



*Vocational Technical Education Framework*



Construction Occupational Cluster

***Masonry & Tile Setting (VMASN)***

CIP Code 460201

June 2014

**Massachusetts Department of Elementary and Secondary Education**

**Office for Career/Vocational Technical Education**

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# Acknowledgements

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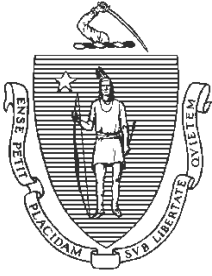
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## Commissioner's Letter

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Mitchell D. Chester, Ed.D.  
Commissioner

July 2014

Dear Colleagues,

I am pleased to present to you the *Massachusetts Vocational Technical Education Frameworks*, adopted by the Department of Elementary and Secondary Education in June 2014. These frameworks, one for each of the 44 vocational technical programs, include standards in multiple strands representing all aspects of the industries that students in the vocational technical education program are preparing to enter.

The frameworks also include a crosswalk between the technical standards and relevant standards in Massachusetts Curriculum Frameworks to support effective integration of academic and technical content.

The comments and suggestions received during revision of the 2007 *Massachusetts Vocational Technical Education Frameworks* have strengthened these frameworks. We will continue to work with schools and districts to implement the 2014 *Massachusetts Vocational Technical Education Frameworks* over the next several years, and we encourage your comments.

I want to thank everyone who worked with us to create challenging learning standards for Massachusetts students. I am proud of the work that has been accomplished.

Sincerely,

Mitchell D. Chester, Ed.D.  
Commissioner of Elementary and Secondary Education

# Introduction

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## Overview & Organization and Key Changes

### Overview

The Massachusetts Department of Elementary and Secondary Education understands the necessity of maintaining current Vocational Technical Education Frameworks which ensure career/vocational technical education students across the Commonwealth are taught the most rigorous standards aligned to the needs of business and industry.

With the advent of the Massachusetts Teaching & Learning System the Office for Career/Vocational Technical Education (CVTE) recognized the significance of including career/vocational technical education in the system and developed a comprehensive plan for including vocational technical education. The plan was designed in a Two Phase Process. Phase One included the revision of strands two, three, and six, of all of the Vocational Technical Education Frameworks. Phase Two consisted of three major components (projects) all equally crucial;

1. The revision of Strands One, Four, and Five to complete the revision of all six strands of the Vocational Technical Education Frameworks;
2. Statewide Professional Development on all revised strands, with training on strands two, three, and six delivered fall 2013, and training on strands one, four, and five delivered spring 2014;
3. The creation and development of additional Model Curriculum Unit (MCU) Teams.

The Office for Career/Vocational Technical Education Framework Team, with support from consultants, began Phase One in the 2012-2013 school year, to revise three of the six strands contained in all of the Vocational Technical Education (VTE) Frameworks. The state was organized into “Collaborative Partnerships” comprised of teams of project administrators, highly qualified subject matter educators, and business and industry partners, whose task was to revise Strand Two – Technical, Strand Three – Embedded Academics, and Strand Six – Technology Literacy. Each team met with a vocational advisory committee which included business and industry representatives and postsecondary education professionals, whose mission was to review and revise the team’s draft document during the revisionary process. Once strand two was revised, academic teachers (typically one English Language Arts teacher, one Mathematics teacher, and one Science teacher) worked with the technical subject matter teachers to develop a crosswalk between academic curricula standards and the technical standards, and provided examples of embedded academic content.

The Office for Career/Vocational Technical Education solicited statewide input from technical and academic teachers and administrators at the annual Massachusetts Association of Vocational Administrators (MAVA)/Massachusetts Vocational Association (MVA) - Connecting for Success Conference. Each framework team met with their content colleagues and reviewed the draft revisions and obtained valuable feedback. Additionally, all drafts were reviewed and revised by the Massachusetts Vocational Technical Teacher Testing Program, to ensure appropriate measurable language.



Project consultants designed a new template to ensure all framework teams entered new standards and additional resources in a consistent manner. The framework teams created an “Appendix” listing potential industry recognized credentials attainable by secondary students; lists of professional, student, and relevant government organizations; and useful resources and websites. *\* It is important to note that although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted. Disclaimer: Reference in the Appendices Section to any specific commercial products, processes, or services, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement or recommendation by the Massachusetts Department of Elementary and Secondary Education.*

The Office for Career/Vocational Technical Education facilitated a comprehensive vetting process throughout the Commonwealth. During the fall of 2012 districts throughout Massachusetts solicited feedback from each Vocational Program’s Advisory Committee members at the Fall Board meetings. Additionally, the Office for Career/Vocational Technical Education met with various licensing boards at the Massachusetts Division of Professional Licensure and provided the applicable draft framework to each board for review. All framework drafts were posted on the CVTE website for public comment. Comments and suggested revisions received were shared with each framework team for response and edits, as appropriate.

The Phase I Process was completed on an accelerated timetable and resulted in all Vocational Technical Education Frameworks; Strand Two and Strand Six, revised with current, rigorous, relevant standards. Strand Three has been redesigned into a crosswalk which directly correlates academic and technical standards. An appendix of useful material for technical teachers recommended by their peers was added to each framework.

Phase II of the Framework Revision Process consisted of three major projects;

1. The Strands One, Four & Five Project, to complete the revision of all six strands of the Vocational Technical Education Frameworks;
2. Statewide Professional Development on all revised strands, with training on strands two, three, and six delivered fall 2013, and training on strands one, four, and five delivered spring 2014;
3. The creation and development of additional Model Curriculum Unit (MCU) Teams.

The Strands One, Four, & Five Project began in the fall of 2013 with the formation of a leadership team and three work groups. Co-Managers led the leadership team comprised of three Strand Coordinators who facilitated work teams and reviewed, researched, and revised these common strands. All skills specific to the vocational technical program have been included into Strand Two Technical.

The Strand One Team revised the safety knowledge and skills that all students need to acquire. The team included relevant issues (i.e., bullying, climate), laws, regulations, guidelines and policies pertaining to safety.

The Strand Four Team revised the Employability Knowledge and Skills that all students need to acquire. Teams considered current research on career readiness, including the work of the College Career Readiness Task Force convened by the Department, changes in workplace, technological changes that impact how people perform their work (i.e., communications methods), and included standards that

emphasize the need for lifelong learning and adaptability given the multiple career changes over and an individual's working life. The team recommended this strand be renamed to: Career Readiness.

The Strand Five Team revised the Management & Entrepreneurship Knowledge and Skills that all students need to acquire. All business owners and employees must possess management and financial skills to be productive members of society. Skills included financial knowledge and basic business management skills.

All Strand One, Four and Five Project Teams worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Massachusetts Career and Technical Student Organizations to crosswalk standards to national Career & Technical Student Organizations Curricula, as applicable.

The Office for Career/Vocational Technical Education contracted the MAVA Consultant Team to work closely with the office to complete all of the work accomplished during Phase II of the Project.

A remarkable amount of work was accomplished through the efforts of hundreds of professionals who collaborated and diligently supported this work. The Office for Career/Vocational Technical Education is grateful for all the support received from the field, particularly all of the teachers (technical and academic), administrators, advisory committee members, business and industry representatives, the Division of Professional Licensure - boards, the Massachusetts Association of Vocational Administrators, the MAVA Consultants, and the Massachusetts Vocational Association, whose contributions were tremendous.

Special thanks to all staff in the Office for Career/Vocational Technical Education and the CVTE Framework Revision Team who provided guidance and numerous contributions during Phase One of the project.

## Organization and Key Changes

This section contains the following:

- Highlights of Changes to the Vocational Technical Education Frameworks; which includes a summary of changes made to each strand.
- Organization of the Frameworks – Strand Two illustrates structure of topic headings, standards and objectives, and performance examples.

### Highlights of Changes to the Vocational Technical Education Frameworks:

#### Strand One:

Safety and Health Knowledge and Skills have been revised to contain the safety standards that are common to all programs. The Strand One Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Career and Technical Student Organizations (CTSO) to crosswalk standards to national CTSO Curricula, as applicable.

- No objectives were deleted, only modified.
- Language and wording was clarified.
- Additions included a focus on maintaining a safe school and workplace in terms of creating a positive climate/environment.
- Student safety credential program has been revised.
- Safety attire has been revised.
- Emergency equipment and fire safety has been revised.
- Many new Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: "Organization of the Frameworks – Strand Two". All strands were organized in that manner, with the exception of the former Strand Three.

#### Strand Two:

The Technical Standards Knowledge and Skills have been revised to reflect business and industry changes since the adoption of the 2007 Vocational Technical Education Frameworks (VTEF). There are additional changes to Strand Two below:

- The Technical Knowledge and Skills (Strand Two) section contains standards specific to the particular vocational program; suffix "a" (as common to all programs) and suffix "c" (as common within a cluster) have been removed.
- Each VTEF Strand Two begins with safety and health knowledge and skills specific to the particular vocational program.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below

titled: “Organization of the Frameworks – Strand Two”. All strands were organized in that manner, with the exception of the former Strand Three.

- Strand Two of the Frameworks for Animal Science, Environmental Science and Technology, and Horticulture, begin with core standards required for all participants in the programs, followed by a series of standards organized in concentrations. See the section below titled: “Organization of the Frameworks – Strand Two” for more information.
- An update to some of the vocational programs framework is the addition of advanced or supplemental standards which are noted in Strand Two by an asterisk (\*). *These standards are not required, but are provided as suggestions that districts may choose to use to increase the depth of a particular topic, or add additional topics, particularly for advanced students or for those seniors who do not participate in cooperative education.* See the section below titled: “Organization of the Frameworks – Strand Two” for more information.

