



# Construction Trades

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CNMI Career Pathways Guides



**Career pathways** are integrative systems created to support secondary school students in enrolling in post-secondary transferable curricula and gaining practical work experience while obtaining their high school diplomas. **Career pathways** are designed to streamline and minimize the steps required for students to advance into jobs that align with their career aspirations. With specialized certifications gained upon high school graduation, students are ready to enter the workforce or seamlessly transition into college. A goal in establishing career pathways is to unify agencies across workforce development, education, and policy to determine processes and influence legislation that benefit students at all levels. Preparing students with marketable skills upon completing secondary school allows the students ample time within their careers to build upon an early foundation of basic knowledge. Providing adequate training and opportunities for certification keeps youth engaged with the workforce and supports them in building sustainable careers that contribute to the economic growth and future of the Commonwealth of the Northern Mariana Islands (CNMI). This curriculum guide will provide resources to guide the instruction of the pathway courses and pathway related activities and connections to post-secondary education and training.



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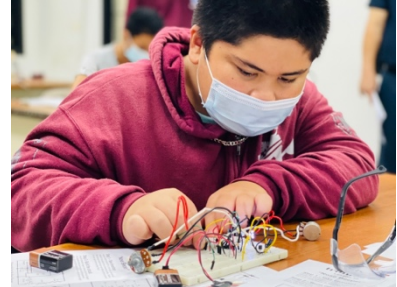


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## Construction Trades Overview

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Intended to assist CNMI as it designs and implements new career pathway programs, this brief is focused on the construction path. It provides a description of the occupation, outlines career ladder opportunities and their associated educational credentials, and details projected growth and potential earnings in the field. Examples of some exceptional national construction pathway programs are also provided.

## CNMI College and Career Readiness Definition

A CNMI student is college and career ready when he/she has achieved proficiency in academic standards, acquired essential skills for lifelong learning, and is able to transition into higher education and/or the workforce through an ongoing process of way finding for meaningful engagement.

## Job Description, Outlook, and Opportunities

The field of construction provides labor opportunities for people with varying levels of education. Construction laborer and helper positions typically require a high school diploma. Construction laborers and helpers support construction managers with preparation tasks, manual labor, and operational equipment management. Construction laborers and helpers may acquire additional specialized licenses and certifications, such as a certification in welding or finishing concrete, to advance within the field. Construction manager positions typically require a 2-year associate's degree and work experience or a 4-year bachelor's degree. Construction managers coordinate the operation of sites, create budgets and reports, and communicate directly with clients.

Position	Education Required	2016 CNMI Mean Hourly Wage <sup>a</sup>	Projected Growth by 2028 (United States)
Construction laborer and helper	High School Diploma	\$7.59	11% <sup>b</sup>
Construction manager	Bachelor's Degree	\$18.14	10% <sup>c</sup>

<sup>a</sup> <http://i2io42u7ucg3bwn5b3l0fquc.wpengine.netdna-cdn.com/wp-content/uploads/2017/09/2016-PWWAS-Report-One-Full-Report-v1.1-1.pdf>

<sup>b</sup> <https://www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm>

<sup>c</sup> <https://www.bls.gov/ooh/management/construction-managers.htm>

# Construction Trades CNMI PSS Curriculum Framework

## **Purpose**

The purpose of this program is to prepare students for employment or advanced training in the building construction industry. This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Architecture & Construction career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills and occupation-specific skills, and knowledge of all aspects of the Architecture & Construction career cluster. The content includes but is not limited to developing skills in various construction trades, as well as providing a foundation in construction management.

## Program of Study

This program is a planned sequence of instruction consisting of four credits.

Course Title	Length
Course 1: NCCER Core and NCCER Level 1 Carpentry	1 credit
Course 2: NCCER Level 1-2 Carpentry	1 credit
Course 3: NCCER Level 2 Carpentry and Cabinetmaking	1 credit
Course 4: NCCER Level 3 Carpentry/Concrete	1 credit

### Common Career Technical Core (CCTC) Alignment

The Common Career Technical Core (CCTC) are a set of rigorous, high-quality benchmark standards for Career Technical Education (CTE), the result of a state-led initiative. The goal of the CCTC is to provide students with the knowledge and skills needed to thrive in a global economy. The CCTC includes a set of end-of-program of study standards for each of the 16 Career Clusters® and their 79 Career Pathways, as well as an overarching set of Career Ready Practices, which address the knowledge, skills, and dispositions that are important to becoming career ready.

1. Understand contractual relations with all parties involved in the building process to ensure the successful build of a project.
2. Understand approval procedures to ensure an effective flow of information in the construction process.
3. Understand and implement testing and inspection procedures to ensure successful completion of a construction project.
4. Understand the purpose of scheduling as it relates to the successful completion of a construction project.
5. Understand and apply practices and procedures required to maintain jobsite safety.
6. Manage relationships with internal and external parties to successfully complete construction projects.
7. Compare and contrast the building systems and components.
8. Demonstrate the construction crafts required for each phase of a given project.
9. Safely use and maintain appropriate tools, machinery, equipment, and resources to accomplish construction project goals.

## **Academic Alignment**

Academic alignment is an ongoing, collaborative effort of professional educators that provide clear expectations for progression year-to-year through course alignment. This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses.

### Chamorro and Carolinian Language Heritage Studies alignment

- 1.1A. Interact using extended spoken, signed, or written communication by providing and obtaining information.
- 1.1E. Interact in a wide range of situations using culturally authentic language and gestures.
- 1.3A. Analyze information from a variety of oral, written, and visual sources by summarizing, critiquing, and explaining text.
- 2.2A. Analyze, discuss, and report on a wide variety of products and perspectives of the Chamorro/Carolinian culture.
- 4.2A. Analyze and discuss how products, practices and perspectives of the students' own culture and the Chamorro/Carolinian culture overlap and differ.
- 5.1A. Evaluate and discuss how understanding of another language and culture enhances job skills and career options.
- 5.2A. Sustain communication with people locally and around the world.
- 5.2C. Evaluate and discuss how understanding of another language and culture enhances job skills and career options.



# Course 1: NCCER Core and NCCER Level 1 Carpentry Student Standards

**Course Title:** NCCER Core and NCCER Level 1 Carpentry

**Course Credit:** 1

## Course Description

This course provides instruction in the basic principles of Construction Trades: the role of the entrepreneur; Construction Trades as a career; ethics in business; and the principles of marketing, financing, and managing a business.

