

*Massachusetts Department of Elementary & Secondary Education*  
Office for College, Career and Technical Education



*Vocational Technical Education Framework*



Transportation Occupational Cluster

***Automotive Collision Repair & Refinishing (VCOLL)***

CIP Code 470603

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## Acknowledgements

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The Massachusetts Department of Elementary and Secondary Education awarded a multi-year contract to the Massachusetts Association of Vocational Administrators (MAVA) to launch the Statewide Vocational Technical Education Framework Revision Project, in consultation with the Office for College, Career and Technical Education. Through the collaborative efforts of many, vocational frameworks were revised to ensure curriculum alignment to current business and industry standards.

The Department of Elementary and Secondary Education wishes to thank all the groups that contributed to the development of these standards and all the teachers, administrators, and private sector advisory committee members who provided valuable employer validation of standards.

This updated Framework reflects current business and industry standards and includes the addition of the *Hours of Instruction*, *updates to Industry Recognized Credentials*, *Equipment*, and the *addition of Embedded Academic Performance Examples*.

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## **Hours of Instruction**

Hours of Instruction have been provided for each framework standard to ensure that adequate instructional time is provided for students to attain complete and comprehensive knowledge of the subject matter.

<b>Schedule of Hours</b>		
<b>2.A.</b>	Automotive Collision Specific Safety Practices	50
<b>2.B.</b>	Fasteners	45
<b>2.C.</b>	Hand and Power Tools	90
<b>2.D.</b>	Repair Plan/Blue Printing/Estimating	75
<b>2.E.</b>	Non-Structural	150
<b>2.F.</b>	Cutting and Welding	75
<b>2.G.</b>	Structural Damage/Frame Repair	75
<b>2.H.</b>	Mechanical and Electrical Components	100
<b>2.I.</b>	Automotive Refinishing	200
<b>2.J.</b>	Cleaning and Detailing	90
	Total:	950

# Introduction

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## **Overview & Organization of Strands**

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

This Revised Framework models the same format of all Massachusetts' Vocational Technical Education Frameworks and is organized into six strands. Standardized VTE Frameworks Strands 1, 4, 5, and 6 have been revised to ensure currency with industry standards.

Strand Two has been revised to include technical standards aligned to current business and industry standards, including new processes utilizing state-of-the-art equipment. The equipment necessary to deliver standards is also identified in this framework. To meet Chapter 74 vocational technical education standards, the equipment must meet industry standards.

Strand Three, Embedded Academic Knowledge and Skills, has been revised to clarify the direct connection of Core Academic Frameworks as they apply to Vocational Technical Education Frameworks.

Framework revision teams created Embedded Academic Performance Examples to provide specific learning scenarios which are typically utilized in VTE classrooms and labs to create real life learning experiences which provide students with knowledge attainment in Vocational Technical Education Frameworks and Academic Learning Standards. It is understood that most VTE learning experiences include Academic Knowledge attainment. The Performance Examples provided in this Framework are intended to provide awareness of these learning experience.

During Phase 3 of the 2021 Framework Revision Process, Strands One, Four, Five, and Six teams completed the revision of these strands. All Strand One, Four, Five and Six 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 College, Career, and Technical Education contracted the MAVA Consultant Team to work closely with the office to complete all the work accomplished during the 2021 Framework Revision Project. A remarkable amount of work was accomplished through the efforts of numerous professionals who collaborated and diligently supported this work. The Office for College, Career, and Technical Education is grateful for all the support received from the field, particularly all 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.

The **Strand Two Team** maintained the structure the 2013 framework that includes topic headings, standards and objectives, and performance examples. The Strand Two Framework now includes Hours of Instruction, as well as identifying Basic, Essential, Advanced and Advanced (A+) skill standards that are coded B, E, A and A+.

The **Strand Three Team** provided embedded academics performance examples that were developed to reflect the Standards for Literacy in Content Areas, the Standards for Mathematical Practice, the High School Science & Engineering Practices, and the Digital Literacy & Computer Science Practices.

## **Skill Standard Levels**

The 2021 Framework identifies vocational competencies in three skill levels; basic, essential and advanced. See below for more information.

**B = Basic Standards:** Fundamental Skills All Chapter 74 state-approved vocational programs are required to deliver basic standards.

**E = Essential Standards:** Knowledge and Skills required for industry licensure and credentials. All Chapter 74 state-approved vocational programs are required to deliver essential standards.

**A = Advanced Standards:** Higher-level knowledge and skills beyond essential entry level employment standards. All Chapter 74 state-approved vocational programs are required to deliver advanced standards.

**A+ = Advanced Plus (A+):** Denotes Advanced Standards - highest level of supplemental training

- **Advanced (A+) Skills Standards** are identified in Strand Two by a plus sign (A+). Although these standards are not required, they 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. Advanced (A+) standards are identified with the use of a plus sign (A+).

It is not required that all students achieve “advanced (A+) level standards”, however, all Chapter 74 state-approved programs must have the capacity to deliver all three skill levels; Basic, Essential, and Advanced.

## **Definitions - Equipment**

**Simulator** – a computer or application designed to provide a realistic operation of an industry standard or control, not to include educational trainers.

**Educational Trainer** - equipment which is designed strictly for educational purposes. Trainers cannot be a substitute or replacement for industry standard equipment.

**Industry Standard Equipment** – current and relevant equipment used in the industry relating to the standard functioning and implementation of operations in the respective fields of production, not to be confused with educational trainers.

**Industry Standard** - a set of criteria within an industry relating to the standard functioning and carrying out of operations in their respective fields of production. It is the generally accepted requirements followed by the members of an industry.

**Software** - current and relevant software used in the industry relating to the standard functioning and implementation of operations in the respective fields of production.

## Organization of Framework – Strand 2

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.

Standards and objectives are grouped under topic headings, which are displayed in bold. Each standard is followed by performance example(s).

