

Curriculum Framework

**A reference guide
for the
Building Technology Career Pathway**

**Albuquerque Public Schools
Career Technical Education
Sheryl Williams Stapleton, Director
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CAREER AND TECHNICAL EDUCATION

Career and Technical Education (CTE), a formal part of American education since the first federal vocational education law was passed in 1917, is proactively responding to an educational reform agenda and to a changing national and global economy. CTE now is increasingly linked to high academic standards as well as particularly responsive to our nation's need for a labor force prepared with the diverse skills required for our knowledge-based economy. CTE provides relevant experiences and enhances opportunities for learning, careers, and further education.

PURPOSE OF THIS GUIDE

The goal of this guide is to provide an integrated curriculum framework that blends the learning and performance expectations in the Building Technology Pathway with New Mexico core academic standards and expected workforce skills.

This guide contains:

- **Course descriptions** for each course offered within the Building Technology Pathway
- **Foundation Standards**, with core academic standards and skills necessary for all courses offered in the Building Technology Pathway, and
- **Pathway Standards** and **Assessment Illustrations** specific to each course.

BUILDING TECHNOLOGY CAREER PATHWAY

This Career Pathway is designed to provide a foundation in building technology for students in the Albuquerque Public Schools. The pathways emphasize real-world, occupationally relevant experiences of significant scope and depth. The standards are designed to integrate academic and technical preparation with a focus on career awareness, career exploration, and skill preparation. Integral components include classroom, laboratory, contextual learning, and project- and work-based instruction as well as internship, community classroom, cooperative career technical education, and leadership development. Sector standards prepare students for continued training, postsecondary education, and entry to a career. The courses include:

Woods I introduces the student to most phases of woodworking and its application to industry and society. The focus is on safety, design, planning, measurement, hand tools, power tools, assembly and hardware, preparation and finishing materials, and employability skills. The student completes projects that are enjoyable to make and useful.

Woods II continues to expose the student to more advanced phases of woodworking. The focus is on safety, design, planning, measurement, power tools, assembly and hardware, preparation and finishing materials, and employability skills. The student works in a self-paced environment working on a major project.

Production Technology – Directed Studies provides a student with individual study in an area of advanced manufacturing. The student assumes responsibility for identifying, pursuing, and culminating an activity that expands knowledge about some phase of industry. An individual plan is required to be approved by the instructor, parent/guardian, student, and school administrator. This course may be a TVI articulated/concurrent enrollment course.

Advanced Cabinet Making/Millwork enhances student's skills in cabinet making and trains him to perform to industry standards. The focus is on safety, design, planning, measurement, technical reading, listening, and reviewing, assembly and hardware, preparation, materials, and employability skills.

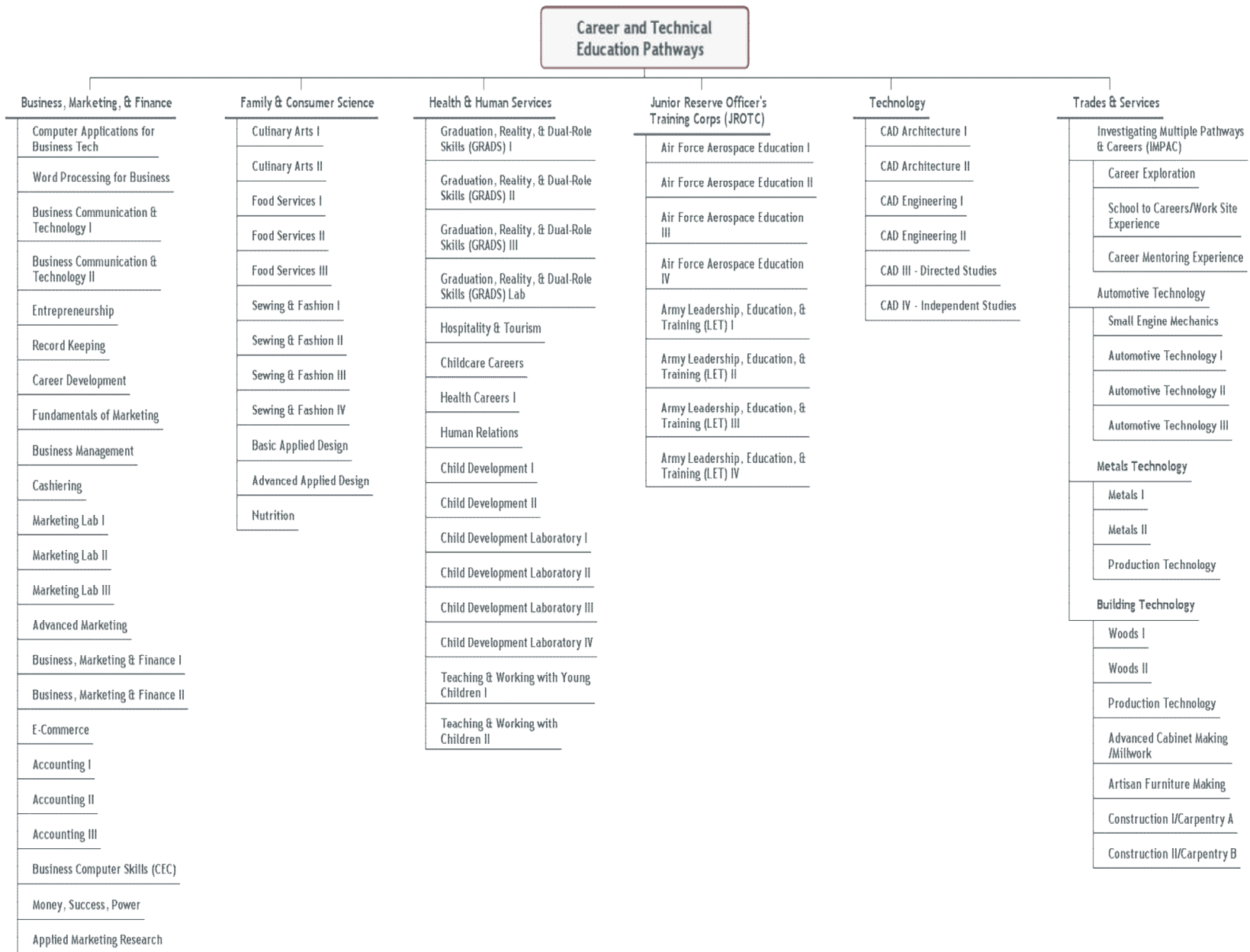
Artisan Furniture Making advances the student's skills in working with different types of wood. The student specializes in hand-made furniture with a focus on Southwest furniture and custom production. Areas of study are safety, joinery, design, planning, procedures and materials selection, usage and maintenance of hand and power tools, measurement, layout, cutting, glue up, and assembly, finishing, and employability skills. The student becomes more proficient with hand tools, saws, mortise/tenon joints, dado joints, dowel joints, and biscuit joints.

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Construction I/Carpentry A is the first course in a two-year program that introduces the student to a competency-based program where the student shows that he/she can perform specific related tasks in preparation for a construction profession. The focus is on basic safety, an introduction to construction math, hand and power tools, responsibilities of a person working in the construction industry, and wood building materials, fasteners, and adhesives. The student follows the National Center for Construction Education and Research (NCCER) guidelines. The benefit of this is that construction craft training is standardized and many technical schools and colleges are using the same program.

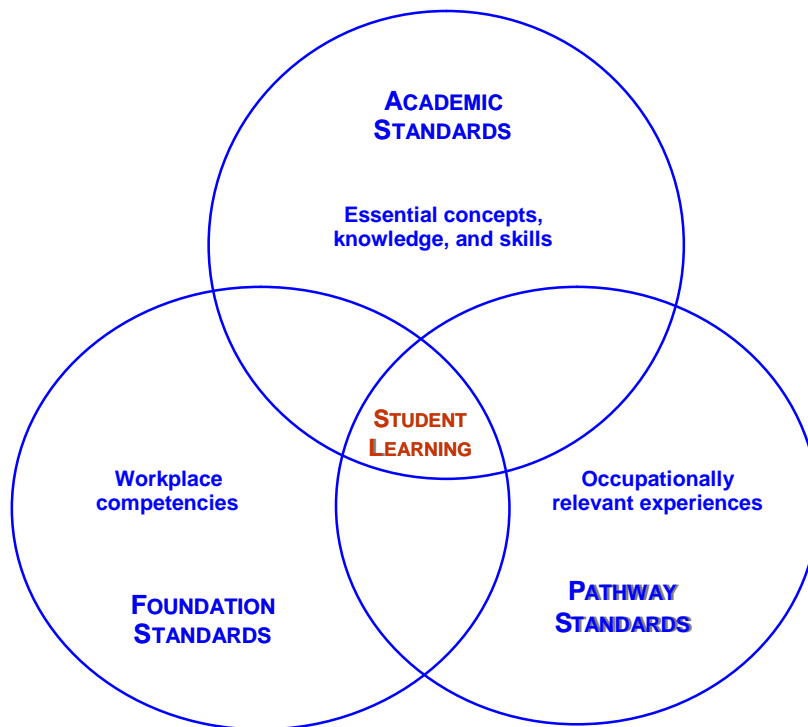
Construction II/Carpentry B is the second course in a two-year program that introduces the student to a competency-based program where the student shows that he/she can perform specific related tasks in preparation for a construction profession. The focus is on the use of hand and power tools, an introduction to blueprints, floor systems, wall and ceiling framing, roof framing, and windows and exterior doors. The student follows the National Center for Construction Education.





Building Technology Career Pathway Framework

Career and Technical Education (CTE) students need to master certain workplace skills. The Secretary's Commission on Achieving Necessary Skills (SCANS) calls these essentials "foundation skills" because they prepare students to master workplace competencies both within the curriculum and in the workplace. These foundation standards are common to all of the Albuquerque Public Schools' CTE clusters.



The Building Technology Career Pathway Foundation Standards include the New Mexico Academic Content Standards.

The following three tabs contain these academic standards, and are labeled:

- **Mathematics Content Standards,**
- **Science Content Standards, and**
- **Language Arts Content Standards.**

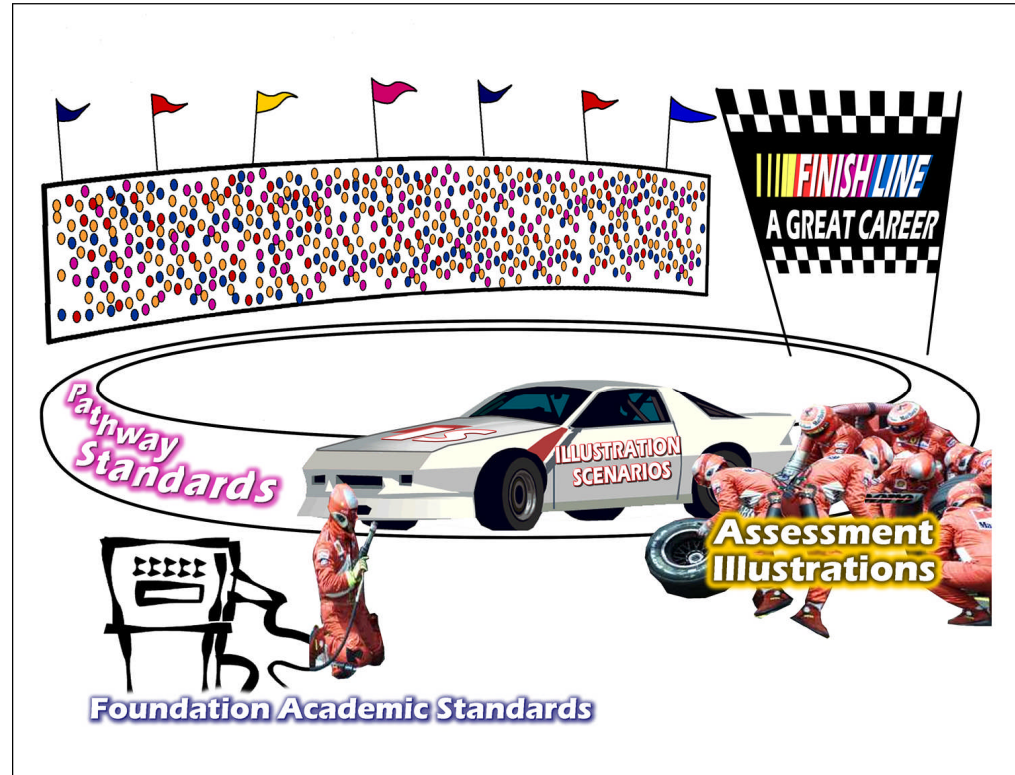
The remaining nationally recognized Foundation Standards are found under the Workforce Skills tab.

The Foundation Standards include workplace competencies. The Core Academic Standards articulate essential concepts, knowledge, and skills. The Pathway Standards contain occupationally relevant materials. When integrated, these three components intersect, creating relevant and successful student learning.

The Relationship Between Foundation Standards, Pathway Standards Assessment Illustrations, and Integration Scenarios

In understanding how these components relate to each other, consider this:

- The **pathway standards** are the track, or super-highway, providing the most direct route between where a student currently is (in school) and their ultimate destination (an engaging and productive career).
- The **illustration scenarios** (or lessons) are the vehicle that moves the student along the track, or highway, and gives students hands on experience in their chosen program of study.
- The **assessment illustrations** are the diagnostics, and instructors use the assessments provided, augmented by their own understanding and any assessment tools they create, to determine where a student is on the track and how ably and quickly they are moving toward the finish line.



- Most importantly, the **foundation standards** are the fuel. The foundation standards, which include the core academic standards, enable students to be successful in their chosen program of study.

Mathematics Academic Content Standards

1.0 Academics

Students understand the academic content required for entry into postsecondary education and employment within the building technology industry.

The **critical mathematics standards** that build a foundation for the Building Technology Pathway are:

CMS 1: **Use a variety of computational methods to estimate quantities involving real numbers.**

(Reference: Mathematics Grade 8, Strand Number and Operations, Benchmark Compute fluently and make estimates, Performance Standard 2).

CMS 2: **Estimate answers and use formulas to solve application problems involving surface area and volume.**

(Reference: Mathematics Grade 8, Strand Number and Operations, Benchmark Compute fluently and make estimates, Performance Standard 9).

