



ONTARIO COLLEGE OF TRADES

ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Curriculum Standard

Brick & Stone Mason

Level 1, 2 and 3

Trade Code: 401A

Date: 2007

Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the *Trades Qualification and Apprenticeship Act* (TQAA) or the *Apprenticeship and Certification Act, 1998* (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the *Ontario College of Trades and Apprenticeship Act, 2009* (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (<http://www.collegeoftrades.ca>) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: <http://www.collegeoftrades.ca/about/legislation-and-regulations>

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Introduction

This new curriculum standard for the Brick & Stone Mason trade is designed from the learning outcomes, which were developed from the industry-approved training standard. The curriculum is organized into **3 levels** of training, each including reportable subjects containing learning outcomes to reflect the units of the training standard. The hours charts indicate how the curriculum can be delivered in the current block release format and summarizes the hours of training for each reportable by level. Since the reportable subjects are all divisible by three they can be adapted to accommodate a more flexible training delivery other than block release.

The reportable subjects are cross-referenced to the training standard for ease of comparison.

Each reportable subject and learning outcome identifies a recommended number of training hours. This hour allotment is broken into hours for instruction in theory and practical application. The division of the curriculum into reportable subjects follows a natural progression of learning through the training program. This structure will allow training centres and apprentices' flexibility in program delivery while still observing the importance of sequencing learning in a logical progression.

The curriculum is framed by and includes specific references to terminal performance objectives in the Apprenticeship Training Standards. However, the curriculum identifies only the learning that takes place off the job, in a training environment. The in-school program focuses primarily on the theoretical knowledge required to master the performance objectives of the Training Standards. Employers are expected to extend the apprentice's knowledge and skills through appropriate practical training on the work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to assure that all apprentices have achieved the learning outcomes identified in the curriculum standard. The balance between theoretical and practical evaluation is identified for each unit of learning outcomes.

Implementation date

December 2007

Stakeholder Information

Program Summary of Reportable Subjects**Level 1**

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0511	Tools & Equipment	40	6	34
S0512	Material & Safety Equipment	10	6	4
S0513	Engineering/Building/Safety Code	20	12	8
S0514	Worksite Preparation	20	3	17
S0515	Acclimatize Worksite	10	3	7
S0516	Clean & Disassemble Site	20	3	17
S0517	Wall System Accessories	5	2	3
S0518	Mortar	68	9	59
S0519	Masonry Unit Preparation	9	1	8
S0520	Job Layout	10	3	7
S0521	Structural Masonry	18	3	15
S0522	Non-Structural Masonry	10	3	7
	Total	240	54	186

Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0523	Tools & Equipment	20	3	17
S0524	Material & Safety Equipment	15	10	5
S0525	Engineering/Building/Safety Code	25	15	10
S0526	Temporary Masonry Supports	3	1	2
S0527	Wall System Accessories	10	3	7
S0528	Grout	10	3	7
S0529	Mortar	20	1	19
S0530	Masonry Unit Preparation	2	0	2
S0531	Job Layout	30	3	27
S0532	Structural Masonry	45	6	39
S0533	Non-Structural Masonry	50	6	44
S0534	Waterproof Below Grade Masonry	10	1	9
	Total	240	52	188

Level 3

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S0535	Tools & Equipment	20	3	17
S0536	Material & Safety Equipment	20	15	5
S0537	Engineering/Building/Safety Code	15	10	5
S0538	Temporary Masonry Supports	3	1	2
S0539	Wall System Accessories	5	2	3
S0540	Mortar	12	1	11
S0541	Masonry Unit Preparation	3	0	3
S0542	Job Layout	10	1	9
S0543	Structural Masonry	38	6	32
S0544	Non-Structural Masonry	60	6	54
S0545	Fireplace & Chimney	44	6	38
S0546	Restoration Masonry	10	3	7
	Total	240	54	186

Brick & Stone Mason Level 1

Reportable Subject

Number: S0511

Title: **Use and Maintain Tools and Equipment**

Duration: Total hours: 40

Theory: 6
Individual/Group Work: 0
Out of Class Practical: 34

Prerequisites: None

Co-requisites:

Cross Reference to Training Standards: 6440.1, 6440.02, 6440.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate the use and maintenance of hand tools, power tools and measurement and layout tools according to manufacturers', employer's direction and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 1.1 Explain and demonstrate the use and maintenance of hand tools and equipment according to manufacturer/employer direction and accepted trade practice
 - a) Identify the hand tools and equipment using trade and manufacturers' terminology.

Hand Tools

Mason's trowel	Pointing trowel
Philadelphia trowel	London trowel
Parging/plastering trowel	Notched trowel
Bucket/buttering trowel	Margin trowel

Scutch hammer
Claw hammer
Mason's hammer
Brick hammer
Rubber mallet
Pry bar
Crow bar
Plugging chisel
Cold chisel
Bolster/Brick set
Line holders
Line Pins
Chalk line
Plumb bob
Corner blocks
Standard levels
Gauge tape
Concave jointer
V-Jointer
Bead jointer
Sled runner
Utility knives
Bolt cutters
Staple gun
Wrenches (SAE/Metric)
Pencils/markers
Mason's brushes
Grout bag
Equipment
Batter boards
Brick tongs
Clean fill/garbage bins
Fuel containers/tanks/pails
Grease guns Grout pump
Hose Mortar hod
Job box
Masonry guide/corner post
Mortar boards/pans/stands
Mortar boxes & buckets
Mortar hoe
Personal protective equipment
Rebar cutter/bender
Scrapers
Shovels (various)
Storage containers
Storey poles
Wheelbarrows (brick/flatbed/mortar)

Line stretchers
Line Trig
Mason's line
Line block
Carpenter's square
Water level
Measuring tapes (Imp/Metric)
Convex jointer
Grapevine jointer
Wheel rakers
Slickers
Tin snips
Pliers
Elastic
Socket sets (SAE/Metric)
Chalk box/chalk
Hard rollers

Come along
Gauge stick

Mortar mixer
Potable water barrels
Scaffolding systems
Tool bag/box/bucket

- b) Select proper hand tools and/or equipment for a specific task
 - Mortar handling
 - Layout & measuring
 - Cutting of units
 - Erecting & dismantling of scaffolding
 - Setup Job Site
 - Laying of masonry units
 - Finishing of walls
 - Lifting
 - Anchoring
 - Cleaning of Walls
 - Site Clean Up

- c) Inspect hand tools and equipment for defects and repair or replace as necessary
 - Trowels – blades, ferrules, handles
 - Levels – accuracy
 - Masonry guides – warps, bends, gauge marks
 - Hammers and chisels – striking and cutting surfaces, handles
 - Lines – frays and knots
 - Jointers – wear
 - Knives – blades, handles
 - Lifting devices – daily inspection of interface and moving parts
 - Scaffold – original colour, rust, welds, distortions, attachment mechanisms

- d) Demonstrate the safe and proper use of the hand tools and equipment
 - Setup/breakdown
 - Mortar handling
 - Measuring
 - Cutting
 - Finishing
 - Lifting
 - Anchoring
 - Cleaning

- e) Clean, store and maintain hand tools and equipment properly
 - Removes mortar, wipes clean
 - Oils if necessary
 - Stores and organizes in tool box or other

1.2 Explain and demonstrate the use of power tools and equipment according to manufacturer and accepted trade practice

- a) Identify and name the power tools and equipment using trade name and manufacturer terms

Power Tools and Equipment

Chop saws

Circular saws

Construction-grade power cables

Handheld/envelope torches

Hydraulic/electric pump truck

Metal saw

Mortar mixers

Portable saws

Propane heaters

Table saws

- b) Select the proper power tool for specific task

- Setup/breakdown
- Materials handling
- Mortar mixing
- Measuring and layout
- Cutting and carving
- Finishing and cleaning
- Anchoring
- Building false work
- Storage

- c) Inspect power tools and equipment

- Electrical
- Mechanical
- Fuel system
- Accessories
- Pneumatic
- Powder
- Hydraulic
- Frame, welds etc.
- Hoses, gauges
- Blades
- Attachments, guards

- d) Identify hazards associated with working with power tools and equipment
 - Electrical shock – Water, frayed wires, weather, obstructions
 - Moving parts – Wear, loose, cracked, incompatible, binding
 - Fires – Chemical, house keeping, storage, fueling, electrical, decanting, mixing
 - Noise, dust, debris, exhaust, flashes, heat, freezing, abrasion, cuts, vibration
 - e) Demonstrate the safe and proper use of the tool and or equipment, follow manufacturer instructions
 - f) Maintain and store tools and equipment
 - Cleans
 - Lubricates
 - Replaces parts and consumables as necessary
 - Secures and stores in proper location
 - g) Log and record as required by OHSA, manufacturer or employer
 - Keeps written records of maintenance and service
- 1.3 Use and maintain measuring and layout tools according to manufacturer instructions and accepted trade practice

- a) Identify and name the measurement or layout tools using trade and manufacturers terms

Measurement and Layout Tools

Mason's line	Theodolite
Batter boards	Measuring tapes
Masonry guides	Carpenter square
Job built square	Storey poles
Straight edge	

Evaluation Structure

Theory Testing	20 %
Practical Exercises	60 %
Final Assessment	20 %

Number: S0512

Title: Use Material Handling and Safety Equipment

Duration: Total hours: 10

Theory: 6

Individual/Group Work: 0

Out of Class Practical: 34

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6441.05, 6441.06, 6441.07

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to inspect and use material handling and safety equipment according to government regulations and manufacturer instructions

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

2.1 Select, inspect and erect scaffold systems according to government regulations and manufacturers' instructions.

a) Identify the various types of scaffold systems

Scaffold Systems

Tubular and clamp

System scaffold

Frame scaffold

b) Inspect scaffold system to ensure it is in good condition and has all required components

- Describe the general components of various systems
- Describe the parts of commonly used scaffold systems
- Identify condition of parts of scaffold

c) Identify safe working procedures and manufacturer instructions

- Describe requirements and/or training required for setting up scaffold
- Identify equipment needed to safely install scaffold
- Explain manufacturer instructions

- d) Identify hazards associated with system, erection of system and site where scaffold will be erected
 - Describe requirements for grade and soil conditions where scaffold is to be built
 - Identify possible electrical hazards below, on or above area where scaffold is to be built
 - Explain access and egress to site and hazards associated with site traffic as it pertains to scaffold
- e) Demonstrate erection of scaffold system
 - Assemble parts of scaffold correctly for commonly used scaffold systems
- f) Inspect scaffold, keep logs daily on scaffold condition and report any deficiencies immediately
 - Inspect scaffold for missing parts, cracks, welds
 - Keep log or reports on scaffold condition

2.2 Dismantle and store scaffold systems according to government regulations and manufacturer instructions

- a) Dismantle scaffold system
 - Take apart various commonly used scaffold systems
 - Stack in orderly manner for transport
- b) Inspect scaffolding, report and record any necessary information, repairs and maintenance
 - Inspect for cracks, proper welds, bent parts, etc.
 - Document inspection results
 - Report any needed repairs for servicing
- c) Maintain and store scaffolding
 - Ensure that repairs and servicing have been performed
 - Store scaffold in a safe and secure manner

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0513

Title: Engineering, Building and Safety Code

Duration: Total hours: 20

Theory: 12

Individual/Group Work: 0

Out of Class Practical: 8

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6442.01, 6442.02, 6442.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to interpret architectural drawing, specifications, schedules, contract documents, building codes, CSA masonry standards, safety codes and estimate materials for masonry jobs to an acceptable standard within the masonry industry

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

3.1 Estimate time, material and costs

- a) Estimate masonry related material and equipment and perform math related calculations
 - Estimate brick, block, stone, concrete, grout, rebar, wire reinforcement, building envelope materials
 - Estimate equipment requirements (scaffold, machinery, fuel, heating, safety related systems)
 - Use charts to estimate

- b) Estimate labour hours needed to do job and perform math related calculations
 - Use given information or experience to estimate time (man hours)

- c) Estimate labour and material costs and perform math related calculations
Trade Math Requirements
Addition, subtraction, multiplication and division
Exponents and square roots
Use of calculators
Fractions and decimals
Percentages
Geometry, angle, circles, Pythagorean Theorem
Area, volume, mass, pressure
Metric and imperial measurement

3.2 Demonstrates plan compliance with building and safety codes

- a) Explain safety regulations for masonry
- Pass evaluations on safety courses
- Safety Documents
Ontario Health and Safety Act
Workers Compensation Act
Environmental Protection Act
General contractor and employer's safety policies
- b) Comply with safety regulations
- Comply with safety regulations while working and using equipment
- c) Identify potential safety hazards, risks and safety equipment required for job
- Perform a basic safety and risk analysis for a specific task
 - Identify preventative safety procedures and safety equipment needed for a specific task

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0514

Title: Worksite Preparation

Duration: Total hours: 20

Theory: 3

Individual/Group Work: 0

Out of Class Practical: 17

Prerequisites: None

Co-requisites:

Cross-Reference Training Standard: 6443.01, 6443.02, 6443.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to prepare a worksite so that the worksite is organized and safe to work according to employers and safety regulations

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

4.1 Demonstrate worksite planning

- a) Orient apprentice with the worksite
 - Locate and report to foreperson
 - Determine company reporting structure, communication and safety system and expectations
 - Describe layout of building site
 - Explain site safety orientation

- b) Obtain relevant information from job documents to determine work area, commencement, scheduling, storage of equipment and tools and setup of site office if necessary
 - Interpret site plans
 - Co-ordinate with site supervisor and other trades about relevant planning issues

Planning Issues

Site access

Parking

Washroom facilities

Daily schedule

Layout and survey responsibilities

Equipment and materials receiving

Utilities – electrical, potable water

Environmental (temperature, lighting etc.)

