

## **MODULE OVERVIEW**

This module introduces trainees to the principles, equipment, and methods used to perform the site layout tasks of distance measurement and differential leveling. It also covers the site layout responsibilities of individuals on site, understanding and using site plan drawings, and methods of job site communications.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three.*

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Describe the major responsibilities of the carpenter relative to site layout.
2. Convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.
3. Use and properly maintain tools and equipment associated with taping.
4. Use manual or electronic equipment and procedures to make distant measurements and perform site layout tasks.
5. Determine approximate distances by pacing.
6. Recognize, use, and properly care for tools and equipment associated with differential leveling.
7. Use a builder's level and differential leveling procedures to determine site and building elevations.
8. Record site layout data and information in field notes using accepted practices.
9. Check and/or establish 90-degree angles using the 3-4-5 rule.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Interpret a construction site/plot drawing and relate the man-made and topographical features and other project information to the layout and topography on the actual site.
2. Convert measurements given in feet and inches to equivalent decimal measurements stated in feet, tenths, and hundredths, and vice versa.
3. Properly use taping equipment and procedures to make distance and site layout measurements.
4. Determine the approximate distances by pacing.
5. Set up, adjust, and field test leveling instruments.
6. Use a builder's level, leveling rods, and differential leveling procedures to determine site and building elevations.
7. Record differential leveling data in field notes in accordance with accepted procedures.
8. Use differential leveling and distance measurement procedures to transfer elevations up a structure.
9. Check and/or establish 90-degree angles using the 3-4-5 rule.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen  
Transparencies  
Blank acetate sheets  
Transparency pens  
Whiteboard/chalkboard

Markers/chalk  
Pencils and scratch paper  
Appropriate personal protective equipment  
Site plot plans for selected construction sites  
Assortment of hubs, stakes, and laths

*continued*

Assortment of different colored flagging tape  
 Permanent markers for marking stakes  
 Field notebooks for recording data  
 2" × 4" or 2" × 6" ledger boards  
 2" × 4" batter boards  
 Nylon string  
 Calculator  
 100 foot steel tape  
 Range poles  
 Plumb bobs/gammon reels  
 Hand sight levels

Tension spring  
 Chaining pins  
 Builder's level  
 Transit level  
 Tripods  
 Laser level  
 Assortment of leveling rods and accessories  
 Quick Quizzes\*  
 Module Examinations\*\*  
 Performance Profile Sheets\*\*

\* Located in the back of this module

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use differential leveling equipment. Ensure that all trainees are briefed on field safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits. This module may require trainees use laser equipment. Ensure all trainees are briefed on laser safety before using laser equipment.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Construction Surveying and Layout: A Step-by-Step Engineering Methods Manual*, Wesley G. Crawford. West Lafayette, IN: Creative Construction Publishing, 1995.

*Surveying*, Jack McCormac. New York, NY: John Wiley & Sons, 1999.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover *Site Layout I: Distance Measurement and Leveling*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction to Site Layout</b>	
A. Introduction	_____
B. Building Plan Drawings	_____
C. Characteristics of Contour Lines	_____
D. Laboratory	_____
Trainees practice interpreting a site/plot drawing. This laboratory corresponds to Performance Task 1.	
<b>Session II. Site Control Points and Hand Signals</b>	
A. Site Control Points	_____
B. Communicating with Hand Signals	_____

**Sessions III and IV. Distance Measurements**

A. Distance Measurement Tools and Equipment \_\_\_\_\_

B. Measuring Distance by Taping \_\_\_\_\_

C. Laboratory \_\_\_\_\_

Trainees practice making measurements by taping. This laboratory corresponds to Performance Task 3.

D. Converting Distances \_\_\_\_\_

E. Laboratory \_\_\_\_\_

Trainees practice converting measurements. This laboratory corresponds to Performance Task 2.

F. Estimating Distances by Pacing \_\_\_\_\_

G. Laboratory \_\_\_\_\_

Trainees practice estimating distances by pacing. This laboratory corresponds to Performance Task 4.

**Session V. Differential Leveling Equipment**

A. Differential Leveling Tools and Equipment \_\_\_\_\_

B. Laboratory \_\_\_\_\_

Trainees practice setting up, adjusting, and field testing a leveling instrument. This laboratory corresponds to Performance Task 5.

**Sessions VI and VII. Basics of Differential Leveling**

A. Basics of Differential Leveling \_\_\_\_\_

B. Laboratory \_\_\_\_\_

Trainees practice using leveling equipment to determine site elevations. This laboratory corresponds to Performance Task 6.

C. Field Notes \_\_\_\_\_

D. Laboratory \_\_\_\_\_

Trainees practice recording differential leveling data in field notes. This laboratory corresponds to Performance Task 7.

**Session VIII. Leveling Applications**

A. Leveling Applications \_\_\_\_\_

B. Laboratory \_\_\_\_\_

Trainees practice using leveling procedures to transfer elevations. This laboratory corresponds to Performance Task 8.

C. Batter Boards \_\_\_\_\_

D. 3-4-5 Rule \_\_\_\_\_

E. Laboratory \_\_\_\_\_

Trainees practice checking or establishing 90-degree angles using the 3-4-5 rule. This laboratory corresponds to Performance Task 9.

**Session IX. Review and Testing**

A. Review \_\_\_\_\_

B. Module Examination \_\_\_\_\_

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing \_\_\_\_\_

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.