CMS 3: **Perform conversions with multiple terms between metric and U.S. standard measurement systems.**

(Reference: Mathematics Grade 8, Strand Measurement, Benchmark Apply appropriate techniques, tools, and formulas to determine measurements, Performance Standard 5).

CMS 4: **Develop an appropriate strategy using a variety of data from surveys, samplings, estimations, and inferences to address a specific problem.**

(Reference: Mathematics Grade 8, Strand Measurement, Benchmark, Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them, Performance Standard 6).

CMS 5: **Demonstrate understanding of the relationships between ratios, proportions, and percents and solve for a missing term in a proportion.**

(Reference: Mathematics Grade 8, Strand Algebra, Benchmark Represent and analyze mathematical situations and structures using algebraic symbols, Performance Standard 4).

CMS 6: **Generate different representations to model a specific numerical relationship given one representation of data.**

(Reference: Mathematics Grade 8, Strand Algebra, Benchmark Use mathematical models to represent and understand quantitative relationships, Performance Standard 1).

CMS 7: **Use a variety of computational methods (e.g. mental arithmetic, paper and pencil, technological tools).**

(Reference: Mathematics Grade 9-12 Strand Algebra, Functions, Graphs Benchmark Use mathematical models to represent and understand quantitative relationships, Performance Standard, 12).

CMS 8: **Generate an algebraic sentence to model real-life situations.**

(Reference: Mathematics Grade 9-12 Strand Algebra, Functions, Graphs, Benchmark Use mathematical models to represent and understand quantitative relationships, Performance Standard 9).

- CMS 9: **Interpret and draw three-dimensional objects and find the surface area and volume of basic figures (e.g. spheres, rectangular solids, prisms, polygonal cones).**
(Reference: *Mathematics Grade 9-12, Strand Geometry and Trigonometry, Benchmark Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships, Performance Standard 4.*)
- CMS 10: **Use basic geometric ideas (e.g. Pythagorean theorem) to calculate perimeters of geometric shapes.**
(Reference: *Mathematics Grade 9-12 Strand Geometry and Trigonometry, Benchmark Specify locations and describe spatial relationships using coordinate geometry and other representational systems, Performance Standard 9.*)
- CMS 11: **Understand the differences between the various methods of data collection.**
(Reference: *Mathematics Grade 9-12 Strand Data Analysis and Probability, Benchmark Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them, Performance Standard 1.*)
- CMS 12: **Understand the meaning of measurement data and categorical data, and of the term “variable”.**
(Reference: *Mathematics Grade 9-12 Strand Data Analysis and Probability, Benchmark Select and use appropriate statistical methods to analyze data, Performance Standard, 1.*)

Science Academic Content Standards

1.0 Academics

Students understand the academic content required for entry into postsecondary education and employment within the building technology industry.

The **critical science standards** that build a foundation for the Building Technology Pathway in Grades 9-12 are:

CSS 1: **Design and conduct scientific investigations that include: testable hypothesis, controls and variables, methods to collect, analyze, and interpret data, results that address hypotheses being investigated, predictions based on results, re-evaluation of hypotheses and additional experimentation as necessary, and error analysis.**

(Reference: Science Grade 9-12, Strand: Scientific Thinking and Practice, Benchmark, Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results, Performance Standard 2).

CSS 2: **Use appropriate technologies to collect, analyze, and communicate scientific data.**

(Reference: Science Grade 9-12, Strand: Scientific Thinking and Practice, Benchmark, Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results, Performance Standard 3).

CSS 3: **Identify and apply measurement techniques and consider possible effects of measurement errors.**

(Reference: Science Grade 9-12, Strand: Scientific Thinking and Practice, Benchmark, Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions, Performance Standard 4).

CSS 4: **Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).**

(Reference: Science Grade 9-12 Strand: Scientific Thinking and Practice, Benchmark, Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions, Performance Standard 3).

CSS 5: **Classify matter in a variety of ways (e.g., element, compound, mixture; solid, liquid, gas; acidic, basic, neutral).**

(Reference: Science Grade 9-12 Strand: Content of Science (Physical Science), Benchmark, Understand the properties, underlying structure, and reactions of matter, Performance Standard Properties of Matter 1).

CSS 6: **Identify, measure and use a variety of physical and chemical properties (e.g., electrical conductivity, density, viscosity, chemical reactivity, pH, melting point).**

(Reference: Science Grade 9-12 Strand: Content of Science (Physical Science), Benchmark, Understand the properties, underlying structure, and reactions of matter, Performance Standard Properties of Matter, 2).

- CSS 7: **Identify factors that influence the rate at which chemical reactions occur.**
(Reference: Science Grade 8, Strand: Content of Science (Physical Science), Benchmark, Know the forms and properties of matter and how matter interacts, Performance Standard, Changes in Matter, 9).
- CSS 8: **Apply Newton's Laws to describe and analyze the behavior of moving objects.**
(Reference: Science Grade 9-12 Strand: Content of Science (Physical Science), Benchmark, Understand the motion of objects and waves, and the forces that cause them, Performance Standard, Motion, 8).
- CSS 9: **Know that every object exerts gravitational force on every other object, and how this force depends on the masses of the objects and the distance between them.**
(Reference: Science Grade 9-12 Strand: Content of Science (Physical Science), Benchmark, Understand the motion of objects and waves, and the forces that cause them, Performance Standard, Forces 2).
- CSS 10: **Know that chemical reactions involve the rearrangement of atoms, and that they occur on many timescales (e.g., picoseconds to millennia).**
(Reference: Science Grade 9-12, Strand: Content of Science (Physical Science), Benchmark, Understand the properties, underlying structure, and reactions of matter, Performance Standard, Changes in Matter, 12).
- CSS 11: **Know that electrical energy is the flow of electrons through electrical conductors that connect sources of electrical energy to points of use, including: electrical current paths through parallel and series circuits, production of electricity, use of electricity by appliances and equipment.**
(Reference: Science Grade 8, Strand Content of Science (Physical Science), Benchmark, Explain the physical processes involved in the transfer, change, and conservation of energy, Performance Standard (Energy Transformation) 4).
- CSS 12: **Create multiple displays of data to analyze and explain relationships in scientific investigations.**
(Reference: Science Grade 9-12, Strand Scientific Thinking and Practice, Benchmark, Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions, Performance Standard 4).
- CSS 13: **Evaluate the influences of technology on society.**
(Reference: Science Strand: Science and Society, Benchmark, Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications, Performance Standard 3).
- CSS 14: **Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.**
(Reference: Science Strand: Scientific Thinking and Practice; Benchmark, Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results, Performance Standard 1).
- CSS 15: **Understand the scientific foundations of common technologies**
(Reference: Science Stand: Science and Society; Benchmark, Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications, Performance Standard 4)

Language Arts Academic Content Standards

2.0 Communication

Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contents.

The critical language arts standards that build a foundation for the Building Technology Pathway are:

CLAS 1: **Respond to informational texts by using a variety of strategies for preparation, engagement, and reflection; paraphrasing main ideas and supporting details.**

(Reference: Language Arts Grade 11, Strand: Reading and Listening for Comprehension, Benchmark, Listen to, read, react to, and analyze information, Performance Standard 3).

CLAS 2: **Evaluate the information, explanations, or ideas of others by identifying clear, reasonable criteria for evaluation applying those criteria using reasoning and substantiation.**

(Reference: Language Arts Grade 10, Strand: Reading and Listening for Comprehension, Benchmark, Listen to, read, react to, and analyze information, Performance Standard 4).

CLAS 3: **Use multiple resources to gather information to evaluate problems, examine cause and effect relationships, and answer research questions to inform an audience.**

(Reference: Language Arts Grade 10, Strand: Reading and Listening for Comprehension, Benchmark, Synthesize and evaluate information to solve problems across the curriculum, Performance Standard 3).

CLAS 4: **Demonstrate proficiency in accessing and sending information electronically.**

(Reference: Language Arts Grade 11, Strand: Reading and Listening for Comprehension, Benchmark, Synthesize and evaluate information to solve problems across the curriculum, Performance Standard 4).

CLAS 5: **Accurately interpret information from and detect inconsistencies in a variety of informational, literary, and technical texts.**

(Reference: Language arts Grade 9, Strand: Reading and Listening for Comprehension, Benchmark, Apply knowledge of reading process to evaluate print, non-print, and technology-based information, Performance Standard 3).

CLAS 6: **Accurately interpret information presented in a technical format (e.g., charts, diagrams, tables).**

(Reference: Language Arts Grade 11, Strand: Reading and Listening for Comprehension, Benchmark, Apply knowledge of reading process to evaluate print, non-print, and technology-based information, Performance Standard 5).

CLAS 7: **Synthesize and organize information from a variety of sources in order to inform and persuade an audience**

(Reference: Language Arts Grade 11, Strand: Speaking and Writing for Expression, Benchmark Demonstrate competence in the skills and strategies of the writing process, Performance Standard 2).

- CLAS 8: **Demonstrate control of grammar, paragraph and sentence structure, diction, and syntax.**
(Reference: Language Arts Grade 9, Strand: Writing and Speaking for Expression, Benchmark Apply grammatical and language conventions to communicate, Performance Standard 3).
- CLAS 9: **Read critically and independently to draw conclusions from research.**
(Reference: Language Arts Grade 10, Strand: Reading and Listening for Comprehension, Benchmark, Demonstrate critical thinking skills to evaluate information and solve problems, Performance Standard 5).
- CLAS 10: **Use a variety of technology tools to present information appropriate for the purpose and audience.**
(Reference: Language Arts Grade 11, Strand: Speaking and Writing for Expression, Benchmark, Apply grammatical and language conventions to communicate, Performance Standard 2).
- CLAS 11: **Make well-informed and well-organized formal presentations with a clear main point, adjusting the message, wording, and delivery to the particular audience and context.**
(Reference: Language Arts Grade 10, Strand: Writing and Speaking for Expression, Benchmark, Communicate information in a coherent and persuasive manner using verbal and non-verbal language, Performance Standard 2).

Workforce Skills Foundation Standards

The **critical workforce skills** that build a foundation for the Building Technology Career Pathway are:

3.0 Career Planning and Management

Students understand how to make effective decisions, use career information, and manage personal career plans, and:

- 3.1 Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers.
- 3.2 Understand the scope of career opportunities and know the requirements for education, training, and licensure.
- 3.3 Develop a career plan that is designed to reflect career interests, pathways, and postsecondary education.
- 3.4 Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.
- 3.5 Understand the past, present, and future trends that affect careers, such as technological developments and societal trends, and the resulting need for life-long learning.
- 3.6 Know key strategies for self-promotion in the hiring process, such as job applications, résumé writing, interviewing skills, and portfolio preparation.

4.0 Technology

Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments, and:

- 4.1 Understand the influence of current and emerging technologies as they relate to the building trades industry.
- 4.2 Understand the use of technological resources to access, manipulate, and produce information, products, and services.
- 4.3 Understand the influence of current and emerging technologies on selected segments of the economy.
- 4.4 Understand the role and function of state-of-the art tools, equipment, and machines in use in the industry.
- 4.5 Know key aspects of the current economy and labor market, including the type of good and services produced, the type of skills workers need, the effects of rapid technological change, and the impact of international competition.

5.0 Problem Solving and Critical Thinking

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques, and:

- 5.1 Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
- 5.2 Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
- 5.3 Use critical thinking skills to make information decisions and solve problems.
- 5.4 Understand and demonstrate the ability to plan and solve problems in a systematic manner and apply the learned skill to real-world problems.

6.0 Health and Safety

Students understand health and safety policies, procedures, regulations, and practices, including equipment and hazardous material handling, and:

- 6.1 Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.
- 6.2 Understand critical elements for health and safety practices related to storing cleaning, and maintaining tools, equipment, and supplies.

- 6.3 Use tools, equipment, and machinery safely and appropriately.
- 6.4 Know local, state, and federal laws, and the requirements of regulatory agencies, that affect the building trades industry.

7.0 Responsibility and Flexibility

Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings, and:

- 7.1 Understand the qualities and behaviors that constitute a positive and professional work demeanor.
- 7.2 Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
- 7.3 Understand the need to adapt to varied roles and responsibilities.
- 7.4 Understand that individual actions can affect the larger community.

8.0 Ethics and Legal Responsibilities

Students understand professional, ethical, and legal behavior consistent with applicable laws, regulations, and organizational norms, and:

- 8.1 Know major local, district, state, and federal regulatory agencies and entities that affect industry and how they enforce laws and regulations.
- 8.2 Understand the concept and application of ethical and legal behavior consistent with workplace standards.
- 8.3 Understand the role of personal integrity and ethical behavior in the workplace.

9.0 Leadership and Teamwork

Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution, and:

- 9.1 Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting.
- 9.2 Understand how to organize and structure work individually and in teams for effective performance and attainment of goals.
- 9.3 Know multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
- 9.4 Understand how to interact with others in ways that demonstrate respect for a variety of situations in the workplace.
- 9.5 Participate as a member of a team and contribute to a group effort.

10.0 Technical Knowledge and Skills

Students understand the essential knowledge and skills common to building trades, and:

- 10.1 Understand construction processes and systems and their importance in construction technology.
- 10.2 Maintain and troubleshoot equipment used in the construction industry.
- 10.3 Use, store, and allocate materials efficiently, and use space efficiently.
- 10.4 Understand the planning and design, construction, and servicing of structures and electromechanical systems in relation to construction activities.
- 10.5 Understand the resources used to transport people and goods in the construction industry.
- 10.6 Understand universal graphic conventions and symbols and technical manuals and specifications.
- 10.7 Understand the attributes of good design.
- 10.8 Understand the need to participate in sector-related professional improvement activities.
- 10.9 Understand the need to obtain and maintain industry-standard, technical certifications significant to an industry sector.

11.0 Demonstration and Application

Students demonstrate and apply the concepts contained in the foundation and pathway standards.

Woods I: Pathway Standards

Woods I introduces the student to most phases of woodworking and its application to industry and society. The focus is on safety, design, planning, measurement, hand tools, power tools, assembly and hardware, preparation and finishing materials, and employability skills. The student completes projects that are enjoyable to make and useful.

References in parenthesis following each performance standard are aligned with critical New Mexico mathematics (CMS), science (CSS), and language arts (CLAS) academic standards, the NM Career Readiness Standards (CR), and the Professional Development Program (PDP).

