Montana Big Sky Pathways (Programs of Study)
Agreement Valid for 2012-2013 Academic Year

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) calls for states to offer "career and technical programs of study," known as Big Sky Pathways in Montana, as an option to students and their parents when planning for and completing future coursework. These programs, at a minimum, must:

- Incorporate and align secondary and postsecondary education elements,
- Include academic and CTE content in a coordinated, non-duplicative progression of courses,
- Offer the opportunity, where appropriate, for secondary students to acquire postsecondary credits, and
- Lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree.

By my signature on this form, I verify each of the eight (8) requirements listed below are demonstrated within the Big Sky Pathways Proposal and Gap Analysis. For approval, all eight (8) requirements must be checked.

<table>
<thead>
<tr>
<th>Name of Big Sky Pathway (Cluster Level):</th>
<th>Architecture &amp; Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of High School:</td>
<td>St. Regis</td>
</tr>
<tr>
<td>Names of High School Lead Teacher &amp; Counselor:</td>
<td>Dave Jeussen, Darlene Jasper</td>
</tr>
<tr>
<td>The Lead High School Teacher will be contacted if OPI has questions about this request.</td>
<td></td>
</tr>
<tr>
<td>Lead Teacher's email address:</td>
<td><a href="mailto:daveje@stregis.k12.mt.us">daveje@stregis.k12.mt.us</a></td>
</tr>
<tr>
<td>Lead Teacher's phone number:</td>
<td>406-224-2311</td>
</tr>
<tr>
<td>Name of College:</td>
<td>UGM COT</td>
</tr>
<tr>
<td>Name of College Program:</td>
<td>Construction/Carpentry</td>
</tr>
<tr>
<td>Name of College Lead Faculty Member:</td>
<td>Dennis Danke</td>
</tr>
<tr>
<td>REQUIREMENTS FOR APPROVAL (IP = In Progress)</td>
<td>YES IP NO</td>
</tr>
<tr>
<td>1. Includes all state and local graduation requirements preparing students for entry into a postsecondary program or apprenticeship.</td>
<td></td>
</tr>
<tr>
<td>2. Identifies the appropriate secondary CTE, academic, and recommended elective courses offered by this high school which will prepare the student for college-level courses without remediation.</td>
<td></td>
</tr>
<tr>
<td>3. Outlines a non-duplicative sequence of courses from grades 9-12 and from secondary to postsecondary education.</td>
<td></td>
</tr>
<tr>
<td>4. Leads to an industry-recognized postsecondary credential, degree or employment</td>
<td></td>
</tr>
<tr>
<td>5. Completed &quot;Gap Analysis&quot; with a program offered by a Montana postsecondary institution.</td>
<td></td>
</tr>
<tr>
<td>6. When applicable, dual enrollment, Advanced Placement, international Baccalaureate courses and CTE START (Statewide Articulations) opportunities have been identified.</td>
<td></td>
</tr>
<tr>
<td>7. Pathway curriculum includes appropriate state/national standards and/or industry skills standards. Identify standards used: Montana Vocational Standards/CTE Curriculum.</td>
<td></td>
</tr>
<tr>
<td>8. Links with a web-based guidance delivery system such as Montana Career Information System (MCIS). If using something other than MCIS, please indicate:</td>
<td></td>
</tr>
</tbody>
</table>

High School Principal's Signature: 
Date: 11/17/11

High School CTE Teacher's Signature: 
Date: 11/17/11

High School Counselor's Signature: 
Date: 11/17/11

Please submit this Approval Form with the Big Sky Pathway Proposal to the Big Sky Pathway Coordinator at the College identified above.

College Chief Academic Officer's Signature: 
Date: 11/17/11

College Lead Faculty Member's Signature: 
Date: 11/17/11

Please submit this Approval Form with the Big Sky Pathway Proposal to OPI, Career and Technical Education, P. O. Box 202501, Helena, MT 59620-2501.

OPI Approval: 
Date of Approval: 2-4-13

OCEH Approval: 
Date of Approval:

October 2011
Bis Sky Pathways 2011, Page 78
Updated class descriptions

**Carpentry:**
10th, 11th or 12th grades. 9th grade may not take.
Prerequisite: Drafting recommended, Woods (power tool safety) recommended.
Students will learn residential building construction. Included are plan and blueprint
reading, reading multiple view drawings, floor plans, elevations, sectionals and details.
Reading and understanding symbols and abbreviations on blue prints. Reading door,
window and finishing schedules. Understand site prep and foundations, construct and
align forms, use builders level and or transit to lay out corners, elevations and line of
sight. Floor framing, wall framing, ceiling and roof framing, trusses, stair construction,
insulation, and siding and roofing. Correctly install sheathing on wall and roof frames.
Calculate and layout rise and run for treads and risers for a stairway stringer. Inspect and
properly use lay out and hand tools. Inspect and properly use power tools.

