 MODULE OVERVIEW
This module describes the use and inspection of the basic equipment and hardware used in rigging, including slings, wire ropes, chains, and attaching hardware. It also explains sling angles and describes the use of tuggers, jacks, hoists, and come-alongs.

PREREQUISITES
Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; and Carpentry Level Two.

OBJECTIVES
Upon completion of this module, the trainee will be able to do the following:
1. Perform a safety inspection on hooks, slings, and other rigging equipment.
2. Select, inspect, use, and maintain special rigging equipment, including:
   • Block and tackle
   • Chain hoists
   • Come-alongs
   • Jacks
   • Tuggers
3. Tie knots used in rigging.

PERFORMANCE TASKS
Under the supervision of the instructor, the trainee should be able to do the following:
1. Perform a safety inspection on hooks, slings, and other rigging equipment.
2. Select, inspect, use, and maintain special rigging equipment, including:
   • Block and tackle
   • Chain hoists
   • Come-alongs
   • Jacks
   • Tuggers
3. Tie knots used in rigging.

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
Manufacturer’s literature on different rigging hooks
Various rigging hooks with wear, cracks, and corrosion
Manufacturer’s literature on shackles
Various types of shackles
Various eyebolts

Various lifting lugs
Turnbuckles
Manufacturer’s literature on plate clamps
Various rigging plates and links
Various types of slings
Rigging pocket guide
29 CFR Section 1926.251, Rigging Equipment for Material Handling
Samples of wire rope that have failed inspection
Rope for tying knots
Block and tackle lifting system
Sample loads for lifting
Spur-gear chain hoist
Electric chain hoist
Ratchet-lever hoist or come-along
SAFETY CONSIDERATIONS

Ensure that trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use various types of hoists, jacks, and tuggers. Ensure that all trainees are briefed on lifting safely and any other shop safety procedures. This module may require that 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. This is optional material for continued education rather than for task training.


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 Rigging Equipment. 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 trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td>Session I. Introduction and Rigging Hardware</td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Rigging Hardware</td>
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<tr>
<td>Session II. Slings and Tag Lines</td>
<td></td>
</tr>
<tr>
<td>A. Slings</td>
<td></td>
</tr>
<tr>
<td>B. Laboratory</td>
<td>Trainees practice performing a safety inspection on hooks, slings, and other rigging equipment. This laboratory corresponds to Performance Task 1.</td>
</tr>
<tr>
<td>C. Tag Lines</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td>Trainees practice tying knots used in rigging. This laboratory corresponds to Performance Task 3.</td>
</tr>
</tbody>
</table>
Session III. Block and Tackle and Hoists

A. Block and Tackle
B. Chain Hoists
C. Ratchet-Lever Hoists and Come-Alongs
D. Jacks
E. Tuggers
F. Laboratory
   Trainees practice selecting, inspecting, and using special rigging equipment.
   This laboratory corresponds to Performance Task 2.

Session IV. Review and Testing

A. Module 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 describes basic rigging and crane hazards and related safety procedures, provides an overview of personnel lift lifting and lift planning, and introduces load charts and load balancing. It includes instructions for rigging and lifting pipe.

PREREQUISITES
Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Module 27301-07.

OBJECTIVES
Upon completion of this module, the trainee will be able to do the following:
1. Determine the weight of the load.
2. Interpret a load chart.
3. Determine the center of gravity of a load.
4. Properly attach rigging hardware for routine lifts.
5. Use and interpret hand signals.
6. Perform sling tension calculations.
7. Identify requirements for an engineered lift.

PERFORMANCE TASKS
Under the supervision of the instructor, the trainee should be able to do the following:
1. Determine the center of gravity of a load.
2. Properly attach rigging hardware for routine lifts.
3. Use and interpret hand signals.
4. Perform sling tension calculations.

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
- Walkie-talkies
- Throat microphone
- Hardwired communication system
- ASME B30.5 Consensus Standard
- 29 CFR 1926.550
- Completed lift plan
- Crane manufacturer’s literature
- Typical teeter-totter and weights
- Various lifting eyebolts
- Rigging hardware
- 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 trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require that 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.