## Standards and Benchmarks

### **1.0 Basic Safety (Construction Site Safety Orientation): Demonstrate knowledge and skills to identify and follow safe work practices and procedures and how to properly inspect and use safety equipment. The student will be able to:**

- 1.1 Describe the importance of safety, the causes of workplace incidents, and the process of hazard recognition and control;
- 1.2 Describe the safe work requirements for elevated work, including fall protection guidelines;
- 1.3 Identify and explain how to avoid struck-by and caught-in-between hazards;
- 1.4 Identify common energy-related hazards and explain how to avoid them;
- 1.5 Identify and describe the proper use of personal protective equipment (PPE); and
- 1.6 Identify and describe other specific job-site safety hazards.

### **2.0 Introduction to Construction Math: Demonstrate basic math skills needed in the construction environment. The module reviews whole numbers and fractions; working with decimals; the four primary math operations; reading rulers and tape measures; the Imperial and metric units of measurement; basic geometric figures; and area and volume calculations for two-dimensional and three-dimensional objects. The student will be able to:**

- 2.1 Identify whole numbers and demonstrate how to work with them mathematically;
- 2.2 Explain how to work with fractions;
- 2.3 Describe the decimal system and explain how to work with decimals;
- 2.4 Identify various tools used to measure length and show how they are used;
- 2.5 Identify and convert units of length, weight, volume, and temperature between the imperial and metric systems of measurement; and
- 2.6 Identify basic angles and geometric shapes and explain how to calculate their area and volume.

**3.0 Introduction to Hand Tools: Demonstrate the identification, use, and care of hand tools. Developing the knowledge to properly choose and safely use hand tools is an essential part of the construction industry. The student will be able to:**

- 3.1 Identify and explain how to use various types of hand tools;
- 3.2 Identify and describe how to use various types of measurement and layout tools;
- 3.3 Identify and explain how to use various types of cutting and shaping tools; and
- 3.4 Identify and explain how to use other common hand tools.

**4.0 Introduction to Power Tools: Identify and describe power tools used by construction workers. The student will be able to:**

- 4.1 Identify and explain how to use various types of power drills and impact wrenches;
- 4.2 Identify and explain how to use various types of power saws;
- 4.3 Identify and explain how to use various grinders and grinder attachments; and
- 4.4 Identify and explain how to use miscellaneous power tools.

**5.0 Introduction to Construction Drawings: Understand information and skills needed to read and understand construction drawings. The student will be able to:**

- 5.1 Identify and describe various types of construction drawings, including their fundamental components and features.

**6.0 Introduction to Basic Rigging: Understand the different types of rigging slings and hardware and describes how those items are used. It explains how to properly inspect slings and hardware items. The student will be able to:**

- 6.1 Identify and describe various types of rigging slings, hardware, and equipment; and
- 6.2 Demonstrate the proper ASME Emergency Stop hand signal.

**7.0 Basic Communication Skills: Develop good communications skills enables the construction professional to become a confident, reliable asset to their craft. The student will be able to:**

- 7.1 Describe the communication, listening, and speaking processes, and their relationship to job performance; and

7.2 Describe good reading and writing skills, and their relationship to job performance.

**8.0 Basic Employability Skills: Demonstrate skills and knowledge related basic employability skills in finding and securing a position in the construction trades. In addition, guidance in the areas of problem-solving and effective interaction with others is offered to help ensure their success in the construction trades. The student will be able to:**

8.1 Describe the opportunities in the construction business and how to enter the construction workforce;

8.2 Explain the importance of critical thinking and how to solve problems; and

8.3 Explain the importance of social skills and identify ways good social skills are applied in the construction trade.

**9.0 Introduction to Materials Handling: Provides safety guidelines for workers handling materials on the job site. It covers proper procedures and techniques to use when lifting, stacking, transporting, and unloading materials. The student will be able to:**

9.1 Describe the basic concepts of material handling and common safety precautions; and

9.2 Identify various types of material handling equipment and describe how they are used.

**10.0 Orientation to the Trade: Explore the history of the carpentry trade, describes the apprentice program, identifies career opportunities for carpenters, explores the SkillsUSA program, and lists the responsibilities and characteristics a carpenter should possess. The student will be able to:**

10.1 Identify the career and entrepreneurial opportunities within the carpentry trade;

10.2 Identify the skills, responsibilities, and characteristics needed to be a successful carpenter; and

10.3 Summarize how to be connected to the industry through an organization like SkillsUSA.

**11.0 Building Materials, Fasteners, and Adhesives: Provides an overview of the building materials used by carpenters, including lumber, engineered wood products, concrete, and steel framing materials. The student will be able to:**

11.1 Identify various types of building materials and describe their uses;

11.2 List safety precautions associated with building materials;

11.3 Describe the proper method of handling and storing building materials;

- 11.4 Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods; and
- 11.5 Describe the fasteners, anchors, and adhesives used in construction and explain their uses.

**12.0 Hand and Power Tools: Demonstrate an understanding of hand and power tools used by carpenters. The student will be able to:**

- 12.1 Identify the hand tools commonly used by carpenters; and
- 12.2 Identify the power tools commonly used by carpenters.

**13.0 Construction Drawings, Specifications and Layout: Describes the information contained in construction drawings, including foundation, floor, and other plan view drawings, as well as how to read them. It also describes how to interpret schedules and specifications, and how to use the 3-4-5 rule to square buildings. The student will be able to:**

- 13.1 Describe the types of drawings usually included in a set of plans and describe the information found on each type;
- 13.2 State the purpose of written specifications; and
- 13.3 Identify the methods of squaring a building.

**14.0 Floor Systems: Understand the layout and construction procedures for floor systems, including how to read and interpret construction drawings and specifications, and how to identify different types of framing systems, floor system components, and floor system materials. The student will be able to:**

- 14.1 Read and interpret specifications and drawings to determine floor system requirements;
- 14.2 Identify the different types of framing systems;
- 14.3 Identify floor system components;
- 14.4 Describe the construction methods for floor systems and identify floor system materials;
- 14.5 Estimate the amount of material needed for a floor assembly; and
- 14.6 Identify some common alternative floor systems.