In the excerpt below, 2.E is the topic; 2.E.01 is the first standard and 2.E.01.01 through 2.E.01.03 are the objectives under that standard. Topic 2.E.02.10 includes Advanced (A+) Skill Levels as defined on a previous page of this framework.

Strand 2 includes Hours of Instruction, Equipment Needed, and Skill Levels.

<b>2.E</b>	<b>Non-Structural Repair</b>	
	<b>Hours of Instruction</b>	<b>150</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b>	
	Aluminum Dent Repair Station (including hammers, dollies, stud weld-on tool and pulling equipment, heat gun, non-contact thermometer), Steel stud weld-on tool, plastic airless welder, plastic nitrogen welder, Paintless Dent Repair equipment	
<b>2.E.01</b>	<b>Panel Replacement and Adjustment</b>	<b>SKILL LEVEL</b>
2.E.01.01	Remove, install, and adjust bolted on exterior body panels. Adjust panel gaps to factory specifications. Set hardware to recommended torque specifications.	B, E
2.E.01.02	Overhaul bumper assembly	E
2.E.01.03	Overhaul door assembly.	E
<b>2.E.02</b>	<b>Panel Repair</b>	
2.E.02.01	Inspect, remove, and store exterior trim and moldings.	E
2.E.02.02	Repair cosmetic damage on an exterior panel.	E
2.E.02.03	Straighten and rough-out contours of damaged panel to a surface condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments (for steel and aluminum).	E
2.E.02.04	Remove paint from the damaged area of a body panel.	E
2.E.02.05	Demonstrate hammer and dolly techniques.	E
2.E.02.06	Mix and apply body filler.	E
2.E.02.07	Sand body filler to match the contour of the vehicle.	E
2.E.02.08	Featheredge broken areas with designated grits of sandpaper to prepare for primer.	E
2.E.02.09	Restore corrosion protection	E, A
2.E.02.10	Perform Paintless Dent Repair (PDR)	A+
	<b>Performance Example:</b>	
	Student will demonstrate a minor dent repair using various body repair methods.	
	Perform Paintless Dent Repair (PDR)	

## Strand 2: Technical Knowledge and Skills

<b>2.A</b>	<b>Automotive Collision Specific Safety Practices</b>	
	Hours of Instruction	50
<b>2.A.01</b>	<b>Identify, describe, and apply safety practices related to types of automotive lifts and dedicated frame equipment according to current industry and OSHA standards.</b>	<b>SKILL LEVEL</b>
2.A.01.01	Demonstrate procedures for safe lift operations.	E
2.A.01.02	Demonstrate safe use and storage of hydraulic floor jacks and jack stands.	B
2.A.01.03	Apply manufacturer`s safety procedures when using a frame machine.	E
	<b>Performance Example:</b> Students will demonstrate safe automotive lifting procedures and frame equipment.	
<b>2.A.02</b>	<b>Identify and describe safety procedures when dealing with high pressure systems equipment according to current industry and OSHA standards.</b>	<b>SKILL LEVEL</b>
2.A.02.01	Describe and explain the importance of safety procedures to be used when servicing high-pressure air-conditioning systems.	E
2.A.02.02	Demonstrate safe use when storing, handling, and installing high-pressure gas cylinders.	B
2.A.02.03	Identify and comply with environmental concerns and current industry and OSHA standards relating to refrigerants and coolants.	E
	<b>Performance Example:</b> Students will safely evacuate and recharge an air conditioning system according to current industry and OSHA standards.	
<b>2.A.03</b>	<b>Identify and describe safety procedures when dealing with electric circuits.</b>	<b>SKILL LEVEL</b>
2.A.03.01	Describe safety procedures to be followed when servicing airbag/supplemental restraint systems.	B
2.A.03.02	Describe safety awareness of high voltage circuits of electrical or hybrid electric vehicles and related safety precautions as per manufacturer`s recommendations.	E
	<b>Performance Example:</b> Student will safely disarm and reactivate an airbag system per manufacturer`s recommendations.	
<b>2.A.04</b>	<b>Describe and apply safety procedures when using all tools.</b>	<b>SKILL LEVEL</b>
2.A.04.01	Describe and apply safety procedures when using pneumatic tools.	B
2.A.04.02	Describe and apply safety procedures when using electric tools.	B
2.A.04.03	Describe and apply safety procedures when using hand tools.	B
	<b>Performance Example:</b> Student will pass a written and performance test before working with all tools.	
<b>2.A.05</b>	<b>Describe safety equipment and procedure for refinishing operations.</b>	<b>SKILL LEVEL</b>
2.A.05.01	Select and use a National Institute for Occupational Safety and Health (NIOSH) approved personal sanding respirator.	B
2.A.05.02	Inspect condition and operation of equipment.	B