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 *Rigging Practices*. 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 trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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</thead>
<tbody>
<tr>
<td><strong>Session I. Introduction, Communication, and Safety</strong></td>
<td></td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Methods of Communication</td>
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</tr>
<tr>
<td>C. Laboratory</td>
<td>Trainees practice using and interpreting hand signals. This laboratory corresponds to Performance Task 3.</td>
</tr>
<tr>
<td>D. General Rigging Safety</td>
<td></td>
</tr>
<tr>
<td>E. Working Around Power Lines</td>
<td></td>
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<tr>
<td>F. Site Safety</td>
<td></td>
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<tr>
<td>G. Emergency Response</td>
<td></td>
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<tr>
<td><strong>Sessions II and III. Lifting Loads</strong></td>
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</tr>
<tr>
<td>A. Using Cranes to Lift Personnel</td>
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<tr>
<td>B. Lift Planning</td>
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<tr>
<td>C. Crane Load Charts</td>
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<tr>
<td>D. Center of Gravity</td>
<td></td>
</tr>
<tr>
<td>E. Laboratory</td>
<td>Trainees practice determining the center of gravity of a load. This laboratory corresponds to Performance Task 1.</td>
</tr>
<tr>
<td>F. Sling Tension</td>
<td></td>
</tr>
<tr>
<td>G. Laboratory</td>
<td>Trainees practice performing sling tension calculations. This laboratory corresponds to Performance Task 4.</td>
</tr>
<tr>
<td><strong>Sessions IV and V. Rigging and Unloading</strong></td>
<td></td>
</tr>
<tr>
<td>A. Rigging Pipe</td>
<td></td>
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<tr>
<td>B. Rigging Valves</td>
<td></td>
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<tr>
<td>C. Guidelines for Unloading and Yarding Materials</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td>Trainees practice properly attaching rigging hardware for routine lifts. This laboratory corresponds to Performance Task 2.</td>
</tr>
</tbody>
</table>
Session VI. 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 describes the properties, characteristics, and uses of cement, aggregates, and other materials that, when mixed together, form different types of concrete. It covers procedures for estimating concrete volume and testing freshly mixed concrete, as well as methods and materials for curing concrete.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 and 27302-07.

OBJECTIVES

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

1. Identify various types of cement and describe their uses.
2. Identify types and sizes of concrete aggregates.
3. Identify types of concrete admixtures and describe their uses.
4. Identify special types of concrete and describe their uses.
5. Calculate concrete volume requirements for rectangular, cylindrical, or other geometric structures using formulas, concrete tables, and/or concrete calculators, as applicable.
6. Identify concrete curing methods and materials.
7. Identify concrete testing methods.
8. Mix concrete using different aggregates and admixtures.
11. Demonstrate how to properly set up a curing box.

PERFORMANCE TASKS

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

1. Calculate concrete volume requirements for rectangular, cylindrical, or other geometric structures using formulas, concrete tables, and/or concrete calculators, as applicable.
2. Perform a specimen casting for concrete strength testing using proper procedures.
3. Extract concrete samples using approved sampling method(s).
4. Perform a concrete slump test using proper procedures.

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
- Copies of a concrete table
- Concrete calculator
- Samples of various aggregates
- Concrete admixtures
- Portland cement
- Water
- Containers for mixing concrete
- Samples of different types of concrete
- ASTM C173
- Hoe or other tools to mix concrete
- Various containers for collecting concrete samples
- Source of freshly mixed concrete
- Shovels
- Hand scoops
- ASTM standardized cone mold and steel tamping rod
- ASTM standardized cylindrical mold and steel tamping rod
SAFETY CONSIDERATIONS

Ensure that trainees are equipped with appropriate personal protective equipment and know how to use it properly. Concrete dust and its components are caustic; brief trainees on the hazards posed by dry and wet concrete and respiratory and skin protection needed. This module may require that 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.

