

**BILLINGS PUBLIC SCHOOLS**  
**HOUSE CONSTRUCTION**  
**Adoption Date March 31, 2001**

**MISSION STATEMENT**

The Career Center is dedicated to providing Billings area students with an education that explores and enhances vocational and academic skills to promote critical thinking, self-discipline, and responsible citizenship.

**BELIEF STATEMENTS**

1. We believe in an environment that fosters mutual respect and dignity.
2. We believe that students and faculty should maintain pride in their work to improve their performance.
3. We believe that academic skills lay the foundation for critical thinking, problem solving, mathematical and communication skills.
4. We believe in the integration of academic and career areas.
5. We believe in the importance of current technology, and its impact on the future.
6. We believe that students who are encouraged to set goals will gain confidence in their potential and ability to contribute to society.
7. We believe mutual support between school and community is an integral part of a students learning experience.

**PHILOSOPHY**

The Billings Career Center's Construction Program, in partnership with the Home Builders Association of Billings is dedicated to providing students with an education in residential house construction. The cooperative construction program gives Career Center students a unique opportunity to work hands-on and learn the knowledge and skills of the building construction trades. Students will experience a real job site as they work from the start to finish of one residential home. To ensure a relevant and comprehensive program, specific courses of instruction are developed in cooperation with representatives from the related trades and industry.

**LEARNING DOMAINS**

- I. Students will demonstrate an understanding of the workplace environment.**
- II. Students will demonstrate an understanding of residential framing**
- III. Students will demonstrate an understanding of HVAC systems.**
- IV. Students will demonstrate an understanding of plumbing systems.**
- V. Students will demonstrate an understanding of building inspections.**
- VI. Students will demonstrate an understanding of insulation.**
- VII. Students will demonstrate an understanding of dry walling.**
- VIII. Students will demonstrate an understanding of painting.**
- IX. Students will demonstrate an understanding of finish carpentry.**
- X. Students will demonstrate an understanding of floor coverings.**
- XI. Students will demonstrate an understanding of concrete finishing.**

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**Learner Objectives**

**I. Construction students will demonstrate an understanding of the workplace environment. (E)**

1. The learner will demonstrate a proficient knowledge of safety.
  - a. Follow job site rules and safety procedures.
  - b. Demonstrate the appropriate use of tools and equipment.
  - c. Practice the proper use of storage of building materials.
  - d. Discuss accident prevention in construction.
  - e. Work in a clean and organized area.
2. The learner will demonstrate appropriate work ethics. **(E)**
  - a. Use positive language.
  - b. Manage time efficiently.
  - c. Develop pride in their work.
  - d. Understand the importance of team work.
  - e. Develop leadership skills.
  - f. Create positive relationships.
  - g. Participate in VICA.
3. The learner will demonstrate working productively. **(I)**
  - a. Discuss housing standards within the industry.
  - b. Review the architectural design.
  - c. Define the requirements for acquiring a building permit.
  - d. Estimate the materials used in framing.
  - e. Contract sub-contractors for hire.

**II. Student will demonstrate an understanding of residential framing.**

4. The learner will understand the use of blueprints. **(E)**
  - a. Discuss housing standards within the industry.
  - b. Review the architectural design.
  - c. Define the requirements for acquiring a building permit.
  - d. Estimate the materials used in framing.
  - e. Contract sub-contractors for hire.
5. The learner will understand the procedures of building layout. **(E)**
  - a. Discuss the requirement of the site development.
  - b. Identify the building codes that apply to the setbacks, easements and other legal restriction.
  - c. Discuss the methods used to complete a dimensional take-off from a set of blueprints.
  - d. Demonstrate the proper use of layout tools, such as transits, plumb bobs, levels and framing squares.
  - e. Demonstrate mathematical layout techniques.
  - f. Install a sill plate according to specifications.
6. The learner will demonstrate knowledge of flooring systems. **(E)**
  - a. Lay out floor support members according to specifications.
  - b. Install the sub flooring using the proper adhesive and fastening methods according to code.
  - c. Straighten and align the rim and header joists to square and plumb.

