine layout, and cut sheathing face and edge cuts.
- 5.12.9 Identify procedures for altering existing structures to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.13		
Title:	Trusses		
Duration:	Total Hours: 7	Theory: 3	Practical: 4
Cross-Reference to Training Standard: 1457, 1458			

General Learning Outcomes

Upon successful completion the apprentice will be able to describe and install roof truss systems.

Learning Outcomes and Content

- 5.13.1 Identify components and properties of prefabricated trusses or trussed rafters (wood and steel).
- 5.13.2 Determine required layout, handling, and installation requirements for trussed roofs.
- 5.13.3 Layout and install a complete roof truss system incorporating gable and hip truss systems.
- 5.13.4 Identify procedures for altering existing structures to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.14		
Title:	Exterior Finish		
Duration:	Total Hours: 21	Theory: 6	Practical: 15
Cross-Reference to Training Standard: 1462			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge of the terminology, components and skill in the application of the various types of exterior finishing materials.

Learning Outcomes and Content

- 5.14.1 Identify window styles, types and components.
- 5.14.2 Install a window/exterior door plumb and level in a rough stud opening with accepted clearances.
- 5.14.3 Identify various types of roofing material such as asphalt, wood, steel, tile, etc.
- 5.14.4 Identify various flashings, water control accessories and building envelope requirements.
- 5.14.5 Identify the O.B.C. requirements in regard to the application of all finishes.
- 5.14.6 Layout and install asphalt shingles, wood shingles, flashing and water control according to manufacturers' specifications.
- 5.14.7 Identify and install cornices and cornice finish materials.
- 5.14.8 Identify installation techniques for types of siding such as wood, aluminum, vinyl, etc.
- 5.14.9 Select and install a type of siding such as wood, aluminum, vinyl, etc.
- 5.14.10 Identify procedures for removing exterior finishes using controlled procedures to accommodate renovations.
- 5.14.11 Describe methods for protecting existing finishes to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.15		
Title:	Interior Finish		
Duration:	Total Hours: 34	Theory: 10	Practical: 24
Cross-Reference to Training Standard: 1464			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge of the various interior finish components and skill in the application of related materials.

Learning Outcomes and Content

- 5.15.1 Identify pre-installation requirements for gypsum and non-gypsum wall and ceiling finishes.
- 5.15.2 Identify typical trims and their installation methods.
- 5.15.3 Identify various types of interior doors such as frame and panel, slab, bifold, bypass and pocket.
- 5.15.4 Identify door hardware such as passage set/lock set, closers and dead bolt.
- 5.15.5 Install an interior door with jamb, trim, and hardware such as passage set/lock.
- 5.15.6 Install window trim including stool, apron, and jamb extensions.
- 5.15.7 Install horizontal trim such as base, chair rail and crown.
- 5.15.8 Identify and determine installation and O.B.C. requirements for various floor coverings such as underlay, hardwood, tile, and resilient floor.
- 5.15.9 Identify, install and adjust upper & lower modular cabinet units.
- 5.15.10 Identify and install countertops.
- 5.15.11 Identify procedures to remove interior finishes using controlled procedures to accommodate renovations.
- 5.15.12 Describe methods to protect existing finishes to accommodate renovations.

Number:	3105		
Title:	Residential Construction		
Number:	S3105.16		
Title:	Building Envelope		
Duration:	Total Hours: 3	Theory: 3	Practical: 0
Cross-Reference to Training Standard: 1453, 1454, 1466, 1469			

General Learning Outcomes

Upon successful completion the apprentice will be able to describe the basic principles of building science as they relate to the building envelope.

Learning Outcomes and Content

- 5.16.1 State the basic principles of building science that are at work in the building envelope and explain the importance of regulated indoor air quality and the meaning of the phrase ‘the house as a system’.
- 5.16.2 Identify the components function of the building envelope:
- Water control layer (a.k.a. drainage plane)
 - Air barrier
 - Vapour barrier
 - Thermal barriers
 - Roof types
 - Sealants
 - Gaskets
- 5.16.3 Identify penetrations to the building envelope and methods to seal those penetrations or other areas of concern.
- 5.16.4 Identify trends in building science such as energy efficiency, indoor air quality and environmental impact.
- 5.16.5 Identify procedures to accommodate renovations.

