

Apprenticeship and Industry Training

Bricklayer

Apprenticeship Course Outline

0104.4 (2004)

Alberta



Apprenticeship and
Industry Training

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Bricklayer

Table of Contents

Apprenticeship	2
Apprenticeship and Industry Training System	2
Apprenticeship Safety	4
Procedures for Recommending Revisions to the Course Outline.....	5
Apprenticeship Route toward Certification	6
Bricklayer Training Profile.....	7

Course Outline

First Period Technical Training.....	10
Second Period Technical Training.....	16
Third Period Technical Training	21

Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. 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 – usually a college or technical institute.

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 on the recommendation of Bricklayer Provincial Apprenticeship Committee.

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

- responsibly do all work tasks expected of a journeyman
- supervise, train and coach apprentices
- produce a better quality product than the minimum acceptable by industry standard
- use and maintain tools and equipment to the standards of competency and safety required in the trade
- understand and apply the principles of sound and safe construction
- know the characteristics and proper use of masonry materials
- interpret plans and specifications, do layout work and calculate material quantities
- lay, install and repair masonry units of all materials including all types of stone
- relate to the work of other tradesperson in the construction industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
 - standards and requirements for training and certification in their trade
 - courses and examinations in their trade
 - apprenticeship and certification
 - designation of trades and occupations
 - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Bricklayer PAC Members

Mr. M. Holbrook.....	Calgary.....	Presiding Officer
Mr. C. Ambrozic	Edmonton.....	Employer
Mr. M. Annich	Edmonton.....	Employer
Mr. R. Chaters	Edmonton.....	Employer
Mr. C. Siever	Calgary.....	Employee
Mr. S. Widdifield	Calgary.....	Employee
Mr. H. Glaus	Edmonton.....	Employee
Mr. A. Ramsay.....	Edmonton.....	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer 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 employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship 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, employers, 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.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment
- providing and maintaining safety equipment, protective devices and clothing
- enforcing safe working procedures
- providing safeguards for machinery, equipment and tools
- observing all accident prevention regulations

The employee and apprentice are responsible for:

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

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force 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.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Bricklayer apprenticeship technical training:

SAIT Edmonton

SAIT Calgary

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Bricklayer Provincial Apprenticeship Committee.

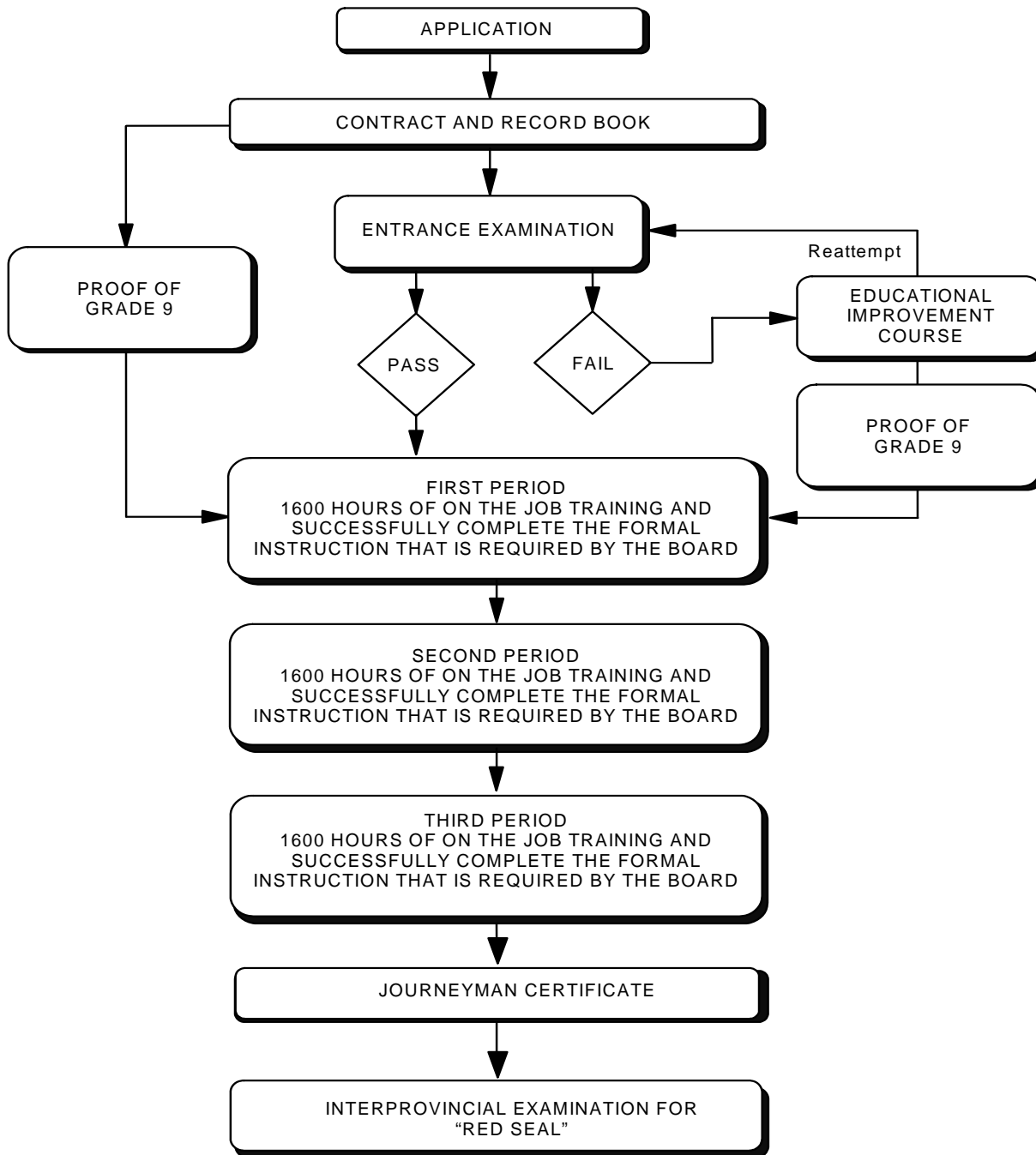
This course outline was approved on March 26, 2004 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