**MATH:** Calculate Board Feet (cubic volume), calculate Cubic Yards of concrete,
calculate area flooring, roofing, sheathing and siding, calculate slope/rafter angle
(geometry), calculate and lay out stud spacing 16" and 24" On-Center, calculate room
volume (cubic feet) for air exchanges, calculate volume of a prism for attic ventilation,
develop materials lists and cost sheets. Measurements to 1/16", add, subtract, multiply
and divide fractions and whole numbers and fractions. Convert fractions to decimals and
decimals to fractions. Use Pythagorean theory (6-8-10 method) to locate 4 corners of a
rectangle. Determine line length of rafters using rafter scale on framing square.

**WRITING:** Develop change of work order. Complete application for electrical and
plumbing permits. Write instructions for completion of a particular job. Use a variety of
technological and informational resources to gather and synthesize information and to
create and communicate information.

Class time: 50% written, 50% lab work (model houses etc.)
Possibility of limited Tech Prep credit if taken as junior or senior.
**High School:** ST REGIS

**College:** U of M CDT

**Cluster Overview:**
Careers in the Architecture and Construction cluster involve the designing, planning, managing, building, and maintaining the built environment.

**Pathway Options:**
- Design/Pre-Construction
- Construction
- Maintenance/Operations

**Occupy Examples:**
Architect; Carpenter; Civil Engineer; Construction Foreman/Manager; Contractor; Demolition Engineer; Drafter; Drywall Installer; Electrician; Electronic Systems Technician; Equipment/Material Manager; General Contractor/Builder; Heating, Ventilation, Air Conditioning and Refrigeration Mechanic; Interior Designer; Painter; Paperhanger; Plumber; Project Estimator; Project Inspector; Roofer; Safety Director; Sheet Metal Worker; Tile and Marble Setter

**For a complete listing, go to:**
http://online.onetcenter.org/find/career?q=2&g=Go

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### Suggested High School Courses

<table>
<thead>
<tr>
<th>Grade</th>
<th>Graduation Requirements</th>
<th>Workforce/2-Year College Prep</th>
<th>CTE and/or Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>4-Year MT College/Univ Prep (Rigorous Core)</td>
<td>Eng 9, Alg. 1, EarthScience, PE</td>
<td>DRAFTING, Comp Concepts</td>
</tr>
<tr>
<td>10th</td>
<td>Graduation Requirements Workforce/2-Year College Prep</td>
<td>Eng 10, World Hist, Biology, Geometry, PE</td>
<td>Carpentry, Welding, SmallEng, Home Maintenance</td>
</tr>
<tr>
<td>11th</td>
<td>Graduation Requirements Workforce/2-Year College Prep</td>
<td>Eng 11, US Hist, Alg II</td>
<td>Forestry, Agric, BPA, TSA</td>
</tr>
<tr>
<td>12th</td>
<td>Graduation Requirements Workforce/2-Year College Prep</td>
<td>Eng 12, Gov, Prac. Math, Chem</td>
<td>SmallEng, Home Maintenance</td>
</tr>
</tbody>
</table>

**Recommended CTE Cluster Foundation Course(s):**

**Recommended CTE Pathway Courses:** DRAFTING, CARPENTRY, WOODS, WELDING, SMALL ENG.

**Other Recommended CTE Courses:**

**Career & Technical Student Organization(s):**

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### Advanced Learning Opportunities

High School to College/Career Linkages

**CTE Start Courses:**

**Advanced Placement or IB Courses:**

**Dual Enrollment Courses:**

**Online Courses:**

**Other:**

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### Postsecondary Program of Study

<table>
<thead>
<tr>
<th>Semester</th>
<th>Math</th>
<th>English</th>
<th>Major</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>13—Semester 1</td>
<td></td>
<td></td>
<td>CSTM 100, 200, 122, 142, 148</td>
<td>CAP 1930D</td>
</tr>
<tr>
<td>13—Semester 2</td>
<td>MTH 101</td>
<td>WRTT 101</td>
<td>CSTM 142, 143</td>
<td>BUS 242T</td>
</tr>
</tbody>
</table>
### MONTANA POSTSECONDARY OPPORTUNITIES

**Montana University System Degree and Program Inventory:** [http://www.homepage.montana.edu/~mus/drainv/](http://www.homepage.montana.edu/~mus/drainv/)

**Your Guide to Montana’s Certificate and Associate Degree Programs:** [http://mus.edu/twogyear/YourGuide.html](http://mus.edu/twogyear/YourGuide.html)