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and shop practices.*

- A. The student develops and demonstrates proficiency in machine shop safety and procedures.
 - 1. Responds to and evaluates information in texts on the safe use of equipment and shop practices by using a variety of strategies for preparation, engagement, reflection, paraphrasing main ideas and supporting details (CLAS 1, 2).
 - 2. Accurately interprets and detects inconsistencies in information presented in a technical format (CLAS 5, 6).
 - 3. Exhibits safe tool and machine usage, and passes certification test at a 100% level (CR-2B).
 - 4. Reads critically and independently to identify individual responsibilities and personal traits of safe work habits (CR-4D).
 - 5. Demonstrates the use and care of appropriate personal protective equipment (CSS 14)(CR-4D, 4E).
 - 6. Exhibits proper material handling (e.g., oversized material, lifting, chemicals, electrical hazards) (CSS 14)(CR-4D, 4E).
 - 7. Synthesizes, organizes (CLAS 7), and discusses fire prevention and fire safety procedure (CR-4D, 4E).
 - 8. Demonstrates responsible behavior related to safety issues (CR-4A, 4C, 4D).

STRAND II: DESIGN, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

- B. The student designs, plans, draws, and constructs a simple project using appropriate materials.
 - 1. Develops an appropriate strategy and uses variety of data to address a specific problem (CMS 4).
 - 2. Evaluates the information, explanations, and ideas of others by identifying clear, reasonable criteria for evaluation and applying those criteria using reasoning and substantiation (CLAS 2)
 - 3. Uses a variety of computational methods to estimate quantities (CMS 1), uses standard ruler and metric rulers to measure within industrial tolerances (CR-1D, 2B), and performs conversions with multiple terms between metric and U.S. standard measurement systems (CMS 3).
 - 4. Identifies and applies measurement techniques and considers possible effects of measurement errors (CSS 3).
 - 5. Estimates answers and uses formulas to solve application problems involving surface area and volume (CMS 2).
 - 6. Interprets and draws three-dimensional objects and finds the surface area and volume of basic figures (CMS 9) and uses basic geometry to calculate the perimeter of geometric shapes (CMS 10).
 - 7. Designs a project using basic joinery (CSS 1)(CR-2B, 2C).
 - 8. Estimates quantities involving real numbers (CMS 1) and draws a project with dimensions (CR-2B).
 - 9. Uses a variety of computational methods (CMS 1) to compute project cost (CR-2C).
 - 10. Applies layout to actual material within industrial tolerances (CR-1D, 2B) and demonstrates an understanding of the relationship

- between ratios, proportions, and percents (CMS 5).
- 11. Performs basic operations using whole numbers, fractions and decimals (CMS 1)(CR–1D, 2B).
- 12. Reads critically (CLAS 2, 9) and accurately interprets and responds to (CLAS 1) information (CLAS 5) when reading operational and technical documents (CLAS 6)(CR–1D, 2B).
- 13. Uses technologies (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling) to quantify relationships (CSS 4).
- 14. Demonstrates efficient use of materials (CR–1D) and classifies matter in a variety of ways (CSS 5).
- 15. Writes directions to complete a project using correct grammar, paragraph, and sentence structure (CLAS 8).
- 16. Demonstrates control and makes well-informed and well-organized formal presentations with a clear main point, adjusting the message, wording and delivery to the particular audience and context (CLAS 7, 11) .

STRAND III: HAND AND POWER TOOLS

The student demonstrates an understanding of hand tools and hand-held power tools.

- C. The student develops and demonstrates proficient use, safety and maintenance of hand tools and hand-held power tools.
 - 1. Responds to informational texts by using a variety of strategies for preparation, engagement, and reflection: paraphrasing main ideas and supporting details (CLAS 1, 6).
 - 2. Evaluates information, explanations, and the ideas of others (CLAS 2) to identify the tools and machines that are used by woodworkers (CR–1D).
 - 3. Performs conversions with multiple terms between metric and standard measurement systems ((CMS 3).
 - 4. Selects the appropriate hand or power hand tool to complete a project (CR–1D).
 - 5. Demonstrates the safe use and care of hand tools/hand-held power tools (CSS 14)(CR–4D).

STRAND IV: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates understanding of the assembly and joinery process.*

- D. The student identifies and applies basic joining and fastening methods.
 - 1. Evaluates and responds to informational texts by using a variety of strategies for preparation, engagement, and reflection: paraphrasing main ideas and supporting details (CLAS 1, 2, 6).
 - 2. Classifies matter in a variety of ways (CSS 5).
 - 3. Identifies, measures, and uses a variety of physical and chemical properties (CSS 6).
 - 4. Identifies a variety of fastening and joining techniques using different applications (CR–1D).
 - 5. Demonstrates the application of simple joints in designed laboratory activities (CR–1D).
 - 6. Assembles projects in appropriate sequence (CR–1D, 2B).

STRAND V: PREPARATION AND FINISHING

CONTENT STANDARD: *The student demonstrates understanding of finishing process.*

- E. The student demonstrates knowledge of finishing materials, methods, and procedures, selecting appropriate surface preparation and finish.
 - 1. Evaluates and responds to informational texts by using a variety of strategies for preparation, engagement, and reflection: paraphrasing main ideas and supporting details (CLAS 1, 2, 6).
 - 2. Selects and uses appropriate materials safety procedures (CR–4D).

3. Selects and uses appropriate preparation techniques and finish materials(CR–1D).
4. Classifies matter in a variety of ways (e.g., element, compound, mixture; solid, liquid, gas; acidic, basic, neutral) (CSS 5).
5. Identifies factors that influence the rate at which chemical reactions occur (CSS 7) and understands chemical reactions (CSS 10).
6. Utilizes appropriate cleaning procedures and materials (e.g., solvents) to safely conclude the finishing process (CR–4D, 4E).
7. Follows directions to complete a project (CSS 14)(CR–1D, 2A, 5A).

STRAND VI: MATERIALS

CONTENT STANDARD: *The student demonstrates knowledge of construction and manufacturing materials.*

- F. The student demonstrates knowledge of industrial processes and manufacturing methods and materials.
 1. Evaluates and responds to informational texts by using a variety of strategies for preparation, engagement, and reflection: paraphrasing main ideas and supporting details (CLAS 1, 2, 6).
 2. Performs conversions with multiple terms between standard and metric systems (CMS 3), uses a variety of computational methods (CMS 7), applies basic geometric ideas (CMS 10), interprets three-dimensional objects (CMS 9), and uses measurement data and categorical data (CMS 12).
 3. Identifies different building materials (CR–1D) and classifies these materials in a variety of ways (CSS 5).
 4. Identifies various types of wood products and applications (CR–1D).
 5. Applies manufacturing methods (i.e., use of simple jigs and fixtures) (CR–1D).
 6. Estimates and uses formulas to solve application problems involving surface area and volume (CMS 3, 8) and uses a variety of computational methods to compute costs of materials (CR–2C).

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student identifies positive employability skills and good work characteristics.*

- G. The student demonstrates teamwork, exhibits timeliness, follows directions, completes tasks, and shows respect.
 1. Collaborates and cooperates with other students using effective leadership skills, interpersonal, problem-solving and critical thinking skills, and team skills (PDP Level 1.3), and evaluates the influences of technology on society (CSS 13, 15).
 2. Demonstrates proficiency in accessing and sending information electronically (CLAS 4) and shows respect for equipment, software etiquette, and observes all ethical guidelines for telecommunications (PDP Level 1.8).
 3. Demonstrates respect for one another and self (PDP Level 1.3).
 4. Conforms to established rules and regulations (PDP Level 1.1).
 5. Maintains appropriate appearance and punctuality (PDP Level 1.1).
 6. Completes assigned tasks in a timely manner (PDP Level 1.3).
 7. Analyzes and integrates positive behavior, conduct and social manners within the school, work place and community (PDP Level 1.1).
 8. Communicates effectively in both oral and written forms (PDP Level 1.3) through the use of appropriate grammar, paragraph and sentence structure, diction, syntax (CLAS 8).
 9. Uses appropriate technologies to collect, analyze, and communicate scientific data (CSS 2, 12)
 10. Interprets accurately information in a variety of informational, literary, and technical texts (CLAS 5,6)
 11. Follows directions in a timely manner (PDP Level 1.1, 1.3).

Woods I: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and shop practices.*

1–3, 6. The student studies safety data sheets for each machine and demonstrates proficiency on each machine without teacher direction. After a teacher demonstration, and before the student demonstrates proficiency on the machine, the student takes a safety test relevant to that machine. Machines include, but are not limited to:

- planer (surfacer)
- jointer
- radial arm saw
- band saw
- circular saw
- saber saw (band saw group)
- jig saw (scroll)
- drill press
- portable electric drill
- portable electric sander
- sanders (spindle, disc, belt)
- portable electric router (shaper)
- lathe
- grinder
- mortise (not needed in shop)

Note: Test results are kept on file for liability purposes.

4. The student demonstrates safe material handling during the construction of a project.
 - ✓ safety practices
5. The student locates and verbally identifies the fire extinguishers and exits
 - ✓ correct identification of extinguishers and exits

STRAND II: DESIGN, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

1. The student takes and passes a written examination on both standard English and metric measurement systems.
 - ✓ understanding of the metric and U.S. ruler

2,3,4,6,8. The student successfully completes the design of a project. Basic dimensions, appropriate joinery, and a materials list with project costs are included.

- ✓ completion of project
- ✓ accurate dimensions
- ✓ correct cost calculation
- ✓ variety of computational methods

5,7. Using applicable operational and technical documents, the student lays out and cuts materials by choosing the correct methods to make a project within acceptable tolerances.

- ✓ acceptable tolerances
- ✓ application of layout techniques
- ✓ accuracy

STRAND III: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand tools and hand-held power tools.*

In front of the instructor, the student demonstrates the safe and proper operation of a machine by becoming certified on that machine. The student exhibits the criteria set by the teacher in his own shop that he understands, is competent in working that machine, and passes an exam.

1-3. Using a variety of tools (e.g., hammer, screwdriver, files, router, sanders, drills) the student names the tool, describes the function of it, and in some cases demonstrates the use of it.

- ✓ accurate identification of tools and functions
- ✓ appropriate handling OR

1-3. The student completes assigned lab activities utilizing a variety of machine tools.

- ✓ surface preparation
- ✓ correct selection of tools for the function
- ✓ correct assembly
- ✓ rough cuts, finish, milling

3. The student performs basic maintenance on machine tools (e.g., changes blades, abrasive discs, cleans, adjusts, lubricates).

- ✓ accurate handling of tools
- ✓ practices

STRAND IV: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates understanding of the assembly and joinery process.*

1. The student demonstrates in the assembly of a project the proper sequence, project time management, neatness, and accuracy needed for the completion of a functional, aesthetically appealing piece of work.

- ✓ proper use and amount of glue
- ✓ flush fastener

- ✓ proper joint fitting (not too loose or tight)
- ✓ accurate angles
- ✓ correct measurements
- ✓ correct ordering of steps involved in the project
- ✓ completion of project in an appropriate time frame determined by the project complexity

STRAND V: PREPARATION AND FINISHING

CONTENT STANDARD: *The student demonstrates understanding of finishing processes.*

- 1–3. The student takes and passes a written examination on finishing materials and safety procedures.
- ✓ understanding of sandpapers (e.g., open coat, closed coat, wet/dry)
 - ✓ understanding of finish families (e.g., alcohol-based, water-based, mineral spirit-based and lacquer-based)
 - ✓ understanding of coatings (e.g., oil-based paints, acrylic-latex paints)
 - ✓ understanding of application methods (e.g., brush, spray, wipe and dip)
- 2, 4. The student documents a finishing schedule for his/her project.
- ✓ sequence of procedures (e.g., sanding, staining, sealing, top coat)
 - ✓ appropriate timelines for procedures
 - ✓ quality project
- 1–4. The student applies a finish on his/her project.
- ✓ appropriate surface preparation
 - ✓ absence of physical defects (e.g., holes, torn grain, embedded foreign material)

STRAND VI: MATERIALS

CONTENT STANDARD: *The student demonstrates knowledge of construction and manufacturing materials.*

- 1–4. The student constructs a teacher-approved project (e.g., banquitos, chess boards, chess sets, stands) to include the best suited materials, a bill of materials, and layout techniques to minimize waste.
- ✓ correct calculations (e.g., square footage, costs)
 - ✓ appropriateness of materials (e.g., hardwoods, softwoods, grain direction)
 - ✓ a variety of techniques and methods (e.g., jigs, fixtures, joints)

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student identifies positive employability skills and good work characteristics.*

- 1,2,4,6,8,9. .The student selects another student from the class to interview and prepares a 1 – 3 minute introduction to be made to the class. The introduction includes background information, hobbies, extra-curricular activities, as well as likes and dislikes (e.g., music, movies, foods). Roles are then reversed.
- ✓ elements of effective speaking
 - ✓ adherence to time limit
 - ✓ organization
 - ✓ criteria

2. The student participates in a class discussion to create a set of classroom rules that are written and posted. Rules include safety, proper equipment use, good character traits, and general classroom etiquette.
 - ✓ language conventions
 - ✓ individual participation
 - ✓ clarity
 - ✓ appropriateness
 - ✓ safety factors
- 5,7,9. The student completes a personal interest inventory, scores his/her responses, and matches the total score with an inventory score description. The student writes a personal reflection of the results.
 - ✓ self-assessment
 - ✓ completeness of task

Woods II: Pathway Standards

Woods II continues to expose the student to more advanced phases of woodworking. The focus is on safety, design, planning, measurement, power tools, assembly and hardware, preparation and finishing materials, and employability skills. The student works in a self-paced environment working on a major project.

References in parentheses following each performance standard refer to critical NM mathematics (CMS), science (CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), and the Professional Development Program (PDP).

