

MODULE OVERVIEW

This module describes the activities involved in organizing and implementing the construction of high-rise buildings. It focuses on the masonry construction techniques used in high-rise construction. Safety and logistics are emphasized.

PREREQUISITES

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

OBJECTIVES

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

1. Recognize and explain the use of high-rise construction equipment.
2. Identify construction sequence in high-rise construction.
3. State the safety procedures in high-rise construction.
4. Safely work with materials handling equipment in high-rise construction.
5. Properly put on a safety harness, lanyard, and lifeline.
6. Demonstrate hand signals used for lifting materials.

PERFORMANCE TASKS

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

1. Properly don a safety harness, lanyard, and lifeline.
2. Demonstrate hand signals used for lifting materials.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	<i>ASME B30.5 Consensus Standard</i>
Transparencies	Ground fault circuit interrupter
Blank acetate sheets	Safety harness
Transparency pens	Lanyard
Whiteboard/chalkboard	Lifeline
Markers/chalk	Television
Pencils and scratch paper	VCR/DVD player
Appropriate personal protective equipment	Module Examinations*
Walkie-talkies	Performance Profile Sheets*
Throat microphone	

*Located in the Test Booklet.

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.

Building Block Walls—A Basic Guide, National Concrete Masonry Association, Herndon, VA, 1988.

Concepts in Building Fire Safety, John Wiley and Sons, New York, NY, 1978.

Masonry Design and Detailing—For Architects, Engineers and Contractors, Fourth Edition, Christine Beall, McGraw-Hill Publishing, New York, NY, 1997.

The ABCs of Concrete Masonry Construction, Videotape 13:34 minutes, Portland Cement Association, Skokie, IL, 1980.

The Application of Reinforced Concrete Masonry Loadbearing Walls in Multistory Structures, National Concrete Masonry Association, Herndon, VA, 1973.

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 17½ hours are suggested to cover *Masonry in High-Rise Construction*. 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
Session I. Introduction and High-Rise Construction	
A. Introduction	_____
B. Construction Sequences	_____
C. Building Design	_____
D. Exterior Walls	_____
E. Interior Walls	_____
Sessions II and III. Materials Handling	
A. Working around Cranes	_____
B. Working around Material Hoists	_____
C. Moving and Stocking Materials	_____
D. Elevated Workstations and Disposal Chutes	_____
E. Laboratory – Trainees practice using hand signals used for lifting materials. This laboratory corresponds to Performance Task 2.	_____
Sessions IV through VI. Personal Protection	
A. Work Area Safety	_____
B. Fall Protection and Falling Objects	_____
C. Laboratory – Trainees practice donning a safety harness, lanyard, and lifeline. This laboratory corresponds to Performance Task 1.	_____
D. Personnel Lifts	_____
E. Controlled Access Zones	_____
Session VII. Review, Module Examination, and Performance Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent 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 describes the many specialized materials and techniques used in the masonry trade. It covers properties and work requirements for such materials as natural and cultured stone, acid brick, refractory brick, structural tile, and glass block. It presents techniques for working under cold- and hot-weather conditions and explains construction of various types of masonry sound barriers.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Masonry Level One; Masonry Level Two; and Masonry Level Three, Module 28301-05.*

OBJECTIVES

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

1. Explain the various techniques used to provide adequate protection during hot- and cold-weather masonry construction.
2. Describe all-weather construction techniques.
3. Describe techniques for surface-bonding mortar.
4. Demonstrate techniques for construction of stone walls and other stone building surfaces.
5. Demonstrate basic knowledge of various building materials such as glass block and refractory brick.

PERFORMANCE TASKS

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

1. Complete two of the following tasks selected by the instructor:
 - Construct a 4' × 4' rubble stone wall dry-stacked.
 - Construct a 4' × 4' wall of glazed masonry units.
 - Construct a 4' × 4' wall of glass blocks.
 - Construct a 4' × 4' wall or floor of refractory brick.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Sledgehammer
Transparencies	Face hammer
Blank acetate sheets	Mash hammer
Transparency pens	Bush hammer
Whiteboard/chalkboard	Pitching chisel
Markers/chalk	Toothed chisel
Pencils and scratch paper	Regular chisel
Appropriate personal protective equipment	Wooden cutting bench
Admixtures, including:	Masonry tools
Set accelerator	Slickers
Air-entraining admixture	Various types of acid brick
Calcium chloride	Various types of refractory brick
Masonry units	Manufacturer's literature on refractory bricks
Samples of natural stone	Refractory mortar
Samples of manufactured stone	

Manufacturer’s literature on refractory mortar	Mortar used with structural clay tiles
<i>Copies of ASTM C126</i>	Various glass blocks
<i>Copies of ASTM C652</i>	Adhesives used with glass block
Various structural clay tiles	Module Examinations*
Manufacturer’s literature on structural clay tiles	Performance Profile Sheets*

*Located in the Test Booklet.