## **MODULE OVERVIEW**

This module introduces trainees to the principles, equipment, and methods used to perform the site layout task of angular measurement. It also covers the site layout responsibilities of individuals on site, understanding and using site plan drawings, and methods of job site communications.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four, Module 27401-08.*

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Perform calculations pertaining to angular measurements:
  - Use the Pythagorean theorem to determine unknown values.
  - Use right triangle trigonometry to determine unknown values.
  - Convert feet and inches to decimal feet, and vice versa.
  - Convert angular measurements stated in decimal degrees to degrees, minutes, seconds, and vice versa.
  - Convert azimuth to bearing, and vice versa.
  - Convert polar coordinates to rectangular coordinates, and vice versa.
  - Convert distance and direction into latitudes and departures.
2. Recognize, safely use, and properly care for site layout tools and instruments.
3. Describe the use of GPS devices for construction projects.
4. Lay out building lines using traditional and radial layout techniques.
5. Use trigonometric leveling techniques to determine unknown elevations.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Perform calculations pertaining to angular measurements.
2. Recognize, safely use, and properly care for site layout tools and instruments.
3. Read transit/theodolite scales and verniers.
4. Use a transit to lay out building lines using traditional and radial layout techniques.
5. Use trigonometric leveling techniques to determine unknown elevations.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Site plot plans

Rotating beam laser instrument

Electronic laser beam detector

Transits

Optical theodolite

Electronic transit and theodolite

Electronic distance measurement instruments  
(EDMIs)

Prisms

Total station

*continued*

Electronic filed books	100-foot steel tape
Direct elevation (Lenker) rod	Plumb bobs
Tripods	Quick Quizzes*
Building stakes	Module Examinations**
Scientific calculator	Performance Profile Sheets**

\* Located in the back of this module.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use leveling equipment. Ensure that all trainees are briefed on field safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits. This module may require trainees use laser equipment. Ensure all trainees are briefed on laser safety before using laser equipment.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Basic Surveying Technology*, Latest Edition. Stillwater, OK: The Mid-America Vocational Curriculum Consortium, Inc.

*Construction Surveying and Layout*, Latest Edition, Creative Construction Publishing, West Lafayette, IN.

EM 1110-1-1005, 1 January 2007. US Army Corps of Engineers. *Engineering and Design Control and Topographic Surveying*.

*Surveying*, Latest Edition, Prentice Hall, Upper Saddle River, NJ.

*Surveying Principles and Applications*, Latest Edition, Prentice Hall, Upper Saddle River, NJ.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 30 hours are suggested to cover *Site Layout II: Angular Measurement*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Sessions I and II. Introduction and the Mathematics of Angular Measurements</b>	
A. Introduction	_____
B. The Elements of Plane Geometry	_____
C. Working with Right Triangles	_____
D. Converting Between Measurement Systems	_____
E. Laboratory	_____
Trainees practice performing calculations pertaining to angular measurements. This laboratory corresponds to Performance Task 1.	

**Sessions III and IV. Laser Instruments**

- A. Laser Instruments
- B. Use and Selection of Laser Instruments
- C. Safety
- D. Calibration
- E. Laboratory

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Trainees practice setting up and operating laser instruments. This laboratory corresponds to Performance Task 2.

**Sessions V through VI. Site Layout Instruments**

- A. Site Layout Instruments and Equipment
- B. Reading Transit/Theodolite Scales
- C. Laboratory

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Trainees practice reading transit/theodolite scales and verniers. This laboratory corresponds to Performance Task 3.

- D. Initial Setup, Adjustment, and Checkout of a Transit/Theodolite
- E. Surveying and Site Layout Instrument Field Checks
- F. Laboratory

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Trainees practice setting up and operating site layout instruments. This laboratory corresponds to Performance Task 2.

**Session VII. Measuring Angles**

- A. Measuring Horizontal and Vertical Angles
- B. Measuring Traverse Angles

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**Sessions VIII and IX. Laying Out Building Foundation Lines**

- A. Laying Out Building Foundation Lines
- B. Laboratory

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Trainees practice using a transit to lay out building lines using traditional and radial layout techniques. This laboratory corresponds to Performance Task 4.

**Sessions X and XI. Leveling Applications**

- A. Trigonometric Leveling
- B. Line Distance and Direction Systems
- C. Laboratory

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Trainees practice using trigonometric leveling techniques to determine unknown elevations. This laboratory corresponds to Performance Task 5.

**Session XII. Review and Testing**

- A. Review
- B. Module Examination
  1. Trainees must score 70% or higher to receive recognition from NCCER.
  2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
- C. Performance Testing
  1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
  2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

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## **MODULE OVERVIEW**

This module covers commercial roofing materials and structures. It also describes the procedures for installing commercial roofing such as lap seam, standing seam, and built-up roofs.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 and 27402-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Describe the characteristics and properties of metals as they relate to roofing applications.
2. Identify the types of trusses and joists used in commercial roofing.
3. Demonstrate the installation of panels for a lap seam metal roof, including the preparation of eaves.
4. Demonstrate the installation of panels for a standing seam metal roof.
5. Describe the proper installation procedures for a built-up roof.
6. Demonstrate the installation of endlapped panels for a standing seam metal roof.
7. Demonstrate the sealing of a sidelap standing seam metal roof.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Prepare an eave installation.
2. Install panels for a lap seam roof.
3. Install endlapped standing seam metal roof panels.
4. Seal sidelap seams for a standing seam metal roof.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen	Open-web steel joists
Transparencies	Angle iron bridging
Blank acetate sheets	Smooth rod bridging
Transparency pens	Galvanized steel roof panels
Whiteboard/chalkboard	Aluminized steel roof panels
Markers/chalk	Corrugated lap seam roof metal panel
Pencils and scratch paper	Fasteners for a lap seam metal roof
Appropriate personal protective equipment	Tape sealant
Metal bars	Standing-seam metal roof panel
Angle iron samples	Standing-seam metal roof clips and fasteners
Metal channel samples	Reinforcing plates
Metal beam samples	Cinch straps
Glulam samples	Batten strips
LVL samples	Ridge covers

