

Apprenticeship and Industry Training

Carpenter

Curriculum Guide

002 (2022)

ALBERTA ADVANCED EDUCATION

Carpenter: apprenticeship education program curriculum guide

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Province of Alberta, Canada.

**Carpenter
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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding a sponsor. Sponsors guide apprentices, and support on-the-job learning through provision of mentorship. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyman or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution (PSI) – usually a college or technical institute.

To receive their post-secondary credential, apprentices must learn theory and skills, and they must pass examinations. Criteria for the program—including the content and delivery of technical training—are developed and updated by the Registrar.

The graduate of the Carpenter apprenticeship education program is an individual 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 drawings, do layout work and calculate quantities of materials
- build various types of concrete forms
- build all types of wood framed buildings and apply exterior and interior finish components
- be proficient in the safe use and maintenance of hand and power tools
- be familiar with the work of other tradespeople in the building industry
- comply with all safety regulations of the construction industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Alberta's apprenticeship programs are supported by industry stakeholders that ensures a highly skilled, internationally competitive workforce in the province. The Registrar establishes the educational standards and provides direction to the system supported by industry and the PSI's. The Ministry of Skilled Trades and Professions provides the legislative framework and administrative support for the apprenticeship and industry training system.

Special thanks are offered to the following industry members who contributed to the development of the standard:

Mr. M. Jantz.....Sexsmith
Mr. K. Gloer Calgary
Mr. D. MathewsLethbridge
Mr. B. ArmstrongRed Deer
Mr. C.ChapmanLethbridge
Mr. C. ErtmanLeduc
Ms. C. PlaxtonGrande Prairie

Alberta Government

Alberta Skilled Trades and Professions works with industry, sponsor and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and sponsors
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Apprentice Safety

Safe working procedures and conditions, incident/injury 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 government, sponsors, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Occupational Health and Safety

Persons engaged in, or supporting an individual in an experiential learning environment are often exposed to more worksite hazards than in other forms of traditional post-secondary education and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Occupational Health and Safety-OHS (a division of Alberta Labour and Immigration) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.alberta.ca/occupational-health-safety.aspx

Technical Training

Apprenticeship technical training is delivered by the PSI's throughout Alberta. The PSI's are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All PSI's place a strong emphasis on safety that complements safe workplace practices towards the development of a culture of safety for all professions.

The PSI's work with industry and Alberta Skilled Trades and Professions to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs across the province. They develop curriculum from the curriculum guides established by the Registrar in consultation with the PSI's and industry and provide the technical training to apprentices.

The following PSI's deliver Carpenter trade apprenticeship technical training:

- Keyano College
- Lethbridge College
- Grande Prairie Regional College
- Red Deer College
- Olds College
- Portage College
- Lakeland College
- Medicine Hat College
- Northern Alberta Institute of Technology
- Southern Alberta Institute of Technology
- Northern Lakes College

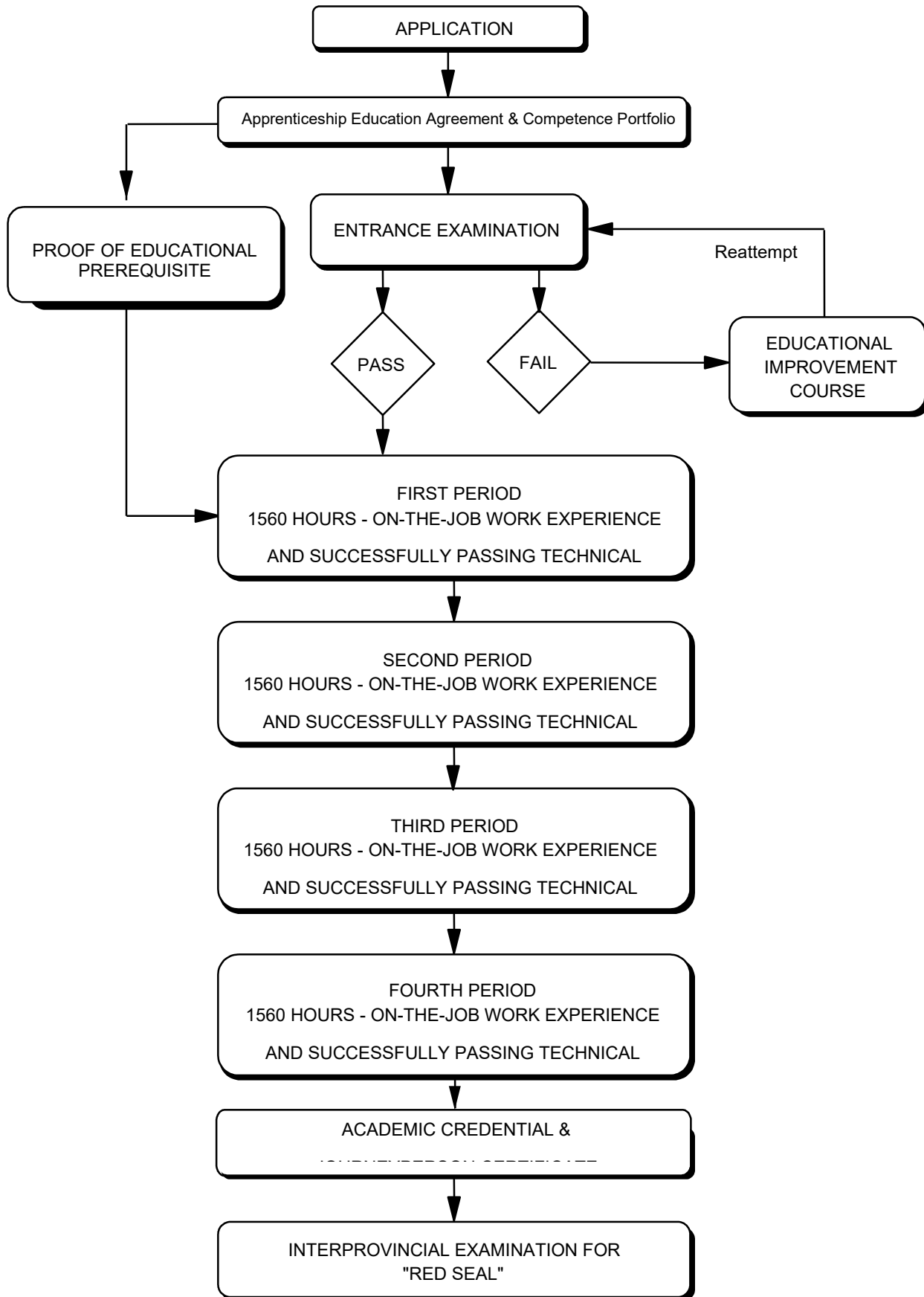
Procedures for Recommending Revisions to the Curriculum Guide