**15.0 Wall Systems: Demonstrate the procedures for laying out and framing walls, including roughing-in door and window openings, constructing corners and partition Ts, bracing walls, and applying sheathing. The student will be able to:**

- 15.1 Identify the components of a wall system;
- 15.2 Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops;
- 15.3 Describe the correct procedure to assemble, erect, and brace exterior walls for a frame building;

- 15.4 Describe wall framing techniques used in masonry construction;
- 15.5 Describe correct procedure to estimate materials required to frame walls; and
- 15.6 Identify alternative wall systems.

### Course 1: NCCER Core and Level 1 Carpentry Recommended Pacing

Standard/ Curriculum Module	Topic	Clock Hours
1	CORE: Basic Safety	12.5
2	CORE: Introduction to Construction Math	10
3	CORE: Introduction to Hand Tools	10
4	CORE: Introduction to Power Tools	10
5	CORE: Introduction to Construction Drawings	10
6	CORE: Introduction to Basic Rigging	7.5
7	CORE: Basic Communication Skills	7.5
8	CORE: Basic Employability Skills	7.5
9	CORE: Introduction to Materials Handling	5
10	Orientation to the Trade	2.5
11	Building Materials, Fasteners, and Adhesives	20
12	Hand and Power Tools	10
13	Construction Drawings, Specifications and Layout	22.5
14	Floor Systems	25
15	Wall Systems	10
Total		160

### Student Portfolio Recommendations

- Manual or a video on safety procedures.
- Blueprint or construction drawing/design of a product.
- Production of the design (pictures/video).
- Student self-reflection and self-assessment (pre and post).

## Course 2: NCCER Level 1-2 Carpentry Student Standards

**Course Title:** NCCER Level 1-2 Carpentry

**Course Credit:** 1

### Course Description

This course builds on the standards taught in the first course continuing instruction around ceiling and roof framing, building envelope systems, and basic stair layout. The student then moves into NCCER Level 2 instruction with a focus on commercial drawings, cold-formed steel framing, exterior finishing, thermal and moisture protection, and completing the course with roof applications.

### Standards and Benchmarks

**1.0 Ceiling and Roof Framing: Provides an overview of ceiling and roof framing, including the components of ceiling and roof framing, the different types of roofs used in residential construction, and use of trusses in basic roof framing. The methods for laying out rafters, erecting a gable roof, framing a basic gable end wall, and installing roof sheathing are introduced. The student will be able to:**

- 1.1 Identify the components of ceiling framing;
- 1.2 Identify common types of roofs used in residential construction;
- 1.3 Identify the components and define the terms associated with roof framing;
- 1.4 Describe the methods used to lay out a common rafter;
- 1.5 Describe how to erect a gable roof;
- 1.6 Describe how to frame a basic gable end wall;
- 1.7 Recognize the use of trusses in basic roof framing;
- 1.8 Describe the basics of roof sheathing installation; and
- 1.9 Describe how to perform a material takeoff for a roof.

**2.0 Introduction to Building Envelope Systems: Introduces the building envelope system and its components. The module describes the various types of windows, skylights, and exterior doors, and provides instructions for installing them. It also includes instructions for installing weather stripping and locksets. The student will be able to:**

- 2.1 Identify the components of the building envelope;
- 2.2 State the requirements for a proper window installation;
- 2.3 State the requirements for a proper door installation; and
- 2.4 Identify the various types of locksets used on exterior doors and explain how they are installed.

**3.0 Basic Stair Layout: Introduces the various types of stairs and the common building code requirements related to stairs. The module focuses on the techniques for measuring and calculating rise, run, and stairwell openings; laying out stringers; and fabricating basic stairways. The student will be able to:**

- 3.1 Identify the types of stairways;
- 3.2 Identify the various components associated with stairs;
- 3.3 Identify terms associated with stair framing;
- 3.4 Describe the procedure used to determine the total rise, number and size of risers, and number and size of treads required for a stairway; and
- 3.5 Describe the procedure to lay out and cut stringers, risers, and treads.

**4.0 Commercial Drawings: Understand how to read and interpret a set of commercial drawings and specifications. The student will be able to:**

- 4.1 Identify the types and uses of commercial construction drawings and schedules; and
- 4.2 Define the use of specifications and how they are referenced.

**5.0 Cold-Formed Steel Framing: Describes the types and grades of steel framing materials and includes instructions for selecting and installing metal framing for interior and exterior walls, loadbearing and nonbearing walls, partitions, and other applications. The student will be able to:**

- 5.1 Identify the tools and components of cold-formed steel framing systems and their safe use;
- 5.2 Identify the steps to lay out and install a steel stud wall;
- 5.3 Identify other steel framing applications.

**6.0 Exterior Finishing: Understand the various types of exterior finish materials and their installation procedures, including wood, metal, vinyl, and fiber-cement siding. The student will be able to:**

- 6.1 Describe the safety hazards when working with exterior finish materials;
- 6.2 Describe the various types and applications of exterior finish materials;
- 6.3 Explain how to install exterior finish materials; and
- 6.4 Describe the estimating procedure for exterior finish projects.

**7.0 Thermal and Moisture Protection: Understand the selection and installation of various types of insulating materials in walls, floors, and attics. It also covers the uses and installation practices for vapor barriers and waterproofing materials. The student will be able to:**

- 7.1 Describe the safety and health hazards when working with insulation;
- 7.2 Describe the various types of insulation and their characteristics;
- 7.3 Describe the various installation methods for insulation;
- 7.4 Identify the requirements for moisture control, waterproofing, and ventilation, and describe the related installation methods; and
- 7.5 Describe the estimating procedure for thermal and moisture projects.

**8.0 Roofing Applications: Describes how to properly prepare the roof deck and install roofing for residential and commercial buildings. The student will be able to:**

- 8.1 Explain the safety requirements for roofing projects;
- 8.2 Identify the tools and fasteners used in roofing;
- 8.3 Identify the different roofing systems and their associated materials;
- 8.4 Describe the installation techniques for common roofing systems; and
- 8.5 Describe the estimating procedure for roofing projects.