Jurisdictional issues

Materials distribution (overhead crane procedures, materials elevators etc.)

- Arrange for equipment storage and site office if necessary
- c) Anticipate other concurrent operations that have an effect on planning
- Obtain relevant information regarding the scheduling of and sequence of the job; i.e. excavation, crane removal, power disruptions/transfer, water connections
 - Confirm scheduling of relevant materials and accessories that will be needed in order for the job to continue on schedule

Items to consider

Steel (angle iron, lintels, and beams)

Rebar (type, quantity, size method of installation)

Grout (type, quantity and method of installation)

Window and doorframes

Mechanical and electrical cabinets

4.2 Coordinate material

- a) Ensure that all permits required have been received
- Offloading permits from street if necessary
- b) Check delivered materials against bill of lading
- Ensure that correct materials and quantities have been sent
 - Check weights if necessary for rigging and offloading
 - Coordinate use of equipment if required to offload materials
- c) Receive and check quality of materials

Items to check

Chipped, cracked or broken material

Dimensions of material

Proper cutting and grain if required

Colour and correct type

Proper labeling (WHMIS)

- d) Store and protect materials in a manner and sequence so that the material can be accessed when needed

Types of materials

Aggregate
Anchors
Angle Iron
Accessories
Bricks
Blocks
Mortars
Stone
Reinforcement

4.3 Set up worksite (Equipment and Materials)

- a) Identify work sequence and schedule
- Communicate with site supervisor to coordinate starting area and general sequence of construction
- b) Co-ordinate, position and set up equipment, and material for general day-to-day use
- Ensure that work area is ready and safe to proceed with setup
 - Set up scaffold or necessary equipment to set out materials
 - Position materials and break down, ready for installation
 - Ensure that all relevant materials, tools, equipment and accessories are at hand
- c) Identify, record and address relevant safety concerns, hazards, and hazardous materials and storage
- Inspect, set up and address any safety issues

Items to check

Scaffold
Planks
Fall arrest/protection systems
Rescue plan
Equipment operation
Traffic lanes

- Identify hazardous materials and ensure proper identification, handling and storage issues are addressed

Hazardous materials

Refractory and restoration chemicals/materials
Airborne particulates
Propane
Solvents
Fuel

- d) Coordinate waste collection and disposal system
 - Communicate with site supervisor regarding location and responsibility of waste disposal, confirm in writing
 - Arrange for waste collection and disposal system to be installed
- e) Identify requirements for power, lighting and ventilation.
 - Arrange for access to power and insure that adequate power and correct types of connections are available and installed for all equipment needs
 - Ensure that all lighting needs have been met
 - Ensure that adequate ventilation is available for any given situation

Types of Equipment

Refer to 1.2a

4.4 Demonstrates worksite communications

- a) Identify the reporting structure on site

Key People

Owner
Architect
Engineers
General contractor
Site supervisor
Safety supervisor or representatives
Foremen (all trades)
Shop steward

- b) Identify methods of communication

Types of Communication

Verbal
Written
Graphics
Fax
E-mail

- c) Communicate in verbal and written format
Uses of Communication
Progress reports
Training reports
Requisition forms
Change orders
Safety reports
Incident reports
Work orders
Reports
Memoranda
Materials order
Waste disposal cycle
Deficiency reports
- d) Identify items and areas that require communication
- Discuss general site layout
 - Communicate safety issues
 - Communicate specific work instructions
 - Discuss and resolve blueprint discrepancies and or errors

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0515

Title: Acclimatize Worksite

Duration: Total hours: 10
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6444.01, 6444.02, 6444.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to acclimatize a worksite to suit various weather conditions according to safety regulations, building codes and CSA A371

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

5.1 Select and build an enclosure system

a) Determine safety hazards

Safety Hazards

Snow load, wind loads, rain runoff, ice, extreme heat, noise, dust

Terrain

Electrical

Structural

b) Determine type of seasonal enclosure systems

Seasonal Enclosure Systems

Tarps

Solar screen

Prefab panels

Safety nets

c) Select the type of enclosure for the job

- Select type of enclosure to suit job requirements and limitations

- d) Determine enclosure erection procedure and standards
 - Explain how to erect enclosure system
- e) Erect enclosure system safely according to contract documents
 - Erects enclosure system

5.2 Explain cold weather requirements and select and install a temporary heating system in accordance with CSA A371 and building codes

- a) Determine area to be heated
 - Access areas that will need heat
 - Calculate area to be heated
- b) Determine type of heat to be used

Heating Methods

Electrical

Propane

Natural gas

Diesel

Other fuels

- c) Identify requirements for temporary heating system
 - Identify ventilation requirements
 - Determine heat transmission network, i.e. socks
 - Determine number of units needed
- d) Identify safety requirements and documentation required to install a temporary heating system
 - Acquire record of training
 - Explain permissible installation limitations
 - Describe emergency procedures and requirements
- e) Install, operate and maintain system
 - Install system
 - Operate (turn on, ignite) system
 - Maintain and have repairs done and record as needed

5.3 Demonstrate a working knowledge of hot weather work procedures

- a) Determine safety requirements
 - Determine personal protective clothing/skin protection
 - Solar screen/safety net
 - Provide potable drinking water

- b) Determine requirements for protection from heat
 - Access area and temperature
 - Develop a work schedule strategy i.e. follow shade around structure, adjust start and finish times
 - Evaluate the need for additional equipment, air packs, fans etc

- c) Identify methods or systems of cooling work area and or materials

Types of Cover

Solar screens

Shade/cover materials

Water misting or dampening techniques

- d) Implement and maintain methods and or systems
 - Explain how to set up and operate system

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0516

Title: Clean and Disassemble Worksite

Duration: Total hours: 20
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 17

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6446.01, 6446.02, 6446.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to clean and disassemble a worksite in accordance with safety regulations and accepted work practices

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

6.1 Clean work area

- a) Gather and sort tools, equipment, materials and waste
 - Use documentation or verbal instruction to identify and sort tools and equipment
 - Sort materials and identify what needs to be kept and what is waste
- b) Organize tools and equipment for storage or return
 - Take inventory of tools and equipment
 - Crate or palletize tools and equipment/materials
- c) Sort waste for recycling or hazardous materials disposal
 - Identify different waste materials and sort into appropriate containers

6.2 Disassemble worksite

- a) Pack and ship back unused material, tools and equipment
 - Arrange for pick-up of tools, equipment and materials
 - Coordinate rental returns, off rent numbers
- b) Dispose of waste in accordance with safety and environmental regulations
 - Arrange for pick up of disposal bins or deliver to appropriate site

6.3 Clean and repair work surfaces

- a) Identify appropriate cleaning methods
- Explain the importance of considering time of year and location of project when selecting method
 - Uses commonly accepted methods to keep wall clean while building or as specified

Common methods to keep wall clean while building

Select only good material to install in wall

Double joint or joint as many times as needed to achieve best results and use appropriate method to rub down wall

Patch minor chips and voids while mortar and/or wall is still fresh

Cover walls and flip closest walking plank away from walls at the end of a workday

- Recognize what type of cleaning is required for a given situation (set mortar)

Types of cleaning methods (new masonry)

Appropriate wire brush /scrapers/carburundum blocks

Soap and water/brush/bucket

Pressure wash

Chemical cleaners

- b) Repair walls and work surfaces
- Identify areas that need repairs

Areas that need repair

Unfinished or poorly finished joints

Chipped or cracked units

Discoloured or misshaped units

Voids in mortar joints

- Identify method of repair

Repair methods

Cut out and repoint joints

Cut out and replace units

Repair chips (if deemed minor and repairable)

- c) Clean walls or work surfaces
- Use identified cleaning method to clean walls
 - Use proper procedure to clean walls

Wall Cleaning Procedures

Wire brush /scrapers/carburundum blocks

- i. Use appropriate tool for situation
- ii. Ensure that tools do not affect units or react with further cleaning methods (acids, etc.)
- iii. Remove excess mortar with appropriate tool
- iv. Use appropriate tools and technique to cut out and repair joints, units and repair minor chips, and repoint or joint as necessary using accepted procedures
- v. Clean repaired work as usual

Soap and water/brush

- i. If required use wire brush/scrapers/carburundum blocks method first (start at bottom of wall and work up)
- ii. Select appropriate method, bucket/brush or pressure wash using caution when selecting tools, types of water (source), water pressure
- iii. Allow sufficient time for any repairs to cure before using water, especially pressure wash
- iv. Rinse wall with clean water first until wall surface is saturated
- v. Apply soap solution and brush or use pressure system (start at top of wall and work down)
- vi. Rinse wall thoroughly

Chemical cleaners

- i. Use previous methods first before selecting chemical cleaners, use only as a last resort and only if specified
- ii. Rinse wall with clean water first until wall surface is saturated
- iii. Apply chemical solution in correct proportion with water, using accepted procedures and methods of application
- iv. Test for removal of chemicals (litmus paper)

Evaluation Structure

Theory:	40%
Practical:	40%
Final Assessment:	20%

Number: S0517

Title: Wall System Accessories

Duration: Total hours: 5
Theory: 2
Individual/Group Work: 0
Out of Class Practical: 3

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6447.01, 6447.02, 6447.03, 6447.04, 6447.05, 6447.06, 6447.07, 6448.08

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able explain wall system accessories and how to install according to building code and standards

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

7.1 Clean substrate

- a) Prepare substrate according to manufacturers' instructions
- b) Inspect substrate and identify any modifications that need to be made in order to install accessories
 - Inspect and identify necessary repairs and modifications to backup as necessary
- c) Remove any extraneous materials and fill voids so that substrate is compatible with accessories
 - Remove extraneous materials, i.e. mortar, dirt, grout
 - Clean anchoring system of mortar and obstructions
 - Fill voids with mortar

7.2 Install insulation

- a) Describe various kinds of insulation and accessories to secure insulation in place

Kinds of Insulation

Extruded polystyrene
Styrofoam
Fiberglass batts
Rigid fiberglass
Mineral wool batts
Rigid mineral wool
Loose/blown insulation
Injected polystyrene
Spray-on foam

Kinds of accessories for attaching Insulation

Adhesives
Pins/securing disk
Plastic Wedges

7.3 Install air barriers

- a) Identify various types of air barrier

Types of air barrier

Trowel on (mastic)
Self-adhesive
Torch on
Spray on
Combination adhesive/insulation

- b) Select the type of air barrier specified
- Consult specification and select air barrier or comparable material subject to engineering approval
- c) Identify tools and equipment needed to apply air barrier
- See tools and equipment 1
 - Identify training or certificates needed (Propane Handling, WHMIS)
- d) Install air barrier as per manufacturer instructions
- Consult manufacturer instructions, building code and contract documents
 - Install air barrier

7.4 Identify and install anchors and connectors

- a) Identify anchors and connectors

Types of anchors and connectors

Reinforcement wire with tab and connector

Brick ties

7.5 Identify and install flashing and drainage systems in accordance with plans, contract documents, and building codes

- a) Identify various kinds of flashings and drainage systems

Kinds of drainage systems

Weepers/breathers (staggered)

- b) Identify and select type of flashing and drainage system from contract documents

- Identify on-the-wall flashing requirements

- d) Install flashings and drainage systems according to manufacturers' instructions and contract documents

- Install flashing and drainage

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0518

Title: Mortar

Duration: Total hours: 68
Theory: 9
Individual/Group Work: 0
Out of Class Practical: 59

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6449.01, 6449.02, 6449.03, 6449.04, 6449.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to select, prepare, and apply mortar according to building codes, manufacturer instructions and building specifications

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

8.1 Select mortar according to building code, manufacturer instructions and contract documents

a) Identify types of mortar

Mortar types

S (Common)

N (Common)

M

O

K

Thin set mortars

b) Identify and select additives and admixtures according to contract documents

Additives and admixtures

Accelerators

Retarders

Waterproofers

Colours

- c) Select mortar type from contract documents or to suit job
 - Consult contract documents or building codes

8.2 Prepare mortar according to CSA A179, building codes, manufacturers' instructions and building specifications and accepted work practice

- a) Select and inspect components of mortar for quality

Mortar components

Portland cement (*type GU=10*)

Lime (*type S, hydrated*)

Masonry cement (*blend of Portland cement and raw limestone dust*)

Mortar cement

Aggregate (*sand, sharp and varied in size and shape*)

Potable water (*clean*)

- Select components according to contract documents
- Inspect components for compliance with the appropriate CSA Standard or building code