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. This module requires that trainees work with different types of masonry units, mortars, and adhesives. Ensure that all trainees are briefed on shop safety procedures and first aid.

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.

Building Block Walls—A Basic Guide, National Concrete Masonry Association, Herndon, VA, 1988.

Concrete Masonry Handbook, Fifth Edition, W.C. Panerese, S.K. Kosmatka, and F.A. Randall, Jr., Portland Cement Association, Skokie, IL.

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 60 hours are suggested to cover *Specialized Materials and Techniques*. 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
Session I. Introduction and Weather Considerations	
A. Introduction	_____
B. Weather Considerations	_____
Session II. Surface Bonding and Surface Coatings	
A. Surface Bonding	_____
B. Surface Coatings	_____
Sessions III through VI. Stone	
A. Materials and Preparation	_____
B. Coursing and Laying	_____
C. Form-Based Stonemasonry	_____
D. Cultured Stone Installation	_____
E. Laboratory – Trainees practice constructing a dry-stacked rubble stone wall. This laboratory corresponds to Performance Task 1.	_____

Sessions VII through IX. Acid Brick

- A. Uses of Acid Brick
- B. Acid Brick Materials
- C. Laying an Acid Brick Floor

Sessions X through XIII. Refractory Brick

- A. Refractory Brick
- B. Laying Refractory Brick
- C. Curing and Heat-Up
- D. Laboratory – Trainees practice constructing a wall or floor of refractory brick. This laboratory corresponds to Performance Task 1.

Sessions XIV through XVIII. Glazed Masonry Units

- A. Properties
- B. Bonding and Coursing
- C. Laying Structural Glazed Tile
- D. Laboratory – Trainees practice constructing a wall of glazed masonry units. This laboratory corresponds to Performance Task 1.

Sessions XIX through XXII. Glass Block

- A. Applications and Uses
- B. Variations
- C. Detail Procedures
- D. Laboratory – Trainees practice constructing a wall of glass blocks. This laboratory corresponds to Performance Task 1.

Session XXIII. Sound Barrier Walls

- A. Pier and Panel Barrier Walls
- B. Pilaster and Panel Barrier Walls
- C. Cantilever Walls

Session XXIV. Review, Module Examination, and Performance Testing

- A. Review
- B. Module Examination
 - 1. Trainees must score 70 percent 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 most common problems that appear in masonry structures and describes various techniques that can be used to repair them. Repair activities include tuckpointing, brick replacement, crack sealing, waterproofing, and stain removal.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Masonry Level One; Masonry Level Two; and Masonry Level Three*, Modules 28301-05 and 28302-05.

OBJECTIVES

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

1. Recognize signs of deterioration in masonry structures.
2. Describe the causes of efflorescence, cracking, and faulty mortar joints.
3. Describe the procedures for preventing and correcting efflorescence, cracking, and faulty mortar joints.
4. Describe the procedures for preventing and correcting water damage in basements.
5. Describe the procedures for rebuilding fireplaces.
6. Replace a damaged brick in a wall.
7. Repair mortar joints.

PERFORMANCE TASKS

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

1. Replace a damaged brick in a wall.
2. Repair mortar joints in a brick wall by tuckpointing.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	MSDSs for cleaning compounds
Transparencies	Acid brushes
Blank acetate sheets	Portable pressure washer or manufacturer's literature
Transparency pens	Portable sand blaster or manufacturer's literature
Whiteboard/chalkboard	Various types of gloves
Markers/chalk	Wire brush
Pencils and scratch paper	Toothing chisel
Appropriate personal protective equipment	Drill
Fiber-optic boroscope	Stiff brush
Plugging chisel	Television
Tuckpoint grinder	VCR/DVD player
Mortar	Module Examinations*
Bricks	Performance Profile Sheets*
Basic masonry tools	
Cleaning solution	

* 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 trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require trainees to visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits. This module requires that trainees work with chisels, tuckpoint grinders, bricks, and mortar. Ensure that all trainees are briefed on shop safety procedures, eye protection, and first aid.

