# Mason and Tile Setting Standards and Skills

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## Health & Safety Standards

### Standard 1: Safety and Health in a Masonry and Tile Setting Environment

Students will prioritize safety by adhering to OSHA standards demonstrating proper use of personal protective equipment (PPE), masonry tools and equipment, and effectively identifying and mitigating workplace hazards.

* Aligned Industry Recognized Credentials: OSHA10 – Construction, OSHA – Hazards of Asbestos, Hoisting Apprentice License

#### Skills:

1. Identify, describe, and demonstrate the effective use of Safety Data Sheets (SDS) to meet documentation requirements.
2. Locate emergency equipment, first aid kit, and emergency action and response plan, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM).
3. Demonstrate safe use, storage, and maintenance of masonry hand tools, power tools, ladders, and scaffolding.
4. Demonstrate safe dress and use of relevant safety gear, personal protective equipment (PPE) and jobsite ergonomics, e.g., safety equipment, gloves, proper footwear, knee pads, earplugs, eye protection and breathing apparatus.
5. Identify fall hazards, demonstrate scaffold safety practices, and effective use of fall arrest systems.
6. Demonstrate safe body mechanics, including appropriate lifting techniques and ergonomics aimed at minimizing injury.
7. Interpret all placards, operation manuals, safety codes and other information pertinent to safe hoisting operations.
8. Demonstrate use, storage, and disposal of various masonry related materials, including cements, sands, mixes, and various chemicals according to manufacturers’ specifications.
9. Demonstrate proper disposal of hazardous waste including solvents and sealants regulated under the Resource Conservation and Recovery Act (RCRA) and enforced by the EPA.
10. Comply with appropriate fire protection regulations, local permit regulations, and state/federal regulations.

## Technical & Integrated Academic Standards

### Standard 2: Role of Masonry and Tile Setting Professionals in Society

Students will examine the role of masonry and tile setting professionals in society, apply fundamental concepts of masonry and tile setting, analyze the evolution of design trends, construction methods, and material innovations.

* Aligned Industry Recognized Credentials: Hoisting Apprentice License

#### Skills:

1. Explain the impact of Massachusetts General Laws and regulations on the masonry and tile setting industry and identify key regulations, compliance requirements, and licensing requirements.
2. Apply Massachusetts General Laws and regulations as they relate to hoisting machinery.
3. Explain how modern EPA regulations have changed the masonry and tile setting industries and evaluate industry best practices employed to address these regulations.

### Standard 3: Technical Drawings and Project Management

Students will be able to read and interpret all aspects of technical drawings, blueprints, and job specifications, enabling them to plan and execute masonry and tile setting projects efficiently.

#### Skills:

1. Interpret print terms, abbreviations, symbols, line types, symbols, and notes of technical drawings and blueprints.
2. Explain the basic layout of a set of prints, as well as the importance of the accompanying job specifications documents in determining work requirements.
3. Interpret and follow drawing dimensions using an architect’s scale.
4. Examine state and local building codes, inspection processes, and zoning regulations.
5. Demonstrate the use of drawing to mark reference points on construction materials to maintain precision and reduce errors.
6. Develop a comprehensive schedule outlining tasks and key checkpoints from project initiation to completion.
7. Calculate the cost of job site preparation to include in project bid.
8. Calculate quantities of materials required for a job and create a material takeoff sheet.
9. Calculate and provide documentation for a project bid, including material, labor, contingencies, and overhead costs.
10. Demonstrate effective communication with clients, contractors, and other tradespeople to understand project requirements, address concerns, and deliver satisfactory outcomes.
11. Explain management roles and responsibility of a job site supervisor/foremen.

### Standard 4: Masonry Tools and Scaffolding

Students will demonstrate proficiency in the safe and effective use and maintenance of modern masonry tools and scaffolding equipment to execute various masonry tasks with precision and efficiency.

#### Skills:

1. Demonstrate accurate measurement techniques for determining lengths, widths, and heights to calculate project area and volume, and to determine the quantity of materials needed to meet project specifications.
2. Select and use appropriate hand and power tools for a given masonry project to ensure efficiency and accuracy.
3. Demonstrate safe operation of various electric and gas-powered equipment including saws, grinders, hammer drills, and power mixers.
4. Demonstrate set-up and operation of a diamond-blade wet saw to cut tile, shape stone, and cut pavers and bricks.
5. Demonstrate the correct technique for cutting brick and block with a hammer and set.
6. Establish grades and/or heights with a builder’s level to ensure precise alignment and elevation in masonry and tile installations.
7. Demonstrate how to level, plumb, and range units accurately to ensure structural integrity and aesthetic appeal.
8. Determine the use of a laser level, string lines, and chalk lines to ensure the most efficient method of achieving precise leveling and alignment in masonry and construction projects.
9. Demonstrate the procedures for erection and dismantling of steel tubular scaffolding at different heights and locations.