Inspection items

Cements & lime – dry, no lumps, age, type

Aggregate – size, shape, colour/pigments, siltation test, clean

Water – clean

- b) Select the right proportions of each component in accordance with CSA A179 or select correct type of pre-mixed mortar
 - Know the correct proportions to make standard proportion mortar types
 - Know proportions for type S and N mortars in accordance with CSA A179
 - Order the correct type and quantity of pre-mixed property mortar in accordance with CSA A179
- c) Select and use any additives or admixtures according to contract documents
 - See 10.01b
 - Consult contract documents and CSA A179
- d) Select tools and equipment for mixing mortar
 - See 1.0 and CSA A179
- e) Demonstrate how to mix mortar according to CSA A179 standards, building code and manufacturer specifications using various types of tools and equipment
 - Use mixer, paddle drill, hand/mortar hoe

- f) Regulate water for quality and quantity to achieve desired consistency, workability and required flow
 - Ensure water quality
 - Consult manufacturer instructions for premixed mortars
- g) Explain the CSA regulations and codes that pertain to the limits and setting times of mortar
 - Check CSA A179, CSA A371 and building codes
- h) Clean and maintain tools and equipment
 - Wash or wipe down hand tools
 - Wash down mixer between mixes
 - Thoroughly clean mixer or other equipment during and at end of use
 - Regularly maintain equipment

8.3 Apply mortar according to accepted practices, codes, and CSA Standards

- a) Identify the various techniques of spreading mortar for different materials

Mortar Spreading Techniques

Stringing on brick or stone

Slicing on block

Dropping on block

Buttering on brick and block

- b) Identify and select the proper tool for the application of the mortar for a specific task
 - See 1.0
- c) Correctly use the selected tool for the type of application
 - String mortar
 - Slice mortar
 - Drop mortar
 - Butter mortar
- d) Select the proper technique to suit the application
 - See 10.3b-c
- e) Pick up and apply the right amount of mortar
 - Demonstrate how to separate and pick up mortar
 - Demonstrate how to roll mortar
- f) Apply mortar in a productive and typical fashion, without waste
 - Demonstrate the ability to apply mortar repetitively in a consistent fashion with minimal waste

- g) Explain how to keep mortar workable (temper, retemper) within the requirements of CSA A179
 - Demonstrate how to temper, retemper mortar
 - Describe the limits of retempering mortar

8.4 Finish mortar according to contract documents and accepted work practice

- a) Find what type of joint is required from the specification or determine by consultation what joint is required or desired
 - Consult specification or determine joint desired (default joint is a tooled concave joint)

Types of joints

Concave (default joint type per A371)

Convex

V joint

Raked/slicked

Flush jointed

Flush cut and rubbed (bagged)

Weathered

Struck

Square/Ribbon

Beaded

Grapevine

Weathered Restoration joint

Extruded

- b) Explain the various types of joints finishes, their purpose and each tool required to make them
 - Concave – Use a convex jointer to depress, compress and smooth the joint into a shallow indented curve of various widths depending on the size of the joint. It is used for decorative and high weather resistance
 - V joint – Use a V jointer to depress and smooth joint into an indented V shape. It is used for decorative and has high weather resistance
 - Raked/slicked – Use a wheel raker for smooth face material and a raking tool or slicker for rough faced materials to take out partially set mortar to a specified depth. Brush joint and use appropriate slicker to smooth joint. Not recommended for weather resistance
 - Flush jointed – Use slicker (wider than joint) to compress joint to a flat surface flush with surface of brick. Acceptable weather resistance, but hard to achieve consistency

Flush cut and rubbed (bagged) – Use trowel to cut excess mortar rub or bag off joint with rubber ball, rubber float, brush or carpet. For use when appearance is not a factor usually used when something else will be placed on or over the masonry surface

- c) Explain the technique of finishing and tooling various kinds of joints
- Timing
 - Explain the following techniques:

Concave (see 8.4b) – General practice is to strike all head joints first then bed joints filling in all voids and cracks at this time. Best practice dictates all joints be filled, but in the event of voids, fill using the following method. This is achieved by swiping the mortar off the trowel with the jointer and inserting the mortar into the void, larger voids may require the use of a pointing trowel or slicker in order to ensure full joints and good compaction.

Consistent pressure ensuring that that joint is finished from edge to edge of top and bottom arris of units without lifting the jointer as it is being done is required. If the mortar is sufficiently set then a light brush with the appropriate tool. This should be done in a swirling motion taking care not to rub interior of joint. The wall should then be retooled to erase any brush marks in the reverse order that was done to begin the process; bed joints then head joints with particular attention to the intersection of the joints

Flush cut and rubbed (bagged) – See 10.04b flush cut and rubbed (bagged)

Extruded joint – See 10 - 4.2 extruded joint

- d) Select the right tool or tools to finish the joint
- Select from the following:

Joins and tools

Concave – Convex jointer, Barrel, Rat Tail Jointer

V joint – V jointer

Raked/slicked – Wheel rake, rake tool, slicker

Flush jointed – slickers

Flush cut and rubbed (bagged) – Pointing trowel, trowel, rubber ball, rubber float, brush or carpet

- e) Explain when the right time to finish mortar joints is
 - Joint when mortar is sufficiently set (thumbprint hard) as specified in CSA A371
 - Explain that depending on the material and the tool being used the timing will vary to some extent, ie:
 - Raked joints can be left longer as outside surface will be raked out, exposing less set mortar inside the joint, which must then be tooled immediately to ensure sealing of the joint; also, dryer mortar tends to make less of a mess on the material when it is being raked out
 - Use sled runners when specified or desired but timing will vary as mortar must be softer for proper use of this tool for first pass or use due to its larger surface area

- f) Tool and finish joint with the correct technique and desired final appearance and durability
 - Demonstrate the correct technique to give the desired finished appearance of a given joint

- g) Clean and maintain tools and replace as necessary
 - Keep jointers and jointing tools clean
 - Check and replace tools as they are worn out or broken

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0519

Title: Masonry Unit Preparation

Duration: Total hours: 9
Theory: 1
Individual/Group Work: 0
Out of Class Practical: 8

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6450.01, 6450.02, 6450.03, 6450.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain the use of masonry units and how to prepare them for installation according to manufacturers' recommendations, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 9.1 Prepare masonry units for cutting according to manufacturers' instructions, building specifications and accepted trade practice
- a) Identify, locate, select and check the masonry unit to be cut
- Identify various types of units

Types of units

Bricks

Blocks (concrete, aerated cellular concrete)

- Locate and select masonry unit
- Select the right size, type and colour of unit

- b) Identify, select, set up and organize area and tools needed to cut masonry
 - Identify and select area and tools
 - Select area that is accessible, in open area away from regular traffic with adequate space for material storage and close to waste bins and power source if needed
 - Select tools that are needed for the type of cutting to be done and to suit power source available

Cutting Tools

Masonry saws: table, portable, hand held used with holding jig

Circular

Grinders

Hammers and chisels (See 1.1a)

Brick hammer

Mash/lump hammer

Scutch hammer

Bolsters/brick set

- c) Confirm size, location and quantity of cuts
 - Check bonding of wall or consult with appropriate person to confirm size, location and quantity of cuts
- d) Measure, mark and demonstrate cutting masonry unit safely
 - Demonstrate how to measure mark and cut masonry using the selected tools needed
- e) Clean units and maintain tools as necessary
 - Rinse off unit if discolored from cutting
 - Check for damages from cutting
 - Clean and maintain tools
 - Clean saw
 - Replace or repair parts

9.2 Prepare masonry unit for installation

- a) Determine what is needed to prepare unit according to CSA A371 and building codes
 - Check units and determine if they can be installed “as is”
 - Check if unit is wet or frozen
 - Determine if unit is high absorption
 - Determine if unit needs to be dampened or dried to install as per CSA 371 (Units with high IRA)
 - Determine if unit is low absorption
 - Determine if any alterations must be made on unit before installation (cutting, drilling)

- b) Determine what tools and equipment are needed to prepare or install unit
 - See 11.1b

- c) Demonstrate preparation needed on units
 - Demonstrate how to dry, dampen or thaw out units in accordance with manufacturer recommendations

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0520

Title: Job Layout

Duration: Total hours: 10
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6451.01, 6451.02, 6451.03, 6451.04, 6451.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to layout masonry according to building codes, blueprints, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

10.1 Locate reference line (building line) on site according to blueprints and other available reference points and codes

Establish a reference line from which building lines can be established

- Mark out a line of reference using lines, chalk lines or other to determine building lines
- Establish methods of maintaining this line until a permanent wall or surface is built

10.2 Layout masonry walls or floors, spacing units correctly and in the right bond to the right gauge according to building codes, CSA standards, contract documents and accepted work practices

- b) Determine the type of bond to be used from the contract documents or from the type of unit being used

Brick Bond Types

Running bond (0.5/0, .25/0, .33/0 lap) Stack bond

Building Code Items

Brick – CSA A82 series

Block – CSA A165 series

Mortar – CSA A179

Walls

Connectors – CSA A370

Reinforcing

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0521

Title: Structural Masonry

Duration: Total hours: 18
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 15

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6452.01, 6352.02, 6452.03, 6452.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build structural masonry and refractory systems in a timely and orderly manner according to building codes, contract documents and blueprints

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 11.1 Build walls, beams, lintels and piers in a timely and orderly manner according to building codes, standards (CSA A371), contract documents, blueprints and accepted work practice
- a) Build leads or corners to plumb, level, square and on gauge
 - Select tools needed
 - Build leads using accepted methods and practice
 - Spread mortar and lay in first course of wall
 - Perform necessary checks with level and tape
 - Joint if needed
 - Spread mortar and lay first course of lead
 - Perform necessary checks with level and tape
 - Continue building leads, checking for accuracy, installing accessories as needed
 - Joint as needed or required

- b) Use masons line to lay units in wall to plumb, level, square and on gauge
 - Attach line to wall using appropriate tool
 - Spread mortar and lay units to line using line and previous laid blocks as guide
 - Align top of unit with top of line
 - End of unit aligned with previous unit laid
 - Bottom of unit aligned with unit laid below
 - Equal space between line and top arris of unit (2 mm, lines width)

- c) Tool and finish wall
 - Tool and or joint wall as specified
 - Use appropriate tool
 - Use correct method for type of joint
 - Clean, bag or brush, wall and retool if necessary
 - Patch or replace any damaged units

- d) Clean tools, equipment and worksite
 - Keep tools and equipment clean and in good repair
 - Keep worksite cleaned up

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0522

Title: Non-Structural Masonry

Duration: Total hours: 10

Theory: 3

Individual/Group Work: 0

Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6453.01, 6453.02, 6453.03, 6454.04, 6454.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build non-structural masonry components in a timely and orderly manner, using plans and/or contract documents so that the components meet structural, dimensional and appearance requirements

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

12.1 Install unit masonry veneer and accessories in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice.

a) Identify different types of unit masonry

Types of brick

Various commonly used sizes

Various colors

Various shapes

Various materials (clay/calcite/sand-lime)

Types of block

Various commonly used sizes

Various colors

Various shapes

Various materials (concrete, lightweight slag, clay (terra cotta))

- b) Identify and use any relevant safety regulations and PPE
 - Use relevant regulations for scaffolding, PPE, bracing, housekeeping
- c) Layout walls or floors with correct bond, as per blueprints and contract documents, demonstrate dry bond when necessary
 - Layout wall
- d) Check layout measurements, level, plumb, straight and square and establish gauge using levels, transits or straight edge
 - Check layout and establish benchmarks and grids
- e) Build leads or corners level, plumb, straight, square and on gauge
 - Build leads accurately
- f) Use mason's line to lay units in wall level, plumb, square, straight and on gauge
 - Use mason's line correctly
- g) Install accessories as required
 - Install accessories
- h) Tool and finish walls or floors and protect as necessary or specified
 - Tool and finish wall
- i) Clean tools, equipment and worksite
 - Clean tools and equipment

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Summary of Equipment Recommended for Level 1

Various cleaning equipment

Power washer, buckets, brushes, etc

Various tarps, screens and covering systems

Various scaffolding

Various hand/power tools and equipment to install materials including trowels, hammers, drills, power actuated tools, propane, torches, etc

Computer with relevant programs (optional)

Computer driven information delivery equipment

Whiteboards, flipcharts, posters, etc

Brick & Stone Mason Level 2

Number: S0523

Title: Use and Maintain Tools and Equipment

Duration: Total hours: 20

Theory: 3

Individual/Group Work: 0

Out of Class Practical: 17

Prerequisites: S0511

Co-requisites:

Cross-Reference to Training Standard: 6440.1, 6440.02, 6440.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate the use and maintenance of hand tools, power tools and measurement and layout tools according to manufacturers', employer's direction and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

1.1 Explain and demonstrate the use and maintenance of hand tools and equipment according to manufacturer/employer direction and accepted trade practice

- a) Identify the hand tools and equipment using trade and manufacturers' terminology.

