Apprenticeship Manitoba

Manitoba

Bricklayer
Level 1

Rev. July 2004

Apprenticeship Manitoba

Bricklayer

Unit: A1 Orientation: Structure and Scope of the Trade

Level: One

Duration: 4 hours

Theory: 4 hours

Practical: 0 hours

Overview:

One sign that a bricklayer has mastered a task or technique is to be asked to share this knowledge. Jobsite skills-exchange has long been fundamental to bricklayer trade-learning. Even trade veterans rely on peers to refine their knowledge and skill. The opportunity to benefit from this process, however, is shaped by complex factors that include jobsite 'politics' and construction deadlines. As adult trade-learners, bricklayer apprentices at all levels of training must use their eyes, ears, prior knowledge, and interpersonal skills to encourage journeypersons to teach as well as to supervise them. This requires understanding the trade's dynamics, as well as the roles and responsibilities which order jobsite work-life. This unit profiles the trade's historical and modern significance, core tasks and skill requirements, as well as its job-ladders and long-term career options. It includes information about learning styles/strategies, stressing their application to apprenticeship and journey-level trade education. The unit also introduces the concept of skills stewardship, stressing the obligation that apprentices incur to help convey what their own journeypersons teach them to those who in turn follow them into the trade. A sound grasp of the roles, workplace relationships, and possibilities introduced in this unit is part of 'learning to learn' in the apprenticeship system. Senior apprentices are later offered information about learning to teach in this system – a central and time-honoured foundation of Bricklayer journeywork.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe structure and scope of the modern Bricklayer trade. **30%**

a. Historical background, including apprentice experience
b. Structure/scope of the trade
   - International and national characteristics
   - Characteristics and practice of the trade in Manitoba
   - Trade organizations
c. Opportunities and career ladders
   - Generalists and specialists
   - 'lead hands' and other immediate supervisors
   - Geographic mobility
   - Job hierarchies and innovations

2. Describe Manitoba's Bricklayer Apprenticeship Program. **30%**

a. Concept and significance of skills stewardship
   - To the trade
   - To apprentices
   - To journeypersons
   - To employers
   - To the community
b. Practical Training (on-the-job)
   - Roles/responsibilities of employer and journeyperson(s)
   - Roles responsibilities of Apprenticeship Training Coordinator (ATC)

- Roles/responsibilities of apprentice(s), including Practical Training Record Book (PTRB) documentation

c Technical training (in-school)
- Role/responsibilities of instructors (including 'Related'-area faculty)
- Role/responsibilities of apprentice(s)

d. Attendance requirements
e. Progression requirements
f. Reporting of Grades
g. Trade Regulation and its significance
h. Policies (e.g., re: personal conduct, "missed" units, fees, harassment, etc.)
- Apprenticeship Manitoba
- Training Provider (College)

3. Explain special challenges and opportunities re: apprenticeship training. 40%

a. Adapting personal learning goals to program contexts
- Characteristics and 'domains' (types) of adult learning
- Description/recognition of learning and teaching styles
- Work culture (including work-crew hierarchy), interpersonal skills, and trade-learning
- Integrating technical training and practical training content
- Possibilities and perils of peer-learning
- Budgeting and other necessary personal arrangements
- Handling common varieties of stress at work and in school

b. On-the-job challenges/opportunities
- Description/recognition of jobsite teaching styles/roles
- Communicating with journeypersons and employers
- Coverage/documentation of formally prescribed tasks and subtasks (PTRB)
- Personal record of achievements/needs: the Trade Learning Journal option
- Getting help and fixing mistakes

c. In-school opportunities/challenges
- Personal arrangements that support in-school progress
- "Baggage handling" – self-assessing potential impacts of previous school experience on current learning (favourable/unfavourable); resources
- Techniques for note-taking, record-keeping, and review
- Relations with instructors (including 'Related'-area faculty)
- College resources (library, support services, etc.)
- 'Missed Units' – policies re: supplementals, re-tests, make-up assignments, etc.

***

Apprenticeship Manitoba

Bricklayer

Unit: A2 Bricklayer Trade Safety

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Apprentices are obliged to understand and to minimize the considerable hazards of their work. As trade 'newcomers,' they are often under pressure to prove themselves, but still have lots to learn about trade safety. This can be a dangerous mix for all concerned. It can even make some journeypersons reluctant to work closely enough to provide apprentices with the workplace training they require. As adult learners, apprentices must develop a personal outlook that includes the maturity to reject the 'unofficial' but all-too-real value which some place on dispensing with personal protective equipment and other safety requirements. A deeper value within trade culture recognizes that even newcomers must think carefully about the kind of trade-safety skills and knowledge they are developing. These are the qualities they will model as journeypersons for those who follow them on the apprenticeship path. This unit supplements health and safety concerns which are addressed throughout the program. It also describes requirement for earning recognized certificates re: First Aid, CPR, the Workplace Hazardous Materials Information System (WHMIS), and Explosive-Activated Tools. Apprentices are urged to pay particular attention to instructional-unit content concerning Shop Safety rules prescribed by their Technical training provider. Failure to comply could prevent a trade learner from satisfying the program's Practicum requirements.

Note: Percentage weighting of unit objectives is at the instructor's discretion.

Objectives and Content: **Percent of Unit Mark (%)**

1. Outline scope of occupational health/safety (OHS) considerations re: bricklayer jobsites. **n/a**

a. General safety considerations.
- Laws, regulations, and rights (e.g., right to refuse dangerous work)
- Roles/responsibilities: employer, contractor, subtrades, client, etc.
- Policy/procedure re: accidents (e.g., Worker's Compensation; Worker's Advocate)
- Quality of light, air, and temperature
- Personal protective equipment
- First Aid supplies and fire protection
- Jobsite access, including clients, children, other trades, and guardrails/barriers
- Jobsite housekeeping, including safe transport and storage of tools/equipment

b. Trade-specific safety considerations
- Tools and equipment (including manufacturer warnings)
- Mortars, grouts, adhesives, solvents/thinners., etc.
- Harmful dusts/particles, vapours, and fumes
- Heavy lifting/hauling; materials handling (conventional and machine-assisted)
- Rigging and hoisting
- Working at heights, including ladders, scaffolding, and other access equipment/structures
- Excavations, including shoring
- Work in confined spaces

- Refractory work
- Climatic extremes
- Hoardings

c. Conducting a job safety assessment – purpose, procedure, and scope
   - Knowledge of regulations and their application
   - Standards and requirements re: reporting/documentation of assessment

d. Other (specified by instructor)

2. Describe/demonstrate all Shop Safety protocols and expectations re: Technical training provider's requirements (e.g., College Shop Safety Rules).