- American Concrete Institute, [www.concrete.org](http://www.concrete.org)
- Cement Association of Canada, [www.cement.ca](http://www.cement.ca)
- Portland Cement Association, [www.cement.org](http://www.cement.org)

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 Properties of Concrete. 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 trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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</thead>
<tbody>
<tr>
<td><strong>Session I. Concrete Materials and Mixing</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Concrete and Concrete Materials</td>
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<tr>
<td>C. Normal Concrete Mix Proportions and Measurements</td>
<td></td>
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<tr>
<td>D. Special Types of Concrete</td>
<td></td>
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<tr>
<td><strong>Session II. Curing and Testing Concrete</strong></td>
<td></td>
</tr>
<tr>
<td>A. Curing Concrete</td>
<td></td>
</tr>
<tr>
<td>B. Sampling Concrete</td>
<td></td>
</tr>
<tr>
<td>C. Laboratory</td>
<td>Trainees practice taking a concrete sample. This laboratory corresponds to Performance Task 3.</td>
</tr>
<tr>
<td>D. Slump Testing</td>
<td></td>
</tr>
<tr>
<td>E. Laboratory</td>
<td>Trainees practice performing a slump test. This laboratory corresponds to Performance Task 4.</td>
</tr>
<tr>
<td>F. Strength Testing</td>
<td></td>
</tr>
<tr>
<td>G. Laboratory</td>
<td>Trainees practice performing a specimen casting for concrete strength testing using proper procedures. This laboratory corresponds to Performance Task 2.</td>
</tr>
</tbody>
</table>

Steel tape or rules
Wood for building a curing box
Basic carpenter’s 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.
Session III. Estimating Concrete
   A. Rectangular Volume Calculations
   B. Circular Volume Calculations
   C. Laboratory
      Trainees practice calculating concrete volume requirements. This laboratory corresponds to Performance Task 1.

Session IV. 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 describes and defines reinforcement materials used in concrete, such as reinforcement bars, bar supports, and welded-wire fabric. It explains the selection and uses of different types of reinforcing materials. It also describes general requirements for cutting, bending, splicing, and tying reinforcing steel, as well as placement of the steel in various types of footings, columns, walls, and slabs.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27303-07.

OBJECTIVES

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

1. Describe the applications of reinforcing bars, the uses of reinforced structural concrete, and the basic processes involved in placing reinforcing bars.
2. Recognize and identify the bar bends standardized by the American Concrete Institute (ACI).
3. Read and interpret bar lists and describe the information found on a bar list.
4. List the types of ties used in securing reinforcing bars.
5. State the tolerances allowed in the fabrication of reinforcing bars.
6. Demonstrate the proper use of common ties for reinforcing bars.
7. Describe methods by which reinforcing bars may be cut and bent in the field.
8. Use the tools and equipment needed for installing reinforcing bars.
9. Safely use selected tools and equipment to cut, bend, and install reinforcing materials.
10. Explain the necessity of concrete cover in placing reinforcing bars.
11. Explain and demonstrate how to place bars in walls, columns, beams, girders, joists, and slabs.
12. Identify lapped splices.

PERFORMANCE TASKS

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

1. Use appropriate tools to cut and bend reinforcing bars.
2. Demonstrate five types of ties for reinforcing bars.
3. Demonstrate proper lap splicing of reinforcing bars using wire ties.
4. Demonstrate the proper placement, spacing, tying, and support for reinforcing bars.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen  Bar lists
Transparencies  Hooks and spirals
Blank acetate sheets  Steel wire bar supports
Transparency pens  Precast concrete bar supports
Whiteboard/chalkboard  Plastic bar supports
Markers/chalk  Standees
Pencils and scratch paper  Welded-wire fabric
Appropriate personal protective equipment  Deformed welded-wire fabric
Pieces of marked rebar  ACI standards for concrete coverage
Copies of ASTM standards  Bolt cutters
Bent bars  Electric shears
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. This module requires that trainees cut and work with rebar. Ensure that all trainees are properly briefed before working with rebar.

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.