Number:	3106		
Title:	Plans, Specifications & Codes 2		
Number:	S3106.1		
Title:	Residential Construction: Plans, Specifications & Codes		
Duration:	Total Hours: 24	Theory: 24	Practical: 0
Cross-Reference to Training Standard: 1453, 1454			

General Learning Outcomes

Upon successful completion the apprentice will be able to read and interpret residential plans and specifications.

Learning Outcomes and Content

- 6.1.1 Read and interpret typical residential drawings and specifications with reference to:
- Plot plans
 - Basement plans
 - Floor plans
 - Elevations
 - Sections
 - Detail drawings
 - Roof plans
 - Door schedule
 - Window schedules
 - Room finish schedules
 - Architectural Specifications
 - Plumbing, heating and electrical symbols

Number:	3107		
Title:	Estimating, Calculation & Layout 2		
Number:	S3107.1		
Title:	Residential Construction: Estimating, Calculation & Layout		
Duration:	Total Hours: 24	Theory: 24	Practical: 0
Cross-Reference to Training Standard:	1453		

General Learning Outcomes

Upon successful completion the apprentice will be able to estimate material quantities and related costs as per residential plans and specifications.

Learning Outcomes and Content

- 7.1.1 State the industry accepted standards regarding time allotted for task completion in terms of carpenter hours per unit measure and demonstrate the Theory: and basic principles of estimating.
- 7.1.2 Estimate, using linear, area, and volume measures, the material quantities and related costs of:
- foundations
 - site requirements
 - floor framing
 - wall framing
 - roof framing
 - roof covering
 - window and doors
 - Insulation
 - exterior weather barriers
 - interior air vapour barriers
 - exterior finishes
 - interior finishes
 - Stairs
 - Cabinetry
 - floor covering

Level 3

Reportable Subject Summary – Level 3

Number	Reportable Subjects	Hours			Evaluation		
		Theory	Practical	Total	Theory	Practical	Total
3108: ICI Construction							
3108.1	Layout Transits and Levels	8	14	22	10%	12%	12%
3108.2	Excavation and Shoring	3	0	3	4%	0%	2%
3108.3	Footings and Deep Foundations	4	4	8	5%	4%	4%
3108.4	Formwork and Concrete Structures	21	35	56	28%	30%	29%
3108.5	Interior Finish	13	20	33	17%	17%	17%
3108.6	Exterior Finish	2	0	2	3%	0%	1%
3108.7	Stairs and ramps	22	36	58	29%	31%	30%
3108.8	Timber Construction	3	7	10	4%	6%	5%
Sub-Totals		76	116	192	100%	100%	100%
3109: Plans, Specifications & Codes 3							
3109.1	ICI Plans, Specifications & Codes	24	0	24	100%	0%	100%
Sub-Totals		24	0	24	100%	0%	100%
3110: Estimating, Calculation & Layout 3							
3110.1	ICI Estimating, Calculation & Layout	24	24	0	100%	100%	0%
Sub-Totals		24	24	0	100%	100%	0%
Level 3 Totals		124	116	240			

Level 3 Suggested Shop Projects

Transits/levels: elevations, horizontal lines, level/plumb lines, benchmarks, building layout

Footings: strip, pier & column footings, keyways, rebar, etc.

Formwork: walls, columns with capitals, suspended slab, stairs, bulkheads, anchor bolts, rebar, shoring

Interior Finish: suspended ceilings, metal studs, drywall, doorframe & components, demountable partitions, commercial hardware

Stairs: straight run, winder, open & housed stringer, balustrade

Raised Access Floor: floor, ramp and handrail

Timber Frame: gazebo/outdoor structure

Number: 3108
Title: **ICI Construction**

Number: S3108.1
Title: **Layout II – Transits and Levels**

Duration: Total Hours: 22 Theory: 8 Practical: 14
Cross-Reference to Training Standard: 1454

General Learning Outcomes

Upon successful completion the apprentice will be able to use typical layout instruments.