3. Describe requirements re: earning/renewing a recognized First Aid Certificate.

a. Describe/demonstrate basic First Aid requirements and techniques
   - Scope and limits of First Aid intervention
   - Specific interventions (cuts, burns, abrasions, fractures, falls from heights, injuries due to crushing, suffocation, shock, electrical shock, exposure, etc.)

b. Interface with other OHS-related services and agencies (e.g., Workers' Compensation claims)

4. Describe requirements re: earning/renewing a recognized CPR Certificate.

a. Describe/demonstrate basic CPR requirements and techniques
   - Scope and limits of CPR intervention (including varieties of CPR certification)
   - Specific interventions (symptomatology; choking/suffocation; severe angina, cardiac arrest, etc.)

b. Interface with other services and agencies (e.g., Emergency Ward personnel)

5. Describe requirements re: earning/renewing a recognized WHMIS Certificate.

a. Description of WHMIS (including varieties of WHMIS Certification)
b. Typology of WHMIS labels, symbols, and classifications
c. Scope and use of Materials Safety Data Sheets (MSDS)
d. Special considerations re: Bricklayer trade (e.g., thinners; ingestion of adhesive vapours, etc.

6. Describe requirements re: earning a recognized Explosive-Actuated Tools Certificate.

a. Safety (including storage and transport)
b. Scope and variety of explosive-actuated tools and accessories
c. Uses and applications
d. Care, maintenance, and operation (including safe storage)
e. Practical exercises re: set-up and firing E-A tools
f. Demonstrate competence selecting accessories and firing tools

***

Apprenticeship Manitoba

Bricklayer

Unit: A3 Trade Communications and Terminology

Level: One

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit explores the bricklayer's jobsite from the viewpoint of its communication requirements: verbal, visual, documentary, and technological. It is designed to help apprentices develop a broad but practical appreciation of the importance of communication skills to the safe, efficient practice of their trade. This requires learning the 'jargon' of the trade in both its informal and formal usage, along with the purposes to which this special language is applied in 'real-life' practice. The unit thus introduces apprentices to trade terminology and hand signals as used on the jobsite. But it also suggests strategies for longer-term skill-building in such areas as learning new terminology, using technical documents, and preparing technical reports in keeping with modern trade requirements.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the scope, significance, and major forms of trade communication. a. Expectations/codes of personal conduct re: jobsite etiquette (written and other) b. Jobsite signage c. Interpretation of regulations and employer/union policies (e.g., permits) d. Use of building codes e. Task-related information exchange with supervisors/other personnel (including roles and responsibilities) f. Use of manuals, logs, and other documents (e.g., to maintain/operate equipment) g. Use/interpretation of measurement devices (tapes, sticks, gauges, metres, etc.) h. Procurement/inventory/preparation of materials per specifications (e.g., mixing mortar) i. Use of hand signals and radio equipment (e.g., for lifting/hoisting tasks) j. Use of sketches, blueprints, and other technical-drawing media k. Business correspondence and record keeping, e.g., including billing, invoicing, etc. l. Conducting/documenting inspections, including job safety assessments m. Preparing/interpreting technical reports, including quality assurance functions n. Other (specified by instructor)	**20%**
2. Describe basic strategies/sources for learning trade/technical language.	**20%**
3. Describe basic strategies for using trade/technical documents.	**30%**
4. Describe basic strategies for preparing informal/formal reports.	**10%**
5. Describe/demonstrate the use of radios and hand-signals.	**20%**

***

Apprenticeship Manitoba

Bricklayer

Unit: A4 Quality Assurance: Standards, Codes and Specifications

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Trade outsiders sometimes believe the staying-power of well-built masonry structures either is due to the physical properties of brick and stone, or to the inspirations of the drawing board.

Working masons and bricklayers know otherwise. The beauty and durability of masonry structures owes much to careful workmanship, continuous monitoring, and the careful correction of error in accordance with formal and informal codes of practice. Historically, many of the codes and expectations that defined such 'best practices' were a closely guarded secret within the trade community, and helped make the term 'craft' synonymous with 'mystery.' But if the 'tricks of the trade' today remain something that many individual journeypersons will share only with apprentices whose seriousness as learners commands respect, industry standards are anything but secret. Indeed, some of them have the force of law - for example, Canada's *National Building Code* and the many local regulations are based upon it. Others are spelled out in industry association codes of practice, and govern quality assurance measures for the design, tendering, construction, and inspection of built structures.

This unit of instruction outlines the standards, codes, and specifications which apply to the Bricklayer trade, including their significance to quality-assurance practices within the construction sector. Apprentices are urged to reflect upon how these concepts and procedures apply to their trade involvement as individual learners, as jobsite crew-members, and as newcomers to a community of practice with an unparalleled heritage of 'building to last.'

Objectives and Content: **Percent of Unit Mark (%)**

1. Identify/describe industry codes, standards, and specifications. **30%**

a. National Building Code and government jurisdictions(s)
d. Industry organizations (e.g., CSA**)**
e. Company policies – managers/supervisors; crew members; individuals
f. Significance/applications to the trade and the construction industry
g. Significance to clients and the community
h. Consequences of substandard work
i. Other (specified by instructor)

2. Explain quality assurance concepts, principles, and processes. **30%**

a. Concepts
- Quality
- Quality standards
- Quality variables (quality elements)
- Quality assurance vs. quality control
- Cost of quality
- Measurement of quality
- Quality audit
- Role expectations and responsibilities

b. Structure and components

- Elements of a quality assurance system
- Purpose of quality assurance manual
- Quality assurance procedures
- Codes and standards
- Documentation and traceability
- Key functions and responsibilities of personnel (e.g., design engineers)

c. Applications
   - Production/generation of technical drawings
   - Inspection/acceptance of materials
   - Calibration of measuring devices
   - Interpretation of specifications and contract documents

d. Other (specified by instructor)

3. Explain quality assurance applications re: specified masonry components. 40%

a. Mortar proportions; use of sealants/coatings and other chemicals
b. Grout slump
c. Reinforcing steel
d. Air spaces
e. Brick expansion joints
f. Masonry bonding
g. Joint reinforcement
h. Insulation (including air/vapour barriers)
i. Flashing
j. Ceramic, glazed and prefaced masonry
k. Masonry unit protection
l. Others (specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: B1 Trade Mathematics

Level: One

Duration: 24 hours

Theory: 24 hours

Practical: 0 hours

Overview:

The bricklayer trade requires the ability to use mathematics and geometry with precision, resourcefulness, and confidence. Many fundamental problems in design, estimation, layout, and building involve careful work with numbers and geometric principles. Real-life trade practice involves a constant dialogue between measured or specified quantities and the performance of precision work to achieve a desired fit or tolerance among the components of a built structure. Many of the trade's most indispensable tools and techniques – whether old or new, simple or complex – essentially are aids for reliably translating abstract numbers and shapes into masonry structures and components. This unit of instruction, then, is intended to help make the world of numbers and shapes work for, rather than against, the apprentice bricklayer. For this reason, the unit includes up-to-date information about the nature of 'math anxiety and how it can be overcome. Unit content also includes a brief review of basic math concepts and operations, but its major focus concerns applications in actual trade practice. Apprentices will extend their trade-math skills elsewhere in Technical training. For example, additional instruction in math will be provided to build materials-estimating skills as part of their senior-level training in blueprint use. Similarly, instruction in applied geometry is key to instruction in such trade-specialty areas as arch-work and restoration masonry

Note: Although this unit includes a review of math basics, and provides some tools for building skill and confidence in applying them, it is not a remedial math course. Unit content assumes a prior familiarity with math basics. Apprentices who might require upgrading in this area are strongly encouraged to consult with their Apprenticeship Training Coordinator (ATC) and/or their Instructor early in the program to identify suitable options and resources.