<table>
<thead>
<tr>
<th>Colleges of Technology:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCOT—Billings; GFCOT—Great Falls; HCOT—Helena; TECHCOT—Butte; UMCO—Missoula; GCP—Bozeman</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community Colleges:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCC—Gardner;</td>
</tr>
<tr>
<td>FC—Kalispell;</td>
</tr>
<tr>
<td>MCC—Missoula City;</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tribal Colleges:</th>
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<tbody>
<tr>
<td>BFCC—Browning;</td>
</tr>
<tr>
<td>CDKC—Lame Deer;</td>
</tr>
<tr>
<td>PPCC—Poplar;</td>
</tr>
<tr>
<td>SCC—Box Elder;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Four Year Colleges/Universities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSU—Bozeman; MSUB—Billings; MSUN—Havre, TECH—Butte, UM—Missoula; UMWSU—Dillon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MILITARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>17 with parental consent; 18 without</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROFESSIONAL CERTIFICATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>Less than 30 credits; little/no general ed credits</td>
</tr>
<tr>
<td>Complete in one year or less</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROFESSIONAL CERTIFICATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>Must be at least 18</td>
</tr>
<tr>
<td>Minimum 2,000 hours of supervised experience</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APPRENTICESHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>30-45 credits; limited general education credits</td>
</tr>
<tr>
<td>Complete in one year or less</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CERTIFICATE OF APPLIED SCIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>30-72 credits; includes 15-25 gen ed credit</td>
</tr>
<tr>
<td>Complete in two years (if prepared academically in math and English)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASSOCIATE'S OF APPLIED SCIENCE DEGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires diploma or GED</td>
</tr>
<tr>
<td>60-72 credits; includes 15-25 general ed credits</td>
</tr>
<tr>
<td>Complete in two years (if prepared academically in math and English)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BACCALAUREATE DEGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires 4-year college prep for admission</td>
</tr>
<tr>
<td>128 credits (approximately)</td>
</tr>
<tr>
<td>Complete in four years</td>
</tr>
</tbody>
</table>

**Degree and Program Inventory above may not be all inclusive**
PATHWAY DESCRIPTION
Construction Pathway: Employees in construction literally build our future! These are the people who build and remodel houses, apartments, industrial buildings, warehouses, office buildings, churches, schools and recreational facilities. This pathway also includes the builders of highways, streets, bridges, tunnels and airports as well as power plants, chemical plants, refineries and mills.

C. CLUSTER (FOUNDATION) KNOWLEDGE AND SKILLS
The following Cluster (Foundation) Knowledge and Skill statements apply to all careers in the Architecture and Construction Cluster. Persons preparing for careers in the Architecture and Construction Cluster should be able to demonstrate these skills in addition to those found on the Essential Knowledge and Skills Chart.

<table>
<thead>
<tr>
<th>Cluster Topic</th>
<th>ACC01</th>
<th>ACC01.01</th>
<th>Perform math operations such as estimating and distributing materials and supplies to complete jobsite/workplace tasks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Indicators</td>
<td>ACC01.01.01</td>
<td>Use basic math functions to complete jobsite/workplace tasks. Identify whole numbers, decimals, fractions, complex numbers, and polynomials. Apply basic arithmetic add, subtract, multiply, and divide operations. Apply relational (equal, not equal, greater than, less than, etc.) and logical operators in a logical expression.</td>
<td></td>
</tr>
<tr>
<td>Sample Indicators</td>
<td>ACC01.01.02</td>
<td>Use geometric formulas to determine areas and volumes of various structures. Calculate areas and volumes of structures. Estimate materials and supplies needed.</td>
<td></td>
</tr>
<tr>
<td>Sample Indicators</td>
<td>ACC01.01.03</td>
<td>Use appropriate formulas to determine percentages /decimals. Calculate percentages/decimals. Use percentages/decimals to perform measurement tasks.</td>
<td></td>
</tr>
<tr>
<td>Sample Indicators</td>
<td>ACC01.01.04</td>
<td>Use appropriate formulas to determine ratios, fractions, and proportion measures. Calculate ratios, fractions and proportion measures. Use ratios, fractions and proportion measures to perform measurement tasks.</td>
<td></td>
</tr>
<tr>
<td>Sample Indicators</td>
<td>ACC01.01.05</td>
<td>Use appropriate formulas to determine measurements of dimensions, spaces and structures. Measure dimensions, spaces and structures using U.S. Standard unit. Measure dimensions, spaces and structures using Metric units.</td>
<td></td>
</tr>
</tbody>
</table>

| | R | IE |
| | R | IEK |
| | R | I |
### ACC01.01.06
**Conceptualize a three-dimensional form from a two-dimensional drawing to visualize proposed work.**

