

# Apprenticeship and Industry Training

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**Carpenter**

**Apprenticeship Course Outline**

**0200 (2000)**



# **CARPENTER**

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## **COURSE OUTLINE**

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Care has been taken to acknowledge all sources and references in these materials. If there are any inadvertent omissions, please contact Alberta Learning, 10th floor, Commerce Place, Edmonton, Alberta, Canada, T5J 4L5.

# **APPRENTICESHIP AND INDUSTRY TRAINING SYSTEM**

Apprenticeship is post-secondary education with a difference. It helps ensure Alberta has a steady supply of highly-skilled employees, the foundation of our economy's future health and competitiveness.

Apprentices in more than 50 trades and crafts spend between one and four years learning their trade - 80% of the time on-the-job under the supervision of a certified journeyman or qualified tradesperson. The balance of the program is technical training in the theory, skills and technologies of their trade.

To become certified journeymen, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification - including the content and delivery of technical training - are developed and updated by the Alberta Apprenticeship and Industry Training Board (the Board) and a network of local and provincial industry committees.

The graduate of the Carpenter apprenticeship training is a journeyman who will be able to:

- responsibly do all work tasks expected of a journeyman.
- supervise, train and coach apprentices.
- understand the principles of sound and safe construction.
- know the characteristics and proper use of all building construction materials.
- read blueprints, do layout work and calculate quantities of materials.
- build various types of forms of concrete.
- build all types of wood framed buildings and apply exterior and interior finish of wood or wood substitutes.
- be proficient in the safe use and maintenance of hand and power tools.
- be familiar with the work of other tradesmen in the building industry.
- perform assigned tasks in accordance with quality and production standards required in industry.
- comply with all safety regulations of the construction industry.

While Alberta's apprenticeship system is supported by government, it is driven by industry (a term which includes both employers and employees). The Board steers the system, but the system relies on a network of local and provincial apprenticeship committees (LACs and PACs), representing the interests of each of more than 50 trades and crafts. Partners in the apprenticeship system play critical roles through the local and provincial committees within each trade.

## **Local Apprenticeship Committees (LAC)**

Wherever there is activity in a trade, the Board can set up a LAC. The Board appoints equal numbers of employees and employers for terms of up to three years. The committee appoints a member as presiding officer. LACs:

- monitor the apprenticeship system, and the progress of apprentices in their trade, at the local level
- help settle certain kinds of issues between apprentices and their employers
- recommend improvements in apprenticeship training and certification to their trade's provincial apprenticeship committee
- make recommendations to the Board regarding the appointment of members to their trade's PAC.

## Provincial Apprenticeship Committees (PAC)

The Board establishes a PAC for each trade and, based on PAC recommendations, appoints a presiding officer and equal numbers of employees and employers for terms of up to three years. Most PACs have nine members. PACs:

- identify the training needs and content for their trade
- recommend to the Board the standards for training and certification for their trade
- monitor the activities of local apprenticeship committees in their trade
- make recommendations to the Board about the designation of trades and occupations
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in the trade
- may participate in resolving any apprenticeship-related disputes between employers and employees

### Carpenter P.A.C. Members

Mr. K. Nielson.....	Medicine Hat .....	Presiding Officer
Mr. A. Head .....	Edmonton.....	Employer
Mr. A. McEwen.....	Grande Prairie.....	Employer
Mr. G. Giercke.....	Red Deer.....	Employer
Mr. M. Lischka .....	Vermilion .....	Employer
Mr. B. Bulloch.....	Calgary.....	Employee
Mr. G. Chanut.....	Calgary.....	Employee
Mr. B. Regan .....	Edmonton.....	Employee
Mr. B. Martinell .....	Lethbridge .....	Employee

## The Alberta Apprenticeship and Industry Training Board (Board)

The 13 members of the government appointed Board are aware of the training and certification needs of trades people and employers. Many Board members have previously served on an LAC or PAC. The Board:

- responds to industry's needs
- sets training and certification standards in all trades
- approves the technical training to be delivered by training establishments
- encourages the development of alternate methods of technical training delivery
- makes recommendations to the Minister of Alberta Learning about the designation of trades and occupations
- creates LACs, PACs, and appoints their members
- advises the Minister on the labour market's need for skilled and trained workers

## Safety Education

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of employers and employees. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to or cause an accident or injury.

It is generally recognised that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy safe attitude towards prevention of accidents.

A tradesperson may be exposed to more hazards than others in the work force. Therefore, tradespersons should be familiar and comply with the Occupational Health and Safety Act and Regulations respecting personal safety and the safety in the work place.

## **Legal and Administrative Aspects of Safety**

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer and employee.

### **Employer's Responsibilities:**

The employer is responsible for:

- provision and maintenance of safety equipment.
- provision of protective devices and clothing.
- enforcement of safe working procedures.
- safeguards for machinery, equipment and tools.
- observance of all accident prevention regulations.
- training of employees in safe use and operation of equipment.

### **Employee's Responsibilities:**

The employee is responsible for:

- working in accordance with the safety regulations pertaining to job environment.
- working in such a way as not to endanger themselves or fellow employees.

## **Technical Training Establishments**

The Carpenter apprenticeship training program is offered by Alberta Learning, Apprenticeship and Industry Training . Staff and facilities for delivering the program are supplied by:

- Northern Alberta Institute of Technology
- Southern Alberta Institute of Technology
- Lethbridge Community College
- Keyano College
- Lakeland College
- Fairview College
- Medicine Hat College
- Red Deer College

## **Procedures for Recommending Revisions to the Course Outline**

This course outline has been prepared by the Industry Programs and Standards of the Apprenticeship and Industry Training in partnership with the Provincial Apprenticeship Committee for the trade.

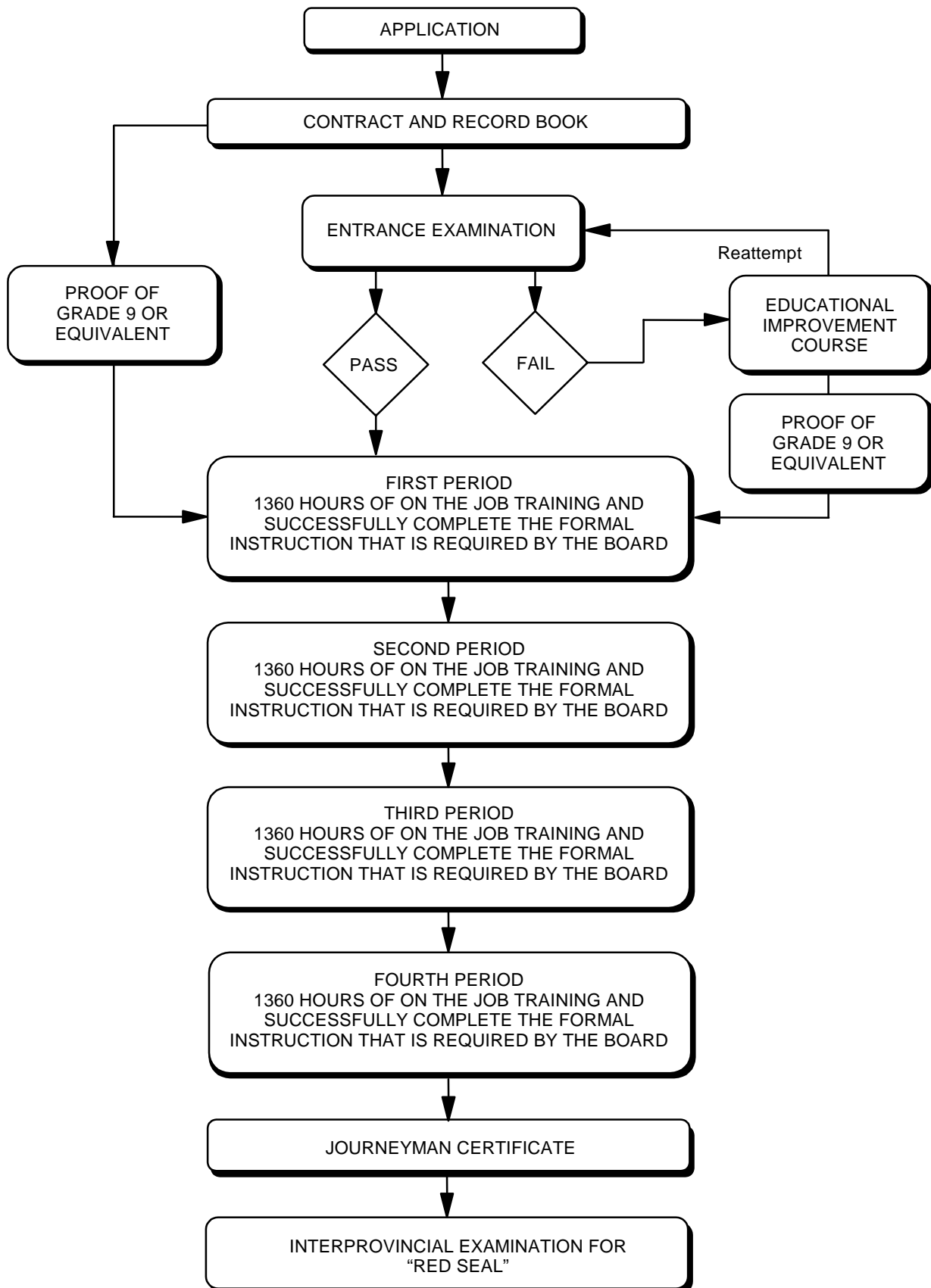
This course outline was approved on May 26, 2000 under the authority of the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. Valuable input is acknowledged from industry and the institutes.

Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to:

Apprenticeship and Industry Training  
Industry Programs and Standards  
10th floor, Commerce Place  
10155 - 102 Street  
Edmonton, AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

## APPRENTICESHIP ROUTE TOWARD CERTIFICATION



# CARPENTER TRAINING PROFILE

## First Period (8 Weeks 30 Hours Per Week – Total of 240 Hours)

### SECTION ONE

**THEORY**  
56 Hours



<b>A</b> Program Introduction 3 Hours	<b>B</b> Materials of Construction 8 Hours	<b>C</b> Hand Tools 3 Hours
<b>D</b> Machines and Powered Hand Tools 3 Hours	<b>E</b> Occupational Health and Safety Regulations 4 Hours	<b>F</b> Machines and Equipment 3 Hours
<b>G</b> Building Operations 10 Hours	<b>H</b> Forming 16 Hours	<b>I</b> The Floor Frame 6 Hours

### SECTION TWO

**SHOP**  
120 Hours



<b>A</b> Hand Tool Operations 32 Hours	<b>B</b> Woodworking Machines and Powered Hand Tools 30 Hours	<b>C</b> Rigging 6 Hours
<b>D</b> Explosive Actuated Tools Course 6 Hours	<b>E</b> Layout and Elementary Form Work 36 Hours	<b>F</b> Floor Framing 10 Hours

### SECTION THREE

**BLUEPRINTS**  
32 Hours



<b>A</b> Introduction of Drawings and Instruments 6 Hours	<b>B</b> Orthographic and Isometric Drawings 12 Hours	<b>C</b> Free Hand Sketching 4 Hours
<b>D</b> Blueprint Interpretation 10 Hours		

### SECTION FOUR

**TRADE MATHEMATICS**  
32 Hours



<b>A</b> Calculations Related to Trade Practice 32 Hours
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## Second Period (8 Weeks 30 Hours Per Week – Total of 240 Hours)