*continued*

Insulation boards  
Rolled roofing felt  
Stone aggregate  
Bitumen

Seaming tools  
Quick Quiz\*  
Module Examinations\*\*  
Performance Profile Sheets\*\*

\* Located in the back of this module.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to install roofing panels. Ensure that all trainees are briefed on field safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Principles and Practices of Commercial Construction*, Sixth Edition. 2001. Cameron K. Andres and Ronald C. Smith, Prentice Hall, Upper Saddle River, NJ.

*Reading Architectural Plans for Residential and Commercial Construction*, Fifth Edition. 2002. Ernest R. Weidhaas, Prentice Hall, Upper Saddle River, NJ.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Advanced Roof Systems*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction to Advanced Roofing Systems</b>	
A. Introduction	_____
B. Characteristics and Properties of Metal for Roofing	_____
C. Mechanical Properties of Metal	_____
<b>Session II. Roof Structures</b>	
A. Open-Web Steel Joists	_____
B. Stack Trusses	_____
C. Engineered Truss Systems	_____
D. Laminated Truss Systems	_____
<b>Sessions III and IV. Metal Roofing Systems: Lap Seam Roofs</b>	
A. Design Considerations	_____
B. Panel Coatings	_____
C. Lap Seam Metal Roof	_____
D. Laboratory	_____

Trainees practice preparing an eave installation and installing panels for a lap seam roof. This laboratory corresponds to Performance Tasks 1 and 2.

**Sessions V and VI. Metal Roofing Systems: Standing Seam Roofs**

A. Standing Seam Metal Roofs

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B. Laboratory

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Trainees practice installing endlapped standing seam metal roof panels and sealing the sidelap seams. This laboratory corresponds to Performance Tasks 3 and 4.

**Sessions VII. Built-Up Roofing and Drainage**

A. Built-Up Roofing

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B. Drainage Considerations

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**Session VIII. Review and Testing**

A. Review

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B. Module Examination

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1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

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1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.



## **MODULE OVERVIEW**

This module introduces the materials and installation techniques for paneling and wainscoting. It also covers various wall construction systems, including curtain walls and fire-rated walls.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27403-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Explain the different types of wall systems.
2. Explain the different types of wall finishes.
3. Explain the various methods of fireproofing a wall system.
4. Demonstrate the ability to install paneling with wainscoting.
5. Describe the process used in forming and installing tilt-up wall panels.
6. Identify various advanced wall systems and explain the techniques used in their construction.
7. Demonstrate the ability to build penetration firewalls and sound control walls per specifications.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Apply paneling with wainscoting.
2. Identify various advanced wall systems.
3. Construct firewalls in accordance with specifications.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen	Drywall compound
Transparencies	8d nails
Blank acetate sheets	Paneling nails
Transparency pens	Flat black paint
Whiteboard/chalkboard	General-purpose adhesive
Markers/chalk	Vapor barrier materials
Pencils and scratch paper	Tape measure
Appropriate personal protective equipment	Knife
Various types of board and sheet paneling	Straightedge
Wainscoting	Power saw
Drywall backer board	Hollow-ground blade
Partial wall for example installation	Cordless drill
Outlet box	Chalkline
Chalk	Steel square
Various firestopping materials	Power sander
Furring strips	Hammer

*continued*

Plane	Wire brush
Level	Sander
Combination square	Fine tooth panel saw
Miter box or miter saw	Adjustable wrench
Nailset	Screwdriver
Caulking gun	Quick Quiz*
Vertical saw	Module Examinations**
Keyhole saw	Performance Profile Sheets**
Scribe	

\* Located in the back of this module.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to construct walls. Ensure that all trainees are briefed on shop safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Gypsum Construction Handbook*. Chicago, IL: United States Gypsum Company.

*Principles and Practices of Heavy Construction*. Upper Saddle River, NJ: Prentice Hall.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 25 hours are suggested to cover *Advanced Wall Systems*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction, Safety, and Interior Paneling</b>	
A. Introduction	_____
B. Safety	_____
C. Interior Paneling	_____
<b>Sessions II through IV. Wainscot Paneling</b>	
A. Wainscot Paneling	_____
B. Laboratory	_____
Trainees practice installing wainscoting. This laboratory corresponds to Performance Task 1.	

**Sessions V and VI. Curtain Walls**

A. Curtain Walls

\_\_\_\_\_

B. Laboratory

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Trainees practice identifying advanced wall systems. This laboratory corresponds to Performance Task 2.

**Sessions VII through IX. Fire-Rated Construction**

A. Fire-Rated Construction

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B. Fireproofing and Protection

\_\_\_\_\_

C. Laboratory

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Trainees practice constructing firewalls. This laboratory corresponds to Performance Task 3.