Objectives and Content:	**Percent of Unit Mark (%)**

1. Describe the practical importance of math disciplines to the trade. **15%**

a. Definition and scope of relevant math disciplines
b. Detailed examples 'past and present'
   - Plane geometry and archwork
   - Ratio/proportion and technical drawing to scale
   - Other (specified by instructor)
c. Time-sheets, wages, and personal budgeting
d. Engineering of tools and equipment
e. Manufacture of trade materials and products
f. Trade documents
g. Standards, codes, tolerances, and other specifications
h. Computer technology/applications
i. Design/technical drawing
j. Estimation and bidding
k. Production planning
l. Materials procurement and inventory

m. Machinery and equipment set-up
n. Measurement and lay-out
o. Architectural and ornamental specialties
p. Marketing and distribution
q. Customer relations/perceptions
r. Business management

2. Describe "math anxiety" and its remedies. 5%

a. Definition
b. Recognition
c. Options, resources, and techniques for overcoming math anxiety
d. Other common problems
   - Importance of adult learner's recognition of problems
   - Importance of early resolution during term of apprenticeship
   - Options/resources for remedial math instruction and other assistance

3. Review general math concepts and use of electronic calculator. 35%

a. Basic operations
   - Addition
   - Subtraction
   - Multiplication
   - Division
   - Order of operations
   - Fractions and decimals
b. Ratio and proportion
c. Percentage calculations
d. Constructing/solving simple equations
e. Trigonometry functions
f. Units of measure
   - Imperial
   - Metric (SI)
   - Conversion factors
g. Calculator use
   - Basic operation keys/functions
   - Percentage keys/functions
   - Trig keys/functions
   - Keys/functions re: memory and constants

4. Perform trade-related calculations as specified by instructor. 45%

a. Linear measurement
   - rectangular/triangular dimensions
   - radius/diameter/circumference
b. Area and volume
   - Squares/rectangles
   - Triangles
   - Circles/cylinders
   - Irregular shapes
c. Ratio/proportion
   - Ratios
   - Percentages
   - Rates
   - SI/Metric Units (including Conversions)

***

Apprenticeship Manitoba

Bricklayer

Unit: B2 Introduction to Masonry Design and Technical Drawing

Level: One

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

This unit of instruction lays the basis for developing a well-rounded working knowledge of conventional design, technical drawing, and blueprint-reading skills in the Bricklayer trade. Learning to 'do drawings and design' is a discipline in its own right. Its methods can be as simple as drawing a pencil sketch on a toolbox scratch-pad, or as elaborate as manipulating computer-generated drawings to provide new information about a masonry structure's dimensions or material requirements Technical drawing is both a way of communicating detailed information to others, and a tool for developing new ideas and solving problems for oneself. Bricklayers and stonemasons require a good, practical grasp of design principles, drawing conventions and techniques, as well as blueprint use. This unit of instruction is the program gateway to developing these abilities. It introduces basic concepts and guidelines for designing and drawing masonry work, and provides a chance for apprentices to try their hand at applying them. Elsewhere in the program, apprentices will work with professionally-produced trade documents which employ many of these same elements of technical drawing practice, and are indispensable to modern Bricklayer trade practice.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe/demonstrate major uses of technical drawing in the Bricklayer trade. 20%

a. Uses
- Design and production of masonry structures/components (form/function; aesthetics; production planning; cost considerations, etc.)
- Problem-solving and trouble-shooting
- Communication among builders, drafting workers, designers, clients, architects, etc.
- Bidding/contracting practices
- Quality assurance – verification of compliance with specifications and standards
- Others as specified by instructor

b. Types/Techniques and Terminology
- Freehand sketches and 'brainstorming'
- Development of sketches/drawings from photographs
- Pictorial drawings
- Working drawings
- Drawings to specification
- Blueprints and blueprint components, including blueprint schedules
- Site layout (including use of layout-rods/sticks)
- Computer Assisted Drawing and Design (CADD) drawings

2. Describe continuity and change in the design/use of masonry components. 20%

a. Elements of design
b. Examples of design principles re: common masonry components (e.g., ornament, archwork, etc.)
c. design change -- significance/examples of market forces, technological change, and other factors in the use of brickwork and building stone

d. design continuity – restoration work; use of traditional masonry components in modern architectural design

3. Describe/demonstrate use and selection of drafting equipment/materials. 20%

a. Rules and straight edges (including T-square, parallel rule)
b. Architect's scales (Imperial and SI)
c. Pencils and leads (especially re: line-weight)
d. Erasers
e. Set squares
f. Protractors
g. Tools for curved work (e.g., compass; French curves)
h. Papers (vellum, grades, "tooth", etc.)
i. Specialty templates
j. Other (as specified by Instructor)

4. Describe/demonstrate specified principles, conventions and techniques for producing masonry sketches and technical drawings. 20%

a. Basic Orthographic projection
   - visualization, matching, sketching
   - plan view
   - elevation view
   - side view
   - sectional view
b. Basic Oblique projection
c. Basic Isometric Projection
d. Applied geometry
   - constructing angles
   - constructing circles, arcs, tangents etc.
   - dividing lines
   - constructing regular polygons
e. Line work and weight
   - object line
   - hidden line
   - extension line
   - dimension line
   - centre line
   - break line
   - cutting-plane line
f. Common architectural symbols
g. Measurement and drawing scale (Metric; Imperial)
h. Lettering
   - Basic knowledge of legibility and other requirements
   - Basic use of lettering templates/guides

5. Design and/or sketch a masonry component per instructor specifications. 20%

a. Interpretation of other drawings/materials to identify/solve a problem
b. Use of scale, accepted conventions re: line-weight, lettering, etc.
c. Use/conversion of metric (SI) and Imperial units of measurements
d. Sequence
   - freehand sketches (including isometric and orthographic projections)
   - specified detail sketch
   - finished drawing, including application of line-weights
   - verification of sketch re: a masonry component, original drawing, and/or provided specifications

***

Apprenticeship Manitoba

Bricklayer

Unit: C1 Masonry Tools and Equipment: an Overview

Level: One

Duration: 10 hours

Theory: 10 hours

Practical: 0 hours

Overview:

Apprentice bricklayers acquire some practical knowledge of the trade's tools and equipment long before they begin in-school Technical training. Most have already invested money in purchasing a few basic tools of their own, and know something about how those tools can be used and misused. They will build on this knowledge long afterward, too, for tool-use is one key area of trade competence that requires special commitment to lifelong learning. The materials, technology, and practical methods involved in construction work continue to evolve. But despite ongoing change, the productivity, the quality, and the safety of trade-life continues to be influenced by developed skills in the selection, use, and maintenance of tools and equipment.
This unit introduces these skill requirements through a broad overview of the modern bricklayer's tool-set, including conventional hand tools as well as portable/stationary power equipment. It explores how they are used and why. The unit also refers to the relationship between hand-tools and their motorized, air-driven, and computer-controlled counterparts. The unit even includes some practical guidance about how and when to collect the basic tools needed to practice the trade. A companion unit offers hands-on experience with basic techniques for safe use and maintenance. Other units will deepen and refine equipment-related skills in the context of specific requirements – for example, with respect to welding (Unit C6), and rigging/hoisting (Units G3 and G4).

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe the use/selection/maintenance of tools and equipment in general. 15%

a. Relevant background re: development of modern trade technology, techniques, and markets
b. Identification/definition of major categories re: the trade's modern tool-set
   - Hand tools
   - Portable power tools and equipment
   - Stationary power tools and equipment
   - Air-driven
   - Powder-activated
   - Computer-assisted/controlled
   - Comparison/contrast between common hand-tools and their power-tool equivalents
   - Persisting importance of hand-tools and hand-tool skills
   - Tools for working with specialty materials (e.g., glass block)
c. General considerations re: use of tools/equipment
   - Safety precautions including use of personal protective equipment
   - Manufacturer and employer requirements
   - Securing work pieces and project components.
d. General considerations re: selection of tools/equipment
   - Variation in the cost, quality, and capacity of bricklayer tools
   - Importance of matching job requirements to available tools/equipment
   - Importance of 'knowing the limits' when selecting and setting up for a given job
   - Trade culture re: borrowing (and returning) tools

- Variation in policy re: self- vs. employer-provided tools/equipment
- Instructor's recommendations re: selecting tools/equipment for personal acquisition (budgeting; arrangements with employer, etc.)

e. General considerations re: maintenance of tools/equipment
- Maintenance as a safety issue
- Common sites, symptoms, and consequences of bad practice re: maintenance
- Routine vs. scheduled maintenance requirements (e.g., manufacturer and/or employer expectations)
- Costs/benefits of maintenance options (e.g., commercial sharpening)
- Ways and means re: ongoing development of inspection/troubleshooting skills

2. Describe hand tools, and demonstrate their use, selection, and maintenance. 35%

a. Tools for measuring, marking/lay-out, and guiding:
- Angle finder/protractor
- Carpenter's framing square and mason's square
- Chalk line and mason's line
- Corner blocks
- Dividers
- Gauge rods
- Levels (including electronic/laser)
- Line blocks/holders/pins/trigs/stretchers
- Levels – including conventional and laser-type
- Plumb bob (including use as plumb gauge)
- Shims and spacers
- Squares and rules (Imperial and metric), including mason's spacing rule
- Storey poles
- Straightedges
- Tape measures (Imperial and metric)
- Templates
- Trammel points/beam
- Transit (vs. builder's level)
- T-square; set squares
- Other (specified by instructor)

b. Trowels
- Mason's trowel (Philadelphia and London patterns)
- Pointing trowel
- Buttering trowel (bucket/bull trowel)
- Notched trowel
- Plastering trowel

c. Jointers
- Flat jointer
- Convex jointer (including standard half-round; S-shaped rat-tail; sled runner)
- Concave jointer
- V-jointer
- Colonial ('grapevine) jointer
- Raised square beader
- Joint rakers (including handmade wooden rake; wheeled)

d. Hammers and mallets
- Axe hammer
- Ball-peen hammer
- Brick hammer
- Bush hammer
- Claw hammer
- Dead-blow hammer/mallet
- Face hammer
- Mash hammer
- Patent hammer
- Pick-axe
- Pneumatic hammer
- Refractory hammer
- Rubber mallet

- Sledgehammer
- Stonemason's hammer

e. Chisels
- Bolster (brick set)
- Splitting chisel
- Pitching tool
- Toothed chisel
- Plugging chisel
- Point chisel

f. Tools and aids for work with fasteners, mortars/caulks, and other materials
- Boltcutters
- Brick tongs
- Brushes and brooms
- Caulking gun and caulking tool
- Float
- Hawk
- Manual splitter
- Mortar board/boxes/hods/hoe
- Pencil vibrator
- Pliers
- Sandbox and sand-screen
- Screwdrivers
- Shovels and spades
- Water buckets/drums/hose
- Wheelbarrow
- Wooden paddles
- Wrenches and socket sets

3. Describe power tools, and demonstrate their use, selection, and maintenance. 20%

a. Saws and saw-blades
- Chopsaws, including sliding compound mitre-saw
- Circular saw
- Jigsaw
- Masonry saw
- Masonry table saw
- Reciprocating saw
- Specialty blades (e.g., for non-ferrous and other metals)

b. Drills and drill-bits (including hammer drill)
c. Mortar mixer
d. Mortar buggy
e. Mortar pump
f. Grinders, including diamond/abrasive discs
g. Air compressors and accessories (e.g., sprayers, etc.)
h. Arc welder
i. Blowtorch
j. Powder-activated tools (low velocity)
k. Hydraulic splitter
l. Pneumatic hammer
m. Pneumatic gun

4. Describe aids for lifting/securing materials and for personnel access. 20%

a. Lifting and hoisting
- Block and tackle
- Come-alongs and Tirfor jacks
- Cranes
- Forklifts
- Handcarts
- Hoisting/rigging accessories (including shackles and slings)
- Stone clamps

b. Personnel access
- Bosun's chair

- Ladders
- Powered platforms (on-/off-slab types)
- Scaffolding (including continuous elevator and suspended)
- Suspended platforms
- Swingstage
- Work cage

c. Other, as specified by instructor

5. Describe electrical-power supply considerations. 5%

a. Hazards and precautions re: electricity
b. Jobsite power supply, including generators
c. Inspection of cords and connections
d. Inspection of jobsite conditions (e.g., damp areas)
e. Requirements for proper grounding
f. Power ratings and their significance (e.g., 'developed power' under load)
g. Legal and regulatory requirements
h. Other (specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: C2 Practicum: Hand-Tool Use

Level: One
Duration: 14 hours
Theory: 14 hours
Practical: 0 hours

Overview:
This unit of instruction offers apprentice bricklayers the opportunity to refine their hand-tool skills in performing basic tasks of the trade safely and proficiently. Working under instructor supervision, apprentices will prepare and process masonry materials in accordance with accepted standards of fit, finish, composition and general workmanship.