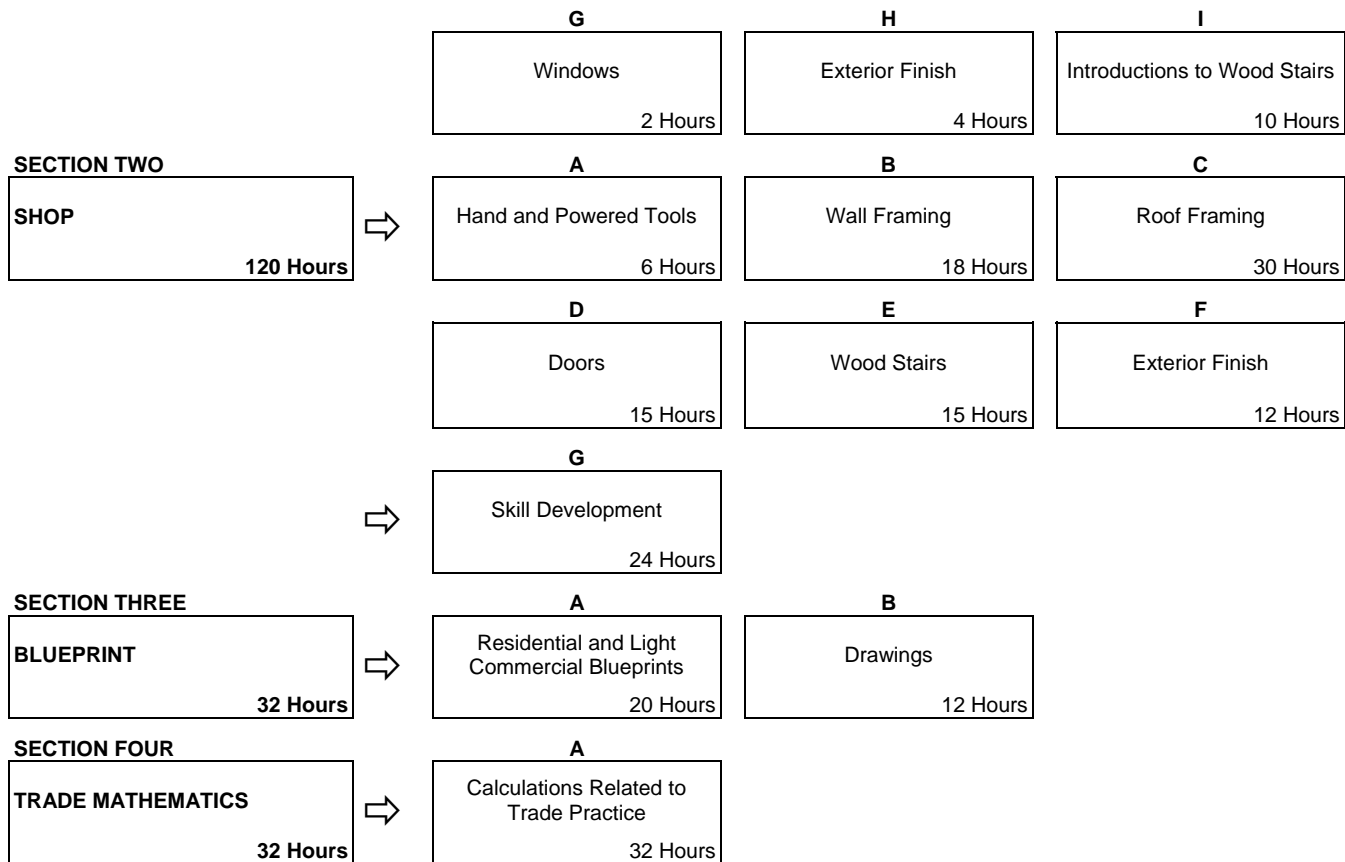
### SECTION ONE

**THEORY**  
56 Hours

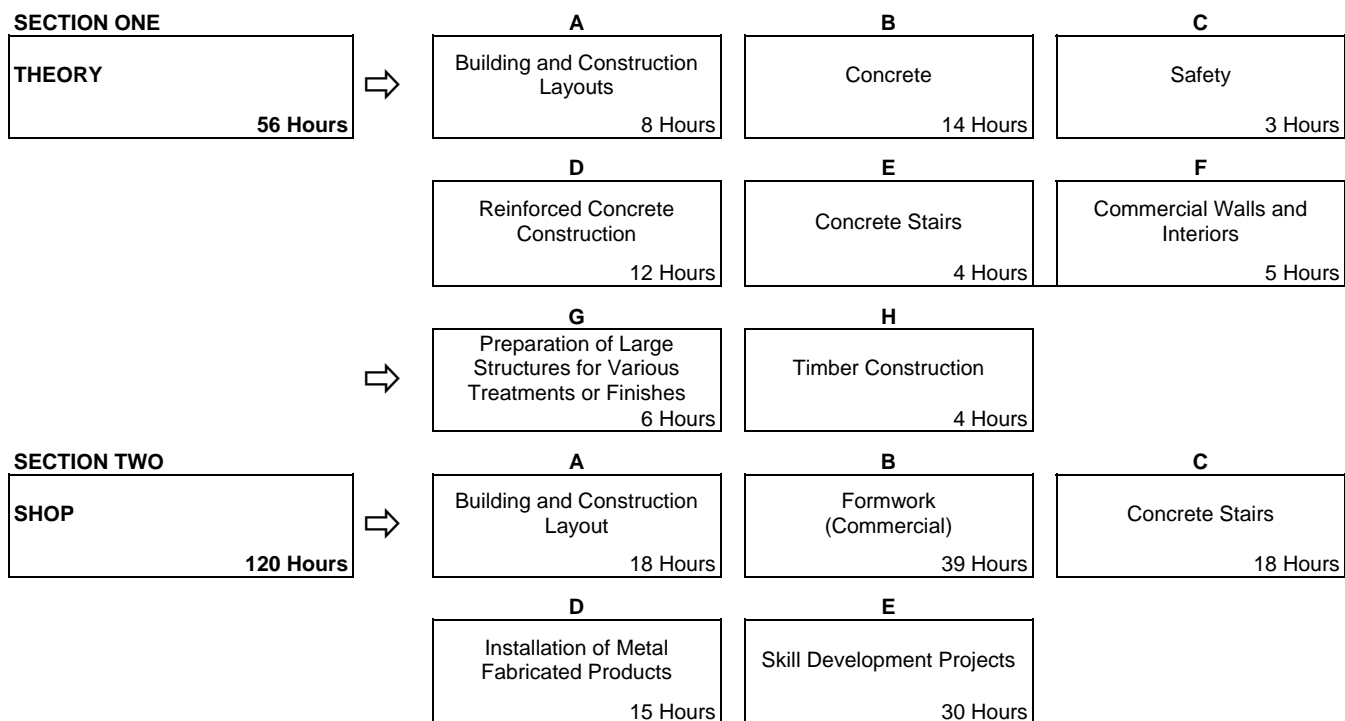


<b>A</b> Framed Structures 9 Hours	<b>B</b> Ceiling Joint Systems 2 Hours	<b>C</b> Roof Framing 20 Hours
<b>D</b> Roof Covering 3 Hours	<b>E</b> Insulations, Building Papers, Air/Vapour Barriers 3 Hours	<b>F</b> Wood and Metals 3 Hours





**Third Period**  
(8 Weeks 30 Hours Per Week – Total of 240 Hours)



**SECTION THREE**

<b>BLUEPRINTS</b>  <b>32 Hours</b>	⇒	<b>A</b> Study of Blueprints for Buildings that are Substantially of Reinforced Concrete <b>16 Hours</b>	<b>B</b> Study of Blueprints for Building with Glued-Laminated or Timber Construction <b>4 Hours</b>	<b>C</b> Drawing Assignments <b>12 Hours</b>

**SECTION FOUR**

<b>TRADE MATHEMATICS</b>  <b>32 Hours</b>	⇒	<b>A</b> Calculations Related to Trade Practice <b>32 Hours</b>

**Fourth Period**  
(8 Weeks 30 Hours Per Week – Total of 240 Hours)

**SECTION ONE**

<b>THEORY</b>  <b>48 Hours</b>	⇒	<b>A</b> Exteriors of Buildings <b>5 Hours</b>	<b>B</b> Interior Finishes for Commercial Buildings <b>9 Hours</b>	<b>C</b> Energy Efficient Construction <b>10 Hours</b>
		<b>D</b> Renovations and Building Additions <b>6 Hours</b>	<b>E</b> Stairs <b>6 Hours</b>	<b>F</b> Project Organization <b>4 Hours</b>
	⇒	<b>G</b> Unequal Sloped Roofs <b>4 Hours</b>	<b>H</b> Workplace Coaching Skills <b>4Hours</b>	

**SECTION TWO**

<b>SHOP</b>  <b>112 Hours</b>	⇒	<b>A</b> Stairs <b>20 Hours</b>	<b>B</b> Interior Finish <b>30 Hours</b>	<b>C</b> Energy Efficient Construction <b>8 Hours</b>
		<b>D</b> Roof Framing <b>8 Hours</b>	<b>E</b> Individual Concerns <b>22 Hours</b>	<b>F</b> Practical Examination <b>24 Hours</b>

**SECTION THREE**

<b>BLUEPRINT</b>  <b>56 Hours</b>	⇒	<b>A</b> Comprehensive Review of Blueprints and Specifications <b>36 Hours</b>	<b>B</b> Shop Drawings <b>20 Hours</b>

**SECTION FOUR**

<b>TRADE MATHEMATICS</b>  <b>24 Hours</b>	⇒	<b>A</b> Calculations Related to Trade Practice <b>24 Hours</b>

**NOTE:** The hours stated are for guidance and should be adhered to as close as possible. However, adjustments must be made for rate of apprenticeship learning, statutory holidays, registration and examinations for the training establishments and Apprenticeship and Industry Training.

# FIRST PERIOD TECHNICAL TRAINING CARPENTER TRADE COURSE OUTLINE

Due to the nature of the work of the Carpenter, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that become evident after progressive tests and examinations have been administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

## TOPICS

## OBJECTIVES

**Upon successful completion of this unit the apprentice will be able to:**

### SECTION ONE: .....THEORY..... 56 HOURS

#### A. Program Introduction .....3 Hours

- |                              |  |
|------------------------------|--|
| 1. The construction industry | 1. Identify the roles of Federal, Provincial and Municipal authorities and their legal implications to the industry.           |
|                              | 2. Describe the scope of the Carpenter trade in residential, light, commercial and industrial construction (what involvement). |

#### B. Materials of Construction.....8 Hours

- |                         |   |
|-------------------------|---|
| 1. Solid woods          | 1. Recognise and classify deciduous and coniferous woods commonly used in the carpenter trade and describe the commercial uses of them.         |
|                         | 2. Identify physical properties of wood:<br>a) drying systems   |
|                         | 3. Name the range of:<br>a) wood grades<br>b) wood usage<br>c) common hardwoods   |
|                         | 4. Describe milling and sawing methods.   |
|                         | 5. Identify lumber mill and grade markings.   |
|                         | 6. Describe and identify the flaws related to growth or milling.  |
|                         | 7. Explain the relationship between moisture content of wood and shrinkage.   |
|                         | 8. Describe proper storage and handling.  |
|                         | 9. List the flaws and defects resulting from improper storage.  |
| 2. Other wood materials | 1. Identify application and classifications of plywoods, chipboards, particle boards, composition boards, fibre boards, oriented strand boards. |
|                         | 2. Describe the proper storage and handling.  |

- |                              |  |
|------------------------------|--|
|                              | <ol style="list-style-type: none"> <li>3. List the prefinished types including vinyl or melamine overlays.</li> <li>4. Identify the surface veneers of commonly used plywoods, standard plywood thicknesses and cores.</li> <li>5. Identify and describe engineered wood products:               <ol style="list-style-type: none"> <li>a) glue laminated wood products</li> <li>b) manufactured joist systems</li> <li>c) composite laminated system</li> <li>d) finger jointed products</li> <li>e) fasteners and connectors</li> </ol> </li> </ol>  |
| 3. Wood mouldings and joints | <ol style="list-style-type: none"> <li>1. Recognise the standard moulding shapes and range of sizes.</li> <li>2. Identify the common uses.</li> <li>3. List the typical joints for installation; (butt, mitre, cope).</li> <li>4. Recognise and understand the common uses of joints for fabrication of butts, rabbet, mitre, middle, end and crosslap, dado, groove and spline, tongue and groove, scarf, finger, biscuit, dovetail and mortise and tenon.</li> </ol>   |
| 4. Other common materials    | <ol style="list-style-type: none"> <li>1. Describe the uses of plastic and metal products:               <ol style="list-style-type: none"> <li>a) plastics (membranes, laminates, solids and below-grade insulations)</li> <li>b) metals (flashing, studs, channels, trims, wire mesh, anchors)</li> </ol> </li> </ol>  |
| 5. Concrete                  | <ol style="list-style-type: none"> <li>1. Define concrete.</li> <li>2. Describe the mixing of concrete.</li> <li>3. Describe the placement of concrete:               <ol style="list-style-type: none"> <li>a) curing time</li> </ol> </li> </ol>   |
| 6. Fasteners and adhesives   | <ol style="list-style-type: none"> <li>1. Identify and describe general purpose fasteners and available coatings for the following:               <ol style="list-style-type: none"> <li>a) selected nails</li> <li>b) selected screws</li> <li>c) selected anchors</li> <li>d) selected bolts</li> <li>e) selected staples</li> <li>f) select framing connectors</li> </ol> </li> <li>2. List and describe the categories of adhesives and cements for:               <ol style="list-style-type: none"> <li>a) types</li> <li>b) usage</li> <li>c) shelf life</li> <li>d) curing periods</li> </ol> </li> <li>3. Identify and select mastics:               <ol style="list-style-type: none"> <li>a) sealants</li> <li>b) caulking</li> </ol> </li> </ol> |

**C. Hand Tools .....3 Hours**

1. Identify and describe the typical tools used in Carpenter trade and the correct application for each:
  - a) measurement, layout and alignment tools
  - b) squaring and marking tools
  - c) cutting tools (edge and tooth)
  - d) boring and drilling tools
  - e) assembly and dismantling tools
  - f) clamping tools
  - g) abrasives and scraping tools

**D. Machines and Powered Hand Tools.....3 Hours**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Woodworking machines and powered hand tools</li> </ol> | <ol style="list-style-type: none"> <li>1. Identify and describe the safe operation, application and regular maintenance for the following list of equipment:           <ol style="list-style-type: none"> <li>a) table saws</li> <li>b) radial arm saws</li> <li>c) jointer</li> <li>d) thicknessers</li> <li>e) band saws</li> <li>f) drill presses</li> <li>g) grinders</li> <li>h) sanders - stationary and portable</li> <li>i) power mitre saws</li> <li>j) hand electric saws</li> <li>k) power routers</li> <li>l) power drills and screw guns</li> <li>m) spline cutters</li> <li>n) chain saws</li> <li>o) wood and abrasive cutting blades</li> <li>p) hand power planes</li> <li>q) pneumatic, gas, electric nailers and staplers</li> </ol> </li> </ol> |
|--|---|

**E. Occupational Health and Safety Regulations.....4 Hours**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Study of the Applicable Regulations</li> </ol> | <ol style="list-style-type: none"> <li>1. Identify the Occupational Health and Safety Regulations as they apply to the safe work practices in carpentry and related trades with emphasis on:           <ol style="list-style-type: none"> <li>a) responsibility of employer</li> <li>b) responsibility of employee</li> <li>c) general safety precautions</li> <li>d) housekeeping               <ol style="list-style-type: none"> <li>i) clean-up</li> <li>ii) storage</li> <li>iii) public protection</li> </ol> </li> <li>e) selected safety precautions for machinery</li> <li>f) guards</li> <li>g) grinding</li> <li>h) rigging</li> </ol> </li> </ol> |
|--|---|

- |                                 |   |
|---------------------------------|---|
| 2. Construction safety          | <ol style="list-style-type: none"> <li>1. Describe safety regulations with emphasis on:               <ol style="list-style-type: none"> <li>a) use of safeguards</li> <li>b) minimum requirements for ladders</li> <li>c) personal protective equipment                   <ol style="list-style-type: none"> <li>i) hard hats and foot wear</li> <li>ii) eye protection</li> <li>iii) skin protection</li> <li>vi) hearing protection</li> </ol> </li> <li>d) protection from falling materials</li> <li>e) fall-arrest systems                   <ol style="list-style-type: none"> <li>i) safety belts, lifelines, safety nets, travel-restraint, full body harness, rope grab</li> </ol> </li> <li>f) scaffolds                   <ol style="list-style-type: none"> <li>i) frame types</li> <li>ii) functions</li> <li>iii) accessories: (base plates, screw jacks, braces, guard-rails, toeboard, platforms, stabilisers, etc.)</li> </ol> </li> <li>g) powered elevation work platforms</li> <li>h) floor and roof openings, perimeter guard-rails</li> <li>i) temporary floors, temporary supporting structures</li> <li>j) excavations, trenching and angle repose</li> <li>k) manual handling of construction materials</li> </ol> </li> <li>2. Identify electrical hazards and sources:               <ol style="list-style-type: none"> <li>a) 110 V, 220 V and 3 phase</li> <li>b) effects of electrical shocks</li> <li>c) requirements for temporary panels</li> <li>d) standards for electrical tools: (grounded, double insulated. etc)</li> </ol> </li> </ol> |
| 3. Fire prevention and controls | <ol style="list-style-type: none"> <li>1. Identify the types of fires by class to ensure the correct equipment is used for fire control.</li> <li>2. Define hazardous areas in construction.</li> <li>3. Describe how to prevent fires.</li> </ol>  |
| 4. Other concerns               | <ol style="list-style-type: none"> <li>1. Outline emergency procedures - and how to obtain assistance for injured workmen.</li> <li>2. Know the procedures for obtaining first aid training and certification.</li> <li>3. Describe potential industrial health hazards for:               <ol style="list-style-type: none"> <li>a) respiratory protection                   <ol style="list-style-type: none"> <li>i) gases, vapours, fumes, dust, masks and breathing apparatus</li> </ol> </li> <li>b) air quality                   <ol style="list-style-type: none"> <li>i) ventilation</li> </ol> </li> <li>c) noise and induced hearing loss</li> <li>d) operating pneumatic equipment</li> <li>e) compressed air-hazards</li> <li>f) asbestos abatement</li> </ol> </li> </ol>  |

5. Introduction to W.H.M.I.S. (Workplace Hazardous Materials Information System)

No additional times will be allotted to this introduction, it will be incorporated with other safety items.