- *Placing Reinforcing Bars, 2005. Concrete Reinforcing Steel Institute (CRI).*

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 2 1/4 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 *Reinforcing Concrete.* 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Overview and Identification of Reinforcing Bars</strong></td>
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<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Overview of Reinforced Concrete</td>
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<tr>
<td>C. Identification of Reinforcing Bars</td>
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<tr>
<td>D. Fabrication</td>
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<tr>
<td>E. Bar Supports</td>
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<tr>
<td>F. Welded-Wire Fabric</td>
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<tr>
<td><strong>Session II. Safety and Cutting and Bending Reinforcing Bar</strong></td>
<td></td>
</tr>
<tr>
<td>A. General Safety Precautions</td>
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<tr>
<td>B. Cutting</td>
<td></td>
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<tr>
<td>C. Bending</td>
<td></td>
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<tr>
<td>D. Laboratory</td>
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</tbody>
</table>

Trainees practice cutting and bending reinforcing bar. This laboratory corresponds to Performance Task 1.
Sessions III and IV. Tying and Splicing Reinforcing Bar
A. Tying and Splicing Reinforcing Bar
B. Tying Tips
C. Laboratory
   Trainees practice various types of ties. This laboratory corresponds to Performance Task 2.
D. Splicing Reinforcing Bar
E. Laboratory
   Trainees practice proper lap splicing of reinforcing bars. This laboratory corresponds to Performance Task 3.

Session V. Placing Reinforcing Steel and Post-Tensioned Concrete
A. Placing Bars in Footings
B. Column Dowels
C. Placing Bars in Walls
D. Wall Mat Supports
E. Placing Bars in Columns
F. Placing Bars in Beams and Girders
G. Laboratory
   Trainees practice placing, spacing, tying, and supporting reinforcing bar. This laboratory corresponds to Performance Task 4.
H. Post-Tensioned Concrete

Session VI. Review and Testing
A. Module 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 covers the tools, equipment, and procedures for handling, placing, and finishing concrete. It also covers the joints made in concrete structures, the use of joint sealants, and form removal procedures. It emphasizes safety procedures for handling, placing, and finishing concrete.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27304-07.

OBJECTIVES

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

1. Recognize the various equipment used to transport and place concrete.
2. Describe the factors that contribute to the quality of concrete placement.
3. Demonstrate the correct methods for placing and consolidating concrete into forms.
4. Demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.
5. Demonstrate how to use tools for placing, floating, and finishing concrete.
6. Determine when conditions permit the concrete finishing operation to start.
7. Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
8. Properly care for and safely use hand and power tools used when working with concrete.

PERFORMANCE TASKS

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

1. Properly handle, place, and consolidate concrete in selected concrete forms.
2. Use a screed to strike off and level a concrete surface.
3. Use a bullfloat and/or darby to level and smooth a concrete surface.
4. Use an edger to form a radius at the edges of a concrete pad, slab, etc.
5. Use a jointer to make control joints in a concrete surface.
6. Use a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface.

MATERIALS AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Overhead projector and screen</th>
<th>Belt conveyor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparencies</td>
<td>Concrete pump</td>
</tr>
<tr>
<td>Blank acetate sheets</td>
<td>Pneumatic gun</td>
</tr>
<tr>
<td>Transparency pens</td>
<td>Internal vibrator</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Rollerbug tamper</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Equipment for screeding, leveling, and finishing concrete, including:</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Manual/power screeds</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>Knee boards</td>
</tr>
<tr>
<td>Equipment for moving, placing, and consolidating concrete, including: Moveable chutes (such as used with mixer trucks)</td>
<td>Darby floats/bullfloats</td>
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<tr>
<td>Drop chutes</td>
<td>Pointed trowels</td>
</tr>
<tr>
<td>Elephant trunk</td>
<td>Edgers</td>
</tr>
<tr>
<td>Wheelbarrow</td>
<td>Jointers (groovers)</td>
</tr>
<tr>
<td>Power buggy and/or carts</td>
<td>Power saws</td>
</tr>
<tr>
<td>Crane and bucket</td>
<td>Hand floats</td>
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<tr>
<td></td>
<td>Hand trowels</td>
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<tr>
<td></td>
<td>Finishing machines</td>
</tr>
</tbody>
</table>
Brooms
Assortment of combination tools
Pointing and margin trowels
Cement hammers
Carborundum rubbing stones
Sprayers
Power grinders
Properly-constructed concrete formworks

Sand
Boxes to contain wet sand
Copies of Quick Quiz*
Module Examinations**
Performance Profile Sheet**

*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. Concrete dust and its components are caustic; brief trainees on the hazards posed by dry and wet concrete and respiratory and skin protection needed. 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.