Hand Tools

Mason's trowel

Philadelphia trowel

Parging/plastering trowel

Bucket/buttering trowel

Claw hammer

Mason's hammer

Pointing trowel

London trowel

Notched trowel

Margin trowel

Scutch hammer

Brick hammer

Rubber mallet

Pry bar

Crow bar

Plugging chisel

Cold chisel

Bolster/Brick set

Line holders

Line Pins

Chalk line

Plumb bob

Corner blocks

Line stretchers

Line Trig

Mason's line

Line block

Carpenter's square

Standard levels	Water level
Gauge tape	Measuring tapes (Imp/Metric)
Concave jointer	Convex jointer
V-Jointer	Grapevine jointer
Bead jointer	Wheel rakers
Sled runner	Slickers
Utility knives	Tin snips
Bolt cutters	Pliers
Staple gun	Elastic
Wrenches (SAE/Metric)	Socket sets (SAE/Metric)
Pencils/markers	Chalk box/chalk
Mason's brushes	Hard rollers
Grout bag	
<u>Equipment</u>	
Guillotine	

1.2 Explain and demonstrate the use of power tools and equipment according to manufacturer and accepted trade practice

a) Identify and name the power tools and equipment using trade name and manufacturer terms

Power Tools and Equipment

Drills and accessories
Jigsaws

Laser levels
Transits

1.3 Use and maintain measuring and layout tools according to manufacturer instructions and accepted trade practice

a) Identify and name the measurement or layout tools using trade and manufacturers terms

Measurement and Layout Tools

Thermostats
Laser levels
Dynamometer (scale)
Bevel set
Squares
Transit level

Quality Assurance Inspection Tools

Slump test equipment
Pin penetration equipment
Thermal photography

Cover meter
Mortar cubes
Flexural bond strength test

- b) Select proper layout or measurement tool for specific task
 - Measuring
 - Gauging
 - Sighting
 - Leveling
 - Plumbing
 - Squaring
 - Aligning

- c) Inspect tool for defects, repairs or replace if needed
 - Clear markings
 - Check levels for accuracy manually

- d) Identify and use tool as per manufacturers' requirements
 - Locates and reads instructions

- e) Set up, test equipment and demonstrate the proper use according to manufacturer instructions
 - Ensures that tool is working and used correctly

- f) Keep records and get service checks and calibrations as required
 - Keeps log book as necessary

- g) Maintain and store tools
 - Repair, clean and store tools in proper case and location

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0524

Title: Use Materials and Safety Equipment

Duration: Total hours: 15
Theory: 10
Individual/Group Work: 0
Out of Class Practical: 5

Prerequisites: S0512

Co-requisites:

Cross-Reference to Training Standard: 6441.05, 6441.06, 6441.07

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to inspect and use material handling and safety equipment according to government regulations and manufacturer instructions

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

2.1 Select, inspect and erect scaffold systems according to government regulations and manufacturers' instructions.

- a) Select the scaffold system for the specific task
 - Explain variables that dictate selection

Scaffold System Variables

Lowrise construction
Limited access site/terrain
Unusual building/wall design
Worker training/experience
Season/weather
Safety
Productivity

- b) Prepare site for scaffold erection
 - Prepare grade
 - Make arrangements to protect from electrical and other hazards
 - Communicate with supervisors for scheduling of work

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0525

Title: Engineering, Building and Safety Code

Duration: Total hours: 25
Theory: 15
Individual/Group Work: 0
Out of Class Practical: 10

Prerequisites: S0513

Co-requisites:

Cross-Reference to Training Standard: 6442.01, 6442.02, 6442.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to interpret architectural drawing, specifications, schedules, contract documents, building codes, CSA masonry standards, safety codes and estimates materials for masonry jobs to an acceptable standard within the masonry industry

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 3.1 Interpret job-related documents correctly to achieve job requirements
- a) Explain the content and organization of all types of drawings

Types of Plans

Site plans

Foundation plans

Floor plans

Types of Views of a Plan

Plan

Elevation

Section

Detail

Schedule

Types of Lines

Object lines (main/visible, hidden, break)

Dimension lines (dimension line, extension line, centre line)

Reference indicators (leader line, section line, schedule mark, detail line, stairway indicator)

- b) Explain architectural, structural and mechanical drawings
 - Explain the difference between architectural, structural and mechanical/electrical drawings
 - Interpret architectural, structural and mechanical/electrical drawings for the purpose of building masonry structures
- c) Draw and interpret sketches
 - Draw sketches in plan, elevation and section views with dimensions
 - Explain scaling as it relates to drawings/sketches
- d) Interpret specifications and schedules
 - Interpret specifications as they relate to masonry
 - Interpret schedules

Types of Schedules

Door and window

Wall

Room finish

Utility hardware

Job schedules/time lines

Revisions

- e) Describe contract documents

Types of Contracts

Bidding

Building

Permits

- f) Read and follow manufacturer instructions and specifications
- g) Use material or equipment according to instructions and specifications
 - Explains how to interpret instructions and specifications for applying masonry materials

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0526

Title: Temporary Masonry Supports

Duration: Total hours: 3
Theory: 1
Individual/Group Work: 0
Out of Class Practical: 2

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6445.01, 6445.02, 6445.03, 6445.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build, install and remove temporary masonry supports according to engineering specifications, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 4.1 Plan temporary support structures according to contract documents
 - a) Examine blueprints and site of work to be supported
 - Confirm measurements from plans are the same as built or confirm pre-assembled supports conform to design
 - Access site for feasibility of installation of support

- b) Determine materials, tools and equipment needed to build support structure as per contract documents
 - Determine materials

Materials

Lumber/cribbing/whalers

Nails

Screws

Shims

- Determine Tools

Tools

Circular saw

Jigsaw

Compass/trammels

Measuring tape

Screw gun or drill

Hammer, hammer drills, powder actuated tools

Chains

- Determine Equipment

Equipment

Forklift

Scissor lift

Manual lifting device

Eye Beams

Templates

Aluminum Beams

Hydraulic and screw jacks

4.2 Construct masonry supports

- a) Select tools and materials to build supports
 - See 6.01
- b) Consider how to place support to allow for building process
 - See 6.01

- c) Build masonry supports/bracing using contract documents, standards and follow applicable safety regulations
 - Determine type of falsework/bracing/shoring support needed (straight or curved)
 - Use mathematical calculations to build support

Mathematics

Geometry

Circumference/perimeter calculations

Radius points

Weight/thrust

- Mark out lumber and cut to correct dimension or select appropriate components to assemble system
- Builds support
- Checks support for accuracy
- Mark out and build shoring/bracing for support

4.3 Install masonry supports/wall bracing in accordance with the contract documents

- a) Ensure that installation is safe and done in accordance with all regulations and per contract documents
 - Determine spacing of supports/bracing
 - Install shoring ensuring that it is secured
 - Install support insuring that it can be removed with out damaging or stressing the wall above (install shims)
 - Check that support is placed level, plumb and properly aligned with wall and does not interfere with construction process
- b) Ensure that installation is safe and secure
 - Ensure that support is temporarily secure until weight/bond of masonry is self supporting or wall is secured
- c) Anticipate building conditions and schedule removal
 - Allow for time to remove support so that it does not restrict the building process

4.4 Remove masonry supports

- a) Ensure that masonry on support is self- supporting
 - Allow for masonry to cure sufficiently
- b) Remove masonry support
 - Remove shims and support carefully
 - Remove shoring
 - Finish masonry work

- c) Disassemble and store masonry support
 - Evaluate the further need for support and disassembles/inspects for repair/maintenance for reuse accordingly
 - Store corresponding centres and templates of unit in an organized fashion

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0527

Title: Wall System Accessories

Duration: Total hours: 10

Theory: 3

Individual/Group Work: 0

Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6447.01, 6447.02, 6447.03, 6447.04, 6447.05, 6447.06, 6447.07, 6448.08

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain wall system accessories and how to install according to building code and standards

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

5.1 Clean substrate

- a) Prepare substrate according to manufacturers' instructions
- b) Inspect substrate and identify any modifications that need to be made in order to install accessories
 - Inspect and identify necessary repairs and modifications to backup as necessary
- c) Remove any extraneous materials and fill voids so that substrate is compatible with accessories
 - Remove extraneous materials, i.e. mortar, dirt, grout
 - Clean anchoring system of mortar and obstructions
 - Fill voids with mortar

5.2 Install insulation

- b) Select the type of insulation from contract documents
 - Consult specification/work order and identify type of insulation needed

- c) Confirm that insulation qualities and location on building comply with contract documents
 - Consult appropriate contract documents and verify by location on building

- d) Identify any tools or equipment needed
 - See tools and equipment list 1
 - Identify essential scaffold requirements for installation

- e) Install insulation in accordance with manufacturer specifications
 - Explain manufacturers' specification, building code and contract documents
 - Install and bond insulation

5.3 Install vapour barriers

- a) Identify various kinds of vapour barriers
 - See air barriers

- b) Identify and select type and location of vapour barrier
 - See air barriers

- c) Install vapour barrier
 - See air barriers

- d) Identify items and areas that require communication
 - Discuss general site layout
 - Communicate safety issues
 - Communicate specific work instructions
 - Discuss and resolve blueprint discrepancies and or errors

5.4 Identify and install various kinds of anchors and connectors

- a) Identify various kinds of anchors and connectors

Types of anchors and connectors

Strap anchors

Angle anchors

Reinforcement bar (re-bar)

Anchor bolts

Wall plates

Beam plates

Dovetail Anchors

Refractory Anchors

- b) Select the type(s) of anchors and connectors needed from contract documents

- Consult specification and select anchors and connectors or comparable accessories subject to engineering approval

- c) Identify tools and equipment needed to install anchors

- See tools and equipment 1

- d) Install anchors and connectors as per contract documents/manufacturer instructions and accepted trade practice

- Consult manufacturer instructions, building code and contract documents
- Install anchors and connectors

5.5 Identify and install flashing and drainage systems in accordance with plans, contract documents, and building codes

- a) Identify various kinds of flashings and drainage systems

Kinds of flashing

Copper

EPDM elastomer

Galvanized steel

PVC coated metal

Stainless steel

Zinc

Modified bitumen membrane, fabricated with a polyethylene liner

Kinds of drainage systems

Below Grade:

Flexible perforated plastic piping (big O) with aggregate covering (weeping tile)

French drains

Rigid plastic (bubble wrap) type wall drainage

Drainage Wallboard

Above Grade:

Cavity nets

Pea Gravel

- b) Identify and select type of flashing and drainage system from contract documents
 - Consult specification and select flashing and drainage materials or comparable/compatible materials subject to engineering approval
 - Identify locations for through-the-wall flashing i.e. on-grade, windows, doors and other openings
- c) Select tools and equipment needed to install flashings and drainage systems
 - See tools and equipment 1
- d) Install flashings and drainage systems according to manufacturers' instructions and contract documents
 - Consult manufacturer instructions, building code and contract documents

5.6 Install frames, cabinets or panels (accessories) in accordance with plans, contract documents, buildings and accepted work practices

- a) Identify various kinds of accessories

Kinds of accessories

Door and window frames

Louvers

Fire hose cabinets

Electrical panels

Mechanical cabinets

Electrical and mechanical switch boxes

Fire dampers/security dampers

Plumbing sleeves/toilet anchors, floor drains

Security/Reception stations

Enunciator panels

- b) Identify and select type of accessory and anchoring system that is to be used
 - Consult specification and select accessory and anchoring system or comparable/compatible materials subject to engineering approval
- c) Locate and verify accessory and anchors as per schedule and identification number
 - Coordinate with appropriate trade to secure and verify correct accessory and location
- d) Determine and verify correct location, measure and mark out dimensions
 - Determine bonding and cuts needed
 - Access method of anchorage and system of instalment
 - Secure all necessary lintels and or specialty blocks
- e) Determine tools and equipment needed to install accessory
 - See tools and equipment 1
- f) Install accessory plumb, level, square and in line
 - Install, or verify that accessory has been installed correctly
 - Consult with appropriate trade for verification of installation
- g) Install masonry against, and anchor accessory as required, rechecking for accuracy of installation as work proceeds

5.7 Install control joints or expansion joints (movement joints) in accordance with contract documents and building codes

- a) Locate control joints or expansion joints (movement joints) as specified or needed
 - Consult documents or confirm type and location of movement joint with engineer
- b) Install movement joint as specified
 - Install movement joint as specified and accessories where required

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0528

Title: Grout

Duration: Total hours: 10
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6.448.1, 6.448.2, 6.448.3, 6448.4

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain what grout is, when it is used, how it is mixed, where it is placed in the wall and what its purpose is in accordance with plans, contract documents, building codes, and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

6.1 Select grout

a) Identify types of grout

Proportion Grouts (in accordance with CSA A179 and Building Codes)

Fine grout

Course grout

Property Grouts (in accordance with CSA A179 and Building Codes)

Propriety Grouts

Ready Mix

b) Select the appropriate grout

- Consult specification or contact engineer responsible

c) Confirm selection and confirm that no changes have been made prior to installation

- Consult with engineer for selection and any structural changes that may have an effect on selection
- Consult codes relating to weather (freezing, extreme heat)