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

Bricklayer Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th 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. Recommendations for change will be placed on the agenda for regular meetings of the Bricklayer Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Bricklayer Training Profile

FIRST PERIOD (8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

**INTRODUCTORY THEORY:
SAFETY, TOOLS, EQUIPMENT,
MATERIALS, LAYOUTS,
PROCEDURES & REFRACTORY**
40 HOURS



A	B	C
Program Introduction, Fire Prevention and Control, and WHMIS 3 Hours	Work Site Safety, Ladders and Scaffolds 5 Hours	Hand Tools 6 Hours
D	E	F
Power Tools 4 Hours	Clay Brick & Concrete Block 6 Hours	Masonry Mortars, Grout & Concrete 5 Hours
G	H	
Layouts and Procedures 5 Hours	Refractory Basics 6 Hours	

SECTION TWO

**BASIC MASONRY
CONSTRUCTION PROJECTS**
176 HOURS



A	B	C
Tool Skills 3 Hours	Basic Brick Projects 60 Hours	Basic Block Projects 60 Hours
D	E	
Composite Walls and Special Projects 48 Hours	Scaffold Erection 5 Hours	

SECTION THREE

**BASIC CONSTRUCTION
DOCUMENTS & TRADE
MATHEMATICS**
24 HOURS



A	B	C
Types of Drawings 2 Hours	Basic Blueprint Reading 10 Hours	Basic Math Concepts 3 Hours
D	E	F
Perimeters and Centerline Perimeters 2 Hours	Areas and Volumes 2 Hours	Ratios and Percentages 2 Hours
G		
Masonry Materials Quantities 3 Hours		

SECOND PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

**INTERMEDIATE THEORY: WALL
SYSTEM DESIGN, MASONRY
ASSEMBLIES, REFRACTORY
SYSTEMS**
72 HOURS



A	B	C
Masonry Insulation 4 Hours	Air-Vapour Barriers 4 Hours	Moisture Control 4 Hours
D	E	F
Movement Control 3 Hours	Load Bearing and Non-Load Bearing Wall Design 4 Hours	Foundation Walls 5 Hours
G	H	I
Reinforced Grouted Masonry Walls 6 Hours	Veneer Walls 4 Hours	Cavity Walls 8 Hours
J	K	L
Masonry Arches 9 Hours	Prefabricated Masonry Panels 2 Hours	Stone Masonry 9 Hours
M		
Refractory Installations 10 Hours		