2.A.05.03	Perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.	B
2.A.05.04	Select and use a NIOSH approved (Fresh Air Make-up System) personal painting/refinishing respirator system.	B
2.A.05.05	Perform maintenance in accordance with EPA40 CFR Part 63, Subpart HHHHHH (6H Rule) and applicable state and local regulation	E
<b>Performance Example:</b>		
Student will select and use the personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.) in accordance with OSHA, federal, state and local regulations.		
<b>2.B</b>	<b>Fasteners</b>	
	<b>Hours of Instruction</b>	<b>45</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b>	
	+ self-piercing rivet gun, ¼ inch structural rivet gun	
<b>2.B.01</b>	<b>Identify commonly used fasteners and related hardware.</b>	<b>SKILL LEVEL</b>
2.B.01.01	Identify Society of Automotive Engineers (SAE) and metric threaded fasteners.	B
2.B.01.02	Identify commonly used nuts and washers.	B
<b>2.B.02</b>	<b>Identify, describe, and use commonly used clips and retainers.</b>	<b>SKILL LEVEL</b>
2.B.02.01	Identify push type clips.	B
2.B.02.02	Identify threaded type retainers.	B
2.B.02.03	Identify commonly used rivets.	B
2.B.02.04	Identify self-piercing rivets.	A
<b>Performance Example:</b>		
Student will choose the correct hardware to match the assigned task.		
<b>2.C</b>	<b>Hand and Power Tools</b>	
	<b>Hours of Instruction</b>	<b>90</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b>	
	Torque wrench, plasma cutter, dustless sanding system	
<b>2.C.01</b>	<b>Demonstrate commonly used measuring tools.</b>	<b>SKILL LEVEL</b>
2.C.01.01	Demonstrate and explain proper use of low precision measuring tools (steel ruler, tape measure).	B
<b>Performance Example:</b>		
Student will demonstrate measurement skills using both American and metric system using variety of low precision measuring tools.		
<b>2.C.02</b>	<b>Describe and demonstrate the use of various types of screwdrivers according to current industry and OSHA standards.</b>	<b>SKILL LEVEL</b>
2.C.02.01	Demonstrate and explain the use of a Phillips screwdriver.	B
2.C.02.02	Demonstrate and explain the use of a flat screwdriver.	B
2.C.02.03	Demonstrate and explain the use of a Torx screwdriver.	B
<b>Performance Example:</b>		
Student will demonstrate the use of various types of screwdrivers.		
<b>2.C.03</b>	<b>Describe and demonstrate the use of various types of pliers according to current industry and OSHA standards.</b>	<b>SKILL LEVEL</b>
2.C.03.01	Demonstrate and explain the use of locking type pliers.	B

2.C.03.02	Demonstrate and explain the use of channel type pliers.	B
2.C.03.03	Demonstrate and explain the use of cutting pliers.	B
2.C.03.04	Demonstrate and explain the use of needle nose pliers.	B
	<b>Performance Example:</b> Student will demonstrate the use of various types of pliers.	
<b>2.C.04</b>	<b>Describe and demonstrate the use of various types of wrenches.</b>	<b>SKILL LEVEL</b>
2.C.04.01	Demonstrate and explain the use of open-end wrenches.	B
2.C.04.02	Demonstrate and explain the use of combination wrenches.	B
2.C.04.03	Demonstrate and explain the use of ratcheting type wrenches.	B
2.C.04.04	Demonstrate and explain the use of torque wrenches.	E
2.C.04.05	Demonstrate and explain the use of boxed wrenches.	B
2.C.04.06	Demonstrate and explain the use of Allen type wrenches.	B
2.C.04.07	Demonstrate and explain the use of tubing wrenches.	B
	<b>Performance Example:</b> Student will demonstrate the use of various types of wrenches.	
<b>2.C.05</b>	<b>Describe and demonstrate the use of various types of hammering tools.</b>	<b>SKILL LEVEL</b>
2.C.05.01	Demonstrate the use and knowledge of the different types of hammers.	B
2.C.05.02	Demonstrate the use and knowledge of the different types of dollies.	B
2.C.05.03	Demonstrate the use and knowledge of the different types of punches.	B
2.C.05.04	Demonstrate the use and knowledge of the different types of chisels.	B
	<b>Performance Example:</b> Student will demonstrate the use of various types of wrenches.	
<b>2.C.06</b>	<b>Describe and demonstrate the use of various types of sockets and ratchets.</b>	<b>SKILL LEVEL</b>
2.C.06.01	Demonstrate the use and knowledge of socket drive sizes.	B
2.C.06.02	Demonstrate the use and knowledge of socket point types.	B
2.C.06.03	Demonstrate the use and knowledge of ratchets and breaker bars.	B
2.C.06.04	Demonstrate the use and knowledge of extensions and swivels.	B
2.C.06.05	Demonstrate the use and knowledge of impact sockets.	B
	<b>Performance Example:</b> Student will select and demonstrate use of proper socket and handle for given task.	
<b>2.C.07</b>	<b>Describe and demonstrate the use of various types of cutting, filing and threading tools.</b>	<b>SKILL LEVEL</b>
2.C.07.01	Demonstrate the use and knowledge of various types of files.	B
2.C.07.02	Demonstrate the use and knowledge of different types of hacksaws.	B
2.C.07.03	Demonstrate the use and knowledge of various types of thread cutting taps	B
2.C.07.04	Demonstrate the use and knowledge of various types of thread cutting dies.	B
<b>2.C.08</b>	<b>Demonstrate and explain the use of various commonly used pneumatic or electric powered tools.</b>	<b>SKILL LEVEL</b>
2.C.08.01	Demonstrate and explain the use of commonly used sanders.	B
2.C.08.02	Demonstrate and explain the use of commonly used grinders.	B
2.C.08.03	Demonstrate and explain the use of commonly used buffers	B
2.C.08.04	Demonstrate and explain the use of commonly used air ratchets and impact guns.	B
2.C.08.05	Demonstrate and explain the use of commonly used cutting tools.	B