Note: An introductory film is available regarding W.H.M.I.S. from Occupational Health and Safety.

1. Describe what W.H.M.I.S. is, its rational and major elements.
2. Define what is meant by a W.H.M.I.S. label and distinguish between supplier and workplace labels and other means of identification.
3. Describe what is meant by the following classifications:
  - a) prohibited product
  - b) restricted product
  - c) controlled product
4. Identify what a Material Safety Data Sheet is, its purpose and limitations.
5. Describe the roles and responsibilities of employer, supplier and worker in the education of workers.

**F. Machines and Equipment.....3 Hours**

1. Light and heavy construction equipment

1. Identify machine types available for handling work tasks:
  - a) excavating, trenching, compacting, back filling
  - b) levelling, grading
  - c) concrete placement and consolidation
  - d) hoisting and lifting - tower and mobile cranes
2. Describe mechanical advantage as it relates to pulley and levers.

**G. Building Operations .....10 Hours**

1. Elementary introductions

1. List reasons for legal surveys, bylaws, permits.
2. Interpret site and plot plans.
3. Identify the location and elevation of utilities.
4. Describe soil testing to classify bearing capacities, water tables and frost levels.
5. Describe how to excavate (soil removal and storage):
  - a) angle of repose and retaining systems
6. Describe how to manage the site to accommodate material flow.

## 2. Site layout

1. Describe building layout to batter boards from:
  - a) plot plan
  - b) property lines
  - c) setbacks
  - d) easements
2. Describe how to square buildings, using 3 - 4 - 5 method and diagonal check.
3. Explain the use of job site datum to establish elevations.
4. Define excavation lines.

## 3. Levelling systems

1. Describe methods of transferring elevations with:
  - a) builder's level
  - b) spirit level and straight edge
  - c) water level
  - d) laser level
  - e) line level

## 4. Theory of structure load

1. Identify natural and built-in forces on buildings.
2. Define live and dead loads (wind, snow, mass, gravity, etc.)
3. Describe the typical members in compression and tension, footings, walls, columns, etc.
4. State the importance of plumb and the alignment of loads with supporting members to avoid deflections, tensions, etc.
5. Describe what lateral forces act on partitions, floors, roofs, pilasters, buttresses, etc.
6. Describe the importance of proper connections, designs, etc. to counter known and anticipated forces.

**H. Forming .....16 Hours**

## 1. Footings

1. Describe how to transfer building lines to the bottom of the excavation.
2. Describe the layout and design of footings (including stepped types) for wall and bearing partitions:
  - a) setting stakes
  - b) levelling, squaring, alignment procedures
  - c) spanning disturbed soil (trenches)
  - d) considerations for fill under slab
  - e) considerations for lateral pressures (concrete)
  - f) placement of keyways
  - g) consideration for placements of reinforcement (horizontal and vertical steel, anchor bolts, use of templates)
3. Describe the layout procedure and design of footings for columns and posts. Identify the material and hardware used. Describe the stepped box types. Describe the use of templates and anchor bolts.



4. Describe piles, list the purposes and types for light construction:
    - a) consideration for frost heaving
  5. Describe simple slabs used for basement floors, surface (grade) slabs, sidewalks and driveways:
    - a) identify typical thickness
    - b) describe control joints, isolation joints and construction joints
  6. Identify slabs combined with piles for grade beams and slab thickening (to support walls).
  7. Correctly interpret building regulations.
2. Wall forms/residential and light construction
1. List the forming materials used for concrete.
  2. Identify basic wall forming systems.
  3. List and identify the release agents and coatings used on forms.
  4. Describe built-in-place systems and the importance of:
    - a) consideration of lateral (hydrostatic) pressures
    - b) spacing of supports
    - c) corner construction and bracing
    - d) walers and strongbacks
    - e) hardware, ties, wedges, rod spreaders
    - f) installation of bucks, bulkheads
    - g) beam pockets and provisions for bearing
    - h) pilasters
    - i) alignment, square and level checks
    - j) consideration for placements of reinforcement (horizontal and vertical steel, anchor bolts, use of templates)
    - k) concrete placement
    - l) stripping procedures
  5. Describe prefabricated systems:
    - a) types and panel sizes
    - b) assembly jigs
    - c) protective coatings and release agents
    - d) hardware - wood or metal walers
    - e) erection, alignment, bracing
    - f) stripping procedure
  6. Describe preserved wood foundations and proper use of this system using the required:
    - a) types of footings
    - b) stud size and spacing
    - c) sheathing materials
    - d) preservatives, sealants
    - e) alignment procedures
    - f) drainage
  7. Describe considerations to take into account before backfilling - (lateral pressures, bracing, moisture proofing, drainage systems).

8. Identify other systems:
  - a) unit masonry
  - b) precast
  - c) light weight
  - d) I.C.S. (insulated concrete systems)

**I. The Floor Frame.....6 Hours**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Procedures for a typical residential unit</li> </ol> | <ol style="list-style-type: none"> <li>1. Describe how to anchor to foundations with cast-in place systems and sills and anchor bolts.</li> <li>2. Illustrate setting of steel beams:           <ol style="list-style-type: none"> <li>a) types of steel beams</li> <li>b) methods of joist attachment</li> </ol> </li> <li>3. Describe construction of wood beams:           <ol style="list-style-type: none"> <li>a) determine beam size (span tables)</li> <li>b) location of joints (supports, <math>\frac{1}{4}</math> points)</li> <li>c) crowns and the camber of beams</li> </ol> </li> <li>4. Describe beam supports:           <ol style="list-style-type: none"> <li>a) beam end bearing</li> <li>b) adjustable metal columns</li> <li>c) wood posts               <ol style="list-style-type: none"> <li>i) build-up</li> <li>ii) solid</li> <li>iii) engineered (glue-lam, composite laminated systems)</li> </ol> </li> <li>d) types of footings required</li> </ol> </li> <li>5. Explain how to construct bearing partitions and typical layouts:           <ol style="list-style-type: none"> <li>a) protection for wood on concrete below grade</li> </ol> </li> <li>6. Identify floor system components.</li> <li>7. Describe floor joists and installation procedures:           <ol style="list-style-type: none"> <li>a) determine spacing, spans and joist size</li> <li>b) typical layouts with emphasis on accommodating               <ol style="list-style-type: none"> <li>i) load bearing and non-load bearing partitions and walls</li> <li>ii) stacks, bathroom fixtures</li> <li>iii) chimneys, fireplaces</li> <li>iv) stair openings</li> </ol> </li> </ol> </li> <li>8. Describe the use of special connectors and supports (hangers, ledgers).</li> <li>9. Describe procedures to correct hollows or crowns that can occur after subfloor is applied.</li> <li>10. Identify engineered floor systems:           <ol style="list-style-type: none"> <li>a) open web truss (wood, metal, composite)</li> <li>b) wood I beam</li> <li>c) laminated systems</li> <li>d) note: all installation as per manufacturer's specification</li> </ol> </li> </ol> |
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11. Identify location of insulation and air/vapour barriers at joist line.
12. Identify joist restraints:
  - a) types (bridging, strapping, solid blocking)
  - b) layout and installation procedures
13. Describe floor sheathing:
  - a) types, required thickness and their application
  - b) spacing and types of fasteners/adhesives
  - c) causes of squeaking floors
  - d) procedures for wood placement on concrete
14. Correctly interpret building regulations.

## SECTION TWO:.....SHOP ..... 120 HOURS

### A. Hand Tool Operations .....32 Hours

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| <ol style="list-style-type: none"> <li>1. Skill development, the use of</li> </ol> | <ol style="list-style-type: none"> <li>1. Competently use hand tools as listed in theory in the construction of projects using woods materials:           <ol style="list-style-type: none"> <li>a) solid woods, plywoods, chip and particle boards</li> <li>b) practice with making and fitting joints of wood</li> <li>c) Practice with fitting of mouldings (butt, mitre, cope)</li> <li>d) gluing, clamping and lay up</li> </ol> </li> <li>2. Sharpen and maintain hand tools.</li> </ol> |
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### B. Woodworking Machines and Powered Hand Tools.....30 Hours

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| <ol style="list-style-type: none"> <li>1. Safe use of tools</li> </ol> | <ol style="list-style-type: none"> <li>1. Describe and demonstrate the safe use of a table saw.</li> <li>2. Describe and demonstrate the safe use of a radial arm saw.</li> <li>3. Describe and demonstrate the safe use of a jointer.</li> <li>4. Describe and demonstrate the safe use of a thickness.</li> <li>5. Describe and demonstrate the safe use of a band saw.</li> <li>6. Describe and demonstrate the safe use of a drill press.</li> <li>7. Describe and demonstrate the safe use of grinders.</li> <li>8. Describe and demonstrate the safe use of sanders.</li> <li>9. Describe and demonstrate the safe use of power mitre saws.</li> <li>10. Describe and demonstrate the safe use of hand electric saws.</li> <li>11. Describe and demonstrate the safe use of power routers and spline cutters.</li> </ol> |
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|                   | 12. Describe and demonstrate the safe use of power drills and screw guns.                                     |
|                   | 13. Describe and demonstrate the safe use of pneumatic and gas fasteners.                                     |
|                   | 14. Describe and demonstrate the safe use of hand power plane.  |
|                   | 15. Describe and demonstrate the safe use of hammer drills.   |
|                   | 16. Describe and demonstrate the safe use of chainsaws.   |
| 2. Maintenance    | 1. Describe routine maintenance for the power tools identified above.   |
| 3. Practical work | 1. Demonstrate proficiency by making selected shop projects that make use of a variety of building materials. |

**C. Rigging .....6 Hours**

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|-----------------------|--|
| 1. Slings and hitches | 1. Demonstrate slings and hitches used for lifting material: <ul style="list-style-type: none"> <li>a) types of slings</li> <li>b) uses</li> <li>c) ling configurations               <ul style="list-style-type: none"> <li>i) location of chokers and slings on loads</li> </ul> </li> </ul> |
|                       | 2. Demonstrate the ability to select and tie knots and hitches: <ul style="list-style-type: none"> <li>a) types of ropes</li> <li>b) uses</li> <li>c) load limits</li> </ul>   |
|                       | 3. Demonstrate the ability to select hand signals to operators of lifting equipment.   |
|                       | 4. Identify safe working loads (S.W.L.).   |
| 2. Scaffolds          | 1. Erect frame scaffolds.  |

**D. Explosive Actuated Tools Course .....6 Hours**

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|---------------|--|
| 1. Objectives | 1. Course will provide instruction in: <ul style="list-style-type: none"> <li>a) safety</li> <li>b) uses and applications</li> <li>c) care, maintenance and operation</li> <li>d) practical experience in firing</li> </ul>            |
| 2. Theory     | 1. Describe and demonstrate the safe use of low velocity tools and their operation. Be aware of the safety features and the different types of fasteners and charges. Learn the safety codes and regulations. State causes of misfire. |
|               | 2. Identify the operator's responsibility. Demonstrate safe operation. Explain the relationships between pins, charges and materials. Discuss the hidden features of fastening surfaces.   |

**TOPICS****OBJECTIVES****FIRST PERIOD**

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| 3. Practical | 1. Demonstrate servicing and safe storage of tools and supplies.<br>Demonstrate minimum service of all common tools. Learn proper and safe storage of tools and charges and the disposal of misfired charges. |
|              | 2. Demonstrate operation and the actual firing of a low velocity tool.  |
|              | 3. Operate - take part in both the prefiring routine and fire a low velocity explosive actuated type.   |
| 4. Test      | 1. Prove proficiency upon successful completion of test and course.   |

**E. Layout and Elementary Form Work.....36 Hours**

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| 1. Applied construction geometry                     | 1. Complete full size layouts:<br>a) parallel lines<br>b) perpendicular lines<br>c) angles 90, 45, 30 and 22½ degrees<br>d) hexagon<br>e) octagon<br>f) circles<br>g) tangent lines  |
| 2. Establish excavation line and building perimeters | 1. Establish excavation lines and building perimeters from given reference points.<br><br>2. Construct and brace batter boards.<br><br>3. Square with tape using diagonals and 3-4-5 methods.  |
| 3. Footing forms                                     | 1. Transfer building lines to bottom of excavation.<br><br>2. Construct footing forms:<br>a) rectangular, "T" or "L" shape perimeters<br>b) pad footings<br>c) step footings<br>d) squaring, levelling, alignment, bracing<br>e) keyways   |
| 4. Forms for columns, posts and bearing partitions   | 1. Construct footing forms for columns, posts and bearing partitions (also stepped types).   |
| 5. Layout and erection of wall forms                 | 1. Construct a built-in-place wall form, as would be done on a job site.<br><br>2. Use prefabricated panels for wall forms; use the various types of hardware and ties. Form pilasters and beam pocket.<br><br>3. Fabricate and install:<br>a) bucks<br>b) bulkheads<br>c) window units<br>d) pilasters<br>e) beams<br>f) reinforcements |

## 6. Concrete slabs

4. Establish elevations and wall heights. Provide for anchoring and level joist system with:
1. Layout, setting forms, pegs and screeds for concrete slabs on or below grade (basement floors, grade slabs, sidewalks). Use elevations, slopes and control joints.
2. Form round or circular slabs with various radii.

**F. Floor Framing.....10 Hours**

## 1. Beam Design

1. Layout built up wood beams and identify nailing patterns.

## 2. Joist layouts on bearing partitions and beams

1. Layout joists for consideration of loads and other trades, including bearing and non-bearing partitions, floor openings, plumbing stacks and fixtures and fireplaces.

## 3. Assemble floor system

1. Construct floor assembly using common techniques and materials:
  - a) checking and aligning crowns of joists
  - b) bridging systems
  - c) application systems (fasteners and adhesives) used for common boards, T & G, plywood and other sheathing

**SECTION THREE: .....BLUEPRINTS..... 32 HOURS****A. Introduction of Drawings and Instruments .....6 Hours**

1. Describe the functions of basic drawing instruments.
2. Identify object, extension, centre, hidden and break lines.
3. Identify metric scales and how to apply them.
4. Use instruments and centring techniques to produce a drawing that illustrates basic drawing procedures.

**B. Orthographic and Isometric Drawings.....12 Hours**

1. Develop and identify the concept of orthographic presentations.
2. Identify and draw top, front, right side views and hidden lines.
3. Draw a three view orthographic plan with sectional view(s) for a shop project.
4. Develop and identify the concept of isometric presentations.
5. Practice the technique of isometric drawings.
6. Produce an isometric drawing for a shop project.

7. Produce cutting list for specified project.

**C. Free Hand Sketching .....4 Hours**

1. Identify and draw detail symbols of materials used in sectional and other drawings.
2. Use basic drawings as an aid in understanding construction terminology.
3. Freehand sketch, in isometric, plan and sectional views.