**Course 2: NCCER Level 1-2 Carpentry Recommended Pacing**

Standard/ Curriculum Module	Topic	Clock Hours
1	Ceiling and Roof Framing	47.5
2	Introduction to Building Envelope Systems	12.5
3	Basic Stair Layout	12.5
4	Commercial Drawings	25
5	Cold-Formed Steel Framing	15
6	Exterior Finishing	35
7	Thermal and Moisture Protection	7.5
8	Roofing Applications	25
Total		180

**Student Portfolio Recommendations:**

- Work samples throughout each module and in culminating project.
- Construct a small-scale model of residential or commercial building.
- Present portfolio and model at Youth Construction Fair.



## Course 3: NCCER Level 2 Carpentry and Cabinetmaking Student Standards

**Course Title:** NCCER Level 2 Carpentry and Cabinetmaking

**Course Credit:** 1

### Course Description

This course continues the Level 2 Carpentry NCCER curriculum with construction topics: door and door hardware; drywall installation; drywall finishing; suspended ceilings; window/door/floor/ceiling trim; cabinet installation; and includes a 35-hour module of cabinetmaking.

### Standards and Benchmarks

**1.0 Door and Door Hardware: Demonstrate the installation of metal doors and related hardware in steel-framed, wood-framed, and masonry walls, along with their related hardware, such as locksets and door closers. The student will be able to:**

- 1.1 Describe the safety hazards related to working with doors;
- 1.2 Identify the different types and composition of residential and commercial doors;
- 1.3 Identify the various types of door jambs and frames;
- 1.4 Identify the different types of door hardware;
- 1.5 Describe the various installation techniques for doors and hardware; and
- 1.6 List and identify specific items included on a typical door schedule.

**2.0 Drywall Installation: Describes the various types of gypsum drywall, their uses, and the fastening devices and methods used to install them. The module also contains detailed instructions for installing drywall on walls and ceilings using nails, drywall screws, and adhesives. The student will be able to:**

- 2.1 Identify components of a drywall assembly;
- 2.2 Describe the installation of drywall;
- 2.3 Contrast rated assemblies to non-rated assemblies; and
- 2.4 Identify how to calculate a quantity takeoff for proper drywall installation.

**3.0 Drywall Finishing: Describes the materials, tools, and methods used to finish and patch gypsum drywall. A discussion of both automatic and manual taping and finishing tools is presented. The student will be able to:**

- 3.1 Identify differences between the six levels of finish established by industry standards;
- 3.2 Identify the different materials for proper drywall finishing;

- 3.3 Identify the proper tools used in drywall finishing;
  - 3.4 Describe proper drywall finishing procedures; and
  - 3.5 Explain how to estimate the proper amount of drywall finishing materials.
- 4.0 Suspended Ceilings: Describes the materials, layout, and installation procedures for many types of suspended ceilings used in commercial construction, as well as ceiling tiles, drywall suspension systems, and pan-type ceilings. The student will be able to:**
- 4.1 Identify the components necessary to properly install a suspended ceiling system;
  - 4.2 Interpret a reflected ceiling plan; and
  - 4.3 Identify the procedures to lay out and install a suspended ceiling system.
- 5.0 Window, Door, Floor, and Ceiling Trim: Describes the different types of trim used in finish work and focuses on the proper methods for selecting, cutting, and fastening trim to provide a professional finished appearance. The student will be able to:**
- 5.1 Describe the safety hazards related to working with window, door, floor, and ceiling trim;
  - 5.2 Identify the different types of standard moldings and materials;
  - 5.3 Explain how to install different types of molding; and
  - 5.4 Explain how to estimate window, door, floor, and ceiling trim.
- 6.0 Cabinet Installation: Provides detailed instructions for the selection and installation of base and wall cabinets and countertops. The student will be able to:**
- 6.1 Describe the safety hazards when installing cabinets;
  - 6.2 Identify the different types of cabinets;
  - 6.3 Identify cabinet components and hardware and describe their purpose; and
  - 6.4 Explain how to lay out and install a basic set of cabinets.
- 7.0 Cabinetmaking: Introduces advanced trainees and experienced carpenters to the construction of high-quality finished products such as cabinets and furniture. The student will be able to:**
- 7.1 Identify and describe the types of wood commonly used to construct cabinets;
  - 7.2 Identify and describe the safe use of various cabinetmaking power tools;
  - 7.3 Identify and describe joints and other construction features of cabinet components and their related hardware and fasteners;
  - 7.4 Describe how to assemble, sand, and finish cabinets; and

7.5 Describe how to prepare and apply laminate to a countertop.

### Course 3: NCCER Level 2 Carpentry and Cabinetmaking Recommended Pacing

Standard/ Curriculum Module	Topic	Clock Hours
1	Door and Door Hardware	20
2	Drywall Installation	15
3	Drywall Finishing	17.5
4	Suspended Ceilings	15
5	Window, Door, Floor, and Ceiling Trim	25
6	Cabinet Installation	10
7	Cabinetmaking	35
Total		137.5

#### Student Portfolio Recommendations:

- Work samples from service-learning projects and class projects.
- Work with school, government agency, or business partner to build a small-scale building.

## Course 4: NCCER Level 3 Carpentry/Concrete Student Standards

**Course Title:** NCCER Level 3 Carpentry/Concrete

**Course Credit:** 1

### Course Description

This course is the Level 3 NCCER Carpentry curriculum with a focus on concrete in the construction process: properties of concrete, rigging equipment and practices; trenching/excavating; reinforcing concrete, foundations and slab on grade; vertical framework; horizontal framework; handling/placing concrete; and tilt-up wall systems.

### Standards and Benchmarks

**1.0 Properties of Concrete: Understand the properties, characteristics, and uses of cement, aggregates, and other materials that, when mixed together, form different types of concrete. The text covers procedures for estimating concrete volume, testing freshly mixed concrete, and methods and materials for curing concrete. The student will be able to:**

- 1.1 Identify various concrete ingredients and describe their purpose in a concrete mixture;
- 1.2 Identify proper concrete mixture measurements and curing methods;
- 1.3 Describe the methods for testing concrete; and
- 1.4 Calculate concrete volume for rectangular or circular structures.