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.

Building Block Walls—A Basic Guide, National Concrete Masonry Association, Herndon, VA, 1988.

Masonry Design and Detailing—For Architects, Engineers and Contractors, Fourth Edition, Christine Beall, McGraw-Hill Publishing, New York, NY, 1997.

Pocket Guide to Brick Construction, Brick Institute of America, Reston, VA, 1990.

Principles of Brick Masonry, Brick Institute of America, Reston, VA, 1989.

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 15 hours are suggested to cover *Repair and Restoration*. 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
Session I. Introduction, Inspection, and Problem Solving	
A. Introduction	_____
B. Inspection and Problem Solving	_____
1. Types of Deterioration and Their Causes	_____
2. Inspection of Existing Masonry Structures	_____
3. Inspection Checklist	_____
Session II. Repair Techniques	
A. Tuckpointing	_____
B. Laboratory – Trainees practice repairing mortar joints in a brick wall by tuckpointing. This laboratory corresponds to Performance Task 2.	_____
C. Efflorescence Removal	_____
D. Crack Repair	_____
Session III. Restoration of Brick Walls	
A. Cleaning Techniques	_____
B. Staining Problems	_____
C. Removing Old Paint	_____
D. Replacing Bricks and Mortar Joints	_____
E. Laboratory – Trainees practice replacing a damaged brick in a wall. This laboratory corresponds to Performance Task 1.	_____
Session IV. Repair of a Foundation Wall	
A. Repairing Water Intrusion	_____
B. Repairing Cracks and Localized Problems	_____

Session V. Repairing and Rebuilding Chimneys and Fireplaces

- A. Repairing Chimneys
- B. Repairing Fireplaces

Session VI. Review, Module Examination, and Performance Testing

- A. Review
- B. Module Examination
 - 1. Trainees must score 70 percent 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 provides information about the format and content of commercial drawings and their use in conveying specific construction requirements. It describes the standard format for specifications.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Masonry Level One; Masonry Level Two; and Masonry Level Three*, Modules 28301-05 through 28103-05.

OBJECTIVES

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

1. Recognize the difference between commercial and residential construction drawings.
2. Identify the basic keys, abbreviations, and other references contained in a set of commercial drawings.
3. Accurately read a set of commercial drawings.
4. Explain basic construction details and concepts employed in commercial construction.

PERFORMANCE TASKS

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

1. Identify and document the design and location of ten items contained in a set of commercial drawings (the drawings and items will be chosen by the instructor).
2. Calculate the floor area of each room in a floor plan.

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

Set of commercial drawings

Quick Quiz*

Module Examinations**

Performance Profile Sheets**

* Located in the back of this module.

** Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures.

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.

Architectural Graphic Standards, Eighth Edition, The American Institute of Architects, John Wiley & Sons, New York, NY, 1988.

Basics for Builders: Plan Reading & Material Takeoff, Wayne J. DelPico, R.S. Means Company, Inc., Kingston, MA, 1994.

Building Block Walls—A Basic Guide, National Concrete Masonry Association, Herndon, VA, 1988.

Principles of Brick Masonry, Brick Institute of America, Reston, VA, 1989.

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 12½ hours are suggested to cover *Commercial Drawings*. 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
Session I. Introduction and Drawing Requirements and Contents	
A. Introduction	_____
B. Requirements for Commercial Plans	_____
C. Commercial Plan Contents	_____
Sessions II and III. Reading and Understanding Drawings I	
A. Architectural Drawings	
B. Laboratory – Trainees practice calculating the area of each room in a floor plan in a set of commercial drawings. This laboratory corresponds to Performance Task 2.	_____
C. Structural Drawings	_____
Session IV. Reading and Understanding Drawings II and Written Specifications	
A. Mechanical Drawings	_____
B. Electrical Drawings	_____
C. Laboratory – Trainees practice identifying and documenting the design and location of ten items contained in a set of commercial drawings. This laboratory corresponds to Performance Task 1.	_____
D. Written Specifications	_____
Session V. Review, Module Examination, and Performance Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent 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 covers the basic procedures for doing takeoffs and estimating quantities of masonry material. Several different methods are described.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Masonry Level One; Masonry Level Two; and Masonry Level Three*, Modules 28301-05 through 28304-05.

