Apprenticeship and Industry Training

Bricklayer

Curriculum Guide

001 (2022)

ALBERTA ADVANCED EDUCATION

Bricklayer : apprenticeship education program curriculum guide

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Bricklayer

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CURRICULUM GUIDE

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 journeyperson 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 postsecondary 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 Bricklayer apprenticeship program is an individual who will be able to:

- responsibly do all work tasks expected of a journeyperson
- 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

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 Advanced Education 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. C. Ambrozic..... Edmonton

Mr. K. Gowerluk ..... Calgary

Mr. W. Pruden..... Calgary

Mr. M. Weinmeier..... Edmonton

Mr. M. Caforio ..... Edmonton

Mr. P. Lemke ..... Edmonton

Mr. L. MacPherson ..... Calgary

Alberta Government

Alberta Advanced Education 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 postsecondary 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 Advanced Education 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 Bricklayer trade apprenticeship technical training:

SAIT Calgary

Procedures for Recommending Revisions to the Curriculum

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

Advanced Education

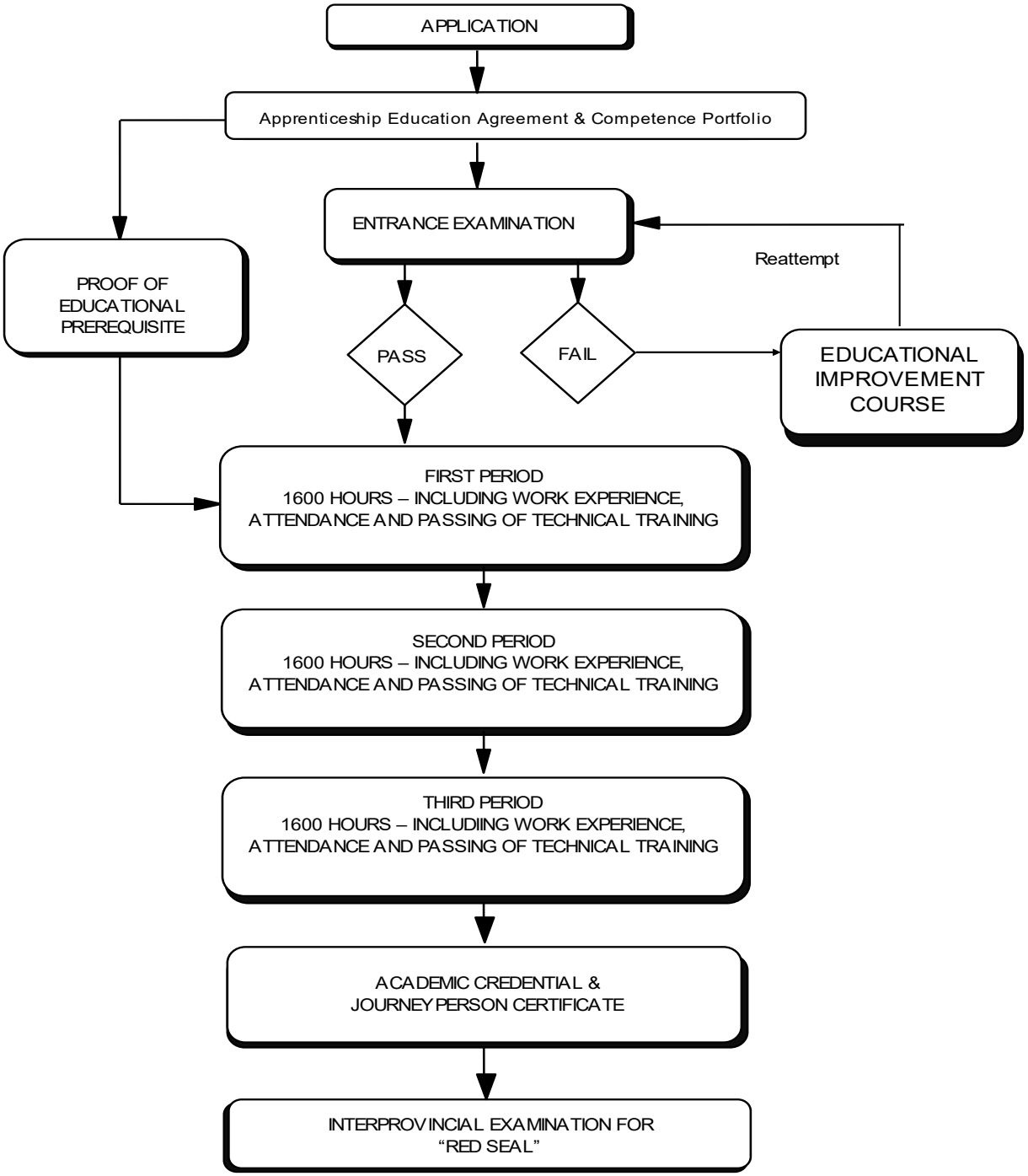
19th floor, Commerce Place

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



Bricklayer Training Profile

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

SECTION ONE	A	B	C
OCCUPATIONAL SKILLS ONE **17%**	Bricklayer Apprenticeship Program Orientation 7%	Work Site Safety 13%	Math One 40%

D
Blueprint One 40%

SECTION TWO	A	B	C
TOOLS AND EQUIPMENT **13%**	Measuring and Layout Tools 19%	Cutting Tools and Equipment 22%	Trowels and Finishing Tools 22%

D	E	F
Mixing and Material Handling Tools and Equipment 9%	Power Hand Tools 9%	Explosive Actuated Tools 19%

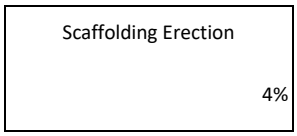
SECTION THREE	A	B	C
MASONRY MATERIALS **13%**	Clay Brick 40%	Concrete Block 40%	Mortars, Grout and Concrete 20%

SECTION FOUR	A	B	C
LAYOUTS AND PROCEDURES **29%**	Laying Masonry Units 44%	Masonry Bond Patterns 22%	Masonry Wall Elements 30%