**2.0 Rigging Equipment: Demonstrate the function and inspection of basic equipment and hardware used in rigging, including slings, wire rope, and chains, and attaching hardware such as shackles, eyebolts, and hooks. The student will be able to:**

- 2.1 Identify and describe the uses of common rigging hardware and equipment;
- 2.2 Perform a safety inspection on hooks, slings, and other rigging equipment;
- 2.3 Select, inspect, use, and maintain special rigging equipment, including Block and tackle (bull rigging), Chain hoists, Ratchet-lever hoists, Jacks, and Base-mounted drum hoists (tuggers);
- 2.4 Inspect heavy rigging hardware; and
- 2.5 Tie knots used in rigging.

**3.0 Rigging Practices: Understand general rigging and crane hazards and related safety considerations. It provides an overview of verbal and nonverbal modes of communication and describes emergency response procedures for rigging operations. The student will be able to:**

- 3.1 Identify and use the correct ASME hand signals to guide a crane operator;

- 3.2 Identify basic rigging and crane safety procedures and determine the center of gravity of a load;
- 3.3 Identify the pinch points of a crane and explain how to avoid them;
- 3.4 Identify site and environmental hazards associated with rigging;
- 3.5 Properly attach rigging hardware for routine lifts and pipe lifts; and
- 3.6 Explain the importance of sling tension calculations.

**4.0 Trenching and Excavating: Understand techniques required for working in and around excavations, particularly when preparing building foundations, including: types and bearing capacities of soils; procedures used in shoring, sloping, and shielding trenches and excavations; trenching safety requirements; and mitigation of groundwater and rock when excavating foundations. The student will be able to:**

- 4.1 List safety considerations for trenches and excavations;
- 4.2 Identify the different types, bearing capacities, and classifications of soils;
- 4.3 Describe the methods of compacting and testing soil; and
- 4.4 Explain surface water, groundwater, and rock mitigation as related to concrete.

**5.0 Reinforcing Concrete: Describes the selection and uses of different types of reinforcing materials. The text discusses requirements for cutting, bending, splicing, and tying reinforcing steel and the placement of steel in footings, columns, walls, and slabs. The student will be able to:**

- 5.1 List applications of reinforced concrete;
- 5.2 Describe the general requirements for working with reinforcing steel, including tools, equipment, and fabricating methods;
- 5.3 Describe methods by which reinforcing bars may be bent and cut in the field; and
- 5.4 Explain the methods for placing reinforcing steel.

**6.0 Foundations and Slab-on-Grade: Describes basic site layout tools and methods; layout and construction of deep and shallow foundations; layout and forming of slabs-on-grade; and forms used for curbing and paving. The student will be able to:**

- 6.1 Identify the safety requirements when forming foundations and slabs;
- 6.2 Describe how to establish formwork locations and elevations;
- 6.3 Explain how to properly perform job-site layout;
- 6.4 Identify the various types of foundations and list appropriate uses for each;
- 6.5 Identify various types of foundation forms and their proper removal;
- 6.6 Describe how slabs-on-grade are formed and finished; and
- 6.7 Identify methods to create curbs and pavement.

**7.0 Vertical Formwork: Understand the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip forms, climbing forms, and shaft forms. The student will be able to:**

- 7.1 Identify the basic types of concrete wall forms;
- 7.2 Describe applications for patented wall-form systems;
- 7.3 Explain how to properly assemble and set forms;
- 7.4 Identify the types of column forms;
- 7.5 List applications of vertical slip forming and describe each;
- 7.6 Describe how to construct stair forms; and
- 7.7 List various vertical architectural and specialty forms, and describe applications for each.

**8.0 Horizontal Formwork: Describes elevated decks and formwork systems and methods used in their construction, including joist, pan, metal deck, and flat slab systems and provides instructions for the use of flying forms, as well as shoring and reshoring systems. The student will be able to:**

- 8.1 Identify safety hazards associated with elevated deck formwork;
- 8.2 Identify the various types of structural-concrete floor and roof slabs;
- 8.3 Describe the different types of form systems;
- 8.4 Identify types of elevated decks;
- 8.5 Identify the different types of shores and describe applications for each; and
- 8.6 Identify specialty form systems.

**9.0 Handling and Placing Concrete: Describes tools, equipment, and procedures for handling, placing, and finishing concrete. The text describes joints made in concrete structures, the use of joint sealants, and form removal procedures. The student will be able to:**

- 9.1 List the safety precautions for handling, placing, and finishing concrete;
- 9.2 Identify the methods of moving and handling concrete;
- 9.3 Explain the proper methods for placing and consolidating concrete into forms;
- 9.4 Describe the proper methods for finishing and curing concrete; and
- 9.5 Identify the different kinds of joints in concrete structures.

**10.0 Tilt-up Wall Systems: Describes how tilt-up concrete construction is used and how tilt-up panels are formed, erected, and braced. The text reviews the installation of rebar and types of embedments used to lift and brace the panels. The student will be able to:**

- 10.1 Describe the tilt-up wall-forming process; and
- 10.2 Explain the proper procedure for erecting and bracing tilt-up wall panels.

## Course 4: NCCER Level 3 Carpentry/Concrete Recommended Pacing

Standard/ Curriculum Module	Topic	Clock Hours
1	Properties of Concrete	10
2	Rigging Equipment	10
3	Rigging Practices	15
4	Trenching and Excavating	15
5	Reinforcing Concrete	15
6	Foundations and Slab-on-Grade	20
7	Vertical Framework	22.5
8	Horizontal Framework	15
9	Handling and Placing Concrete	20
10	Tilt-up Wall Systems	17.5
Total		160

### Student Portfolio Recommendations

- Work samples from service-learning projects and class projects.
- Work with school, government agency or business partner to build a small-scale building.

## CNMI Construction Trades Four-Year Plan

A four-year plan refers to the outline of courses that a high school student will take to complete the necessary requirements for high school graduation, per PSS policy (shown below). The four-year plan allows students to personalize their high school experience, incorporate classes that will lead to their future college major and career, and ensure that they graduate on time. Student schedules include four blocks of instruction per day. Students can earn eight credits per year, earning one credit per block per semester.