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and shop practices.*

- A. The student develops and demonstrates proficiency in machine shop safety and practice.
 - 1. Responds to informational texts by using a variety of strategies for preparation, engagement, and reflection; paraphrasing main ideas and supporting details (CLAS 1).
 - 2. Interprets accurately information presented in a technical format and research (CLAS 5, 6, 9).
 - 3. Applies safe tool and machine usage, and passes certification test at a 100% level (CR–2B).
 - 4. Demonstrates individual responsibilities and personal traits of safe work habits (CSS 14)(CR–4D).
 - 5. Employs the use and care of appropriate personal protective equipment (CR–4A, 4D).
 - 6. Selects proper material handling (e.g., oversized material, lifting, chemicals, electrical hazards) (CSS 14)(CR–4-D, 4E).
 - 7. Examines and evaluates fire prevention and fire safety procedure (CSS 14)(CR–4D, 4E).
 - 8. Integrates responsible behavior related to safety issues (CR–4A, 4C, 4D).

STRAND II: DECISION, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

- B. The student designs, plans, draws, and constructs an advanced project using appropriate materials.
 - 1. Evaluates the information, explanations, or ideas of others by identifying clear, reasonable criteria for evaluation applying those criteria to using reasoning and substantiation (CLAS 2).
 - 2. Interprets accurately information from and detects inconsistencies in a variety of information, literary, and technical texts (CLAS 5, 6, 9).
 - 3. Evaluates the influence of modern technologies on society and the industry (CSS 13).
 - 4. Uses a variety of computational methods to estimate quantities involving real numbers (CMS 1).
 - 5. Identifies and applies measurement techniques and considers possible effects of measurement errors (CSS 3).
 - 6. Uses technology tools to quantify relationships (calculators, spreadsheets, databases, graphing software, simulations, modeling (CSS 4).
 - 7. Uses a standard ruler and metric rule to measure within industrial tolerances (CR–1D, 2 B) and performs conversions with multiple terms between metric and standard measurement systems (CMS 3).
 - 8. Synthesizes and organizes information from a variety of sources (CLAS 7) and uses appropriate technologies to collect, analyze data (CSS 2) to design an advanced project using appropriate joinery (CR–2B, 2C)
 - 9. Draws an advanced project showing dimensions (CMS 9)(CR–2B).

10. Demonstrates an understanding of the relationship between ratios, proportions, and percents (CMS 5), and calculates the perimeter of geometric shapes (CMS 10).
11. Develops an appropriate strategy using a variety of data (CMS 4) and a variety of computations methods (CMS 1) to create a bill of materials, a cut sheet, and computes the cost of the project (CR–2C).
12. Applies layout to actual material within industrial tolerances (CSS 3)(CR–1D, 2B).
13. Performs multi-step operations using whole numbers, fractions and decimals (CMS 1, 7)(CR—1D, 2 B) and considers possible effects of measurement errors (CSS 3)..
14. Uses 32 MMKD methods for efficient use of materials (CR–1D).
15. Writes directions to complete a project and makes well-informed and well-organized formal presentations with a clear main point, adjusting the message, wording, and delivery to a particular audience and context (CLAS 11).

STRAND III: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand tools and hand-held power tools.*

- C. The student consistently employs proficient use, safety, and care of hand tools and hand-held power tools.
 1. Responds to informational texts by using a variety of comprehension strategies (CLAS 1), evaluates information and explanations (CLAS 2), and interprets accurately information presented in a technical format (CLAS 6).
 2. Routinely selects and uses appropriate hand and hand-held power tools to complete advanced projects (CR–1D).
 3. Incorporates the safe use and care of hand and hand-held power tools (CSS 14)(CR–4D).
 4. Understands the correct application of each machine (CR–4D).

STRAND IV: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates and understanding of the joinery and assembly process.*

- D. The student selects and uses advanced joining and fastening methods.
 1. Responds to informational texts by using a variety of comprehension strategies (CLAS 1), evaluates information and explanations (CLAS 2), and interprets accurately information presented in a technical format (CLAS 6).
 2. Identifies, measures, and uses a variety of physical and chemical properties (CSS 6).
 3. Uses a variety of appropriate fastening and joining techniques for advanced applications (CR–1D).
 4. Demonstrates the application of a variety of wood joints in laboratory activities (CR–1D).
 5. Demonstrates and understanding of measurement and categorical data (CMS 12) to assemble advanced projects in an appropriate sequence (CR–1D, 2B).

STRAND V: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates an understanding of the joinery and assembly process.*

- E. The student selects and used advanced joining and fastening methods.
 1. Responds to informational texts by using a variety of comprehension strategies (CLAS 1), evaluates information and explanations (CLAS 2), and interprets accurately information presented in a technical format (CLAS 6).
 2. Classifies matter in a variety of ways (CSS 5), identifies factors that influence the rate at which chemical reactions occur (CSS 7), and understands chemical reactions (CSS 10).
 3. Implements an appropriate finishing schedule (CR–1D, 5 A).
 4. Completes a finishing schedule in an appropriate environment (CR–2A).

5. Implements appropriate clean-up procedures and materials to safely complete the finishing process (CR–4D, 4E).

STRAND VI: MATERIALS

CONTENT STANDARD: *The student demonstrates a knowledge of construction and manufacturing materials.*

- F. The student applies knowledge of industrial processes and manufacturing methods and materials.
 1. Classifies (CSS 5), selects, and utilizes various types of wood products and applications (CR–1D).
 2. Applies 32 MMKD manufacturing methods (i.e., use of jigs and fixtures) (CR–1D).
 3. Identifies and is familiar with the use of wood fasteners (e.g., screws, epoxies, dowels, spines, high tech wood glues) (CR-1D).
 4. Experiments with the effects of water on natural and man-made products (CSS 6)(CR–4E, 1D).
 5. Uses a variety of estimation (CMS 2,) and computation methods (CMS 7), measurement data and categorical data (CMS 12) to create a bill of materials (CR–2C).

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- G. The student demonstrates teamwork, exhibits timeliness, follows directions, completes tasks, and shows respect.
 1. Collaborates and cooperates with other students using effective leadership skills, interpersonal, problem-solving and critical thinking skills, and team skills (PDP Level 2.5).
 2. Understands the scientific foundations of common technologies used in the building industry (CSS 15) and evaluates the influence of technology on society (CSS 13).
 3. Interprets accurately information from and detects inconsistencies in a variety of informational, literary, and technical texts (CLAS 5, 6).
 4. Demonstrates respect for equipment, software etiquette, and observation of all ethical guidelines for telecommunications (PDP Level 2.5) and uses technology to collect, analyze, and communicate scientific data (CSS 2).
 5. Demonstrates respect for one another and self (PDP Level 2.5).
 6. Conforms to established rules and regulations (PDP Level 2.5, 3.7, 3.9).
 7. Maintains appropriate appearance and punctuality (PDP Level 3.7, 3.9).
 8. Completes assigned tasks in a timely manner (PDP Level 2.12, 2.5).
 9. Analyzes and integrates positive behavior, conduct and social manners within the school, workplace, and community (PDP Level 2.5, 2.12).
 10. Communicates effectively in both oral and written forms (PDP Level 1.14, 2.12, 3.7, 3.9) by demonstrating control of grammar, paragraph and sentence structure, diction, and syntax (CLAS 8), and creates displays to explain scientific investigations (CSS 12).
 11. Follows directions (PDP Level 2.12, 2.14, 2.5, 3.7, 3.9).

Woods II: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and shop practices.*

1–3, 6. The student reviews safety data sheets for each machine and demonstrates proficiency on each machine without teacher direction. After a teacher demonstration, and before the student demonstrates proficiency on the machine, the student takes a safety test relevant to that machine. Machines include, but are not limited to:

- planer (surfacer)
- jointer
- radial arm saw
- band saw
- circular saw
- saber saw (band saw group)
- jig saw (scroll)
- drill press
- portable electric drill
- portable electric sander
- sanders (spindle, disc, belt)
- portable electric router (shaper)
- lathe
- grinder
- mortiser (not needed in shop)
 - ✓ grade of 100% in certification test(s)

4. The student demonstrates safe material handling during the construction of an advanced project.

- ✓ proper selection of materials

5. The student reviews the locations of all fire extinguisher and their uses as well as all exits.

- ✓ correct identification of extinguishers and exits

STRAND II: DESIGN, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

1–4, 6 – 8. The student draws a plan for an advanced project which includes:

- ✓ dimensions
- ✓ appropriate joinery
- ✓ bill of materials
- ✓ cut list

- ✓ finishing schedule
- ✓ efficiency
- ✓ correct measurements
- ✓ correct calculations

5. The student constructs a project applying a layout and procedures to within specified tolerance.

- ✓ aesthetically pleasing appearance
- ✓ tight joints
- ✓ smooth finish
- ✓ operational functionality (e.g., doors, hinges, catchers)

STRAND III: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand tools and hand-held power tools.*

1 – 3. The student incorporates a variety of tools to successfully complete an advanced project as approved by the teacher.

- ✓ safety procedures
- ✓ quality of product
- ✓ use of multiple tools
- ✓ appropriate project level of difficulty
- ✓ correct use of proper tools
- ✓ joinery accuracy
- ✓ correct fit/alignment
- ✓ proper materials, utilization
- ✓ appropriate tool selection

STRAND IV: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates an understanding of the joinery and assembly process.*

1 – 3. The student demonstrates the proper sequence in the assembly of an advanced project, project time management, neatness, and accuracy needed for the completion of a functional, aesthetically appealing piece of work.

- ✓ proper use and amount of glue
- ✓ flush fastener
- ✓ proper joint fitting (not too loose or tight)
- ✓ accurate angles
- ✓ correct measurement
- ✓ correct ordering of steps involved in the project
- ✓ projects are completed in an appropriate time frame determined by the project complexity

STRAND V: ASSEMBLY AND HARDWARE

CONTENT STANDARD: *The student demonstrates an understanding of the joinery and assembly process.*

1 – 3. The student completes a finishing schedule board that shows the types of finishes relating to his/her interest. The student presents the board to the class and explains the steps in each finish. The board illustrates at least six different finishes.

- ✓ correct sequence of finishing steps
- ✓ completion of required elements of the project.
- ✓ effective and accurate presentation

OR

1 – 3. The student applies a finish to his/her advanced project using an instructor – approved finishing schedule.

- ✓ completion of required elements of the project
- ✓ effective communication
- ✓ adherence to timelines
- ✓ safety procedures

STRAND VI: MATERIALS

CONTENT STANDARD: *The student demonstrates a knowledge of construction and manufacturing materials.*

1, 2, 5. The student constructs a teacher – approved advanced project that may include re-engineered wood products (e.g., veneers, composite materials, hard wood plywood). The project includes the best-suited materials, a bill of materials, and layout techniques in minimize waste.

- ✓ correct calculations (e.g., square footage, costs)
- ✓ appropriateness of materials (e.g., hardwoods, softwoods, grain directions)
- ✓ a variety of techniques and methods (e.g., jigs, fixtures, joints)

3. The student experiments and reports on various methods of fastening by discovering the limits of the fastener.

- ✓ show of data on findings of various experiments
- ✓ accurate presentation of data and findings of experiments

4. The student conducts an experiment submerging man-made materials under water for 24 hours and observes and presents results to the class.

- ✓ accurate data and conclusions from findings
- ✓ comprehension of and effective presentation on findings

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *the student models positive employability skills and good work characteristics.*

1, 3, 6, 7, 9. The student applies team skills to a group project by using brainstorming techniques to list possible class projects for a community service project (e.g., volunteer in a hospital, adopt a highway, serve in a nursing home).

- ✓ use of individual participation
- ✓ application of cooperation and collaboration
- ✓ completion of task
- ✓ adherence to timelines
- ✓ demonstration of appropriate behavior

4, 6, 7, 8, 9. The student properly fills out a job application for a position for which he or she would like to work.

- ✓ follows directions
- ✓ writing conventions (e.g., correct spelling and punctuation)
- ✓ alignment of job description with personal skills

2, 8, 9 The student assembles his or her employment portfolio.

- ✓ required components
- ✓ organization
- ✓ quality of portfolio
- ✓ effective and accurate communication of skills and talents

4, 5, 8. The student sets up an interview with a worker in his/her chosen field. The interview is conducted in an organized, timely fashion. Written questions are formulated before the interview. The interview is taped (with permission) and notes taken.

- ✓ effective oral and written communication
- ✓ adherence of rules and regulations of workplace
- ✓ appropriate attire

Production Technology – Directed Design Projects

Production Technology – Directed Studies provides a student with individual study in an area of advanced manufacturing/woodworking. The student assumes responsibility for identifying, pursuing, and culminating an activity that expands knowledge about some phase of industry. An individual plan is required to be approved by the instructor, parent/guardian, student, and school administrator. This course may be a TVI articulated/concurrent enrollment course.

References in parenthesis following some of the descriptors refer to critical NM mathematics (CMS), science (CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), and the Professional Development Plan (PDP).

STRAND I: DIRECTED DESIGN PROJECTS

CONTENT STANDARD: *The student pursues advanced individual study in an area of woodworking.*

- A. The student identifies, organizes, and completes a course of study in an area of specialized interest in the woodworking industry.
 - 1. Identifies and defines a technological problem related to a career interest (CR: 3D).
 - 2. Seeks new knowledge, synthesizes this information, and utilizes it in solving the defined problem (CR: 5#).
 - 3. Develops a timeline and schedule (CR: 2A).
 - 4. Completes the managed activities necessary (CR: 2A, 5A).
 - 5. Evaluates the solutions that have been completed (CR: 5E, 5F).
 - 6. Demonstrates the ability to transfer technical and academic skills from the classroom to careers (CR: 1E).

STRAND II: CAREER PATHS

CONTENT STANDARD: *The student develops an advanced knowledge of various technical fields that are related to woodworking.*

- B. The student participates in activities to investigate career fields and researches requirements for woodworking career.
 - 1. Investigates through the use of technologies the skills requirements for metal working career (CR: 2B, 3A, 3B, 3C, 3D).
 - 2. Compares educational requirements need for different levels of employment in metal working careers (CR: 1B, 3C0).
 - 3. Examines career choices though course applications (CR: 1A, 3D).