American Concrete Institute. www.concrete.org
Cement Association of Canada. www.cement.ca

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 $2\frac{1}{2}$ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately $22\frac{1}{2}$ hours are suggested to cover Handling and Placing Concrete. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session I. Overview and Joints in Concrete Structures</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Joints in Concrete Structures</td>
<td></td>
</tr>
<tr>
<td><strong>Session II. Moving and Handling Concrete</strong></td>
<td></td>
</tr>
<tr>
<td>A. Off-Site Equipment for Mixing and Conveying Concrete</td>
<td></td>
</tr>
<tr>
<td>B. On-Site Equipment for Mixing and Conveying Concrete</td>
<td></td>
</tr>
<tr>
<td><strong>Sessions III and IV. Placing and Consolidating Concrete in Forms</strong></td>
<td></td>
</tr>
<tr>
<td>A. Placing Concrete in Forms</td>
<td></td>
</tr>
<tr>
<td>B. Consolidating Concrete</td>
<td></td>
</tr>
<tr>
<td>C. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice placing, handling, and consolidating concrete in selected concrete forms. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
</tbody>
</table>
Session V. Finishing I
   A. Screeding
   B. Laboratory
      Trainees practice using a screed to strike off and level a concrete surface. This laboratory corresponds to Performance Task 2.
   C. Leveling Concrete
   D. Laboratory
      Trainees practice using a bullfloat and/or darby to level and smooth a concrete surface. This laboratory corresponds to Performance Task 3.

Session VI. Finishing II
   A. Edging
   B. Laboratory
      Trainees practice using an edger to form a radius at the edges of a concrete pad or slab. This laboratory corresponds to Performance Task 4.
   C. Jointing
   D. Laboratory
      Trainees practice using a jointer to make control joints in a concrete surface. This laboratory corresponds to Performance Task 5.
   E. Floating and Troweling
   F. Laboratory
      Trainees practice using a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface. This laboratory corresponds to Performance Task 6.

Session VII.
   A. Curing Concrete
   B. Joint Sealants
   C. Removing Forms

Session VIII. Tools and Safety
   A. Other Hand and Power Tools Used When Working with Concrete
   B. Safety Precautions

Session IX. Module Testing
   A. Module 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 prepares the trainee for working in and around excavations, particularly in preparing building foundations. It covers types and bearing capacities of soils; procedures used in shoring, sloping, and shielding trenches and excavations; trenching safety requirements, including recognition of unsafe conditions; and mitigation of groundwater and rock when excavating foundations.

PREREQUISITES
Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27305-07.

OBJECTIVES
Upon completion of this module, the trainee will be able to do the following:
1. Identify the different types, bearing capacities, and classifications of soils.
2. Identify ways to increase soil density.
3. State the purpose of soil density (compaction) tests.
4. Explain the safety considerations for trenches and deep excavations.
5. Identify and describe groundwater mitigation methods.
6. Identify and describe rock mitigation techniques.

PERFORMANCE TASKS
Under the supervision of the instructor, the trainee should be able to do the following:
1. Perform a trench inspection.

MATERIALS AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead projector and screen</td>
<td></td>
</tr>
<tr>
<td>Transparencies</td>
<td></td>
</tr>
<tr>
<td>Blank acetate sheets</td>
<td></td>
</tr>
<tr>
<td>Transparency pens</td>
<td></td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td></td>
</tr>
<tr>
<td>Markers/chalk</td>
<td></td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td></td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td></td>
</tr>
<tr>
<td>Samples of different types of soils</td>
<td></td>
</tr>
<tr>
<td>Access to a trench for inspection</td>
<td></td>
</tr>
<tr>
<td>Soil density testing equipment</td>
<td></td>
</tr>
<tr>
<td>Sample stormwater permit and pollution prevention plan</td>
<td></td>
</tr>
<tr>
<td>Several types of pumps</td>
<td></td>
</tr>
<tr>
<td>Safety video or DVD (optional)</td>
<td></td>
</tr>
<tr>
<td>TV with VCR or DVD player (optional)</td>
<td></td>
</tr>
<tr>
<td>Plastic boxes</td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td></td>
</tr>
<tr>
<td>Tools for digging</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Boxes of sand or dirt</td>
<td></td>
</tr>
<tr>
<td>Module Examinations*</td>
<td></td>
</tr>
<tr>
<td>Performance Profile Sheet*</td>
<td></td>
</tr>
</tbody>
</table>