A minimum of twenty-eight (28) credits are required for graduation from the 12<sup>th</sup> grade. Required courses constitute twenty-three (23) credits of the minimum credit and are as follows:

Required Courses	Credits
<b>English</b> - Composition I and II - Integrated literature and composition – 9 <sup>th</sup> - Integrated literature and composition – 10 <sup>th</sup> - Technical research/business writing – 11 <sup>th</sup> - American literature – 11 <sup>th</sup> - British literature- 12 <sup>th</sup>	8 credits
<b>Math</b> - Algebra I – 9 <sup>th</sup> - Geometry – 10 <sup>th</sup> - Algebra II – 11 <sup>th</sup>	6 credits
<b>Science</b> - Environmental science – 9 <sup>th</sup> - General biology – 10 <sup>th</sup> - Chemistry – 11 <sup>th</sup>	3 credits
<b>Social Studies</b> - NMI history – 10 <sup>th</sup> - US/World history – 11 <sup>th</sup> - US Government/economics – 12 <sup>th</sup>	3 credits
<b>Physical Education</b> 0.5 credit of physical education must include a health course. (JROTC may be substituted for 1 credit of Physical Education)	2 credits
<b>Language other than English</b>	1 credit



This plan includes the career pathway courses for the Construction Trades if a student chooses to take four CTE courses as their electives.

## Commonwealth of Northern Marianas Islands Plan of Study

### Cluster: Construction and Architecture Pathway: Construction Trades Carpentry

*This Career Pathway Plan of Study can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.*

EDUCATION LEVELS	GRADE	English/ Language Arts	Mathematics	Science	Social Studies	Other Required Courses	Recommended Career and Technical Courses	Electives Student Choice
		8 credits	6 credits	3 credits	3 credits	3 credits	4 credits	1 credit
<b>NOTE: Honors, Pre-AP, or AP courses offered in many courses.</b>								
Career Assessment: Identify an appropriate career assessment instrument at the middle school level used to help students and their parents plan for high school.								
<b>SECONDARY</b>	9	Composition I and Integrated Literature and Composition 9th	Algebra I	Environmental Science		PE I & Health	Course 1: NCCER Core and NCCER Level 1 Carpentry <a href="#">DE CA110 NMTI</a>	Arts: Band, Chorus, Drama, or Dance  CTE: Agriculture, Bookkeeping, Digital Video, General Business, Technology, Video Production, or Cooperative Education
	10	Composition II and Integrated Literature and Composition 10th	Geometry	General Biology	NMI History	PE II and ROTC	Course 2: NCCER Level 1-2 Carpentry <a href="#">DE CA310 NMTI</a>	Any Pre-AP Courses
	11	Technical Research/Business Writing And American Literature	Algebra II	Chemistry	US/World History	LOTE Chamorro or Carolinian	Course 3: NCCER Level 2 Carpentry and Cabinetmaking <a href="#">DE CA210 NMTI</a>	Additional AP Courses  Additional General Education Courses
	12	British Literature			US Government & Economics		Course 4: NCCER Level 3 Carpentry <a href="#">DE CA410 NMTI</a>	
High school courses in the pathway offered locally for college credit should be coded: DE (Dual Enrollment).								

<p><b>List related certifications/credentials offered locally:</b></p> <ul style="list-style-type: none"> <li>▪ OSHA 10</li> <li>▪ OSHA 30</li> <li>▪ NCCER Core</li> <li>▪ NCCER Level 1 Carpentry</li> <li>▪ NCCER Level 2 Carpentry</li> </ul>	<p><b>Additional Learning Opportunities:</b></p> <p>CTSO Organization(s):</p> <p><input type="checkbox"/> DECA      <input type="checkbox"/> FBLA      <input type="checkbox"/> FCCLA      <input type="checkbox"/> FFA.</p> <p><input type="checkbox"/> FEA      <input type="checkbox"/> HOSA      <input checked="" type="checkbox"/> SkillsUSA      <input checked="" type="checkbox"/> TSA</p> <p><input type="checkbox"/> AmeriCorp    <input type="checkbox"/> Educators Rising</p> <p><b>Work-Based Learning:</b></p> <p><input checked="" type="checkbox"/> Career Research    <input type="checkbox"/> Cooperative Education      <input checked="" type="checkbox"/> Internship</p> <p><input checked="" type="checkbox"/> Job Shadowing    <input checked="" type="checkbox"/> Service-Learning Project      <input checked="" type="checkbox"/> Mentorship</p> <p><input type="checkbox"/> Student Apprenticeship</p>
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<b>POSTSECONDARY</b>	<b>SAMPLE POSTSECONDARY PROGRAMS RELATED TO THIS CAREER PATHWAY</b>			
	<input type="checkbox"/> Guam Community College (GCC) <input type="checkbox"/> Northern Marianas College (NMC) <input checked="" type="checkbox"/> Northern Marianas Technical Institute (NMTI)			
	<b>Pathway</b>	<b>Associate Degree, College Certificate, or Apprenticeship</b>	<b>Bachelor's Degree</b>	<b>Postgraduate Degree</b>
Construction Trades Carpentry	Northern Marianas Technical Institute (NMTI) Construction Carpentry Cabinetmaking	Northern Marianas College: Engineering	N/A	

**SAMPLE – Occupations Relating to This Pathway:**

<http://www.careerclusters.org> and <http://www.cteresource.org/cpg/>

Carpenters, Electricians, Plumbers, Pipefitters, Steamfitters, Electrical Power line Installers and Repairers, First-line, Construction Trades Supervisors, Electrical Engineering Technicians, Civil Engineering Technicians, Construction Managers, Cost Estimators, Surveyors, Project Management, Project Inspection, OSHA Inspectors, Supply Chain and Materials.

## Knowledge, Skills, and Dispositions

Knowledge	Technical Skills	Employability Skills	Dispositions
<ul style="list-style-type: none"> <li>• Applied/Construction Math</li> <li>• Safety Principles</li> <li>• Resource Management</li> <li>• Interpreting Data</li> <li>• Measurements</li> <li>• Technical Skills</li> <li>• Mechanical</li> <li>• Building and Construction HVAC</li> <li>• Carpentry</li> <li>• Welding</li> <li>• Masonry</li> <li>• Electrical</li> <li>• Customer and Personal Service</li> <li>• Legal and Ethical Behavior</li> </ul>	<ul style="list-style-type: none"> <li>• OSHA Training</li> <li>• CPR</li> <li>• Building Code</li> <li>• First Aid</li> <li>• Material Science</li> <li>• Licensing &amp; Permitting</li> </ul>	<ul style="list-style-type: none"> <li>• Time Management</li> <li>• Interpersonal Skills</li> <li>• Communication</li> <li>• Problem Solving</li> <li>• Teamwork</li> <li>• Reliability</li> <li>• Attention to Detail</li> <li>• Flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Critical Thinker</li> <li>• Problem Solver</li> <li>• Dependable</li> <li>• Responsible</li> <li>• Cooperative</li> <li>• Honest</li> <li>• Principled</li> <li>• Empathetic and Compassionate</li> </ul>

# Work-Based Learning

Work-Based Learning (WBL) provides opportunities in which a student completes meaningful tasks in a workplace. Such programs are designed to prepare participants for full-time work and help them acquire the knowledge and skills they need to enter or advance in particular career fields. Work-based learning can be a component of a continuum of lifelong learning and skill development for a range of learners, including K-12 students, young adults, college students, and adult jobseekers.