Objectives and Content:	Percent of Unit Mark (%)

1. Produce the Brick-Cutting Project instructor specifications. — **40%**

a. Identification and observance of all relevant safety considerations
b. Rationale for project (e.g., relevance of specified skills/techniques)
c. Project requirements re: tool selection and technique
   - Hammer
   - Chisel
   - Portable saw
   - Table saw
d. Size and squareness of finished stock (dimensioning)
e. Appearance and finish
f. Other (specified by instructor)

2. Produce the Mortar Joint Project per instructor specifications. — **40%**

a. Identification and observance of all relevant safety considerations
b. Rationale for project (e.g., relevance of specified skills/techniques)
c. Project requirements re: tool selection and technique
   - Mortar hoe
   - Mechanical mortar mixer
   - Raker jointer
   - Round Jointer
   - Vee Jointer
d. Manual and mechanical mortar-mixing to specifications
e. Forming and finishing of mortar joints, including flush joints and struck joints
f. Mortar consistency; appearance/finish of mortar joints
g. Other (specified by instructor)

3. Produce the Tool Maintenance Project per instructor specifications. — **30%**

a. Identification and observance of all relevant safety considerations
b. Rationale for project (e.g., relevance of specified skills/techniques)
c. Project requirements re: tool selection and technique
d. Repointing chisel
e. Hardening of chisel
f. Removing burr with grinder
g. Appearance and Finish
h. Other (specified by instructor)

Apprenticeship Manitoba

Bricklayer

Unit: C3 Materials: Brick, Block/Panel Products and Stone

Level: One

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit offers a general overview of masonry materials with special emphasis on brick, block, stone, and prefabricated/proprietary products with respect to manufacture, special characteristics, preferred uses, and relative cost. Content includes the classification and dimensioning systems used in estimating, ordering, and installing them. Although bricklayers routinely work with some of the most ancient of building materials, they also use relatively new products (e.g., refractory work) that require special knowledge and techniques. The employability, productivity, and usefulness of their skills depend partly on knowing these materials of the trade. Other units provide further instruction on using and applying particular materials introduced here. This unit will help familiarize apprentices with masonry products in general, while alerting them new materials and practices which they might not yet have encountered in their on-the-job practical training.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe modern masonry materials. **15%**

a. Brick
b. Block
c. Stone
d. Tile products and paving products
e. Lumber
f. Veneers, cladding, and ornamental materials (including restoration)
g. Mortars
h. Masonry grouts and caulks
i. Masonry adhesives and fasteners
j. Concrete and concrete products (including prefabricated/prefabricated components)
k. Steel reinforcement and other metal products (including structural steel; rebar; flashings)
l. Building membranes and moisture-barrier products
m. Special products/systems (e.g., prefabricated panels; refractory products)
n. Cleaning agents

2. Describe the manufacture, selection, and use of brick products. **30%**

a. Major varieties of brick products, including components and manufacture
   - Soft mud moulding
   - Stiff mud extrusion
   - Dry press
   - Finishing and facing (e.g., glazing)
b. General classification of brick products according to physical characteristics, properties (including strength, absorption, shape, size, texture), etc.
c. Specific classification – type and grades - of brick products
   - By size: Actual, Nominal, Standard, Modular/Non-modular
   - By strength: Compressive; Transverse

- By colour: Red/Orange; Whites/Creams/Naturals; Black/Grey; Purple/Blue
- By weather-resistance: SW, MW, and NW brick
- By absorption: Amount; Rate
- By use, finish: Building, Common, Clinker, Facing, Fire, Glazed, Paving, Solid/Hollow, Salmon, Traffic, Weathering
- By Location/Position: Facing (exterior wythes) and Backing (interior wythes); Header, Rowlock, Sailor, Soldier, Stretcher

d. Relevance to handling, shipment, storage, and culling; salvage
e. Relevance to design and bond pattern considerations
f. Relevance to estimation and costing
g. Other (specified by instructor).

3. Describe the manufacture, selection, and use of block/panel products. 30%

a. Major varieties of block products, including manufacture (cement and glass)
   - Materials (including Portland cement, aggregates, additives/admixtures, etc.)
   - Mixing and molding
   - Curing (including high-/low- pressure steam methods)
   - Stacking
   - Shipment and jobsite storage

b. General features and their significance
   - Concave vs. square end
   - 'ears'
   - cells (cores)
   - cross web
   - face shell

c. Specific classification – type and grades – of block products
   - By weight: density of aggregate; Light, Medium, and Normal/Heavy weights
   - By moisture retention: Type I vs. Type II
   - By resistance to weather (e.g.,, Grade N vs. Grade S)
   - By resistance to fire, including Fire Endurance Ratings
   - By trade convention: NI, NII; SI, SII;
   - By size and shape (Jumbo, Solid, Standard, Split-Block Solid)
   - By Code standards (e.g., fire performance properties re: Equivalent Thickness and *National Building Code*)

d. Common types of block and their placement
   - Ashlar
   - Bond Beam
   - Beam/Llintel
   - Bullnose
   - Breaker
   - Cap
   - Chimney
   - Column
   - Corner Block
   - Header
   - Insulated
   - Glazed
   - Jamb
   - Loadbearing vs. Non-loadbearing
   - Partition
   - Pier (including Pier Sash and Pier Sash Half
   - Pilaster
   - Sound
   - Split
   - Stretcher

e. Common types of prefabricated/proprietary masonry panels and their use
   - Manufacture and variety
   - Design considerations and preferred applications
   - Special handling requirements
   - Special fastening/securement requirements

f. Relevance to costing and estimating
g. Other (specified by instructor)

4. Explain the manufacture, selection, and use of building stone. 25%

a. Varieties (local and other) of building stone and their procurement
   - Common varieties (e.g.,Tyndall stone vs. random rubble)
   - Quarries and quarry practices
   - Artificial stone
   - Comparison/contrast with other masonry materials

b. Typical applications and requirements
   - Estimation and costing considerations
   - Cladding and ornament (including mantles, fireplaces, etc.)
   - Restoration work
   - Procurement, handling, and storage of building stone

c. Practical stonework techniques
   - Types of stone bonding
   - Installation procedures
   - Selection of stone
   - Cutting, facing, and polishing
   - Laying of Stones
   - Fasteners
   - Caulking of stonemasonry

***

Apprenticeship Manitoba

Bricklayer

Unit: C4 Mortars, Grouts. Adhesives and Fasteners

Level: One

Duration: 28 hours

Theory: 14 hours

Practical: 14 hours

Overview:

Two main ingredients for a durable, attractive stonemasonry building project are the remarkable integrity of brick and stone, and the exacting effort of workers thoroughly versed in Bricklayer trade skills and traditions. But even these resources will be wasted without a third ingredient: the careful selection and application of appropriate mortars, grouts, and fasteners. Outside the trade, this ingredient is seldom as valued or as celebrated the other two, but working bricklayers themselves are well aware of its importance. Deficiencies in this area are often the cause of serious problems even where trade skills have been renewed across many generations of trade practice, and stonemasonry materials otherwise retain their famous integrity. In New York City, for example, people have actually been killed because metal fasteners on century-old skyscrapers have corroded and failed, allowing masonry to shear off and fall onto sidewalks from great heights. In some areas of the city, there are so many buildings of this vintage and construction that the problem represents a kind of restoration emergency of widespread proportions. In Manitoba, meanwhile, the aging of housing stock has placed a premium on the modern trade's ability to cope with chimneys and other masonry installations that are in danger of failing because of problems related to original mortars.