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**II. Student will demonstrate an understanding of residential framing. (cont.)**

7. The learner will demonstrate knowledge of stairs. (R)
  - a. Stud run over rise mathematical calculations.
  - b. Apply standard stairs layout techniques into practice.
  - c. Cut practice stair stringers/jacks to specific total riser heights.
8. The learner will demonstrate knowledge of wall fabrication. (E)
  - a. Render layout on dimensional lumber using a sole plate and a top plate.
  - b. List the materials and specialty members needed to complete the wall package.
  - c. Construct wall to meet local codes.
  - d. Set walls in specific locations according to design.
  - e. Brace, plumb and string lining walls into the correct alignment.
9. The learner will demonstrate knowledge of deck framing. (I)
  - a. Review the blueprints and drawing a layout schematic.
  - b. Estimate the materials used in the deck.
  - c. Research the building codes that apply the deck construction.
  - d. Lay out the structural support system.
  - e. Build the floor system and the railing.
  - f. Attach exterior stairs to the deck.
10. The learner will demonstrate knowledge of roof framing. (I)
  - a. Identify the various styles of architecture.
  - b. Classify the roofing members and there nomenclature.
  - c. Calculate the relative slope and angle.
  - d. Install truss and rafters upon the exterior walls.
  - e. Apply the roof sheathing and the sub fascia.
11. The learner will demonstrate knowledge of roofing. (E)
  - a. Study the various roofing materials and their product design.
  - b. Calculate attic ventilation and application for the Career Center house.
  - c. Estimate materials and cost.
  - d. Installation of roofing materials.
12. The learner will demonstrate knowledge of windows and exterior doors. (I)
  - a. Study product type and design.
  - b. Identify the specifications and the recommended product installation.
  - c. Calculate rough opening.
  - d. Correct installation.
13. The learner will demonstrate knowledge of siding. (I)
  - a. Study product type and design.
  - b. Identify the specifications and the recommended product installation.
  - c. Estimate the amount and cost of materials.
  - d. Proper installation.

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**II. Student will demonstrate an understanding of residential framing. (cont.)**

14. The learner will demonstrate knowledge of soffit and fascia. (I)
  - a. Study product type and design.
  - b. Identify the specifications and the recommended product installation.
  - c. Estimate the amount and cost of materials.
  - d. Practice the proper manufacturing techniques.
  - e. Use the correct techniques during installation.

**III. Students will demonstrate an understanding of HVAC systems.**

15. The learner will demonstrate knowledge of heating systems. (R)
  - a. Discuss advantages and disadvantages of heating sources.
  - b. Review the components of a furnace.
  - c. Lay out the mechanical work of the current house.
  - d. Install a complete forced air system.
16. The learner will demonstrate knowledge of air conditioning systems. (I).
  - a. Review the components of cooling system.
  - b. Discuss layout and installation.
  - c. Work on the installation.

**IV. Students will demonstrate and understanding of plumbing systems. (I)**

17. The learner will demonstrate knowledge of plumbing (ground rough-ins). (R)
  - a. Review blueprints and discussing layout.
  - b. Identify local building codes.
  - c. Examine current systems.
  - d. Work on the installation of system.
18. The learner will demonstrate knowledge of rough-in plumbing. (R)
  - a. Review blueprints and discussing layout.
  - b. Identify local codes that apply to the design of the Career Centers house.
  - c. Examine current systems and drawing schematics.
  - d. Lay out drain and vent pipe locations.
  - e. Measure and cut PVC pipe.
  - f. Dry fit assigned systems together.
  - g. Inspect work and check for code violation.
  - h. Clean/prime and glue system together.
  - i. Pressure test the PVC system.
19. The learner will demonstrate knowledge of potable water systems. (R)
  - a. Review blueprints and discussing layout.
  - b. Practice the measure, cut and assembly of pipe.
  - c. Examine current systems and drawing schematics.
  - d. Work on the installation of the system.
  - e. Pressure test the system.

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**IV. Students will demonstrate and understanding of plumbing systems. (I) (cont.)**

20. The learner will demonstrate knowledge of finish plumbing. (R)
  - a. Read manufacturers recommendations on the installation of fixtures.
  - b. Inspect all fixtures and materials before installation.
  - c. Prep rooms for trim-out.
  - d. Assemble parts of the fixtures together.
  - e. Correct installation of fixtures.

**V. Student will demonstrate an understanding of building inspections. (I)**

21. The learner will demonstrate knowledge of residential house inspections. (I)
  - a. Inspect walls.
  - b. Inspect roof framing.
  - c. Inspect roofing.
  - d. Inspect windows and doors.
  - e. Inspect siding.
  - f. Inspect HVAC systems.
  - g. Inspect g plumbing systems.

**VI. Students will demonstrate an understanding of insulation. (E)**

22. The learner will demonstrate knowledge of wall insulation. (E)
  - a. Review the product types and calculating the R-values in accordance with the building codes.
  - b. Estimate the amount and the cost of insulation needed.
  - c. Application of fiberglass insulation.
23. The learner will demonstrate knowledge of attic insulation. (I)
  - a. Review the product types and calculating.
  - b. Estimate the amount and the cost of insulation needed.
  - c. Blow in the proper amounts of insulation.