**D. Blueprint Interpretation .....10 Hours**

1. Describe the elements of a complete set of drawings for residential and light commercial drawings including:
  - a) site plan
  - b) foundation plan
  - c) floor plan
  - d) elevations
  - e) building sections and details
  - f) wall sections
  - g) room finishes
  - h) shop drawings (revisions)
  - i) specifications (as built)
  - j) mechanical drawings (related to carpentry)
  - k) electrical drawings (related to carpentry)
2. Identify problems arising from study of blueprint. (discrepancy between different views)

**SECTION FOUR: ..... TRADE MATHEMATICS ..... 32 HOURS**

**A. Calculations Related to Trade Practices .....32 Hours**

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| <ol style="list-style-type: none"> <li>1. Complete basic math operations</li> </ol> | <ol style="list-style-type: none"> <li>1. With the aid of a calculator complete basic math problems related to theory, blueprints, construction materials and shop for carpentry:               <ol style="list-style-type: none"> <li>a) add, subtract, multiply and divide</li> <li>b) square root</li> <li>c) percent</li> <li>d) memory functions</li> </ol> </li> <li>2. Complete a set of practice problems relating to addition, subtraction, multiplication and division, using whole numbers and decimal numbers.</li> <li>3. Complete a set of practice problems relating to the four basic mathematical operations where they are combined in one problem.</li> </ol> |
| <ol style="list-style-type: none"> <li>2. Basic units and S.I.</li> </ol>           | <ol style="list-style-type: none"> <li>1. Apply the metric system of measuring lengths.</li> <li>2. Apply the metric system to measuring capacity, mass and volume.</li> </ol>   |

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| 3. Imperial system     | <ol style="list-style-type: none"><li>1. Apply the Imperial system to measuring lengths.</li><li>2. Apply the Imperial system to measuring capacity, weight and volume.</li><li>3. Demonstrate an ability to use fractions in addition, subtraction, multiplication and division as it relates to the construction industry.</li><li>4. Demonstrate an ability to convert fractions to decimals.</li></ol>   |
| 4. Linear measurements | <ol style="list-style-type: none"><li>1. Calculate (perimeter) measurements of square, rectangular, circular shapes and geometric shapes in metric and imperial.</li></ol>   |
| 5. Area                | <ol style="list-style-type: none"><li>1. Solve area problems of square, rectangular, circular and geometric shapes.</li></ol>  |
| 6. Volumes             | <ol style="list-style-type: none"><li>1. Solve volume problems of square, rectangular, circular and geometric shapes.</li></ol>  |
| 7. Proportions         | <ol style="list-style-type: none"><li>1. Compare like ratios by expressing the comparison in terms of proportion and solve for unknown terms.</li><li>2. Calculate percentages for:<ol style="list-style-type: none"><li>a) percent of a number</li><li>b) what percent one number is of another</li><li>c) when a percent is unknown</li></ol></li></ol>  |
| 8. Quantity take off   | <ol style="list-style-type: none"><li>1. Calculate quantities related to study of plans and drawings for:<ol style="list-style-type: none"><li>a) estimate excavation areas and volumes</li><li>b) estimate linear footing forms</li><li>c) estimate foundation form material quantities</li><li>d) estimate foundation concrete volume quantities</li><li>e) estimate residential floor system material quantities<ol style="list-style-type: none"><li>i) beams</li><li>ii) joists systems</li><li>iii) bridging</li><li>iv) floor sheathing</li></ol></li><li>f) estimate fasteners required for area</li><li>g) introduction to production rates</li><li>h) introduction to waste factor</li></ol></li></ol> |



## SECOND PERIOD TECHNICAL TRAINING CARPENTER TRADE COURSE OUTLINE

Due to the nature of the work of the Carpenter, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that become evident after progressive tests and examinations have been administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

### TOPICS

### OBJECTIVES

**Upon successful completion of this unit the apprentice will be able to:**

**SECTION ONE: .....THEORY..... 56 HOURS**

**A. Framed Structures .....9 Hours**

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|----------------------------------|--|
| 1. Design                        | 1. Identify framing systems and how they differ with respect to load transfer and shrinkage: <ul style="list-style-type: none"><li>a) moisture content</li><li>b) building loads</li><li>c) wood grades</li></ul>  |
|                                  | 2. Explain the importance of specifications and details.   |
| 2. Applicable codes              | 1. Read and interpret - codes and span tables.   |
| 3. Comparison of framing systems | 1. Describe the following framing systems: <ul style="list-style-type: none"><li>a) western platform</li><li>b) balloon</li><li>c) post and beam</li><li>d) pole sheds</li><li>e) sandwich panels</li></ul>  |
| 4. Walls                         | 1. Define wall framing members and their functions.  |
|                                  | 2. Describe plate layout for exterior walls: <ul style="list-style-type: none"><li>a) relating to door and window dimensions, room heights, length of studs</li><li>b) spacing of studs</li><li>c) corner construction for intersecting partitions and walls</li><li>d) wall openings (including bay/bow windows, lintel, box beams and engineered beams)</li><li>e) energy efficient construction</li><li>f) combined framing systems (post and beam, platform and balloon)</li></ul> |
|                                  | 3. Describe the assembling and erecting of walls: <ul style="list-style-type: none"><li>a) squaring and aligning for sheathing</li><li>b) exterior finish considerations (backing for vertical siding and interior fixtures)</li><li>c) sheathing application</li><li>d) erecting and temporary bracing procedures</li><li>e) considerations for multi-storey buildings</li></ul>  |

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|  | <ol style="list-style-type: none"> <li>4. Describe the layout and erection of interior partitions. Explain the necessary considerations for:               <ol style="list-style-type: none"> <li>a) typical and special doors and door units (passage, pocket, bypassing, bifold and folding)</li> <li>b) laundry chutes, chimneys, girths, fire stops, sound transmissions</li> <li>c) other trades (fireplaces, bathroom fixtures, heating systems, backing for finish materials and units)</li> <li>d) erecting, aligning and bracing procedures</li> <li>e) vapour barriers behind and on top of partitions</li> </ol> </li> <li>5. Correctly interpret building regulations.</li> </ol> |
| 5. Introduction to energy efficient construction | <ol style="list-style-type: none"> <li>1. Describe the basic construction techniques used.</li> <li>2. Analyse the requirements for air tightness.</li> <li>3. Describe efficient insulation techniques.</li> </ol>   |

**B. Ceiling Joists Systems .....2 Hours**

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| 1. Layout for gable and hip roof systems | <ol style="list-style-type: none"> <li>1. Define terms associated with ceiling framing.</li> <li>2. Correctly interpret building codes to determine joist size, spacing and spans.</li> <li>3. Explain butting or lapping of joists.</li> <li>4. Show how to incorporate joists for flush or dropped beams.</li> <li>5. Identify and describe:               <ol style="list-style-type: none"> <li>a) trim cut on end of ceiling joist to match slope of rafter</li> <li>b) stub ceiling joist for hip roofs</li> </ol> </li> <li>6. Explain purpose of strongbacks and ribbons.</li> <li>7. Describe supporting and backing for parallel partitions.</li> <li>8. Describe framing requirements for access openings.</li> </ol> |
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**C. Roof Framing .....20 Hours**

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|-------------------------|---|
| 1. Roof framing systems | <ol style="list-style-type: none"> <li>1. Identify the following framed roof systems:               <ol style="list-style-type: none"> <li>a) flat</li> <li>b) shed</li> <li>c) gable</li> <li>d) hip</li> <li>e) intersecting roofs</li> </ol> </li> </ol> |
| 2. Roof design terms    | <ol style="list-style-type: none"> <li>1. Define the following terms:               <ol style="list-style-type: none"> <li>a) rise</li> <li>b) run</li> </ol> </li> </ol>   |

- c) slope
  - d) building span
  - e) rafter span
  - f) line length
  - g) projection
- 2. Identify and describe rafter terminology:
  - a) plumb and level cuts
  - b) birds mouth cuts
  - c) rise cuts
  - d) tail cuts
  - e) vertical wood above plate
  - f) effective depth
- 3. Roof member
  - 1. Describe the following rafters:
    - a) common, barge, (fly rafters)
    - b) hip rafter
    - c) valley rafters
    - d) jacks
    - e) cripples
  - 2. Roof support members:
    - a) ridge boards
    - b) lookouts
    - c) gable studs
    - d) collar ties
    - e) purlins, struts
    - f) dwarf walls
    - g) wind Bracing
  - 3. Roof finishing:
    - a) sheathing
    - b) fascia
    - c) barge board
    - d) cornice details
- 4. Gable roof
  - 1. Define and describe the cutting and erection procedures with and without ridge:
    - a) temporary bracing methods
  - 2. Identify gable ends:
    - a) built-in place
    - b) prefabricated and raised in place (vents, louvers)
    - c) other considerations (e.g. backing for interior finishes)
  - 3. Describe the use of sheathing and exterior finish.
  - 4. Discuss the consideration at wall line for insulation and air/vapour barriers.
- 5. Hip and intersecting roofs
  - 1. Describe layout and erection procedures for the following:
    - a) ridge boards
    - b) common and end common rafters
    - c) hip rafters

- d) valley rafter
  - e) jack rafter
  - f) cripple jack rafter
- 2. Identify other considerations of roof systems for:
  - a) backing for interior materials - stub ceiling joists, etc.
  - b) combining trusses and built-in-place rafters
  - c) roof bracing procedures
  - d) soffits and fascias
  - e) sheathing and roof coverings
  - f) venting requirements
  - g) insulation stops
  - h) large openings (skylight, chimneys)
- 6. Other roof systems
  - 1. Describe the different techniques for constructing:
    - a) dormers
    - b) gambrel
    - c) mansard
    - d) flat
    - e) domed and vaulted
    - f) Turrets
  - 2. Discuss requirements of special features for:
    - a) sun porches
    - b) additions
- 7. Cornice details (wood, metal, vinyl)
  - 1. Recognise closed cornice systems (without soffits).
  - 2. Describe boxed eaves:
    - a) Soffits
    - b) Fascia
    - c) frieze boards
    - d) barge board
    - e) cornice returns
- 8. Light trusses
  - 1. Identify typical trusses used in "light" construction:
    - a) mono
    - b) scissor
    - c) fink
    - d) high heel
    - e) bobtail
    - f) cantilever
    - g) girder
    - h) stepped
  - 2. Describe layout and erection procedures of trusses with emphasis on:
    - a) handling
    - b) erection
    - c) temporary bracing
    - d) permanent bracing
  - 3. Describe the fabrication and erection procedures for other roof units with emphasis on:
    - a) combining trusses with built-in place rafters
    - b) fabrication and erection of rigid frame members

- c) fabrication and erection of arch ribs
  - d) temporary and permanent bracing
- 9. Roof sheathing
  - 1. Describe the use of sheathing:
    - a) grades and types – joint patterns
    - b) fasteners - types and spacing
    - c) considerations for eavestroughing

**D. Roof Coverings .....3 Hours**

- 1. Materials and systems
  - 1. Identify the following:
    - a) built up roofing
    - b) roll roofing
    - c) wood shingles and shakes
    - d) asphalt shingles (regular and low slope)
    - e) tile and slate
    - f) metal
    - g) hardboard
    - h) fibreglass
  - 2. Identify application procedures for roll roofing, wood and asphalt shingles:
    - a) papers, felts, rigid insulations (starter shingles, exposures to weather, flashing systems and fasteners)

**E. Insulations, Building Papers, Air/Vapour Barriers.....3 Hours**

- 1. Insulations
  - 1. Identify and describe insulations and the typical usage in industry with emphasis on R.S.I. values and sound transmission:
    - a) blanket-batt
    - b) rigid
    - c) loose-fill
    - d) foamed-in-place
    - e) reflective
  - 2. Describe placement techniques.
- 2. Heat transfer and loss
  - 1. Explain the theory of heat transfer and loss.
- 3. Vapour barriers
  - 1. Identify types, thickness and explain the purpose of vapour barriers with emphasis on:
    - a) moisture content and levels in building and materials
    - b) problems related to moisture penetrations (installation application procedures, repair of punctures)
- 4. Air/moisture barriers
  - 1. Identify types of paper, felts and others used in industry (weights, laps, etc.)

**F. Wood and Metal Doors .....3 Hours**

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|---|---|
| 1. Door types                             | 1. Recognise door types, range of sizes and common uses with emphasis on: <ul style="list-style-type: none"> <li>a) solid and hollow cores</li> <li>b) panelled</li> <li>c) folding, overhead, sliding and architectural designed glazed united)</li> <li>d) insulated doors</li> <li>e) fire rated</li> </ul>  |
| 2. Exterior and interior door frames      | 1. Identify the differences between rabbetted jambs and unrabbetted jambs.<br><br>2. Describe the fabrication and installation of frames for: <ul style="list-style-type: none"> <li>a) swing of door, clearance</li> <li>b) weather seals, flashing</li> <li>c) thresholds, astragals</li> </ul><br>3. Describe the installation procedures for exterior and interior trims.<br><br>4. Describe the installation of frames used for special units (overhead, pocket, folding and bi pass doors). |
| 3. Hardware for doors                     | 1. Describe the hinge types available.<br><br>2. Describe hangers and rollers (grips, recesses, edge pulls).<br><br>3. Differentiate between locksets: passage set, privacy set, latch, identify magnetic hold openers, fusible link and lock systems.<br><br>4. Identify closers, panic hardware and hand (finger) and kick plates.<br><br>5. Describe special security items including flush bolts, bars, dead bolts.   |
| 4. Door hanging and hardware installation | 1. Describe how to cope with moderate crowns or bows.<br><br>2. Describe how to adjust previously hung doors because of the settling of buildings and moisture absorption.<br><br>3. Describe the installation of prehung door units.<br><br>4. Identify standard installation locations for hardware.  |

**G. Windows .....2 Hours**

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| 1. Typical wood, vinyl, plastic and metal types | 1. Recognise the following window types and associated hardware: <ul style="list-style-type: none"> <li>a) double hung</li> <li>b) horizontal sliding</li> <li>c) Casement</li> <li>d) Awning</li> <li>e) fixed sash units</li> <li>f) skylights</li> <li>g) bow</li> <li>h) bay</li> <li>i) hopper</li> <li>j) pivot</li> </ul> |
|---|--|

2. Identify window accessories (seals/gaskets).
3. Identify special architectural components (mullions, muntins and transom bars).
4. Relate glass area to room usage.
5. Discuss installation procedures for window units.