This unit of instruction explains the importance of masonry mortars, grouts, and fasteners from the vantage point of contemporary trade practice. It includes information about traditional knowledge in this area, and supplements this with an overview of new products and techniques that have evolved to address an ancient challenge associated with stonemasonry construction. Modern bricklayer apprentices have a sophisticated array of special-purpose chemical compounds and manufactured fasteners to help ensure the durability of the projects they build. A fully-rounded skill set demands a well-developed knowledge of these options, and the ability to keep abreast of further advances in masonry product development and trade technique.

Objectives and Content:	**Percent of Unit Mark (%)**

1. Identify mortars, grouts, adhesives, and fasteners and their use. **10%**

a. Mortars
d. Grouts
e. Adhesives
f. Fasteners
g. Related products and accessories

2. Describe the selection, preparation, and use of masonry mortars. **10%**

a. Major varieties of masonry mortars and their particular applications
   - Classifications and characteristics of major types
   - Properties of mortar (including strength, plasticity, body. moisture resistance, yield, colour)
   - Composition of mortar
   - Mortar additives (including plasticizers, air entraining agents, retardants, and dyes)
   - Applications

b. Considerations in selecting/applying mortars
   - General

- Special applications (e.g., cold weather; refractory work)
- Restoration work – including documenting and matching mortars

c. Procedure and techniques for ordering, mixing, applying mortar
   - Specifications and calculations, including communication/consultation requirements
   - Determining amount and depth of mortar required
   - Trade conventions re: classification of mortars – type, grade, etc.
   - Curing practices
   - Testing of mortars (scratch test, etc.)
   - Tools and equipment for mortar-related work
d. Relevance to handling, shipment, storage
e. Deterioration: causes, symptoms, consequences
f. Other (specified by instructor)

3. Describe the selection/use of grouts, caulks, and adhesives. 10%

a. Major varieties and uses of grouts, caulks, and adhesives
b. Preparation of grouts, caulks, and adhesives
c. Applications and techniques
d. Precautions and special requirements (including consequences of faulty technique)
e. Other (specified by instructor)

4. Describe the selection/use of masonry fasteners and anchors. 10%

a. Major varieties of masonry fasteners and anchors
   - Accessories for reinforcing, anchoring, bracing, etc.
   - Rating and capacities of common fasteners
   - Structural plates
   - Clips
   - Wire ties
   - Pins
   - Stirrups
   - Chairs
   - Fastening systems for tiers and anchoring (including prefabricated components – panels, screens, etc.)
   - Other (specified by instructor)
b. Typical applications and requirements
   - Installation of reinforcing fasteners
   - Installation of anchors
   - Welding of anchors, brackets, etc.
   - Code and/or manufacturer specifications re: placement
c. Other (specified by instructor)

5. Demonstrate tasks per instructor specifications. 60%

a. Select mortar per instructor-prescribed project requirements/conditions.
b. Mix mortar per: provided specifications
   - Calculations re: required quantities
   - Interpreting and modifying specifications to suit application
   - Manual techniques
   - Mechanically-assisted techniques
   - Requirements for retempering mortar
c. Apply caulking per provided specifications
d. Select fasteners and anchors, and prepare bill of materials per prescribed project specifications
e. Perform test(s) of mortar
f. Install fasteners and anchors per provided specifications
g. Other (as specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: D1 Principles of Wall/Column Work and Structural Integrity

Level: One

Duration: 69 hours

Theory: 34 hours

Practical: 35 hours

Overview:

This unit is a Program gateway for refining practical skill required to build masonry walls and columns, as well as the knowledge needed to anticipate how to guard against the many factors that can compromise these built structures. The modern Bricklayer must have a working familiarity with current knowledge in a range of construction disciplines that provide for the durability and safety of masonry walls, columns, and related components. Masonry walls of many kinds are among the oldest built structures, and are living evidence of the trade's enduring contributions to the common stock of modern construction know-how. The content of this unit will help Bricklayer apprentices establish their own living connection with the traditions as well as the current technology of masonry wall-building. The unit introduces fundamental concepts and important trade terminology associated with this complex subject. It also provides opportunity to practice basic wall-building skills. Other units in of the Bricklayer program build directly on this component. Some of them revisit this material in order to deepen understanding of particular concepts and techniques introduced here. But all of them have at least some relationship to the unit's concern with the concept and requirements of structural integrity. This concern applies to all phases of trade practice, and further reinforces the stonemason's honoured place among the modern construction disciplines more generally.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe masonry walls/columns in general. **5%**

a. General concept of structural integrity re: masonry walls/columns
   - Technical/technological considerations re: the building sciences
   - Interdependence of all components re: structural integrity
   - Cost/benefit considerations, including health, safety, and environmental issues

b. Overview types of masonry wall/column systems and their general characteristics
   - Walls
   - Columns (including pilasters and piers)
   - Lintels
   - Beams
   - Wall/column systems
   - Hollow vs. solid walls
   - Loadbearing vs. nonloadbearing
   - Exterior vs. interior masonry walls/columns
   - Single vs. multi-storey walls
   - Above-grade vs. below-grade walls
   - Faced walls vs. Back-up walls
   - Free-standing walls/columns
   - Special requirements re: restoration and refractory wall-projects
   - Compare/contrast general advantages of wall/column-system options and applications

c. Other (specified by instructor)

2. Describe general requirements re: the integrity of masonry walls/columns. 15%

a. Overview of all relevant factors, forces, and stresses, including:
   - Implications re: social and environmental concerns (e.g., harmful moulds)
   - Site characteristics (climate, soils, slope, seismology, drainage, architectural environment, etc.)
   - Gravitational force and its resolution into structural stresses
   - Loading and use requirements
   - Expansion and contraction
   - Waterproofing and damp-proofing
   - Structural characteristics (masonry and non-masonry)
   - Role of planning, coordination, and execution (standards of work, etc.)