D
Cleaning New Masonry 4%

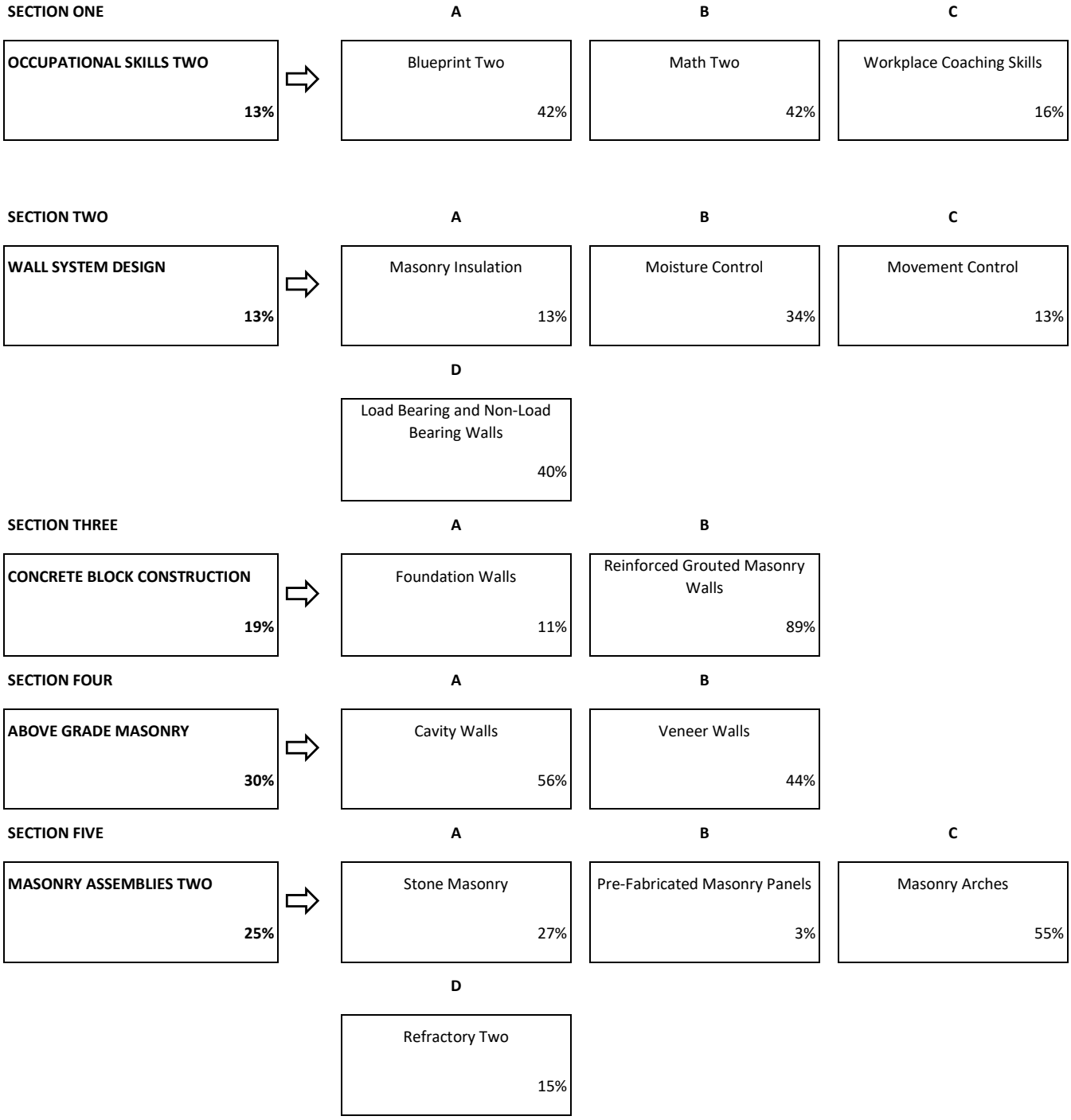
SECTION FIVE	A	B	C
MASONRY ASSEMBLIES ONE **28%**	Brick Projects 40%	Refractory One 16%	Composite Walls 40%