SECTION TWO

**INTERMEDIATE MASONRY
CONSTRUCTION PROJECTS**
120 HOURS



A	B	C
Reinforced Masonry Projects 60 Hours	Masonry Arch Projects 30 Hours	Stone Projects 30 Hours

SECTION THREE

**INTERMEDIATE
CONSTRUCTION DOCUMENTS
& TRADE MATHEMATICS**
48 HOURS



A	B	C
Construction Sketching 3 Hours	Intermediate Blueprint Reading 21 Hours	Basic Math Review 3 Hours
D	E	F
Material Quantity Calculations 6 Hours	Gauge and Slope Calculations 6 Hours	Material Calculations from Blueprints 9 Hours

THIRD PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

**ADVANCED THEORY:
 REFRACTORY, TOOLS,
 MASONRY DETAILS & REPAIR,
 CHIMNEYS & FIREPLACES**
62 HOURS



A	B	C
Advanced Refractory Procedures 6 Hours	Builders Levels, Laser Levels, and Water Levels 3 Hours	Masonry Aesthetics 6 Hours
D	E	F
Pavements 3 Hours	Glass Block 3 Hours	Unit Masonry Repair 4 Hours
G	H	I
Stone Restoration 4 Hours	Chimneys 9 Hours	Fireplaces 15 Hours
J	K	L
Levelling Exercises 3 Hours	Site Preparation 3 Hours	New Trends and Technology & Industry Network System 3 Hours

SECTION TWO

**ADVANCED MASONRY
 CONSTRUCTION PROJECTS**
120 HOURS



A	B	C
Building Layout 6 Hours	Stairs and Decorative Masonry 67 Hours	Chimney Construction 12 Hours
D		
Fireplace Construction 35 Hours		

SECTION THREE

**ADVANCED CONSTRUCTION
 DOCUMENTS & TRADE
 MATHEMATICS**
58 HOURS



A	B	C
Advanced Construction Sketching 2 Hours	Advanced Blueprint Reading 32 Hours	Basic Math Review 3 Hours
D	E	F
Material Quantity Review 6 Hours	Advanced Material Calculations From Blueprints 9 Hours	Manpower Calculations 6 Hours

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

**FIRST PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE**

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

**SECTION ONE:..... INTRODUCTORY THEORY: SAFETY, TOOLS,
..... EQUIPMENT, MATERIALS, LAYOUTS, PROCEDURES & REFRACTORY 40 HOURS**

A. Program Introduction, Fire Prevention and Control and Workplace Hazardous Materials Information System (WHMIS).....3 Hours

Outcome: *Describe and identify the role of apprenticeship, fire prevention, fire control and WHMIS within the masonry industry.*

1. Describe the role of apprenticeship within the masonry industry in regards to the:
 - a) historical events that contributed to this trade
 - b) scope of the masonry industry and the key techniques used in masonry
 - c) authorities that regulate the masonry trade
 - d) Apprenticeship and Industry Training Act
 - e) obligations and responsibilities of apprentices on the job and in school
2. Identify and describe fire classes, extinguishers, prevention and detection in regards to:
 - a) the classes of fires and the appropriate fire extinguishers suitable to fight each of these fires
 - b) procedures and equipment related to preventing, detecting and warning of fires
3. Describe WHMIS requirements and labeling used by the construction industry especially:
 - a) the three key elements of WHMIS
 - b) WHMIS labels and the hazards associated to controlled products

B. Work Site Safety, Ladders and Scaffolds5 Hours

Outcome: *Describe work site safety, ladders and scaffolds in the workplace.*

1. Apply the Occupational Health and Safety Regulation and safe work practices in the workplace in regards to:
 - a) the Occupational Health and Safety Regulation
 - b) requirements related to personal protective equipment and safety measures
 - c) emergency procedures for dealing with injured workers
 - d) potential health hazards
2. Identify and describe various types and safe applications of ladders and scaffolds.