STRAND III: EMPLOYMENT SKILLS

CONTENT STANDARD: *The student models positive employability skills/good work ethic.*

- C. The student develops leadership skills within the work setting at school.
 - 1. Collaborates and cooperates with other students using effective leadership, interpersonal, problem-solving, critical thinking, and team skills (PDP Level 4.8, 4.11; CR: 2B, 5A 5C, 5D, 5E).
 - 2. Demonstrates respect for equipment, software, etiquette, and observes all ethical guidelines for industry (PDP Level 4.8, 5.6; CR: 3A, 3B, 3C, 3D).
 - 3. Demonstrates respect for one another and self (PDP Level 4.8, 4.11; CR: 4A, 4B, 4C, 4E).
 - 4. Conforms to established rules and regulations ((PDP Level 4.8, 4.11; CR: 4C, 4D).
 - 5. Maintains appropriate appearance and punctuality (PDP Level 4.11; CR: 4A).
 - 6. Completes assigned tasks in a timely manner (PDP Level 4.8, 4.11, 5.6; CR: 4B, 4C).
 - 7. Analyzes and integrates positive behavior, conduct, and social manners within the school and work place (CR: 4A).
 - 8. Communicates effectively in both oral and written forms (PDP Level 4.8, 4.11, 5.6).
 - 9. Follows directions (PDP Level 4.8, 4.11, 5.6).

Production Technology: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: DIRECTED DESIGN PROJECTS

CONTENT STANDARD: *The student pursues advanced individual study in an area of metal woodworking.*

1-6. The student chooses a product to manufacture and explores commercial applications. The student researches other products, begins drawings, and maintains a notebook of researched materials and supplies needed for such a project. With an agreed upon timeline, the student works individually and maintains contact with the instructor to develop a complete project.

- ✓ adherence to timelines
- ✓ completion of required activities
- ✓ scrutinization of materials and supplies
- ✓ comprehension
- ✓ application of skills and knowledge
- ✓ problem solving

STRAND II: CAREER PATHS

CONTENT STANDARD: *The student develops an advanced knowledge of various technical fields that are related to woodworking.*

1-3. The student gathers information about careers by visiting industry and technical schools, checking reference materials [e.g., Occupational Outlook Handbook (OOH), Occupational Information Network software (O*NET), magazines, pamphlets]. The student needs to research types of careers available, tasks involved in particular jobs, education, special skills, and/or training required, salary and benefits.

- ✓ use of technology
- ✓ completion of task
- ✓ relevancy,

OR

The student makes contact with a variety of people (e.g., people employed in the field of interest, other teachers and counselors at the school, professional associations) and interviews them to find out training, educational requirements, and opportunities available in the field.

- ✓ use of technology
- ✓ completion of task
- ✓ relevancy

Extension: The student may want to explore getting a part-time job in the field or doing volunteer work in the field.

- ✓ supervisor's evaluation

STRAND III: EMPLOYABILITY SKILLS

CONTENT STANDARD: The student models positive employability skills/good work characteristics.

1-4, 6-9. The student investigates on-line entrepreneurship opportunities as a team member and reports findings to the team.

- ✓ collaboration and cooperation
- ✓ ethical considerations
- ✓ use of technology
- ✓ appropriate behavior
- ✓ completion of all task components
- ✓ effective communication
- ✓ adherence to criteria and guidelines

1, 3-9. The student manages a project and evaluates others.

- ✓ leadership skills
- ✓ problem solving and critical thinking
- ✓ assessments
- ✓ cooperation and collaboration
- ✓ respect for others
- ✓ effective communication

2, 8, 9. The student refines his/her employment portfolio.

- ✓ ethical considerations
- ✓ required components
- ✓ organization
- ✓ quality of portfolio
- ✓ effective communication

Advanced Cabinet Making/Millwork: Pathway Standards

Advanced Cabinet Making/Millwork enhances the student's skills in cabinet making and trains him to perform to industry standards. The focus is on safety, design, planning, measurement, technical reading, listening, and reviewing, assembly and hardware, preparation, materials, and employability skills.

References in parentheses following each performance standard are aligned with critical NM mathematics (CMS), science (CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), and the Professional Development Program (PDP).

STRAND I: BASIC SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment in a cabinet-making environment.*

- A. The student develops and demonstrates proficiency in safe work practices and procedures in a cabinet-making environment.
 - 1. Applies safe tool and machine usage and passes certification test at a 100% level (CR-2B).
 - 2. Demonstrates individual responsibilities and personal traits of safe work habits (CR-4D).
 - 3. Employs the use and care of appropriate personal protective equipment (CR-4A, 4D).
 - 4. Selects proper material handling (e.g., oversized material, lifting chemicals, electrical hazards) (CR-4D, 4E).
 - 5. Examines and evaluates fire prevention and fire safety procedures (CR-4D, 4E).
 - 6. Integrates responsible behavior related to safety issues (CR-4A, 4C, 4D).
 - 7. Reviews all safety procedures regarding use of hand and power tools (CR-4D).

STRAND II: DESIGN, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

- B. The student designs, plans, draws, and constructs cabinets.
 - 1. Uses a variety of estimation and computation methods (CMS 1) to perform conversions between standard and metric units (CMS 3).
 - 2. Designs an advanced project using appropriate joinery (CR-2B, 2C).
 - 3. Draws an advanced project showing dimensions (CR-2B).
 - 4. Prepares a bill of materials, a cut sheet, and computes the cost of a project (CMS 1, 8)(CR-2C).
 - 5. Applies layout to actual material according to industrial tolerances (CR-1D, 2B).
 - 6. Performs multi-step operations using whole numbers, fractions, and decimals (CR-1D, 2B) and demonstrates an understanding of the relationships between ratios, proportions, and percents (CMS 5).
 - 7. Uses a variety of computational methods and estimation (CMS 1, 7) to solve technical problems using ratio, proportion, and geometry (CR-1D, 2B).
 - 8. Uses industry standards for efficient use of materials (CR-1D)
 - traditional English standards (face frame)
 - 32 mm European style
 - knock down (KD) European style

STRAND III: TECHNICAL READING, LISTENING, AND VIEWING

CONTENT STANDARD: *The student demonstrates the ability to read, listen, and view technical documents used in the cabinet-making industry.*

- C. The student reads and applies technical information from a variety of documents or electronic mail.
 - 1. Interprets specialized vocabulary and applies information from technical resources (CR–3A, 3B, 3C, 3D).
 - 2. Analyzes operational and technical documents (CR–1D, 2B).
 - 3. Applies step-by-step procedures for the maintenance of production equipment and the completion of projects (CR–3C, 3D).
 - 4. Operates, maintains, or repairs from a technical manual (CR–1D, 3A).
 - 5. Analyzes a situation based on technical information (CR–1D, 3C).
 - 6. Assembles a project based on a technical drawing (CR–1D, 3C).

STRAND IV: PREPARATION, ASSEMBLY, HARDWARE, AND FINISHING

CONTENT STANDARD: *The student demonstrates an understanding of the preparation, joinery, assembly, and finishing process.*

- D. The student selects and uses advanced joining and fastening methods and develops finishing schedules appropriate to a laboratory activity.
 - 1. Uses a variety of appropriate and joining techniques for advanced applications (CR–1D).
 - 2. Demonstrates the application of a variety of wood joints in laboratory activities (CR–1D).
 - 3. Implements an appropriate finishing schedule (CR–1D, 5A).
 - 4. Completes a finishing schedule in an appropriate environment (CR–2A).
 - 5. Implements appropriate clean-up procedures and materials to safely complete the finishing process (CR–4D, 4E).
 - 6. Identifies, describes, and installs basic hardware (e.g., hinges and knobs) (CR–1D).

STRAND V: MATERIALS

CONTENT STANDARD: *The student demonstrates knowledge of construction and manufacturing materials.*

- E. The student applies knowledge of industrial processes and manufacturing methods and materials used in the cabinet-making industry.
 - 1. Identifies, describes, and selects appropriate wood products and composite materials for a given project (CR–1D).
 - 2. Describes and applies storage, handling, and conditioning procedures for materials (CR–1D, 4E).
 - 3. Describes and demonstrates initial material preparation (CR–1D).
 - 4. Applies 32 mm KD manufacturing methods (i.e., use of jigs and fixtures) (CR–1D).
 - 5. Identifies, describes, and installs basic wood fasteners (e.g., screws, epoxies, dowels, nails, spines, high tech glues) (CR–1D).
 - 6. Experiments with the effects of water on natural and man-made products (CR–1D, 4E).

STRAND VI: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- F. The student demonstrates teamwork, exhibits timeliness, follows directions, completes tasks, and shows respect.
 - 1. Collaborates and cooperates with other students using effective leadership skills interpersonal, problem solving, critical thinking, and team skills (PDP Level 2.5).
 - 2. Demonstrates respect for equipment, software etiquette, and observes all ethical guidelines for telecommunications (PDP Level 2.14).
 - 3. Demonstrates respect for one another and self (PDP Level 2.5).

4. Conforms to established rules and regulations (PDP Level 2.5, 3.7, 3.9).
5. Maintains appropriate appearance and punctuality (PDP Level 3.7, 3.9).
6. Completes assigned tasks in a timely manner (PDP Level 2.12, 2.5).
7. Analyzes and integrates positive behavior, conduct and social manners within the school, work place, and community (PDP Level 2.12, 2.5)
8. Communicates effectively in both oral and written forms (PDP Level 1.14, 3.7, 3.9).
9. Follows directions (PDP Level 2.12, 2.14, 2.5, 3.7, 3.9).

Advanced Cabinet Making/Millwork: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits safe use of equipment in a cabinet-making environment.*

1-3, 6,7. The student reviews safety data sheets for each machine and demonstrates proficiency on each machine without teacher direction.

After a teacher demonstration, and before the student demonstrates proficiency on the machine, the student takes a safety test relevant to that machine. Machines include, but are not limited to: planer – jointer – radial arm saw – band saw – circular saw –saber saw (band saw group) – jig saw (scroll) – drill press – portable electric drill – sanders (spindle, disc, belt) – portable electric router (shaper) – lathe – grinder – mortise (not needed in shop)

4. The student demonstrates safe material handling during the construction of an advanced project.

- ✓ proper selection of materials

5. The student reviews the locations of all fire extinguishers and their uses as well as exits.

- ✓ correct identification of extinguishers and exits

STRAND II: DESIGN, PLANNING, MEASUREMENT

CONTENT STANDARD: *The student demonstrates the ability to design, plan, and lay out projects.*

1-4, 6,8. The student draws a plan for an advanced cabinet-making project to include dimensions, appropriate joinery, bill of materials, cut list, finishing schedule, efficient use of materials, and correct measurements and calculations.

- ✓ accuracy in calculations
- ✓ efficiency
- ✓ completion of all required components
- ✓ neatness

5, 7. The student constructs a project applying layout procedures to acceptable industry tolerances and industry standards for joinery

- ✓ acceptable tolerances
- ✓ mathematical applications
- ✓ aesthetically pleasing appearance
- ✓ tight joints
- ✓ smooth finish
- ✓ operational functionality (e.g., doors, hinges, catches)

STRAND III: TECHNICAL READING, LISTENING, AND VIEWING

CONTENT STANDARD: *The student demonstrates the ability to read, listen and view technical documents used in the cabinet-making industry.*

- 1 - 6. Using a set of lab activity sheets and handouts, the student completes a variety of tasks which include assembling a portfolio of vocabulary worksheets, following instructions from a manual to maintain and operate equipment, and assembling a teacher-selected project from a drawing or structural plan. The student is rated using a four point scoring criteria when all parts of the tasks have been completed.
- 4 – Performance exceeds expectations of high standard work.
 - 3 – Performance meets the expectations of high standard work.
 - 2 – Work has been completed, but all or parts of the student's performance is below standard level.
 - 1 – Work has been completed, but performance is substantially below high standard level.
- ✓ adherence to scoring criteria
 - ✓ vocabulary acquisition
 - ✓ ability to follow step-by-step procedures
 - ✓ analytical skills

STRAND IV: PREPARATION, ASSEMBLY AND HARDWARE, AND FINISHING

CONTENT STANDARD: *The student demonstrates an understanding of the preparation, joinery, assembly, and finishing process.*

- 1–6. The student demonstrates the proper sequence in the assembly of an advanced project, time management, neatness, and accuracy needed for the completion of a functional, aesthetically appealing piece of work. The student applies a finish to his/her project using an instructor-approved finishing schedule.
- ✓ proper joint fitting (not too loose or tight)
 - ✓ accurate angles
 - ✓ correct measurements
 - ✓ proper sequence of steps involved in the project
 - ✓ project completed in an appropriate time frame determined by the project complexity
 - ✓ safety procedures
 - ✓ proper use of glue and amount of glue
 - ✓ flush fastener
 - ✓ required elements of the project
 - ✓ quality of completed project
- OR**
- 3, 4. The student completes a finishing schedule board that shows the types of finishes relating to his/her interest. The student presents the board to the class and explains the steps in each finish. The board demonstrates at least six different finishes.
- ✓ effective communication
 - ✓ adherence to timelines
 - ✓ required elements of the project
 - ✓ safety procedures

STRAND V: MATERIALS

CONTENT STANDARD: *The student demonstrates knowledge of construction and manufacturing materials.*

- 1 – 4. The student constructs a teacher-approved advanced project (e.g., applying Formica to cabinet top surfaces) which may include re-engineered wood products (e.g., veneers, composite materials, hard wood plywood). The project includes the best-suited materials, a bill of materials, and layout techniques to minimize waste.
 - ✓ correct calculations (e.g., square footage, costs)
 - ✓ appropriateness of materials (e.g., hardwoods, softwoods, grain direction).
 - ✓ a variety of techniques and methods (e.g., jigs, fixtures, joints)
 - ✓ proper preparation, handling, and storage of materials
 - ✓ efficient use of materials
5. The student experiments and reports on various methods of fastening by discovering the limits of the fastener.
 - ✓ effective communication
6. The student conducts an experiment submerging man-made materials under water for 24 hours, observes, and presents results to the class.
 - ✓ accuracy
 - ✓ effective presentation
 - ✓ comprehension of the effect water has on materials
 - ✓ reasonable conclusion

STRAND VI: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- 1,3,6,7,9. The student applies team skills to a group project by using brain-storming techniques to list possible class projects for a community service project (e.g., hospital work, adopt a highway, serve in a nursing home).
 - ✓ individual participation
 - ✓ cooperation and collaboration
 - ✓ completion of task
 - ✓ adherence to timelines
 - ✓ appropriate behavior
- 4,6-9. The student properly fills out a job application for a position for which he or she would like to work.
 - ✓ follows directions
 - ✓ organization
 - ✓ language conventions
 - ✓ effective communication
- 2,8,9. The student assembles his or her employment portfolio.
 - ✓ ethical considerations
 - ✓ required components
 - ✓ organization

- ✓ quality of portfolio
- ✓ effective communication
- ✓ variety

4,5,8,9. The student sets up an interview with a worker in his/her chosen field. The interview is conducted in an organized, timely fashion. Written questions are formulated before the interview. The interview is taped (with permission) and notes taken.