2.C.08.06	Demonstrate and explain the use of High-Volume, Low Pressure (HVLP) and compliant spray guns.	E
2.C.08.07	Demonstrate and explain the use of blow guns.	B
	<b>Performance Example:</b> Student will demonstrate cleaning a spray gun using the specified gun washer system Student will demonstrate the use of dent removal equipment according to current industry and OSHA standards.	
<b>2.D</b>	<b>Repair Plan/Blue Printing/Estimating</b>	
	<b>Hours of Instruction</b>	<b>75</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b> computer-aided estimating software, diagnostic scan tool, digital camera, factory recommended repair procedures software	
<b>2.D.01</b>	<b>Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired.</b>	<b>SKILL LEVEL</b>
2.D.01.01	Wash entire vehicle with appropriate cleaning materials.	B
	<b>Performance Example:</b> Student will soap and water wash the entire vehicle to identify damage on the vehicle.	
<b>2.D.02</b>	<b>Develop and execute a repair plan.</b>	<b>SKILL LEVEL</b>
2.D.02.01	Create a hand-written or electronic damage report; record old/unrelated damage.	E
2.D.02.02	Review damage report and analyze damage to determine appropriate methods for area to be repaired.	E
2.D.02.03	Identify paint code according to vehicle manufacturer’s location.	B
2.D.02.04	Perform pre- post-scans; discuss recalibration procedures	A
	<b>Performance Examples:</b> Student will execute a repair plan to the assigned task. Student will generate an estimate using various methods. Student will prepare a repair plan using manufacturer’s recommended procedure.	
<b>2.E</b>	<b>Non-Structural Repair</b>	
	<b>Hours of Instruction</b>	<b>150</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b> Aluminum Dent Repair Station (including hammers, dollies, stud weld-on tool and pulling equipment, heat gun, non-contact thermometer), Steel stud weld-on tool, plastic airless welder, (A+) plastic nitrogen welder, Paintless Dent Repair equipment	
<b>2.E.01</b>	<b>Panel Replacement and Adjustment</b>	<b>SKILL LEVEL</b>
2.E.01.01	Remove, install, and adjust bolted on exterior body panels. Adjust panel gaps to factory specifications. Set hardware to recommended torque specifications.	E
2.E.01.02	Overhaul bumper assembly	E
2.E.01.03	Overhaul door assembly.	E
<b>2.E.02</b>	<b>Panel Repair</b>	
2.E.02.01	Inspect, remove, and store exterior trim and moldings.	E
2.E.02.02	Repair cosmetic damage on an exterior panel cosmetic repair.	E

2.E.02.03	Straighten and rough-out contours of damaged panel to a surface condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments (for steel and aluminum).	E
2.E.02.04	Remove paint from the damaged area of a body panel.	E
2.E.02.05	Demonstrate hammer and dolly techniques.	E
2.E.02.06	Mix and apply body filler.	E
2.E.02.07	Sand body filler to match the contour of the vehicle.	E
2.E.02.08	Featheredge broken areas with designated grits of sandpaper to prepare for primer.	E
2.E.02.09	Restore corrosion protection	E
2.E.02.10	Perform Paintless Dent Repair	A+
<b>Performance Example:</b> Student will demonstrate a minor dent repair using various body repair methods. Perform Paintless Dent Repair (PDR)		
<b>2.E.03</b>	<b>Plastic Repair</b>	<b>SKILL LEVEL</b>
2.E.03.01	Identify the types of plastics used in vehicles and determine their reparability. Per OEM recommendations	E
2.E.02.02	Explain plastic repair using product manufacturer's recommendations.	E
2.E.02.03	Prepare panel to perform an adhesive repair per product manufacturer's recommendation	E
2.E.02.04	Prepare panel to perform an airless welding repair	E
2.E.02.05	Prepare panel to perform a nitrogen weld repair	A+
<b>2.E.04</b>	<b>Reassemble and Final inspection.</b>	
2.E.04.01	Inspect vehicle to ensure all items on the repair order were performed.	E
2.E.04.02	Apply decals, transfers, tapes, pinstripes.	E
<b>Performance Example</b> Student will apply decals and pin striping tape.		
<b>2.F</b>	<b>Cutting and Welding</b>	
<b>Hours of Instruction</b>		<b>75</b>
<b>Equipment Needed – (Must Meet Industry Standards)</b> OEM recommended Squeeze type resistance spot welder, aluminum pulse welder, silicon bronze pulse welder, welding fume extractor/ventilation system		
<b>2.F.01</b>	<b>Identify weldable and non-weldable materials used in collision repair.</b>	<b>SKILL LEVEL</b>
2.F.01.01	Weld and cut mild steel, and high-strength steel, aluminum and other metals using manufacturer/industry specification.	E
<b>Performance Example</b> Student will identify weldable and non-weldable materials.		
<b>2.F.02</b>	<b>Identify cutting and welding processes and equipment used for different materials and locations in accordance with manufacturer recommendations and specification.</b>	<b>SKILL LEVEL</b>
2.F.02.01	Determine the type of cutting process for the type of metal to manufacturer's specification.	E
2.F.02.02	Determine the joint type (butt weld with backing, lap, etc.) for each specific welding operation according to manufacturer's specification.	E

2.F.02.03	Determine the type of weld (continuous, butt weld with backing plug, etc.) for each specific welding operation according to manufacturer and industry specifications.	E
2.F.02.04	Explain the following welds: continuous, stitch, tack, plug, squeeze-type resistant spot welding (STRSW), butt weld, butt weld with backing and lap joints.	E
<b>2.F.03</b>	<b>Set up welding equipment.</b>	<b>SKILL LEVEL</b>
2.F.03.01	Determine the appropriate welder type (aluminum, steel, or +silicon bronze), electrode, wire type, diameter, drive roll tension and gas to be used in a specific welding situation.	E
2.F.03.02	Adjust the welder to "tune" for proper electrode stick-out, voltage, polarity, flow-rate and wire-feed required for the material being welded.	E
2.F.03.03	Determine work clamp (ground) location and attach. Prep metal and work area for welding and make test welds.	B
	<b>Performance Example:</b> Student will safely set-up and adjust a Metal Inert Gas (MIG) welder for a proper weld. Student will use body repair manuals or electronic software to look up proper cutting and welding procedures per the manufacturer's recommendations.	
<b>2.F.04</b>	<b>Prep metal and work area for welding and complete test welds.</b>	<b>SKILL LEVEL</b>
2.F.04.01	Clean and prepare metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.	B
2.F.04.02	Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations.	B
2.F.04.03	Protect computers and other electronic control modules during welding procedures according to manufacturer's specifications.	B
2.F.04.04	Make test welds to ensure proper welder tuning.	E
	<b>Performance Example:</b> Student will properly prep area for welding and properly protect vehicle for welding.	
<b>2.F.05</b>	<b>Make test welds and perform a destructive test.</b>	<b>SKILL LEVEL</b>
2.F.05.01	Weld in the flat, horizontal, vertical, and overhead position using the proper angle of the gun to the joint and direction gun travel and perform a destructive test.	E, A
2.F.05.02	Explain the following welds: continuous, stitch, tack, plug, Squeeze-Type Resistant Spot Welding (STRSW), butt weld, butt-weld with backing and lap joints and perform a destructive test.	B
2.F.05.03	Weld cracked or torn steel body panels; repair broken welds.	E, A
	<b>Performance Example:</b> Student will weld a test panel and perform a destructive test. Students will weld in the flat, horizontal, vertical, and overhead position using the proper angle of the gun to the joint and direction of gun travel.	
<b>2.F.06</b>	<b>Identify welding problems.</b>	<b>SKILL LEVEL</b>