#### H. Exterior Finish.....4 Hours

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|--|--|
| 1. Exterior finishes for residential and light commercial construction | 1. Identify the following exterior finishes and their installation procedures: <ol style="list-style-type: none"> <li>a) wood siding</li> <li>b) shakes and shingles</li> <li>c) vinyl siding</li> <li>d) metal siding</li> <li>e) panel siding</li> <li>f) masonry</li> <li>g) composite</li> </ol> |
| 2. Application procedures  | 1. Describe the purpose and installation of flashing, sealants and building paper <ol style="list-style-type: none"> <li>a) windows</li> <li>b) doors</li> <li>c) eave (projection)</li> <li>d) exterior finish transitions</li> </ol>   |
| 3. Other exterior finishes   | <ol style="list-style-type: none"> <li>1. Describe how stucco is applied.</li> <li>2. Describe the use of brick veneer and review the role of carpenter with emphasis on footings, ledgers, drip caps, dividers, frieze boards.</li> </ol>   |

#### I. Introduction to Wood Stairs.....10 Hours

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|--|---|
| 1. Basic wood stairs                                       | <ol style="list-style-type: none"> <li>1. Identify straight flight stair types and landings for:               <ol style="list-style-type: none"> <li>a) cut out (notched) stringers</li> <li>b) mitred stringers</li> <li>c) semihoused stringers</li> </ol> </li> <li>2. Relate the following to codes:               <ol style="list-style-type: none"> <li>a) rise and run</li> <li>b) effective depth of stringers</li> <li>c) nosing projections</li> <li>d) distance between landings</li> <li>e) handrails</li> <li>f) headroom</li> <li>g) flight width</li> <li>h) door access to stairs</li> </ol> </li> </ol> |
| 2. Layout, cutting, assembling and installation procedures | <ol style="list-style-type: none"> <li>1. Identify materials for stairs and landings.</li> <li>2. Describe methods of support for hanging of landings.</li> </ol>   |

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|-------------------------|---|
|                         | <ol style="list-style-type: none"> <li>3. Describe the use of framing square applications for:               <ol style="list-style-type: none"> <li>a) unit rise and run</li> <li>b) plumb and level cuts</li> </ol> </li> <li>4. Describe methods of securing stringers or units to landings (attachment).</li> <li>5. Describe surface treatments and coverings. List when to use nonslip surfaces and nosings.</li> <li>6. Describe the installation and alignment of stairs and the securing of handrails.</li> </ol> |
| 3. Framing requirements | <ol style="list-style-type: none"> <li>1. Describe how to achieve stairwell openings.</li> <li>2. Describe how to provide greater headroom clearances.</li> </ol>   |

**SECTION TWO:.....SHOP ..... 120 HOURS**

**A. Hand and Powered Tools.....6 Hours**

- |                  |  |
|------------------|--|
| 1. Hand tools    | <ol style="list-style-type: none"> <li>1. Demonstrate the use of hand tools as listed in first period.</li> <li>2. Recondition hand tools:               <ol style="list-style-type: none"> <li>a) hand saws (touch – up)</li> <li>b) chisels</li> <li>c) plane irons</li> </ol> </li> </ol>                         |
| 2. Powered tools | <ol style="list-style-type: none"> <li>1. Demonstrate the safe use of hand and stationary power tools as listed in first period with emphasis on safe use and application of tools.</li> <li>2. Sharpen "Touch up":               <ol style="list-style-type: none"> <li>a) circular sawblade</li> </ol> </li> </ol> |

**B. Wall Framing .....18 Hours**

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|--------------------------------------|--|
| 1. Framed wall and partition layouts | <ol style="list-style-type: none"> <li>1. Layout of plates using common spacings of members, including:               <ol style="list-style-type: none"> <li>a) corners, intersecting walls</li> <li>b) doors and window openings</li> <li>c) considerations for special items, frames for pocket doors and bifolds fireplaces, insulation</li> <li>d) backing requirements for fixtures</li> <li>e) beam supports</li> </ol> </li> <li>2. Assemble sheath, erect and align the walls and partitions.</li> </ol> |
|--------------------------------------|--|

**C. Roof Framing .....30 Hours**

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|---|---|
| 1. Gable roofs - demonstration and erection | <ol style="list-style-type: none"> <li>1. Layout and cut:               <ol style="list-style-type: none"> <li>a) pattern common rafter</li> <li>b) barge board line lengths, plumb and level cuts</li> <li>c) shortenings</li> </ol> </li> </ol> |
|---|---|



**TOPICS**
**OBJECTIVES**
**SECOND PERIOD**

- |    |  |   |
|----|--|---|
|    | 2.   | Layout and install collar ties.   |
| 2. | Gable ends - demonstration and practice        | 1. Cut gable studs for standard and dropped gables.   |
| 3. | Cornices - demonstration and practice          | 1. Build and install soffits and fascias: <ul style="list-style-type: none"> <li>a) built-in-place</li> <li>b) prefabricated and secured in place</li> <li>c) Auxiliary vents</li> </ul>  |
| 4. | Intersecting roofs, demonstration and practice | 1. Build boxed eaves.<br>2. Layout, cut and install barge boards.<br>3. Layout and erect selected roof types to include hip rafters, valley rafter, jack rafters and ridge boards.<br>4. Layout and install ceiling joists: <ul style="list-style-type: none"> <li>a) Butt or lapped joints</li> <li>b) Ribbons, strongbacks</li> <li>c) Integrating parallel partitions</li> <li>d) Backing for finish materials</li> <li>e) Location and framing requirements for attic access</li> </ul> |
| 5. | Roof coverings                                 | 1. Install wood and asphalt shingles.   |

**D. Doors .....15 Hours**

- |    |                        |  |
|----|------------------------|--|
| 1. | Installation           | 1. Install a door jamb into a prepared opening (using building paper).         |
| 2. | Hanging doors          | 1. Hang a door.<br>2. Install a lock (latch) set.                              |
| 3. | Other frames and doors | 1. Install other frames and doors (interior pocket, bifold and bi-pass doors). |

**E. Wood Stairs.....15 Hours**

- |    |                                      |  |
|----|--------------------------------------|--|
| 1. | Stair stringers in a straight flight | 1. Layout stair stringers (notched, mitred and semi-housed).<br>2. Use templates and jigs. |
| 2. | Stair units                          | 1. Cut components and assemble stair units.  |

**F. Exterior Finish.....12 Hours**

- |    |                               |   |
|----|-------------------------------|---|
| 1. | Wood, metal and vinyl sidings | 1. Install vertical and horizontal applications of siding: <ul style="list-style-type: none"> <li>a) air/moisture barriers, trims, starter strips, drip caps and water table</li> <li>b) installation around window and door units</li> <li>c) flashing and sealants</li> </ul> |
|----|-------------------------------|---|

**G. Skill Development .....24 Hours**

- |                      |   |
|----------------------|---|
| 1. Selected projects | 1. To work with a variety of joints using plywood and solid woods, including scribing, mitres and coping.<br><br>2. To use clamps and adhesives.<br><br>3. To use jigs, templates and other accessories to increase the efficiency of a variety of power tools. |
|----------------------|---|

**SECTION THREE: .....BLUEPRINTS..... 32 HOURS****A. Residential and Light Commercial Blueprints .....20 Hours**

- |                             |   |
|-----------------------------|---|
| 1. Blueprint interpretation | 1. Describe the elements of a complete set of drawings for residential and light commercial including:<br>a) site plan<br>b) foundation plan<br>c) floor plan<br>d) elevations<br>e) building sections and details<br>f) wall sections<br>g) room finishes<br>h) shop drawings (revisions)<br>i) specifications<br>j) as built drawings<br>k) mechanical drawings (related to carpentry)<br>l) electrical drawings (related to carpentry) |
| 2. Specifications           | 1. State the purpose of a standard specification.<br><br>2. State the relationship of specifications to drawings.<br><br>3. Locate information in a standard specification.   |
| 3. Architectural units      | 1. Sketch or describe special exterior features for:<br>a) gable, hip and valley, gambrel, mansard roofs<br>b) dormers<br>c) flat roof framing<br>d) window bays, cantilevered units<br>e) various exterior treatments - brick veneer, stucco and siding combinations, panels, battens<br>f) decks and patios   |
| 4. Interior finish          | 1. Identify areas requiring backing for future installations.<br><br>2. Identify access openings for ducts, chutes, chimneys.   |
| 5. Problem solving          | 1. Identify problems arising from study of blueprints (discrepancy between different views).  |

**B. Drawings .....12 Hours**

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|---|--|
| 1. Formal drawings and freehand sketching | 1. Develop orthographic and isometric presentations.<br>2. Sketch details and clarify vague or obscure items in plan and section views: <ul style="list-style-type: none"> <li>a) sketch details of wall and partition framing</li> <li>b) sketch roof framing components</li> <li>c) draw sections of exterior door jambs</li> </ul> 3. Develop working drawings for specified shop projects.<br>4. Produce cutting list for specified shop projects. |
|---|--|

**SECTION FOUR: ..... TRADE MATHEMATICS ..... 32 HOURS****A. Calculations Related to Trade Practices**

- |                         |  |
|-------------------------|--|
| 1. Review first period  | 1. Review problems relating to: <ul style="list-style-type: none"> <li>a) addition, subtraction, multiplication and division</li> <li>b) percentage</li> <li>c) ratio and proportion</li> <li>d) perimeters</li> <li>e) theorem of Pythagoras</li> <li>f) areas</li> <li>g) volumes</li> </ul>   |
| 2. Walls and partitions | 1. Calculate quantities for walls and partitions related to plans and specifications.<br>2. Calculate door and window rough opening sizes.   |
| 3. Ceiling framing      | 1. Estimate ceiling framing members.   |
| 4. Roof framing         | 1. Calculate line lengths for: <ul style="list-style-type: none"> <li>a) equal slope roofs</li> <li>b) equal slope intersecting roofs</li> </ul> 2. Estimate quantities for: <ul style="list-style-type: none"> <li>a) equal slope roofs</li> <li>b) equal slope intersecting roofs</li> </ul> 3. Estimate quantities for: <ul style="list-style-type: none"> <li>a) sheathing</li> <li>b) roof coverings</li> <li>c) cornice framing</li> </ul> |
| 5. Stairs               | 1. Calculate the unit rise, unit run, finished opening and rough opening for a straight flight stair.<br>2. Calculate the unit rise and unit run for a straight flight stair to suit an existing rough opening in the floor frame.   |

- |                    |  |
|--------------------|--|
|                    | <ul style="list-style-type: none"><li>3. Calculate the unit rise, unit run for a straight flight stair with total run limitations.</li><li>4. Calculate the unit rise, unit run, finished opening and rough opening for a straight flight stair with a landing incorporated.</li><li>5. Calculate the unit rise, unit run, finished opening and rough opening for a dogleg stair with a corner landing incorporated.</li><li>6. Estimate material quantities for specified stairs.</li></ul> |
| 6. Exterior finish | <ul style="list-style-type: none"><li>1. Calculate weather exposures of siding to type and height of walls.</li><li>2. Estimate quantities from study of elevation views and plans.</li></ul>  |

# THIRD PERIOD TECHNICAL TRAINING

## CARPENTER TRADE

### COURSE OUTLINE

Due to the nature of the work of the Carpenter, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that become evident after progressive tests and examinations have been administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

#### TOPICS

#### OBJECTIVES

Upon successful completion of this unit the apprentice will be able to:

### SECTION ONE: .....THEORY..... 56 HOURS

#### A. Building and Construction Layouts .....8 Hours

- |   |  |
|---|--|
| 1. Legal description of property                | 1. List reasons for legal surveys, real property reports, by-laws, permits, certificate of title and restricted covenant.  |
|   | 2. Define and locate plan, block and lot within a subdivision.   |
| 2. Scope and applications of survey instruments | 1. State the uses of survey instruments, tools and accessories:<br>a) builders level<br>b) transit<br>c) theodilite<br>d) total station<br>e) optical plummet<br>f) laser equipment  |
|   | 2. State the uses of a builder's level and when to use accessories (rod types, stick and tape measure, targets and chains).  |
|   | 3. State the uses of laser equipment.  |
| 3. Site applications                            | 1. Describe topographical considerations on a large site:<br>a) foresight's-backsights<br>b) establishing elevations, reading existing slopes grade<br>c) to building lines, gridlinks and offset lines<br>d) cut and fill |
| 4. Building layouts and checks                  | 1. Describe the transfer of elevations using established bench marks and job site datum.   |
|   | 2. Describe how to locate centres and run lines for piles and footings.  |
|   | 3. Describe how to establish locations for items on the same plane:<br>a) top of foundations<br>b) floor lines, window lines, ceiling heights<br>c) off set and parallel lines to existing buildings                       |

4. Describe vertical checks for:
  - a) columns, walls and architectural lines
5. Describe how to establish grades and slopes (% grade)

**B. Concrete .....14 Hours**

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|--------------------------|---|
| 1. Scope within industry | <ol style="list-style-type: none"> <li>1. Describe architectural and structural concrete:               <ol style="list-style-type: none"> <li>a) cast (poured)-in-place</li> <li>b) precast</li> <li>c) guniting</li> </ol> </li> <li>2. Identify fire ratings and acoustic values.</li> </ol>   |
| 2. Portland cement       | <ol style="list-style-type: none"> <li>1. Identify cement types and their usage.</li> <li>2. List additives and their purposes, advantages and disadvantages and effects on compressive strength, durability and water tightness:               <ol style="list-style-type: none"> <li>a) retarders</li> <li>b) accelerators</li> <li>c) air entrainment</li> <li>d) colouring agents</li> <li>e) plasticisers</li> <li>f) hardeners</li> <li>g) flyash</li> </ol> </li> </ol>                                    |
| 3. Aggregates            | <ol style="list-style-type: none"> <li>1. Explain the types, gradation and quality.</li> <li>2. Identify the tests done in field for:               <ol style="list-style-type: none"> <li>a) moisture and bulking</li> <li>b) organic content</li> <li>c) fineness modulus</li> </ol> </li> <li>3. Describe special lightweight aggregates:               <ol style="list-style-type: none"> <li>a) structural</li> <li>b) architectural</li> </ol> </li> <li>4. Explain the use of heavy aggregates.</li> </ol> |
| 4. Concrete design       | <ol style="list-style-type: none"> <li>1. Identify the range of compressive strengths and the typical demands of industry.</li> <li>2. Describe batching (mixing) of concrete:               <ol style="list-style-type: none"> <li>a) water cement ratio</li> <li>b) paste to aggregate ratios</li> <li>c) weight versus volume method</li> <li>d) use of design tables as listed in part 9 of the building code</li> <li>e) time from batching to placement</li> </ol> </li> </ol>                              |
| 5. Concrete testing      | <ol style="list-style-type: none"> <li>1. Describe slump test.</li> <li>2. Describe cylinder (compressive).</li> <li>3. Describe non-destructive testing.</li> </ol>  |