### Strand Three:

Since the purpose of Strand Three was to correlate academic content that was *embedded* in the knowledge and skills necessary to perform certain technical skills, it was logical to highlight those connections through a crosswalk between the academic curriculum standards and the technical standards (Strand Two). The crosswalk directly correlates the English Language Arts (2011) and Mathematics (2011) Frameworks, incorporating the Common Core Standards and the Science and Technology/Engineering Frameworks. The crosswalk can be found in the appendix of each vocational framework. The crosswalk also includes performance examples which illustrate integrated academic and technical content.

- Embedded Academics has been replaced with a crosswalk between the academic curriculum standards and the technical knowledge and skills standards. The crosswalk is located in the Appendices.

### Strand Four:

Employability (and Career Readiness) Knowledge and Skills focused on providing students with general knowledge and skills to be college and career ready. The Strand Four Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Career and Technical Student Organizations to crosswalk standards to national CTSO Curricula, as applicable.

- Language and wording were clarified.
- Additions included a focus on providing students with skills for employability/career readiness.
- Modifications included Career Exploration & Navigation, Communication in the Workplace, and Work Ethic & Professionalism.
- New Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: “Organization of the Frameworks – Strand Two”. All strands were organized in that manner, with the exception of the former Strand Three.

### Strand Five:

Strand Five contains Management and Entrepreneurship Knowledge and Skills that are general for all students. The Strand Five Team worked collaboratively with staff from the Department of Elementary and Secondary Education and the Advisors of the Massachusetts Career and Technical Student Organizations to crosswalk standards to national Career & Technical Student Organizations Curricula, as applicable.

- Language and wording were clarified and organized into a logical format.
- The Strand Five Team felt that the 2007 curriculum remained valid.
- Additions included a focus on providing students with skills for management and entrepreneurship applicable to all vocational programs.
- Modifications included Starting and Managing a Business, Marketing, and Financial Concepts & Applications in Business, and Legal/Ethical/Social Responsibilities.
- New Performance Examples have been included.
- Within each strand, standards and objectives were grouped under Topic Headings, which are displayed in bold. Each standard is followed by a performance example. See the section below titled: "Organization of the Frameworks – Strand Two". All strands were organized in that manner, with the exception of the former Strand Three.

### Strand Six

Strand Six Technology Literacy Knowledge and Skills has been replaced with the 2008 Massachusetts Technology Literacy Standards and Expectations Framework.

## Appendix<sup>1</sup>

Each framework contains an “Appendix” section which includes an Embedded Academic Crosswalk, Industry Recognized Credentials, Statewide Articulation Agreements, Professional, Governmental, and Student Organizations, Resources, and relevant websites.

The Appendix<sup>2</sup> contains:

- Embedded Academic crosswalks for English Language Arts, Mathematics, and Science & Technology/Engineering.
- Statewide Articulations: Current statewide Articulation Agreements and/or Apprenticeship Programs available to the specific vocational program are listed on this page. The development of new statewide articulations continues, and therefore these pages will be revised as new agreements are finalized.
- Industry-Recognized Credentials: Technical Teacher Teams generated lists of credentials for the vocational programs. Program Advisory Committees throughout the state reviewed and provided recommendations through the validation process. *The credential list has been provided as a resource only and districts are not obligated to provide all of the specified credentials for students.*
- Other: These pages provide lists of reference materials, government agencies, professional and student organizations, and useful websites created by each framework team. These are intended as helpful resources for technical teachers, identified by peers. These are not recommended or required by the Department of Elementary & Secondary Education.

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<sup>1</sup> *Note: Although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted.*

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## Organization of the Frameworks – Strand Two

The Vocational Technical Education Frameworks contain knowledge and skills covering all aspects of industry, reflected in six strands: Safety and Health, Technical, Embedded Academics, Employability, Management and Entrepreneurship, and Technological.

Within each strand, standards and objectives were grouped under topic headings, which are displayed in bold. Each standard is followed by a performance example. In the excerpt below, 2.A is the topic; 2.A.01 is the first standard and 2.A.01.01 and 2.A.01.02 are the objectives under that standard.

### **2.A Automotive Technology Specific Safety Practices**

- 2.A.01 Identify and describe safety procedures when dealing with different types of automotive lifts according to current industry standards.
- 2.A.01.01 Demonstrate procedures for safe lift operations.
- 2.A.01.02 Demonstrate safe use, placement and storage of floor jacks and jack stands.

2.A.01 Performance Example:

- Student will set up lift using manufacturer’s suggested lift points.

- 2.A.02 Demonstrate and describe safety procedures when dealing with high pressure systems including necessary ventilation according to current industry standards.
- 2.A.02.01 Describe and demonstrate the importance of safety procedures to be used when servicing high pressurized systems (fuel systems, brakes, air conditioning, suspension, hydraulic systems, etc.).
- 2.A.02.02 Describe and demonstrate safe use of oxygen/acetylene torches and electric welding equipment.
- 2.A.02.03 Demonstrate ventilation procedures to be followed when working in the lab/shop area.

2.A.02 Performance Example:

- Student will relieve fuel system pressure to perform necessary repairs.

- 2.A.03 Identify and describe safety procedures when dealing with electrical circuits according to current industry standards.
- 2.A.03.01 Describe safety procedures to be followed when servicing supplemental restraint systems.
- 2.A.03.02 Demonstrate safety awareness of high voltage circuits of electric or hybrid electric vehicles and related safety precautions.

2.A.03 Performance Example:

- Safely disable Supplemental Restraint System (SRS) air bag for repair using manufacturer’s recommendations.

There are additional changes to some of the Frameworks Strand Two (Technical Knowledge and Skills). Specifically, Strand Two of the Frameworks for Animal Science, Environmental Science and Technology and Horticulture begin with core standards required for all participants in the programs, followed by a series of standards organized in concentrations. For example, Strand Two of the Horticulture Framework begins with the core standards required of all Horticulture students

(Topics 2.A through 2.I). These standards are followed by the three concentrations: Arboriculture (Topics 2.J through 2.L), Greenhouse Management and Floriculture (Topics 2.J. through 2.L) and Landscape and Turf Management (Topics 2.M through 2.Q).

### **Advanced / Supplemental Standards (Not Required)**

Another variation that is new to the revised Strand Two Frameworks is the addition of advanced or supplemental standards which are noted with the use of an asterisk (\*). *These standards are not required, but are provided as suggestions that districts may choose to use to increase the depth of a particular topic, or add additional topics, particularly for advanced students or for those seniors who do not participate in cooperative education.*

The following is an example from Automotive Technology, where entire topics were added:

#### ***Advanced Automotive Technology Technical Knowledge and Skills***

*Note: The following competencies are optional, supplementary competencies suitable for advanced students. These are not required.*

### **2.CC Demonstrate appropriate engine repair techniques.**

2.CC.01 Perform appropriate cylinder Head Repair.

2.CC.01.01\* Diagnose, remove and replace cylinder head(s).

2.CC.01.02\* Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition; determine necessary action.

The following is an example from the Strand Two Radio and Television Broadcasting Framework that shows the addition of an advanced objective, 2.B.04.08\*:

2.B.04 Explain concepts fundamental to shooting in cinema and video.

- 2.B.04.01 Compare and contrast a single-camera and a multiple-camera production.
- 2.B.04.02 Explain the importance of shooting for the edit (i.e., match on action, sequencing, coverage).
- 2.B.04.03 Explain the importance of continuity.
- 2.B.04.04 Explain the 180° Rule line, and its application in various cinema scenarios.
- 2.B.04.05 Identify and establish a specific point-of-view when shooting from a script.
- 2.B.04.06 Analyze the methods in which specific shots can evoke emotion from an audience.
- 2.B.04.07 Define drop frame and non-drop frame code shooting and explain how to account for both when preparing for an edit.
- 2.B.04.08\* Describe various cinematographic methods necessary when shooting scenes that incorporate post-production visual effect

2.B.04 Performance Examples:

- Students will list similarities and differences of single-camera and multiple-camera shoots.
- Students will describe multiple shooting considerations that are useful in streamlining the editing process.



# Construction Occupational Cluster

## Masonry & Tile Setting Framework (VMASN)

### Strand 1: Safety and Health Knowledge and Skills

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#### 1.A Fundamentals of Health and Safety

- 1.A.01 Describe and apply health and safety regulations.
- 1.A.01.01 Identify, describe and apply health and safety regulations that apply to specific tasks and jobs. Students must complete a safety credential program, e.g., Occupational Safety and Health Administration 10, CareerSafe and ServSafe.
  - 1.A.01.02 Identify, describe and apply Environmental Protection Agency (EPA) and other environmental protection regulations that apply to specific tasks and jobs in the specific occupational area.
  - 1.A.01.03 Identify, describe and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the specific occupational area.
  - 1.A.01.04 Explain procedures for documenting and reporting hazards to appropriate authorities.
  - 1.A.01.05 Identify and describe potential consequences for non-compliance with appropriate health and safety regulations.
  - 1.A.01.06 Identify and list contact information for appropriate health and safety agencies and resources.