D



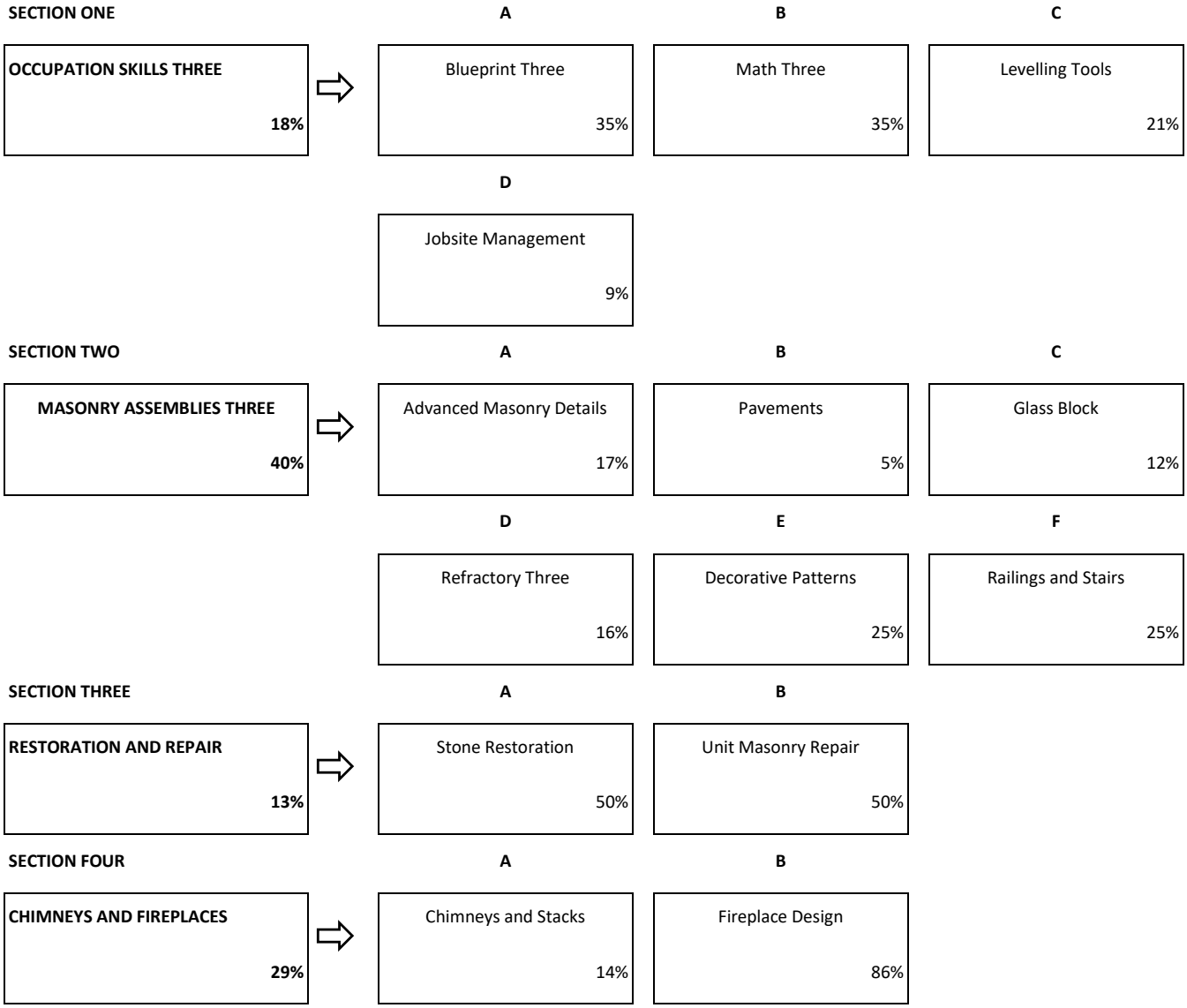
Bricklayer Training Profile

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



Bricklayer Training Profile

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



FIRST PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
CURRICULUM GUIDE

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

SECTION ONE:..... OCCUPATIONAL SKILLS ONE..... 17%

A. Bricklayer Apprenticeship Program Orientation..... 7%

Outcome: Describe the scope and function of Bricklayer apprenticeship training.

1. Describe the apprenticeship training system in Alberta.
2. Explain the Bricklayer curriculum guide learning outcomes and objectives.
3. Identify residential, commercial, and industrial fields that provide employment opportunities for Bricklayers.
4. Identify the authorities that regulate the masonry trade.
5. Describe historical events that contributed to the trade.

B. Work Site Safety 13%

Outcome: Recognize Occupational Health and Safety Regulations and safe work practices in the workplace.

1. Interpret Occupational Health and Safety regulations.
2. Describe the safe and proper use of personal protective equipment.
3. Describe emergency procedures for dealing with injured workers.
4. Identify potential health safety hazards and related work practices.
5. Describe the safe use of various types of ladders scaffolds.
6. Describe procedures and equipment related to preventing, detecting and warning of fires.

C. Math One 40%

Outcome: Perform basic calculations related to masonry construction.

1. Use a calculator and apply basic math concepts to solve trade-related math problems in both the metric and imperial systems of measurement.
2. Determine the perimeter and centreline perimeter for various masonry projects and buildings.
3. Determine the area and volume for various shapes and objects.
4. Solve trade related problems involving ratio and proportion, mechanical advantage and percentage.
5. Calculate masonry material quantities from residential and commercial blueprints.