6.2 Prepare grout according to contract documents

- a) Identify ways of mixing grout
- Select mixing method

Grout mixing methods

Ready mix truck

Jobsite mixer

- Consult with engineer if necessary

- b) Prepare and mix grout to the specified proportion and consistency (slump)
- Mix using proportions (see 9.1a)
- c) Test grout for consistency and strength if required
- Apply procedure for performing slump test
 - Take samples to be used for testing strength

6.3 Install grout

- a) Identify the various methods of installing grout

Grout installation methods

Grout pump

Grout truck with pump

Pump truck

Grout Hopper with pump with forklift

Mortar box and pail

- b) Select the appropriate method of installation
- Select method according to specification, experience, available equipment and in consultation with engineer if necessary
- c) Identify the tools and equipment needed to place grout
- See tools and equipment 1
- d) Inspect wall prior to grouting
- Ensure that walls are fully jointed or otherwise sealed
 - Confirm that reinforcement has been correctly placed in accordance with CSA A371 or building codes
 - Centred or positioned as specified
 - Spaced correctly
 - Adequately secured
 - Correct splicing/lap as necessary
 - Correct size

- e) Ensure that throat is clean and that, in high lift grouting, cleanouts are sealed
 - Knock any protruding mortar fins off
 - Clean out cells that are to be grouted through cleanouts (for high lift grouting)
 - Close up clean outs (use prefab cleanout windows, wood or a piece of block)
 - Ensure that cleanout blocking is well secured

- f) Place grout ensuring that it is in the right location and placed using the selected method for the wall being grouted

Grouting Procedures

Low lift

High lift

- Provide shear key as required between grout pours/lifts

6.4 Consolidate grout

- a) Explain the various methods of consolidation
 - Puddling (use of stick to consolidate)
 - Mechanical vibrator

- b) Explain the purpose of consolidation
 - Fill voids and ensure that grout and rebar are bonded together

- c) Demonstrate the proper techniques to consolidate grout
 - Consult specification
 - Ensure that adequate consolidation is done but not excessive as grout mixture may segregate

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0529

Title: Mortar

Duration: Total hours: 20
Theory: 1
Individual/Group Work: 0
Out of Class Practical: 19

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6449.01, 6449.02, 6449.03, 6449.04, 6449.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to select, prepare, and apply mortar according to building codes, manufacturer instructions and building specifications

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

7.1 Select mortar according to building code, manufacturer instructions and contract documents

a) Identify types of mortar

Mortar types

S (Common)

N (Common)

M

O

K

Thin set mortars

b) Identify and select additives and admixtures according to contract documents

Additives and admixtures

Accelerators

Retarders

Waterproofers

Colours

- c) Select mortar type from contract documents or to suit job
 - Consult contract documents or building codes

7.2 Prepare mortar according to CSA A179, building codes, manufacturers' instructions and building specifications and accepted work practice

- a) Select and inspect components of mortar for quality

Mortar components

Portland cement (*type GU=10*)

Lime (*type S, hydrated*)

Hydraulic lime combined with other binders (*Restoration*)

Masonry cement (*blend of Portland cement and raw limestone dust*)

Mortar cement

Aggregate (*sand, sharp and varied in size and shape*)

Potable water (*clean*)

- Select components according to contract documents
- Inspect components for compliance with the appropriate CSA Standard or building code

Inspection items

Cements & lime – dry, no lumps, age, type

Aggregate – size, shape, colour/pigments, siltation test, clean

Water – clean

- b) Select the right proportions of each component in accordance with CSA A179 or select correct type of pre-mixed mortar
 - Know the correct proportions to make standard proportion mortar types
 - Know proportions for type S and N mortars in accordance with CSA A179
 - Order the correct type and quantity of pre-mixed property mortar in accordance with CSA A179
- c) Select and use any additives or admixtures according to contract documents
 - See 10.1b
 - Consult contract documents and CSA A179
- d) Select tools and equipment for mixing mortar
 - See 1 and CSA A179
- e) Demonstrate how to mix mortar according to CSA A179 standards, building code and manufacturer specifications using various types of tools and equipment
 - Use mixer, paddle drill, hand/mortar hoe

- f) Regulate water for quality and quantity to achieve desired consistency, workability and required flow
 - Ensure water quality
 - Consult manufacturer instructions for premixed mortars
- g) Explain the CSA regulations and codes that pertain to the limits and setting times of mortar
 - Check CSA A179, CSA A371 and building codes
- h) Clean and maintain tools and equipment
 - Wash or wipe down hand tools
 - Wash down mixer between mixes
 - Thoroughly clean mixer or other equipment during and at end of use
 - Regularly maintain equipment (see 1.2 f-g)

7.3 Apply mortar according to accepted practices, codes, and CSA Standards

- a) Identify the various techniques of spreading mortar for different materials

Mortar Spreading Techniques

Parging on masonry surfaces

- b) Correctly use the selected tool for the type of application
 - Parge mortar

7.4 Finish mortar according to contract documents and accepted work practice

- a) Find what type of joint is required from the specification or determine by consultation what joint is required or desired
 - Consult specification or determine joint desired (default joint is a tooled concave joint)

Types of joints

Concave (default joint type per A371)

Convex

V joint

Raked/slicked

Flush jointed

Flush cut and rubbed (bagged)

Weathered

Struck

Square/Ribbon

Beaded

Grapevine

Weathered Restoration joint

Extruded

- b) Explain the various types of joints finishes, their purpose and each tool required to make them
- Weathered – Use pointing trowel, or short slicker to strike joint with a compressed bevel sloping down from underside of top brick to front edge of brick below. Average weather resistance and decorative appeal
- Struck – Use pointing trowel, or short slicker to strike joint with a compressed bevel sloping in from the edge of the top brick to about 5mm in on the top surface of the brick below. Not recommended for weather resistance and is more decorative in nature
- Beaded – Use a bead jointer to compress joint that will have a small raised bead in the centre of the joint. This is generally an uncommon joint, except in restoration but has average weather resistance and used mostly for decorative effect and to match existing work
- Grapevine – Use a grapevine jointer to compress joint that will have an indented bead in the centre of the joint. This is generally an uncommon joint, except in restoration work but has better weather resistance and used mostly for decorative effect and to match existing work
- Extruded Joint – No tools required and mortar is left to hang out over the material and not cradled or removed. This is not considered to be weather resistant and is used for its rustic effect
- c) Explain the technique of finishing and tooling various kinds of joints
- Timing (See 10.4e)
 - Explain the following techniques:
- V Joint – Process similar to 10.4c concave joints
- Raked/slicked – The process for using a raked joint is to rake out the mortar to a given depth usually 10 mm or less using a wheel rake or other raking tool. It is important to ensure that all mortar has been raked out from the top and bottom edge of the joint to the full depth consistently. Then the joints should be brushed out, then a slicker or other acceptable tool of the appropriate size is used to compress and finish the joint. Usually a variety of widths and lengths of blades will be necessary to effectively finish this joint
- Flush jointed – Process similar to 10.04c concave joints
- Weathered – See 10.4 weathered, similar process to concave, using appropriate tool with special attention given to consistency of angle and depth of recessed portion of joint. Usually head joint all angled same direction

Struck – See 10.04 struck, similar process to concave, using appropriate tool with special attention given to consistency of angle and depth of recessed portion of joint. Usually head joint all angled same direction

- d) Select the right tool or tools to finish the joint
- Select from the following:

Joints and tools

Weathered – Pointing trowel, short slicker

Struck – Pointing trowel, short slicker, hammer head

Beaded – Bead jointer

Grapevine – Grapevine jointer

(Sled runners are available in many of the joint styles to finish long horizontal joints)

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0530

Title: Masonry Unit Preparation

Duration: Total hours: 2
Theory: 0
Individual/Group Work: 0
Out of Class Practical: 2

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6450.01, 6450.02, 6450.03, 6450.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain and demonstrate the use of masonry units and how to prepare them for installation according to manufacturers' recommendations, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

8.1 Prepare masonry units for cutting according to manufacturers' instructions, building specifications and accepted trade practice

- a) Identify, locate, select and check the masonry unit to be cut
- Identify various types of units

Types of units

Manufactured stone

Acid resistant tile

Pavers (clay, concrete, stone)

- Locate and select masonry unit
- Select the right size, type and colour of unit

Other cutting tools

Guillotine

8.2 Prepare masonry unit for installation

- b) Determine what is needed to prepare unit according to CSA A371 and building codes
 - Determine if unit is low absorption (refractory)

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0531

Title: Job Layout

Duration: Total hours: 30
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 27

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6451.01, 6451.02, 6451.03, 6451.04, 6451.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to layout masonry according to building codes, blueprints, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 9.1 Locate reference line (building line) on site according to blueprints and other available reference points and codes
 - a) Locate where a project will be built on site by using blueprints, existing structures and government regulations
 - Consult plans to establish project placement
 - Consult with building officials or building regulations to ensure that project is not in violation of local codes or bylaws
 - Use existing benchmarks, or structures to establish building lines of project
- 9.2 Layout wall or surface lines and heights according to blueprints, gridlines and benchmarks
 - a) Identify wall or surface lines from blueprints and or gridlines
 - Locate parts of blueprint for needed information
 - Identify required measurements and reference points

- b) Select, set up and organize area where wall or surface is to be built
 - Locate area
 - Ensure that area is clear and accessible
 - Clean footing, slab or other surface needed to mark out wall or surface
- c) Select tools required to establish wall or surface lines and benchmarks for heights

Tools needed for setup

Levels (masons)

Transits (laser or sight)

Builders level, dumpy level, automatic level (elevations)

Theodolite instrument (squaring) 90 degrees etc

Total station (computer driven) level, vertical, angles

Measuring tapes (short/long, metric/imperial)

Chalk lines, spray paint

- d) Layout wall lines, angles, and benchmarks using blueprints, squaring methods and measuring tools within tolerances specified in CSA A371
 - Calculate lengths of walls or surface centerlines, openings, angles etc
 - Use appropriate tools to layout walls or surface
 - Mark out wall or surface locations

9.3 Layout masonry walls or floors, spacing units correctly and in the right bond to the right gauge according to building codes, CSA standards, contract documents and accepted work practices

- a) Layout walls or floors, both vertical and horizontal, using blueprints, contract documents, and measuring tools
 - Use information and tools to lay out masonry elements
 - Set up and use various tools to layout job
 - Refer to CSA A371 which specifies tolerances for masonry layout
- b) Determine the type of bond to be used from the contract documents or from the type of unit being used
 - Explain brick, block or stone bonding with various types of brick, block and stone
 - Determine bond from information given in contract documents
 - Set out bond in dry layout to minimize cuts

Brick Bond Types

English bond

Common/American bond

Herringbone

Diaper

Etc

Flemish bond

Decorative bonds

Basketweave

Gilbreth

Block bond types
Stack bond
Building Code Items
Brick – CSA A82 series
Block – CSA A165 series
Mortar – CSA A179
Walls
Connectors – CSA A370
Reinforcing

9.4 Layout openings, utilities, accessories and expansion/control joints according to building codes, CSA standards and accepted masonry practice

- a) Layout openings, utilities, accessories and expansion/control joints (movement joints) using blueprints, contract documents, building codes, and accepted masonry practice
- Consult blueprints for required information
 - Consult building codes
 - Layout openings, utilities, accessories and movement joints
 - Review layout tolerances contained in CSA A371 or contract documents
- b) Communicate with others on job to confirm and verify openings, utilities, accessories and expansion/control joints (movement joints)

Communicates with others
Other masons
Job foreman
Job supervisors
Other foremen and tradespeople
Manufacturers

- Communicate using verbal and written instructions regarding openings, utilities, accessories and expansion/control joints

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0532

Title: Structural Masonry

Duration: Total hours: 45
Theory: 6
Individual/Group Work: 0
Out of Class Practical: 39

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6452.01, 6352.02, 6452.03, 6452.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build structural masonry and refractory systems in a timely and orderly manner according to building codes, contract documents and blueprints

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 10.1 Build foundation and retaining walls in a timely and orderly manner according to building codes, standards, contract documents, blueprints and accepted work practice
- a) Check and confirm measurements from blueprints and use batter boards and or transits
 - Check and confirm measurements from blueprints
 - Find foundation and or structural plans and confirm measurements
 - Confirm all details, sections and elevations as well as contract documents to ensure proper construction of foundation
 - Use measurements and layout tools to set out building lines (see 12.1-12.3)
 - b) Apply shoring and trenching rules for excavation
 - Explain basic shoring and trenching rules
 - Access excavation and determine if it is safe to work
 - Communicate appropriate directions if changes are needed

- c) Layout, form and pour footings
 - Use measurements and layout tools to check for correct excavation size and elevations and layout footings
 - Form footings to proper dimensions and pour concrete
- d) Explain requirements and confirm that footing has the right dimensions and is structurally sound
 - Explain building code requirements for footings as it relates to masonry foundation walls
 - Confirm that footing called for in blueprint is the correct size and structurally sound
- e) Check and confirm type of material and mortar
 - Use contract documents to determine type of materials needed
 - Estimate and order material (see 3.2)

10.2 Build walls, beams, lintels and piers in a timely and orderly manner according to building codes, standards (CSA A371), contract documents, blueprints and accepted work practice