2.F.06.01	Identify the causes of burn-through, lack of penetration, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead and make necessary adjustments.	B
2.F.06.02	Identify cause of contact tip burn-back and failure of wire to feed and make necessary adjustments.	B
	<b>Performance Example:</b> Students will identify and correct burn through, lack of penetration, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead and make necessary adjustments. Student will set-up and adjust various types of welders for various types of materials. Student will perform squeeze type resistance spot weld. All welds will have a destructive test performed. Student will set up and adjust aluminum MIG pulse welder. Student will set up and adjust silicon bronze MIG pulse welder.	
<b>2.G</b>	<b>Structural Damage/Frame Repair</b>	
	<b>Hours of Instruction</b>	<b>75</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b> Equipment Needed: Dedicated frame machine, 3-D computer aided measuring system, Wheel Alignment Equipment, Tire Mount and Wheel Balance Machine	
<b>2.G.01</b>	<b>Set-up and measure structural damage using the appropriate measuring devices.</b>	<b>SKILL LEVEL</b>
2.G.01.01	Attach vehicle to frame equipment using anchoring devices.	B
2.G.01.02	Demonstrate and explain use of self-centering, and tram gauge.	B
2.G.01.03	Analyze unibody or full frame dimensions using appropriate measuring devices per measuring system specifications.	A
2.G.01.04	Determine the extent of damage to structural steel and body panels to repair or replace panels.	B
	<b>Performance Example:</b> Student will safely set-up, measure and diagnose structural damage using appropriate measuring devices. Student will set-up and measure structural damage using 3-D electronic measuring system. Student will select and demonstrate the use of pulling equipment.	
<b>2.G.02</b>	<b>Panel Bonding</b>	<b>SKILL LEVEL</b>
2.G.02.01	Demonstrate and explain the use of adhesive bonding in vehicle repair.	E
2.G.02.02	Demonstrate and explain weld bonding and rivet bonding.	E
<b>2.H</b>	<b>Mechanical and Electrical Components</b>	
	<b>Hours of Instruction</b>	<b>100</b>
	<b>Equipment Needed – (Must Meet Industry Standards)</b> Equipment Needed: 134A Air condition servicing machine, Electronic Battery Charger, Digital Volt Ohm Meter, Battery Jumper Pack, Hybrid/Electric Vehicle Servicing Equipment, 1234YF Air condition servicing machine, Headlight Aiming Equipment, Advanced Driver Assistance Systems Calibration equipment	
<b>2.H.01</b>	<b>Identify and explain common suspension and braking components.</b>	<b>SKILL LEVEL</b>
2.H.01.01	Identify suspension system fasteners that should not be reused.	B

2.H.01.02	Identify suspension types and components.	B
2.H.01.03	Identify brakes components.	B
2.H.01.04	Reinstall wheel and torque lug nuts according to manufacturer's specifications.	B
	<b>Performance Example:</b> Student will properly identify suspension and brake components. Student will remove and install a tire/wheel assembly using the torque sequence per manufacturer's recommendations. Identify and replace damaged or worn suspension components; align vehicle.	
<b>2.H.02</b>	<b>Heating and air conditioning systems.</b>	<b>SKILL LEVEL</b>
2.H.02.01	Identify air conditioning (A/C) components.	E
2.H.02.02	Evacuate and recharge an air conditioning system.	E
2.H.02.03	Identify heating and cooling system components.	E
	<b>Performance Example:</b> Students will identify heating and air conditioning components.	
<b>2.H.03</b>	<b>Identify electrical systems components.</b>	<b>SKILL LEVEL</b>
2.H.03.01	Inspect, clean, and charge or replace a battery.	B
2.H.03.02	Inspect, clean and repair or replace battery cables, connectors and clamps.	B
2.H.03.03	Aim headlight assemblies and fog/driving lamps per manufacturers recommendations; determine needed repairs.	B
2.H.03.04	Check operation of power or manual options in vehicle such as locks, windows, mirrors, etc.	E
2.H.03.05	Identify electric hybrid vehicles and disarm high voltage system per manufacturer's recommendations.	E
2.H.03.06	Identify vehicle restraint systems.	E
2.H.03.07	Disable and enable restraints systems per manufacturers specifications.	E
2.H.03.08	Identify and describe Advanced Driver Assistance Systems (ADAS)	E
	<b>Performance Example:</b> Student will safely remove, inspect, and install a battery. Student will safely install jump-pack, battery charger. Student will properly aim headlights, fog lights per manufacturers recommendations.	
<b>2.I</b>	<b>Automotive Refinishing</b>	
	<b>Hours of Instruction</b>	<b>200</b>
	<b>Equipment Needed - (Must Meet Industry Standards)</b> OSHA Compliant Heated Spray Booth, Fresh Air Respirator System, Gun Washer to clean both solvent and waterborne materials, Color Corrective Light, Spectrophotometer	
<b>2.I.01</b>	<b>Cover, mask and protect exterior and interior of vehicle for both repair and refinish process.</b>	<b>SKILL LEVEL</b>
2.I.01.01	Identify and explain spray mask procedures.	B
2.I.01.02	Mask area for primer.	B
<b>2.I.02</b>	<b>Identify and describe accurate liquid measuring procedures.</b>	<b>SKILL LEVEL</b>
2.I.02.01	Explain and demonstrate the calculation of mixing ratios.	B