**Session X. Review and Testing**

A. Review

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B. Module Examination

\_\_\_\_\_

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

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1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.





## **MODULE OVERVIEW**

This module provides extensive coverage of the materials and techniques used in finishing wooden staircases. It also covers stair systems used in commercial construction.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27404-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Identify the various stair parts.
2. Explain and demonstrate the procedure for cutting and installing various stair parts, including:
  - Mitered finish stringers
  - Mitered risers
  - Treads
  - Newel posts
  - Handrails
  - Balusters
3. Describe the method for finishing service stairs and main stairs, and demonstrate instructor-selected finishing for one or more of the following:
  - Open
  - Closed
  - Combination open/closed
  - L-shaped
  - U-shaped
4. Identify what materials can be used to build stairs for commercial construction.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Install open and closed service stair treads and risers.
2. Install treads and risers on open, closed, and/or combination open/closed main stairs.
3. Miter a finished stringer and risers.
4. Install a return nosing.
5. Install an over-the-post balustrade system.
6. Install a post-to-post balustrade system.
7. Lay out an elliptical stairway.
8. Install a preassembled stair rail system.
9. Install a false tread kit.

## MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Landing (balcony) newel
Transparencies	Gooseneck fitting
Blank acetate sheets	Balusters
Transparency pens	Baluster mounting screws or pins
Whiteboard/chalkboard	Quarterturn
Markers/chalk	Wood plugs
Pencils and scratch paper	Opening cap
Appropriate personal protective equipment	Rosette or half-newel
Samples of various styles of stair finish and balustrade components	Preassembled stair rail system
Typical stair and balustrade component installation kits	False tread kit
Photographs or drawings from architectural firms or building materials manufacturers that show specific types of stairways (both finished and under construction)	Hammer
Manufacturers' literature for various styles of rails, newel posts, landing newels, fittings, and blusters	Power compound miter saw
Stair installation kits, hardware, and tools commonly used for stair component installation	Nail set
Materials used to construct service stairs	Knife
Manufactured riser and tread templates	Framing square
Pre-drilled balustrade components	Power drill with bits
Finish nails	Screwdriver set
Handrail stock	Tape measure
Wood screws	Fabricated tread and rise templates
Handrail posts	Wrench set
Tread and riser stock	Wood file
Handrail brackets	Combination square
Cove molding	Torpedo level
Glue or construction adhesive	4" level
Paraffin wax	Wood chisel
Starting step	Reciprocating saw
Starting newel posts and mounting systems	Vise grip pliers
Tread nosing	Bar clamps
Lag bolts	Plumb bob
Rail bolts	Baluster spacing sphere
Volute	Baluster drilling guides
	Trammed bar and points
	Straightedge
	Tempered hardboard or plywood
	Quick Quizzes*
	Module Examinations**
	Performance Profile Sheets**

\* Located in the back of this module.

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## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to construct stairs. Ensure that all trainees are briefed on shop safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

*Balustrade Installation Guide S-0191-INST and LJ-0694-INST.* Bowerston, OH: L.J. Smith Stair Systems.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 25 hours are suggested to cover *Advanced Stair Systems*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction</b>	
A. Introduction	_____
B. Stair and Balustrade System Components	_____
<b>Sessions II through IV. Service Stairs</b>	
A. Open Service Stairs	_____
B. Closed Service Stairs	_____
C. Laboratory	_____
Trainees practice installing open and closed service stair risers.	
This laboratory corresponds to Performance Task 1.	
D. Laboratory	_____
Trainees practice installing open and closed service stair treads.	
This laboratory corresponds to Performance Task 1.	
<b>Sessions V through VII. Main Stairs</b>	
A. Main Stairs	_____
B. Laboratory	_____
Trainees practice installing return nosing. This laboratory corresponds to Performance Task 4.	
B. Laboratory	_____
Trainees practice mitering a finished stringer. This laboratory corresponds to Performance Task 3.	
C. Laboratory	_____
Trainees practice installing treads and risers on open, closed, and/or combination open/closed stairs. This laboratory corresponds to Performance Task 2.	
E. Laboratory	_____
Trainees practice installing a post-to-post balustrade system. This laboratory corresponds to Performance Task 6.	
F. Laboratory	_____
Trainees practice installing an over-the-post balustrade system. This laboratory corresponds to Performance Task 5.	

**Sessions VIII and IX. Other Types of Stairways**

A. Rough-Sawn Stairs

\_\_\_\_\_

B. Elliptical Stairs

C. Laboratory

\_\_\_\_\_

Trainees practice laying out an elliptical stairway. This laboratory corresponds to Performance Task 7.

D. Shop-Built Stairs

\_\_\_\_\_

E. Precut Stair Parts

\_\_\_\_\_

F. Laboratory

\_\_\_\_\_

Trainees practice installing a preassembled stair rail system. This laboratory corresponds to Performance Task 8.

G. Laboratory

\_\_\_\_\_

Trainees practice installing a false tread kit. This laboratory corresponds to Performance Task 9.