D. Blueprint One..... 40%

Outcome: Interpret blueprints and related documents.

1. Recognize the types of drawings used by construction trades.
2. Define the language of blueprints (scale, line types, symbols, dimensioning standards, abbreviations).
3. Recognize the views of a blueprint.

4. Interpret masonry information from blueprints.
5. Sketch objects in various views.

SECTION TWO: ..... TOOLS AND EQUIPMENT 13%

A. Measuring and Layout Tools 19%

Outcome: Identify measuring and layout tools.

1. Describe the use of lines and measuring tools.
2. Describe the use of various squares and related layout tools.
3. Describe the use of spirit levels.
4. Use measuring and layout tools.

B. Cutting Tools and Equipment 22%

Outcome: Identify the tools and equipment used to cut masonry materials

1. Describe the safe use of hammers and chisels.
2. Describe the safe use of masonry saws.
3. Cut masonry units with hammers and chisels.
4. Choose blades for and use masonry saws.

C. Trowels and Finishing Tools 22%

Outcome: Identify the tools used to spread and finish mortar, grout and concrete.

1. Describe the use of brick trowels.
2. Describe the use of jointers and tuck pointers.
3. Use trowels to spread mortar for head and bed joints.
4. Finish mortar joints with round jointers, rakers and flat jointers.

D. Mixing and Material Handling Tools and Equipment 9%

Outcome: Identify the tools and equipment used to mix mortar and grout and to move material.

1. Describe the tools to mix mortar by hand.
2. Describe the safe use of the paddle and mud mixers.
3. Describe the safe use of hoists and forklifts.
4. Mix mortar using hand tools and power mixing equipment.

E. Power Hand Tools 9%

Outcome: Describe the safe operation of power hand tools.

1. Describe the operation of electric drills and hammer drills.
2. Describe the safe operation of power handsaws.
3. Describe the safe use of angle grinders and tuck-pointer's grinders.
4. Demonstrate the safe use power hand tools.

F. Explosive Actuated Tools 19%

Outcome: ***Describe the safe operation of explosive actuated tools.***

1. Describe explosive actuate tool power loads, power load strength and safety.
2. Describe explosive actuated tool fasteners, accessories and applications.
3. Assess base material suitability and related fastening requirements.
4. Perform tool maintenance and use an explosive actuated tools.

SECTION THREE: ..... MASONRY MATERIALS 13%

A. Clay Brick 40%

Outcome: ***Describe clay brick materials.***

1. Relate the steps involved in the manufacturing of brick.
2. Describe the uses for various brick shapes.
3. List the actual and nominal sizes for commonly used bricks.
4. Describe the physical and aesthetic characteristics of bricks.
5. Detail the use of salvaged bricks.

B. Concrete Block 40%

Outcome: ***Describe concrete block materials.***

1. Relate the steps involved in the manufacturing of concrete blocks.
2. Describe the uses for various concrete block shapes.
3. List the actual and nominal sizes for commonly used concrete blocks.
4. Describe the physical and aesthetic characteristics of concrete blocks.

C. Mortars, Grouts, and Concrete 20%

Outcome: ***Describe the production and uses for masonry mortars, grouts, and concrete in masonry structures.***

1. Describe the mortar used for masonry construction.
2. Describe the use of masonry grout.
3. Describe the uses for concrete in masonry construction.

SECTION FOUR: ..... LAYOUT AND PROCEDURES 29%

A. Laying Masonry Units 44%

Outcome: ***Describe the procedures used to lay bricks and concrete blocks.***

1. Describe the procedures for applying mortar to masonry units.
2. Describe the procedures for positioning bricks and blocks on a wall.
3. Describe the procedures for forming mortar joints.
4. Describe the procedures for laying to the line.
5. Construct brick and concrete block leads.
6. Construct masonry walls.

B. Masonry Bond Patterns 22%

Outcome: Describe structural bond patterns for masonry.