WBL experiences reinforce the 21<sup>st</sup> Century Skills by allowing students to apply these skills in a real-world business or service-oriented work environment.

## Connecting WBL to 21st Century Skills

### Learning Skills:

- Critical Thinking: Develop a project to meet a community need or solve a community problem.
- Creativity: Publicize/advertise project, solve problems, and present findings.
- Collaboration: Work with community members, peers, and mentors.
- Communication: Write and present proposals; make requests and get permissions; publicize and present final project.

### Literacy Skills:

- Information: Access and evaluate information to use to solve problems.
- Media: Understand how and why media messages are constructed in a real-world setting; create media products to communicate a message.
- Technology: Use technology as a tool to research, organize, evaluate, and communicate information.

### Life Skills:

- Flexibility: Adapt to varied roles, job responsibilities, and schedules; incorporate feedback effectively; understand and balance diverse views.
- Leadership: Set and meet goals; prioritize, plan, and manage work to achieve the intended result.
- Initiative: Go beyond completion of assigned tasks to advance responsibility.
- Productivity: Monitor, define, prioritize, and complete tasks.

## 21st Century Skills

How today's students can stay competitive in a changing job market

### Learning Skills



### Literacy Skills



### Life Skills



- **Social Skills:** Know when it is appropriate to listen and when to speak; conduct oneself in a respectable, professional manner.

## **Work-Based Learning Framework**

WBL experiences offer students the opportunity to explore career options and develop critical academic and technical skills in collaboration with community and/or industry involvement. As such, students should have access to a series of structured WBL experiences that deepen their knowledge and allow them to apply classroom theories into practice. At an early level/grade, WBL experiences can help students develop a broad understanding and awareness of industries and possible careers that are available to them. Over time, these experiences narrow in focus as students find a good fit, learn what type of postsecondary education is necessary for success, and begin practicing the academic, technical and professional skills necessary to enter their identified careers.

### **Career Awareness**

Career awareness activities build knowledge of the variety of careers available and the role of postsecondary education; broaden student options. Some examples of career awareness activities include: guest speakers; career days or college and career fairs; field trips and workplace tours; videos or presentations about various professions; and opportunities to conduct informational interviews. Career awareness activities ideally lead to WBL experiences where students can deepen their knowledge of career pathways and begin applying skills learned in the classroom.

### **Career Exploration**

Career exploration experiences encourage students to develop personal career interests, a better understanding of pathways to a chosen career, and the workplace readiness skills needed to make informed decisions regarding secondary and postsecondary education and training. These experiences are typically of shorter duration.

### **Career Preparation**

Career preparation experiences deepen student knowledge and develop skills necessary for success in employment and postsecondary education. These experiences are recommended for students who have a clear goal of entering the workforce directly after high school or of enrolling in a closely related postsecondary training program. These experiences are structured primarily to give students extensive practice in applying fundamental technical and practical knowledge and skills in their chosen careers.

### **Career Training**

Career training consists of any activity that allows a student to train for employment and/or postsecondary education in a specific range of occupations.

CNMI Work-Based Learning Opportunities			
Type of Student WBL Experience	Purpose/Learning Outcome	Experience Defined by	WBL Student Experiences
<b>9th Grade Industry and Career Awareness</b>	<p>Build awareness of the variety of careers available and the role of post-secondary education; broaden student options.</p> <p>Student can articulate the type of postsecondary education and training required in the career field and its importance to success in that field.</p>	<ul style="list-style-type: none"> <li>• One-time interaction with partner(s), often for a group of students</li> <li>• Designed primarily by adults to broaden student’s awareness of a wide variety of careers and occupations</li> </ul>	<ul style="list-style-type: none"> <li>• Guest Speakers</li> <li>• Career Fair</li> </ul>
<b>10th Grade Career Exploration</b>	<p>Explore career options and postsecondary requirements for the purpose of motivation and to inform decision making in high school and postsecondary education.</p> <p>Student can give at least two examples of how the student’s individual skills and interests relate to the career field and/or occupations.</p>	<ul style="list-style-type: none"> <li>• One-time interaction with partner(s) for a single student or small group</li> <li>• Personalized to connect to emerging student interests</li> <li>• Student takes an active role in selecting and shaping the experience</li> <li>• Depth in particular career fields</li> <li>• Builds skills necessary for in-depth work-based learning</li> </ul>	<ul style="list-style-type: none"> <li>• Workplace/ Industry Tours</li> </ul>

CNMI Work-Based Learning Opportunities			
Type of Student WBL Experience	Purpose/Learning Outcome	Experience Defined by	WBL Student Experiences
<b>11th Grade Career Preparation</b>	<p>Apply learning through practical experience that develops knowledge and skills necessary for success in careers and postsecondary education.</p> <p>Student works effectively as a member of a team, with respect for diverse perspectives and strengths.</p>	<ul style="list-style-type: none"> <li>• Direct interaction with partners over time</li> <li>• Application of skills transferable to a variety of careers</li> <li>• Activities have consequences and value beyond success in the classroom</li> <li>• Learning for the student and benefit to the partner are equally valued</li> </ul>	<ul style="list-style-type: none"> <li>• Job Shadowing</li> </ul>
<b>12th Grade Career Training</b>	<p>Train for employment and/or postsecondary education in a specific range of occupations.</p> <p>Student demonstrates knowledge and skills specific to employment in a range of occupations in a career field.</p>	<ul style="list-style-type: none"> <li>• Interaction with partners over extended period of time</li> <li>• Benefit to the partner is primary and learning for student is secondary</li> <li>• Develop mastery of occupation specific skills.</li> <li>• Complete certifications or other requirements for a specific range of occupations</li> </ul>	<ul style="list-style-type: none"> <li>• Clinical Experience</li> <li>• Internship</li> <li>• Extended Job Shadow</li> </ul>

## Career and Technical Student Organization

### **SkillsUSA**

SkillsUSA is a United States career and technical student organization serving more than 395,000 high school, college, and middle school students and professional members enrolled in training programs in trade, technical, and skilled service occupations, including health occupations.