**Sample Indicators**
- Build
- Create three-dimensional form models.

### ACC01.02
**Apply principles of physics as they relate to worksite/jobsite situations to work with materials and load applications.**

#### ACC01.02.01
**Apply basic concepts of statics and loads to planning.**

**Sample Indicators**
- Use the basic concepts of static and load calculations for rigging and moving loads.

#### ACC01.02.02
**Identify the physical properties present when using common construction materials in order to use the materials safely, effectively and efficiently.**

**Sample Indicators**
- Use the basic concepts of physics when working with common construction materials.

### Cluster Topic
**COMMUNICATIONS:** Use oral and written communication skills in creating, expressing and interpreting information and ideas, including technical terminology and information.

### ACC02
#### ACC02.01
**Use vocabulary and visual cues commonly used in design and construction to be successful in workplace/jobsite communications.**

#### ACC02.01.01
**Match vocabulary and visual cues to workplace/jobsite situations.**

**Sample Indicators**
- Use correct terminology to convey verbal and visual.

#### ACC02.01.02
**Utilize vocabulary and visual cues in context of design and construction situations.**

**Sample Indicators**
- Confirm understanding of verbal and visual instructions.
- Ask questions concerning details of instructions.
- Perform assignments as requested.

<table>
<thead>
<tr>
<th>Draft</th>
<th>I</th>
<th>I</th>
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</thead>
<tbody>
<tr>
<td>I</td>
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<tr>
<td>I Comp.</td>
<td>IFR</td>
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<tr>
<td>I Comp.</td>
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</tbody>
</table>

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### ACC03 - Problem Solving and Critical Thinking

**Cluster Topic**: Solve problems using critical thinking skills (analyze, synthesize, evaluate). Independently and in teams.

<table>
<thead>
<tr>
<th>ACC03.01</th>
<th>Create and implement project plans considering available resources and requirements of a project/problem to accomplish realistic planning in design and construction situations.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACC03.01.01</strong></td>
<td>Plan, organize, schedule and manage a project/job to optimize workflow and outcome.</td>
</tr>
<tr>
<td><em>Sample Indicators</em></td>
<td>Report results of the project/job.</td>
</tr>
<tr>
<td><strong>ACC03.01.02</strong></td>
<td>Manage the schedule of a project/job.</td>
</tr>
<tr>
<td><em>Sample Indicators</em></td>
<td>Identify timeline required to complete a project/job. Evaluate efficiency and effectiveness of a project/job.</td>
</tr>
<tr>
<td><strong>ACC03.01.03</strong></td>
<td>Estimate resources/materials required for a specific project or problem.</td>
</tr>
<tr>
<td><em>Sample Indicators</em></td>
<td>Estimate correct amount of required resources/materials. Create a budget.</td>
</tr>
<tr>
<td><strong>ACC03.01.04</strong></td>
<td>Use available resources/materials effectively while completing a project or resolving a problem with a project plan.</td>
</tr>
<tr>
<td><em>Sample Indicators</em></td>
<td>Evaluate waste of resources/materials. Evaluate necessity for additional resources/materials.</td>
</tr>
<tr>
<td><strong>ACC03.01.05</strong></td>
<td>Determine alternative solutions for a specific project/problem.</td>
</tr>
<tr>
<td><em>Sample Indicators</em></td>
<td>Evaluate feasibility of alternative suggestions. Implement appropriate alternatives.</td>
</tr>
</tbody>
</table>

**ACC03.02** Evaluate and adjust design and construction project plans and schedules to respond to unexpected events and conditions.

| **ACC03.02.01** | Incorporate potential job disruptions into planning timelines. |
| *Sample Indicators* | Identify potential events and conditions that disrupt the completion of a job. Solve situational problems involved with unexpected events and conditions. |
| **ACC03.02.02** | Adjust project plans and schedules when presented with unexpected information. |
| *Sample Indicators* | Modify existing plans to reflect an unexpected change. Modify existing schedules to reflect an unexpected change. Modify existing budget to reflect unexpected change. |
| **ACC03.02.03** | Identify and assess critical situations as they arise to resolve issues. |
| *Sample Indicators* | Evaluate potential solutions and determine best solution. Appraise critical situations and implement appropriate response. |
| ACC03.02 | Generate a project update that tracks changes necessitated by unexpected events and conditions.  
| Sample Indicators | Present an oral and/or written status report on the project.  |

| Cluster Topic | INFORMATION TECHNOLOGY APPLICATIONS: Use information technology tools specific to the career cluster to access, manage, integrate, and create information.  
| Cluster Topic | SYSTEMS: Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.  
| ACC04 | No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.  
| ACC05 | Comply with regulations and applicable codes to establish a legal and safe workplace/jobsite.  