**VII. Students will demonstrate an understanding of dry walling. (I)**

24. The learner will demonstrate knowledge of wall and ceiling dry walling. (R)
  - a. Review the product types and the applications.
  - b. Estimate the amount and the cost of drywall needed.
  - c. Study the methods used to hand drywall.
  - d. Review tool nomenclature and use.
  - e. Complete assigned jobs.
25. The learner will demonstrate knowledge of perfataping and texturing. (R)
  - a. Discuss the techniques of applying corners and returns.
  - b. Review the steps and methods used.
  - c. Complete assigned jobs
  - d. Prepare walls, windows, and doors with masking.
  - e. Seal the drywall with primers.
  - f. Apply different styles of texture.

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**VIII. Students will demonstrate an understanding of painting. (I)**

- 26. The learner will demonstrate knowledge of painting. (R)
  - a. Review product use and application.
  - b. Discuss safe and proper cleanup techniques.
  - c. Review the various methods of application.
  - d. Work on assigned jobs.

**IX. Student will demonstrate an understanding of finish carpentry. (E)**

- 27. The learner will demonstrate knowledge of door installation.
  - a. Review manufacturer's recommendations.
  - b. Discuss step-by-step hanging procedures.
  - c. Prep rough openings.
  - d. Work on assigned jobs.
- 28. The learner will demonstrate knowledge of trimming out. (R)
  - a. Review safe installation procedures and tool safety.
  - b. Discuss material characteristics and the proper applications.
  - c. Estimate linear footage and costs.
  - d. Review decorative design and architecture.
  - e. Work on assigned jobs.
- 29. The learner will demonstrate knowledge of cabinetry. (R)
  - a. Review kitchen cabinet blueprints.
  - b. Review appliance specifications.
  - c. Discuss manufacturer's recommendations.
  - d. Mark layout for cabinet location.
  - e. Work on assigned installation projects.

**X. Students will demonstrate an understanding of floor coverings. (I)**

- 30. The learner will demonstrate knowledge of vinyl flooring. (I)
  - a. Review the manufacturer's recommendation.
  - b. Cut and install under-layment.
  - c. Prep the floor surface.
  - d. Pattern out a room.
  - e. Cut the vinyl product to layout.
  - f. The application of adhesive and flooring.
- 31. The learner will demonstrate knowledge of ceramic tile. (I)
  - a. Review the manufacturers recommendations.
  - b. Cut and install under-lament.
  - c. Prep the floor surface.
  - d. Calculate the layout and design.
  - e. Apply the adhesive and setting the tile.
  - f. Grout the tile.

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**X. Students will demonstrate an understanding of floor coverings. (I) (cont.)**

32. The learner will demonstrate knowledge of carpet laying. (I)
  - a. Estimate the square yards.
  - b. The installation of tac strips and pat.
  - c. The layout and cutting procedures.
  - d. Review methods of installation.
  - e. Stretch and laying the floor coverings.
  - f. Stairs installation.

**XI. Students will demonstrate an understanding of concrete. (I)**

33. The learner will demonstrate knowledge of concrete stairs. (R)
  - a. Review stairs layout information.
  - b. Estimate the number of yards of concrete and cost.
  - c. Review the landscaping design and the architecture.
  - d. Research the codes that apply the exterior stairs.
  - e. Design the stairs and form installation.
  - f. Pour and stairs finishing.
  - g. Form removal and rubbing out the risers.
34. The learner will demonstrate knowledge of concrete flatwork. (I)
  - a. Review the building codes that apply to drainage and setbacks.
  - b. Estimate the number of yards of concrete and the cost.
  - c. Form and reinforce the concrete.
  - d. Pour, screeding and bull floating the concrete.
  - e. Finish and seal concrete.
35. The learner will demonstrate knowledge of concrete footing. (R)
  - a. Review the building codes and blueprints.
  - b. Estimate the number of yards of concrete and the cost.
  - c. Lay out forms to structural design.
  - d. Reinforce bar installation.
  - e. Review keyways, rebar ties, block outs and in beds.
  - f. Pouring and screeding.
36. The learner will demonstrate knowledge of foundation walls. (R)
  - a. Review the specification and the building codes.
  - b. Estimate the number of yards of concrete.
  - c. Produce an accurate layout onto the footings.
  - d. Install the wall forms.
  - e. Reinforce bar application.
  - f. Pour the concrete and set J-bolts.