1. Describe brick positions.
2. Describe running bond and stack pattern.
3. Describe structural bond patterns for multi-wythe brick walls.

C. Masonry Wall Elements 30%

Outcome: Describe building components and elements that are incorporated in masonry walls.

1. Describe the construction of masonry openings.
2. Describe the construction of chases and recesses in walls.
3. Describe the inclusion of electrical and mechanical components in walls.
4. Describe corbelling and battering.
5. Construct masonry columns.

D. Cleaning New Masonry 4%

Outcome: Describe the methods used to clean new masonry.

1. Describe the use of acids and cleaners for masonry walls.
2. Demonstrate the safe use of acids and cleaners for masonry walls.

SECTION FIVE: ..... MASONRY ASSEMBLIES ONE 28%

A. Brick Projects 40%

Outcome: Construct various brick projects.

1. Construct projects that incorporate rowlocks, soldiers and mitres.
2. Construct multi-wythe walls in running, American, English, and Flemish bonds.

B. Refractory One 16%

Outcome: Describe the components of refractory systems.

1. Define refractory safety procedures.
2. Describe refractory materials.

C. Composite Walls 40%

Outcome: Construct composite walls.

1. Construct solid and composite brick and block walls.
2. Construct walls that include electrical and mechanical components.
3. Construct walls with openings.

D. Scaffolding Erection..... 4%

Outcome: ***Erect and use frame scaffolding.***

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

SECOND PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
CURRICULUM GUIDE

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SECTION ONE: ..... OCCUPATIONAL SKILLS TWO 13%

A. Blueprint Two 42%

Outcome: Interpret small building blueprints.

1. Interpret architectural plans.
2. Interpret information from schedules.
3. Interpret masonry specifications.
4. Sketch and dimension shop projects.

B. Math Two 42%

Outcome: Solve masonry related quantities.

1. Determine material quantities from blueprints.
2. Calculate quantities for mechanical fasteners.
3. Calculate quantities for rebar and grout fill.
4. Determine stone quantities.
5. Calculate arch geometries.

C. Workplace Coaching Skills 16%

Outcome: Use coaching skills when training an apprentice.

1. Describe the process for coaching an apprentice.

SECTION TWO: ..... WALL SYSTEM DESIGN 13%

A. Masonry Insulation 13%

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

1. Describe the function, type, and RSI value of insulation.
2. Describe the placement of insulation in masonry.

B. Moisture Control 34%

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

1. Describe the function, material and placement of air-vapour barriers.
2. Describe the function of flashing in masonry.
3. Describe the use of weep holes and vents in masonry walls.
4. Describe the use of masonry membranes.

C. Movement Control 13%

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 walls.
4. Install control joints.

D. Loadbearing and Non-loadbearing Walls 40%

Outcome: Describe the effect of wall design 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 the function of load bearing walls.
4. Describe the design of load bearing walls.

SECTION THREE: ..... CONCRETE BLOCK CONSTRUCTION 19%

A. Foundation Walls..... 11%

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 procedures for parging and waterproofing foundations.

B. Reinforced Grouted Masonry Walls 89%

Outcome: Describe the construction of above grade reinforced grouted masonry (RGM) walls.

1. Describe the footing for RGM walls.
2. Describe the placement of reinforcing wire, rebar, and grout.
3. Describe the installation of metal door and window frames.
4. Describe the placement of insulation in RGM walls.
5. Describe high lift grouting in reinforced block walls.
6. Describe low lift grouting.
7. Construct reinforced grouted masonry walls.

SECTION FOUR: ..... ABOVE GRADE MASONRY 30%

A. Cavity Walls..... 56%

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 placement of insulation within cavity wall construction.
4. Describe the placement of ties and anchors in cavity walls.

5. Describe the loading capacities and locations for cavity walls.
6. Construct cavity walls.

B. Veneer Walls 44%

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 placement of insulation within veneer walls.
4. Describe the installation of ties and anchors in veneer walls.