<https://www.skillsusa.org/>

### **Technology Student Association (TSA)**

The Technology Student Association is a national student organization created to develop skills in science, technology, engineering, and mathematics as well as business education. TSA aims to develop leadership, academic, and business management skills in the workplace among students and leaders within the community.

<https://tsaweb.org/>

## Industry Certification

Earning a nationally recognized industry certification allows students to demonstrate their technical skills and abilities and provides opportunities for employment. The [National Center for Construction Education and Research \(NCCER\)](#) was founded in 1996 to standardize training and provide industry-recognized credentials for those working in the construction, maintenance, and pipeline industries. It offers curriculum and assessments to both entry-level and journey-level craftsmen relevant to plants, manufacturers, oil and gas companies, and others in the industrial sector who are looking to become certified. NCCER certification means that the holder is highly trained, knowledgeable, and qualified to do the job anywhere in the country.

The mission of NCCER is to provide a safe, sustainable, and productive workforce to industry professionals. They do this by offering training, assessment, certification, and career development to construction and maintenance craft professionals. Students in the Construction Trades Carpentry pathway will have an opportunity to sit for exams in Carpentry and Cabinetmaking. Additionally, students will be able to complete training to be Occupational Safety and Health Administration (OSHA) authorized in the following areas: OSHA 10; OSHA 30; and HAZWOPER.



## Postsecondary Alignment

Earning college credit in high school helps students learn time management skills, earn scholarships for college, explore specific fields of study in depth, make room for diverse experiences, and save money. Students have an opportunity to earn early college credit with Northern Marianas Technical Institute in this program of study with the following alignment.

Postsecondary Website: <https://nmticnmi.org/>

CNMI PSS Course	Aligned NMC Course
Course 1: NCCER Core and NCCER Level I Carpentry	CA 110 Exploratory and Introduction to Carpentry
Course 2: NCCER Level I and II: Carpentry	CA 310 Carpentry: Residential Construction
Course 3: NCCER Level II: Carpentry and Cabinetmaking	CA 310 Carpentry: Residential Construction CA 210 Cabinetry
Course 4: NCCER Level 3: Carpentry/Concrete	CA 410 Carpentry-Residential and Commercial Construction

## Profile of CNMI PSS Graduate

(Pending completion from Office of Curriculum and Instruction)

# Recruitment & Marketing Action Plan Template

District Office or Program of Study Plan (POS):	POS Site:
District Office or Program of Study Plan (POS):	POS Site:
Marketing & Recruitment Team Members:	

Goal 1: Pathway Messaging <i>Action Steps</i>	Will this be an effective strategy for the CNMI?	Who will lead this?	Date to begin work	Date to complete work	What help do you need? From whom?
<p>Ensure consistent messaging to all audiences identified. Create website or recruitment brochure to include:</p> <ul style="list-style-type: none"> <li>Required course sequence;</li> <li>Eligibility and enrollment requirements;</li> <li>Related college pathways, what to expect in the pathway, and potential careers;</li> <li>Pictures, contact information, certifications; and</li> <li>Application requirements, and deadlines.</li> </ul>					
<p>Solidify program description and course sequence.</p> <ul style="list-style-type: none"> <li>Update course descriptions as needed.</li> </ul>					
<p>Create a video for your pathway or other visuals to use in webpages, parent meeting presentations, counselor professional development, board presentations, advisory committee meetings, and so forth.</p>					
<p>Update the school and/or district website with pathway information; make branding decisions about centralized design versus pathway-specific creativity.</p>					

Goal 1: Pathway Messaging <i>Action Steps</i>	Will this be an effective strategy for the CNMI?	Who will lead this?	Date to begin work	Date to complete work	What help do you need? From whom?
Create a poster of your pathway sequence for your counseling center and classrooms.					
Consider district and/or school branding and communication guidelines.					
Create a presentation for your counseling, teacher, and administrative teams.					
Other:					

Goal 2: Collaboration and Communication With Site and District Stakeholders <i>Action Steps</i>	Will this be an effective strategy for the CNMI?	Who will lead this?	Date to begin work	Date to complete work	What help do you need? From whom?
Set up a meeting to present the pathway to counseling and administrative teams to ensure strong understanding of pathways.					
Address any prerequisites or indicators for pathway recruitment.					
Ensure administrative and counseling teams are aware of any master scheduling needs of the pathway to ensure student participation and completion.					
Bring counselors, administrative staff, and board members to tour the pathway facilities or observe the class in action to help them better recruit.					

Goal 2: Collaboration and Communication With Site and District Stakeholders <i>Action Steps</i>	Will this be an effective strategy for the CNMI?	Who will lead this?	Date to begin work	Date to complete work	What help do you need? From whom?
Review forms that counselors give to students for course selection to ensure pathway courses are correctly identified and listed.					
Raise equity and access concerns with counselors to increase recruiting to special populations. Ensure that the underrepresented population being targeted is intentionally represented in all marketing forums.					
Present at the school board regarding pathway information and recruitment.					
Determine how students can be tagged in your student information system so that pathway-designated students are not inadvertently removed from the pathway course.					
Identify appropriate class caps and create a plan to address equity when limited seats are available.					
Other:					

Goal 3: Student and Parent Marketing <i>Action Steps</i>	Will this be an effective strategy for the CNMI?	Who will lead this?	Date to begin work	Date to complete work	What help do you need? From whom?
Engage with students for a pathway-related activity or information event.					
Distribute promotional materials (e.g., brochures, videos) to your middle schools and high schools.					
Host a virtual parent night at the high school to relay information about all pathways, give tours of pathway facilities, and highlight student work.					
Bring middle school students to the high school to tour pathway facilities and/or engage in a pathway activity.					
Identify newsletters, e-mails, and social media that go out to your district, schools, parents, and stakeholders, and highlight your program.					
Other:					