2.1.02.02	Explain and demonstrate the calculation of percentage.	B
<b>2.1.03</b>	<b>Mix and apply undercoats per paint manufacturer's recommendations.</b>	<b>SKILL LEVEL</b>
2.1.03.01	Select, mix, and apply appropriate undercoat.	E
	<b>Performance Example:</b> Student will mix and apply undercoats per paint manufacturer's recommendations, current industry and OSHA standards. Student will safely prep substrate for primer-surfacer and prime the panel following paint manufacturer's recommendations.	
<b>2.1.04</b>	<b>Dry or wet sand area to which topcoat will be applied.</b>	
2.1.04.01	Select appropriate grit sandpaper and apply sanding techniques.	B
	<b>Performance Example:</b> Demonstrate the sanding techniques using the appropriate grit sandpaper according to paint manufacturer's recommendations and current industry and OSHA standards.	
<b>2.1.05</b>	<b>Clean area to be refinished using cleaning solutions.</b>	<b>SKILL LEVEL</b>
2.1.05.01	Select and use final cleaning solutions.	E
	<b>Performance Example:</b> Student will use the correct cleaning solutions in according with paint manufacturer's recommendations and OSHA standards.	
<b>2.1.06</b>	<b>Explain and demonstrate procedures for blending a panel per paint manufacturer's recommendations, current industry and OSHA standards using product technical data sheets.</b>	<b>SKILL LEVEL</b>
2.1.06.01	Determine paint color with variant decks, mix paint, and tint, if necessary, for a blendable match.	E
2.1.06.02	Demonstrate and explain procedures to make a spray out card and a letdown panel using a color corrective light to match the paint.	E
2.1.06.03	Blend basecoat into adjacent panel.	E
2.1.06.04	Explain and demonstrate procedures for overall panel refinishing per paint manufacturer's recommendations, current industry and OSHA standards using product technical data sheets.	
	<b>Performance Example:</b> Students will demonstrate the ability to blend paint. Students will demonstrate the ability to create a spray out card and let down panel. Student will apply a topcoat to a prepared surface per paint manufacturer's recommendation and OSHA standards.	
<b>2.1.07</b>	<b>Identify dirt or dust in the paint surface.</b>	<b>SKILL LEVEL</b>
2.1.07.01	De-nib, buff, and polish finishes, where necessary, to remove imperfections such as runs, sags, orange peel and dirt.	B
	<b>Performance Example:</b> Student will identify and remove paint imperfections.	
<b>2.1.08</b>	<b>Identify and remove/repair buffing related imperfections (i.e. swirl marks, wheel burns).</b>	<b>SKILL LEVEL</b>
2.1.08.01	Remove buffing related imperfections.	B
<b>2.1.09</b>	<b>Identify and remove/repair overspray conditions.</b>	<b>SKILL LEVEL</b>
2.1.09.01	Remove overspray.	B

	<b>Performance Example:</b> Student will identify and remove overspray.	
<b>2.I.10</b>	<b>Identify, diagnose, and repair paint problems.</b>	<b>SKILL LEVEL</b>
2.I.10.01	Identify blistering or lifting (i.e., raising of the paint surface) fisheyes (crater-like opening), solvent popping; determine the cause(s) and correct condition.	B
2.I.10.02	Identify sags and runs, dry spray, orange peel and tape tracking in the paint surface; determine the cause(s) and correct the condition.	B
<b>2.J</b>	<b>Cleaning and Detailing</b>	
	<b>Hours of Instruction</b>	90
	<b>Equipment Needed – (Must Meet Industry Standards)</b> Pressure Washer, Carpet Extractor/Steamer	
<b>2.J.01</b>	<b>Detail exterior of vehicle.</b>	<b>SKILL LEVEL</b>
2.J.01.01	Demonstrate the use of cleaners and techniques to clean exteriors of the vehicles following current industry and OSHA standards.	B
2.J.01.02	Wash and dry exterior of vehicle with soap and water.	B
2.J.01.03	Inspect and remove environmental contaminants such as sap, road tar, etc.	B
2.J.01.04	Inspect and diagnose surface imperfections such as scratches, brake dust, oxidation, acid rain, etc.	B
2.J.01.05	Apply and remove wax or other UV protective coating using manufacturer’s recommendations.	B
2.J.01.06	Clean and restore conditioner to tires and rims.	B
	<b>Performance Example:</b> Student will wash and wax outside of vehicle.	
<b>2.J.02</b>	<b>Detail Interior of vehicle.</b>	<b>SKILL LEVEL</b>
2.J.02.01	Vacuum and shampoo upholstery and carpets.	B
2.J.02.02	Clean dirt, dust and stains from interior door panels, dashboard and other interior trim.	B
2.J.02.03	Clean and apply conditioner to leather components.	B
2.J.02.04	Clean interior and exterior glass.	B
2.J.02.05	Clean body openings with necessary cleaners.	B
2.J.02.06	Demonstrate the correct use of a pressure washer per manufacturer’s recommendations.	A+
2.J.02.07	Demonstrate the correct use of a carpet extractor or steamer to remove stains per manufacturer’s recommendations.	A+
	<b>Performance Example:</b> Student will recondition interior to industry standards. Student will perform a final detail on a vehicle.	

## **Strand 3: Embedded Academics**

### **Embedded Academics Grades 9 –14 for Chapter 74 Vocational Technical Education Programs**

Due to the thoughtful planning that went into the revisions of the English Language Arts & Literacy (2017), Mathematics (2017), Science and Technology Engineering (2016), and Digital Literacy Frameworks (2016), the current Vocational Technical Education Frameworks can move forward with a new level of embedded academics that are more content focused and more meaningful to students as they attain transferrable skills. Core content area experts carefully developed the literacy standards and academic practices in the aforementioned Massachusetts Frameworks documents which are highlighted. The Standards for Literacy in Content Areas, the Standards for Mathematical Practice, the High School Science & Engineering Practices, and the Digital Literacy & Computer Science Practices complement but do not take the place of the grade-level or course-level content standards in any of the discipline-specific Vocational Technical Education Frameworks.