*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. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures. This module requires that trainees work near trenches. Ensure that all trainees are properly briefed on trench safety procedures before working near trenches.
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.


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 Trenching and Excavating. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session I. Sitework</td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Sitework</td>
<td></td>
</tr>
<tr>
<td>C. Compaction</td>
<td></td>
</tr>
<tr>
<td>Session II. Safety</td>
<td></td>
</tr>
<tr>
<td>A. Deep Foundation Excavation Safety</td>
<td></td>
</tr>
<tr>
<td>B. Trenching Safety</td>
<td></td>
</tr>
<tr>
<td>C. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice inspecting a trench. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
<tr>
<td>Session III. Mitigation</td>
<td></td>
</tr>
<tr>
<td>A. Surface and Groundwater Mitigation</td>
<td></td>
</tr>
<tr>
<td>B. Rock Mitigation</td>
<td></td>
</tr>
<tr>
<td>Session IV. Review and Testing</td>
<td></td>
</tr>
<tr>
<td>A. Module Review</td>
<td></td>
</tr>
<tr>
<td>B. Module Examination</td>
<td></td>
</tr>
<tr>
<td>1. Trainees must score 70% or higher to receive recognition from NCCER.</td>
<td></td>
</tr>
<tr>
<td>2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
<td></td>
</tr>
<tr>
<td>C. Performance Testing</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
<td></td>
</tr>
</tbody>
</table>
MODULE OVERVIEW

This module covers basic site layout tools and methods; layout and construction of deep and shallow foundations; layout and forming of slabs-on-grade; and forms used for curbing and paving.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27306-07.

OBJECTIVES

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

1. Establish elevations.
2. Identify various types of footings and foundations.
3. Select the appropriate footing for a foundation.
4. Lay out and construct a selected footing and foundation using an established gridline.
5. Install templates, keyways, and embedments.
6. Form and strip pier foundation forms and prepare for resetting at another location.
7. Identify the different classes of slabs-on-grade.
8. Identify edge forms and explain their purpose.
9. Construct and disassemble edge forms.
10. Install vapor barrier, reinforcement, and control joints.
11. Establish finish grade and fill requirements.

PERFORMANCE TASKS

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

1. Establish elevations.
2. Lay out and construct a selected footing and foundation using an established gridline.
3. Install templates, keyways, and embedments.
4. Form and strip pier foundation forms and prepare for resetting at another location.
5. Construct and disassemble edge forms.
6. Install vapor barrier, reinforcement, and control joints.

MATERIALS AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Overhead projector and screen</th>
<th>Batter boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparencies</td>
<td>Hub stakes</td>
</tr>
<tr>
<td>Blank acetate sheets</td>
<td>Marker stakes</td>
</tr>
<tr>
<td>Transparency pens</td>
<td>Color-coded stakes or markers</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Markers/chalk</td>
</tr>
<tr>
<td>Plumb bob and line</td>
<td>Pencils and scratch paper</td>
</tr>
<tr>
<td>Leveling rods and accessories</td>
<td>Appropriate personal protective equipment</td>
</tr>
<tr>
<td>Direct elevation rod</td>
<td>Steel tape (100’)</td>
</tr>
<tr>
<td>Project plans</td>
<td>Gammon reel</td>
</tr>
<tr>
<td>Automatic leveling instruments</td>
<td>Field notebook</td>
</tr>
<tr>
<td>Builder’s level</td>
<td>Transit level</td>
</tr>
<tr>
<td>Tripod</td>
<td>2’ or 4’ level</td>
</tr>
<tr>
<td>Laser level</td>
<td>String line</td>
</tr>
</tbody>
</table>
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. This module requires that trainees work with concrete forms.