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

Registrar of Apprenticeship Programs
c/o Apprenticeship Delivery and Industry Support Services
Apprenticeship Delivery and Industry Support
Skilled Trades and Professions
19th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used.

Apprenticeship Route toward Academic Credential



**Carpenter Training Profile
First Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

SAFETY AND BUILDING MATERIALS
11%



A	B	C
Safety Legislation, Regulations and Industry Policy in the Trades 15%	Climbing, Lifting, Rigging and Hoisting 15%	Hazardous Materials and Fire Protection 8%
D	E	F
Construction Equipment Safety 11%	Apprenticeship Training Program Orientation 8%	Solid Wood Products and Wood Joinery 11%
G	H	I
Manufactured Construction Products 12%	Fasteners, Adhesives and Sealants 12%	Introduction to Concrete 8%

SECTION TWO

TOOLS
32%



A	B	C
Hand Tools 39%	Portable Power Tools 23%	Stationary Power Tools 24%
D	E	F
Cutters, Bits and Abrasives 5%	Explosive Actuated Tools 6%	Pneumatic and Fuel Powered Tools 3%

SECTION THREE

SITE PREPERATION, BUILDING LAYOUT, FOUNDATIONS AND FLOOR FRAME SYSTEMS
31%



A	B	C
Preliminary Building Procedures 8%	Building Loads and Forces 3%	Foundation Supports 16%
D	E	F
Concrete Flatwork 6%	Foundation Systems 43%	Floor Frame Support 12%
G		
Floor Frames 12%		

SECTION FOUR

RESIDENTIAL ESTIMATING AND DRAWING INTEPRETATION
26%



A	B	C
Drawing Basics 3%	Orthographic Drawings 6%	Pictorial Drawings and Sketching 7%
D	E	F

Drawing Standards
10%

Drawing Interpretation Principles
26%

Math Concepts
29%

G

H

Estimate Foundation Forms and Concrete Material Requirements
10%

Estimate Floor Systems Material Requirements
9%

**Second Period
(8 Weeks 30 Hours per Week – Total of 240 Hours)**

SECTION ONE

FRAME STRUCTURES
17%



A	B	C
Construction Site Safety 5%	Wall Framing Systems 57%	Ceiling Framing 19%
D		
Building Envelope 19%		

SECTION TWO

WOOD FRAME ROOFS
25%



A	B
Roof Framing Systems 67%	Engineered Truss Systems 33%

SECTION THREE

INTERIOR AND EXTERIOR FINISHES
18%



A	B	C
Windows and Doors 42%	Exterior Finishes 42%	Residential Roof Coverings 16%

SECTION FOUR

WOOD STAIRS
13%



A
Single and Multi-Flight Stairs 100%

SECTION FIVE

LIGHT COMMERCIAL ESTIMATING AND DRAWING INTERPRETATION
27%



A	B	C
Drawing Standards 6%	Drawing Interpretation 25%	Interpretation of Building Codes and Standards 16%
D	E	F
Wall Framing Calculations 14%	Ceiling Framing Calculations 6%	Roof Framing Calculations 16%
G	H	
Exterior and Interior Wall Finish Calculations 5%	Straight and Multi-Flight Stair Calculations 12%	

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

SECTION ONE

CONCRETE AND BUILDING LAYOUT
18%



A	B	C
Commercial and Industrial Construction Site Safety 10%	Scaffolding 21%	Concrete Mix Design 7%
D	E	F
Transporting and Placement of Concrete 5%	Finishing and Curing of Concrete 7%	Joints and Reinforcement for Concrete 5%
G	H	
Pre-Stressed and Precast Concrete 2%	Survey Equipment 43%	

SECTION TWO

COMMERCIAL FORM WORK
26%



A	B	C
Piles, Footings & Grade Beams 6%	Wall and Column Forming 31%	Suspended Concrete Slabs 31%
D		
Concrete Stairs 32%		

SECTION THREE

COMMERCIAL INTERIORS AND EXTERIORS
27%



A	B	C
Interior Systems and Door Frames 16%	Commercial Doors and Windows 16%	Commercial Exteriors 6%
D	E	F
Commercial Roofs 3%	Fire Protection, Acoustics and Commercial Insulation 6%	Commercial Fasteners and Anchors 3%
G	H	
Timber Construction 3%	Commercial Interior Millwork 47%	

SECTION FOUR

COMMERCIAL ESTIMATING AND DRAWING INTERPRETATION
29%



A	B	C
Drawing Standards 6%	Commercial Drawing Interpretation 34%	Commercial Concrete Structures Material Takeoffs 14%