1. A.01 Performance Examples:

- List and define OSHA Health and Safety Regulations, EPA and other environmental protection regulations to occupational area.
- List and define Right-to-Know regulations and reporting of hazards and contact information for appropriate health and safety agencies.
- List the laws and rules of regulatory agencies governing sanitation and safety.
- Utilize OSHA as well as health and safety websites for purposes of research.

- 1.A.02 Demonstrate appropriate health and safety practices based on the specific occupational area.
- 1.A.02.01 Identify, describe and demonstrate the effective use of Safety Data Sheets (SDS).
  - 1.A.02.02 Read and interpret chemical, product and equipment labels to determine appropriate health and safety considerations.
  - 1.A.02.03 Identify, describe and demonstrate personal, shop and job site safety practices and procedures.
  - 1.A.02.04 Demonstrate safe dress and use of relevant safety gear, personal protective equipment (PPE) and ergonomics, e.g., wrist rests, adjustable workspaces, equipment, gloves, proper footwear, earplugs, eye protection and breathing apparatus.
  - 1.A.02.05 Demonstrate appropriate safe body mechanics, including appropriate lifting techniques and ergonomics.

- 1.A.02.06 Locate emergency equipment, first aid kit, SDS information directories and emergency action/response plan/escape routes in your lab, shop and classroom, including labels and signage that follow OSHA Hazard Communication Program (HAZCOM), eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches and emergency exits.
- 1.A.02.07 Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop and classroom, e.g., the OSHA Lockout/Tagout Program (LOTO).
- 1.A.02.08 Describe safety practices and procedures to be followed when working with and around electricity, e.g., ground fault circuit interrupter (GFCI) and frayed wiring.
- 1.A.02.09 Handle, store, dispose of and recycle hazardous, flammable and combustible materials, according to EPA, OSHA and product specifications.
- 1.A.02.10 Demonstrate appropriate workspace cleaning, sanitation, disinfection and sterilization procedures required in specific occupational areas, e.g., Workplace Housekeeping OSHA Regulations.

1. A.02 Performance Examples:

- Identify, describe and demonstrate the use of SDS.
- List and demonstrate shop dress code, safety procedures and location of emergency equipment in labor classroom.
- Define and demonstrate safe storage and maintenance of equipment and proper disposal or recycling of hazardous, flammable and combustible materials.
- Identify, describe and demonstrate the Universal Precautions set of guidelines.

- 1.A.03 Demonstrate appropriate responses to situations that may threaten health and safety.
  - 1.A.03.01 Describe First Aid procedures for potential injuries and other health concerns in the specific occupational area.
  - 1.A.03.02 Describe the importance of emergency preparedness and an emergency action/response plan.
  - 1.A.03.03 Describe procedures used to handle emergency situations, defensive measures and accidents, including identification, reporting, response, evacuation plans and follow-up procedures.
  - 1.A.03.04 Identify, describe and demonstrate safety practices in specific occupational areas used to avoid accidents.
  - 1.A.03.05 Identify and describe fire protection, protection, precautions and response procedures.
  - 1.A.03.06 Discuss the role of the individual and the company/organization in ensuring workplace safety including transportation to and from school, school activities and the workplace.
  - 1.A.03.07 Discuss ways to identify, prevent and report school and workplace violence, discrimination, harassment and bullying.
  - 1.A.03.08 Demonstrate positive and appropriate behavior that contributes to a safe and healthy environment in school and the workplace.

1. A.03 Performance Example:

- Define first aid procedures and protocols used to handle emergency situations and practices used to avoid accidents.
- View safety videos and discuss the role of workplace safety.
- Attend or participate in a human rights alliance organization presentation.
- Observe and/or demonstrate the appropriate use of a fire extinguisher using the (PASS) technique: Pull, Aim, Squeeze, Sweep.
- Review and discuss specific policies, procedures and protocols regarding discrimination, harassment and bullying.
- Discuss and/or role-play proper and respectful behavior that contributes to a positive climate.
- Discuss and/or demonstrate behavior that contributes to a collaborative/teamwork environment.

### *Selected Websites*

- Bullying Prevention and Intervention Resources : [www.doe.mass.edu/bullying](http://www.doe.mass.edu/bullying)
- Centers for Disease Control and Prevention: [www.cdc.gov](http://www.cdc.gov)
- Environmental Protection Agency : [www.epa.gov](http://www.epa.gov)
- “Lost Youth – Four Stories of Injured Young Workers”– WorkSafeBC:  
<http://www2.worksafebc.com/Publications/Multimedia/Videos.asp?reportid=34291>
- Massachusetts Department of Elementary and Secondary Education. (2011). Career/Vocational Technical Education Safety Guide: [www.doe.mass.edu/cte](http://www.doe.mass.edu/cte)
- Massachusetts Department of Elementary and Secondary Education: [www.doe.mass.edu](http://www.doe.mass.edu)
- Massachusetts Emergency Management Agency: [www.mass.gov/eopss/agencies/mema](http://www.mass.gov/eopss/agencies/mema)
- Massachusetts General Law: [www.malegislature.gov](http://www.malegislature.gov)
- Massachusetts Health and Human Services: [www.mass.gov/dph](http://www.mass.gov/dph)
- Massachusetts Right to Know Law Summary:  
<http://www.mass.gov/lwd/docs/dos/mwshp/hib397.pdf>
- Safety Data Sheet: [www.sdsonline.com](http://www.sdsonline.com)
- National Fire Protection Association: [www.nfpa.org](http://www.nfpa.org)
- Protection of Student Rights: Massachusetts General Law:  
<https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXII/Chapter76/Section5>
- Occupational Safety and Health Administration: [www.osha.gov](http://www.osha.gov)
- Readiness and Emergency Management for Schools: [www.rems.ed.gov](http://www.rems.ed.gov)
- Safe and Healthy Learning Environments: [www.doe.mass.edu/ssce/safety.html](http://www.doe.mass.edu/ssce/safety.html)

## Strand 2: Technical Knowledge and Skills

### 2.A Masonry and Tile Setting Safety and Health Knowledge and Skills

- 2.A.01 Complete safety training for all masonry equipment and materials.
- 2.A.01.01 Demonstrate use of all masonry related hand and power tools according current industry and OSHA standards.
  - 2.A.01.02 Identify, describe and demonstrate the procedures for erection and dismantling of steel tubular scaffolding.
  - 2.A.01.03 Demonstrate the use and maintenance of fall protection systems.
  - 2.A.01.04 Explain use and storage of various masonry related materials, including cements, sands, mixes, and various chemicals according to manufacturers' specifications and industry and OSHA standards.
  - 2.A.01.05 Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in masonry.

- 2.A.01 Performance Example:
- Students will successfully complete OSHA 10-hour certification training.

### 2.B Read and Interpret Prints

- 2.B.01 Identify, describe and use working drawings.
- 2.B.01.01 Explain the basic layout of a set of prints as well as the importance of the accompanying job specifications document.
  - 2.B.01.02 Identify and define basic print terms, abbreviations, line types, symbols and notes.
  - 2.B.01.03 Interpret and follow drawing dimensions using an architect scale.
  - 2.B.01.04 Read and interpret all aspects of a plan.
  - 2.B.01.05 Describe, develop and complete material quantity takeoff sheets.
  - 2.B.01.06 Explain how state and/or local requirements apply to prints.

- 2.B.01 Performance Examples:
- Perform shop/job site projects/work from appropriate sets of prints/drawings.
  - Draw appropriate cross sections and/or details.
  - Develop a material quantity takeoff for the project/job.
  - Prepare an application for a specified permit.

### 2.C Basics of Mason and Tile Setting Trade

- 2.C.01 Explain the fundamentals of the masonry and tile setting trade.
- 2.C.01.01 Describe trade history and trade opportunities.
  - 2.C.01.02 Set-up materials and work area according to industry standards.

- 2.C.01 Performance Example:
- The student will give an oral presentation using appropriate masonry/construction terminology noting locations of hazards and first-aid supplies.

### 2.D Hand Tools

- 2.D.01 Identify and use masonry hand tools.
- 2.D.01.01 Identify the mason's basic hand tools.
  - 2.D.01.02 Use and clean hand tools.
  - 2.D.01.03 Apply mortar with a trowel.
  - 2.D.01.04 Cut brick and block with a hammer and set.
  - 2.D.01.05 Demonstrate how to level, plumb, and range units.
  - 2.D.01.06 Secure line to pins, blocks and stretcher and trigs.

- 2.D.01 Performance Example:
- Students will identify hand tools and describe and demonstrate their use.

## 2.E Power Tools

- 2.E.01 Select and use appropriate power tools.
- 2.E.01.01 Set-up and operate power hand tools and fastening equipment.
  - 2.E.01.02 Set-up and operate a diamond-blade wet saw.
  - 2.E.01.03 Set-up and operate various electric and gas powered equipment.

- 2.E.01 Performance Example:
- Students will demonstrate the use and application of masonry power tools.

## 2.F Mixing of Various Cementitious Materials

- 2.F.01 Demonstrate the preparation of various mixes.
- 2.F.01.01 Identify appropriate mortar for a specified application.
  - 2.F.01.02 Mix mortar by hand.
  - 2.F.01.03 Mix concrete by hand.
  - 2.F.01.04 Mix grout for reinforcement by hand.
  - 2.F.01.05 Mix with power mixers.

- 2.F.01 Performance Example:
- Students will select the ingredients and demonstrate the procedure and of mixing various cementitious products.