OBJECTIVES

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

1. Explain and apply basic materials estimating procedures for concrete block and brick construction.
2. Explain and apply basic estimating procedures for reinforcements, ties, and other materials.
3. Explain and apply procedures for estimating quantities of mortar and mortar materials.

PERFORMANCE TASKS

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

1. Estimate masonry quantities and volumes from a set of commercial drawings.
2. Complete a set of estimating worksheets.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Appropriate personal protective equipment
Transparencies	Calculator
Blank acetate sheets	Estimating calculator
Transparency pens	Estimating program
Whiteboard/chalkboard	Module Examinations*
Markers/chalk	Performance Profile Sheets*
Pencils and scratch paper	

*Located in the Test Booklet.

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.

Building Block Walls—A Basic Guide, National Concrete Masonry Association, Herndon, VA, 1988.

Building With Stone, Story Communications, Pownal, VT, 1989.

Pocket Guide to Brick Construction, Brick Institute of America, Reston, VA, 1990.

Principles of Brick Masonry, Brick Institute of America, Reston, VA, 1989.

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 *Estimating*. 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
Sessions I and II. Introduction and Estimating Brick and Mortar	
A. Introduction	_____
B. Laboratory – Trainees practice completing a set of estimating worksheets. This laboratory corresponds to Performance Task 2.	_____
C. Estimating Brick and Mortar	_____
1. Coursing Method for Brick	_____
2. Square Foot Method for Brick	_____
3. Openings and Mortar	_____
Sessions III and IV. Estimating Block and Mortar	
A. Coursing Method for Block	_____
B. Square Foot Method for Block	_____
C. Openings	_____
D. Mortar and Grout	_____
E. Laboratory – Trainees practice estimating masonry quantities from a set of commercial drawings. This laboratory corresponds to Performance Task 1.	_____
Sessions V and VI. Estimating Accessory Items	
A. Joint Reinforcement	_____
B. Structural Reinforcement	_____
C. Masonry Ties and Additional Items	_____
D. Laboratory – Trainees practice estimating masonry quantities from a set of commercial drawings. This laboratory corresponds to Performance Task 1.	_____
Session VII. Estimating Stone	
A. Stone Veneers	_____
B. Stone Volume Estimates	_____
C. Laboratory – Trainees practice estimating masonry quantities from a set of commercial drawings. This laboratory corresponds to Performance Task 1.	_____
Sessions VIII and IX. Estimating Aids and Practice Exercises	
A. Estimating Aids	_____
B. Practice Exercises	_____
C. Laboratory – Trainees practice estimating masonry quantities from a set of commercial drawings. This laboratory corresponds to Performance Task 1.	_____
Session X. Review, Module Examination, and Performance Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent 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 the masonry trainee to the principles, equipment, and methods used to perform the site layout tasks of distance measurement and differential leveling. Also covered are the site layout responsibilities of individuals on site, understanding and using site plan drawings, and methods of job site communication.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Masonry Level One; Masonry Level Two; and Masonry Level Three, Modules 28301-05 through 28305-05.*

OBJECTIVES

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

1. Describe the major responsibilities of the mason 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 taping and/or chaining equipment and procedures to make distance 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 or transit 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 topographic features and other project information to the layout and topography of 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 approximate distances by pacing.
5. Set up, adjust, and field test a leveling instrument.
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 practices.
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	VCR/DVD player (optional)
Transparencies	Television (optional)
Blank acetate sheets	Videotape (optional), <i>Foundation and Curb Forms: Preparing Site for Form Building</i>
Transparency pens	100-foot steel tape
Whiteboard/chalkboard	Range poles
Markers/chalk	Plumb bobs/gammon reels
Pencils and scratch paper	Hand sight levels
Appropriate personal protective equipment	Chaining pins
Site/plot plans for selected construction sites	Tension spring
Assortment of hubs, stakes, and laths	Builder's level
Assortment of different colored flagging tape	Transit level
Permanent markers for marking stakes	Laser level
Field notebook pages for recording leveling data	Tripods
2 × 4 or 2 × 6 ledger boards	Assortment of leveling rods and accessories
2 × 4 batter board support stakes	Copies of Worksheets 1 through 4*
Nylon string	Module Examinations*
Calculator	Performance Profile Sheets*

*Located in the Test Booklet.

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, Wesley G. Crawford. West Lafayette, IN: Creative Construction Publishing, Inc.