### Standard 5: Hoisting and Rigging

Students will be able assist with hoisting and rigging actions by identifying the center of gravity of materials to be moved, selecting proper equipment, and using appropriate communication with crane operator. Schools must pursue a variance with the Office of Public Licensure to allow for students to take the Hoisting Licensure exam at 16. Students must pass the test before operating hoisting equipment.

* Aligned Industry Recognized Credentials: Hoisting Apprentice License

#### Skills:

1. Explain all working parts of hoisting machinery and purposes of rigging components to ensure safe operating practices.
2. Utilize rigging component charts to determine the proper type and size of devices required for specific tasks.
3. Calculate and apply appropriate sling angle in accordance with industry standards.
4. Use appropriate terminology to communicate with the crane operator by headset or radio.
5. Use correct hand signals for collaborating with the crane operator during a lift.
6. Follow visual instructions on posted signs to ensure safety.

### Standard 6: Brick Bonds, Paving, Leads, and Corners

Students will be able to demonstrate layout and position of brick bonds, prepare a base area for pavers, and construct various brick leads, masonry units, corners, and walls.

#### Skills:

1. Identify, select, and demonstrate use of basic brick and concrete paver tools to facilitate efficient and accurate installation of paving projects.
2. Identify appropriate mortar for a specified application, select the ingredients, and demonstrate the procedure of mixing various cementitious products to ensure strong and durable bonds between masonry units.
3. Prepare a base for the area to be paved to provide a stable foundation and promote proper drainage.
4. Demonstrate the layout of brick and block bonds and positions, e.g., Stretcher or Running, Common or American, English, Flemish, and Stack Bond, to ensure structural integrity and meet industry standards.
5. Demonstrate installation of pavers using various patterns, e.g., Basket Weave, or Herringbone pattern, to optimize durability and meet industry standards.
6. Demonstrate the construction of various brick leads, e.g., inside and outside brick corner leads, brick quoin corner, brick jam lead, and brick rack-back lead, to ensure precise alignment and structural integrity in bricklaying projects.
7. Demonstrate construction of corner leads using concrete masonry units (CMUs) of various sizes (4", 6", 8", and 12") to establish the proper alignment and structural support for walls.
8. Demonstrate the ability to construct walls between established corner leads or deadmen using CMUs of various sizes (4", 6", 8", and 12") with precision, ensuring stability, and adherence to layout specifications.

### Standard 7: Masonry Finishing and Restoration

Students will demonstrate jointing, cutting, and washing techniques on masonry walls to ensure compliance with job specifications and industry standards.

#### Skills:

1. Inspect work sites to determine the condition or necessary repairs needed to maintain masonry structures in optimal condition.
2. Remove worn, damaged, or outdated materials from work areas to prepare for renovations and repairs.
3. Demonstrate the use of various jointing techniques, e.g., flush joint, raked joint, struck joint, V joint, beveled joint, and concave joint to achieve desired visual effects.
4. Select and apply appropriate finishing materials to mortar to achieve desired look and weatherproofing.
5. Cut out joints and tuck point wall on existing work to improve appearance and stability.
6. Demonstrate the 'Wash-Down' procedure using chemical cleaners, emphasizing the differences between cleaning clay brick masonry and architectural concrete masonry**.**

### Standard 8: Building, Reinforcing, and Waterproofing

Students will apply fundamentals of building layout, new construction, reinforcement, and waterproofing to diverse masonry wall projects.

#### Skills:

1. Demonstrate how to snap chalk lines and square layout using 3-4-5 method (Pythagorean Theorem).
2. Lay out openings and space for doors and windows, including sills and lintels at designated heights.
3. Demonstrate the construction of various masonry walls, e.g., brick or block veneer on a wood-frame structure and composite walls with brick and block.
4. Demonstrate construction of partition and cavity walls aligned to structural and architectural requirements.
5. Identify load-bearing and non-load-bearing walls to accurately assess the intended load distribution and architectural design requirements.
6. Mix various cement materials by hand and/or with power mixers (mortar, concrete, grout) to ensure proper consistency, strength, and workability.
7. Analyze the effects of cold and hot weather conditions on the workability and curing of mortar, grout, concrete, and tile adhesives.
8. Demonstrate techniques to adjust material preparation and construction processes to ensure structural integrity and performance in extreme temperatures.
9. Analyze and compare various methods of reinforcing masonry walls, including steel reinforcement, bond beams, lintels, shear walls, fiber reinforcement, carbon fiber reinforcement, grouted cells, and anchor systems, to understand advantages, limitations, and applications in modern construction practices.
10. Demonstrate installation of reinforcement methods including wire reinforcement and tracking in bed joints, anchors and wall ties, and cutting, bending, and installing rebar and wire mesh.
11. Evaluate structural requirements and building codes to select the most appropriate reinforcement method for specific masonry wall applications, optimizing structural integrity and durability.
12. Identify and compare temporary and permanent bracing systems, including wood, steel, and tension braces, and select the appropriate system based on wall size, construction stage, and environmental conditions.
13. Demonstrate installation of a temporary bracing system, ensuring it is securely fastened to the wall and the ground or floor to provide adequate support.
14. Select and implement appropriate methods for weatherproofing masonry walls to prevent moisture infiltration and maintain the structural integrity of the building envelope.
15. Demonstrate the installation of flashings and application of sealants or other protective coatings for waterproofing.