| ACC05.01 | Identify governmental regulations and national, state and/or local building codes that apply to a given workplace/jobsite.  
| Sample Indicators | Follow governmental regulations and building codes.  
| | Follow industry regulations and building codes.  
| | Follow jurisdictional regulations and building codes.  
| | Use information given in regulations and codes correctly.  
| | Pass job inspections and comply with regulations at all times.  
| | Pass required substance abuse screening.  

| ACC05.02 | Evaluate workplace/jobsite activities for compliance with governmental and other applicable safety regulations such as EPA and OSHA.  
| Sample Indicators | Read and discuss information on OSHA, EPA and other safety regulations.  
| | Pass safety inspections and comply with regulations at all times.  

| ACC05.03 | Use MSDS (Material Safety Data Sheets) information for the management, use and disposal of materials.  
| Sample Indicators | Obtain, understand and follow MSDS (Material Safety Data Sheets) information.  
| | Use materials safely.  

| ACC05.04 | Identify workplace/jobsite environmental hazards of a given situation.  
| Sample Indicators | Follow safe practices relating to environmental hazards.
### ACC05.02
Examine how the roles and responsibilities among trades/professions work in relationship to complete a project/job.

**ACC05.02.01** Describe how relationships between trades/professions can facilitate smooth workflow and outcome to meet project goals.

*Sample Indicators*
- Coordinate work between trades.

**ACC05.02.02** Explain how the hierarchy of roles on a jobsite facilitate smooth workflow and outcome to meet project goals.

*Sample Indicators*
- Incorporate job functions in the reporting chain of supervision.
- Evaluate the safety issues and responsibilities managed by each level of supervision.

### ACC05.03
Examine all factors affecting the project and the planning process.

**ACC05.03.01** Understand social, environmental and political factors that affect the project.

*Sample Indicators*
- Label all systems on a set of construction documents.
- Discuss the interrelationship of the systems in the built environment.
- Use the concept of “Critical Path Method (CPM)” and/or similar sequential methods so that work progresses efficiently.

**ACC05.03.02** Understand the context of the projects.

### ACC05.04
Understand and manage union-management relationships and contracts to create a cooperative work environment.

**ACC05.04.01** Analyze a proposed contract in terms of the company’s position and union’s position in labor contract negotiations.

*Sample Indicators*
- Document how quality improves profitability.
- Report on issues that affect quality.

**ACC05.04.02** Assess a situation for compliance with terms of a contract.

### ACC06.01
Assess and control the types and sources of workplace hazards to ensure a safe workplace and jobsite.

**ACC06.01.01** Demonstrate methods to correct common design and construction hazards.

*Sample Indicators*
- Identify and describe common hazards in the workplace.
- Identify and describe major sources of information about hazards in the workplace (e.g., Material Safety Data Sheets (MSDS), work procedures, exposure control plans, training materials, labels, and signage).
### Career Cluster: Knowledge and Skills

**ACC06.01.02** Identify types and sources of workplace hazards common to design and construction situations.

**ACG06.01.03** Demonstrate personal and group health and safety practices.

**Sample Indicators**
- Demonstrate principles of safe physical movement to avoid slips, trips, and spills.
- Inspect and use personal protective equipment (PPE).

### Cluster Topic: Leadership and Teamwork

**ACC07.01** Establish specific goals to manage project assignments in a timely manner.

**ACC07.01.01** Establish project goals that assist in meeting project specifications and deadlines.

**Sample Indicators**
- Define and describe project goals.
- Identify and list key project activities.
- Identify and report activity deadlines.

**ACC07.01.02** Organize work teams that effectively manage assignments.

**Sample Indicators**
- Determine and list assignments by activity and personnel.
- Complete assignments.
- Monitor and write a report on progress of the project.
- Evaluate completed project according to customer requirements.

### Cluster Topic: Ethics and Legal Responsibilities

**ACC08.01** Recognize legal and ethical relationships between employees and employers to establish workplace/jobsite rules, regulations and guidelines in a design and/or construction setting.

**ACC08.01.01** Access appropriate resources to identify the roles, rights and responsibilities of an employee and an employer.

**Sample Indicators**
- Practice workplace/jobsite conduct incorporating employee and employer roles, rights and responsibilities.

**ACC08.01.02** Examine insurance documentation to determine liability issues associated with a job.

**Sample Indicators**
- Describe liability issues as needed.

**ACC08.01.03** Comply with employer policies, procedures, and job specific agreements such as sexual harassment avoidance and substance abuse control to prevent ethical and legal problems.
ACC08.02 Read regulations and contracts to ensure ethical and safety elements are observed.