Learning Outcomes and Content

- 8.1.1 Identify types of layout instruments and related terminology.
- 8.1.2 Calculate and track changes in elevations and angles.
- 8.1.3 Select and use appropriate leveling instruments (on site) to establish elevations and level and plumb lines.
- 8.1.4 Select and use appropriate instruments such as a builder's level & laser level - for site and building layout.
- 8.1.5 Identify and describe the functions of advanced layout instruments such as total stations and theodolites.

Number: 3108
Title: **ICI Construction**

Number: S3108.2
Title: **Excavation, Shoring and Re-Shoring**
Duration: Total Hours: 3 Theory: 3 Practical: 0
Cross-Reference to Training Standard: 1454, 1455

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge in safe working practices related to excavation and shoring.

Learning Outcomes and Content

- 8.2.1. State the Occupational Health & Safety Act's (O.H.S.A.) regulations regarding trenching and shoring.
- 8.2.2 Identify types of shoring, and piles.
- 8.2.3 Identify hazards related to excavation, shoring and re-shoring including underpinning of adjacent buildings.
- 8.2.3 Identify re-shoring procedures to accommodate renovations.

Number: 3108

Title: **ICI Construction**

Number: S3108.3

Title: **Footings and Deep Foundations**

Duration: Total Hours: 8 Theory: 4 Practical: 4

Cross-Reference to Training Standard: 1454, 1455, 1456

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the layout and construction of footing forms and used in commercial construction.

Learning Outcomes and Content

- 8.3.1 Identify types of footing used in commercial construction such as spread, piles, caissons, piers, etc.
- 8.3.2 Layout, cut and assemble footing forms.
- 8.3.3 Identify procedures for altering existing structures to accommodate renovations.

Number: 3108
Title: **ICI Construction**

Number: S3108.4
Title: **Formwork & Concrete Structures**

Duration: Total Hours: 56 Theory: 21 Practical: 35
Cross-Reference to Training Standard: 1455

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the layout and construction of concrete formwork used in commercial construction and renovations.

Learning Outcomes and Content

- 8.4.1 Identify types of walls, columns, slabs, and girder used in commercial construction.
- 8.4.2 Identify O.H.S.A.'s regulations regarding formwork and falsework.
- 8.4.3 Describe the composition and properties of various types of concrete.
- 8.4.4 Describe the proper delivery, placement, consolidation and curing of concrete and describe testing methods.
- 8.4.5 Identify and describe the factors affecting form design.
- 8.4.6 Identify and describe formwork for concrete walls, slabs, stairs, beams and columns.
- 8.4.7 Identify and describe ICF systems for commercial use.
- 8.4.8 Identify methods used to connect structures to concrete.
- 8.4.9 Identify and describe uses and placement of concrete-embedded steel.
- 8.4.10 Construct and install templates for anchor bolts.
- 8.4.11 Erect formwork for concrete walls, slabs, stairs, beams and columns, including ICF, loose forms and pre-manufactured forming systems.

Number:	3108		
Title:	ICI Construction		
Number:	S3108.5		
Title:	Interior Finish		
Duration:	Total Hours: 33	Theory: 13	Practical: 20
Cross-Reference to Training Standard: 1464			

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge and skill in the installation of suspended ceiling systems, metal studs, demountable partitions, and commercial hardware.

Learning Outcomes and Content

- 8.5.1 Identify and describe the tools, materials required for metal stud, suspended ceiling, and drywall installations.
- 8.5.2 Identify and describe various types of demountable partitions.
- 8.5.3 Layout and install suspended ceilings and metal stud walls complete with drywall ready for taping- using adhesives, screws or nailing – door frames, doors, bulkheads and chases.
- 8.5.4 Identify and follow manufacturer’s instructions to install various types of commercial hardware such as mortise lock, exit devices, closers, and handicap access hardware.
- 8.5.5 Identify and describe materials and installation techniques used for fire ratings and sound attenuation ratings (STC) as applied to commercial buildings.
- 8.5.6 State the purpose for access floors and select the required tools and materials.
- 8.5.7 Demonstrate the layout and installation of Raised Access Floors.
- 8.5.8 Identify procedures to remove interior and finishes using controlled procedures to accommodate renovations.
- 8.5.9 Describe methods to protect existing finishes to accommodate renovations.