D	E	F
Commercial Concrete Volume Calculations <div style="text-align: right;">11%</div>	Cut and Fill Calculations <div style="text-align: right;">12%</div>	Concrete Stair Calculations <div style="text-align: right;">11%</div>
G		
Interior Systems Calculations <div style="text-align: right;">12%</div>		

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

SECTION ONE

**WORKPLACE ORGANIZATION
AND INTERIOR FINISHES**

28%



A	B	C
Industrial Construction Site Safety 4%	Workplace Coaching and Skills 3%	Interprovincial Standards Red Seal Program 2%
D	E	F
Job Scheduling 6%	Construction Materials Management 6%	Cabinet Installation 7%
G	H	I
Trim Installation 6%	Walls and Storage 3%	Wood Finishing 3%
J	K	
Flooring 3%	Interior Finish Carpentry Project 57%	

SECTION TWO

**ADVANCED ROOF FRAMING
AND STAIRS**

31%



A	B	C
Advanced Roof Framing 27%	Housed Stairs 20%	Winder Stairs 26%
D		
Curved Stairs 27%		

SECTION THREE

**RENOVATIONS, BUILDING
DESIGN, ENERGY EFFICIENCY
AND BUILDING SCIENCE**

18%



A	B	C
Renovations 9%	Additions 5%	Architectural Building Design Concepts 5%
D	E	F
Barrier-Free Design and Ergonomics 10%	Energy Efficient Construction 14%	Energy Efficient Building Design 14%
G	H	
Energy Efficient Framing 14%	Insulation and Air Barriers 29%	

SECTION FOUR

**INDUSTRIAL ESTIMATING AND
DRAWING INTERPRETATION**
23%



A	B	C
Industrial Trade Math 11%	Interior Finish Calculations 7%	Industrial Project Costing 6%
D	E	F
Roof Calculations 11%	Advanced Stair Calculations 9%	Industrial Drawing Interpretation 56%

**FIRST PERIOD TECHNICAL TRAINING
CARPENTER TRADE
CURRICULUM GUIDE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... SAFETY AND BUILDING MATERIALS..... 11%

A. Safety Legislation, Regulations & Industry Policy in the Trades 15%

Outcome: ***Apply legislation, regulations and practices ensuring safe work in this trade.***

1. Demonstrate the application of the Occupational Health and Safety Act, Regulation and Code.
2. Describe the sponsor's and employee's role with Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations and related advisory bodies and agencies.
3. Describe industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of worker and sponsors to apply emergency procedures.
5. Describe tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of sponsors and employees with the selection and use of personal protective equipment (PPE).
7. Maintain required PPE for tasks.
8. Use required PPE for tasks.

B. Climbing, Lifting, Rigging and Hoisting 15%

Outcome: ***Use industry standard practices for climbing, lifting, rigging and hoisting in this trade.***

1. Describe manual lifting procedures.
2. Describe rigging hardware and associated safety factors.
3. Select equipment for rigging loads.
4. Describe hoisting and load moving procedures.
5. Maintain personal protective equipment (PPE) for climbing, lifting and load moving equipment.
6. Use PPE for climbing, lifting and load moving equipment.

C. Hazardous Materials & Fire Protection 8%

Outcome: ***Apply industry standard practices for hazardous materials and fire protection in this trade.***

1. Describe roles, responsibilities, features and practices related to the Workplace Hazardous Materials Information System (WHMIS) program.
2. Describe three key elements of WHMIS.
3. Describe handling, storing and transporting procedures for hazardous material.

4. Describe venting procedures when working with hazardous materials.
 5. Describe hazards, classes, procedures and equipment related to fire protection.
- D. Construction Equipment Safety 11%**
- Outcome: Apply safe work practices with construction equipment.**
1. Identify construction equipment.
 2. Use safe work practices when working with construction equipment.
- E. Apprenticeship Training Program 8%**
- Outcome: Manage an apprenticeship to earn journey person certification.**
1. Describe the contractual responsibilities of the apprentice, sponsor and Alberta Apprenticeship and Industry Training.
 2. Describe the purpose of the apprentice competency portfolio.
 3. Describe the procedure for changing sponsors during an active apprenticeship.
 4. Describe the purpose of the curriculum guide.
 5. Describe the procedure for progressing through an apprenticeship.
 6. Describe advancement opportunities in this trade.
- F. Solid Wood Products and Wood Joinery 11%**
- Outcome: Use solid wood products and joinery.**
1. Describe types and characteristics of solid wood products.
 2. Describe how lumber is milled, seasoned, stored and ordered.
 3. Describe the application of solid wood mouldings.
 4. Describe wood joining methods for fabrication and installation.
- G. Manufactured Construction Products 12%**
- Outcome: Use manufactured construction products.**
1. Describe the application of panel products.
 2. Describe the application of engineered wood products.
 3. Describe the application of synthetic and metal products.
- H. Fasteners, Adhesives and Sealants 12%**
- Outcome: Apply fasteners, adhesives and sealants.**
1. Identify types and functions of fasteners.
 2. Identify types and functions of adhesives.
 3. Identify types and functions of sealants.
- I. Introduction to Concrete 8%**
- Outcome: Describe the ingredients, production, placing and curing of concrete.**
1. Identify the ingredients and production of concrete.
 2. Describe the placement and curing of concrete.

SECTION TWO: TOOLS 32%

A. Hand Tools 39%

Outcome: Use hand tools.

1. Identify hand tools.
2. Describe the uses of hand tools.
3. Use hand tools.

B. Portable Power Tools 23%

Outcome: Use portable power tools.