C. Hand Tools.....6 Hours**Outcome: Identify hand tools used in the masonry industry.**

1. Identify and describe the use of measuring and layout tools:
 - a) lines and measuring tools
 - b) various squares and related layout tools
 - c) spirit levels
2. Identify and describe the tools and equipment used to cut masonry materials and:
 - a) the use of hammers
 - b) the use of chisels
 - c) the use of masonry saws
 - d) select saw blades for various materials
 - e) relate care and maintenance requirements for cutting tools and equipment
 - f) the safety precautions for the use of cutting tools and equipment
3. Identify and describe the use of the tools used to spread and finish mortar:
 - a) brick trowels
 - b) jointers and tuck pointers

D. Power Tools.....4 Hours**Outcome: Identify power tools used in the masonry industry.**

1. Identify and describe the use of the tools and equipment used to mix mortar and grout and those used to move material especially:
 - a) shovels and wheelbarrows
 - b) mortar box and hoe
 - c) paddle and drum mixers
 - d) care and maintenance requirements for mixing tools and equipment
 - e) hoists and forklifts
 - f) safety precautions for the use of mixing and material handling tools and equipment
2. Describe the safe operation of explosive actuated tools in regards to:
 - a) explosive actuated tool power loads, power load strength and safety requirements
 - b) explosive actuated tool fasteners, accessories and applications
 - c) base material suitability and related fastening requirements
 - d) explosive actuated system safety and firing procedure
 - e) tool maintenance and safe use of the tool
3. Describe the safe operation and selection of power hand tools in regards to:
 - a) power hand and hammer drills
 - b) drill bits
 - c) power handsaws
 - d) saw blades
 - e) power hand grinders
 - f) maintenance requirements for power hand tools

E. Clay Brick & Concrete Block6 Hours**Outcome: Describe clay brick materials and concrete block.**

1. Describe clay brick materials in relation to the:
 - a) steps involved in the manufacture of brick
 - b) uses for various brick shapes
 - c) actual and nominal sizes for commonly used bricks
 - d) physical and aesthetic characteristics of bricks
 - e) use of salvaged bricks
2. Describe concrete block in relation to the:
 - a) steps involved in the manufacture of concrete blocks
 - b) uses for various concrete block shapes
 - c) actual and nominal sizes for commonly used concrete blocks
 - d) physical and aesthetic characteristics of concrete blocks

F. Masonry Mortars, Grout & Concrete5 Hours**Outcome: Describe masonry mortars, grout and concrete.**

1. Describe the production and uses for masonry mortars and grouts in relation to:
 - a) the materials used to make mortar
 - b) mortar types
 - c) the properties of mortars
 - d) mortar mixing
 - e) mixing and use of grout
2. Describe the production and uses for concrete in masonry structures in regards to the:
 - a) materials used to make concrete
 - b) procedures for mixing concrete
 - c) concrete curing process
 - d) uses for concrete in masonry

G. Layouts & Procedures5 Hours**Outcome: Describe the layouts and procedures used in the masonry industry.**

1. Describe the procedures used to lay bricks and blocks in regards to:
 - a) applying mortar to masonry units
 - b) positioning bricks and blocks on a wall
 - c) forming mortar joints
 - d) laying to the line
 - e) cutting masonry units
2. Describe structural bond patterns for masonry including:
 - a) brick positions
 - b) running bond and stack pattern
 - c) American or common bond
 - d) English bond
 - e) Flemish bond
 - f) corbelling and battering

3. Describe building components and elements that are incorporated in masonry walls including the:
 - a) construction of masonry openings
 - b) construction of chases and recesses in walls
 - c) inclusion of electrical components in walls
 - d) inclusion of plumbing components in walls
4. Describe the methods used to clean new masonry for:
 - a) newly completed brickwork
 - b) newly completed block walls

H. Refractory Basics6 Hours

Outcome: *Describe the basic components of refractory systems.*

1. Define refractories.
2. Classify refractories.
3. Describe the physical properties of refractories.

SECTION TWO: BASIC MASONRY CONSTRUCTION PROJECTS 176 HOURS

A. Tool Skills3 Hours

Outline: *Demonstrate the safe use of the common tools of the bricklaying trade.*

1. Use measuring and layout tools.
2. Cut masonry units with hammers and chisels.
3. Use trowels to spread mortar for head and bed joints.
4. Finish mortar joints with round jointers, rakers and flat jointers.
5. Mix mortar using hand tools and power mixing tools and equipment.
6. Choose blades for and use masonry saws.
7. Use power hand tools.

B. Basic Brick Projects60 Hours

Outcome: *Construct various brick projects.*

1. Construct straight and return leads.
2. Construct walls using a mason's line.
3. Construct multi-wythe walls in running, American, English and Flemish bonds.
4. Construct projects that incorporate rowlocks, soldiers and mitres.
5. Construct brick columns.