Number: 3108
Title: **ICI Construction**

Number: S3108.6
Title: **Exterior Finish**

Duration: Total Hours: 2 Theory: 2 Practical: 0

Cross-Reference to Training Standard: 1462, 1466

General Learning Outcomes

Upon successful completion the apprentice will be able to recognize types of commercial exterior finishes.

Learning Outcomes and Content

- 8.6.1 Identify commercial exterior finishes such as aluminum, vinyl, wood, steel, composite products, concrete, flashings, cladding, brick mould, EIFS, CMU, curtain wall, precast.
- 8.6.2 Identify procedures for altering existing structures to accommodate renovations.

Number: 3108
Title: **ICI Construction**

Number: S3108.7
Title: **Stairs and Ramps**

Duration: Total Hours: 58 Theory: 22 Practical: 36

Cross-Reference to Training Standard: 1455, 1458, 1459, 1462

General Learning Outcomes

Upon successful completion the apprentice will be able to calculate, layout, cut, and assemble stairs and ramps.

Learning Outcomes and Content

- 8.7.1 Name and identify all stair components and terminology.
- 8.7.2 Apply the Ontario Building Code to all types of stairs.
- 8.7.3 Calculate and design stairs and suitable stairwell openings.
- 8.7.4 Layout and construct stairs that include cut, housed and mitred stringers.
- 8.7.5 Layout and construct a 3 step winder.
- 8.7.6 Layout and install handrails, balusters, and newel posts.
- 8.7.7 Identify and describe requirements for barrier free access ramps in reference to O.B.C.
- 8.7.8 Layout a barrier free access ramp.

Number: 3108
Title: **ICI Construction**

Number: S3108.8
Title: **Timber Construction**

Duration: Total Hours: 10 Theory: 3 Practical: 7

Cross-Reference to Training Standard: 1458, 1465

General Learning Outcomes

Upon successful completion the apprentice is able to demonstrate knowledge in the layout, fabrication, construction and installation of timber structures.

Learning Outcomes and Content

- 8.8.1 Identify the components and methods of construction of Post & Beam, mechanically connected and traditional timber frame.
- 8.8.2 Layout and construct a traditional timber frame structure.

Number: 3109
Title: **Plans, Specifications & Codes 3**

Number: S3109.1
Title: **ICI Plans, Specifications & Codes**

Duration: Total Hours: 24 Theory: 24 Practical: 0

Cross-Reference to Training Standard: 1453, 1454, 1464

General Learning Outcomes

Upon successful completion the apprentice is able to demonstrate knowledge and skill in the reading and interpretation of commercial plans, specifications, and codes.

Learning Outcomes and Content

- 9.1.1 Read and interpret Architectural plans, specifications and shop drawings with reference to:
- Site layout
 - Landscape plan
 - Foundations
 - Floors
 - Elevations
 - Sections
 - Details
 - Roofs
 - Window Schedules
 - Door schedules
 - Room Finish Schedules
 - Ceilings
 - Handicap accessibility
 - Hardware schedules
 - Painting schedules
 - Plumbing, heating, cooling and electrical symbols

9.1.2 Read and interpret engineered plans, specifications and shop drawings in reference to:

- Scaffolding
- Formwork
- Trenching
- Structural steel construction
- Reinforced concrete structures
- Electrical drawings
- Mechanical drawings

Number: 3110

Title: **Estimating, Calculation & Layout 3**

Number: S3110.1

Title: **ICI Estimating, Calculation & Layout**

Duration: Total Hours: 24 Theory: 24 Practical: 0

Cross-Reference to Training Standard: 1453

General Learning Outcomes

Upon successful completion the apprentice will be able to demonstrate knowledge in the procedure of estimating material quantities and costs as per commercial plans and specifications.

Learning Outcomes and Content

- 10.11 State the industry accepted standards regarding time allotted for task completion in terms of carpenter hours per unit measure and demonstrate the Theory: and basic principles of estimating.
- 10.1.2 Estimate, using linear, area, and volume measures, the material quantities of:
- Interior finish
 - Concrete volumes with related components
 - Formwork and falsework
 - Roof details such as parapets, curbs and sleepers,
 - Temporary safety components such as guard rails, barricades, ramps, stairs, hoarding, etc.



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