- a) Identify and name different wall systems, beams, lintels and piers

Types of Wall Systems

Area wall	Cavity wall
Composite wall	Curtain wall
Dwarf wall	Enclosure wall
Firewall	Garden walls
Knee wall	Load/non-load bearing
Panel wall	Parapet wall
Party wall	Retaining wall
Reinforced grouted masonry (including shaft work)	
Serpentine wall	Shear wall
Solar screen wall	Spandrel wall
Veneer	

- b) Check and confirm type of material and mortar
 - Use blueprints, contract documents and other job documents to confirm materials and mortar (See 3)
- c) Set out tools, equipment and materials to build wall, beam, lintel and pier
 - Select appropriate tools and equipment to suit type of wall being built (See 1)
- d) Identify and use any relevant safety regulations and personal protective equipment (PPE)
 - Access project and acquire appropriate safety equipment and PPE

- e) Layout wall with correct bond as per blueprints and contract documents
 - Use tape or dry bond to establish bond (See 12)
- f) Check layout measurements, plumb, level and square and establish gauge using levels, transits or straight edge (tolerances are specified in CSA A371)
 - Use appropriate tools to check measurements and wall and unit orientation (See 12)
- g) Install reinforcement and/or grout in wall if specified
 - Use appropriate tools and techniques and methods for reinforced grouted masonry (See 9)

10.3 Build arches in a timely and orderly manner according to building codes, contract documents and blueprints as well as accepted work practice

- a) Identify different types and parts of arches

Types of Arches

Semi-circular/Roman

Elliptical/multi centered

Tudor/four centered

Gothic

Parts/Dimensions of Arch

Creepers

Arch axis

Skewback

Skewback angle

Springer unit

Spring line

Centerline

Vousoir

Intrados

Extrados

Apex/crown

- b) Check and confirm measurements from blueprints
 - Check job documents to find measurements (span, rise, radius, depth, location)
- c) Check and confirm type of material and mortar
 - Use contract documents to find type of material and mortar
- d) Set out tools, equipment, materials and templates to build arches, vaults and domes
 - See 6

- e) Calculate size and number of units within the arch ring and make a template for individual units
 - Use mathematical calculations to find size and number of units in the arch ring
 - Know formulas for calculating radius, circumference and other related math for various types of arches
- f) Use basic geometry to layout arch with correct bond as per blueprints and contract documents
 - Know formulas for calculating radius, circumference and other related math for various types of arches
- g) Check layout measurements and radius, plumb, level and square and establish gauge using levels, transits or straight edge, trammels, lines, bevel and adjustable squares
 - Use tools and measurements to ensure that arch layout, template, and abutments are properly set up
 - Cut and check units for correct size, shape and condition
- h) Build arches and their abutments plumb, level, square and on gauge
 - Build arches using correct methods, tools and techniques
- i) Use masons line, radius lines or trammels to lay units in arch, plumb, level, square and on gauge
 - Uses masons line, radius lines and other tools to keep wall in alignment
- j) Install reinforcement and/or grout in arch if specified
 - Consults plans and contract documents to ensure proper placement of reinforcement, anchors and/or grout
 - Install reinforcement and/or grout
- k) Tool and finish arch
 - Tool and finish arch face
 - Remove arch support, (template) at appropriate time after arch has cured
 - Cut out and repoint soffit of arch
- l) Clean tools, equipment and worksite

Evaluation Structure

Theory:	20%
Practical:	60%
Final Assessment:	20%

Number: S0533

Title: Non-Structural Masonry

Duration: Total hours: 50

Theory: 6

Individual/Group Work: 0

Out of Class Practical: 44

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6453.01, 6453.02, 6453.03, 6454.04, 6454.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build non-structural masonry components in a timely and orderly manner, using plans and/or contract documents so that the components meet structural, dimensional and appearance requirements

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

11.1 Install unit masonry veneer and accessories in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice

a) Identify different types of unit masonry

Types of manufactured stone

Various commonly used sizes

Various colors

Various shapes

Various materials (concrete, sand-lime, slag)

b) Check and confirm measurements from blueprints

- Use job documents to verify measurements

c) Check and confirm type of material and mortar

- Use job documents to verify material and mortar
- Estimate and order materials (See 3.2)

- d) Set out tools, equipment, and any materials to build wall or floors
 - Assess job for tools and equipment needed (See 1)
 - Set out materials (See 12)
- 11.2 Build prefabricated masonry units in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Explain what prefabricated masonry is
 - Explain that prefabricated masonry is parts, pieces or sections of a wall that have been built offsite and then transported to the site for installation
 - Explain that prefabricated masonry is done with smaller unit masonry mortared together with a steel framework
 - Explain that the transport and movement of the unit will require additional thought and planning
 - b) Check and confirm measurements from blueprints
 - Use job documents to find measurements
 - Often each piece or section of wall will have a separate plan
 - c) Check and confirm type of material, mortar, epoxy and/or anchoring system needed
 - Materials especially mortars, grouts, epoxies and anchoring within each piece will need specific instruction
 - d) Set out tools, equipment and materials to build prefabricated unit
 - Explain that tools and equipment may be different from typical masonry – hoisting devices, templates
 - e) Layout prefabricated unit with correct bond, as per blueprints and specifications, demonstrate dry bond when necessary
 - Use job documents to layout units within prefabricated piece
 - f) Check layout measurements, plumb, level and square and establish gauge using levels, transits, straight edge or templates
 - Use appropriate tools to ensure accuracy
 - g) Build leads or corners plumb, level, square and on gauge
 - Use tools and materials to build corner ends of prefab unit
 - Setup devices to use as guides if corners cannot be built
 - h) Use mason's line to lay units in wall, plumb, level, square and on gauge
 - Use line to ensure that units within prefab are built accurately
 - i) Install accessories, reinforcement, lifting points and grout as specified and/or required
 - Explain that due to transport and movement, the unit will require additional accessories to be installed for this purpose

- j) Tool and finish wall and protect as necessary or specified
 - Check job documents and finish prefab pieces
 - k) Clean tools, equipment and worksite
 - Ensure that tools, equipment and worksite are cleaned as required
- 11.3 Parge masonry in a timely and orderly manner according to building codes, specifications, blueprints and accepted trade practice
- a) Remove any extraneous materials and fill voids so that substrate is compatible for parge coats
 - Use scrapers, and carborundum blocks to clean off extraneous materials
 - Wash or clean any dirt or oil based substances from wall
 - Fill any voids with appropriate mortar and allow to cure
 - b) Check and confirm type of material, mortar and additives needed for parging
 - Check specifications for materials needed and order accordingly
 - c) Set out tools, equipment and mix materials for parging
 - Explain what type of tools and equipment are needed for preparing and applying parging
 - d) Apply parge coats according to specifications
 - Check specifications and/or parge wall in accordance with accepted work practice
 - e) Cure parge coats as specified or in accordance with accepted work practice

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0534

Title: Waterproofing Below Grade Masonry

Duration: Total hours: 10

Theory: 1

Individual/Group Work: 0

Out of Class Practical: 9

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6456.01, 6456.02

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to dampproof and waterproof below grade masonry in a timely and orderly manner according to building codes, contract documents and blueprints

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 12.1 Prepare masonry surface for damp proofing or waterproofing in a timely and orderly manner according to building codes, contract documents and blueprints
 - a) Remove stains, soil or excess mortar and fills in any voids with mortar so that surface is flush
 - Prepare substrate according to manufacturer instructions
 - Inspect substrate and identify any modifications that need to be made in order to install damp proofing or waterproofing
 - Indicate where modification and/or repairs are needed
 - Remove any extraneous materials and fill voids so that substrate is compatible with damp proofing or waterproofing methods
 - Fill voids with mortar
 - Repair and or replace any backup material as necessary

12.2 Apply damp proofing or waterproofing materials in a timely and orderly manner according to building codes, contract documents and blueprints

- a) Determine if surface is to be damp proofed or waterproofed from plans or contract documents
 - Consult blueprints and contract documents
 - Confirm what application is called for, damp proofing or waterproofing
- b) Explain damp proofing requirements and methods
 - Explain that damp proofing is usually at or above grade to prevent the migration of moisture in any form, except from hydrostatic pressure, from either below grade to above grade or from the atmosphere into the wall

Methods of Damp Proofing

Through wall

Impervious course of material (slate, dense limestone, granite)

Membrane course

On wall

Portland cement coats (parging) with membrane or coatings

Waterproof membranes or coatings

Sealants (allow for evaporation but resist moisture, breathable)

- c) Select and safely apply the required treatment in accordance with building codes, manufacturer instructions and contract documents
 - Apply damp proofing or waterproofing

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Summary of Equipment Recommended for Level 2

Cementitious materials, membranes and sealants

Various hand/power tools and equipment to install materials including trowels, hammers, drills, powder actuated tools, propane, torches, etc

Computer with relevant programs (optional)

Computer driven information delivery equipment

Whiteboards, flipcharts, posters, etc

Brick & Stone Mason Level 3

Number: S0535

Title: Use and Maintain Tools and Equipment

Duration: Total hours: 20
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 17

Prerequisites: S0523

Co-requisites:

Cross-Reference to Training Standard: 6440.1, 6440.02, 6440.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate the use and maintenance of hand tools, power tools and measurement and layout tools according to manufacturers', employer's direction and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 1.1 Explain and demonstrate the use and maintenance of hand tools and equipment according to manufacturer/employer direction and accepted trade practice
 - a) Identify the hand tools and equipment using trade and manufacturers' terminology.

Equipment
Belts and cushions
Carabineers
Hydraulic metal bender
Lewis pins
Metal-hole punch
Stone cramp
Two/three/four-way hook
 - b) Select proper hand tools and/or equipment for a specific task
 - Restoration of heritage structures
 - Retrofit/Repair of existing structures

- 1.2 Explain and demonstrate the use of power tools and equipment according to manufacturer and accepted trade practice
Identify and name the power tools and equipment using trade name and manufacturer terms
Power Tools and Equipment
Air compressor
Generators
Grinders
HEPA vacuum and accessories
Platforms/PEWP
Powder actuated tools
Power washer and accessories
- 1.3 Use and maintain measuring and layout tools according to manufacturer instructions and accepted trade practice

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0536

Title: Use Material Handling and Safety Equipment

Duration: Total hours: 20
Theory: 15
Individual/Group Work: 0
Out of Class Practical: 5

Prerequisites: S0524

Co-requisites:

Cross-Reference to Training Standard: 6441.05, 6441.06, 6441.07

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to inspect and use material handling and safety equipment according to government regulations and manufacturer instructions

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

2.1 Select, inspect and erect scaffold systems according to government regulations and manufacturers' instructions.

a) Identify the various types of scaffold systems

Scaffold Systems

Swing stage
Suspended work platform
Tower scaffold
PEWP

b) Select the scaffold system for the specific task
▪ Explain variables that dictate selection

Scaffold System Variables

Highrise construction

c) Identify hazards associated with system, erection of system and site where scaffold will be erected
▪ Identify limitations to scaffold system including weight, height and engineering requirements

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0537

Title: Engineering, Building and Safety Code

Duration: Total hours: 15
Theory: 10
Individual/Group Work: 0
Out of Class Practical: 8

Prerequisites: S0525

Co-requisites:

Cross-Reference to Training Standard: 6442.01, 6442.02, 6442.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to interpret architectural drawing, specifications, schedules, contract documents, building codes, CSA masonry standards, safety codes and estimate materials for masonry jobs to an acceptable standard within the masonry industry

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

3.1 Demonstrates plan compliance with building and safety codes

- a) Explain building code requirements for masonry
 - Use building code documents to explain requirements for masonry
 - Refer to National and Ontario building codes as they relate to masonry
- b) Apply building code requirements
 - Use building code when building projects

Building Code Documents
National Building Code
Ontario Building Code
CSA Standards
ASTM Standards
Job Specifications/Contract Documents

Evaluation Structure

Theory: 40%
Practical: 40%
Final Assessment: 20%

Number: S0538

Title: Temporary Masonry Supports

Duration: Total hours: 3
Theory: 1
Individual/Group Work: 0
Out of Class Practical: 2

Prerequisites: S0526

Co-requisites:

Cross-Reference to Training Standard: 6445.01, 6445.02, 6445.03, 6445.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build, install and remove temporary masonry supports according to engineering specifications, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 4.1 Plan temporary support structures according to contract documents
 - a) Determine hoisting and rigging equipment needed to build support structure as per contract documents
 - b) Determine load/wind load requirements from contract documents or obtain relevant information required to build supports
 - Calculate or request weight of load/wind load bearing onto support

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0539

Title: Wall System Accessories

Duration: Total hours: 5
Theory: 2
Individual/Group Work: 0
Out of Class Practical: 3

Prerequisites: SO527

Co-requisites:

Cross-Reference to Training Standard: 6447.01, 6447.02, 6447.03, 6447.04, 6447.05, 6447.06, 6447.07, 6448.08

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain and demonstrate wall system accessories and how to install according to building code and standards

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

5.1 Identify and install various kinds of anchors and connectors

a) Identify various kinds of anchors and connectors

Types of anchors and connectors

Dowels, split-pins, kerf anchors

Galvanized slotted anchors

Liner Plates

Stone Cladding anchors

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0540

Title: Mortar

Duration: Total hours: 12

Theory: 1

Individual/Group Work: 0

Out of Class Practical: 11

Prerequisites: S0529

Co-requisites:

Cross-Reference to Training Standard: 6449.01, 6449.02, 6449.03, 6449.04, 6449.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to select, prepare, and apply mortar according to building codes, manufacturer instructions and building specifications

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

6.1 Prepare mortar according to CSA A179, building codes, manufacturers' instructions and building specifications and accepted work practice

a) Select and inspect components of mortar for quality

Mortar components

Hydraulic lime combined with other binders (*Restoration*)

- Select components according to contract documents
- Inspect components for compliance with the appropriate CSA Standard or building code

- 6.2 Finish mortar according to contract documents and accepted work practice
- a) Explain the various types of joints finishes, their purpose and each tool required to make them

Convex – Use a concave jointer to shape and compress a built up mortar joint into a protruding half rounded joint of various widths depending on the size of the joint. It is used mostly for stonework and for its decorative effect but not recommended for weather resistance

Square/Ribbon – Use square jointer to compress a built up portion of mortar to give a square joint appearance of various widths depending on jointer. Used mostly for decorative effect on stone and not considered to be weather resistant

Weathered Restoration joint – (This joint is relatively new as it was created to match existing joints that have some natural deterioration.) Use a slicker or sculpturing tool to compress and accent joint between the masonry materials by picking out protrusions and indentations along the arris of the unit while also giving a slightly weathered joint (see weathered joint) appearance to the joint. Then use a stiff bristled brush to further compact the joint and give a textured appearance to the joint to simulate natural weathering This is generally an uncommon joint, except in restoration but has better weather resistance and used mostly for decorative effect and to match existing work

- b) Explain the technique of finishing and tooling various kinds of joints
- Timing (See 10.4e)
 - Explain the following techniques:

Convex (see 10.4b) – Usually this joint is created after the wall is completed, most often used on stone work, and the existing joint has been raked out to receive the process of making the convex joint. Mortar, possibly coloured, is first placed into the joint flush with the units face. While this mortar is still fresh (roughly thumb print hard) the body of the convex joint is applied either by building up an area slightly higher and larger than the convex jointer being used or by using the convex jointer itself to apply the mortar. The first method has an extra process it but may prove to be more successful as the latter is hard to achieve a consistent looking joint that adheres well to the back pointed mortar

Square/Ribbon – See 10.4b square/ribbon, similar technique to that which is outlined in 10.4d convex joint except using square jointer

Beaded – See 10.4b beaded, similar technique to that which is outlined in 10.04d convex joint except using a bead jointer

Grapevine – See 10.4b grapevine, similar technique to that which is outlined in 10.4d convex joint except using a grapevine jointer
Weathered Restoration joint – See 10.4 weathered restoration joint

- c) Select the right tool or tools to finish the joint
- Select from the following:

Joints and tools

Convex – Concave jointer

Square – Square jointer (can also be made with slickers or sculptors tools and straight edge)

Weathered Restoration joint – Slickers, stiff bristled brush, sculpture tools

- 6.3 Cure and protect mortar according to building codes and manufacturer instructions and contract documents

- a) Explain the effects of various kinds of weather on the finished wall
- Explain that high heat and full sunlight will cause mortar to cure more rapidly and that shading or dampening the wall may be necessary to slow the curing process down
 - Explain that extreme cold, frost and freezing will have adverse effects on the wall and protection and heat may be required
 - Explain the effect of wind and rain on the wall and that some type of protection may be required

- b) Explain the curing techniques and protection methods

Methods of curing

Hot weather, wind or rain:

Damp cure – cover wall with burlap, plastic, blue Styrofoam

Misting – set up a series of watering devices to keep wall damp or use spray canister by hand at specified times

Solar screens – fine mesh or tarps set up to shade wall

Cold weather (See CSA A371):

Tarps and heat

- c) Select tools, equipment and material needed to cure or protect wall
- Selects scaffolding, tarps, screens and or misting devices or heating devices
- d) Apply curing and protection techniques safely
- Build scaffold, install tarps and screens (see 2.5f)
 - Install misting devices
 - Install heating devices (see 5)

- e) Removes and stores tools equipment and materials used for curing and protection
 - Remove and store tools
 - Remove and store equipment and material for reuse

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0541

Title: Masonry Unit Preparation

Duration: Total hours: 3
Theory: 3
Individual/Group Work: 0
Out of Class Practical: 3

Prerequisites: S0530

Co-requisites:

Cross-Reference to Training Standard: 6450.01, 6450.02, 6450.03, 6450.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to explain the use of masonry units and how to prepare them for installation according to manufacturers' recommendations, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 7.1 Prepare masonry units for cutting according to manufacturers' instructions, building specifications and accepted trade practice
- a) Identify, locate, select and check the masonry unit to be cut
- Identify various types of units

Types of units

Natural Stone (see 11.3)

- Locate and select masonry unit
- Select the right size, type and colour of unit

- b) Identify, select, set up and organize area and tools needed to cut masonry
 - Identify and select area and tools
 - Select area that is accessible, in open area away from regular traffic with adequate space for material storage and close to waste bins and power source if needed
 - Select tools that are needed for the type of cutting to be done and to suit power source available

Hammers and chisels (See 1.1a)

Stone chisels

7.2 Prepare masonry unit for installation

- a) Determine what is needed to prepare unit according to CSA A371 and building codes
 - Determine if any alterations must be made on unit before installation (hardware, etc)
- b) Determine what tools and equipment are needed to prepare or install unit
 - See 11.1b
- c) Demonstrate preparation needed on units
 - Demonstrate cuts, drilling and attaching of hardware or any other preparation needed

7.3 Prepare stone for cutting by locating, selecting, measuring and marking stone and cutting it according to accepted trade practice

- a) Identify, select, and check stone to be cut using plans, drawing and schedules
 - Consults plans, shop drawings and schedules to identify and select stone
 - Check stone for consistency, size, defects, bedding planes etc. as per plans and shop ticket
- b) Identify, select, set up and organize area and tools and techniques needed to cut stone
 - Identify area to cut stone (On/offsite: onsite, at place to be built or separate designated cutting area)
 - Tools and equipment needed (Bankers, scaffolds, hand/pneumatic tools, saws, etc)
 - Techniques for cutting, styles (Roughly squared, squared, dimensioned)

Finishes

Margin Draft

Plucked

Honed

Polished

Bush

Machined etc

- c) Confirm size, location and orientation of cut relative to bedding planes of stone, using shop drawings, templates and patterns
 - Consult plans and shop drawings to confirm size, orientation of stone and shape stone to be cut
 - Make necessary templates or patterns to cut stone

- d) Measure, mark and demonstrate cutting stone safely
 - Use various types of hand and power tools to cut and prepare stone

- e) Clean stone as necessary and maintain tools.
 - Cleans stone (water, dust or any other substance that may have stained stone)
 - Sand arris
 - Maintains tools
 - Keeps hammers and chisels in good repair, sharp, no beards etc
 - Clean saw
 - Replace or repair parts

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0542

Title: Job Layout

Duration: Total hours: 10

Theory: 1

Individual/Group Work: 0

Out of Class Practical: 9

Prerequisites: S0531

Co-requisites:

Cross-Reference to Training Standard: 6451.01, 6451.02, 6451.03, 6451.04, 6451.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to layout masonry according to building codes, blueprints, contract documents and accepted trade practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

8.1 Locate, match and select masonry units from contract documents or find the unit customer ordered

- a) Identify masonry units
- Identify various kinds of masonry units

Types of brick

Various commonly used sizes

Various colors

Various shapes

Various compositions

Various uses (pavers)

Types of block

Various commonly used sizes

Various colors

Various shapes

Types of manufactured stone

Various commonly used sizes

Various colors

Various shapes

- b) Match units to existing building, locate units from contract documents or find out what customer wants
 - Check plans and contract documents for required masonry unit(s)
 - Match or confirm masonry unit with appropriate person if specified unit is not available or none was specified
- c) Inspect masonry units for chips and defects before installation according to CSA A165 series and CSA A82 series
 - See 4.2c

8.2 Layout masonry walls or floors, spacing units correctly and in the right bond to the right gauge according to building codes, CSA standards, contract documents and accepted work practices

- a) Determine the type of bond to be used from the contract documents or from the type of unit being used
 - Explain brick, block or stone bonding with various types of brick, block and stone
 - Determine bond from information given in contract documents
 - Set out bond in dry layout to minimize cuts

Brick Bond Types

Running bond (0.5/0, .25/0, .33/0 lap)

English bond

Common/American bond

Herringbone

Diaper

Etc

Block bond types

Stack bond

Stone bond types

Random

Roughly squared

Dimensioned

Stack bond

Flemish bond

Decorative bonds

Basketweave

Gilbreth

Random rubble

Squared

Etc

- b) Interpret building code and CSA A371 and apply acceptable masonry practice as it relates to masonry layout
 - Consult building code and describe the specifications and codes outlined

Building Code Items

Brick – CSA A82 series

Block – CSA A165 series

Mortar – CSA A179

Walls

Connectors – CSA A370

Reinforcing

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: S0543

Title: Structural Masonry

Duration: Total hours: 38

Theory: 6

Individual/Group Work: 0

Out of Class Practical: 32

Prerequisites: S0532

Co-requisites:

Cross-Reference to Training Standard: 6452.01, 6352.02, 6452.03, 6452.04

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build structural masonry and refractory systems in a timely and orderly manner according to building codes, contract documents and blueprints

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 9.1 Build walls, beams, lintels and piers in a timely and orderly manner according to building codes, standards (CSA A371), contract documents, blueprints and accepted work practice
- 9.2 Build vaults and domes in a timely and orderly manner according to building codes, contract documents and blueprints as well as accepted work practice
 - a) Identify different types and parts of vaults and domes
Types of Arches
Parabolic
 - b) Use basic geometry to layout vault or dome with correct bond as per blueprints and contract documents
 - Know formulas for calculating radius, circumference and other related math for various types of arches
 - c) Build vaults or domes and their abutments plumb, level, square and on gauge
 - Build arches using correct methods, tools and techniques

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Number: SO544

Title: Non-Structural Masonry

Duration: Total hours: 60

Theory: 6

Individual/Group Work: 0

Out of Class Practical: 54

Prerequisites: S0533

Co-requisites:

Cross-Reference to Training Standard: 6453.01, 6453.02, 6453.03, 6454.04, 6454.05

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build non-structural masonry components in a timely and orderly manner, using plans and/or contract documents so that the components meet structural, dimensional and appearance requirements

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

10.1 Install unit masonry veneer and accessories in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice

a) Identify different types of unit masonry

Types of natural stone

Sedimentary

Metamorphic

Igneous

10.2 Install stone cladding and accessories in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice

a) Identify different types of stone

Types of natural stone

Sedimentary

Metamorphic

Igneous

- Identify that stone being used is what is specified

b) Check and confirm measurements from blueprints

- Use job documents to verify measurements
- Check measurements of stone
- Check measurements of backup or existing walls

c) Check and confirm type of material, mortar and joint specified

- Check job documents to verify materials
- Check job documents to confirm mortar/mortarless and joint type

d) Cut, split and/or shape stone as required

- Complete any work required on stone before being set

e) Prepare for anchors, setting plates or other accessories

- Drill or cut stone for setting anchors or anchor plates
- Confirm shelf angle elevations and snap gridlines to set
- Set angle iron (shelf angle) if required
- Check or confirm that angle iron or plates have been set at correct elevations

f) Select, mix and install epoxy according to contract documents and manufacturer instructions

- Use epoxy to secure anchors or plates and stone chocks to back up

g) Prefabricate reveal and soffits where possible.