- | TOPICS                         | OBJECTIVES   | THIRD PERIOD |
|--------------------------------|--|--------------|
| 6. Curing                      | <ol style="list-style-type: none"><li>1. Explain necessary considerations to cure in hot and cold weather. Relate industry practices.</li><li>2. Describe the hydration process and how to retain moisture.</li><li>3. Identify shrinkage problems.</li></ol>  |              |
| 7. Grouts and slurries         | <ol style="list-style-type: none"><li>1. Describe where grouts and slurries are used.</li><li>2. Identify bonding agents.</li></ol>  |              |
| 8. Topping finishes            | <ol style="list-style-type: none"><li>1. Describe where and how topping finishes are used and applied.</li><li>2. Identify bonding agents.</li></ol>   |              |
| 9. Concrete placement          | <ol style="list-style-type: none"><li>1. Describe concrete placements in forms and on decks with reference to:<ol style="list-style-type: none"><li>a) consolidation and integration of deposits (lifts)</li><li>b) hydrostatic forces, uplifts</li><li>c) thermal expansion</li></ol></li><li>2. Explain the cause of segregation and the use of chutes, tremies and pumps.</li><li>3. Identify shrinkage problems.</li></ol>   |              |
| 10. Establishing elevations    | <ol style="list-style-type: none"><li>1. Describe how to establish reference points using:<ol style="list-style-type: none"><li>a) screeds, pegs, chairs and pour heights</li><li>b) tolerances</li></ol></li></ol>  |              |
| 11. Form watching during pours | <ol style="list-style-type: none"><li>1. Describe the precautions necessary.</li><li>2. Identify critical areas.</li></ol>   |              |
| 12. Surface finishing systems  | <ol style="list-style-type: none"><li>1. Identify the tools and equipment necessary and their functions.</li><li>2. Identify where rough texture is desirable:<ol style="list-style-type: none"><li>a) crawl spaces</li><li>b) base for other trades</li><li>c) mud sills</li></ol></li><li>3. Describe how to make non-slip surfaces using:<ol style="list-style-type: none"><li>a) brushed or rolled surfaces</li><li>b) inserts</li></ol></li><li>4. Describe how to make smooth surfaces.</li><li>5. Describe special surface treatments:<ol style="list-style-type: none"><li>a) hardeners</li><li>b) colour</li><li>c) metallic and non metallic</li><li>d) sealants</li><li>e) etching and exposed aggregates</li></ol></li></ol> |              |

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|-----------------------------------|---|
| 13. Architectural concrete finish | 1. Describe how to maintain accuracy of form work - joint patterns.<br><br>2. Describe how to create special treatments to columns and walls: <ul style="list-style-type: none"> <li>a) formliners - inserts for effect (water treatment and sand blasting, etching)</li> </ul> |
|-----------------------------------|---|

**C. Safety .....3 Hours**

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|-------------------------|---|
| 1. Comprehensive review | 1. Identify hazards and dangers encountered on large projects: <ul style="list-style-type: none"> <li>a) swing stages</li> <li>b) site barricades</li> <li>c) employer-employee responsibilities</li> <li>d) excavations</li> <li>e) working around heavy equipment</li> <li>f) moving forms</li> <li>g) ladders</li> <li>h) electrical hazards</li> </ul> 2. Identify dangers when hoisting or lifting equipment is used: <ul style="list-style-type: none"> <li>a) hooks, shackles, slings</li> <li>b) accepted signal systems</li> </ul> 3. Identify hazards inherent with material skips, hoists and man lifts. |
| 2. Scaffold systems     | 1. Identify scaffold systems and structures: <ul style="list-style-type: none"> <li>a) scaffold components and materials</li> <li>b) scaffold safety and access</li> <li>c) tying and bracing scaffolds</li> <li>d) base conditions for scaffolds</li> <li>e) erection and dismantling procedures</li> </ul>  |

**D. Reinforced Concrete Construction .....12 Hours**

- |   |   |
|---|---|
| 1. Forces encountered during concrete pours | 1. Describe the forces encountered and transmitted during pouring of concrete and describe the necessary compensations through form design and supports: <ul style="list-style-type: none"> <li>a) compression</li> <li>b) tension</li> <li>c) lateral pressures</li> <li>d) torque - racking, shearing, deflections, distortions</li> <li>e) safety in form design</li> </ul>  |
| 2. Joints                                   | 1. Describe the joints used to compensate for built-in and natural forces on structures: <ul style="list-style-type: none"> <li>a) construction joints</li> <li>b) control joints</li> <li>c) isolation joints</li> <li>d) expansion joints-materials and installation systems in forms, sawn-joints, fillers, sealants</li> <li>e) joint pattern to create architectural features</li> <li>f) water stops</li> </ul> |



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|--|---|
| 3. Steel for reinforced concrete                         | <ol style="list-style-type: none"> <li>1. Describe the gauges, sizes and condition of welded mesh and bars.</li> <li>2. Identify the accessories available - the types, purpose and installation procedures including:               <ol style="list-style-type: none"> <li>a) tie wires, chairs, stirrups, reglets, sleeves, weld plates.</li> </ol> </li> <li>3. Identify reinforcing for footings, lintels, beams, columns, slabs, drop panels, walls with emphasis on:               <ol style="list-style-type: none"> <li>a) positioning concrete cover over steel</li> <li>b) prefabricated reinforcing units and inserts</li> <li>c) beam and column connections</li> </ol> </li> </ol>   |
| 4. Types of form systems layout and alignment procedures | <ol style="list-style-type: none"> <li>1. Identify the typical slab on grade with reference to:               <ol style="list-style-type: none"> <li>a) slab thickness</li> <li>b) considerations for frost heaving</li> <li>c) the use of moisture barriers</li> </ol> </li> <li>2. Describe piles and grade beams:               <ol style="list-style-type: none"> <li>a) consideration for frost heaving</li> <li>b) consideration for soil movement</li> </ol> </li> <li>3. Describe methods for accommodating other trades:               <ol style="list-style-type: none"> <li>a) heating ducts, sumps, sleeves, blockouts, weld plates, anchorages, embeds, etc.</li> </ol> </li> <li>4. Describe how to locate and set anchors and plates (embeds).</li> <li>5. Identify the considerations to be made prior to concrete placement:               <ol style="list-style-type: none"> <li>a) removal of wood, organic materials, snow, refuse, etc.</li> <li>b) fill-compaction, reinforcement placement</li> <li>c) joints</li> </ol> </li> </ol> |
| 5. Special design footing and wall forms                 | <ol style="list-style-type: none"> <li>1. Define battered footing forms.</li> <li>2. Describe multisided forms</li> <li>3. Describe curved forms with reference to:               <ol style="list-style-type: none"> <li>a) vertical segments and liners, kerf cuts for short radii (curvature)</li> <li>b) locating and setting anchor bolts</li> </ol> </li> <li>4. Describe stripping procedures.</li> <li>5. Describe cleaning and storage procedures.</li> </ol>   |
| 6. Columns-type and typical locations                    | <ol style="list-style-type: none"> <li>1. Describe structural and aesthetic columns:               <ol style="list-style-type: none"> <li>a) light and heavy (built-on-site)</li> <li>b) round, regular and irregular</li> </ol> </li> <li>2. Identify different form materials.</li> <li>3. Identify and describe the use of typical hardware and accessories including:               <ol style="list-style-type: none"> <li>a) clamps, yokes</li> <li>b) banding</li> <li>c) collars, templates</li> </ol> </li> </ol>   |

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|---------------------------------------|---|
|                                       | <ul style="list-style-type: none"> <li>4. Identify design considerations for:               <ul style="list-style-type: none"> <li>a) pressures during concrete placement</li> <li>b) clean outs</li> <li>c) chamfers</li> <li>d) joint sealing tape</li> </ul> </li> <li>5. Describe cutting and assembly procedures for:               <ul style="list-style-type: none"> <li>a) establishing column heights</li> <li>b) alignment and bracing</li> </ul> </li> <li>6. Describe prefabricated metal forms:               <ul style="list-style-type: none"> <li>a) where used</li> <li>b) maintenance</li> <li>c) fasteners</li> </ul> </li> </ul>                                      |
| 7. Beam and slab construction         | <ul style="list-style-type: none"> <li>1. Identify shoring systems with reference to:               <ul style="list-style-type: none"> <li>a) wood posts adjustable metal types</li> <li>b) mudsills, wedges, bracing</li> </ul> </li> <li>2. Identify column materials and design for:               <ul style="list-style-type: none"> <li>a) drop panels</li> <li>b) capitals</li> </ul> </li> <li>3. Describe typical beam and girder construction using spandrel beams.</li> <li>4. Identify slab decks with reference to:               <ul style="list-style-type: none"> <li>a) ribbed and waffle systems</li> <li>b) flat slabs - sleeves, sleepers, etc.</li> </ul> </li> </ul> |
| 8. Stripping and reshoring procedures | <ul style="list-style-type: none"> <li>1. Describe sequences of stripping and reshoring for beams and slabs.</li> <li>2. Describe the stripping and reshoring procedures for prefabricated form systems.</li> </ul>   |
| 9. Special project systems            | <ul style="list-style-type: none"> <li>1. Describe slip forms.</li> <li>2. Describe gang and fly form systems.</li> <li>3. Identify cast on site tilt-up panels for:               <ul style="list-style-type: none"> <li>a) steel placement - lift anchors</li> <li>b) fabrication - lifting and bracing</li> </ul> </li> </ul>  |
| 10. Pre-stressed concrete             | <ul style="list-style-type: none"> <li>1. Identify the types of pre-stressed concrete and where they are used:               <ul style="list-style-type: none"> <li>a) pre-tensioned</li> <li>b) post-tensioned</li> </ul> </li> <li>2. Describe erection systems for precast units including:               <ul style="list-style-type: none"> <li>a) hoisting equipment</li> <li>b) bracing systems</li> <li>c) connectors sealants (curtain wall)</li> <li>d) combining formed-in-place and precast units</li> </ul> </li> </ul>   |

**E. Concrete Stairs .....4 Hours**

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|-------------------------------|---|
| 1. Formed types               | 1. Describe stringer types: <ul style="list-style-type: none"> <li>a) inverted</li> <li>b) block (kicker)</li> </ul> 2. Describe the layout of concrete stairs on existing wall surfaces.   |
| 2. Typical forming procedures | 1. Identify landings - keys and placement requirements of reinforcement.         2. Describe risers and treads in reference to: <ul style="list-style-type: none"> <li>a) sloped risers</li> <li>b) bracing systems</li> <li>c) reinforcement</li> <li>d) concrete placement and curing</li> <li>e) finishing</li> </ul> 3. Describe stripping and re-shoring procedures. |
| 3. Precast types              | 1. Describe lifting and anchoring systems.  |
| 4. Stair finishes             | 1. Identify allowances for tread and landing finish surfaces.         2. Describe hand rail considerations and requirements.  |

**F. Commercial Walls and Interiors .....5 Hours**

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|---|---|
| 1. Metal stud partitions                                | 1. Describe loadbearing and nonbearing systems with emphasis on: <ul style="list-style-type: none"> <li>a) floor and ceiling runners</li> <li>b) securing systems to various materials</li> <li>c) corner and intersecting walls</li> <li>d) framing for door and other access openings</li> <li>e) internal, lateral bracing procedures</li> <li>f) accessories (corner beads, stiffeners, wall angles, slips, bars)</li> <li>g) fire rating</li> </ul>  |
| 2. Horizontal and vertical application of gypsum boards | 1. Identify types of gypsum boards and patterns for joints.         2. Describe how to locate and cut out openings and outlets.         3. Selection and spacing of nails and screws and the causes of nail/screw-popping.         4. Discuss laminated systems - strip and backing boards and adhesives.         5. Describe the bending of gypsum sheets - moisture and Kerfed systems.         6. Describe the procedures for installing plaster on gypsum and metal lath: <ul style="list-style-type: none"> <li>a) curing times</li> </ul> |
| 3. Setting metal frames                                 | 1. Describe levelling, plumbing and fastening procedures.   |

- |                                       |    |   |
|---------------------------------------|----|---|
|                                       |    | 2. Describe the method of installation of demountable partitions using manufacturer's instructions.   |
| 4. Prefabricated partitioning systems | 1. | Describe the types and finishes available, the components and erection systems and the installation of doors, glass units, etc.   |
| 5. Suspended ceiling systems          | 1. | Describe layout and installation procedures with emphasis on: <ul style="list-style-type: none"> <li>a) concealed, semiconcealed and exposed T-system</li> <li>b) selection of correct hangers, inserts, eye pins, etc.</li> <li>c) selection of carrying and secondary channels</li> <li>d) establishment of elevations with laser or hydro levels</li> <li>e) outline bending and tying techniques</li> <li>f) grid layouts for regular and irregular areas</li> <li>g) provisions for dropped or stepped ceilings</li> </ul> |
|                                       | 2. | Describe the installation of ceiling tiles acoustic and decorative types.   |

**G. Preparation of Large Structures for Various Treatments or Finishes .....6 Hours**

- |   |    |  |
|---|----|--|
| 1. Furring and backing systems                                    | 1. | Identify the strapping methods of walls and ceilings, concrete and steel columns and beams.  |
|   | 2. | Describe dropped ceilings for concealment of mechanical systems.   |
|   | 3. | Explain the use of sleepers.   |
| 2. Fastening systems  | 1. | Describe methods of fastening wood components to concrete masonry and metal.   |
|   | 2. | Describe methods of fastening metal components to wood, masonry and concrete.  |
|   | 3. | Describe methods of installing insulation on all types of surfaces.  |
|   | 4. | Describe securing cabinets and other fixtures to various walls and floors using mechanical fasteners and adhesives.  |
| 3. Fire protection and acoustics                                  | 1. | Describe the function of designed control systems and the importance that tradesmen play with respect to adhering to design specifications: <ul style="list-style-type: none"> <li>a) sound transmission</li> <li>b) heat transmission - flame spread</li> </ul> |
|   | 2. | Describe the requirements of walls and ceilings that include: <ul style="list-style-type: none"> <li>a) non combustible materials</li> <li>b) cavities (chases and raceways)</li> <li>c) fire dampers</li> </ul>   |
|   | 3. | Identify the loss of efficiency due to improper or careless work: <ul style="list-style-type: none"> <li>a) smoke through minute cracks, openings</li> <li>b) sound through cracks, access openings</li> </ul>   |
| 4. Insulations and air/vapour - barriers for commercial buildings | 1. | Identify types of insulation and methods of their installation.  |
|   | 2. | Identify types of air/vapour barriers, moisture barriers and methods of their installation.  |

3. Identify types of caulking and methods of their installation.
4. Identify types of expanding foams and methods of their installation.

