



ONTARIO COLLEGE OF TRADES
ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Curriculum Standard

General Carpenter

Levels 1, 2 & 3

403A

2014

The Ontario College of Trades General Carpenter Trade Board would like to acknowledge the following trade representatives for their contributions to the development of this publication:

Jeff Acciaccaferro
Vic Bodnar
Del Boudreau
Dan De La Mothe
Steve Laing
Bob McDermid

Please Note:

Previously, Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards.

Please refer to the College's website (www.collegeoftrades.ca) for the most accurate and up-to-date information about the College. For information on the *Ontario College of Trades and Apprenticeship Act, 2009*, and its regulations, please visit: www.collegeoftrades.ca/about/legislation-and-regulations.

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Introduction

The curriculum is organized into 3 levels of training. The reportable subjects summary chart on p. 7 summarizes the training hours for each reportable subject.

The curriculum identifies only the learning that takes place off-the-job. The in-school program focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives contained in the Apprenticeship Training Standards for General Carpenter.

Employers/Sponsors are expected to extend their apprentice's knowledge and skills through practical training on the work site. 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.

Pre-requisites

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.

Suggested Equipment for Training Delivery Agencies

The listing of tools on pages 15-19 does not list minimum quantities based on the understanding that the delivering Training Delivery Agent (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.

Reporting of Hours Disclaimer:

It is agreed that 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.

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

REPORTABLE SUBJECT SUMMARY

LEVEL 1

HOURS			
SUBJECT	THEORY	PRACTICAL	TOTAL
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

HOURS			
SUBJECT	THEORY	PRACTICAL	TOTAL
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

HOURS			
SUBJECT	THEORY	PRACTICAL	TOTAL
1: ICI CONSTRUCTION			
	76	116	192
2: PLANS, SPECIFICATIONS & CODES 3			
	24	0	24
3: ESTIMATING, CALCULATION & LAYOUT 3			
	24	0	24
LEVEL 3 TOTALS	124	116	240

LEVEL 1

HOURS					EVALUATION		
#	UNIT	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	20	25	8%	19%	15%
3101.6	Hand Tools	12	34	46	19%	33%	27%
3101.7	Power Tools	12	37	49	19%	36%	29%
3101.8	Rigging	12	0	12	19%	0%	7%
3101.9	Access Structures	3	13	16	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

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.1:	Trade Introductions		
Hours:	Total: 1	Theory: 1	Practical: 0
Training Standard Reference:	N/A		

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.

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.2:	Health and Safety		
Hours:	Total: 8	Theory: 8	Practical: 0
Training Standard Reference:	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

Reportable Subject 3101:	Safety, Materials & Tools
S3101.3:	Types of Materials
Hours:	Total: 5 Theory: 5 Practical: 0
Training Standard Reference:	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.

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.4:	Wood and Wood Products		
Hours:	Total: 6	Theory: 6	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.5:	Joints and Fasteners		
Hours:	Total: 25	Theory: 5	Practical: 20
Training Standard Reference:	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.

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.6:	Hand Tools		
Hours:	Total: 46	Theory: 12	Practical: 34
Training Standard Reference:	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 below.

Hand Tools & Equipment

Measuring, Layout and marking	
TAPE MEASURE – 25’	CALIPERS
TAPE MEASURE – 50 – 100’	Inside
SQUARES - metric/imperial	Outside
Steel (rafters) Imperial & metric	Vernier
Try	LINES
Speed	Dry Line
Combination	Chalk Line
Square Gauges, Square Guide	Plumb Bob
Sliding t-bevel	LEVELS
Drywall t-square	Line
MARKING TOOLS	Carpenter’s (hand)
Marking Gauge	Torpedo
Mortise Gauge	Water
Profile Gauge	Builder’s level - Automatic Level
Butt Marker	Transit (theodolite)
Awl	Various Lasers
Dividers	Total: Station
Compass	SETS AND PUNCHES
Scriber	Nail Sets
Trammel Points	Drift Pin
Profile Gauge	Centre Punch
HAMMERS	Self-Centering Punch
Curved Claw	HATCHETS
Straight Claw	Drywall
Mallets	Roofing