1. Identify portable power tools.
2. Describe the uses of portable power tools.
3. Use portable power tools.

C. Stationary Power Tools 24%

Outcome: Use stationary power tools.

1. Identify stationary power tools.
2. Describe the uses of stationary power tools.
3. Maintain stationary power tools.
4. Use stationary power tools.

D. Cutters, Bits and Abrasives 5%

Outcome: Maintain tools and accessories.

1. Describe the equipment used to maintain chisels, plane irons and scrapers.
2. Describe the types and uses of sanding abrasives.
3. Describe the types, uses and maintenance of saw blades.
4. Describe the types, uses and maintenance of drill bits and router bits.

E. Explosive Actuated Tools 6%

Outcome: Use explosive actuated tools.

1. Identify explosive actuated tools.
2. Describe the uses of explosive actuated tools.
3. Maintain explosive actuated tools.
4. Use explosive actuated tools.

F. Pneumatic and Fuel Powered Tools 3%

Outcome: Use pneumatic and fuel-powered tools.

1. Identify pneumatic and fuel powered tools.
2. Describe the uses of pneumatic and fuel-powered tools.
3. Describe the maintenance of pneumatic and fuel powered tools.
4. Use pneumatic and fuel powered tools.

SECTION THREE:SITE PREPARATION, BUILDING LAYOUT, FOUNDATIONS 31%
AND FLOOR FRAME SYSTEMS

A. Preliminary Building Procedures 8%

Outcome: *Follow preliminary site and building layout procedures in preparation for footing placement.*

1. Describe initial on-site procedures.
2. Describe building layout procedures.
3. Describe the use of levelling equipment.
4. Describe excavation and shoring procedures.

B. Building Loads and Forces 3%

Outcome: *Use construction design principles to counteract the forces that act upon buildings and structures.*

1. Identify the loads and forces that act upon a building.
2. Describe construction design principles used to counteract loads and forces.

C. Foundation Supports 16%

Outcome: *Construct footings.*

1. Describe types of footings.
2. Describe layout and construction of footings.
3. Describe types of piles and their construction.
4. Construct a footing.

D. Concrete Flatwork 6%

Outcome: *Construct concrete flatwork.*

1. Describe sub grade preparation, forming methods, reinforcement, and placing requirements for concrete flatwork.
2. Construct concrete flatwork.

E. Foundation Systems 43%

Outcome: *Construct foundation systems.*

1. Describe the components and erection processes for modular foundation form systems.
2. Describe steel reinforcement, concrete placement and form removal for concrete foundations.
3. Describe permanent wood foundation systems.
4. Describe insulated concrete systems.
5. Describe alternative foundation system types.
6. Describe moisture protection and backfill requirements for foundation systems.
7. Construct a foundation system.

F. Floor Frame Support 12%

Outcome: Install floor frame supports.

1. Identify beam support types.
2. Describe the design and construction of beams.
3. Describe methods used to anchor the floor frame to the foundation.

G. Floor Frames 12%

Outcome: Construct a floor frame.

1. Identify the components of a floor frame.
2. Describe the layout and installation procedures for a floor frame.
3. Construct a floor frame system.

SECTION FOUR: RESIDENTIAL ESTIMATING AND DRAWING INTERPRETATION 26%

A. Drawing Basics 3%

Outcome: Use drawing instruments.

1. Describe the functions of drawing instruments.
2. Complete geometric shape exercises using drawing instruments.
3. Describe the applications of geometry in trade situations.
4. Draw objects incorporating shapes and angles.

B. Orthographic Drawings 6%

Outcome: Draw orthographic projections of objects.

1. Describe the concept and principles of orthographic projection.
2. Draw orthographic projections of objects.

C. Pictorial Drawings and Sketching 7%

Outcome: Use sketching and pictorial drawing techniques to produce isometric drawings.

1. Describe sketching and pictorial drawing methods.
2. Use isometric drawing techniques.
3. Produce isometric drawings.

D. Drawing Standards 10%

Outcome: Create orthographic views, section views, detail views and a cutting list for a shop project.

1. Identify drawing conventions for orthographic and section views and details.
2. Describe the requirements for a cutting list.
3. Produce the drawings and cutting list for a shop project.
4. Sketch detail views required for a shop project.

E. Drawing Interpretation Principles 26%**Outcome: Interpret a set of working drawings and construction documentation.**

1. Identify the paper language conventions used on working drawings.
2. Describe architectural, structural, mechanical, electrical and shop drawings.
3. Identify the different views found on a set of working drawings.
4. Describe specifications, discrepancies and path in a set of working drawings.
5. Interpret working drawings.

F. Math Concepts 29%**Outcome: Apply math concepts to solve problems using both the metric and imperial systems of measurement.**

1. Describe math equations and order of operations.
2. Describe calculator functions and operations.
3. Describe the metric and imperial measurement systems.
4. Perform calculations involving fractions.
5. Convert measurements between metric and imperial systems.
6. Perform calculations using the Pythagorean Theorem.
7. Determine the perimeter and centerline perimeter for various shapes and buildings.
8. Determine the area and volume for various shapes and objects.
9. Perform ratio and proportion calculations.
10. Perform percentage calculations.

G. Estimate Foundation Forms and Concrete Material Requirements 10%**Outcome: Calculate the quantity of forming material and concrete required for concrete foundations.**

1. Describe the difference between a material takeoff and an estimate.
2. Estimate material requirements for forming strip footings, pad footings and foundation walls.
3. Estimate concrete volume requirements for footings, pilings and foundation walls.
4. Estimate concrete volume requirements for floor areas.