Mathematics, science, technology, reading, writing, speaking, and listening skills and standards focus on understanding and practicing discipline-specific literacy, math, STE, and communication skills, using resources and characteristics of specific Vocational Technical Education programs. The philosophy of the embedded academics is not to have vocational teachers become traditional content teachers of English, science, and mathematics but is intended to reinforce the concept that it is the responsibility of all teachers to embed rich academic experiences in Vocational Technical Education. This will ensure that students recognize the transferrable skills that are essential for success in 21st century careers and in college. In rigorous Vocational Technical Education, students have hands-on and real-world experiences which develop relevant connections both from academic areas to Vocational Technical areas and vice versa.

The performance examples included in Strand Three are models developed using the portrait from the English Language Arts & Literacy (2017) of Students Who Are Ready for College, Careers, and Civic Participation. The examples illustrate how individual vocational teachers may use academic practices and literacy standards from the Massachusetts Frameworks listed above to seamlessly embed and explicitly teach relevant academics through Vocational Technical Education.

Vocational Technical Education of the past and of the 21st century naturally embed the elements of the portrait of Students Who are Ready for College, Careers, and Civic Participation through the hands-on and real-world experiences that students engage in throughout their tenure as Vocational Technical students. The following guidelines and practices that are collated in this document for easy reference are directly from the English Language Arts & Literacy (2017), Mathematics (2017), Science & Technology Engineering (2016), and Digital Literacy Frameworks (2016).

## Auto Collision Performance Task 1

Selecting appropriate personal protective equipment (PPE) - gloves, safety glasses, etc. -as outlined in the SDS (Safety Datasheets) sheet, students acting as collision repair technicians will inspect a test panel for proper panel preparation to accept filler. Technicians will choose an appropriate filler for the substrate and estimate amount of filler required. Technicians will weigh the filler for accurate catalyzation using the product technical datasheet and mix the body filler to achieve uniform color. Technicians will apply body filler to match contour being repaired. Using appropriate online tools and industry standard resources, the technicians will research proper techniques to correct deficiencies, document the process and techniques chosen for this particular repair, and discuss the chosen process with his/her supervisor (teacher) before performing the repair. After the repair is completed, technicians will evaluate their own work according to industry standards and write a reflection indicating successes, struggles, and ideas for future practices.

### Embedded Math:

- [SMP.2] Reason abstractly and quantitatively.
- [SMP.5] Use appropriate tools strategically.
- [SMP.6] Attend to precision.

### Embedded Science & Engineering:

- [SEP.1] Asking questions (for science) and defining problems (for engineering).
- [SEP.2] Developing and using models.
- [SEP.3] Planning and carrying out investigations.
- [SEP.4] Analyzing and interpreting data.
- [SEP.6] Constructing explanations and designing solutions.
- [SEP.8] Obtaining, evaluating, and communicating information.

### Embedded Reading in Science & Technical Subjects:

- [RCA-ST.11-12.3] Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze specific results based on explanations in the text.
- [RCA-ST.11-12.4] Determine the meaning of general academic vocabulary as well as symbols, notation, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to auto collision texts and topics.
- [RCA-ST.11-12.8] Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- [RCA-ST.11-12.9] Synthesize information from a range of sources (i.e., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
- [RCA-ST.11-12.10] Independently and proficiently read and comprehend science/technical texts exhibiting complexity appropriate for the grade/course.

### Embedded Writing in Content Areas:

- [WCA.11-12.2d] Use precise language, domain-specific vocabulary and techniques to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
- [WCA.11-12.4] Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

**Embedded Digital Literacy and Computer Science Practices:**

- [DLCS.2] Connecting
- [DLCS.4] Analyzing
- [DLCS.7] Researching

**Career & Technical Standards:**

- [2.E.02.04] Remove paint from the damaged area of a body panel.
- [2.E.02.06] Mix and apply body filler.
- [2.A.04.01] Describe and apply safety procedures when using pneumatic tools.
- [2.A.05.01] Select and use a National Institute for Occupational Safety and Health (NIOSH) approved personal sanding respirator.
- [2.E.02.07] Sand body filler to match the contour of the vehicle.

## Auto Collision Performance Task 2

Students acting in the role of I-CAR examiners will observe and document other students acting in the roles of technicians setting up a MIG (Metal Inert Gas) Welder. The weld must meet length, width, height per I-CAR standards. Technicians will adjust the welder for appropriate materials to achieve proper penetration (i.e., wire speed, voltage, and gas flow). Examiners will perform a destructive test on the weld, write the rating of each test, and explain the results. Examiners will use the written results to communicate the corrections verbally with the technician who performed the weld.

### Embedded Math:

- [SMP.2] Reason abstractly and quantitatively.
- [SMP.3] Construct viable arguments and critique the reasoning others.
- [SMP.6] Attend to precision.

### Embedded Science & Engineering:

- [SEP.3] Planning and carrying out investigations.
- [SEP.6] Constructing explanations (for science) and designing solutions (for engineering).
- [SEP.7] Engaging in arguments from evidence.
- [SEP.8] Obtaining, evaluating, and communicating information.