## 2.G Measurements

- 2.G.01 Demonstrate how to accurately take measurements.
- 2.G.01.01 Identify fractions on a rule.
  - 2.G.01.02 Measure with various spacing rules.
  - 2.G.01.03 Measure and estimate materials for a specific project.
  - 2.G.01.04 Establish grades and or heights with a builder's level.
  - 2.G.01.05 Calculate the area and volume of a specified project.

- 2.G.01 Performance Example:
- Students will demonstrate the use of various measuring tools by taking various measurements (lengths, widths, and heights) to calculate the areas and materials needed for a specified project.

## 2.H Brick Bonds

- 2.H.01 Demonstrate the layout of brick bonds and positions according to industry standards..
- 2.H.01.01 Identify the six brick positions.
  - 2.H.01.02 Demonstrate the layout of Stretcher or Running Bond.
  - 2.H.01.03 Demonstrate the layout of Common or American Bond.
  - 2.H.01.04 Demonstrate the layout of English Bond.
  - 2.H.01.05 Demonstrate the layout of Flemish Bond.
  - 2.H.01.06 Demonstrate the layout of Stack Bond.

- 2.H.01 Performance Example:
- Students will construct several given projects using the various brick positions and bonds.

## 2.I Brick Paving

- 2.I.01 Demonstrate installation of pavers according to industry standards.

- 2.I.01.01 Identify basic brick paving tools.
- 2.I.01.02 Prepare base for area to be paved.
- 2.I.01.03 Install pavers using the Stretcher or Running Pattern.
- 2.I.01.04 Install pavers using the Basket Weave Pattern.
- 2.I.01.05 Install pavers using the Herringbone Pattern.

## 2.J **Brick Leads and Corners**

- 2.J.01 Demonstrate the construction of various brick leads.
  - 2.J.01.01 Construct standard inside and outside brick corner lead.
  - 2.J.01.02 Construct brick quoin corner.
  - 2.J.01.03 Construct brick jam lead.
  - 2.J.01.04 Construct brick rack-back lead.

### 2.J.01 Performance Example:

- Students will construct several specified projects using brick for various corners and leads.

- 2.J.02 Construct concrete masonry unit, corners and walls.
  - 2.J.02.01 Construct 4" block corner lead.
  - 2.J.02.02 Construct 4" block wall between established leads or deadmen.
  - 2.J.02.03 Construct 6" block corner lead.
  - 2.J.02.04 Construct 6" block wall between established leads or deadmen.
  - 2.J.02.05 Construct 8" block corner lead.
  - 2.J.02.06 Construct 8" block wall between established leads or deadmen.
  - 2.J.02.07 Construct 12" block corner lead.
  - 2.J.02.08 Construct 12" block wall between established leads or deadmen.

### 2.J.02 Performance Example:

- Students will construct several specified projects using the various block wall and corner construction.

## 2.K **Masonry Finishing and Restoration**

- 2.K.01 Demonstrate how to joint, cut, repoint and clean masonry.
  - 2.K.01.01 Demonstrate the use of various jointing techniques and finishes.
  - 2.K.01.02 Cut out joints and tuck point wall on existing work.
  - 2.K.01.03 Rub, brush and touch-up a wall.
  - 2.K.01.04 Demonstrate the 'Wash-Down' procedure with chemical cleaners following current industry and OSHA standards.

### 2.K.01 Performance Example:

- Students will demonstrate the jointing, cutting and washing techniques on masonry walls.

## 2.L **Building Layout**

- 2.L.01 Apply the fundamentals of building layout.
  - 2.L.01.01 Read and interpret a basic masonry drawing.
  - 2.L.01.02 Snap chalk lines and square layout using 3-4-5 method (Pythagorean Theorem).
  - 2.L.01.03 Arrange masonry materials for efficient use.

### 2.L.01 Performance Example:

- Students will demonstrate layout of a building using specified layout tools and methods from a given drawing, according to industry standards.

## 2.M Tile Setting

- 2.M.01 Demonstrate proper tile setting techniques.
  - 2.M.01.01 Identify tile setter's basic hand tools.
  - 2.M.01.02 Prepare an area to be tiled.
  - 2.M.01.03 Layout the pattern of a work area.
  - 2.M.01.04 Spread thin set mortar and other tile adhesive.
  - 2.M.01.05 Set tile into notched adhesive bedding.
  - 2.M.01.06 Make cuts in tile using various tile cutting tools.
  - 2.M.01.07 Grout tile joints.
  - 2.M.01.08 Clean a completed surface area.

2.M.01 Performance Example:

- Students will show tile setting procedures on given pattern and project area.

## 2.N Scaffolding

- 2.N.01 Demonstrate assembly, use, and dismantling of scaffolding according to industry and OSHA standards.
  - 2.N.01.01 Identify all components of steel tubular sectional scaffolding.
  - 2.N.01.02 Layout scaffold location and place mud-sill planking.
  - 2.N.01.03 Erect frames with cross-braces on screw jacks.
  - 2.N.01.04 Level, plumb and range scaffold frames.
  - 2.N.01.05 Set-up side brackets, walking plank and deck plank.
  - 2.N.01.06 Prepare scaffolding for inclement weather.
  - 2.N.01.07 Stock materials on scaffold for safe and efficient use.

2.N.01 Performance Example:

- Students will assemble scaffolding from given plans according to industry and OSHA standards.

## 2.O Various Masonry Walls

- 2.O.01 Demonstrate the construction of various masonry walls.
  - 2.O.01.01 Construct a brick veneer on a wood-frame structure.
  - 2.O.01.02 Construct composite walls with brick and block.
  - 2.O.01.03 Construct partition and cavity walls.
  - 2.O.01.04 Lay out openings and space for doors and windows.
  - 2.O.01.05 Set sills and lintels at designated heights.

2.O.01 Performance Example:

- Students will construct several projects using various block and brick construction.

## 2.P Reinforcement of Masonry

- 2.P.01 Demonstrate various ways to reinforce masonry.
  - 2.P.01.01 Identify load-bearing and non-load-bearing walls.
  - 2.P.01.02 Install wire reinforcement tracking in bed joints.
  - 2.P.01.03 Install anchors and wall ties.
  - 2.P.01.04 Cut, bend and install rebar and wire mesh.

2.P.01 Performance Example:

- Students will describe and demonstrate bearing wall construction and installation of reinforcement and anchors.

## 2.Q Waterproof Masonry Construction

- 2.Q.01 Demonstrate the installation of flashing and waterproofing.
  - 2.Q.01.01 Demonstrate how to damp-proof walls.

- 2.Q.01.02 Install flashing using various techniques.
- 2.Q.01.03 Caulk expansion joints, window and door jambs.
- 2.Q.01.04 Apply sealer to masonry surfaces.

2.Q.01 Performance Example:  
 ▪ Students will demonstrate various flashing and waterproofing techniques.

**2.R Chimneys and Fireplaces**

- 2.R.01 Construct residential chimneys and fireplaces according to industry and OSHA standards.
  - 2.R.01.01 Construct single or double flue chimney.
  - 2.R.01.02 Construct firebox with ash dump, damper and smoke chamber.
  - 2.R.01.03 Install lead flashing and cap chimney.

2.R.01 Performance Example:  
 ▪ Student will construct chimney and fireplace projects from given plans.

**2.S Concrete Finishing**

- 2.S.01 Demonstrate how to place and finish concrete.
  - 2.S.01.01 Identify basic concrete finishing hand tools.
  - 2.S.01.02 Prepare area to grade and set forms.
  - 2.S.01.03 Place, screed, and bull-float the concrete surface.
  - 2.S.01.04 Edge and groove according to job requirements.
  - 2.S.01.05 Demonstrate various finishing techniques (e.g., broomed, troweled, pattern stamped).

2.S.01 Performance Example:  
 ▪ Students will identify and demonstrate the use and techniques of placement and finishing concrete.

**2.T Arches**

- 2.T.01 Demonstrate the construction of various arches.
  - 2.T.01.01 Identify the various arches.
  - 2.T.01.02 Explain the construction of wooden forms and arches.
  - 2.T.01.03 Layout and construct various arches (e.g., segmental, semi-circular, gothic).

2.T.01 Performance Example:  
 ▪ Students will identify and construct arch projects.

**2.U Residential and Ornamental Masonry**

- 2.U.01 Construct residential and ornamental masonry.
  - 2.U.01.01 Construct brick and block planter with cap.
  - 2.U.01.02 Construct brick steps with a platform.
  - 2.U.01.03 Construct a curved masonry project (serpentine wall or well).
  - 2.U.01.04 Describe procedures used to install landscape retaining walls.
  - 2.U.01.05 Compare and contrast the construction of stone and brick/block walls.
  - 2.U.01.06 Define details from a basic set of construction plans

2.U.01 Performance Example:  
 ▪ Students will construct given masonry projects using working drawings.



## Strand 3: Embedded Academics

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Strand 3: Embedded Academics, a critical piece of a Vocational Technical Education Framework, are presented as Crosswalks between the Massachusetts Vocational Technical Education Frameworks and the Massachusetts Curriculum Frameworks. These Crosswalks are located in the Appendix of this Framework.