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Sledge	BARS
Dead Blow	Pry
Brad Push	Flat
STAPLERS	Nail Pullers
Staple Gun	Cat's Paw
Hammer Tacker	
Fastening	
WRENCHES	PLIERS
Box End	Slip joints
Open End	C-joint
Combination	Locking
Adjustable	Needle Nose
Socket (and ratchet)	Side Cutting
Pipe	Linesman
Allen (hex keys)	Fencing
Nut Drivers	Carpenter's (nippers)
Spud	Sheet Metal
Speed	SCREWDRIVERS
	Phillips
	Robertson
	Standard (flat)
	Stubby
	Offset
	Ratchet
	Security
Sawing and Cutting	
SAWS	SAWS Cont'd
Hand (cross cut and rip)	Flooring
Compass, keyhole	Variety of knives
Coping	Mitre Shear
Dovetail	Laminate Shear
Back	CHISELS
Flush Cut Saw	Butt
Hack	Paring
Nail saw (pistol grip)	Firmer
Japanese	Mortise
Drywall	Cold
Snips	Framing
Sheet Metal/Aviation	Flooring
Bolt cutter	Corner
Boring and Clamping	
DRILLS	BITS
Hand	Twist

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Bit Brace (ratchet type)	Auger
CLAMPS	Expansive
C	• Ship auger
Bar	• Extension
Pipe	• Countersink
Spring	• (Screw) Pilot
Hand screw (Jorgensen)	• Spade
Band (strap)	• Step
F	• Masonry
VICES	• Taps
Bench	• Driver
Woodworking	• Plug Cutter
Saw	• Forstner
	• Hole Saw
Smoothing, Shaping & Sharpening	
PLANES	SCRAPERS
Block (and low angle)	Hand
Smoothing	Cabinet
Jack	Paint
Fore	Burnisher
Jointer	Rasps
Rabbet (bullnose and duplex)	Files
Router	Floor
Forming (`surform`)	Filecard
Cornering Tools	MISCELLANEOUS
Spokeshave	Saw set
STONES	Saw jointer
Oil (whet)	Drywall Knives and trowels
Water	Concrete Finishing Tools
Slip	Wire brush
MISCELLANEOUS CONT'D	
Sanding blocks	Caulking gun
Rivet gun	Magnet
Safety and Apparel	
Nail Apron	Dust Mask
Tool Belt	Respirator
Safety Boots	Hard Hat
Visors, Face Masks	Gloves
Ear Plugs and Muffs	Glasses, Goggles
Shop Apron	Safety Harness
Coveralls	First Aid Kit
Fire Extinguisher	

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.7:	Power Tools and Equipment		
Hours:	Total: 49	Theory: 12	Practical: 37
Training Standard Reference:	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 TBD 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 TBD and apply and use with appropriate accessories in accordance with manufacturers' instructions.

Power Tools and Equipment List

PORTABLE	STATIONARY
Circular Saws	Mitre saws
Planers	Compound Mitre Saws
Screw Guns	Sliding Compound Mitre Saws
Routers/Laminate Trimmers	Table Saws
Belt Sanders	Radial Arm Saws
Oscillating Sanders	Drill Press
Palms Sanders	Belt/Disc Sander
Sabre Saws	Shaper
Reciprocating Saw	Jointer(s)
Cordless Screwdrivers	Thickness Planer(s)
Electric Drills	Grinder
Biscuit Joiner	Panel
Powder-Actuated Tool (low velocity)	Band Saw
Hammer Drill	Aluminum Brake

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Rotary hammer Drill	Dry Cutout Tool
Door Kit Jig	Wall
Chain Saw	Metal chop Saw
Compressor	
Generator	
Pneumatic Fastening Tools	
Quick-cut	
Hand Grinders	

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.8:	Rigging		
Hours:	Total: 12	Theory: 12	Practical: 0
Training Standard Reference:	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.

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Reportable Subject 3101:	Safety, Materials & Tools		
S3101.9:	Access Structures		
Hours:	Total: 16	Theory: 3	Practical: 13
Training Standard Reference:	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 dismantling 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)*.

GENERAL CARPENTER – LEVELS 1, 2 AND 3

Reportable Subject 3102:	Plans, Specifications, & Codes I		
S3102.1:	Related Services & Authorities		
Hours:	Total: 5	Theory: 5	Practical: 0
Training Standard Reference:	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).