H. Estimate Floor Systems Material Requirements 9%**Outcome: Calculate the quantity of framing materials required for conventionally framed floor and floor support systems.**

1. Calculate material takeoffs for floor support systems.
2. Calculate material takeoffs for floor frames.
3. Calculate material takeoffs for sub-floor coverings

**SECOND PERIOD TECHNICAL TRAINING
CARPENTER TRADE
CURRICULUM GUIDE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... FRAME STRUCTURES 17%

A. Construction Site Safety 5%

Outcome: Apply safety procedures on construction work sites.

1. Describe fall prevention systems and personal protective equipment used on construction work sites.

B. Wall Framing Systems 57%

Outcome: Construct wall framing systems for wood frame buildings.

1. Describe wall framing systems.
2. Describe the effects of load transfer and material shrinkage on wall framing system design.
3. Describe wall and wall plate layout.
4. Describe the assembly and erection of interior and exterior walls.
5. Describe wall framing design considerations for other trades.
6. Construct wall framing systems.

C. Ceiling Framing..... 19%

Outcome: Install ceiling joists.

1. Describe the layout and installation of ceiling joists.
2. Interpret building code span tables to design ceiling joists.
3. Install ceiling joists.

D. Building Envelope 19%

Outcome: Apply the materials and procedures used to reduce heat transfer.

1. Describe the design concepts of building envelope systems.
2. Describe heat transfer through building components.
3. Describe insulation and sound reduction techniques.
4. Describe the function of air, vapour and weather barriers.
5. Describe energy efficient construction techniques.

SECTION TWO:..... WOOD FRAME ROOFS 25%

A. Roof Framing Systems 67%

Outcome: Construct wood frame roof systems.

1. Describe wood frame roof and cornice systems.
2. Perform calculations for roof framing component.

- 3. Use building codes to determine rafter dimensions and spacing.
- 4. Describe layout and assembly of gable, hip and intersecting roof systems.
- 5. Construct a wood frame roof system.

B. Engineered Truss Systems 33%

Outcome: Install an engineered truss system.

- 1. Describe engineered trusses.
- 2. Describe the loads and forces acting on engineered trusses.
- 3. Describe receiving, storage and handling of engineered trusses.
- 4. Describe methods of erecting and bracing engineered trusses.
- 5. Install an engineered truss system.

SECTION THREE: INTERIOR AND EXTERIOR FINISHES 18%

A. Windows and Doors 42%

Outcome: Install windows and doors.

- 1. Describe window types and their uses.
- 2. Describe door types and their uses.
- 3. Describe window and door hardware and accessories.
- 4. Describe window and door installation procedures.
- 5. Install windows and doors.

B. Exterior Finishes..... 42%

Outcome: Install exterior finishes.

- 1. Describe exterior finishes and their uses.
- 2. Describe the installation of exterior finishing components.
- 3. Install an exterior finish.

C. Residential Roof Coverings..... 16%

Outcome: Install residential roof coverings.

- 1. Describe the preparation required for residential roof coverings.
- 2. Describe residential roof coverings.
- 3. Install a residential roof covering.

SECTION FOUR: WOOD STAIRS 13%

A. Single and Multi-Flight Stairs 100%

Outcome: Construct single and multi-flight stairs.

- 1. Define stair terms.
- 2. Interpret building code requirements for stairs.

3. Perform stair calculations.
4. Construct a stair.

SECTION FIVE: ... LIGHT COMMERCIAL ESTIMATING AND DRAWING INTERPRETATION 27%

A. Drawing Standards 6%

Outcome: *Create orthographic views, sectional views and detail views for a shop project.*

1. Describe line types used in orthographic drawings.
2. Demonstrate dimensioning methods and techniques.
3. Describe page layout and centering techniques.
4. Describe section and detail views and the use of material symbols.
5. Create orthographic views, sectional views and detail views for a shop project.

B. Drawing Interpretation 25%

Outcome: *Interpret a set of residential and light commercial working drawings.*

1. Explain the paper language used in reading a set of drawings.
2. Identify the information contained in the different views presented in a set of drawings.
3. Describe the steps used to navigate through a set of drawings.
4. Interpret residential and light commercial working drawings.
5. Interpret engineered floor joist and roof truss details on shop drawings.

C. Interpretation of Building Codes and Standards 16%

Outcome: *Interpret building codes and standards as they apply to residential and commercial building construction.*

1. Describe the process of locating information in building codes and related documentation.
2. Interpret information from building codes and standards.

D. Wall Framing Calculations 14%

Outcome: *Produce a material takeoff for wood wall framing.*

1. Calculate material quantities using given centre-to-centre spacing details.
2. Calculate the quantity of linear material required.
3. Calculate the quantity of studs required for exterior and interior walls.
4. Determine lintel size from door and window rough openings.
5. Calculate the amount of sheathing required for exterior walls.
6. Produce a material take-off for exterior and interior walls.

E. Ceiling Framing Calculations 6%

Outcome: *Produce material takeoffs for framed ceilings.*

1. Produce a ceiling framing material takeoff for a gable and hip roof.

F. Roof Framing Calculations..... 16%

Outcome: Produce material take-offs for roof systems.

1. Perform calculations using given centre-to-centre spacing details.
2. Calculate framing material required for gable, hip and intersecting roofs.
3. Calculate sheathing and roof covering material requirements.
4. Calculate materials required for truss roofs.

G. Exterior and Interior Wall Finish Calculations..... 5%

Outcome: Produce material takeoffs for exterior and interior wall finish materials.

1. Calculate interior wall finish materials.
2. Calculate cornice and rake finish materials.
3. Calculate exterior wall finish materials.
4. Produce a material take-off for interior and exterior wall finish materials.