- ✓ effective oral and written communication
- ✓ adherence to rules and regulations
- ✓ appropriate attire and behavior
- ✓ conducts interview in a timely manner

Artisan Furniture Making: Pathway Standards

Artisan Furniture Making advances the student's skills in working with different types of wood. The student specializes in hand-made furniture with a focus on Southwest furniture and custom production. Areas of study are safety, joinery, design, planning, procedures and materials selection, usage and maintenance of hand and power tools, measurement, layout, cutting, glue up, and assembly, finishing, and employability skills. The student becomes more proficient with hand tools, saws, mortise/tenon joints, dado joints, dowel joints, and biscuit joints.

References in parentheses following each performance standard refer to critical NM mathematics (CMS), science (CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), and the Professional Development Program (PDP).

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and safe shop practices.*

- A. The student demonstrates a high level of proficiency in wood lab safety and practices.
 - 1. Applies safe tool and machine usage and passes a certification test at a 100% level (CR–2B).
 - 2. Demonstrates individual responsibilities and personal traits of safe work habits (CR–4D).
 - 3. Employs the use and care of appropriate personal protective equipment (CR–4A, 4D).
 - 4. Selects proper material handling (e.g., oversized material, lifting, chemicals, electrical hazards) (CR–4D, 4E).
 - 5. Examines and evaluates fire prevention and fire safety procedures (CR–4D, 4E).
 - 6. Integrates responsible behavior related to safety issues (CR–4A, 4C, 4D).

STRAND II: JOINER, FASTENER, HARDWARE

CONTENT STANDARD: *The student demonstrates mastery of both simple and complex joints.*

- B. The student constructs and assembles joints that are typically found in artisan furniture making.
 - 1. Uses a variety of appropriate fastening and joining techniques for advanced applications (CR–1D).
 - 2. Identifies and constructs basic woodworking joints (e.g., dado, mitre, rabbet, butt) (CR–1D).
 - 3. Identifies, selects, and utilizes correctly fasteners and hardware (CR–1D).
 - 4. Assembles advanced projects in an appropriate sequence using a variety of joints, fasteners, and hardware (CR–1D).

STRAND III: DESIGN, PLANNING, PROCEDURES, MATERIALS SELECTION

CONTENT STANDARD: *The student develops a comprehensive work plan for a project.*

- C. The student demonstrates the ability to plan, design, and create procedures for a project of increasing complexity.
 - 1. Describes the characteristics of wood and different methods used to process it (CR–1D).
 - 2. Identifies and describes defects in wood (CR–1D).
 - 3. Identifies and selects wood products appropriate for a given project (CR–1D).
 - 4. Identifies and is familiar with the use of wood fasteners (e.g., screws, dowels, spines, epoxies, high tech wood glues) (CR–1D).
 - 5. Experiments with the effects of water on natural and man-made products (CR–1D).
 - 6. Creates a bill of materials, a cut sheet, and computes the cost of the project (CR–2C).
 - 7. Describes and demonstrates initial material preparation (CR–1D).
 - 8. Analyzes operational and technical document (CR–3A).
 - 9. Uses 32 mm KD methods for efficient use of materials (CR – 1D).

STRAND IV: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand tools, hand-held power tools, and woodworking machines.*

- D. The student consistently employs proficient use, safety, and care of hand, hand-held power tools, and woodworking machines.
 - 1. Routinely selects and uses appropriate hand and hand-held power tool (e.g., cutting tools, boring tools, shaping tools) to complete advanced projects (CR–1D).
 - 2. Selects and uses the appropriate machines to complete an advanced woodworking project (CR–1D).
 - 3. Incorporates the safe use and care of tools and machines (CR–4D).

STRAND V: MEASUREMENT, LAYOUT, CUTTING, GLUE, ASSEMBLY

CONTENT STANDARD: *The student demonstrates the ability to measure, layout, and assemble a project.*

- E. The student demonstrates proficiency in using a variety of measuring instruments, layout tools, and mathematical techniques to assist in creating woodworking projects.
 - 1. Uses a standard ruler and metric ruler to measure within acceptable tolerances (CR–1D, 2B).
 - 2. Demonstrates proficiency in using whole numbers, fractions, and decimals to solve problems related to woodwork (CR–1D, 2B).
 - 3. Solves technical problems using ratio, proportion, and geometry (CR–1D).
 - 4. Applies layout to actual material within acceptable tolerances (CR–1D, 2B).
 - 5. Assembles advanced projects in an appropriate sequence (CR–1B).
 - 6. Identifies, selects, and applies a variety of wood adhesives (CR–1B).

STRAND VI: FINISHING

CONTENT STANDARD: *The student demonstrates understanding of finishing processes.*

- F. The student develops finishing schedules appropriate to wood working projects.
 - 1. Implements an appropriate finishing schedule (CR–2A).
 - 2. Completes a finishing schedule in an appropriate environment (CR–2A).
 - 3. Implements appropriate clean-up procedures and materials to safely complete the finishing process (CR–1D).
 - 4. Describes types of and uses for finishing materials (CR–1D).
 - 5. Prepares wood surfaces for application of finish (CR–1D).
 - 6. Constructs and completes a project that uses a variety of finishing materials (CR–1D).

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- G. The student demonstrates teamwork, exhibits timeliness, follows directions, completes tasks, and shows respect.
 - 1. Collaborates and cooperates with other students using effective leadership skills, interpersonal, problem solving, critical thinking, and team skills (PDP Level 2.5).
 - 2. Demonstrates respect for equipment, software etiquette, and observes all ethical guidelines for telecommunications (PDP Level 2.14).
 - 3. Demonstrates respect for one another and self (PDP Level 2.5).
 - 4. Conforms to established rules and regulations (PDP Level 2.5, 3.7, 3.9).
 - 5. Maintains appropriate appearance and punctuality (PDP Level 3.7, 3.9).

6. Completes assigned tasks in a timely manner (PDP Level 2.12, 2.5).
7. Analyzes and integrates positive behavior, conduct and social manners within the school, work place, and community (PDP Level 2.12, 2.5).
8. Communicates effectively in both oral and written forms (PDP Level 1.14, 3.7, 3.9).
9. Follows directions (PDP Level 2.12, 2.14, 2.5, 3.7, 3.9).

Artisan Furniture Making: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: SAFETY

CONTENT STANDARD: *The student exhibits the safe use of equipment and shop practices.*

1–3, 6. The student reviews safety data sheets for each machine and demonstrates proficiency on each machine without teacher direction. After a teacher demonstration, and before the student demonstrates proficiency on the machine, the student takes a safety test relevant to that machine. Machines include, but are not limited to:

- planer (surfacer)
- jointer
- saws (radial arm, band, circular
- saber saw (band saw group)
- jig saw (scroll)
- drill press
- portable electric drill
- portable electric sander
- sanders (spindle, disc, belt)
- portable electric router (shaper)
- lathe
- grinder
- mortise (not needed in shop)

4. The student demonstrates safer material handling during the construction of an advanced project.

- ✓ proper selection of materials

5. The student reviews the locations of all fire extinguishers and their uses as well as all exits.

- ✓ correct identification of extinguishers and exits

STRAND II: JOINER, FASTENER, AND HARDWARE

CONTENT STANDARD: *The student demonstrates mastery of both simple and complex joints.*

1 –4. The student works on an advanced project (teacher assigned) and demonstrates the proper sequence in its assembly. The student uses a variety of joints, fasteners and hardware to complete a functional, aesthetically appealing piece of work. He/she pays special attention to project time management, neatness, and accuracy .

- ✓ proper joint fitting (not too loose or tight)
- ✓ flush fastener
- ✓ correct measurements
- ✓ sequence of steps involved in the project
- ✓ completion of projects in an appropriate timeframe determined by the complexity of the project

STRAND III: DESIGN, PLANNING, PROCEDURES, AND MATERIALS SELECTION

CONTENT STANDARD: *The student develops a comprehensive work plan for a project.*

- 1–9. The student works on a project (e.g., small table with drawer) that an instructor selects and that everyone in the class works on and incorporates all skills of an artisan. The student designs a plan which includes a list of the materials to be used, the cost to construct the project, a cut list, the dimensions of the project, and a finishing schedule. The student can include in the design an item that is uniquely his and customize it to his own needs.
- ✓ correct calculations (e.g., measurements, costs)
 - ✓ timeline specifications
 - ✓ efficiency of materials
 - ✓ appropriate selection of materials for the project
 - ✓ clarity of plan

STRAND IV: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand tools, hand-held power tools, and wood working machines.*

- 1–3. The student uses a variety of tools to successfully complete an advanced project as approved by the teacher.
- ✓ safety procedures
 - ✓ quality of product
 - ✓ use of multiple tools
 - ✓ appropriate project level of ability
 - ✓ correct use of proper tools
 - ✓ condition of tools

STRAND V: MEASUREMENT, LAYOUT, CUTTING, GLUE UP, AND ASSEMBLY

CONTENT STANDARD: *The student demonstrates the ability to measure, layout, and assemble a project.*

- 1–6. The student writes up specific details involved in the construction of an item selected from a teacher-approved list. The procedures require that the item be duplicated and that it meets a customer's specifications. Teacher-selected items for the student at this level are coffee tables, small entertainment centers, armoires, dining room tables, chairs, beds, end tables, and bookshelves. Tables and chairs are ideal for duplicate cutting.
- ✓ correct calculations
 - ✓ acceptable tolerances
 - ✓ sequencing
 - ✓ assembly techniques
 - ✓ quality of product
 - ✓ customer satisfaction
 - ✓ criteria met
 - ✓ completion of project
 - ✓ use of appropriate adhesives

STRAND VI: FINISHING

CONTENT STANDARD: *The student demonstrates understanding of finishing processes.*

1–6. The student completes a finishing schedule board that shows the types of finishes relating to his/her interest. The student presents the board to the class and explains the steps in each finish. The board demonstrates at least six different finishes.

OR

The student applies a finish to his/her advanced project using an instructor-approved finishing schedule.

- ✓ required elements of the project
- ✓ effective communication
- ✓ adherence to timelines
- ✓ safety procedures
- ✓ appropriate use of finishes
- ✓ quality of final product
- ✓ clean-up

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

1,3,6,7,9. The student applies team skills to a group project by using brain-storming techniques to list possible class projects for a community service project (e.g., hospital work, adopt a highway, serve in a nursing home).

- ✓ individual participation
- ✓ cooperation and collaboration
- ✓ completion of task
- ✓ adherence to timelines
- ✓ appropriate behavior

4,6-9. The student properly fills out a job application for a position for which he or she would like to work.

- ✓ follows directions
- ✓ organization
- ✓ language conventions
- ✓ effective communication

2,8,9. The student assembles his or her employment portfolio.

- ✓ ethical considerations
- ✓ required components
- ✓ organization
- ✓ quality of portfolio
- ✓ effective communication
- ✓ variety

4,5,8,9. The student sets up an interview with a worker in his/her chosen field. The interview is conducted in an organized, timely fashion. Written questions are formulated before the interview. The interview is taped (with permission) and notes taken.

- ✓ effective oral and written communication

- ✓ adherence to rules and regulations
- ✓ appropriate attire and behavior
- ✓ conducts interview in a timely manner

Construction I/Carpentry A: Pathway Standards

NOTE: Successful completion of Woods I is a prerequisite for this class.

Construction I/Carpentry A is the first course in a two-year program that introduces the student to a competency-based program where the student shows that he/she can perform specific related tasks in preparation for a construction profession. The focus is on basic safety, an introduction to construction math, hand and power tools, responsibilities of a person working in the construction industry, and wood building materials, fasteners, and adhesives. The student follows the National Center for Construction Education and Research (NCCER) guidelines. The benefit of this is that construction craft training is standardized and many technical schools and colleges are using the same program.

References in parentheses following each performance standard are to critical New Mexico mathematics (CMS), science (CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), NCCER guidelines, and the Professional Development Program (PDP).

STRAND I: BASIC SAFETY

CONTENT STANDARD: *The student exhibits safe work practices and procedures in a construction environment.*

- A. The student develops and demonstrates proficiency in the safe use of equipment before and during use in a construction environment.
 - 1. Identifies the responsibilities and personal characteristics of a professional craftsman (CR-1B, NCCER-Mod 101).
 - 2. Explains the role that safety plays in the construction craft (CR-4D, NCCER-Mod 101).
 - 3. Describes what on-site safety means (CR-4D, NCCER-Mod 101).
 - 4. Explains the appropriate safety precautions around common job-site hazards (CR-4D, NCCER-Mod 101).
 - 5. Demonstrates the use and care of appropriate personal protective equipment (CR-4D, NCCER-Mod 101).
 - 6. Follows safe procedures for lifting heavy objects (CR-4D, NCCER-Mod 101).
 - 7. Describes safe behavior on and around ladders and scaffolds (CR-4D, NCCER-Mod 101).
 - 8. Explains the importance of the HazCom (Hazard Communication Standard) requirement and MSDSs (Material Safety Data Sheets) (CR-4D, NCCER-Mod 101).
 - 9. Describes fire prevention and fire-fighting techniques (CR-4D, NCCER-Mod 101).
 - 10. Defines safe work procedures around electrical hazards (CR-4D, NCCER-Mod 101).

STRAND II: CONSTRUCTION MATHEMATICS

CONTENT STANDARD: *The student demonstrates mathematical procedures commonly used in the construction and maintenance crafts.*

- B. The student relates the use of mathematics to various career options available in the construction industry and illustrates how mathematics is a valuable tool for craft workers.
 - 1. Adds, subtracts, multiplies, and divides whole numbers, fractions, and decimals, with and without a calculator (NCCER-Mod 102).
 - 2. Uses a standard ruler and metric ruler to measure (NCCER-Mod 102).
 - 3. Converts numbers from one form to another (e.g., fractions to decimals, decimals to percents) (NCCER-Mod 102).
 - 4. Explains what the metric system is and why it is important in the construction trade (NCCER-Mod 102).
 - 5. Recognizes and uses metric units of length, weight, volume, and temperature (NCCER-Mod 102).
 - 6. Identifies some of the basic shapes used in the construction industry and applies basic geometry to measure them (NCCER-Mod 102).