### Embedded Reading in Science & Technical Subjects:

- [RCA-ST.11-12.3] Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- [RCA-ST.11-12.4] Determine the meaning of general academic vocabulary as well as symbols, notation, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to auto collision texts and topics.
- [RCA-ST.11-12.9] Synthesize information from a range of sources (i.e., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

### Embedded Writing in Content Areas:

- [WCA.11-12.2] Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

### Embedded Digital Literacy and Computer Science Practices:

- [DLCS.2] Connecting
- [DLCS.4] Analyzing
- [DLCS.5] Communicating
- [DLCS.6] Collaborating

### Embedded Speaking & Listening in Content Areas:

- [SLCA.11-12.1] Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on auto collision specific topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
- [SCLA.11-12.4] Present information, findings, and supportive evidence conveying a clear and distinctive perspective, such that listeners can follow the line of reasoning, alternative or opposing perspective are addressed, and the organization, development, vocabulary, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
- [SLCA.11-12.6] Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

**Career & Technical Standards:**

- [2.A.05.02] Inspect condition and operation of equipment.
- [2.A.02.02] Demonstrate safe use when storing, handling and installing high-pressure gas cylinders.
- [2.F.03.01] Determine the appropriate welder type (aluminum, steel, or +silicon bronze), electrode, wire type, diameter, drive roll tension and gas to be used in a specific welding situation.
- [2.F.03.02] Adjust the welder to "tune" for proper electrode stickout, voltage, polarity, flow-rate and wire-feed required for the material being welded.
- [2.F.03.03] Determine work clamp (ground) location and attach prep metal and work area for welding and make test welds.

## Auto Collision Performance Task 3

Students acting in the roles of collision repair frame technicians will measure a frame to determine damages to the vehicle structure using industry approved 3-D measuring system. Frame technicians will research metal type to determine the reparability of parts using manufacturer's specific electronic databases. Frame technicians will use a tram gauge to compare under hood dimensions to those found in the measuring database or in the under-hood dimensions located in the estimating guide. Frame technicians will develop a written repair plan to include sequential repair procedures to return the vehicle to factory specifications. Using their written documentation as a guide, frame technicians will explain the repair plan to the customer and answer clarifying questions. All students will rotate through the roles of frame technicians and customers.

### Embedded Math:

- [SMP.1] Make sense of problems and persevere in solving them.
- [SMP.5] Use appropriate tools strategically.
- [SMP.6] Attend to precision.

### Embedded Science & Engineering:

- [SEP.1] Asking questions (for science) and defining problems (for engineering).
- [SEP.3] Planning and carrying out investigations.
- [SEP.4] Analyzing and interpreting data.
- [SEP.6] Constructing explanations and designing solutions.
- [SEP.8] Obtaining, evaluating, and communicating information.

### Embedded Reading in Science & Technical Subjects:

- [RCA-ST.3] Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- [RCA-ST.11-12.4] Determine the meaning of general academic vocabulary as well as symbols, notation, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to auto collision texts and topics.
- [RCA-ST.11-12.9] Synthesize information from a range of sources (i.e., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

### Embedded Writing in Content Areas:

- [WCA.11-12.2] Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- [WCA.11-12.3] In technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations, analyses, or technical work so that others can replicate them and (possibly) reach the same results. In addition, career/vocational courses may involve more specific forms of narrative composition: scripts and storyboards in filmmaking, timelines and interview write-ups in journalism, instructions for a tool's assembly or safe use in auto collision, and more.

### Embedded Digital Literacy and Computer Science Practices:

- [DLCS.2] Connecting
- [DLCS.4] Analyzing
- [DLCS.5] Communicating
- [DLCS.6] Collaborating

**Embedded Speaking & Listening in Content Areas:**

[SLCA.11-12.2] Integrate multiple sources of information presented in diverse formats and media (i.e., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

[SLCA.11-12.4] Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, vocabulary, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

**Career & Technical Standards:**

[2.G.01.01] Attach vehicle to frame equipment using anchoring devices.

[2.G.01.02] Demonstrate and explain use of self-centering and tram gauge.

[2.G.01.03] Analyze unibody or full frame dimensions using appropriate measuring devices per measuring system specifications.

[2.G.01.04] Determine the extent of damage to structural steel and body panels to repair or replace panels.

[2.A.01.03] Apply manufacturer's safety procedures when using a frame machine.

[2.D.02.01] Create a hand-written or electronic damage report; record old/unrelated damage.

[2.D.02.02] Review damage report and analyze damage to determine appropriate methods for area to be repaired.

## **Appendices**

***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 or the Massachusetts Association of Vocational Administrators.***

## Appendix A

### Industry Recognized Credentials (IRCs)

An **Industry Recognized Credential** is verification of an individual's qualification or competence. An authoritative third party issues the credential. **IRCs** are valued in the labor market and are a validation of an individual's knowledge and skill.

Industry-recognized credentials are accepted by multiple employers across an industry. They are often endorsed by recognized trade associations or organizations representing a significant part of an industry or sector.

IRCs are identified as either “**Essential**” or “**Optional**”.

**Essential IRCs** indicate credentials that are in high demand by employers.

School districts that offer VTE programs with “**Essential**” IRCs must ensure that adequate time and resources are available for students to be instructed in the standards necessary to be prepared for the certification examination, as well as, provide opportunities for students to obtain these certifications.

**Optional IRCs** provide credentials that enhance employment opportunities.

	<b>Essential</b>	<b>Optional</b>	<b>Hours of Instruction needed to attain this Credential</b>
I-CAR certifications - Intro to Collision Repair Series (14 modules)	X		40
OSHA General Industry – 10 Hrs (OSHA G10)	X		10
SP/2 Safety Certification	X		10
EPA 6H Rule certification	X		10
I-CAR certifications - Non-Structural Pro-Level 1		X	30
I-CAR certifications - Refinishing Pro-Level 1		X	30
SNAP ON DVOM Certification		X	20
American Lift Institute Certification		X	5
I-CAR certifications - WCS03 MIG Welding certification		X	20
I-CAR certifications - Estimating		X	30
ASE Refrigerant Certification		X	10
ASE certification in Painting and Refinishing		X	10
ASE certification in Structural Analysis and Damage Repair		X	10
ASE certification in Non-structural Analysis and Damage Repair		X	10
Auto Collision product specific certifications (i.e., BASF Painting Color Match, Dupont)		X	10

## **DESE Statewide Articulation Agreement**

### **ARTICULATION AGREEMENT**

*Between*

Massachusetts Community Colleges

*And*

Massachusetts Chapter 74 State-Approved

*for more information, click*

<http://www.masscc.org/partnerships-initiatives/voc-schools-articulation-agreements>

### **Student Organizations**

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