### **Academic Crosswalks**

[Appendix A:](#) [English Language Arts](#)

[Appendix B:](#) [Mathematics](#)

[Appendix C:](#) [Science and Technology/Engineering](#)

Earth and Space Science

Life Science (Biology)

Physical Science (Chemistry and Physics)

Technology/Engineering

## Strand 4: Employability and Career Readiness

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### 4.A Career Exploration and Navigation

- 4.A.01 Develop a career plan and portfolio.
  - 4.A.01.01 Develop and revise career plan annually based on workplace awareness and skill attainment.
  - 4.A.01.02 Assess personal strengths and interest areas to determine potential careers, career pathways and career ladders.
  - 4.A.01.03 Examine potential career field(s)/discipline(s) and identify criteria to select, secure and keep employment in chosen field(s).
  - 4.A.01.04 Research and evaluate a variety of careers utilizing multiple sources of information and resources to determine potential career(s) and alternatives.
  - 4.A.01.05 Identify training and education requirements that lead to employment in chosen field(s) and demonstrate skills related to evaluating employment opportunities.
  - 4.A.01.06 Explore and evaluate postsecondary educational opportunities including degrees and certifications available, traditional and nontraditional postsecondary pathways, technical school and apprenticeships, cost of education, financing methods including scholarships and loans and the cost of loan repayment.
  - 4.A.01.07 Create a portfolio showcasing academic and career growth including a career plan, safety credential, resume and a competency profile demonstrating the acquisition of the knowledge and skills associated with at least two years of full-time study in the Chapter 74 program.
  
- 4.A.02 Demonstrate job search skills.
  - 4.A.02.01 Conduct a job search and complete written and electronic job applications, resumes, cover letters and related correspondence for a chosen career path.
  - 4.A.02.02 Explore and evaluate postsecondary job opportunities and career pathways specific to career technical areas.
  - 4.A.02.03 Identify role and use of social media and networking for staying current with career and employment trends as well as networking, job seeking and career development opportunities.
  - 4.A.02.04 Demonstrate ability to use social media and networking to develop useful occupational contacts, job seeking and career development opportunities.
  
- 4.A.03 Demonstrate all phases of the job interview process.
  - 4.A.03.01 Gather relevant information about potential employer(s) from multiple print and digital sources, assessing the credibility and accuracy of each source.
  - 4.A.03.02 Identify employment eligibility criteria, such as drug/alcohol free status, clean driving record, etc.

- 4.A.03.03 Practice effective interviewing skills: appearance, inquiry and dialogue with interviewer, positive attitude and evidence of work ethic and skills.
- 4.A.03.04 Explore and evaluate employment benefit packages including wages, vacation, health care, union dues, cafeteria plans, tuition reimbursement, retirement and 401K.

4. A Performance Examples:
- Conduct research to analyze and present on specific careers within a cluster.
  - Conduct web-based job search using sites such as Monster.com, CareerBuilder.com, Indeed.com, Snagajob.com, Simplyhired.com and others.
  - Create profile on social media/networking site such as LinkedIn and/or LinkedIn University for postsecondary research and employment opportunities.
  - Complete online job application.
  - Conduct and videotape practice interviews for instructor and student analysis.
  - Provide students with sample employment and benefit packages for evaluation.

#### **4.B Communication in the Workplace**

- 4.B.01 Demonstrate appropriate oral and written communication skills in the workplace.
  - 4.B.01.01 Communicate effectively using the language and vocabulary appropriate to a variety of audiences within the workplace including coworkers, supervisors and customers.
  - 4.B.01.02 Read technical and work-related documents and demonstrate understanding in oral discussion and written exercise.
  - 4.B.01.03 Demonstrate professional writing skills in work-related materials and communications (e.g., letters, memoranda, instructions and directions, reports, summaries, notes and/or outlines).
  - 4.B.01.04 Use a variety of writing/publishing/presentation applications to create and present information in the workplace.
  - 4.B.01.05 Identify, locate, evaluate and use print and electronic resources to resolve issues or problems in the workplace.
  - 4.B.01.06 Use a variety of financial and data analysis tools to analyze and interpret information in the workplace.
  - 4.B.01.07 Orally present technical and work-related information to a variety of audiences.
  - 4.B.01.08 Identify and demonstrate professional non-verbal communication.
- 4.B.02 Demonstrate active listening skills.
  - 4.B.02.01 Listen attentively and respectfully to others.
  - 4.B.02.02 Focus attentively, make eye contact or other affirming gestures, confirm understanding and follow directions.
  - 4.B.02.03 Show initiative in improving communication skills by asking follow-up questions of speaker in order to confirm understanding.

4. B Performance Examples:

- Read and analyze technical instructions to learn what makes them effective.
- Read and analyze technical instructions to follow directions and/or solve a problem.
- Examine a technical document and use it to write a set of instructions for another student to follow and evaluate.
- Analyze websites for effective technical writing and design.
- Create brochures and presentations using software and/or Web 2.0 tools to convey technical information.
- Conduct research using the Internet, print documents, observations and interviews to create a technical guide.

**4.C Work Ethic and Professionalism**

4.C.01 Demonstrate attendance and punctuality.

4.C.01.01 Identify and practice professional time-management and attendance behaviors including punctuality, reliability, planning and flexibility.

4.C.02 Demonstrate proper workplace appearance.

4.C.02.01 Identify and practice professional appearance specific to the workplace.

4.C.02.02 Identify and practice personal hygiene appropriate for duties specific to the workplace.

4.C.02.03 Identify and wear required safety gear specific to the workplace.

4.C.03 Accepts direction and constructive criticism.

4.C.03.01 Demonstrate ability (both verbally and non-verbally) to accept direction and constructive criticism and to implement solutions to change behaviors.

4.C.03.02 Ask appropriate questions to clarify understanding of feedback.

4.C.03.03 Analyze own learning style and seek instructions in a preferred format that works best for their understanding (such as oral, written or visual instruction).

4.C.04 Demonstrate motivation and initiative.

4.C.04.01 Evaluate assigned tasks for time to completion and prioritization.

4.C.04.02 Demonstrate motivation through enthusiasm, engagement, accurate completion of tasks and activities.

4.C.04.03 Demonstrate initiative by requesting new assignments and challenges.

4.C.04.04 Explain proposed solutions to challenges observed in the workplace.

4.C.04.05 Demonstrate the ability to evaluate multiple solutions to problems and challenges using critical reasoning and workplace/industry knowledge and select the best solution to the problem.

4.C.04.06 Implement solution(s) to challenges and/or problem(s) observed in the workplace.

4.C.04.07 See projects through completion and check work for quality and accuracy.

4.C.05 Demonstrate awareness of workplace culture and policy.

- 4.C.05.01 Display ethical behavior in use of time, resources, computers and information.
- 4.C.05.02 Identify the mission of the organization and/or department.
- 4.C.05.03 Explain the benefits of a diverse workplace.
- 4.C.05.04 Demonstrate a respect for diversity and its benefit to the workplace.
  
- 4.C.06 Interact appropriately with coworkers.
  - 4.C.06.01 Work productively with individuals and in teams.
  - 4.C.06.02 Develop positive mentoring and collaborative relationships within work environment.
  - 4.C.06.03 Show respect and collegiality, both formally and informally.
  - 4.C.06.04 Explain and follow workplace policy on the use of cell phones and other forms of social media.
  - 4.C.06.05 Maintain focus on tasks and avoid negative topics or excessive personal conversations in the workplace.
  - 4.C.06.06 Negotiate solutions to interpersonal and workplace conflicts.

4. C Performance Examples:

- Complete a learning style analysis tool.
- Develop a rubric to assess work ethic and professionalism as detailed in the standards above.

### Student Organizations

Business Professionals of America

[www.bpa.org](http://www.bpa.org)

### *Selected Websites*

- 5 Ways to Ace a Job Interview: [http://kidshealth.org/teen/school\\_jobs/jobs/tips\\_interview.html](http://kidshealth.org/teen/school_jobs/jobs/tips_interview.html)
- America’s Career Resource Network: <http://acrn.ovae.org/teachers/careerexpclassrm.htm>
- Career Cruiser – Florida Department of Education: <http://www.fldoe.org/workforce/pdf/cruiser.pdf>
- Career Development Guide and Glossary: <http://www.doe.mass.edu/connect/cde.html>
- Career One Stop: <http://www.careeronestop.org/>
- Career Plan: <http://www.doe.mass.edu/cd/plan/intro.html>
- Career Plan Model: [http://www.doe.mass.edu/ccr/epp/samples/cpmodel\\_11x17.pdf](http://www.doe.mass.edu/ccr/epp/samples/cpmodel_11x17.pdf)
- Checklist: <http://www.doe.mass.edu/cd/plan/checklist.pdf>
- Career Tech: [http://www.okcareertech.org/cac/Pages/resources\\_products/ethics\\_web\\_sites.htm](http://www.okcareertech.org/cac/Pages/resources_products/ethics_web_sites.htm)
- Ethics Resource Center: <http://www.ethics.org/>
- Interaction in the Workplace: <http://hrweb.berkeley.edu/guides/managing-hr/interaction/communication>