b. General provisions for ensuring structural integrity
   - Adherence to all prescribed standards and practices, including selection/preparation of mortar(s)
   - Consultation with other trades
   - Cleaning/preparing all footings, surfaces, and substrates
   - Footings and foundations
   - Bonding of units to footing
   - Maintaining measurements and bond
   - Tooling of joints
   - Alignment and leveling
   - Bracing, shoring, and reinforcement (including structural plates and other fasteners)
   - Internal anchoring
   - Incorporation of pilasters, piers, and columns (including significance of joist/beam load)
   - Setting of frames
   - Insulation (where applicable)
   - Installation of waterproofing and damp-proofing materials/components (including grouting and caulking, weep holes,)
   - Compartmentalization (air- and fire-flow)
   - Overlays (e.g., parging)
   - Other (specified by instructor)

c. Common sites, symptoms, and general remedies re: masonry structural failure
   - Foundations
   - Masonry units
   - Mortar joints
   - Masonry reinforcements
   - Concrete components (e.g., foundation walls, grade beams, etc.)
   - Weather-protection components (e.g., flashings, membranes, caulks, etc.)
   - Wall openings, lintels, beams, sills, jambs, thresholds, etc., including associated millwork (e.g., doors and windows)
   - Ornamental components (including veneers)
   - Identifying, analyzing, and solving structural problems

d. Specific practical techniques for restoring structural integrity, including
   - Troubleshooting tips

e. Other (specified by instructor)

3. Describe specific masonry-wall/column types and construction details. 10%

a. Apron walls
b. Area walls
c. Cavity walls
d. Counterfort and buttressed walls
e. Composite walls
f. Curtain walls
g. Dwarf walls
h. Enclosure walls
i. Fire and Fire Division walls
j. Foundation Walls (including concrete)
k. Garden walls
l. Gravity walls
m. Panel walls
n. Parapet walls
o. Party walls
p. Pilasters, piers, and columns

q. Retaining walls
r. Serpentine walls
s. Shear walls
t. Solar screen walls
u. Spandrel walls
v. Veneered walls
w. Walls using prefabricated horizontal/vertical masonry units
x. Other (specified by instructor)

4. Explain/demonstrate construction of a cavity wall. 35%

a. Back-up wall
- Vertical/horizontal reinforcement
- Structural requirements re: metal plates
- Seismic requirements
- Laying of units
- Maintaining measurements and bonds

b. Cavity wall components
- Air barrier
- Vapour barrier
- Angle irons
- Flashing

c. Exterior wythe
- Anticipating expansion/contraction of masonry units
- Laying units
- Maintaining measurements and bonds
- Use of lines and levels
- Use of ties
- Inclusion of weep holes

d. Other (specified by instructor)

5. Perform specified tasks per instructor specifications. 35%

a. Rough sketch of wall project
b. Analysis of anticipated stresses and forces re: structural integrity of project
c. Lay-out
d. Mixing of mortar re: specifications
e. Laying of units
f. Application of reinforcement
- Vertical
- Horizontal

g. Other (specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: D2 Masonry Bonds, Joints and Corners

Level: One

Duration: 62 hours

Theory: 27 hours

Practical: 35 hours

Overview:

This unit focuses on several key practices selected from among the general requirements of modern masonry wall construction. The unit introduces additional theoretical information about wall-building required to complete the unit's prescribed set of 'hands-on' exercises involving masonry bonds, joints, cutting brick, the forming of wall-corners, and the inclusion of control joints and weep-holes.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe/demonstrate masonry bonds and their execution. **40%**

a. General considerations re: bonds
- Rationale/definition re: bonds and bond varieties (structural; pattern; mortar)
- Common requirements re: maintenance of bonds (e.g., overlaps; interlocks)
- Bonds in relation to masonry corners
- Determinants of bond pattern (brick position; joint location, courses)
- Tools/equipment and other technical requirements re: maintaining bonds

b. Orientation of brick re: achieving bonds and bond functions/characteristics
- Stretcher
- Header
- Rowlock
- Soldier
- Sailor
- Orientation of units re: structural vs. pattern vs. mortar bond(s)
- Expansion and contraction
- Incorporation of metal ties, anchors, reinforcements, etc.

c. Decorative bond patterns and materials/techniques for achieving decorative bonds
- American Bond
- Basketweave Bond (parallel/diagonal)
- Common
- Diaper Bond
- Dutch Corner Bond
- English Corner Bond
- Flemish Bond
- Garden Wall
- Herringbone
- Monk
- Running Bond
- Square Bond
- Stack Bond
- Textured/coloured units
- Coloured mortar

- Protruding/recessing units
- Extended brick header units
- Shadowing
- Other (specified by instructor)

d. Mortar Joints - variation/function re: masonry bonds, including required cuts
   - Bed joint
   - Head joint
   - Collar joint
   - Brick cuts (0.5; 0.25; 0.75; Queen Closure)

2. Describe/demonstrate mortar joints and their execution. 45%

a. Overview of joints, jointing, and finishing
   - Recap re: forces/stresses (loading, compression, expansion/contraction, tension, shear, racking, etc.) and importance of waterproofing/damp-proofing masonry walls
   - Weep holes, etc: purpose, placement, and execution
   - Definitions/explanation re: joints, jointing, and finishing (e.g., decorative vs. structural joints)
   - Control joints: rationale and execution
   - Order of operations, including rationale
   - Specifications re: joint finishes, maximum width of joints, etc., including rationale
   - Considerations/techniques re: selection/use of tools
   - Considerations/techniques re: selection/use of mortars, grouts, etc.

b. Variation among specific joint finishes/shapes, including rationale/application, major features, and tooling/finishing requirements
   - Beaded/Grapevine Joint
   - Concave (Deep Concave)
   - Convex Joint
   - Extruded/Weeping Joint
   - Flush Joint
   - Raked Joint
   - Sack Joint
   - Struck Joint
   - V Joint
   - Weather Joint
   - Other (specified by instructor)

c. Common sources, symptoms, and remedies re: masonry joint failure
d. Other (specified by instructor)

3. Describe/demonstrate masonry corners and their execution. 15%

a. Comparison/contrast re: corner-forming options and techniques
b. Special precautions and requirements re: joints, reinforcement, etc.
c. Other (specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: F1 Masonry Specialties Past and Present

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:
This instructional unit introduces a cluster of trade specialties that includes stonework, archwork, pavement, ornamental work, and restoration practices. These specialties commonly dovetail in any given project – for example, in the repair of a patio paved with mortared, curved-brick units. Moreover, these specialties typically involve still other skill-sets and trade requirements: for example, when an archway is incorporated in a masonry wall, or a brick fireplace is ornamented with stonework components. Nevertheless, each of the specialties introduced in this unit also involve particular techniques, procedures, and materials that warrant exploration in their own right, and each of them receives more- detailed attention in subsequent components of Bricklayer Technical training.

As in all other areas of Bricklayer apprenticeship, however, trade-learners are strongly encouraged to reflect carefully on how these specialties connect with other aspects of their training both in school and on the job. While it is useful to begin to explore these special topics in isolation, the journey-level bricklayer's productivity, employability, and personal satisfaction are related to do the individual tradeworker's integration of skills, knowledge, theory, and practice into a broad, fully-rounded competence in all areas of contemporary trade practice.