C. Basic Block Projects60 Hours

Outcome: *Construct various block projects.*

1. Construct straight and return leads.
2. Construct walls using a mason's line.

D. Composite Walls and Special Projects.....48 Hours**Outcome: *Construct composite walls and special projects.***

1. Construct solid and composite brick and block walls.
2. Construct brick and block veneer walls.
3. Construct walls with chases, corbels and batters.
4. Construct walls that include electrical and plumbing components.
5. Construct projects with walls that intersect.

E. Scaffold Erection5 Hours**Outcome: *Erect and use scaffolds.***

1. Prepare surfaces for scaffolds.
2. Erect, inspect and load frame scaffolds.
3. Dismantle frame scaffolds.

SECTION THREE:BASIC CONSTRUCTION DOCUMENTS & TRADE MATHEMATICS.....24 HOURS**A. Types of Drawings2 Hours****Outcome: *Recognize the types of drawings used by construction trades.***

1. Sketch objects in isometric.
2. Sketch objects in oblique.
3. Sketch objects in perspective.
4. Sketch objects in orthographic.

B. Basic Blueprint Reading10 Hours**Outcome: *Interpret residential and small commercial blueprints.***

1. Identify the line types, symbols, dimensioning standards, and abbreviations used on blueprints.
2. Describe the principles of scale.
3. Describe the views of a blueprint and typical symbols.
4. Describe the order of views/drawings and the type of information found on each.
5. Navigate blueprints using appropriate lines and symbols.
6. Interpret masonry information from blueprints.

C. Basic Math Concepts.....3 Hours**Outcome: *Use a calculator and apply basic math concepts to solve trade-related math problems in both the metric and imperial systems of measurement.***

1. Describe basic math concepts and operations.
2. Describe the basic calculator functions and operations.
3. Describe the Metric Measurement System (SI).
4. Describe the Imperial Measurement System.
5. Complete calculations involving fractions.
6. Convert measurements between metric and imperial systems.

7. Complete calculations using the Pythagorean theorem.

D. Perimeters and Centerline Perimeters.....2 Hours

Outcome: *Determine the perimeter and centerline perimeter for various masonry projects and buildings.*

1. Complete perimeter calculations.
2. Complete centerline perimeter calculations.

E. Areas and Volumes.....2 Hours

Outcome: *Determine the area and volume for various shapes and objects.*

1. Complete calculations for the areas of various shapes.
2. Complete calculations for the volumes of various shapes.

F. Ratios and Percentage2 Hours

Outcome: *Solve trade related problems involving ratio and proportion, mechanical advantage and percentage.*

1. Solve ratio and proportion problems related to masonry.
2. Complete mechanical advantage calculations for levers, pulleys and gears.
3. Complete percentage calculations related to masonry.

G. Masonry Material Quantities3 Hours

Outcome: *Calculate masonry material quantities from residential and small commercial blueprints.*

1. Calculate brick quantities from blueprints.
2. Calculate concrete block quantities from blueprints.
3. Calculate mortar and concrete quantities from blueprints.
4. Calculate cuts and special units from blueprints.

**SECOND PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE**

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

**SECTION ONE:..... INTERMEDIATE THEORY: WALL SYSTEM DESIGN,
MASONRY ASSEMBLIES, REFRACTORY SYSTEMS 72 HOURS**

A. Masonry Insulation 4 Hours

Outcome: ***Describe the use of insulation to control heat loss in masonry structures.***

1. Describe the function of insulation.
2. Describe types of insulation.
3. Describe insulation values.
4. Describe the location of insulation in masonry.

B. Air-Vapour Barriers 4 Hours

Outcome: ***Describe the use of air-vapour barriers as a means of moisture control in masonry.***

1. Describe the function of air-vapour barriers.
2. Describe the materials used to form air-vapour barriers.
3. Describe the location of air-vapour barriers.

C. Moisture Control 4 Hours

Outcome: ***Describe methods used to control the movement of moisture in masonry.***

1. Describe the function of flashings in masonry.
2. Describe the types of materials that can be used for masonry flashings.
3. Describe the installation of masonry flashings.
4. Describe the use of weep holes and vents in masonry walls.