SECTION FIVE: ..... MASONRY ASSEMBLIES TWO 25%

A. Stone Masonry 27%

Outcome: Describe natural stone installations.

1. Describe stone types.
2. Describe the mortars used for stone.
3. Describe the layout and patterns for stone.
4. Describe the various procedures for setting stone.
5. Describe the installation of stone cladding.

B. Pre-fabricated Masonry Panels 3%

Outcome: Describe the use of prefabricated masonry panels.

1. Describe the methods used to assemble prefabricated masonry panels.
2. Describe the placement of prefabricated masonry panels.

C. Masonry Arches 55%

Outcome: Describe the most commonly constructed masonry arches.

1. Describe the various types of arches.
2. Describe arch layout procedures.
3. Describe arch load factors.
4. Construct arch centres.
5. Construct masonry arches.

D. Refractory Two 15%

Outcome: Describe the procedures used to assemble refractory systems.

1. Describe the installation procedures for refractories.
2. Describe refractory anchors.
3. Identify materials required for tear out within a refractory system.

THIRD PERIOD TECHNICAL TRAINING
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SECTION ONE: ..... OCCUPATIONAL SKILLS THREE 18%

A. Blueprint Three 35%

Outcome: Interpret commercial blueprints.

1. Interpret architectural plans.
2. Define masonry elements in structural plans.
3. Locate and identify masonry details.
4. Locate non-masonry components.
5. Sketch masonry details to clarify construction drawings.
6. Describe LEED© requirements.

B. Math Three 35%

Outcome: Calculate masonry quantities and manpower needs for masonry projects.

1. Calculate gauge and slope.
2. Calculate the amount of materials.
3. Calculate the manpower as it relates to masonry projects.
4. Finalize the cost of masonry projects.

C. Leveling Tools 21%

Outcome: Set up and use various types of levels.

1. Set up a builder's level and prepare it for operation.
2. Set up a laser level and prepare it for operation.
3. Demonstrate the ability to lay out story poles.

D. Jobsite Management 9%

Outcome: Describe jobsite preparation.

1. Determine material storage and mortar mixing areas.
2. Describe procedures for hot and cold weather conditions.
3. Describe methods for bracing and shoring walls.

SECTION TWO: ..... MASONRY ASSEMBILIES THREE 40%

A. Advanced Masonry Details 17%

Outcome: Describe the design of advanced masonry details.

1. Describe the layout of Serpentine masonry projects.
2. Describe masonry quoins.

3. Describe corbelling and battering.
4. Construct project that incorporate masonry details.

B. Pavements 5%

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 the installation of flagstone.
4. Install brick pavers.

C. Glass Block 12%

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. Install a glass block panel.

D. Refractory Three 16%

Outcome: Describe the 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.
5. Install various types of refractories.

E. Decorative Patterns 25%

Outcome: Describe decorative masonry patterns.

1. Describe colours and textures in masonry materials.
2. Describe decorative patterns in masonry.
3. Describe the use of brick slices.
4. Construct projects using various decorative patterns.

F. Railings and Stairs 25%

Outcome: Describe the construction of stairs and railings.

1. Calculate the rise and run of masonry stairs.
2. Describe the layout procedures for constructing steps.
3. Describe the rail/ cheek wall layout procedures.
4. Construct a set of brick stairs.

SECTION THREE: ..... RESTORATION AND REPAIR..... 13%

A. Stone Restoration..... 50%

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.
3. Describe the methods used to remove stains from stone masonry.
4. Describe the procedure for replacing and repointing stone.
5. Discuss *jahn* injection repair.

B. Unit Masonry Repair..... 50%

Outcome: Describe procedures to repair unit masonry walls.

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

SECTION FOUR: ..... CHIMNEYS AND FIREPLACES..... 29%

A. Chimneys and Stacks 14%

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

B. Fireplace Design..... 86%

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. Build a masonry fireplace.

Apprenticeship and Industry Training

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