ACC08.02.01 Study regulations and codes to identify those applicable to the local area.

Sample Indicators
- Locate and implement regulations and codes applicable to tasks and projects.
- Comply with local, state and Federal codes.

ACC08.02.02 Explain the various aspects of service contracts to ensure compliance.

Sample Indicators
- Evaluate and follow service contracts.

ACC08.02.03 Recognize the relationship and responsibilities of various parties to a contract.

Sample Indicators
- Fulfill contractual roles and responsibilities.
- Monitor relationships with other parties.

ACC08.02.04 Recognize the definition of specialized words or phrases to fully understand documents and contracts.

Sample Indicators
- Use industry jargon or terminology appropriately.
- Use industry acronyms correctly.
- Use words with multiple meanings correctly in context.

ACC08.03 Use ethical and legal standards to avoid conflicts of interest in a design and/or construction setting.

ACC08.03.01 Identify conflicts of interest relating to a job or project to prevent ethical or legal problems.

Sample Indicators
- Resolve issues relating to any potential conflicts of interest.

ACC09 Explain written organizational policies, rules and procedures common in design and construction settings to help employees perform their jobs.

ACC09.01 Locate appropriate information on organizational policies in handbooks and manuals.

Sample Indicators
- Identify the contents of various organizational publications.
- Select the appropriate document(s) as reference for the situation.

ACC09.01.02 Discuss how specific organizational policies and rules influence a specific work situation.

Sample Indicators
- Locate and identify specific organizational policy, rule or procedure to assist with a given situation.
- Explain specific organizational policy, rule or procedure to improve a given situation.
Recognize the responsibilities and personal characteristics to develop individual goals for professionalism.

ACC09.02.01 Identify appropriate responsibilities and personal characteristics by researching workplace/jobsite information.
   Sample Indicators Practice the responsibilities and characteristics of a professional craftsperson.
   Identify all critical/important functions.
   Document customer satisfaction.
ACC09.02.01 Present a professional image in the workplace/jobsite.
   Sample Indicators Maintain appropriate professional memberships.
   Follow rules, regulations and guidelines.

TECHNICAL SKILLS: Use the technical knowledge and skills required to pursue the targeted careers for all pathways in the career cluster including: knowledge of design, operation, and maintenance of technological systems critical to the career cluster.

ACC10.01 Read, interpret, and use technical drawings, documents, and specifications to plan a project.
   ACC10.01.01 Interpret drawings used in project planning.
      Sample Indicators Recognize elements and symbols of blueprints and drawings.
   ACC10.01.02 Describe written standards and that specifications that apply.
      Sample Indicators Interpret and explain standards and specifications.
   ACC10.01.03 Recognize how specifications and standards are arranged for proper access.
      Sample Indicators Use specifications and standards.
      Apply specifications and standards appropriately.
   ACC10.01.04 Use architect's plan, manufacturer's illustrations and other materials to communicate specific data and visualize proposed work.
      Sample Indicators Sketch/draw/illustrate concepts and ideas.
      Draw or sketch plan/layout to be completed.
      Use proper measurements to determine layout.

Use and maintain appropriate tools, machinery, equipment, and resources to accomplish project goals.

ACC10.02 Select tools, machinery, equipment, and resources that match requirements of the job.
D. PATHWAY KNOWLEDGE AND SKILLS

The following knowledge and skill statements apply to all careers in the Construction Pathway. The statements are organized within five topics.

**Pathway Topic: SYSTEMS**

**ACPB01.01** Understand contractual relationships with all parties involved in the building process to ensure successful build of a project.

- ACPB01.01.01 Create a sustainable and accountable partnership between stakeholders.
- ACPB01.01.02 Establish/implement reporting relationships among stakeholders.
- ACPB01.01.03 Determine priorities of all parties involved.

**ACPB01.02** Design and implement submittal approval procedures to ensure effective flow of information in construction process.

- ACPB01.02.01 Identify the components necessary for developing submittal approval procedures system.
- ACPB01.02.02 Employ procedures that complete submittal approval process related to shop drawings.
- ACPB01.02.03 Employ procedures that complete submittal approval process related to state and local permits.

**ACPB01.03** Understand risk management and use a variety of strategies and tactics to maintain, increase or decrease risk.