#### H. Timber Construction.....4 Hours

- |   |  |
|---|--|
| 1. Uses of timber in the construction industry      | 1. Identify the uses of sawn timber in: <ol style="list-style-type: none"> <li>a) piling</li> <li>b) heavy trusses</li> <li>c) beams, joists, columns, decks, preservatives, fire retardants and typical connectors</li> </ol>   |
| 2. Glue-laminated units                             | 1. Describe types, structural and aesthetic qualities, and Identify typical connectors.  |
| 3. Other materials combined with timber or gluelams | 1. Describe the erection of walls on prepared footing. Describe lifting equipment, anchors, connectors, precautions against damage.<br><br>2. Describe open beam interiors with regards to: <ol style="list-style-type: none"> <li>a) box beams</li> </ol> 3. Describe application of wood decking: <ol style="list-style-type: none"> <li>a) jointing and nailing patterns</li> </ol> |
| 4. Heavy arch ribs                                  | 1. Describe anchoring systems.<br><br>2. Describe the lifting, assembly and hardware.  |
| 5. Heavy trusses and purlins                        | 1. Describe the types and where they are used.<br><br>2. Identify the web arrangements with regards to: <ol style="list-style-type: none"> <li>a) panel points, connectors</li> <li>b) purlins</li> <li>c) knee braces, bents</li> </ol> 3. Describe the lifting and bracing procedures.   |
| 6. Pole Buildings                                   | 1. Describe their uses.<br><br>2. Describe erection and bracing procedures.  |

#### SECTION TWO:.....SHOP .....120 Hours

#### A. Building and Construction Layout .....18 Hours

- |                                |   |
|--------------------------------|---|
| 1. Transit and builder's level | 1. Set up and operate builder's level and transit.<br><br>2. Sight and record backsights and foresight's.<br><br>3. Establish elevations.<br><br>4. Establish or re-establish straight, off-set and grid lines. |
|--------------------------------|---|

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|---------------------|---|
|                     | 5. Record existing angles.  |
|                     | 6. Establish a given angle.   |
| 2. Practice layouts | 1. Determine actual finish floor elevations from a given datum or bench mark.     |
|                     | 2. Record backsights and foresight's.   |
|                     | 3. Transfer elevations using several set ups.                                     |
|                     | 4. Calculate, cut and fill requirements.  |
|                     | 5. Locate building corners, property pins and excavation lines using the transit. |
|                     | 6. Locate footings, piles and other building components.                          |
| 3. Laser equipment  | 1. Set up laser equipment.  |
|                     | 2. Transfer elevations using laser equipment.                                     |
|                     | 3. Transfer building lines using laser equipment.                                 |
|                     | 4. State the potential hazards of laser exposure.                                 |

**B. Formwork (Commercial).....39 Hours**

- |                          |  |
|--------------------------|--|
| 1. Forming basic columns | 1. Erect formwork for columns using a variety of hardware and accessories. |
|                          | 2. Install chamfer strips.   |
|                          | 3. Locate, plumb, align and brace columns, and establish elevations.       |
|                          | 4. Construct formwork for flared, haunched or multi-sided columns.         |
| 2. Forming slabs         | 1. Erect formwork for a slab (example):                                    |
|                          | a) ribbed slab   |
|                          | b) pan slab  |
|                          | c) flat slab   |
|                          | d) beam and slab   |
|                          | e) cantilevered slab   |
|                          | 2. Level, align and brace slab forms.                                      |
| 3. Forming walls         | 1. Erect formwork for a wall using a variety of hardware and accessories.  |
|                          | 2. Install bulkheads, door bucks, window bucks, sleeves and accessories.   |
|                          | 3. Align and brace wall forms.   |
|                          | 4. Construct a simple gang or giant form.                                  |

**C. Concrete Stairs .....18 Hours**

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|-------------------|---|
| 1. Stair projects | 1. Develop a full size stair layout.<br>2. Construct the formwork to support a concrete stair and landing.<br>3. Cut and install inverted and open stringers.<br>4. Install sloped riser forms.<br>5. Install shoring to support the concrete stair and formwork.<br>6. Install bracing to resist lateral movement. |
|-------------------|---|

**D. Installation of Metal Fabricated Products .....15 Hours**

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|------------------------------|--|
| 1. Nonbearing partitions     | 1. Install a typical nonbearing partition of metal tracks and studs with emphasis on: <ul style="list-style-type: none"> <li>a) floor layout</li> <li>b) floor and ceiling runners</li> <li>c) plumbing and aligning procedures</li> <li>d) various metal stud types</li> <li>e) bracing procedures</li> <li>f) intersecting walls</li> <li>g) window, door and access openings</li> <li>h) installation of frames</li> <li>i) resilient sound bars</li> </ul> |
| 2. Metal jambs               | 1. Set, level, plumb and secure metal door jambs for use in block walls.   |
| 3. Gypsum wall boards        | 1. Application procedures for gypsum wall boards.  |
| 4. Suspended ceiling systems | 1. Layout and install a suspended ceiling system.  |
| 5. Scaffolding               | 1. Erect scaffold systems: <ul style="list-style-type: none"> <li>a) metal frames</li> <li>b) metal frame rolling scaffold</li> <li>c) tube and clamp</li> <li>d) modular systems</li> <li>e) scaffold/hoarding systems</li> <li>f) swing stage</li> </ul>   |

**E. Skill Development Projects .....30 Hours**

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|--|---|
| 1. Construct selected projects that develop the skill required for on site finish work | 1. Match wood grains and apply edge veneers and plywood.<br>2. Work with a variety of joints and solid woods.<br>3. Use clamps and glues.<br>4. Use contact adhesives.<br>5. Construct and install drawers, doors and shelves and sliding components. |
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|                                   |    | 6. Use jigs, templates and other accessories to increase the efficiency of a variety of power tools. |
|                                   |    | 7. Cut, fit and apply plastic laminates or other wood substitutes.                                   |
| 2. Development of geometric units | 1. | Develop obtuse, acute and compound angles and incorporate them into a project.                       |

**SECTION THREE: .....BLUEPRINTS..... 32 HOURS**

**A. Study of Blueprints for Buildings that are Substantially of Reinforced Concrete .....16 Hours**

- |                          |    |  |
|--------------------------|----|--|
| 1. Blueprints            | 1. | State the purpose and list the information that would normally be found on:<br>a) architectural drawings<br>b) structural drawings<br>c) mechanical drawings<br>d) electrical drawings<br>e) shop drawings |
| 2. Specifications        | 1. | State the purpose of a standard specification.   |
|                          | 2. | State the relationship of specifications to drawings.  |
|                          | 3. | Locate information in a standard specification.  |
| 3. Site plans            | 1. | Determine the dimensions, orientation and location of building services and fixtures.  |
|                          | 2. | Relate bench marks or datum's to finish floor elevations.  |
|                          | 3. | Relate finished contours with that of existing contours.   |
| 4. Foundation plans      | 1. | List the information normally found on foundation plans.   |
|                          | 2. | Locate and determine size of footings, piles, grade beams and foundation walls.  |
| 5. Floor plans           | 1. | List the information normally found on the floor plan.   |
|                          | 2. | Locate and determine the size of rooms, doors, windows and other components from a floor plan.   |
| 6. Sections              | 1. | State the purpose of section drawings.   |
|                          | 2. | Orient the section to the floor plan and elevations.   |
|                          | 3. | Determine the size, location and types of material used for construction from section.   |
| 7. Miscellaneous details | 1. | State what information is usually clarified by the use of details.   |
|                          | 2. | Determine the relationship between the details and other drawings.   |
| 8. Elevations            | 1. | Relate elevations to floor plans and details.  |



**TOPICS****OBJECTIVES****THIRD PERIOD**

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| 9. Schedules | 1. State the advantage of and list types of information that could be found on schedules.<br>2. Use schedules to find information. |
|--------------|--|

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|-----------------------------|---|
| 10. Interior considerations | 1. Determine size and location of cabinets, fixtures and built-ins.<br>2. Determine ceiling types, grid patterns, locations and heights.<br>3. Determine other material types and finishes. |
|-----------------------------|---|

**B. Study of Blueprints for Building with Glued-Laminated or Timber Construction .....4 Hours**

- |                                |  |
|--------------------------------|--|
| 1. Trusses                     | 1. Identify truss types, spacing and connections used.<br>2. Identify bracing requirements specified.<br>3. Identify the span and slope of trusses.        |
| 2. Glued-laminated beams, ribs | 1. Identify the components as to type and quality used.<br>2. Identify size and spans of members.<br>3. Identify the spacing, bracing and connectors used. |

**C. Drawing Assignments .....12 Hours**

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|------------------|---|
| 1. Obscure items | 1. Sketch freehand, or with the aid of a straight edge, items that require clarification. Suggested items- stepped footings, grade beams, concrete stair details, timbers and glue-laminated connections. |
| 2. Shop projects | 1. Draw shop drawings and sections to be used to construct shop projects.   |

**SECTION FOUR: ..... TRADE MATHEMATICS ..... 32 HOURS****A. Calculations Related to Trade Practices.....32 Hours**

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|---|--|
| 1. Review of first and second period math | 1. Perform calculations related to first and second period for review.   |
| 2. Concrete                               | 1. Calculate volumes from plans of commercial buildings.   |
| 3. Calculate cut and fill                 | 1. Calculate the volume of excavations required to level or slope a site to a required elevation.<br>2. Calculate the volume of mass excavation required for a building. |

**TOPICS****OBJECTIVES****THIRD PERIOD**

- |                     |   |   |
|---------------------|---|---|
|                     |   | 3. Calculate the volume of backfill for a building and the amount of excess haul required to be removed from the building site. |
| 4. Formwork         | 1. Calculate material quantities related to blueprints.         |   |
|                     | 2. Calculate spacing and layout of inserts.                     |   |
| 5. Concrete stairs  | 1. Calculate unit rise, run, headroom clearances and total run. |   |
|                     | 2. Calculate material quantities related to blueprints.         |   |
| 6. Interior systems | 1. Develop and calculate material quantities for:               |   |
|                     | a) metal studs systems  |   |
|                     | b) gypsum boards  |   |
|                     | c) demountable partitioning systems                             |   |
|                     | d) suspended ceiling systems                                    |   |

**FOURTH PERIOD TECHNICAL TRAINING  
CARPENTER TRADE  
COURSE OUTLINE**

Due to the nature of the work of the Carpenter, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that become evident after progressive tests and examinations have been administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

**TOPICS**

**OBJECTIVES**

**Upon successful completion of this unit the apprentice will be able to:**

**SECTION ONE: .....THEORY..... 48 HOURS**

**A. Exteriors of Buildings..... 5 Hours**

- |  |   |
|--|---|
| <p>1. Typical exterior treatments for commercial buildings</p> | <p>1. Identify methods to install exterior finishes for:</p> <ul style="list-style-type: none"><li>a) solid wood</li><li>b) plywood</li><li>c) composition boards</li><li>d) masonry veneers</li><li>e) stucco (traditional, outsulations and acrylic)</li><li>f) metal</li><li>g) vinyl</li><li>h) concrete (precast/cast in place)</li></ul> <p>2. Describe installation procedures for entrance doors and window units and associated hardware.</p> <p>3. Describe installation procedures for curtain walls.</p> <p>4. Describe requirements for commercial roofs, facades and parapet walls:</p> <ul style="list-style-type: none"><li>a) sealants</li><li>b) flashing</li></ul> <p>5. Identify roof finishes with emphasis on the carpenters role in preparation for the roofing system.</p> <p>6. Describe preparations for the trades:</p> <ul style="list-style-type: none"><li>a) furring, ledgers and footing</li><li>b) arch centring</li></ul> |
|--|---|

**B. Interior Finishes for Commercial Buildings .....9 Hours**

- |   |  |
|---|--|
| <p>1. Interior finish materials - handling and storage procedures</p> | <p>1. Identify methods used to install interior finishes for:</p> <ul style="list-style-type: none"><li>a) solid woods</li><li>b) architectural panelling</li><li>c) masonry products</li><li>d) floor coverings</li><li>e) plaster</li><li>f) metal</li></ul> |
|---|--|

- g) vinyl products
  - h) caulking and sealants
- 2. Describe the effects of humidity levels and temperature levels on various materials including pre-expansion (equilibrium moisture content, E.M.C.) for special materials.
- 3. Determine the allocation of distribution and storage of materials on the job site:
  - a) weight and point loading
  - b) accessibility of materials to expedite work schedules
  - c) climatizing of materials
- 4. Identify and isolate the causes of stain or discoloration to wood and other materials including:
  - a) poor housekeeping
  - b) mortar, gypsum and paint splatters
  - c) sunlight, moisture
  - d) protective coverings
- 5. Describe and identify how flaws or adhesives are highlighted or obscured under various stains, flat or gloss finishes.
- 6. Describe how to repair minor defects prior to wood finishing.
- 7. Describe how to repair minor defects on finished surfaces.
- 2. Architectural wood panelling
  - 1. Describe how to select wood panels and mouldings for grain and colour.
  - 2. Describe layout methods for:
    - a) minimising or accentuating panels and mouldings
    - b) making provisions for electrical outlets and other openings
  - 3. Describe installation methods:
    - a) using nail or screw-on systems
    - b) using adhesives
    - c) valances
- 3. Other wood finishes
  - 1. Describe the installation of vertical and horizontal strips, frame and panels for walls, ceilings and floors.
  - 2. Describe how to apply strip and parquet flooring.
- 4. Trim and finishing systems for building components
  - 1. Describe the procedures for applying trim components and systems for various finishes on wood, metal and plastic and the making of external and internal corners.
- 5. Storage room and components
  - 1. Describe the procedures for building of shelves with emphasis on the use of:
    - a) spacing, spans, supports
    - b) racks, bars, etc.
    - c) premanufactured systems
- 6. Installation of doors and cabinets
  - 1. Describe the installation procedures for commercial doors:
    - a) light and heavy duty
    - b) hardware

- |    |                                   |  |
|----|-----------------------------------|--|
|    | 2.                                | Describe installation procedures for cabinets:                                     |
|    | a)                                | straightening - furring of crooked walls   |
|    | b)                                | scribing - shimming points to balance doors  |
|    | c)                                | mouldings, covers for finished appearance  |
|    | d)                                | selection of fasteners and hardware  |
|    | e)                                | counter tops   |
| 7. | Study of aesthetic and ergonomics | 1. Identify concepts within modern, contemporary, colonial and provincial designs. |
|    | 2.                                | Identify hardware, joint and material selection.                                   |
|    | 3.                                | Compare ways to maintain design proportion and balance with:                       |
|    | a)                                | room screens, dividers   |
|    | 4.                                | Describe how fixtures affect the aesthetics of millwork.                           |
|    | 5.                                | Describe the use of full scale layouts for curved, geometric units.                |
|    | 6.                                | Identify positioning of architectural features as they relate to millwork:         |
|    | a)                                | table, chairs and benches  |
|    | b)                                | desk(s)  |
|    | c)                                | vanities   |
|    | d)                                | kitchen cabinets and counters  |
|    | e)                                | work triangle  |
| 8. | Barrier free design               | 1. Identify concepts of barrier free design:                                       |
|    | a)                                | code requirements  |
|    | b)                                | hardware   |
|    | c)                                | fixture requirements   |

**C. Energy Efficient Construction .....10 Hours**

- |    |                        |  |
|----|------------------------|--|
| 1. | Introduction           | 1. Describe what energy efficient construction entails and refer to:   |
|    |                        | a) history of low energy housing and advances in concept and technology  |
|    |                        | b) active solar gain as a transition technology and why it is no longer appropriate for space conditioning on the prairies |
| 2. | Heat transfer          | 1. Describe how energy is lost or gained by:   |
|    |                        | a) conduction  |
|    |                        | b) convection  |
|    |                        | c) radiation   |
| 3. | Control of air leakage | 1. Describe the functions of the air/vapour barrier.   |
|    |                        | 2. Describe why there may be a need for mechanical ventilation.  |
|    |                        | 3. Identify critical air-leakage locations:  |
|    |                        | a) basement  |
|    |                        | b) framing   |
|    |                        | c) mechanical  |
|    |                        | d) windows   |
|    |                        | e) doors   |