H. Stairs for Commercial Construction

\_\_\_\_\_

I. Winder Treads

\_\_\_\_\_

J. Exterior Wood Stairs

\_\_\_\_\_

**Session X. Review and Testing**

A. Review

\_\_\_\_\_

B. Module Examination

\_\_\_\_\_

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

\_\_\_\_\_

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

## **MODULE OVERVIEW**

This module explains the applications, proper use, and safety considerations for using light equipment, including aerial lifts, skid steer loaders, trenchers, generators, compressors, forklifts, and backhoe/loaders.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27405-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Identify and explain the operation and use of various pieces of light equipment, including:
  - Aerial lifts
  - Skid steer loaders
  - Trenchers
  - Generators
  - Compressors
  - Compactors
  - Forklifts
  - Backhoe
2. State the safety precautions associated with light equipment.
3. Operate selected items of light equipment.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate or simulate the procedures for the safe and proper operation of one or more types of selected light equipment, including:
  - Aerial lift
  - Skid steer loader
  - Trencher
  - Generator
  - Air compressor
  - Compactor
  - Fork lift
  - Backhoe/loader

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Aerial lift and operator's manual

Skid steer loader and operator's manual

*continued*

Trencher and operator's manual  
 Portable generators and accessories  
 Portable generator operator's manual  
 Portable air compressor and accessories  
 Portable air compressor operator's manual  
 29 CFR 1926.453  
 Compaction equipment

Compactor operator's manual  
 Forklift and operator's manual  
 Backhoe and operator's manual  
 Quick Quiz\*  
 Module Examinations\*\*  
 Performance Profile Sheets\*\*

\* Located in the Trainee Guide.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use various types of light equipment. Review hazards associated with each type of equipment and general precautions needed when operating light equipment.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

*Construction Equipment Guide*. Latest Edition. New York, NY: John Wiley & Sons.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Introduction to Light Equipment*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

<b>Topic</b>	<b>Planned Time</b>
<b>Session I. Introduction, Safety, Aerial Lifts, and Skid Steer Loaders</b>	
A. Introduction	_____
B. Safety Precautions	_____
C. Aerial Lifts	_____
D. Laboratory	_____
Trainees practice the safe operation of aerial lifts. This laboratory corresponds to Performance Task 1.	
E. Skid Steer Loaders	_____
F. Laboratory	_____
Trainees practice the safe operation of skid steer loaders. This laboratory corresponds to Performance Task 1.	

## Session II. Trenchers, Generators, and Air Compressors

A. Trenchers

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B. Laboratory

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Trainees practice the safe operation of trenchers. This laboratory corresponds to Performance Task 1.

C. Generators

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D. Laboratory

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Trainees practice the safe operation of generators. This laboratory corresponds to Performance Task 1.

E. Air Compressors

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F. Laboratory

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Trainees practice the safe operation of air compressors. This laboratory corresponds to Performance Task 1.

## Session III. Compaction Equipment, Forklifts, and Backhoes

A. Compaction Equipment

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B. Laboratory

---

Trainees practice the safe operation of compaction equipment. This laboratory corresponds to Performance Task 1.

C. Forklifts

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D. Laboratory

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Trainees practice the safe operation of forklifts. This laboratory corresponds to Performance Task 1.

E. Backhoes

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F. Laboratory

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Trainees practice the safe operation of backhoes. This laboratory corresponds to Performance Task 1.

## Session IV. Review and Testing

A. Review

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B. Module Examination

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1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

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1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.





## **MODULE OVERVIEW**

This module explains the safety requirements for welding and oxyfuel cutting. It identifies equipment and provides instruction for setting up, lighting, and using the equipment.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27406-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Identify and explain the parts of an oxyfuel cutting outfit.
2. State the safety rules for working with oxyfuel and welding equipment.
3. Identify the proper protective clothing and eye protection to be used in oxyfuel cutting and welding.
4. Explain the meaning of the terms backfire and flashback, describe how to avoid them, and what to do if they occur.
5. Match cutting torch tips to their applications.
6. Under the supervision of the instructor, demonstrate the ability to:
  - Set up equipment for oxyfuel cutting.
  - Turn on, light, and adjust the equipment to obtain a neutral flame.
  - Cut mild steel, stop, and restart the cut.
7. Identify the types of arc welding machines.
8. Identify the types of arc welding electrodes.
9. Interpret the meanings of the electrode classification codes.
10. Identify the factors to consider when selecting electrodes.
11. State the characteristics of a good weld.
12. Under the supervision of the instructor, demonstrate the ability to perform a basic welding procedure.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. Match cutting torch tips to their applications.
2. Set up equipment for oxyfuel cutting.
3. Turn on, light, and adjust the equipment to obtain a neutral flame.
4. Cut mild steel, stop, and restart the cut.

## MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Pneumatic slag chipper
Transparencies	Scaler
Blank acetate sheets	Flash arrestor
Transparency pens	Reverse flow check valve
Whiteboard/chalkboard	Grinding equipment
Markers/chalk	One-piece cutting torch
Pencils and scratch paper	Combination cutting torch and torch tips
Tape measure	Assorted acetylene, liquefied fuel gas, and special-purpose cutting torch tips
Soapstone	Welding electrodes
Penknife	MSDS for electrodes
Chipping hammer	Welding coupons
Friction lighter	Samples of welded metal
Tip manuals and tip manufacturer's charts	Cutting tips
Vendor cutting tip chart	Tip cleaners
Appropriate personal protective equipment, to include:	Tip drills
Safety goggles	Mechanical guide
Face shields	Cylinder cart
Welding helmets or shields	Motorized oxyfuel track cutter
Ear protection	Framing squares
Welding cap	Combination squares with protractor head
Leather jacket	Wrenches (torch, hose, and regulator)
Leather pants or chaps	Examples of good and bad cuts
Gauntlet-type welding gloves	Steel plate
Respirators	Thin (16 to 10 gauge)
Brass valves	Thick (¼ inch to 1 inch)
MSDS for cutting products	Steel pipe
Oxygen cylinder with cap	Vises and pipe jacks to hold steel for cutting
Fuel gas cylinder with cap	Safety video/DVD (optional)
Regulators (oxygen and fuel gas)	TV/VCR/DVD player (optional)
Hose set	Quick Quiz*
SMAW setup	Module Examinations**
Workpiece clamps	Performance Profile Sheets**
Wire brush	
Pliers	