Principles and Practices of Commercial Construction, Cameron K. Andres and Ronald C. Smith. 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 22½ hours are suggested to cover *Site Layout—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
Session I. Introduction, Site/Plot Plans and Topographical Maps, and Contour Lines	
A. Introduction	_____
B. Site/Plot Plans and Topographical Maps	_____

C. Characteristics of Contour Lines _____

D. Laboratory – Trainees practice interpreting a drawing and relating the man-made and topographic features and other project information to the layout and topography of the actual site. This laboratory corresponds to Performance Task 1. _____

Session II. Site Layout Control Points and Communicating with Hand Signals

A. Site Layout Control Points _____

B. Communicating with Hand Signals _____

Sessions III and IV. Measuring Distances by Taping and Pacing

A. Distance Measurement Tools and Equipment _____

B. Measuring Distances by Taping _____

C. Laboratory – Trainees practice measuring various distances using taping equipment. This laboratory corresponds to Performance Task 3. _____

D. Converting Between Distance Measurement Systems _____

E. Laboratory – Trainees practice converting measurements. This laboratory corresponds to Performance Task 2. _____

F. Estimating Distances by Pacing _____

G. Laboratory – Trainees practice pacing distances and determining their individual pace lengths. This laboratory corresponds to Performance Task 4. _____

Session V. Electronic Distance Measurements and Differential Leveling Tools and Equipment

A. Electronic Distance Measurements _____

B. Differential Leveling Tools and Equipment _____

C. Initial Setup and Adjustment of a Leveling Instrument _____

D. Laboratory – Trainees practice setting up and adjusting a leveling instrument. This laboratory corresponds to Performance Task 5. _____

E. Testing the Calibration of the Leveling Instrument _____

F. Laboratory – Trainees practice field testing a leveling instrument. This laboratory corresponds to Performance Task 5. _____

Sessions VI and VII. Basics of Differential Leveling and Field Notes

A. Basics of Differential Leveling _____

B. Field Notes _____

C. Laboratory – Trainees calculate and record differential leveling measurement data. This laboratory corresponds to Performance Task 7. _____

D. Laboratory – Trainees practice using a builder’s level, leveling rods, and differential leveling procedures to determine site and building elevations. Ensure that all data is properly recorded in field notes. This laboratory corresponds to Performance Task 6. _____

Session VIII. Leveling Applications, Batter Boards, and the 3–4–5 Rule

A. Leveling Applications _____

B. Laboratory – Trainees practice using differential leveling to transfer elevations up a structure. This laboratory corresponds to Performance Task 8. _____

C. Batter Boards _____

D. 3–4–5 Rule _____

E. Laboratory – Trainees practice using the 3–4–5 rule to check or establish a 90-degree angle. This laboratory corresponds to Performance Task 9. _____

Session IX. Review, Module Examination, and Performance Testing

A. Review

B. Module Examination

1. Trainees must score 70 percent 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.

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. More information may be found at our website at 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
Session I. Orientation to the Job	
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	_____
Session II. Leadership Skills, Part One	
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	_____

Session III. Leadership Skills, Part Two

- A. Team Building
 - 1. Successful Teams
 - 2. Building Successful Teams
- B. Getting the Job Done
 - 1. Delegating Responsibilities
 - 2. Implementing Policies and Procedures
- C. Problem Solving and Decision Making
 - 1. Problem Solving vs. Decision Making
 - 2. Types of Decisions
 - 3. Formal Problem-Solving Techniques
 - 4. Special Leadership Problems

Session IV. Safety, Part One

- A. Safety Overview
- B. Costs of Accidents
 - 1. Insured Costs
 - 2. Uninsured Costs
- C. Safety Regulations
 - 1. Workplace Inspections
 - 2. Penalties for Violations

Session V. Safety, Part Two

- A. Safety Responsibilities
 - 1. Safety Program
 - 2. Safety Policies and Procedures
 - 3. Hazard Identification and Assessment
 - 4. Safety Information and Training
 - 5. Safety Record Systems
 - 6. Accident Investigation Procedures
- B. Supervisor Involvement in Safety
 - 1. Safety Meetings
 - 2. Inspections
 - 3. First Aid
 - 4. Fire Protection and Prevention
 - 5. Substance Abuse
 - 6. Accident Investigations
- C. Promoting Safety
 - 1. Meetings
 - 2. Contests
 - 3. Recognition and Awards
 - 4. Publicity

Session VI. Project Control, Part One

- A. Project Control Overview
- B. Project Delivery Systems
 - 1. General Contracting
 - 2. Design-Build
 - 3. Construction Management

- 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. _____