- Individual Learning Plans: How-to Guide: “Promoting Quality Individualized Learning Plans: A How to Guide on the High School Years” <http://www.ncwd-youth.info/ilp/how-to-guide>
- ILP Fact Sheet: <http://www.ncwd-youth.info/fact-sheet/individualized-learning-plan>
- ILP Policy Brief: <http://www.ncwd-youth.info/ilp/produce-college-and-career-ready-high-school-graduates>
- ILP Resources Home Page: <http://www.ncwd-youth.info/ilp>
- Interview Skills Lesson Plans:  
<http://www.amphi.com/media/1220281/interview%20skills%20lesson%20plan.doc>
- Labor and Workforce Development: <http://www.mass.gov/lwd/employment-services/preparing-for-your-job-search/>
- Maine Community College System – Center for Career Development:  
[http://www.ccd.me.edu/careerprep/CareerPrepCurriculum\\_LP-6.pdf](http://www.ccd.me.edu/careerprep/CareerPrepCurriculum_LP-6.pdf)
- Massachusetts Work-Based Learning: <http://skillspages.com/masswbl>
- North Dakota Association of Agriculture Educators:  
[http://www.ndaae.org/attachments/File/Preparing\\_students\\_for\\_a\\_Job\\_Interview.pptx](http://www.ndaae.org/attachments/File/Preparing_students_for_a_Job_Interview.pptx)
- NY CTE Learning Standards—Career Development and Occupational Studies (CDOS) Resource Guide with Core Curriculum : <http://www.p12.nysed.gov/cte/cdlearn/cdosresourceguide.html>
- Occupational Outlook Handbook: <http://www.bls.gov/ooh/>
- Purdue OWL Job Search Resources (for writing resumes, applications, and letters):  
<https://owl.english.purdue.edu/engagement/34/>
- Soft Skills to Pay the Bills — Mastering Soft Skills for Workplace Success:  
<http://www.dol.gov/odep/topics/youth/softskills/>
- US Department of Labor: <http://www.dol.gov/dol/audience/aud-unemployed.htm>
- Workplace Communication:  
<http://www.regionalskillstraining.com/sites/default/files/content/WC%20Book%201.pdf>
- Your Plan For the Future: <http://www.yourplanforthefuture.org>

## Strand 5: Management and Entrepreneurship Knowledge and Skills

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### 5.A Starting a Business

- 5.A.01 Demonstrate an understanding of the practices required to start a business.
  - 5.A.01.01 Define entrepreneurship and be able to recognize and describe the characteristics of an entrepreneur.
  - 5.A.01.02 Compare and contrast types of business ownership (i.e., sole proprietorships, franchises, partnerships, corporations).
  - 5.A.01.03 Identify and explain the purpose and contents of a business plan.
  - 5.A.01.04 Demonstrate an understanding of the principles and concepts of a business's supply chain (i.e., suppliers, producers and consumers).

#### 5. A Performance Examples:

- Develop a presentation pertaining to an entrepreneur and their business.
- Communicate with a business owner and discuss the pros and cons of starting and owning a business. Summarize the main points of the discussion.
- Choose a product or service and describe the process leading to distribution.
- Write a business plan for a business in your community.

### 5.B Managing a Business

- 5.B.01 Demonstrate an understanding of managing a business.
  - 5.B.01.01 Formulate short- and long-term business goals.
  - 5.B.01.02 Demonstrate effective verbal, written and visual communication skills.
  - 5.B.01.03 Utilize a decision-making process to make effective business decisions.
  - 5.B.01.04 Identify a business's chain of command and define its organizational structure.
  - 5.B.01.05 Identify and apply effective customer service skills and practices.
  - 5.B.01.06 Identify, interpret and develop written operating procedures and policies.
  - 5.B.01.07 Track inventory, productivity and labor cost.
  - 5.B.01.08 Demonstrate business meeting skills.
  - 5.B.01.09 Identify professional organizations and explore their benefits.

#### 5. B Performance Examples:

- Working as a team, role-play situations that an entrepreneur might face in dealing with customers or employees.
- Contact a relevant professional organization and request information about its benefits, membership requirements and costs.
- Plan and conduct a business meeting.
- Identify companies that are known for customer service and list the practices that help differentiate themselves from all others in their industry.

### 5.C Marketing a Business

- 5.C.01 Demonstrate an understanding of marketing and promoting a business.
  - 5.C.01.01 Explain the role of business in the economy.
  - 5.C.01.02 Describe the relationship between business and community.
  - 5.C.01.03 Describe methods of market research and identifying target markets.

- 5.C.01.04 Describe and apply the concepts of a marketing mix (the 4Ps of marketing: product, price, place and promotion).
- 5.C.01.05 Compare and contrast the promotional tools and techniques used to sell products, services, images and ideas.
- 5.C.01.06 Describe the impact of supply and demand on a product or business.
- 5.C.01.07 Identify direct and indirect competition on a business.
- 5.C.01.08 Identify and use sales techniques to meet client needs and wants.
- 5.C.01.09 Discuss strategies to acquire and retain a customer base.

5. C Performance Examples:
- Research reliable sources to identify marketing and industry data related to a business.
  - Conduct market research by developing a survey and presenting the results.
  - Create a promotional campaign using a variety of media.
  - Write a marketing plan for a product.

## **5.D Financial Concepts and Applications in Business**

- 5.D.01 Demonstrate an understanding of financial concepts and applications.
  - 5.D.01.01 Identify essential financial reports and understand their purpose (i.e., budget, balance sheet and income statement).
  - 5.D.01.02 Describe payroll practices (i.e., deductions – federal, FICA and state taxes and insurances).
  - 5.D.01.03 Identify the importance of maintaining accurate records.
  - 5.D.01.04 Apply practices related to pricing, purchasing and billing.
  - 5.D.01.05 Maintain and reconcile a checking account.
  - 5.D.01.06 Identify the options for funding a business.

5. D Performance Examples:
- Given an employee time card and rate of pay, calculate gross pay, taxes, deductions and net pay.
  - Develop a budget for a simulated business or project.
  - Analyze and discuss financial documents from a company.
  - Research various methods of funding a business.

## **5.E Legal/Ethical/Social Responsibilities**

- 5.E.01 Demonstrate an understanding of legal, ethical and social responsibility for businesses.
  - 5.E.01.01 Identify state and federal laws and regulations related to managing a business.
  - 5.E.01.02 Describe and identify ethical business practices.
  - 5.E.01.03 Demonstrate an understanding of business contracts.
  - 5.E.01.04 Explain the role of diversity in the workplace.
  - 5.E.01.05 Explain the role of labor organizations.
  - 5.E.01.06 Identify practices that support clean energy technologies and encourage environmental sustainability.
  - 5.E.01.07 Demonstrate an understanding of how technology advancements impact business practices.



- 5.E Performance Example:
- Read and interpret a contract.
  - Complete an application for a license, permit or certificate.
  - Research federal, state and local regulations and laws required for a business.
  - Participate in and summarize a discussion with a member of a labor or civil rights organization.

### *Selected Websites*

- CVTE Strand 1, 4, and 5 Resources: <https://sites.google.com/a/mccanntech.org/cvte-strands-1-4-and-5-resources/>
- Entrepreneur: <http://www.entrepreneur.com>
- Inc. Magazine: <http://www.inc.com/>
- Junior Achievement “Be Entrepreneurial Program”: <https://www.juniorachievement.org/web/ja-usa/home>
- Kahn Academy Interviews with Entrepreneurs: <https://www.khanacademy.org/economics-finance-domain/entrepreneurship2/interviews-entrepreneurs>
- Kauffman Founders School: <http://www.entrepreneurship.org/en/founders-school.aspx>
- National Federation of Independent Business: [www.nfib.com](http://www.nfib.com)
- National Foundation for Teaching Entrepreneurship (NFTE): [www.nfte.com](http://www.nfte.com)
- SBA Loans: <http://www.sba.gov>
- SkillsUSA Professional Development Program Competency List: <http://www.skillsusa.org/downloads/PDF/lessons/professional/PDPPreview.pdf>
- Small Business Administration: [www.sba.gov](http://www.sba.gov)

### *Glossary*

<b>Term</b>	<b>Definition</b>
Balance sheet	A statement of the assets, liabilities and capital of a business at a particular point in time.
Budget	An estimate of income and expenditure for a set period of time.
Business Ownership	Types of business ownership refer to the legal structure of an organization. Legal structures include: Sole Proprietorship, Partnerships, Corporations and Limited Liability Companies.
Business Plan	A written document that describes in detail your business goals and how you are going to achieve them from a marketing, operational and financial point of view.

**Term**

Chain of Command and Organizational Structure

**Definition**

Refers to the management structure of an organization. It identifies lines of authority, lines of communication, and reporting relationships. Organizational structure determines how the roles, power and responsibilities are assigned and coordinated and how information flows between the different levels of management. (A visual representation of this structure is called an org chart).

FICA

Federal Insurance Contributions Act requires taxes deducted from pay for supporting Social Security.

Income Statement

A financial statement providing operating results for a specific time period showing a business's revenues, expenses and profit or loss.

Market Research

- Primary: Surveys, Focus Groups, Observation
- Secondary: Websites, Internet

Marketing Mix

A set of controlled variables that formulate the strategic position of a product or service in the marketplace. These variables are known as the 4 P's of marketing and include product, place, price and promotion.

Methods to Track Inventory, Productivity and Labor Cost

Refers to the processes a business uses to account for: 1) the inflows and outflows of inventory and materials related to inventory; 2) the efficiency of operations and 3) the cost of labor including salary and benefits.

Promotional Tools and Techniques

The six elements of a promotional mix are: advertising, visual merchandising, public relations, publicity, personal selling and sales promotion.

Supply Chain

The supply chain, or channel of distribution, describes how the product is handled and/or distributed from suppliers with materials, to the manufacturer, wholesaler or retailer and finally to the consumer.