\* Located in the Trainee Guide.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires that the trainees operate oxyfuel cutting and welding equipment. Ensure that trainees are briefed on fire and shop safety policies prior to performing any work. Emphasize the special safety precautions associated with the use of cylinders and oxyfuel cutting and welding equipment.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

American Welding Society: <http://www.aws.org>

Lincoln Electric Company: <http://www.lincolnelectric.com>

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 25 hours are suggested to cover *Welding*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction, Safety, and Oxyfuel Cutting Equipment</b>	
A. Introduction	_____
B. Safety	_____
C. Oxyfuel Cutting Equipment	_____
D. Laboratory	_____
Trainees practice matching torch tips to their applications. This laboratory corresponds to Performance Task 1.	
<b>Session II. Setting Up Oxyfuel Equipment</b>	
A. Setting Up Oxyfuel Equipment	_____
B. Laboratory	_____
Trainees practice setting up oxyfuel equipment. This laboratory corresponds to Performance Task 2.	
<b>Sessions III and IV. Oxyfuel Cutting</b>	
A. Oxyfuel Flames	_____
B. Shutting Off the Torch	_____
C. Laboratory	_____
Trainees practice lighting and adjusting the equipment to obtain a neutral flame. This laboratory corresponds to Performance Task 3.	
<b>Sessions V and VI. Performing Cutting Procedures</b>	
A. Performing Cutting Procedures	_____
B. Laboratory	_____
Trainees practice cutting mild steel. This laboratory corresponds to Performance Task 4.	
<b>Session VII. Welding Equipment</b>	
A. Shielded Metal Arc Welding	_____
B. Shielded Metal Arc Welding Electrodes	_____
<b>Sessions VIII and IX. Welding</b>	
A. The Welding Process	_____
B. Fillet Welds	_____
C. Additional Cutting and Welding Processes	_____
D. Welding Symbols	_____

## Session X. Review and Testing

A. Review

B. Module Examination

1. Trainees must score 70% or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

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## **MODULE OVERVIEW**

This module describes the materials and methods used to finish the interior and exterior of commercial buildings.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27407-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Identify materials and methods used to finish the interior of commercial buildings.
2. Identify materials and methods used to finish the exterior of commercial buildings.

## **PERFORMANCE TASKS**

Under the supervision of the instructor, the trainee should be able to do the following:

1. From a set of drawings, identify the finishes required for different surfaces.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen	Manufacturer's literature on drywall grid system ceilings
Transparencies	MSDSs for wood, cork, and bamboo flooring
Blank acetate sheets	Manufacturer's literature on wood, cork, and bamboo flooring
Transparency pens	Manufacturer's literature on exterior insulation and finish systems and direct-applied exterior finish systems
Whiteboard/chalkboard	Manufacturer's literature on concrete masonry units
Markers/chalk	Manufacturer's literature on stucco
Pencils and scratch paper	Quick Quiz*
Appropriate personal protective equipment	Module Examinations**
Project drawings which include a finish schedule	Performance Profile Sheets**
Manufacturers' literature on epoxy paints, fiberglass reinforced panels, and stone veneers	
Manufacturers' literature on paint additives	
Manufacturer's literature on Compasso™ trim	

\* Located in the back of this module

\*\* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## **SAFETY CONSIDERATIONS**

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*EIFS in Fairfax County*, <http://www.fairfaxcounty.gov/dpwes/construction/eifs.htm>

*Everyone's Guide to Instant Epoxy Expertise*, Paul Oman, <http://www.epoxyproducts.com>

*Controlling Pollutants and Sources*, <http://www.epa.gov/iaq/schooldesign/controlling.html>

*Keep Your Terrazzo Floors Beautiful*, Marie S. Hammer and Carolyn J. Combrink,  
<http://edis.ifas.ufl.edu/HE780>

*What Are Acoustic Ceilings?* <http://www.wisegeek.com/what-are-acoustic-ceilings.htm>

*Workshop Notes from Saturday, February 25, 2006 Presubmission Meeting and Terrazzo Workshop*,  
Phoenix Office Of Arts And Culture Terrazzo Public Art Projects, Donna Isaac and Raphael Ngotie,  
<http://phoenix.gov/ARTS/presub2.pdf>

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Commercial Finish Work*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Interior Finishing</b>	
A. Introduction	_____
B. Interior Walls	_____
C. Laboratory	_____
Trainees practice identifying the finishes required for different surfaces. This laboratory corresponds to Performance Task 1.	
D. Interior Ceilings	_____
E. Interior Floors	_____
<b>Session II. Exterior Finishing, Review, and Testing</b>	
A. Exterior Walls	_____
B. Awnings, Canopies, and Porticos	_____
C. Review	_____
D. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
E. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

## **MODULE OVERVIEW**

This module explains the necessary considerations and procedures to prepare a site for commercial construction.