H. Straight and Multi-Flight Stair Calculations..... 12%

Outcome: Calculate the required dimensions for openings and stairs.

1. Calculate the unit rise, unit run, finished opening and rough opening for straight-flight and multi-flight stairs.

**THIRD PERIOD TECHNICAL TRAINING
CARPENTER TRADE
CURRICULUM GUIDE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

- SECTION ONE:.....CONCRETE AND BUILDING LAYOUT 18%**
- A. Commercial and Industrial Construction Site Safety 10%**
- Outcome: Apply safe work practices on commercial and industrial construction sites.**
1. Identify commercial and industrial construction site safety hazards.
 2. Apply safe work practices with hoisting and lifting equipment.
- B. Scaffolding 21%**
- Outcome: Assemble scaffold systems.**
1. Describe scaffold terms and components.
 2. Describe requirements for use and erection of scaffolds.
 3. Describe scaffold systems and erection procedures.
 4. Assemble a scaffold system.
- C. Concrete Mix Design 7%**
- Outcome: Describe the mix design of concrete.**
1. Describe concrete use within the construction industry.
 2. Describe concrete materials, design and testing.
 3. Describe the functions of concrete additives and treatments.
 4. Describe types of grouts and mortars.
- D. Transporting and Placement of Concrete 5%**
- Outcome: Describe methods of transporting and placing concrete.**
1. Describe the transporting, placing and consolidating of concrete.
 2. Describe the forces acting on concrete forms before and after set.
- E. Finishing and Curing of Concrete..... 7%**
- Outcome: Describe concrete finishing, curing and toppings.**
1. Describe concrete finishing tools.
 2. Describe concrete finishing methods.
 3. Describe concrete hardeners, toppings and sealers and their uses.
 4. Describe special surface treatments and finishes.
 5. Describe concrete curing procedures.

F. Joints and Reinforcement for Concrete 5%

Outcome: Describe the purpose of concrete joints and reinforcement.

1. Describe the uses of construction, control, isolation, and expansion joints.
2. Describe types and sizes of deformed bars and welded wire fabric.
3. Describe the placement of reinforcing for footings, beams, columns, slabs, walls, and stairs.

G. Pre-Stressed and Precast Concrete 2%

Outcome: Describe pre-stressed, precast and tilt-up construction and erection procedures.

1. Describe uses of pre-stressed concrete.
2. Describe precast concrete manufacturing and erection.
3. Describe tilt up construction methods.

H. Survey Equipment 43%

Outcome: Use survey equipment for building layout.

1. Interpret how land is legally described.
2. Describe equipment used for building layout operations.
3. Describe advanced survey equipment.
4. Describe survey operations and use of accessories.
5. Use survey equipment for building layout.

SECTION TWO: COMMERCIAL FORM WORK 26%

A. Piles, Footings and Grade Beams 6%

Outcome: Describe foundation types used in commercial and industrial construction.

1. Describe types of piles, footings and grade beams for commercial and industrial construction.

B. Wall and Column Forming 31%

Outcome: Construct concrete wall and column formwork.

1. Describe the forces encountered during concrete placement in walls and columns.
2. Describe wall and column form systems.
3. Describe architectural concrete form systems.
4. Describe slip forms.
5. Construct wall and column forms.

C. Suspended Concrete Slabs 31%

Outcome: Construct suspended slab formwork.

1. Identify types of suspended concrete slab systems.
2. Describe stationary forming of suspended slabs.
3. Describe fly forming of suspended slabs.
4. Describe stripping and re-shoring procedures for suspended slabs.
5. Construct formwork for a suspended slab.

D. Concrete Stairs 32%

Outcome: Construct concrete stair formwork.

1. Describe concrete stair types.
2. Describe types of landings, handrails and guards.
3. Perform calculations for concrete stairs.
4. Describe layout, formwork and stripping of concrete stair forms.
5. Construct a concrete stair form.

SECTION THREE: COMMERCIAL INTERIORS AND EXTERIORS 27%

A. Interior Systems and Door Frames 16%

Outcome: Install interior metal fabricated products.

1. Describe the installation of metal studs.
2. Describe the installation of gypsum board.
3. Describe the installation of demountable partitions.
4. Describe the installation of suspended ceilings.
5. Describe setting and anchoring of metal frames.
6. Install metal non-load bearing wall systems.
7. Install metal door jambs.
8. Install suspended ceiling systems.

B. Commercial Doors and Windows 16%

Outcome: Install commercial doors and windows.

1. Describe commercial door and door hardware installation.
2. Describe commercial window rough opening preparations.
3. Install commercial doors and windows.

C. Commercial Exteriors 6%

Outcome: Describe types of commercial exteriors and the layout and construction of arch support templates used for masonry exteriors.

1. Identify types of commercial exteriors.
2. Describe layout and construction procedures for exterior architectural features.

D. Commercial Roofs 3%

Outcome: Prepare a commercial building roof for roofing installers.

1. Describe low slope roof systems.
2. Describe the carpenter's role in preparing commercial roofs for roofing application.

E. Fire Protection, Acoustics and Commercial Insulation 6%

Outcome: Install fire and sound rated assemblies, thermal insulations and sealants.

1. Describe the requirements and materials used for fire protection and separations installations.

2. Describe the requirements and materials used for sound-rated installations.
3. Describe the requirements and materials used for commercial insulation installation procedures.

F. Commercial Fasteners and Anchors 3%

Outcome: Install fasteners and anchors used in commercial construction.

1. Describe types of commercial fasteners, anchors, loads and tools.
2. Describe methods of fastening materials.

G. Timber Construction 3%

Outcome: Construct heavy timber buildings.