Target Market

Those who are most likely to buy your product or service.

## Strand 6: Technology Literacy Knowledge and Skills

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### 6.A Technology Literacy Knowledge and Skills (Grades 9 through 12)

- 6.A.01 Demonstrate proficiency in the use of computers and applications, as well as an understanding of the concepts underlying hardware, software, and connectivity.
  - 6.A.01.01 Use online help and other support to learn about features of hardware and software, as well as to assess and resolve problems.
  - 6.A.01.02 Install and uninstall software; compress and expand files (if the district allows it).
  - 6.A.01.03 Explain effective backup and recovery strategies.
  - 6.A.01.04 Apply advanced formatting and page layout features when appropriate (e.g., columns, templates, and styles) to improve the appearance of documents and materials.
  - 6.A.01.05 Use editing features appropriately (e.g., track changes, insert comments).
  - 6.A.01.06 Identify the use of word processing and desktop publishing skills in various careers.
  - 6.A.01.07 Identify the use of database skills in various careers.
  - 6.A.01.08 Define and use functions of a spreadsheet application (e.g., sort, filter, find).
  - 6.A.01.09 Explain how various formatting options are used to convey information in charts or graphs.
  - 6.A.01.10 Identify the use of spreadsheet skills in various careers.
  - 6.A.01.11 Use search engines and online directories.
  - 6.A.01.12 Explain the differences among various search engines and how they rank results.
  - 6.A.01.13 Explain and demonstrate effective search strategies for locating and retrieving electronic information (e.g., using syntax and Boolean logic operators).
  - 6.A.01.14 Describe good practices for password protection and authentication.
- 6.A.02 Demonstrate the responsible use of technology and an understanding of ethics and safety issues in using electronic media at home, in school, and in society.
  - 6.A.02.01 Demonstrate compliance with the school's Acceptable Use Policy.
  - 6.A.02.02 Explain issues related to the responsible use of technology (e.g., privacy, security).
  - 6.A.02.03 Explain laws restricting the use of copyrighted materials.
  - 6.A.02.04 Identify examples of plagiarism, and discuss the possible consequences of plagiarizing the work of others.
- 6.A.03 Design and implement a personal learning plan that includes the use of technology to support lifelong learning goals.
  - 6.A.03.01 Evaluate the authenticity, accuracy, appropriateness, and bias of electronic resources, including Web sites.
  - 6.A.03.02 Analyze the values and points of view that are presented in media messages.
  - 6.A.03.03 Describe devices, applications, and operating system features that offer accessibility for people with disabilities.

- 6.A.03.04 Evaluate school and work environments in terms of ergonomic practices.
- 6.A.03.05 Describe and use safe and appropriate practices when participating in online communities (e.g., discussion groups, blogs, social networking sites).
- 6.A.03.06 Explain and use practices to protect one's personal safety online (e.g., not sharing personal information with strangers, being alert for online predators, reporting suspicious activities).
- 6.A.03.07 Explain ways individuals can protect their technology systems and information from unethical users.
- 6.A.04 Demonstrate the ability to use technology for research, critical thinking, problem solving, decision making, communication, collaboration, creativity, and innovation.
  - 6.A.04.01 Devise and demonstrate strategies for efficiently collecting and organizing information from electronic sources.
  - 6.A.04.02 Compare, evaluate, and select appropriate electronic resources to locate specific information.
  - 6.A.04.03 Select the most appropriate search engines and directories for specific research tasks.
  - 6.A.04.04 Use a variety of media to present information for specific purposes (e.g., reports, research papers, presentations, newsletters, Web sites, podcasts, blogs), citing sources.
  - 6.A.04.05 Demonstrate how the use of various techniques and effects (e.g., editing, music, color, rhetorical devices) can be used to convey meaning in media.
  - 6.A.04.06 Use online communication tools to collaborate with peers, community members, and field experts as appropriate (e.g., bulletin boards, discussion forums, listservs, Web conferencing).
  - 6.A.04.07 Plan and implement a collaborative project with students in other classrooms and schools using telecommunications tools (e.g., e-mail, discussion forums, groupware, interactive Web sites, video conferencing).

## Appendices

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The framework teams created an “Appendix” listing potential industry recognized credentials attainable by secondary students; lists of professional, student, and relevant government organizations; and useful resources and websites. ***\* It is important to note that although most Framework Teams provided information for the “Appendix”, not all teams did. Therefore, sub-headings within the “Appendix” without information have been deleted.***

***Disclaimer: Reference in the Appendices Section to any specific commercial products, processes, or services, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement or recommendation by the Massachusetts Department of Elementary and Secondary Education.***

## Embedded Academic Crosswalks

### Embedded English Language Arts and Literacy

CVTE Learning Standard Number	Strand Coding Designation Grades ELAs Learning Standard Number	Text of English Language Arts Learning Standard
Performance Example: <ul style="list-style-type: none"> <li>Research and present on a power point the various jobs in Health care that are specifically involved in providing immediate first aid to an injured person. Explain the role of the providers.</li> </ul>		
2.B.01	RST Grades 9-10 #1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
	RST Grades 11-12 #1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
Performance Example: <ul style="list-style-type: none"> <li>The student will discuss the specific textual evidence and discuss the distinctions and inconsistencies in a set of working drawings.</li> </ul>		
2.B.01	RST Grades 9-10, 11-12 #4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9-10 texts and topics/grades 11-12 tests and topics</i> .
Performance Example: <ul style="list-style-type: none"> <li>The student will discuss a set of working drawings, interpret all aspects of the plan, and accurately determine the meaning of various abbreviations, symbols and notes.</li> </ul>		
2.B.01	RST Grades 9-10 #7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
Performance Example: <ul style="list-style-type: none"> <li>Using a set of technical drawings or prints, the student will develop comprehensive material quantity takeoff sheets. The student will deliver a multimedia presentation (handouts, PowerPoint presentation, poster, etc.) that includes tables and/or charts, reflecting the materials, quantities and cost of the proposed project.</li> </ul>		
2.B.01	RST Grades 9-10 #10	By the end of grade 10, read and comprehend science/technical texts in the grades 9 – 10 text complexity band independently and proficiently.
	RST Grades 11-12 #10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
Performance Example: <ul style="list-style-type: none"> <li>The student will identify all aspects of a plan, and discuss the complexity of the proposed project and how it will affect the building progress.</li> </ul>		
2.B.01	WHST Grades 9-10, 11-12 #4	Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.

<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will interpret a set of working drawings, and prepare a report that identifies materials, quantities and cost of the proposed project. The report will demonstrate an understanding of the project as well as the customer's specific needs, and will be written in a style that is appropriate to the trade.</li> </ul>		
2.C.01	RST Grades 9 – 10 #2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
	RST Grades 11 - 12 #2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
2.C.01	WHST Grades 9-10, 11-12 #4	Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will discuss a proposed project and work area, citing specific industry standards and necessary materials. The student will provide an accurate summary of the complex process, but will "break-down" the presentation by paraphrasing in accurate terms more appropriate for the given audience.</li> </ul>		
2.D.01, 2.E.01, 2.F.01, 2.G.01, 2.H.01, 2.I.01, 2.J.01, 2.K.01, 2.L.01, 2.M.01, 2.N.01, 2.O.01, 2.P.01, 2.Q.01, 2.R.01, 2.S.01, 2.T.01, 2.U.01	RST Grades 9-10 #3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
	RST Grades 11-12 #3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
	RST Grades 9-10 #4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9-10 texts and topics</i> .
	RST Grades 11-12 #4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11-12 texts and topics</i> .
	RST Grades 9-10 #7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
RST Grades 11-12 #7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	

RST Grades 9-10 #10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
RST Grades 11-12 #10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
WHST Grades 9-10 #2 a-e	<p>Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> <ol style="list-style-type: none"> <li>Introduce a topic and organize ideas, concepts and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</li> <li>Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.</li> <li>Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.</li> <li>Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</li> <li>Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li> </ol>
WHST Grades 9-10, 11-12 #4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST Grades 9-10, 11-12 #5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
WHST Grades 9-10 #6	Use technology, including the Internet, to produce, publish and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
WHST Grades 11-12 #6	Use technology, including the Internet, to produce, publish and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
WHST Grades 9-10, 11-12 #9	Draw evidence from informational texts to support analysis, reflection, and research.