## **PREREQUISITES**

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; Carpentry Level Three; and Carpentry Level Four*, Modules 27401-08 through 27408-08.

## **OBJECTIVES**

Upon completion of this module, the trainee will be able to do the following:

1. Discuss reasons for stormwater protection and erosion and sedimentation control.
2. Name ways to prevent erosion and sedimentation.
3. List items that need to be addressed in the site utilization plan.
4. State methods for ensuring that crane work is performed safely.
5. Identify methods used to mitigate water problems at a work site.

## **PERFORMANCE TASKS**

This is a knowledge-based module. There are no performance tasks.

## **MATERIALS AND EQUIPMENT LIST**

Overhead projector and screen	Army Corps of Engineers literature on disposal of demolition debris
Transparencies	Sample Stormwater Pollution Prevention Plan
Blank acetate sheets	Concrete calculator
Transparency pens	One-Call cards
Whiteboard/chalkboard	Soil samples
Markers/chalk	Typical construction site signs
Pencils and scratch paper	Quick Quiz*
Appropriate personal protective equipment	Module Examinations**
Sample site/plot drawings	Performance Profile Sheets**
<i>EPA Guide to Developing a Stormwater Pollution Prevention Plan</i>	

\* Located in the back of this module.

\*\*Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## **SAFETY CONSIDERATIONS**

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Construction Surveying and Layout*. 1995. Wesley G. Crawford. West Lafayette, IN: Creative Construction Publishing.

*International Building Code*. 2000. International Code Council. Kaplan AEC Engineering.

*Clean Water Act? What's That?*, Janice Kaspersen, *Erosion Control* magazine, July/August 2000, Forester Communications, Inc.

*How to Effectively Manage Your Construction Site and Survive Regulatory Scrutiny, Grading and Excavation Contractor* magazine. July/August 2005. Carol L. Forrest. Santa Barbara, CA: Forester Communications, Inc.

*Using Lime for Soil Stabilization and Modification*, National Lime Association website, <http://www.lime.org>, March 2001.

*Developing Your Stormwater Pollution Prevention Plan – A Guide for Construction Sites*, EPA document 833-R-060-04, The Environmental Protection Agency, May 2007.

*Standards for Construction Site Fire Safety*; UN-024-2/6, <http://www.unidocs.org>

*Construction Site Security*, City of Scottsdale, Arizona, October 2004, <http://www.scottsdaleaz.gov>

*Temporary Stream and Wetland Crossing Options for Forest Management*, Charles R. Blinn, Rick Dahlman, Lola Hislop, and Michael A. Thompson, USDA Forest Service, North Central Research Station, General Technical Report NC-202, November 30, 1998.

## TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Site Preparation*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	Planned Time
<b>Session I. Introduction and Environmental Concerns</b>	
A. Introduction	_____
B. Environmental Concerns	_____
C. Characteristics of Contour Lines	_____
D. Laboratory	_____
Trainees practice interpreting a site/plot drawing.	
<b>Session II. Site Control</b>	
A. Setting Up the Site	_____
B. Site Safety and Security	_____
<b>Session III. Utilities; Review and Testing</b>	
A. Utilities	_____
B. Review	_____
C. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	



## **COURSE OVERVIEW**

This course introduces the basic leadership skills a crew leader needs in order to supervise a crew. Trainees will learn about:

- The construction industry today
- Construction organization
- Team building
- Gender and minority issues
- Communication
- Motivation
- Problem solving
- Decision making
- Safety
- Project control

## **PREREQUISITES**

There are no prerequisites for this course.

## **LEARNING OBJECTIVES**

Upon completion of this course, the trainee will be able to:

1. Discuss current issues and organizational structure in the construction industry today.
2. Understand and incorporate leadership skills into work habits, including communication, motivation, team building, problem solving, and decision-making skills.
3. Demonstrate an awareness of safety issues, including the cost of accidents and safety regulations.
4. Identify a supervisor's typical safety responsibilities.
5. Show a basic understanding of the planning process, scheduling, and cost and resource control.

## **PERFORMANCE OBJECTIVES**

This is a knowledge-based module—there is no performance profile examination.

## **NCCER STANDARDIZED CRAFT TRAINING PROGRAM**

The National Center for Construction Education and Research (NCCER) provides a standardized national program of accredited craft training. Key features of the program include instructor certification, competency-based training, and performance testing. The program provides trainees, instructors, and companies with a standard form of recognition through a National Craft Training Registry. The program is described in full in the *Guidelines for Accreditation*, published by the NCCER. For more information on standardized craft training, contact the NCCER by writing us at 13614 Progress Boulevard, Alachua, FL 32615, calling 1-800-NCCER20, or e-mailing [info@NCCER.org](mailto:info@NCCER.org). More information may be found at our website at [www.nccer.org](http://www.nccer.org).

## **NOTE TO INSTRUCTORS**

If you are training under an Accredited NCCER Sponsor, note that you may be eligible for dual credentials for successful completion of Introductory Skills for the Crew Leader. When submitting the Form 200, indicate completion of the two module numbers that apply to Introductory Skills for the Crew Leader – MT101 (from NCCER's Contren® Management Series) and 04406-09 (from NCCER's Sheet Metal Level Four) and transcripts will be issued to you accordingly.

## HOW TO USE THIS ANNOTATED INSTRUCTOR'S GUIDE

Each page presents two sections of information. The larger section displays each page exactly as it appears in the Trainee Guide. The narrow column ties suggested trainee and instructor actions to each page and provides icons to call your attention to material, safety, audiovisual, or testing requirements. The bottom of each page includes space for your notes.