1. Describe heavy timber construction methods.
2. Describe glue laminated wood products and erection procedures.
3. Describe heavy truss and box beam construction.
4. Describe construction methods for Pole Buildings.
5. Describe construction of log buildings.

H. Commercial Interior Millwork 47%

Outcome: Construct commercial interior millwork.

1. Match wood grains and apply edge veneers and plywood.
2. Work with a variety of joints and solid woods.
3. Use clamps and glues.
4. Use contact adhesives.
5. Construct and install drawers, doors and shelves and sliding components.
6. Use jigs, templates and other accessories to increase the efficiency of power tools.
7. Cut, fit and apply plastic laminates or other wood substitutes.
8. Develop obtuse, acute and compound angles and incorporate them into a project.

SECTION FOUR: COMMERCIAL ESTIMATING AND DRAWING INTERPRETATION 29%

A. Drawing Standards 6%

Outcome: Develop orthographic and pictorial drawings.

1. Describe orthographic and pictorial drawing basics.
2. Develop orthographic and pictorial drawings for a shop project.

B. Commercial Drawing Interpretation..... 34%

Outcome: Interpret a set of commercial drawings.

1. Describe commercial drawing interpretation practices.
2. Interpret a set of pole frame construction drawings.
3. Interpret a set of heavy timber construction drawings.
4. Interpret a set of reinforced concrete construction drawings.
5. Interpret a set of drawings for emerging technology commercial building systems.

C. Commercial Concrete Structures Material Takeoffs..... 14%**Outcome: Develop material takeoffs for commercial concrete formwork.**

1. Perform calculations using different centre-to-centre spacings.
2. Calculate wall form sheathing requirements.
3. Calculate dimensional lumber requirements for formwork.
4. Calculate snap ties and wedges requirements for formwork.
5. Produce a formwork material takeoff.

D. Commercial Concrete Volume Calculations..... 11%**Outcome: Develop a material takeoff for concrete volume requirements of various components of a commercial building.**

1. Calculate concrete volume requirements for various construction components.
2. Calculate concrete volume requirements for commercial building components.
3. Produce a commercial building concrete material takeoff.

E. Cut and Fill Calculations..... 12%**Outcome: Calculate volumes for cut, fill and excavation requirements.**

1. Calculate the volume of excavation required to level or grade a site.
2. Calculate the volume of mass excavation required for a building.
3. Calculate the volume of backfill and excess haul required for a building.

F. Concrete Stair Calculations..... 11%**Outcome: Calculate design dimensions and material requirements for concrete stairs.**

1. Perform calculations for a concrete stair design.
2. Calculate quantities of concrete required for concrete stairs.
3. Calculate material requirements for concrete stair forming.

G. Interior Systems Calculations..... 12%**Outcome: Produce a material takeoff for an interior system in a commercial building.**

1. Calculate required metal studs and plate material.
2. Calculate required gypsum board and resilient channel.
3. Calculate required quantities of all components of a demountable partition system.
4. Calculate required quantities of grid components and tiles for a suspended ceiling system.
5. Produce a material takeoff for a commercial interior system.

**FOURTH PERIOD TECHNICAL TRAINING
CARPENTER TRADE
CURRICULUM GUIDE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....WORKPLACE ORGANIZATION AND INTERIOR FINISHES..... 28%

A. Industrial Construction Site Safety..... 4%

Outcome: Apply Occupational Health and Safety Regulations and safe work practices on construction sites.

1. Determine OH & S safety requirements for industrial construction site hazards.
2. Describe personal health hazards related to industrial construction sites.
3. Describe organizational roles within industrial construction projects and the levels of responsibility and reporting.

B. Workplace Coaching Skills..... 3%

Outcome: Use coaching skills when training an apprentice.

1. Describe the process for coaching an apprentice.

C. Interprovincial Standards Red Seal Program 2%

Outcome: Use Red Seal Products to challenge an Interprovincial examination.

1. Identify Red Seal products used to develop Interprovincial examinations.
2. Use Red Seal products to prepare for an interprovincial examination.

D. Job Scheduling..... 6%

Outcome: Use job scheduling methods.

1. Describe job scheduling methods.
2. Identify computer software applications for job scheduling.
3. Create a job schedule.

E. Construction Materials Management 6%

Outcome: Manage construction materials.

1. Describe procurement and delivery considerations.
2. Describe methods of construction material storage.
3. Describe methods of protecting completed projects from damage.
4. Draft a construction materials management plan.

F. Cabinet Installation 7%

Outcome: Install cabinets and storage units.

1. Describe pre-made and site-built cabinet installation.
2. Describe trim, accessories and hardware for cabinets.

3. Describe countertop installation.

G. Trim Installation..... 6%

Outcome: Install trim and finishing components.

1. Identify types of trim.
2. Describe trim installation methods.
3. Describe types of joints.
4. Install trim.

H. Walls and Storage..... 3%

Outcome: Install commercial interior wall finishes, shelving and storage systems.

1. Describe commercial interior wall finishes and installation procedures.
2. Describe shelving systems and installation procedures.
3. Describe storage systems and installation procedures.

I. Wood Finishing..... 3%

Outcome: Apply wood finishes.

1. Describe wood finishing products.
2. Describe surface preparation for wood finishes.
3. Describe methods of applying wood finishes.

J. Flooring 3%

Outcome: Install flooring materials.

1. Describe flooring materials.
2. Describe the preparation requirements for flooring materials.
3. Describe the installation of flooring materials.