- Measure and cut stone as needed to prefabricate pieces

h) Set out tools, equipment and materials to build walls, floors or other clad surfaces

- Explain what tools and equipment are needed to install stone cladding – lifting equipment, hand tools
- Explain what other accessories may be needed to install stone cladding – dowels, caulking (keep at room temperature until needed), shims, additional hardware, bender

- i) Layout walls, floors or other clad surfaces with correct bond, as per blueprints and contract documents, demonstrate dry bond when necessary
 - Use job documents to verify layout
 - j) Check layout measurements, plumb, level and square and establish gauge using levels, transits or straight edge
 - Use measurement tools to confirm all layout and existing conditions and previous laid units or plates to ensure correct positioning of units
 - k) Build (attach) leads or corners plumb, level, square and on gauge
 - Set stone at corners to use as point of reference for lines and levels
 - l) Install accessories as required
 - Install any additional accessories as wall is being built
 - m) Use mason's line to lay units in wall, floors, or other surfaces to be clad, plumb, level, square and on gauge
 - Set up line as guide
 - Use jack lines when necessary if stone must follow existing work
 - n) Tool and finish wall or other surfaces and protect as necessary or specified
 - Consult contract documents to ensure that finishing is carried out as required
 - o) Clean and maintain tools, equipment and worksite
 - Ensure that tools, equipment and worksite are cleaned as required
- 10.3 Build prefabricated masonry units in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Explain what prefabricated masonry is
 - Explain that prefabricated masonry is more commonly used with larger pieces of natural stone but can also be done with smaller unit masonry mortared together with a steel framework
- 10.4 Erect prefabricated masonry units in a timely and orderly manner according to building codes, specifications, blueprints and accepted trade practice
- a) Inspect unit(s) for size, damage, proper construction, anchors and/or lifting points
 - Access units
 - Check measurements
 - Inspect for damage in transit and document
 - Confirm lifting points and anchors

- b) Ensure that hardware can be installed as specified
 - Check for correct hardware and hardware installation (anchors, plates)
 - c) Ensure that any mortar, grout or epoxy is fully cured
 - Describe setting and curing times for epoxies and mortars
 - Ensure that units are set and cured
 - d) Calculate and/or determine from shop ticket the mass of the unit and determine the type of tools and equipment needed for erection
 - Explain how to do basic calculations for mass of masonry materials
 - Select the right kind of tools and equipment for the type of pieces being installed
 - e) Determine sequence of installation
 - Evaluate pieces to be installed and order of installation based on plans and specifications, time, space and other relevant operations onsite
 - f) Install unit by using proper tools and equipment or directing operator of equipment
 - Use communication skills and methods to properly position pieces
 - Install units using placement skills and methods with the appropriate tools and equipment safely
 - g) Ensure that units are installed and anchored as per plans and specifications
 - Checks installation to ensure that piece is secure
 - h) Explain and demonstrate how wall is to be finished
 - Explain how the wall will be finished as pieces are installed
 - i) Clean tools, equipment and worksite
 - j) Store and maintain equipment
- 10.5 Install unit masonry pavers and accessories in a timely and orderly manner according to building codes, specifications, blueprints and accepted trade practice

- a) Identify different types of masonry pavers

Types of pavers

Various commonly used sizes

Various colors

Various shapes

Various materials (clay/calcite/sand-lime/stone)

- Check and confirm measurements from blueprints/job documents
- Check and confirm type of material and mortar
- Use job documents to verify material and mortar
- Estimate and order materials

- b) Set out tools, equipment, and any materials to build floors

- Assess job for tools and equipment needed
- Set out materials

- c) Identify and use any relevant safety regulations and PPE

- Use relevant regulations (PPE, housekeeping)

- d) Prepare substrate or ground to install pavers

Types of substrate

Excavated earth, landscape cloth, compacted sand or screenings

Excavated earth, poured concrete

Foundations and poured concrete slab

- Excavate to proper depth
- Calculate slopes and angles
- Install substrate using specifications or accepted practice

- e) Layout floors with correct bond, as per blueprints and contract documents, demonstrate dry bond when necessary

- Layout wall

- f) Check layout measurements, level, straight and square and establish gauge using levels, transits or straight edge

- Check layout and establish benchmarks and grids

- g) Build leads or corners level, straight, square and on gauge

- Build leads accurately

- h) Use mason's line to lay units in floor, level, square, straight and on gauge

- Use mason's line correctly

- i) Install accessories as required
 - Install accessories

- j) Tool and finish floors and protect as necessary or specified
 - Tool and finish wall

- k) Clean tools, equipment and worksite
 - Clean tools and equipment

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0545

Title: Fireplace and Chimney

Duration: Total hours: 44
Theory: 6
Individual/Group Work: 0
Out of Class Practical: 38

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6454.01, 6454.02, 6454.03, 6454.04, 6454.05, 6454.06

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to build and maintain fireplaces, chimneys and alternative heating systems according to building codes, contract documents and manufacturer instructions

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 11.1 Construct fireplace and chimney foundations according to CSA standards, building codes and contract documents
 - a) Verify that building permits are in order and arrange inspection check off by building inspectors at critical stages of construction according to bylaws
 - Consult relevant documents to describe minimum requirements for footings and foundations for a fireplace and/or chimney
 - Consult with building official or other qualified person if necessary to establish requirements if atypical
 - b) Determine size, location and number of fireplace(s) and/or chimney(s)
 - Consult job documents to determine information regarding fireplaces and chimneys to plan for job
 - Determine from information materials list and estimate time and materials cost

- c) Determine size, location and install footings for fireplace(s) and/or chimney(s)
 - Use information from job documents and/or measurements to locate and install footings
 - Coordinate any carpentry that will have to be done in relation to fireplaces and chimneys (Opening in floor, roof system, walls near any components)

- d) Identify components and requirements of the foundation
 - Use job documents or consult with customer to verify what is needed or desired for foundation – air intake, ash dump, other heating systems that maybe be in or attached to the foundations
 - Estimate and order materials for foundations

- e) Install materials and components within the foundation
 - Lay out foundation
 - Build foundation
 - Install any components within foundation as required

- f) Install concrete slab on foundation to support fireplace and chimney with necessary components and openings for accessories
 - Install and form as necessary to pour concrete slab
 - Consult codes and install reinforcement, and any components in the slab– air intake, ash dump (if required), flue liners or opening for flue liners (if required)
 - Pour concrete and allow to cure as required

11.2 Construct firebox in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice

- a) Identify the parts of the fireplace

Fireplace Components

Ash dump, ash pit

Fresh air intake

Face

Inner shell

Firebox

Smoke chamber

Flue lining

Outer shell

Foundation

Face

Outer hearth

Chimney

Skirt
Firebox
Hearth
 Inner hearth
 Outer hearth
 Raised
 Flush
Throat
Damper
Smoke shelf
Smoke chamber

- b) Determine the size, location and type of firebox
- Use job documents to determine type of fireplace

Types of Fireplaces

Plain or conventional
Raised or flush hearth (can be integrated with most fireplace types)
Corner
 Outside corner (usually end and side open)
 Diagonal across and inside corner
Double/triple opening
Prefabricated steel circulating
Hooded/Scandinavian
Rumford

- c) Determine desired hearth height by calculating facing material and size of firebox using damper measurements or other means
- Explain the relationship of the finished fireplace to the rough-in
 - Calculate finished hearth height in order to build rough sub-inner hearth to lay firebox floor on, to correspond to finished outer hearth
 - Determine damper size and acquire damper to use for layout purposes
- d) Build sub-hearth if required to suit firebox dimensions and regulations with provisions for fresh air intake and ash dump if needed
- Calculate and build the sub-hearth to accommodate all accessories and firebox
- e) Determine materials and requirements to construct firebox
- Calculate firebrick and mortar required
- f) Determine tools and equipment required
- Determine power and hand tools needed to build firebox
- g) Determine safety regulation and PPE requirements
- Consider dust and/or chemicals used

- h) Layout firebox and construct according to regulations
 - Use damper as template to mark out where firebox will be built
 - Layout and build firebox floor (must be large enough to completely support firebox walls)
 - Layout firebox walls using damper as template
 - Build firebox calculating cuts and angles needed as construction proceeds
 - Cut firebrick to keep mortar joints as thin as possible (1.5mm to a maximum of 3.0mm)
 - Compound angle cuts must be calculated for back wall angle
 - Throat of firebox must correspond to inside measurement of damper
- 11.3 Install damper and construct smoke chamber in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Ensure that throat of firebox is equal to inside measurements of damper
 - Check that firebox is constructed to correct dimensions using damper as template
 - b) Determine material requirements and regulations of backup walls
 - Calculate the amount of brick needed to build backup walls
 - Consult regulations to ensure code compliance for thickness of backup walls and clearances that may apply
 - c) Construct backup walls to firebox according to regulations
 - Lay out and build backup walls to regulations
 - Keep clearances from firebox and combustibles
 - Determine requirements for corbel/battering of brickwork to accommodate smoke shelf at the appropriate time
 - Keep backup work aligned and gauged with front edge of firebrick to accommodate crossover angle iron over damper
 - Keep backup work at smoke shelf location slightly down to allow for concave smoke shelf

- d) Construct smoke shelf and smoke chamber according to regulations
 - Ensure that smoke shelf is the correct depth and finished with a smooth surface
 - Calculate the size of flue liner needed for the fireplace being built
 - Determine flue liner by using code/contract documents or standards, use calculations based on fireplace opening and chimney heights
 - Construct smoke chamber to code after installing damper (see 15.03e)
 - Build the battered walls of smoke chamber appropriately to the finished height that will allow for the proper size of flue liner to sit on the top, make template of flue liner
 - Build the back wall of the smoke chamber plumb while the sides and front batter in to align parallel and perpendicular to each other for a typical fireplace, atypical fireplaces may require different smoke chamber configuration
 - e) Install damper as per building code and accepted practice
 - Install damper on throat of firebox so that there are no voids underneath and not embedded in mortar, allowing for expansion
 - Use fireproof material to close up or cover any voids or parts of damper that may get embedded because of mortar droppings or brick battering above damper
 - Ensure that all parts of damper have been assembled before installation. If screw type damper control. Thimble mechanism is installed, height should be accommodated
 - f) Calculate and ensure that opening at top of smoke chamber is suited for correct flue liner
 - Ensure that the inside measurement of the smoke chamber opening is equal to the inside measurement of the selected flue liner
- 11.4 Build chimney and cap in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Calculate materials needed for chimney
 - Determine height and size of chimney
 - Calculate backup brick (if needed, face brick and flue liners)
 - b) Determine tools and equipment required and set up for construction of chimney
 - Determine scaffold and tools need to construct chimney
 - c) Build chimney according to regulations and contract documents
 - Describe regulations about clearances
 - Describe separation of flue liners
 - Describe regulation about termination heights
 - Build chimney

- d) Explain how and where flashing is installed at roof intersection
 - Install appropriate flashings at chimney and roof intersection
 - e) Build or install cap according to regulations and contract documents
 - Build (form and pour) or install precast cap
 - Describe overhang and drip regulations
 - Describe min/max regulations of cap to flue liner heights
 - f) Test fireplace and chimney
 - Test fireplace and chimney to ensure proper function and air tightness
- 11.5 Construct fireplace face and outer hearth in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Calculate and determine facing materials, bonding patterns, mantles and other accessories
 - Determine through consultation with customer the desired material for fireplace facing
 - Consult codes, contract documents, and manufacturer instructions regarding materials or accessories being used on face
 - Ensure that material courses out to height and other dimensions on face
 - Ensure that hearth and mantle pieces are available and correspond with design, gauge and heights
 - b) Determine tools and equipment required to construct facing and hearth
 - Explain what tools and equipment are needed to build facing and hearth
 - c) Construct face and outer hearth according to regulations
 - Describe clearances and minimum/maximum allowances for hearth, facing, mantle and accessories
- 11.6 Construct or install alternative masonry heating systems in a timely and orderly manner according to building codes, contract documents, blueprints and accepted trade practice
- a) Identify and name alternative masonry heating systems
 - Alternative masonry heating systems
 - Precast designs
 - Finnish model
 - Russian model
 - Wood/pellet stoves
 - Fireplace inserts
 - Masonry ovens

- b) Calculate materials needed for system
 - Estimate materials for various systems based on manufacturer designs or blueprints
- c) Determine tools and equipment needed to build system
 - Determine what tools and equipment are needed in relation to the location, size and type of system being used
- d) Explain and/or build system according to regulations and contract documents
 - Use plans and knowledge to build or explain system
- e) Explain and/or build or connect chimney for system
 - Describe how to connect system to chimney depending on type of system

Evaluation Structure

Theory: 20%
Practical: 60%
Final Assessment: 20%

Number: S0546

Title: Restoration Masonry

Duration: Total hours: 10

Theory: 3

Individual/Group Work: 0

Out of Class Practical: 7

Prerequisites: None

Co-requisites:

Cross-Reference to Training Standard: 6455.2, 6455.03

GENERAL LEARNING OUTCOMES

Upon successful completion the apprentice is able to demonstrate how to restore and maintain existing masonry according to restoration principles in a timely and orderly manner according to building codes, contract documents, blueprints and accepted work practice

LEARNING OUTCOMES

Upon successful completion the apprentice is able to:

- 12.1 Repair and/or remove and replace damaged joints and parging according to codes, contract documents and accepted work practice
 - a) Prepare for replacement of joints and parging
 - Assess and determine what joints or parging need repair
 - Remove deteriorated joints or parging using specified or accepted practice
 - Clean out and prepare joint for repointing using specified or accepted practice
 - b) Explain how to evaluate, prepare and install a compatible and comparable mortar
 - Evaluate original mortar and joint
 - Describe components and proportions of restoration mortars
 - Explain how to prepare a comparable mortar as specified
 - Ensure that mortar is compatible with the condition of the surrounding material
 - Install mortar according to specified or accepted practice

- c) Protect and cure repair
 - Explain how to protect and cure joint or parging repair
 - Describe damp curing
 - Describe misting techniques

Evaluation Structure

Theory: 20%

Practical: 60%

Final Assessment: 20%

Summary of Equipment Recommended for Level 3

Building Materials, Cleaning Materials, Restoration materials and specialty tools for repairs

Dampers, air intake, flue liners

Various hand/power tools and equipment to install materials including trowels, hammers, drills, powder actuated tools, propane, torches, etc

Computer with relevant programs (optional)

Computer driven information delivery equipment

Whiteboards, flipcharts, posters, etc