STRAND III: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand and power tools used in construction and maintenance.*

- C. The student develops and demonstrates proficient use, safety, and maintenance of hand tools.
 - 1. Recognizes and identifies some of the basic tools used in the construction trade (NCCER-Mod 103).
 - 2. Uses hand tools safely (NCCER-Mod 103).
 - 3. Describes the basic procedures for taking care of hand tools (NCCER-Mod 103).
 - 4. Identifies commonly used power tools of the construction trade (NCCER-Mod 104).
 - 5. Uses power tools safely (NCCER-Mod 104).
 - 6. Explains how to maintain power tools properly (NCCER-Mod 104).

STRAND IV: ORIENTATION TO THE TRADE

CONTENT STANDARD: *The student understands the competencies required for a nationally-accredited construction training program.*

- D. The student develops and demonstrates specific job-related tasks required to become part of a national registry in the construction trade.
 - 1. Describes the history of the carpentry trade (NCCER-Mod 27101).
 - 2. Identifies the stages of progress within the carpentry trade (NCCER-Mod 27101).
 - 3. Identifies the responsibilities of a person working in the construction industry (NCCER-Mod 27101).
 - 4. States the personal characteristics of a professional (NCCER-Mod 27101).
 - 5. Explains the importance of safety in the construction industry (NCCER-Mod 27101).

STRAND V: WOOD BUILDING MATERIALS, FASTENERS, AND ADHESIVES

CONTENT STANDARD: *The student becomes familiar with a number of different building materials, fasteners, and adhesives used in construction.*

- E. The student identifies a variety of building materials, screws, anchors, adhesives, and their uses.
 - 1. Explains the terms commonly used in discussing wood and lumber (NCCER-Mod 27102).
 - 2. States the uses of various types of hardwoods and softwoods (NCCER-Mod 27102).
 - 3. Identifies various types of imperfections that are found in lumber (NCCER-Mod 27102).
 - 4. Explains how lumber is graded (NCCER-Mod 27102).
 - 5. Interprets grade markings on lumber and plywood (NCCER-Mod 27102).
 - 6. Explains how plywood is manufactured, graded, and used (NCCER).
 - 7. Identifies various types of building boards and their uses (NCCER).
 - 8. Identifies the uses of and safety precautions associated with pressure-treated and fire-retardant lumber (CR-4D, NCCER-Mod 27102).
 - 9. Describes the proper method for caring for lumber and wood building materials at the job site (NCCER-Mod 27102).
 - 10. States the uses of various types of engineered lumber (NCCER).
 - 11. Calculates the quantities of lumber and wood products using industry-standard methods (NCCER-Mod 27102).
 - 12. Lists the basic types of screws and their uses (NCCER-Mod 27102).
 - 13. Lists the basic nail and staple types and their uses (NCCER).
 - 14. Identifies the different types of anchors and their uses (NCCER).
 - 15. Describes the common types of adhesives used in construction work and explains their uses (NCCER-Mod 27102).

STRAND VI: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student identifies positive employability skills and good work characteristics.*

- F. The student demonstrates teamwork, exhibits timelines, follows directions, completes tasks, and shows respect.
 - 1. Collaborates and cooperates with other students using effective leadership skills, interpersonal, problem solving, critical thinking, and team skills (PDP Level 2.5).
 - 2. Demonstrates respect for equipment, software etiquette, and observes all ethical guidelines for telecommunications (PDP Level 2.5).
 - 3. Demonstrates respect for one another and self ((PDP Level 2.5).
 - 4. Conforms to established rules and regulations (PDP Level 2.5, 3.7, 3.9).
 - 5. Maintains appropriate appearance and punctuality (PDP Level 3.7, 3.9).
 - 6. Completes assigned tasks in a timely manner (PDP Level 2.12, 2.5).
 - 7. Analyzes and integrates positive behavior, conduct, and social manners within the school, work place, and community (PDP 2.12, 2.5).
 - 8. Communicates effectively in both oral and written forms (PDP Level 1.14, 3.7, 3.9).
 - 9. Follows directions (PDP Level 2.12, 2.14, 2.5, 3.7, 3.9).

Construction I/Carpentry A: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: BASIC SAFETY

CONTENT STANDARD: *The student exhibits safe work practices and procedures in a construction environment.*

1-10. Through the use of videos, visuals, class discussions, and teacher demonstrations, the student learns safe work practices. He/she participates in teacher-designed activities that allow the student to practice safety and to gain information about:

- Different types of signs (e.g., informational, safety, caution)
- Types of unsafe acts and unsafe conditions (e.g., failure to use protective equipment, lifting improperly)
- OSHA laws that impact construction job sites
- Possible construction site hazards (e.g., working near a hazard, but not in direct contact with it)
- Safety guidelines for vehicle operation on a job site
- The importance of training before working in a permit-required confined space
- Personal protective equipment needs (e.g., hard hat, gloves)
- Lifting safety
- Fire protection rules and methods
- Classes of fuels involved in fires

The student keeps a notebook on new concepts and is tested frequently on new materials and information.

- ✓ comprehension
- ✓ appropriate behaviors
- ✓ safety practices

STRAND II: CONSTRUCTION MATHEMATICS

CONTENT STANDARD: *The student demonstrates mathematical procedures commonly used in the construction and maintenance crafts.*

1-10. The student practices computation, measurement, and conversions through a variety of activities designed to provide actual situations found in the construction industry. Scenarios for problems include counting out items needed to do a job, figuring out the total number of bricks, tiles, nails, and screws needed for a job, determining the cost of a project, measuring objects in the classroom, converting the measurements from standard to metric, meters to centimeters, and determining volumes of solids. The student is allowed to use the calculator on all computations.

- ✓ Accuracy in computation
- ✓ Comprehension
- ✓ Shape identification

STRAND III: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand and power tools used in construction and maintenance.*

- 1-3. Before the student uses any tools, he/she first learns how they work, the possible dangers of using the tools the wrong way, and the procedures and safety tips for using these tools. The student also learns how to check to see if the tool is in good share. The student views transparencies to learn techniques, observes teacher demonstrations, and then practices observed techniques (e.g., driving nails into different materials with a claw hammer). The tools to be mastered are hammer, screwdriver, saw, wrenches, pliers, spirit level, carpenter's square, steel rule and tape, and clamps. Performance Profile sheets are filled out after the student successfully demonstrates correct use of tools.
 - ✓ Proper use of tools
 - ✓ Correct identification of tools
 - ✓ Safety procedures
 - ✓ Maintenance of tools
- 4-6. Through videos, lectures, visuals, and teacher demonstrations, the student learns safety issues surrounding power tools and must successfully pass the Basic Safety Module before being allowed to use the power tools. Working with electricity is dangerous so the student needs to understand fully what can happen when safety procedures for power tools are not followed. Upon completion of the safety module, the student is put through a variety of tasks to learn proficiency (e.g., identifying parts of a drill, loading a bit into a drill, adjusting the ring and depth gauge on a hammer drill, inspection of saw blades, clamping, using a bench grinder). The student learns to operate the electric drill, circular saw, bench grinder, portable belt sander, and a nail gun.
 - ✓ Proper use of tools
 - ✓ Correct identification of tools
 - ✓ Safety procedures
 - ✓ Maintenance of tools

STRAND IV: ORIENTATION TO THE TRADE

CONTENT STANDARD: *The student understands the competencies required for a nationally-accredited construction training program.*

1. After listening to a presentation (e.g., lecture, video, transparencies), the student creates a poster depicting a variety of tools and dwellings from a time period ranging from 1300's – 1800's.
 - ✓ broad representation (e.g., time, tools, structures)
2. Through videos, visuals, and class discussions, the student learns how carpentry has evolved and progressed over time. The student writes a paper summarizing what knowledge he has gained about the changes in carpentry. Included in the paper are key ideas that might include synthetic building materials, improvement of tools, categories of carpentry, duties of carpenters, and types of conditions carpenters work under.
 - ✓ writing conventions
 - ✓ clarity
 - ✓ required components
- 3, 4. The student participates in class discussions on "What makes a good worker". Starting with a small group, the student brainstorms the traits (e.g., honesty, integrity, loyalty, willingness to learn) that a successful carpenter must possess and writes them on "post-it" notes. In a whole class discussion, the students compare what they have written and create a larger 2-column poster categorizing all of their ideas into

two areas:

Skills and Personal Traits

- ✓ individual participation
- ✓ broad range of ideas

5. The student listens to a guest speaker who is brought in to speak to the class about the importance of job site safety and OSHA regulations. After the presentation and the students have had an opportunity to have questions answered, the student writes a paper on the importance of following safety procedures and OSHA regulations.
- ✓ organization of ideas
 - ✓ accuracy
 - ✓ writing conventions

STRAND V: WOOD BUILDING MATERIALS, FASTENERS, AND ADHESIVES

CONTENT STANDARD: *The student becomes familiar with a number of different building materials, fasteners, and adhesives used in construction.*

1. The student is given a list of terms associated with the types and grades of wood building materials and the many types of fasteners and adhesives. Using photographs and other visuals the student studies the terms and is later quizzed on them in a manner established by the instructor.
- ✓ accuracy
 - ✓ comprehension
- 2–7. The student examines a cut portion of an actual tree trunk and identifies the different portions of the tree's cross section. Using this tree trunk and other examples of wood pieces, the student learns about lumber defects and grading of lumber. As an extension of this activity and depending on a school's resources, the student visits a lumber yard and identifies types of natural and manufacturing defects and wood types
- ✓ comprehension
 - ✓ correct identifications
- 8, 9. The student listens to a lecture emphasizing the safety precautions necessary when working with pressure-treated and fire-retardant lumber. Because the chemicals used react to extreme heat releasing toxic fumes, the student learns safety measures (e.g., washing exposed skin or clothing, wearing eye protection). After the lecture, the student writes a paper summarizing the importance of safety.
- ✓ key points
 - ✓ clarity and comprehension
- 10–15. The student selects a project to build and submits a detailed plan describing the steps he/she takes to complete the project, the materials to be used (e.g., nails, staples, anchors, adhesives), a rationale for the type of wood that is used in the project, and an itemized list of expenses that covers the cost of all the materials to be used in construction.
- ✓ proper use of materials
 - ✓ appropriate wood selections

- ✓ calculations (e.g., cost, material quantity)
- ✓ quality of completed project

STRAND VI: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student identifies positive employability skills and good work characteristics.*

1,3,6,7,9. The student applies team skills to a group project by using brain- storming techniques to list possible class projects for a community service project (e.g., hospital work, adopt a highway, serve in a nursing home).

- ✓ individual participation
- ✓ cooperation and collaboration
- ✓ completion of task
- ✓ adherence to timelines
- ✓ appropriate behavior

4,6-9. The student properly fills out a job application for a position for which he or she would like to work.

- ✓ follows directions
- ✓ organization
- ✓ language conventions
- ✓ effective communication

2,8,9. The student assembles his or her employment portfolio.

- ✓ ethical considerations
- ✓ required components
- ✓ organization
- ✓ quality of portfolio
- ✓ effective communication
- ✓ variety

4,5,8,9. The student sets up an interview with a worker in his/her chosen field. The interview is conducted in an organized, timely fashion. Written questions are formulated before the interview. The interview is taped (with permission) and notes taken.

- ✓ effective oral and written communication
- ✓ adherence to rules and regulations
- ✓ appropriate attire and behavior
- ✓ conducts interview in a timely manner

Construction II/Carpentry B: Pathway Standards

Construction II/Carpentry B is the second course in a two-year program that introduces the student to a competency-based program where the student shows that he/she can perform specific related tasks in preparation for a construction profession. The focus is on the use of hand and power tools, an introduction to blueprints, floor systems, wall and ceiling framing, roof framing, and windows and exterior doors. The student follows the National Center for Construction Education and Research (NCCER) guidelines. The benefit of this is that construction craft training is standardized and many technical schools and colleges are using the same program.

References in parentheses following each performance standard are aligned with critical NM mathematics (CMS), science, CSS), and language arts (CLAS) academic content standards, NM Career Readiness Standards (CR), NCCER guidelines, and the Professional Development Program (PDP).

STRAND I: BASIC SAFETY

CONTENT STANDARD: *The student exhibits safe work practices and procedures in a construction environment.*

- A. The student develops and demonstrates proficiency in the safe use of equipment before and during use in a construction environment.
 - 1. Applies the responsibilities and personal characteristics of a professional craftsperson (CR-4D, NCCER-Mod 101).
 - 2. Explains the role that safety plays in the construction crafts.
 - 3. Demonstrates what job-site safety means.
 - 4. Employs the appropriate safety precautions around common job-site hazards.
 - 5. Demonstrates the use and care of appropriate personal protective equipment.
 - 6. Follows safe procedures for lifting heavy objects.
 - 7. Demonstrates safe behavior on and around ladders and scaffolds.
 - 8. Explains the importance of the HazCom (Hazard Communication Standard) requirement and MSDS (Material Safety Data Sheets).
 - 9. Exhibits fire prevention and fire-fighting techniques.
 - 10. Models safe work procedures around electrical hazards.

NOTE: All of the above performance standards are taken from the NCCER guidelines, Module 101 and are aligned with the state of New Mexico Career Readiness Standards.

STRAND II: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand and power tools used in construction and maintenance.*

- B. The student develops and demonstrates proficient use, safety, and maintenance of hand and power tools.
 - 1. Understands the correct function of the basic tools used in the construction trade.
 - 2. Incorporates the safe use and care of hand tools.
 - 3. Demonstrates the basic procedures for taking care of hand tools.
 - 4. Identifies commonly used power tools of the construction trade.
 - 5. Uses power tools safely.
 - 6. Explains how to maintain power tools properly.

Note: All of the above performance standards are taken from the NCCER curriculum guidelines, Modules 103 and 104.