- |                         |   |
|-------------------------|---|
|                         | <ol style="list-style-type: none"> <li>4. State the importance and quality of sealants and stapling.</li> <li>5. Describe the qualities of acoustical sealant.</li> <li>6. Describe the uses of weather stripping.</li> <li>7. Describe the function of air-locks (vestibules, revolving doors).</li> </ol>   |
| 4. Insulation materials | <ol style="list-style-type: none"> <li>1. Describe the following insulations, their uses and thermal resistance values:               <ol style="list-style-type: none"> <li>a) rigid</li> <li>b) loose fill</li> <li>c) batt</li> <li>d) form</li> <li>e) reflective</li> <li>f) air</li> </ol> </li> <li>2. Describe movable insulation and its uses (shutters, blinds, storm windows).</li> </ol>  |
| 5. Wall configuration   | <ol style="list-style-type: none"> <li>1. Describe the following wall configurations:               <ol style="list-style-type: none"> <li>a) double wall</li> <li>b) 38 x 140 wall plus insulating sheathing</li> <li>c) 38 x 89 wall plus horizontal interior strapping</li> <li>d) staggered stud wall</li> <li>e) truss wall                   <ol style="list-style-type: none"> <li>i) loadbearing</li> <li>ii) non-loadbearing</li> </ol> </li> <li>f) hybrid systems</li> </ol> </li> <li>2. Relate to economics and the following:               <ol style="list-style-type: none"> <li>a) pay back</li> <li>b) cost benefit</li> <li>c) life cycle</li> <li>d) reference costs</li> </ol> </li> </ol> |
| 6. Ceilings and roofs   | <ol style="list-style-type: none"> <li>1. Describe possible problems inherent with sloped ceilings and flat roofs.</li> <li>2. Describe truss uplift problems.</li> <li>3. Describe venting requirements.</li> </ol>  |
| 7. Passive solar        | <ol style="list-style-type: none"> <li>1. Describe building design with reference to:               <ol style="list-style-type: none"> <li>a) energy from sunlight</li> <li>b) south windows as a solar gain</li> <li>c) need for good design and siting</li> </ol> </li> <li>2. Describe shading control and overhang design.</li> <li>3. Describe the methods used for thermal storage.</li> <li>4. Outline the advantages and disadvantages of green house and sun space alternatives.</li> </ol>  |

**D. Renovations and Building Additions .....6 Hours**

- |   |   |
|---|---|
| 1. Typical procedures and problems encountered in adding additions to buildings | <ol style="list-style-type: none"> <li>1. Describe the necessary plumb, square and alignment checks.</li> <li>2. Describe how to extend building lines and check for existing services.</li> <li>3. Describe how to excavate with reference to:               <ol style="list-style-type: none"> <li>a) earth removal, material flow and storage</li> <li>b) minimising damage to existing landscaping</li> <li>c) underpinning existing adjacent footings and walls</li> </ol> </li> <li>4. Describe the requirements for footings and foundation walls including:               <ol style="list-style-type: none"> <li>a) connections to existing concrete, masonry</li> <li>b) access openings through existing concrete</li> <li>c) shoring, bucks, frames</li> </ol> </li> <li>5. Describe how to provide weather protection.</li> </ol> |
| 2. Renovating interiors   | <ol style="list-style-type: none"> <li>1. Describe the precautions required in disconnection of utilities.</li> <li>2. Identify what precautions are to be taken when renovating an occupied building.</li> <li>3. Describe methods to protect existing floors, cabinets and furnishings.</li> <li>4. Describe methods of removal of old material and methods of disposal.</li> <li>5. Describe the logical sequence of work schedules.</li> </ol>  |

**E. Stairs .....6 Hours**

- |                  |   |
|------------------|---|
| 1. Stair systems | <ol style="list-style-type: none"> <li>1. Describe how to build housed stairs:               <ol style="list-style-type: none"> <li>a) where used</li> <li>b) code requirements</li> <li>c) layout</li> <li>d) assembly</li> <li>e) attachment to landings</li> </ol> </li> <li>2. Describe how to build winder stairs:               <ol style="list-style-type: none"> <li>a) where used</li> <li>b) code requirements</li> <li>c) layout</li> <li>d) assembly</li> <li>e) attachment to landings</li> </ol> </li> <li>3. Describe how to build circular and spiral stairs of wood and concrete. Describe how to layout forming systems for concrete and layout assembly for wood.</li> </ol> |
|------------------|---|

**F. Project Organisation .....4 Hours**

- |                    |   |
|--------------------|---|
| 1. Roles of others | <ol style="list-style-type: none"> <li>1. Outline the roles of architects, engineers, contractors, subcontractors and local authorities.</li> </ol> |
|--------------------|---|

- |                          |   |
|--------------------------|---|
| 2. Job scheduling        | 1. Describe the mechanics of a critical path method of scheduling.<br>2. Describe bar charts.<br>3. Describe how scheduling affects other trades.   |
| 3. Material organisation | 1. Describe reasons for and methods of achieving lead time for procurements.<br>2. Describe the sequence for delivery and the accommodation on site for: <ul style="list-style-type: none"> <li>a) consideration for long or wide components</li> <li>b) distribution of weights on various slabs, levels or floors</li> <li>c) access to materials</li> <li>d) protection from weather</li> <li>e) security</li> </ul> |
| 4. Job safety            | 1. Describe job safety with emphasis on: <ul style="list-style-type: none"> <li>a) safety committees, structure and responsibilities</li> <li>b) industrial health hazards, illnesses and symptoms</li> <li>c) inspections</li> <li>d) individual responsibilities</li> <li>e) scaffolding, ladders</li> </ul>  |

**G. Unequal Sloped Roofs.....4 Hours**

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|-------------------------|--|
| 1. Unequal sloped roofs | 1. Review roofing terms.<br>2. Describe unequal sloped intersecting roofs without an overhang. |
|-------------------------|--|

**H. Workplace Coaching Skills .....4 Hours**

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|----|--|
| 1. | Describe the following coaching skills used for training apprentices: <ul style="list-style-type: none"> <li>a) identify the point of the lesson</li> <li>b) link the lesson</li> <li>c) demonstrate a skill</li> <li>d) provide opportunity to practice a skill</li> <li>e) give feedback to the learner</li> <li>f) assess the learner's progress</li> </ul> |
|----|--|

**SECTION TWO:.....SHOP ..... 112 HOURS**

**A. Stairs.....20 Hours**

- |   |   |
|---|---|
| 1. Layout, cutting and assembly systems | 1. Build housed stringers and stair balustrade.<br>2. Build winder stairs.<br>3. Build circular stairs and circular stair form. |
|---|---|



**B. Interior Finish .....30 Hours**

- |                      |   |
|----------------------|---|
| 1. Selected projects | <ol style="list-style-type: none"> <li>1. Install site built or modular cabinet units.</li> <li>2. Develop sloping; irregular shapes:               <ol style="list-style-type: none"> <li>a) displays for store interiors</li> <li>b) architectural features on building exteriors</li> <li>c) alcoves, arches</li> <li>d) decorative louvered panels for window</li> </ol> </li> <li>3. Develop panel work for interiors: mouldings, battens, valances.</li> <li>4. Prepare jigs, templates for specified operations and full scale layouts.</li> <li>5. Install a range of hardware:               <ol style="list-style-type: none"> <li>a) concealed hinges</li> <li>b) door closers</li> <li>c) sliding hardware</li> </ol> </li> </ol> |
|----------------------|---|

**C. Energy Efficient Construction .....8 Hours**

NOTE: Due to extensive course material and time lines to Energy Efficient Construction it may be necessary to provide exposure to existing models as opposed to actual construction and personal hand skill involvement of apprentices. Methods and procedures may be provided in the form of demonstrations.

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|-----------------------|---|
| 1. Air/vapour barrier | <ol style="list-style-type: none"> <li>1. Identify and describe an air/vapour barrier as per energy efficient standards.</li> <li>2. Apply:               <ol style="list-style-type: none"> <li>a) film, foil, paints</li> <li>b) sealants</li> <li>c) polypanes, vapour hats, beam bags</li> </ol> </li> </ol>  |
| 2. Air leakage        | <ol style="list-style-type: none"> <li>1. Prepare beams set in concrete.</li> <li>2. Seal air leakage at floor joists.</li> <li>3. Install vapour barrier at top plates.</li> <li>4. Install door and window units.</li> <li>5. Construct an attic hatch.</li> <li>6. Prepare cantilever treatment for air tightness.</li> <li>7. Install (or make provision for) mechanical ventilation from an airtight structure.</li> </ol> |
| 3. Trusses            | <ol style="list-style-type: none"> <li>1. Erect a high heeled truss.</li> <li>2. Erect a scissors truss.</li> </ol>   |

**D. Roof Framing .....8 Hours**

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|---|--|
| 1. Roof systems   | 1. Layout: <ul style="list-style-type: none"> <li>a) common, hips, valley and jack rafters</li> <li>b) plumb and level cuts</li> <li>c) shortenings</li> </ul> |
|   | 2. Layout collar ties.   |
| 2. Layout and erection of unequal slope roofs for gable roofs | 1. Layout: <ul style="list-style-type: none"> <li>a) pattern common rafters</li> <li>b) plumb and level cuts</li> <li>c) shortenings</li> </ul>                |

**E. Individual Concerns .....22 Hours**

NOTE: As the needs of individual apprentices dictate, review and reinforcement projects are to be designed and constructed under the direction of instructors.

1. Display competence in such suggested areas as:
  - e) cabinets or fixtures
  - b) site layout
  - f) pattern common rafters
  - g) plumb and level cuts
  - e) shortenings
  - h) stair work
  - g) geometric layout

**F. Practical Examination.....24 Hours**

1. Achieve a pass mark in a practical examination project under the following circumstances:
  - a) every apprentice will be required to build an in-shop practical project

This project will be assessed by representatives from industry and the marks obtained will be a major consideration in awarding completion of apprenticeship and journeyman status.

**SECTION THREE: .....BLUEPRINTS..... 56 HOURS****A. Comprehensive Review of Blueprints and Specifications .....36 Hours**

- |                             |   |
|-----------------------------|---|
| 1. Blueprint interpretation | 1. Read and interpret a set of light commercial blueprints showing: <ul style="list-style-type: none"> <li>a) site plan</li> <li>b) foundation plan</li> <li>c) floor plan</li> <li>d) elevations</li> <li>e) sections and details</li> </ul> |
|-----------------------------|---|

- |    |  |  |
|----|--|--|
|    | 2.   | Read and interpret a set of blueprints of a commercial building showing:   |
|    |  | <ul style="list-style-type: none"> <li>a) site plan</li> <li>b) floor plan and elevations</li> <li>c) building sections and details</li> <li>d) wall sections</li> <li>e) room finishes</li> <li>f) structural details</li> <li>g) mechanical layout</li> <li>h) electrical layout</li> <li>i) detail drawings</li> </ul>  |
| 2. | Sections   | <ul style="list-style-type: none"> <li>1. State the purpose of section drawings.</li> <li>2. Orient the section to the floor plan and elevations.</li> <li>3. Determine the size, location and types of material used for construction from section.</li> </ul>  |
| 3. | Interior and exterior treatments for commercial building | <ul style="list-style-type: none"> <li>1. Identify typical dropped ceilings and furred walls and the sections for mechanical concealment, and describe how they are achieved.</li> <li>2. Describe various elevations and sections for requirements of exterior treatments.</li> <li>3. Relate to room finish schedules, plans, elevation and reflected views in order to describe interior treatments.</li> <li>4. Relate to working drawings and exploded views of various interior units to show construction of: <ul style="list-style-type: none"> <li>a) stairs</li> <li>b) storage units</li> <li>c) dividers, valances, etc.</li> </ul> </li> <li>5. Determine and solve ambiguous sections that may be encountered when interpreting plans and specifications.</li> </ul> |
| 4. | Blueprints for other structures                          | <ul style="list-style-type: none"> <li>1. Interpret blueprints for structures other than buildings for appreciation of scope of the carpenter trade.</li> </ul>  |

**B. Shop Drawings.....20 Hours**

- |    |  |   |
|----|--|---|
| 1. | Formal drawings and freehand sketching | <ul style="list-style-type: none"> <li>1. Prepare plans and pictorial drawings related to design concepts for interior units.</li> <li>2. Make sketches suitable for communication within industry for: <ul style="list-style-type: none"> <li>a) operator of power equipment</li> <li>b) clarification of procedures with a supervisor</li> <li>c) clarification of design and procedure with a customer</li> </ul> </li> <li>3. Use drawings to calculate cutting lists for shop projects.</li> </ul> |
| 2. | Provincial practical examination       | <ul style="list-style-type: none"> <li>1. In a class discussion, read through the plans and specifications provided by the Apprenticeship and Industry Training for the final examination project.</li> </ul>   |

2. Individually draw the necessary working drawings to construct the examination project.
3. Produce a material cutting list for the examination project.
4. In a class discussion, review the project and plan a procedure.

#### SECTION FOUR: ..... TRADE MATHEMATICS ..... 24 HOURS

##### A. Calculations Related to Trade Practices.....24 Hours

- |   |  |
|---|--|
| 1. Review of first, second and third period math  | <ol style="list-style-type: none"> <li>1. Perform calculations related to first, second and third periods for review.</li> <li>2. Calculate the lengths of hip roof framing members.</li> <li>3. Calculate the lengths of roof framing members and the sheathing required for intersecting roofs.</li> </ol>   |
| 2. Review of stair calculations                   | <ol style="list-style-type: none"> <li>1. Calculate the unit rise, unit run, finished opening and rough opening for various types of stairs.</li> </ol>  |
| 3. Winder stairs                                  | <ol style="list-style-type: none"> <li>1. Calculate the walking line radius for a winder stair.</li> <li>2. Calculate the rough opening in the floor frame required for a winder stair.</li> </ol>   |
| 4. Circular stairs                                | <ol style="list-style-type: none"> <li>1. Calculate the unit rise, inside unit run and outside unit run for a circular stair.</li> <li>2. Calculate the: unit rise, inside radius, outside radius and outside unit run for a given inside unit run stair.</li> <li>3. Calculate the: unit rise, inside unit run, outside unit run and finished opening required for a given radius stair.</li> </ol>   |
| 5. Quantity take-off from blueprints and drawings | <ol style="list-style-type: none"> <li>1. Calculate interior components, systems for:               <ol style="list-style-type: none"> <li>a) wall, ceiling and floor surfaces</li> <li>b) cabinets - doors, hardware</li> <li>c) cutting lists for storage rooms or units</li> </ol> </li> <li>2. Select materials to minimise waste for:               <ol style="list-style-type: none"> <li>a) area, volume and dimensioned materials</li> <li>b) trim or finish components, etc.</li> </ol> </li> </ol> |
| 6. Costing  | <ol style="list-style-type: none"> <li>1. Calculate costs of material, labour, equipment rentals and variables such as weather and work stoppages.</li> </ol>  |



# Alberta Apprenticeship and Industry Training

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