D. Movement Control 3 Hours

Outcome: ***Describe the use of expansion and crack control joints in masonry.***

1. Describe the stresses to which masonry is subject.
2. Describe the function of expansion joints in masonry walls.
3. Describe the function of crack control joints in masonry.
4. Describe the materials used to form control joints.
5. Describe the installation of control joints.

E. Load Bearing and Non-Load Bearing Wall Design 4 Hours

Outcome: ***Describe the effect of wall design on the ability of masonry to carry load.***

1. Describe the function of non-load bearing walls.
2. Describe the design of non-load bearing walls.
3. Describe function of load bearing walls.
4. Describe the design of load bearing walls.

F. Foundation Walls..... 5 Hours

Outcome: ***Describe the construction of masonry foundation walls.***

1. Describe footings for foundation walls.
2. List the materials used to construct foundation walls.
3. Describe the placement of reinforcing wire, rebar and concrete in foundation walls.
4. Describe the installation of insulation in foundation walls.
5. Describe the procedures for waterproofing foundations.

G. Reinforced Grouted Masonry Walls 6 Hours

Outcome: ***Describe the construction of above grade RGM walls.***

1. Describe the footings for RGM walls.
2. Describe the placement of reinforcing wire, rebar and grout in RGM walls.
3. Describe the installation of metal door and window frames in RGM walls.
4. Describe the installation of insulation in RGM walls.
5. Describe high lift grouting in reinforced block walls.
6. Describe low lift grouting in double wythe brick walls.

H. Veneer Walls 4 Hours

Outcome: ***Describe the construction of masonry veneer walls.***

1. Describe the bearing support for veneer walls.
2. Describe the procedures for controlling the movement of moisture in veneer walls.
3. Describe the installation of insulation in veneer walls.
4. Describe the installation of ties and anchors in veneer walls.

I. **Cavity Walls**.....8 Hours

Outcome: *Describe the construction of cavity walls.*

1. Describe the bearing support for cavity walls.
2. Describe the procedures for controlling the movement of moisture in cavity walls.
3. Describe the installation of insulation in cavity walls.
4. Describe the installation of ties and anchors in cavity walls.
5. Describe the loading capacities and locations for cavity walls.

J. **Masonry Arches**.....9 Hours

Outcome: *Describe the most commonly constructed masonry arches.*

1. Describe the Roman arch.
2. Describe the segmental arch.
3. Describe the flat or jack arch.
4. Describe the Gothic arch.
5. Describe the elliptical arch.
6. Describe the Tudor arch.

K. **Prefabricated Masonry Panels**2 Hours

Outcome: *Describe the use of prefabricated masonry panels.*

1. Discuss the scope of prefabricated masonry.
2. Describe the methods used to assemble prefabricated masonry panels.
3. Describe the transportation and placement of prefabricated masonry panels.

L. **Stone Masonry**9 Hours

Outcome: *Describe natural stone installations.*

1. Describe stone types.
2. Describe the quarrying and processing of stone.
3. Describe the mortars used for stone.
4. Describe the layouts and patterns for stone.
5. Describe the procedures for setting stone.
6. Describe the installation of granite and marble panels.

M. Refractory Installations..... 10 Hours

Outcome: *Describe the materials and procedures used to assemble refractory systems.*

1. Identify appropriate materials for refractory applications.
2. Describe the installation procedures for refractories.
3. Describe refractory anchors.

SECTION TWO:.....INTERMEDIATE MASONRY CONSTRUCTION PROJECTS..... 120 HOURS

A. Reinforced Masonry Projects..... 60 Hours

Outcome: *Construct reinforced masonry projects.*

1. Construct reinforced walls using high lift grouting procedures.
2. Construct reinforced walls using low lift grouting procedures.
3. Construct cavity walls.

B. Masonry Arch Projects 30 Hours

Outcome: *Construct masonry arches.*

1. Layout and construct arch centers (forms) for various arch types.
2. Construct various types of arches.
3. Layout and construct a jack arch.

C. Stone Projects..... 30 Hours

Outcome: *Construct projects of natural stone.*

1. Mix mortars for stone.
2. Construct projects with rough stone in various patterns.
3. Construct projects with cut stone in various patterns.
4. Install caps on piers and copings on walls.