K. Interior Finish Carpentry Project 57%

Outcome: Construct an interior finish carpentry project

1. Interpret a set of drawings for an interior finish carpentry project.
2. Create detail drawings for an interior finish carpentry project.
3. Identify materials, hardware and specifications for an interior finish carpentry project.
4. Produce a material cutting list for an interior finish carpentry project.
5. Cut and prepare materials for assembly.
6. Match wood grains and apply edge veneers, mouldings and plywood.
7. Work with a variety of joints and solid woods.
8. Use clamps and glues.
9. Use contact adhesives.
10. Construct and install drawer, door and shelves and sliding components.
11. Cut, fit and apply plastic laminates or other wood substitutes.
12. Construct an interior finish carpentry project.

SECTION TWO:ADVANCED ROOF FRAMING AND STAIRS 31%**A. Advanced Roof Framing 27%****Outcome: Frame unequal slope roofs, dormers, turrets and other roof features.**

1. Describe framing for unequal slope roofs.
2. Perform unequal slope roof framing calculations and layout.
3. Describe framing for advanced roof features.
4. Perform advanced roof features framing calculations and layout.
5. Frame an unequal slope roof.
6. Frame advanced roof features.

B. Housed Stairs..... 20%**Outcome: Construct housed stairs and balustrades.**

1. Describe the construction of housed stairs.
2. Describe the installation of balustrades.
3. Prepare jigs and templates for specified operations and full scale layouts.
4. Construct housed stairs and stair balustrades.

C. Winder Stairs..... 26%**Outcome: Construct winder stairs.**

1. Describe winder stair components and building code requirements.
2. Perform calculations involving winder stairs.
3. Describe the layout and construction of winder stair landings.
4. Construct winder stairs.

D. Curved Stairs 27%**Outcome: Construct curved stairs.**

1. Describe curved stairs and building code requirements.
2. Perform calculations involving curved stairs.
3. Describe the layout and construction of curved stairs.
4. Construct curved stairs.

**SECTION THREE:RENOVATIONS, BUILDING DESIGN, ENERGY EFFICIENCY 18%
AND BUILDING SCIENCE****A. Renovations 9%****Outcome: Describe renovations contracting, planning and renovation scheduling.**

1. Identify the roles and responsibilities of a renovation contractor.
2. Produce a renovation schedule.
3. Describe problem-solving strategies for unforeseen challenges with renovation projects.

B. Additions 5%**Outcome: Construct building additions.**

1. Describe building preparation considerations for additions.
2. Describe the sequence, scheduling and structural considerations for adding to the footprint of a building.
3. Describe design and load-bearing requirements when adding a storey to a building.

C. Architectural Building Design Concepts 5%**Outcome: Apply concepts of architectural design.**

1. Describe concepts of design in architecture.
2. Describe the concept of function in architecture.

D. Barrier-Free Design and Ergonomics 10%**Outcome: Apply concepts of ergonomic and barrier-free design.**

1. Describe standards of ergonomic design.
2. Describe barrier-free design principles.

E. Energy Efficient Construction 14%**Outcome: Apply current and emerging technologies in energy efficient construction.**

1. Describe the evolution of Canadian energy efficient construction practices.
2. Describe energy rating and certification systems.
3. Describe the building sciences applicable to energy efficient construction.
4. Identify the economics of low-energy consumption buildings.

F. Energy Efficient Building Design 14%**Outcome: Use energy efficient design principles and equipment.**

1. Identify energy efficiency factors affecting the design process.
2. Describe the principles of space conditioning.
3. Identify methods and equipment used to satisfy energy efficient heating, ventilation and air conditioning (HVAC) requirements.
4. Describe alternative energy sources and emerging technologies.

G. Energy Efficient Framing 14%**Outcome: Use energy-efficient framing systems.**

1. Describe methods of constructing energy efficient wall and floor systems.
2. Describe methods of constructing energy efficient roof systems.

H. Insulation and Air Barriers 29%**Outcome: Install insulation and air barrier systems.**

1. Describe insulation materials.
2. Describe insulation installation methods.

3. Describe materials and assembly methods for air barrier systems.

SECTION FOUR:INDUSTRIAL ESTIMATING AND DRAWING INTERPRETATION 23%

A. Industrial Trade Math 11%

Outcome: Solve trade-related math problems.

1. Perform trigonometric calculations.
2. Perform calculations for beam/column reactions.

B. Interior Finish Calculations 7%

Outcome: Perform interior finish calculations.

1. Perform interior finish calculations using different centre-to-centre spacings.
2. Perform calculations related to floor, ceiling and wall finishes.
3. Calculate material quantities for mouldings and trim.
4. Calculate material quantities for cabinets, countertops and hardware.
5. Produce a material takeoff and cutting list for interior finish components.

C. Industrial Project Costing 6%

Outcome: Prepare an estimate for an industrial project.

1. Describe a preliminary estimate for an industrial project.
2. Describe a detailed estimate.
3. Estimate material costs including waste factors.
4. Estimate labour costs.
5. Estimate overhead expenses.
6. Produce a summary sheet.
7. Prepare an estimate.

D. Roof Calculations 11%

Outcome: Perform equal and unequal slope roof calculations.

1. Calculate material quantities using different centre-to-centre spacings, slope gain factors and comparison of triangles.
2. Calculate line lengths of rafters for equal slope gable, hip and intersecting roofs.
3. Calculate line lengths of rafters for unequal slope gable, hip and intersecting roofs.

E. Advanced Stair Calculations 9%

Outcome: Perform stair and balustrade calculations.

1. Perform calculations for winder stairs.
2. Perform calculations for curved stairs.
3. Perform calculations for balusters and balustrades.

F. Industrial Drawing Interpretation 56%

Outcome: *Interpret industrial drawings.*

1. Interpret the information contained in the different views presented in a set of industrial project drawings.
2. Navigate through a set of industrial project drawings.



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