The present unit introduces stonemasonry, curved work, ornament, and restoration masonry as distinct topics, including their significance in trade tradition and history. The unit also suggests important connections between these specialties and other aspects of Bricklayer trade practice in general.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the specialties and their significance in modern trade practice.	**33%**
a. Stonemasonry and stonework – contemporary applications and opportunities	
b. Archwork – contemporary applications and opportunities	
c. Ornamental work – contemporary applications and opportunities	
d. Restoration masonry – contemporary applications and opportunities	
2. Describe the specialties in their relevant historical contexts.	**33%**
a. Stonework: historical dimensions and practical legacies	
b. Archwork: historical dimensions and practical legacies	
c. Ornamental work: historical dimensions and practical legacies	
d. Restoration work: historical dimensions and practical legacies	
3. Describe connections among the specialties, and re: other trade requirements.	**34%**
a. Considerations re: math, geometry, and technical documents	
b. Considerations re: architectural design and engineering practice	
c. Considerations re: tools, equipment, materials, and technological change	
d. Considerations re: wall-column systems (including veneers)	
e. Considerations re: refractory work	

f. Considerations re: special jobsite requirements
g. Case-study and discussion of Manitoba Legislature renovation project
h. Other (specified by instructor)

***

Apprenticeship Manitoba

Bricklayer

Unit: G1 Scaffolding and Fall Protection

Level: One

Duration: 21 hours

Theory: 10 hours

Practical: 11 hours

Overview:

The subject of scaffolding and access structures is fundamental to the safe and productive practice of the construction trades. It is closely bound up with a complex array of technological and regulatory issues, as well as with highly specific issues involving particular tasks, project characteristics, and rigorous safety precautions. The hazards and materials of the Bricklayer trade make it mandatory that even entry-level apprentices achieve a sound working knowledge of scaffolding and access structures.

This unit of instruction provides an overview of essential information about access structure equipment and practical techniques, with a special emphasis upon safety and regulatory concerns. Unit content includes important guidance about the selection, protection equipment, as well as procedures for the erecting, inspecting, disassembling and storing access structure components. Because the use of scaffolds is so closely related to tradework involving rigging and hoisting, the unit also includes information about this dimension as well.

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe scaffolding and access structures. **20%**

a. Varieties
   - Ladders
   - Ramps, runways, and stairs
   - Scaffolding and scaffold systems
   - Suspended access equipment, including bosun's chair and swing stages
   - Scissor lifts
   - Bleachers and stages

b. Applications and preferred uses on re: masonry projects
c. General safety precautions and regulatory considerations
d. Fall-protection requirements, apparatus, and techniques
e. Dismantling and storage
f. Interplay with rigging/hoisting procedures and equipment
g. Other (specified by instructor)

2. Describe/demonstrate the selection and use of fall-protection equipment. **20%**

a. Variety of fall protection
   - Arrest
   - Prevention
   - Restraint

b. Fall arrest equipment and techniques
   - Harnesses
   - Lanyards
   - Lifelines (horizontal/vertical)
   - Rope-grabs

- Shock absorbers
- Tie-ins/anchor points

c. Travel arrest equipment and accessories
- Belly-hooks
- Belts
- Harnesses
- Half-harnesses
- Lanyards
- Rope-grabs
- Tie-ins
- Anchor points

d. Fall prevention
- Floor-opening protection
- Guardrail systems
- Wall openings

3. Describe/demonstrate the use of ladders, ramps/runways, and temporary stairs. 20%

a. Ladders
- Varieties, including, fixed; job-built; manufactured
- Base-to-height ratio; three-point contact
- Electrical and other hazards
- Fall protection; tie-off
- Founding
- Ladder cages/jacks
- Minimum extension
- Overlaps
- Rest platform
- Safety feet
- Securement

b. Ramps, runways and stairs
- Relevant regulations
- Varieties and their rationale/use
- Guardrails and handrails
- Slope
- Stepping laths (cleats)
- Tread rise/run
- Widths

c. Construction techniques, materials, standards, and other requirements
- Relevant regulations
- Bearers (transoms/ledgers)
- Braces
- Handrails, guardrails, and ice-boards
- Footings
- Loading
- Platform material
- Rails/rungs
- Ribbons
- Sills
- Stringers
- Treads
- Uprights

d. Other (specified by instructor)

4. Describe/demonstrate the selection, use, and maintenance of scaffolding. 20%

a. Types of scaffolding and scaffolding systems, including preferred applications
- Birdcage
- Bridging and cantilever scaffolds
- Independent/dependent
- Rolling
- Tube and clamp
- Frame

- Machine scaffolds (including articulated booms, mast-climbing scaffolds, scissor-lifts, and zooms
- Applicable regulations (including re: spans, loading, safety codes

b. Major components
   - Baseplates
   - Bearers
   - Brackets (end/side)
   - Casters
   - Clamps
   - Connectors/couplers
   - Farm wagons
   - Frames
   - Ledgers
   - Outriggers
   - Planks (decks; grates)
   - Putlogs
   - Rails
   - Reveal pins
   - Ribbons
   - Screw-jacks
   - Sills
   - Standards
   - Toeboards
   - Transoms
   - Trusses
   - U-heads
   - Uprights

c. Loading and capacities
   - Dead/live loads
   - Ground loads
   - Leg
   - Loads
   - Rolling loads
   - Safe workloads
   - Static loads
   - Wind loads
   - Permissible spans

d. Erection, maintenance, and disassembly of independent scaffolding
   - Access/egress
   - Base lift
   - Base-to-height ratio
   - Bracing
   - Duty ratings (light/heavy)
   - Foundations
   - Guardrails
   - Single- and double-pole
   - Tie-ins (horizontal/vertical)
   - Wood and metal

e. Erection, maintenance, and disassembly of suspended scaffolding
   - Beam clamps
   - Guardrails (toeboards
   - Hoarding
   - Moving
   - Multi-point suspension
   - Platform materials
   - Rigging
   - Trusses/beams

f. Erection, maintenance, and disassembly of hanging scaffolding
   - Box-ties
   - Check clamps
   - Guardrails
   - Puncheons

- Rakers

g. Erection, maintenance, and disassembly of swing stages
   - Anchors
   - Ascenders/Descenders
   - Balance-point
   - Beams/thrust-outs
   - Counterweights
   - Multipoint suspension
   - Rigging
   - Tiebacks

h. Other (specified by instructor)

5. Describe/demonstrate inspection and hoisting procedures re: scaffolding. 20%

a. Safety considerations, including regulatory requirements and precautions
b. Inspection procedure, including rationale, critical targets, and documentation
c. Targets for scheduled/periodic maintenance
d. Special considerations re: rigging/hoisting operations

***