SECTION THREE:INTERMEDIATE CONSTRUCTION DOCUMENTS & TRADE MATHEMATICS 48 HOURS

A. Construction Sketching 3 Hours

Outcome: *Sketch masonry details to clarify construction drawings.*

1. Sketch and dimension shop projects.
2. Sketch masonry design details.

B. Intermediate Blueprint Reading21 Hours

Outcome: *Interpret commercial blueprints.*

1. Interpret architectural plans.
2. Interpret information from door, window, and room finish schedules.
3. Interpret information from general notes.
4. Describe the CSI format for blueprint specifications.
5. Interpret masonry specifications.

C. Basic Math Review3 Hours

Outcome: *Review basic math concepts.*

1. Solve problems using basic math operations.
2. Solve perimeter problems.
3. Solve area problems.
4. Solve volume problems.
5. Solve problems involving ratio and proportion and percentage.

D. Material Quantity Calculations6 Hours

Outcome: *Solve masonry material quantity problems.*

1. Calculate brick and block quantities.
2. Calculate quantities for masonry ties, reinforcing wire and anchors.
3. Calculate mortar and grout quantities.
4. Calculate quantities for concrete and rebar.
5. Calculate waste allowances for masonry materials.

E. Gauge and Slope Calculations6 Hours

Outcome: *Determine the layout of wall elements.*

1. Determine gauge for masonry walls.
2. Calculate offsets for battered and corbelled walls.
3. Calculate layouts for masonry arches.

F. Material Calculations From Blueprints9 Hours

Outcome: *Calculate masonry quantities from commercial blueprints.*

1. Complete masonry takeoffs from commercial blueprints.
2. Determine coursing from blueprints.
3. Calculate special materials from blueprints.

**THIRD PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE**

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

**SECTION ONE:.....ADVANCED THEORY: REFRACTORY, TOOLS,
MASONRY DETAILS & REPAIR, CHIMNEYS & FIREPLACES 62 HOURS**

A. Advanced Refractory Procedures..... 6 Hours

Outcome: ***Describe refractory elements and processes that contribute to the successful performance of refractory installations.***

1. Describe the use of control and expansion joints in refractories.
2. Describe the curing and thermal drying of refractory systems.
3. Identify destructive service factors of refractories.
4. Describe refractory inspection and repair processes.

B. Builders Levels, Laser Levels and Water Levels 3 Hours

Outcome: ***Describe leveling equipment used by masons.***

1. Identify and describe the use of optical levels.
2. Identify and describe the use of laser levels.
3. Identify and describe the use of water levels.
4. Describe the use of story poles and gauge rods.

C. Masonry Aesthetics..... 6 Hours

Outcome: ***Describe the effect of aesthetic design on masonry structures.***

1. Describe colours and textures in masonry materials.
2. Describe decorative patterns in masonry.
3. Describe the use of brick slices.
4. Describe the construction of brick steps.
5. Describe the layout of serpentine masonry projects.

D. Pavements..... 3 Hours

Outcome: ***Describe the use of pavers and flagstone.***

1. Describe the installation of dry set brick pavers.
2. Describe the installation of mortared brick pavers.
3. Describe pattern layouts for brick patios.
4. Describe the installation of flagstone.

E. Glass Block 3 Hours**Outcome: Describe the use of glass block.**

1. List the types and sizes of glass block.
2. Describe the mortar mixes used with glass block.
3. Describe glass block reinforcements.
4. Describe the installation of glass block.

F. Unit Masonry Repair 4 Hours**Outcome: Describe procedures to repair unit masonry walls and assemblies.**

1. Describe the causes of deterioration of masonry structures.
2. Describe the replacement methods for brick and block units.
3. Describe the procedure for repointing brick and block walls.
4. Describe the repair and replacement of masonry flashings.
5. Describe the methods for sealing and recaulking existing masonry.
6. Describe methods for removing stains from brick and block.

G. Stone Restoration 4 Hours**Outcome: Describe the restoration of natural stone installations.**

1. Describe the causes of deterioration of stone.
2. Describe the methods used to match mortar colours used for stone restoration.
3. Describe the methods used to remove stains from stone masonry.
4. Describe the procedure for replacing and repointing stone.
5. Describe methods for removing stains from natural stone.

H. Chimneys 9 Hours**Outcome: Describe masonry chimneys and stacks.**

1. Classify chimney types.
2. Describe the principles of chimney design.
3. List the parts of a chimney.
4. Describe the construction of masonry chimneys.