STRAND III: BLUEPRINTS

CONTENT STANDARD: *The student is introduced to basic blueprint terms, components, and symbols.*

- C. The student develops and demonstrates understanding of a variety of types of construction drawings and describes the importance of each.
 - 1. Recognizes and identifies basic blueprint terms, components, and symbols (NCCER–Mod 105).
 - 2. Relates information on blueprints to actual locations on the print (NCCER–Mod 105).
 - 3. Recognizes different classifications of drawings (NCCER–Mod 105).
 - 4. Interprets and uses drawing dimensions (NCCER–Mod 105).

STRAND IV: FLOOR SYSTEMS

CONTENT STANDARD: *The student acquires a variety of methodology used for framing buildings.*

- D. The student gains knowledge about existing installations and focuses on the proper construction of floors, an essential for a well-constructed structure.
 - 1. Identifies the different types of framing systems.
 - 2. Reads and understands drawings and specifications to determine floor system requirements.
 - 3. Identifies floor and sill framing and support members.
 - 4. Names the methods used to fasten sills to the foundation.
 - 5. Given specific floor load and span data, selects the proper girder/beam size from a list of available girders/beams.
 - 6. Lists and recognizes different types of floor joists.
 - 7. Given specific floor load and span data, selects the proper joist size from a list of available joists.
 - 8. Lists and recognizes different types of bridging and flooring materials.
 - 9. Explains the purposes of sub flooring and underlayment.
 - 10. Matches selected fasteners used in floor framing to their correct uses.
 - 11. Estimates the amount of material needed to frame a floor assembly.
 - 12. Demonstrates the ability to lay out and construct a floor assembly, install bridging, joists for a cantilever floor, a sub floor using butt-joint plywood/OSB panels, and a single floor system using tongue-and-groove plywood/OSB panels.

Note: All of the above performance standards have been taken from the NCCER Curriculum guidelines, Module 27104.

STRAND V: WALL, CEILING, AND ROOF REPAIR

CONTENT STANDARD: *The student explores basic principles, practices, and materials used in wall, ceiling, and roof framing.*

- E. The student demonstrates skills in laying out and erecting walls, installing ceiling joists, and framing different types of roofs used in residential construction.
 - 1. Identifies the components of a wall, ceiling, and roof layout.
 - 2. Describes the procedures for laying out a wood frame wall, including plates, corner posts, door and window openings, partition T's, bracing, and fire stops.
 - 3. Describes the correct procedures for assembling and erecting an exterior wall.
 - 4. Describes the common materials and methods used for installing sheathing on walls and roofs.
 - 5. Lays out, assembles, erects, and braces exterior walls for a frame building.
 - 6. Describes wall-framing techniques used in masonry construction.
 - 7. Explains the use of metal studs in wall framing.

8. Describes the correct procedures for laying out a ceiling.
9. Cuts and installs ceiling joists on a wood frame building.
10. Estimates the materials required to frame walls, ceilings, and roofs.
11. Identifies the various methods used to calculate the length of a rafter.
12. Identifies the various types of trusses used in roof framing.
13. Uses a rafter framing square, speed square, and calculator in laying out a roof.
14. Frames a roof opening (e.g., gable roof with vent openings).
15. Constructs a frame roof, including hips, valleys, commons, jack rafters, sheathing, and gable roof using trusses.

NOTE: All of the above performance standards have been taken from the NCCER Curriculum guidelines, Modules 27105 and 27106.

STRAND VI: WINDOW AND EXTERIOR DOORS

CONTENT STANDARD: *The student gains and understanding of various kinds of windows and exterior doors used in residential construction.*

- F. The student demonstrates installation practices and procedures for a variety of types and styles of windows and exterior doors.
 1. Identifies various types of fixed, sliding, and swinging windows.
 2. Identifies the parts of a window installation.
 3. States the requirements for a proper window installation.
 4. Install a pre-hung window.
 5. Identifies the common types of skylights and roof windows.
 6. Describes the procedure for properly installing a skylight.
 7. Identifies the common types of exterior doors and explains how they are constructed.
 8. Identifies the parts of a door installation.
 9. Identifies the types of thresholds used with exterior doors.
 10. Installs a threshold on a concrete floor.
 11. Installs a pre-hung exterior door with weather-stripping.
 12. Identifies the various types of locksets used on exterior doors and explains how they are installed.
 13. Explains the correct installation procedure for a rollup garage door.
 14. Installs a lockset.

All of the above performance standards have been taken from the NCCER Curriculum guidelines, Module 27107.

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- G. The student demonstrates teamwork, exhibits timeliness, follows directions, completes tasks, and shows respect.
 1. Collaborates and cooperates with other students using effective leadership, interpersonal, problem-solving, critical thinking, and team interpersonal, problem-solving, critical thinking, and team skills (PDP Level 4.8, 4.11).
 2. Demonstrates respect for equipment, software etiquette, and observes all ethical guidelines for telecommunications (PDP Level 4.8, 5.6).
 3. Demonstrates respect for one another and self (PDP Level 4.8, 4.11).
 4. Conforms to established rules and regulations (PDP Level 4.8, 4.11).
 5. Maintains appropriate appearance and punctuality (PDP Level 4.11).

6. Completes assigned tasks in a timely manner (PDP Level 4.8, 4.11, 5.6).
7. Analyzes and integrates positive behavior, conduct, and social manners within the school, work place, and community (PDP Level 4.8, 4.11).
8. Communicates effectively in both oral and written forms (PDP Level 4.8, 4.11, 5.6).
9. Follows directions (PDP Level 4.8, 4.11, 5.6).

Construction II/Carpentry B: Assessment Illustrations

Note: These assessment illustrations include suggested activities for attaining each performance standard, with at least one key feature to look for while assessing student performance. A check (✓) refers to a key feature to look for while assessing student performance.

STRAND I: BASIC SAFETY

CONTENT STANDARD: *The student exhibits safe work practices and procedures in a construction environment.*

1-10. Through the use of videos, visuals, class discussions, and teacher demonstrations, the student reinforces safe work practices. He/she participates in teacher-designed activities that allow the student to practice safety and to apply information about:

- different types of signs (e.g., informational, safety, caution)
- types of unsafe acts and unsafe conditions (e.g., failure to use protective equipment, lifting improperly)
- OSHA laws that impact construction job sites
- possible construction site hazards (e.g., oxygen close to sources of flame and combustible materials)
- proximity work (e.g., working near a hazard, but not in direct contact with it)
- safety guidelines for vehicle operation on a job site
- the importance of training before working in a permit-required confined space
- personal protective equipment needs (e.g., hard hat, gloves)
- lifting safely
- fire protection rules and methods
- classes of fuels involved in fires

The student keeps a notebook on new concepts and is tested frequently on new materials and information.

- ✓ Comprehension
- ✓ appropriate behaviors
- ✓ safety practices

STRAND II: HAND AND POWER TOOLS

CONTENT STANDARD: *The student demonstrates an understanding of hand and power tools used in construction and maintenance.*

1-3. Before the student uses any tools, he/she first learns how they work, the possible dangers of using the tool the wrong way, and the procedures and safety tips for using these tools. The student also learns how to check to see if the tool is in good shape. The student views transparencies to learn techniques, observes teacher demonstrations, and then practices observed techniques (e.g., driving nails into different materials with a claw hammer). The tools to be mastered are hammer, screwdriver, saw, wrenches, pliers, spirit level, carpenter's square, steel rule and tape, and clamps. Performance Profile sheets are filled out after the student successfully demonstrates correct use of tools.

- ✓ proper use of tools
- ✓ correct identification of tools
- ✓ safety procedures
- ✓ maintenance of tools

4-6. Through videos, lectures, visuals, and teacher demonstrations, the student learns safety issues surrounding power tools and must successfully pass the basic safety module before being allowed to use the power tools. Working with electricity is dangerous so the student needs

to understand fully what can happen when safety procedures for power tools are not followed. Upon completion of the safety module, the student is put through a variety of tasks to learn proficiency (e.g., identifying parts of a drill, loading a bit into a drill, adjusting the ring and depth gauge on a hammer drill, inspection of saw blades, clamping, using a bench grinder). The student learns to operate the electric drill, circular saw, bench grinder, portable belt sander, and a nail gun.

- ✓ proper use of tools
- ✓ correct identification of tools
- ✓ safety procedures
- ✓ maintenance of tools

STRAND III: BLUEPRINTS

CONTENT STANDARD: *The student is introduced to basic blueprint terms, components, and symbols.*

1. Using samples from each plan group (i.e., civil, architectural, structural, mechanical, plumbing, electrical), the student examines each plan and identifies the major plan groups. Using class discussion, the student describes symbols used in the different plans.
 - ✓ correct identification of plans
 - ✓ comprehension
- 2, 3. Using an example of a blueprint, the student points out and describes the five parts (i.e., title block, border, drawing area, revision block, legend) of the blueprint.
 - ✓ correct identification of parts
 - ✓ understanding
4. The student looks at a variety of blueprints to inspect the differences among the engineer's, architect's, and metric scales. Working in small groups, the student discusses the differences and describes the meaning of the notations. The student also practices finding parts of buildings using the sample blueprints.
 - ✓ interpretations

STRAND IV: FLOOR SYSTEMS

CONTENT STANDARD: *The student acquires a variety of methodology used for framing buildings.*

1. Through photographs and/or drawings from architectural firms or building material manufacturers, the student observes specific types of building construction in various stages of completion and learns the four basic framing methods (i.e., platform, braced, balloon, post-and-beam).
 - ✓ correct identification of framing methods
2. The student, either orally or in writing, explains the purpose of structural drawings and specifications, shows examples, and points out detailed information not given in the drawings. Using drawing sets and specifications, the student practices determining requirements for instructor-selected floor systems.
 - ✓ comprehension
- 3–11. Using transparencies, demonstrations, Job Sheets, Performance Profile Tasks, and Trainee Modules, the student identifies floor and sill framing and selects the proper girder/beam and joist sizes for various floor plans, floor loads, and span data.
 - ✓ accuracy

- ✓ comprehension

12. Using the video *Framing Floors and Sills*, the student observes the proper sequence and procedures required in the construction of a platform floor assembly. Following the viewing, the student participates in a teacher-led discussion demonstrating understanding of procedures and completes the Module Examination to the instructor's set level of proficiency.
 - ✓ individual participation
 - ✓ satisfactory completion of tasks

STRAND V: WALL, CEILING, AND ROOF REPAIR

CONTENT STANDARD: *The student explores basic principles, practices, and materials used in wall, ceiling, and roof framing.*

1. Given illustrations, the student identifies the structural members of a wood frame wall (e.g., blocking, header, stud, opening) and the most common types of roofs used in residential construction (e.g., gable, hip, gambrel, shed).
 - ✓ correct identification
- 2-9. Using transparencies and the videos *Wall Framing* and *Roof Framing, Part One*, the student observes the correct procedures for laying out and erecting a wall and framing a roof. After the viewings, the student writes a summary of the procedures making sure that specific points are made (e.g., locations of soleplates, stud positions, rafter locations, materials needed).
 - ✓ clarity of expression
 - ✓ comprehension
 - ✓ accuracy
 - ✓ observation skills
- 10-13. The student follows the basic steps explained earlier to estimate the amount of lumber needed to frame the walls and ceilings of a building. Major specifications are: the structure is 24' x 30', walls are 8' tall, 2 x 4's are to be used, the ceiling is constructed from 2 x 6's, two 24" wide windows, two 48" wide windows, one 36" wide door, three rooms (12' x 40', two 11' – 1 1/2" x 12'), each small room has a 36" door leading to the hallway, and there is a 36" opening, without a door, from the large room to the hallway. The student submits an itemized list of materials and expenses along with a written summary of types of materials to be used, how the rafter lengths were determined, and the types of trusses used in the framing.
 - ✓ accurate calculations
 - ✓ effective communication
 - ✓ proper procedures
 - ✓ all required components
- 14, 15. Hands-on experiences and opportunities may be limited as the student moves forward in his/her training. When possible, the student visits a construction site and observes framing procedures. Upon return, the student, in a class discussion, describes what he observed and entertains appropriate questions from the other students.
 - ✓ description of framing procedures
 - ✓ clarity of expression
 - ✓ response to questions

STRAND VI: WINDOWS AND EXTERIOR DOORS

CONTENT STANDARD: *The student gains an understanding of various kinds of windows and exterior doors used in residential construction.*

- 1-3,5,6. The student learns the definition of a window, all the parts (e.g., glass, sash, frame) of a window, the different types (e.g., fixed, case-ment, bay, jalousie) of windows, and the requirements and procedures for window installation. He/she keeps a notebook of new terms learned throughout the year and submits it for periodic checking.
- ✓ note taking
 - ✓ completeness
 - ✓ accuracy
4. After seeing a demonstration of the proper method for installing a window and securing the window unit to the building structure, the student practices installing a window.
- ✓ window shut before installation
 - ✓ plumb, level, and square opening
 - ✓ proper spacing between rough header and jamb for settling
 - ✓ level of sill
 - ✓ appropriate pack insulation or expanding foam in the gaps
- 7–9, 13. Through the use of videos, transparencies, and pictures the student learns the different types of residential entry doors and their installation.
- ✓ understanding
- 10-12, 14. After observing a door installation, the student installs an exterior pre-hung door with threshold, weather-stripping, and locksets.
- ✓ correct procedures
 - ✓ removal of nails
 - ✓ correct clearance

STRAND VII: EMPLOYABILITY SKILLS

CONTENT STANDARD: *The student models positive employability skills and good work characteristics.*

- 1-4, 6-9. The student, working in a team, investigates on line entrepreneurship opportunities, and reports findings to the rest of the class.
- ✓ collaboration and cooperation
 - ✓ ethical considerations
 - ✓ use of technology
 - ✓ appropriate behavior
 - ✓ completion of all task components
 - ✓ effective communication
 - ✓ adherence to criteria and guidelines

1, 3-9. The student manages a project and evaluates others.

- ✓ leadership skills
- ✓ problem solving and critical thinking
- ✓ assessments
- ✓ cooperation and collaboration
- ✓ respect for others
- ✓ effective communication

2, 8, 9. The student refines his/her employment portfolio.

- ✓ ethical considerations
- ✓ required components
- ✓ organization
- ✓ quality of portfolio
- ✓ effective communication