<p>Performance Example:</p> <ul style="list-style-type: none"> <li>The student will evaluate information presented in a multimedia format (e.g. video), comparing and contrasting (either written or orally) the appropriate use of tools and materials. The student will discuss and demonstrate the appropriate use of tools and materials in a multi-step procedure.</li> </ul>
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## Embedded Mathematics

CVTE Learning Standard Number	Math Content Conceptual Category and Domain Code Learning Standard Number	Text of Mathematics Learning Standard
2.B.01	G-SRT1	The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Given a set of plans, students will determine the actual size of project to be built.</li> </ul>		
2.B.01	N-Q3 MA.3.A	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. Identify significant figures in recorded measures and computed values based on the context given and the precision of the tools used to measure.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Given a set of plans, students will estimate a materials list and approximate cost.</li> </ul>		
2.D.01	S-ID2	Use statistics appropriate to the shape of the data distribution to compare center ( median, mean) and spread (interquartile range, standard deviation) of two or more different data sets
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will determine slope of work area and how it would change given different range of dimensions.</li> </ul>		
2.D.01	G-SRT8	Use trigonometric ratios and Pythagorean Theorem to solve right triangles in applied problems.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will determine the diagonal distances across a rectangular area to be used for patio.</li> </ul>		
2.F.01	G-MG2 MA.4	Apply concepts of density based on area and volume in modeling situations. Use dimensional analysis for unit conversions to confirm that expressions and equations make sense.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will compute area for project and volume of material needed to complete.</li> </ul>		
2.G.01	N-Q2 MA.3.a	Define appropriate quantities (fractions) for the purpose of descriptive modeling with various measuring tools. Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will estimate work area and volume of materials, measuring within 1/8 of an inch. Determine variance.</li> </ul>		
2.G.01	N-Q3 MA.3.A	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. Identify significant figures in recorded measures and computed values based on the context given and the precision of the tools used to measure.
<p>Performance Example:</p>		

<ul style="list-style-type: none"> <li>Given a set of plans, students will estimate material list and then measure for exact amount necessary. Students will compare cost variation between the two results.</li> </ul>		
2.G.01	G-MG2 MA.4	Apply concepts of density based on area and volume in modeling situations and specific real life projects. Use dimensional analysis for unit conversions to confirm that expressions and equations make sense.
Performance Example: <ul style="list-style-type: none"> <li>Students will convert units between yards, feet, and inches. Students will be asked to confirm “that expressions and equations make sense.”</li> </ul>		
2.J.01	G-CO12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.
Performance Example: <ul style="list-style-type: none"> <li>Students will make a model structure with paper/cardboard given proper scale.</li> </ul>		
2.L.01	G-SRT8	Use trigonometric ratios and Pythagorean Theorem to solve right triangles in applied problems.
Performance Example: <ul style="list-style-type: none"> <li>Given two sides of a structure, students will determine the length of the diagonal connecting the two.</li> </ul>		
2.M.01	G-CO12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.
Performance Example: <ul style="list-style-type: none"> <li>With string, students will layout the perimeter for 5 to 8 sided project.</li> </ul>		
2.M.01	G-GPE7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
Performance Example: <ul style="list-style-type: none"> <li>Students will compute the distance between two points in a coordinate grid.</li> </ul>		
2.U.01	G-GMD1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and a cone.
Performance Example: <ul style="list-style-type: none"> <li>Students will compute the amount of material needed for a semi-circled patio.</li> </ul>		

## Embedded Science and Technology/Engineering

### *Earth and Space Science*

CVTE Learning Standard Number	Subject Area, Topic Heading and Learning Standard Number	Text of Earth and Space Science Learning Standard
2.U.01 2.Q.01	3. Earth Process and Cycles 3.1	Explain how physical and chemical weathering leads to erosion and the formation of soils and sediments, and creates various types of landscapes. Give examples that show the effects of physical and chemical weathering on the environment.
Performance Example: <ul style="list-style-type: none"> <li>Students will describe procedures used to install landscape retaining walls, and their benefits. Students will discuss the benefit of damp-proof walls, and how to install flashing.</li> </ul>		

### *Physical Science (Chemistry)*

<b>CVTE Learning Standard Number</b>	<b>Subject Area, Topic Heading and Learning Standard Number</b>	<b>Text of Chemistry Learning Standard</b>
2.F.01 2.K.01	7. Solutions, Rates of Reaction, and Equilibrium 7.1, 7.3	7.1 Describe the process by which solutes dissolve in solvents.  7.3 Identify and explain the factors that affect the rate of dissolving (e.g. temperature, concentration, surface area, pressure, mixing).  7.5 Identify the factors that affect the rate of a chemical reaction (temperature, mixing, concentration, particle size, surface area, catalyst).
Performance Example: <ul style="list-style-type: none"> <li>Students will demonstrate an understanding of the process by which solutes dissolve in solvents by mixing various cementitious materials to specifications. Students will demonstrate the “Wash-Down” procedure with chemical cleaners.</li> </ul>		
2.F.01	6. States of Matter, Kinetic Molecular Theory, and Thermochemistry 6.4	Describe the law of conservation of energy. Explain the difference between an endothermic process and an exothermic process.
Performance Example: <ul style="list-style-type: none"> <li>Students will identify basic concrete principles and understand process is exothermic.</li> </ul>		

### *Physical Science (Physics)*

<b>CVTE Learning Standard Number</b>	<b>Subject Area, Topic Heading and Learning Standard Number</b>	<b>Text of Physics Learning Standard</b>
2.G.01	1. Motion and Forces 1.1	Compare and contrast vector quantities (e.g. displacement, velocity, acceleration force, linear momentum) and scalar quantities (e.g. distance, speed, energy, mass, work).
Performance Example: <ul style="list-style-type: none"> <li>Students will demonstrate the proper use of various measuring tools by taking various measurements (lengths, widths, and heights) to calculate the areas and materials needed for a specific project.</li> </ul>		
2.J.01	1. Motion and Force 1.5	Use a free-body diagram to show forces acting on a system consisting of a pair of interacting objects. For a diagram with only co-linear forces, determine the net force acting on a system and between the objects.
Performance Example: Students will construct several projects using brick for various corners and leads.		
2.P.01	1. Motion and Force 1.4	Interpret and apply Newton’s three laws of motion.
Performance Example: <ul style="list-style-type: none"> <li>Students will demonstrate and identify bearing wall construction and the installation of reinforcement and anchors.</li> </ul>		

## Technology/Engineering

CVTE Learning Standard Number	Subject Area, Topic Heading and Learning Standard Number	Text of Technology/Engineering Learning Standard
2.B.01	1. Engineering Design 1.1, 1.4, 1.5	<p>1.1 Identify and explain the steps of the engineering design process: identify the problem, research the problem, develop possible solutions, select the best possible solution(s), and redesign.</p> <p>1.4 Interpret and apply scale and proportion to orthographic projections and pictorial drawings (e.g., <math>\frac{1}{4}'' = 1'0</math>, 1 cm = 1m).</p> <p>1.5 Interpret plans, diagrams, and working drawings in the construction of prototypes or models.</p>
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will discuss the steps of the engineering design process, reading and interpreting prints.</li> </ul>		
2B.01	2. Construction Technologies 2.6	Recognize the purposes of zoning laws and building codes in the design and use of structures.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will discuss state and local building requirements, and prepare an application for an appropriate permit.</li> </ul>		
2.C.01	2. Construction Technologies 2.1	Identify and explain the engineering properties of materials used in structures (e.g., elasticity, plasticity, R value, density, strength).
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will identify and discuss the differences between various masonry walls (e.g. brick veneer, composite, etc.).</li> </ul>		
2.L.01	1. Engineering Design 1.5	Interpret plans, diagrams, and working drawings in the construction of prototypes or models.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will demonstrate proper layout of a building using various layout tools and methods according to industry standards from a given drawing.</li> </ul>		
2.M.01	7. Manufacturing Technologies 7.1	Describe the manufacturing processes of casting and molding, forming, separating, conditioning, assembling, and finishing.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will show proper tile setting procedures on given pattern and project area.</li> </ul>		
2.N.01	7. Manufacturing Technologies 7.2	Identify the criteria necessary to select safe tools and procedures for a manufacturing process (e.g., properties of materials, required tolerances, end-uses).
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will assemble scaffolding from given plans according to industry standards.</li> </ul>		
2.C.01 2.R.01	1. Engineering Design 1.2	Understand that engineering design process is used in the solution of problems and the advancement of society. Identify examples of technologies, objects, and processes that have been modified to advance society, and explain why and how they were modified.
<p>Performance Example:</p> <ul style="list-style-type: none"> <li>Students will demonstrate an understanding of trade history and opportunities. Students will discuss</li> </ul>		

examples of masonry processes that have modified to accommodate the advancement of society (e.g. chimney, fireplace, retaining walls, etc.)		
2.T.01	2. Construction Technologies 2.4	Calculate the resultant force(s) for a combination of live loads and dead loads.
Performance Example: <ul style="list-style-type: none"> <li>Students will identify, lay-out, and construct various arch projects.</li> </ul>		
2.B.01 2.L.01	1. Engineering Design 1.5	Interpret plans, diagrams, and working drawings in the construction of prototypes or models.
Performance Example: <ul style="list-style-type: none"> <li>Students will demonstrate proper layout of a building using various layout tools and methods according to industry standards from a given drawing.</li> </ul>		

## DESE Statewide Articulation Agreements

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No Statewide Articulation Agreements at this time.

## Industry Recognized Credentials (Licenses and Certifications/Specialty Programs)

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Occupational Safety and Health Administration (OSHA) 10 Hour Card – Construction

## Other

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### Related National, Regional, and State Professional Organizations

- **International Union of Bricklayers and Allied Craft Workers  
(Local 3) - CHARLESTOWN**  
550 Medford Street  
Charlestown, MA 21291  
Contact: Charles Raso  
Email: Askbac@bacweb.org  
Ph: (617) 242-5500  
<http://www.bacweb.org/>
- **Plasterers and Cement Masons**
- **(Local 534) - BOSTON**
- 7 Frederika Street
- Boston, MA 02124
- Contact: Stephen Uva
- Ph: (617) 825-5200
- Mason Contractors Association of America, <http://www.mca-m.com/base.html>
- International Masonry Institute, <http://www.imiweb.org/>

### Student Organizations

- Skills USA [www.maskillsusa.org](http://www.maskillsusa.org)