- ACPB01.03.01 Evaluate the tolerability of the inherent risk exposure in a given situation.
- ACPB01.03.02 Provide solutions to unaddressed problems that pose great risk to a project.
- ACPB01.03.03 Identify the most appropriate team member to manage risk in a given situation.
ACP01.04 Understand construction subcontracts and manage working relationships on a project.
ACP01.04.01 Identify the components of a subcontract.
ACP01.04.02 Explain the function of each component of a subcontract.
ACP01.04.03 Assess the relevance of subcontract terms in a given situation.
ACP01.05 Understand and apply project turnover procedures to successfully manage construction projects.
ACP01.05.01 Identify the components of project turnover procedures.
ACP01.05.02 Explain the function of each component of project turnover procedures.
ACP01.05.03 Explain the use of project turnover procedures for a given situation.
ACP01.06 Build in accordance with contracts to meet budget and schedule.
ACP01.06.01 Recognize and understand the contract documents and related activities in respect to a specific project.
ACP01.06.02 Apply the components of the document as they relate to a given project.
ACP01.06.03 Identify activities such as coordination meetings, project schedules, meeting deadlines, resolving disputes, change orders, etc. for use in a given project.
ACP01.07 Understand and implement testing and inspection procedures to ensure successful completion of the project.
ACP01.07.01 List testing and inspection procedures related to specific areas.
ACP01.07.02 Interpret guides designed for testing and inspection purposes in specific areas.
ACP01.08 Understand purpose for scheduling as it relates to successful completion of the project.
ACP01.08.01 Develop a schedule for a specific project.
ACP01.08.02 Explain rationale for a specific scheduling procedure.
ACP01.09 Understand and apply closeout procedures to effectively complete a project.
ACP01.09.01 Identify the components of closeout procedures.

ACP02 Create and apply a jobsite safety program to ensure safe practices and procedures.
ACP02.01 Determine procedures for a jobsite safety program.
ACP02.01.01 Explain the importance of workers being OSHA certified.
### Recognize and employ universal construction signs and symbols to function safely in the workplace.

**Sample Indicator**
- Explain functions of signs and symbols.
- Work safely using signs and symbols.
- Inspect all signs and symbols for safe and proper use.
- Use proper signs and signals for the work area.
- Respond appropriately to signs and signals.

**ACP02.02**
- Select the most appropriate sign or symbol for use in a workplace situation.

### Understand and apply procedures for jobsite security to prevent liability.

**ACP02.03**
- Explain the need for jobsite security to prevent liability.
- Design and implement jobsite security procedures.

### Create and apply a jobsite environmental program.

**ACP02.04**
- Explain the need for an environmental program that include recycling, site clean-up and safe disposal in accordance with MSDS.
- List the steps to establish an environmental program.

### Manage relationships with internal and external parties to successfully complete construction projects.

**ACP03.01**
- Describe strategies used to promote collaboration, trust and clear communication among contractors, suppliers, clients and others on a jobsite.
- Plan and organize project meetings.

### Understand proper changeover procedures for successful completion of the project.

**ACP04.01**
- Establish process for changeover procedures.
- Explain the need for specific changeover procedures.

### Examine building systems and components to evaluate their usefulness to a project.

**ACP05.01**
<table>
<thead>
<tr>
<th>ACPB05.01</th>
<th>Identify building systems needed to complete a construction project.</th>
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<tbody>
<tr>
<td>Sample Indicator</td>
<td>List all building systems involved in a project.</td>
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<td>Describe the purpose of each system.</td>
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<td>List all components of the involved building system.</td>
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<td>Describe the function of each component.</td>
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<td>ACPB05.01.02</td>
<td>Identify components of building systems needed to complete a construction project.</td>
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<td>ACPB05.01.03</td>
<td>Incorporate appropriate building systems into a construction project.</td>
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<td>ACPB05.02</td>
<td><strong>Utilize craft skills to meet or exceed customer expectations.</strong></td>
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<td>ACPB05.02.01</td>
<td>Develop and utilize good craft skills.</td>
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**Notes:**
Read blueprints and specifications by interpreting dimensions and specifications, as well as door, window and finish schedules while understanding common blueprint abbreviations and symbols

- Interpret and determine dimensions from multiple view drawings and build the project from plans, elevations, sections and details
- Interpret specifications and drawing notes by verbally demonstrating how specifications are used
- Identify plot plan information such as reference points and benchmarks by locating the reference point; using Pythagorean theory, a level and square, the participant can lay out building as drawn on the plot plan
- Interpret oral and written changes, and incorporate modifications into existing plans
- Understand common abbreviations and symbols, and verbally describe all common blueprint abbreviations and symbols on competition blueprints

- Interpret door, window and finish schedules by describing location, quantity and type of materials used at 95 percent accuracy

Organize building site/materials in a safe and sequential manner while using builder's level and transit properly

- Use builder's level and transit properly for layout and elevation to properly lay out and level the site at no more than one degree off level and out of square
- Identify, receive and inspect materials and ensure all required materials are in place prior to start of competition by using material lists supplied
- Store lumber and other materials properly by type and use in a safe and sequential manner
Build foundations and forms including the construction and alignment of footing forms, wall and wall forms, and column and pier forms