### Standard 9: Tile Setting

Students will demonstrate tile setting procedures by preparing project areas, executing various tile patterns, and ensuring precise alignment, proper adhesion, and meticulous grouting techniques.

#### Skills:

1. Identify tile setter’s basic hand tools and demonstrate the safe use of each.
2. Execute tile layouts, considering factors such as pattern alignment and tile orientation, to achieve aesthetic balance.
3. Evaluate and contrast various types of tiles, adhesives, grouts, sealants, and substrates, and select and apply them according to project requirements and industry best practices.
4. Prepare the substrate, including leveling, priming, and waterproofing, to ensure a stable and durable base for tile installation.
5. Demonstrate accurate tile cutting with wet saws and other cutting tools to achieve clean cuts, especially for irregular shapes and intricate designs.
6. Demonstrate applying tile adhesives or thin set mortar evenly and at the correct thickness to achieve strong bonds between tiles and substrates.
7. Demonstrate grouting techniques, including grout selection, application, and finishing, to achieve smooth and uniform grout lines and enhance the appearance of the installation.
8. Seal tiles and grout to protect against stains, water damage, and mold growth, and provide clients with guidance on proper maintenance.
9. Troubleshoot common issues such as uneven substrates, tile lippage, or adhesive failure, and implement effective solutions to ensure quality results.

### Standard 10: Concrete Placement and Finishing

Students will demonstrate concrete placement skills and finishing techniques, utilizing appropriate tools and methods to achieve high-quality results.

#### Skills:

1. Demonstrate the proper use of tools such as screeds, bull floats, edgers, brooms, and groovers.
2. Calculate the volume of the project area and express the answer in cubic feet.
3. Calculate the conversion of cubic feet to cubic yards accurately to ensure the correct amount of concrete is ordered.
4. Prepare the work area to grade, measure, level, and position forms or molds in accordance with project specifications.
5. Place concrete, screed, and bull-float the concrete surface to achieve a level and smooth surface.
6. Demonstrate edging and grooving with consideration to the importance of proper joint placement and spacing in controlling cracking and promoting durability.
7. Demonstrate various finishing techniques, e.g., broomed, troweled, and stamped pattern, to achieve specified finish.
8. Remove excess materials from finished projects adhering to environmental regulations and guidelines.

### Standard 11: Chimneys, Fireplaces, Arches, Residential, and Ornamental Masonry

Students will demonstrate construction of diverse masonry projects by accurately interpreting and implementing working drawings.

#### Skills:

1. Construct residential chimneys and fireplaces to specifications according to industry and OSHA standards.
2. Construct single or double flue chimney to ensure proper venting and smoke evacuation in accordance with building codes.
3. Construct firebox with ash dump, damper, and smoke chamber to facilitate efficient and safe operation of the fireplace system.
4. Install lead flashing, cap chimney, and install roofing materials to effectively weatherproof the chimney structure and prevent water infiltration.
5. Layout and construct various arches, e.g. segmental, semi-circular, and gothic.
6. Construct wooden forms and arches to specifications using appropriate materials, tools, and techniques.
7. Demonstrate construction of residential and ornamental masonry, e.g. brick and block planter with cap, and brick steps with a platform.
8. Demonstrate techniques required to construct a curved masonry project such as a serpentine wall or well.
9. Install a retaining wall, including concepts of load-bearing capacity, soil mechanics, drainage engineering, and structural reinforcement.

## Employability Standards

### Standard 12: Employability Skills

Students will understand and demonstrate the roles of professional communication, critical thinking, problem solving, professionalism, teamwork, and collaboration within the context of Masonry and Tile setting careers.

#### Skills:

1. Apply the concept of teamwork to a commercial project to improve outcomes.
2. Describe effective methods of communication with clients about products, procedures, and policies.

## Entrepreneurship Standards

### Standard 13: Entrepreneurship

Students will be able to describe opportunities for entrepreneurship and be able to evaluate the value proposition of business ownership in the Masonry and Tile Setting industry.

#### Skills:

1. Describe a business model of a company that employs masonry/tile setting professionals.
2. Evaluate the licensing, regulatory, and tax implications of self-employment and business ownership as a masonry/tile setting professional compared to W-2 employment.

## Digital Literacy Standards

### Standard 14: Digital Literacy

Students will be able to demonstrate the use of common software and information technology in a Masonry and Tile Setting work environment.

#### Skills:

1. Demonstrate the use of a common ticketing/jobsite management system for masonry and tile setting bids and jobs.
2. Demonstrate the use of common scheduling, resource management, and customer relationship software systems.
3. Understand where to find online resources that support effective masonry and tile setting work and how to be a safe and ethical consumer and creator of digital content.
4. Apply strategies for using digital tools and technology to drive business and commerce.