I. Fireplaces 15 Hours**Outcome: Describe masonry fireplaces.**

1. Describe design variations for fireplaces.
2. Describe the function of the parts of a fireplace.
3. Relate the codes that apply to fireplace construction.
4. List the materials used to build a masonry fireplace.
5. Describe the installation procedures for a fireplace.
6. Describe differences in the construction of single, multi-opening, and multiple fireplaces in a single chase.

7. Describe the requirements for protection of combustibles around wood stoves.

J. Levelling Exercises 3 Hours

Outcome: ***Set up and use levels.***

1. Set up a builder's level and prepare it for operation.
2. Transfer elevations.
3. Sight and record back sights and fore sights for establishing elevations.
4. Run lines horizontally and vertically.
5. Turn angles for large layouts.
6. Set up a laser level and prepare it for operation.
7. Run lines horizontally and vertically with a laser level.
8. Set up a water level and prepare it for operation.
9. Establish elevations using a water level.
10. Lay out story poles and gauge rods.

K. Site Preparation 3 Hours

Outcome: ***Describe jobsite preparation.***

1. Determine material storage and mortar mixing areas.
2. Determine the location of temporary utility services.
3. Describe procedures for hot and cold weather construction.
4. Determine workflow schedules to coordinate with other trades.
5. Describe methods for bracing and shoring walls.

L. New Trends and Technology & Industry Network System 3 Hours

Outcome: ***Discuss new trends and technologies in masonry and, explain the role of the industry network system.***

1. Explain the role and purpose of the industry network system in the bricklayer trade.

SECTION TWO: ADVANCED MASONRY CONSTRUCTION PROJECTS 120 HOURS

A. Building Layout..... 6 Hours

Outcome: ***Layout masonry projects from blueprints and drawings.***

1. Layout masonry projects to proper dimensions and specifications.

B. Stairs And Decorative Masonry 67 Hours

Outcome: ***Construct special design masonry projects.***

1. Layout and construct a serpentine wall.
2. Layout and construct straight and curved masonry stairs.
3. Construct projects with herringbone and basketweave patterns.

C. Chimney Construction 12 Hours

Outcome: **Construct masonry chimneys.**

1. Construct a masonry chimney through a sloped roof structure.

D. Fireplace Construction 35 Hours

Outcome: **Construct a masonry fireplace.**

1. Layout and construct a masonry fireplace to drawings and specifications.

SECTION THREE: ADVANCED CONSTRUCTION DOCUMENTS & TRADE MATHEMATICS..... 58 HOURS

A. Advanced Construction Sketching..... 2 Hours

Outcome: **Sketch masonry details to clarify construction drawings.**

1. Sketch and dimension shop projects.
2. Sketch masonry design details.

B. Advanced Blueprint Reading 32 Hours

Outcome: **Interpret commercial blueprints.**

1. Interpret architectural plans.
2. Define masonry elements in structural plans.
3. Locate and identify masonry details.
4. Interpret masonry specifications.
5. Describe the process for resolving conflicts or discrepancies between drawings and specifications.

C. Basic Math Review 3 Hours

Outcome: **Review basic math concepts.**

1. Solve problems using basic math operations.
2. Solve perimeter problems.
3. Solve area problems.
4. Solve volume problems.
5. Solve problems involving ratio and proportion and percentage.

D. Material Quantity Review 6 Hours

Outcome: **Solve masonry material quantity problems.**

1. Calculate brick and block quantities.
2. Calculate quantities for masonry ties, reinforcing wire and anchors.
3. Calculate mortar and grout quantities.
4. Calculate quantities for concrete and rebar.
5. Calculate waste allowances for masonry materials.
6. Calculate material loads on scaffolds and floors.

E. Advanced Material Calculations From Blueprints 9 Hours

Outcome: ***Calculate masonry quantities from commercial blueprints.***

1. Complete masonry takeoffs from commercial blueprints.
2. Determine coursing from blueprints.
3. Calculate cuts and special units from blueprints.

F. Manpower Calculations 6 Hours

Outcome: ***Calculate manpower needs for masonry projects.***

1. Determine production rates for bricklayers.
2. Determine bricklayer/tender ratios.
3. Determine optimal crew size for masonry projects.



Excellence through training and experience

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