Review questions and participant exercises are found periodically throughout the Trainee Guide in order for the trainees to test their knowledge. An answer key to these review questions and suggested answers for the participant exercises are located at the back of this Annotated Instructor's Guide. After trainees complete their review questions, go over the correct answers with them to be sure they understand all concepts.

## PREPARATION

Before teaching this course, you should review the Course Outline, Learning Objectives, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

## MATERIALS AND EQUIPMENT LIST

### Materials:

Transparencies

Markers/chalk

Calculator

Pencils/scratch paper

Example of OSHA Log Books

Examples of MSDS Sheets

Copies of Module Examinations\*

### Equipment:

Overhead projector

Screen (or large blank wall)

Whiteboard/chalkboard

\* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code..

## ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

*Construction Contracting*, 1994. Richard H. Clough and Glenn A. Sears. New York: John Wiley & Sons.

*Construction Management*, 1997. Daniel W. Halpin and Ronald W. Woodhead. New York: John Wiley & Sons.

*Construction Operations Manual of Policies and Procedures*, 2000. Andrew Civitello Jr. New York: McGraw-Hill.

*Professional Construction Management*, 1991. Donald S. Barrie, Boyd C. Paulson (Contributor). New York: McGraw-Hill.

## TEACHING TIME FOR THIS COURSE

An outline for use in developing your lesson plan is presented below. This course is designed to be taught in one of two formats: two 8-hour sessions (such as all-day workshops) or eight 2-hour sessions (such as after-work training seminars). Because of this, each session below has a suggested time period of two hours. If leading 8-hour sessions, simply teach four of these 2-hour sessions both times your class meets. All instructors will need to adjust the time required for participant activities and testing based on class size and resources.

Topic	Planned Time
<b>Session I. Orientation to the Job</b>	
A. Overview of the Construction Industry	_____
1. Historical Importance of the Construction Industry	_____
2. Growth and Economics of the Construction Industry	_____
3. Changing Values of Workers	_____
B. The Construction Industry Today	_____
1. Training	_____
2. New Technology	_____
C. Gender and Minority Issues	_____
1. Communication Styles of Men and Women	_____
2. Language Barriers	_____
3. Cultural Differences	_____
4. Sexual Harassment	_____
5. Gender and Minority Discrimination	_____
D. Construction Projects	_____
E. The Construction Organization	_____
1. Division of Responsibility	_____
2. Authority and Responsibility	_____
3. Job Descriptions	_____
4. Policies and Procedures	_____
<b>Session II. Leadership Skills, Part One</b>	
A. Introduction to Supervision	_____
B. The Shift in Work Activities	_____
C. Becoming a Leader	_____
1. Characteristics of Leaders	_____
2. Functions of a Leader	_____
3. Leadership Styles	_____
4. Ethics in Leadership	_____
D. Communication	_____
1. Verbal Communication	_____
2. Non-Verbal Communication	_____
3. Written or Visual Communication	_____
4. Communication Issues	_____
E. Motivation	_____
1. Employee Motivators	_____
2. Motivating Employees	_____



- C. An Overview of Planning
  - 1. What is Planning? \_\_\_\_\_
  - 2. Why Plan? \_\_\_\_\_
- D. Stages of Planning
  - 1. Pre-Construction Planning \_\_\_\_\_
  - 2. Construction Planning \_\_\_\_\_
- E. The Planning Process
  - 1. Establishing a Goal \_\_\_\_\_
  - 2. Identifying the Work to be Done \_\_\_\_\_
  - 3. Determining Tasks \_\_\_\_\_
  - 4. Communicate Responsibilities \_\_\_\_\_
  - 5. Follow-Up \_\_\_\_\_
- F. Planning Resources
  - 1. Planning Materials \_\_\_\_\_
  - 2. Planning Equipment \_\_\_\_\_
  - 3. Planning Tools \_\_\_\_\_
  - 4. Planning Labor \_\_\_\_\_
- G. Ways to Plan \_\_\_\_\_

**Session VII. Project Control, Part Two**

- A. Estimating \_\_\_\_\_
- B. Scheduling
  - 1. The Scheduling Process \_\_\_\_\_
  - 2. Bar Charts \_\_\_\_\_
  - 3. Network Schedule \_\_\_\_\_
  - 4. Short-Interval Production Scheduling \_\_\_\_\_
  - 5. Updating a Schedule \_\_\_\_\_

**Session VIII. Project Control, Part Three**

- A. Cost Awareness And Control
  - 1. Categories of Costs \_\_\_\_\_
  - 2. Field Reporting System \_\_\_\_\_
  - 3. Supervisor's Role in Cost Control \_\_\_\_\_
- B. Resource Control
  - 1. Control \_\_\_\_\_
  - 2. Materials Control \_\_\_\_\_
  - 3. Equipment Control \_\_\_\_\_
  - 4. Tools Control \_\_\_\_\_
  - 5. Labor Control \_\_\_\_\_
- C. Production and Productivity \_\_\_\_\_
- D. Summary
  - 1. Summarize Course \_\_\_\_\_
  - 2. Answer Questions \_\_\_\_\_
- E. Module Examination
  - 1. Trainee must score 70% or higher to receive recognition from the NCCER. \_\_\_\_\_
  - 2. Record testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor. \_\_\_\_\_