- Construct and align various footing forms to include keyways, bulkheads, dowels and anchorages, as per site plans and various forms within a (+/-) 1/8" variable
- Construct and align foundation wall and wall forms to include pilasters and beam pockets
- Construct and align column and pier forms
- Maintain form materials properly

Construct rough framing by identifying and selecting framing members, and installing frame components while meeting OHSA standards

- Identify framing members and select materials for project
- Frame and install sill plate, girders, floor joists and bridging
- Frame floor
- Install sub-floor
- Build or erect safe scaffolding to meet OHSA standards

- Frame and brace walls to include corners, openings, trimmers, cripples, partitions, plumbing partitions, fixture backing and sheathing
- Frame stair stringer and other components

Construct roof framing by determining rafter lengths, making calculations, laying out a plan, framing and installing roof sheathing

- Identify types and components of roof construction and verbally describe all typical components of roof construction identified on the competition project blueprint
- Determine rafter lengths from a rafter scale
- Calculate and use the rise and run of a common roof
- Lay out a common roof plan
- Lay out, cut and install common rafters, ridge board, collar ties, gambrel rafters, valley rafters, valley jack rafters, tail rafters, hip rafters, hip jack rafters and cripple jack rafters
- Frame roof openings, dormers and saddles
- Lay out, cut and install roof trusses (purling)
- Install roof sheathing

Construct exterior finish by installing frames, corner boards, moldings, cornices, siding and shingles as per industry standards
- Install window and doorframes as per competition project blueprint and manufacturer's standards
- Measure, cut and install trim for window and door frames within 1/8"
- Install corner boards, moldings or metal/vinyl corners within 1/8"
- Install wood bevel and lap siding and aluminum or vinyl siding as per competition project blueprint and manufacturer's recommendations
- Install wood shingles and miter corners as per industry standards
- Install exterior finish rake, open cornice and box cornice as per competition project blueprint and within 1/8"

Construct interior finish while measuring and cutting materials, fitting and hanging doors and trim, constructing closets and installing crown moldings
- Measure, cut and install gypsum board to meet blueprint specs and industry standards
- Cut and install paneling while trimming to fit in prescribed locations within 1/8" for paneling and 1/16" for trim
- Fit and hang doors and trim to include swinging, sliding, folding and pocket doors to industry and manufacturers' standards
- Construct closets and built-in units and install accessories as per competition blueprint specs and manufacturers' recommendations
- Cut and install crown molding or other moldings within 1/16"
Build stairs by laying out stringer and stringer sets, calculating rise, run and tread cutting and installing stair treads and stair skirts

- Lay out a straight run stringer and a two-flight stringer set with landing using a carpenter square within a 1/8" variable
- Calculate rise, run and tread width within 1/16".
- Cut and install stair treads and stair skirt within a 1/8" variable.

Identify lumber by writing a requisition for ordering lumber

- Match letters designating uses in plywood or composition board to their current application at 80 percent accuracy.
- Match at least two examples each of common hardwoods and softwoods to their uses.
- Identify types of trim and moldings, and describe use when prompted.
- Identify common defects in lumber.
- Write a requisition for ordering lumber based on a given material list.

- Calculate board feet using the standard formula (No. of pieces _ thickness in inches _ width in inches _ length in feet ÷ 12 = board feet).

Using and maintaining tools safely per manufacturers’ recommendations

- Inspect and properly use hand tools as per manufacturers’ recommendations. Hand tools from the following list: sliding T-bevel, tape measure, combination square/speed square coping saw, keyhole saw, folding rule, hammer, punch, handsaw, nail set, wood chisel, carpenter’s level, framing square and hand plane.
- Inspect and properly operate power tools as per manufacturers’ recommendations. Power tools from the following list: reciprocating (jig saw), miter saw, hand drill, belt sander, circular saw, sabre saw, table saw, hand plane, finish sander, hand router, pneumatic nailers and time limit.
Demonstrate professional development skills in a simulated customer service or employment situation. Examples may include:
- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

**Committee Identified Academic Skills**

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the carpentry training program and assessment:

**Math Skills**
- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Measure angles
- Find surface area and perimeter of two dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make comparisons, predictions and inferences using graphs and charts
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation

**Science Skills**
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

**Language Arts Skills**
- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint, and purpose of texts

Connections to National Standards
State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards
- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem Solving
- Communication
- Connections
- Representation


Science Standards
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: [www.mcrel.org/standards-benchmarks/](http://www.mcrel.org/standards-benchmarks/).

### Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes

- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: [www.readwritethink.org/standards/index.html](http://www.readwritethink.org/standards/index.html).