Reportable Subject 3102:	Plans, Specifications, & Codes I
S3102.2:	Drawing: Related Equipment and Identification
Hours:	Total: 5 Theory: 5 Practical: 0
Training Standard Reference:	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

Reportable Subject 3102:	Plans, Specifications, & Codes I		
S3102.3:	Plans and Sketches: Reading		
Hours:	Total: 3	Theory: 3	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3102:	Plans, Specifications, & Codes I
S3102.4:	Plans and Sketches: Drawing
Hours:	Total: 11 Theory: 11 Practical: 0
Training Standard Reference:	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

Reportable Subject 3103:	Estimating, Calculation, & Layout I		
S3103.1	Trade Calculations		
Hours:	Total: 21	Theory: 21	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3103:	Estimating, Calculation, & Layout I
S3103.2:	Construction Layout Principles
Hours:	Total: 12 Theory: 12 Practical: 0
Training Standard Reference:	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

Reportable Subject 3104:	Welding
S3104.1:	Basic Oxy-Acetylene & Shielded Metal Arc Welding (SMAW)
Hours:	Total: 15 Theory: 3 Practical: 12
Training Standard Reference:	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

HOURS					EVALUATION		
#	UNIT	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	0	3	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%
3105.1	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 2 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

Reportable Subject 3105:	Residential Construction		
S3105.1:	Building Layout		
Hours:	Total: 6	Theory: 2	Practical: 4
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.2:	Excavation		
Hours:	Total: 2	Theory: 2	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.3:	Footings		
Hours:	Total: 3	Theory: 3	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.4:	Foundations		
Hours:	Total: 4	Theory: 4	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.5:	Drainage Systems		
Hours:	Total: 2	Theory: 2	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.6:	Sill Plates		
Hours:	Total: 2	Theory: 1	Practical: 1
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.7:	Floor Beams		
Hours:	Total: 3	Theory: 3	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.8:	Columns		
Hours:	Total: 1	Theory: 1	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.9:	Floor Systems		
Hours:	Total: 16	Theory: 6	Practical: 10
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.10:	Wall Framing		
Hours:	Total: 18	Theory: 8	Practical: 10
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.11:	Ceiling Framing		
Hours:	Total: 3	Theory: 1	Practical: 2
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.12:	Equal & Unequal Slope Roofs (Roof Foundations)		
Hours:	Total: 67	Theory: 21	Practical: 46
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.13:	Trusses		
Hours:	Total: 7	Theory: 3	Practical: 4
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.14:	Exterior Finish		
Hours:	Total: 21	Theory: 6	Practical: 15
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.15:	Interior Finish		
Hours:	Total: 34	Theory: 10	Practical: 24
Training Standard Reference:	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.

Reportable Subject 3105:	Residential Construction		
S3105.16:	Building Envelope		
Hours:	Total: 3	Theory: 3	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3106:	Plans, Specifications & Codes II		
S3106.1:	Residential Construction: Plans, Specifications & Codes		
Hours:	Total: 24	Theory: 24	Practical: 0
Training Standard Reference:	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

Reportable Subject 3107:	Estimating, Calculation & Layout II		
S3107.1	Residential Construction: Estimating, Calculation & Layout		
Hours:	Total: 24	Theory: 24	Practical: 0
Training Standard Reference:	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

HOURS					EVALUATION		
#	UNIT	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	0	24	100%	0%	100%
SUB TOTALS		24	0	24	100%	0%	100%
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

Reportable Subject 3108:	ICI Construction		
S3108.1:	Layout II – Transits and Levels		
Hours:	Total: 22	Theory: 8	Practical: 14
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.2:	Excavation, Shoring and Re-Shoring		
Hours:	Total: 3	Theory: 3	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction
S3108.3:	Footings and Deep Foundations
Hours:	Total: 8 Theory: 4 Practical: 4
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.4:	Formwork & Concrete Structures		
Hours:	Total: 56	Theory: 21	Practical: 35
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.5:	Interior Finish		
Hours:	Total: 33	Theory: 13	Practical: 20
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.6:	Exterior Finish		
Hours:	Total: 2	Theory: 2	Practical: 0
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.7:	Stairs and Ramps		
Hours:	Total: 58	Theory: 22	Practical: 36
Training Standard Reference:	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.

Reportable Subject 3108:	ICI Construction		
S3108.8:	Timber Construction		
Hours:	Total: 10	Theory: 3	Practical: 7
Training Standard Reference:	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.

Reportable Subject 3109:	ICI Construction
S3109.1:	ICI Plans, Specifications & Codes
Hours:	Total: 24 Theory: 24 Practical: 0
Training Standard Reference:	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

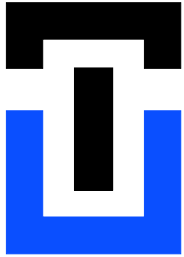
Reportable Subject 3110:	ICI Construction		
S3110.1:	ICI Estimating, Calculation & Layout		
Hours:	Total: 24	Theory: 24	Practical: 0
Training Standard Reference:	1453		

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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