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 task training.

American Concrete Institute, www.aci-int.org
The Concrete Network, www.concretenetwork.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 2¼ 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 Foundations and Slab-on-Grade. 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.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Session I. Sitework</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Sitework</td>
<td></td>
</tr>
<tr>
<td>C. Establishing Formwork Locations and Elevations</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice establishing elevations. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
<tr>
<td><strong>Sessions II and III. Job Site Layout</strong></td>
<td></td>
</tr>
<tr>
<td>A. Establishing Building Location</td>
<td></td>
</tr>
<tr>
<td>B. Batter Boards</td>
<td></td>
</tr>
<tr>
<td>C. Excavation and Trenching</td>
<td></td>
</tr>
<tr>
<td>D. Laying Out Forms</td>
<td></td>
</tr>
<tr>
<td>E. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice laying out and constructing a selected footing and foundation using an established gridline. This laboratory corresponds to Performance Task 2.</td>
<td></td>
</tr>
<tr>
<td>F. Templates</td>
<td></td>
</tr>
<tr>
<td>G. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice installing templates, keyways, and embedments. This laboratory corresponds to Performance Task 3.</td>
<td></td>
</tr>
</tbody>
</table>
Session IV. Foundations and Slabs-on-Grade

A. Deep Foundation Elements
B. Shallow Foundation Elements
C. Construction Considerations for Slab-on-Grade
D. Laboratory
   - Trainees practice installing vapor barrier, reinforcement, and control joints. This laboratory corresponds to Performance Task 6.
E. Commercial Slab-on-Grade

Sessions V and VI. Foundation Forms

A. Job-Built Forms
B. Pier Forms
C. Laboratory
   - Trainees practice forming and stripping pier foundation forms and preparing for resetting at another location. This laboratory corresponds to Performance Task 4.
D. Manufactured Forms
E. Edge Forms
F. Laboratory
   - Trainees practice constructing and disassembling edge forms. This laboratory corresponds to Performance Task 5.

Session VII. Screeds and Paving Forms

A. Screeds
B. Curbing and Paving Forms

Session VIII. Review and Testing

A. Module 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 covers the applications and construction methods for various types of forming and form hardware systems for walls, columns, and stairs, as well as slip forms, climbing forms, and shaft forms. This module also provides an overview of the assembly, erection, and stripping of gang forms.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27307-07.

OBJECTIVES

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

1. Explain safety procedures associated with using concrete wall forms.
2. Identify the various types of concrete wall forms.
3. Identify the components of each type of vertical forming system.
4. Erect, plumb, and brace a selected wall.
5. Recognize various types of manufactured forms.
6. State the differences in construction and use among different types of forms.
7. Erect, plumb, and brace a column form.
8. Erect, plumb, and brace a stair form.
9. Locate and install bulkheads and embedded forms.

PERFORMANCE TASKS

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

1. Erect, plumb, and brace a selected wall form.
2. Erect, plumb, and brace a column form.
3. Erect, plumb, and brace a stair form.
4. Install blockouts and embedded items.

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
- Sheets of plywood
- Components used to construct wall forms, including assembly hardware, walers, strongbacks, braces, and stakes
- Manufacturers’ literature on different types of gang forms
- Manufacturers’ literature on different types of flexible wall forms
- Tools and materials to construct a wall form
- Materials to construct blockouts and embeddings
- Materials inventory
- Tools and materials to construct column forms
- Circular saw
- Form assembly hardware
- OSHA Standard 1926:700-701
- Walers
- Strongbacks
- Manufacturers’ literature on different types of wall-forming systems
- Manufacturers’ literature on different types of column forms
- Drawings with design details
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. This module requires that trainees work with concrete forms. Ensure that all trainees are properly briefed on lifting and tool safety procedures before working with forms.

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 task training.

*Scaffold, Shoring, and Forming Institute*. [www.ssfi.org](http://www.ssfi.org)

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 27½ hours are suggested to cover *Vertical Formwork*. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sessions I and II. Formwork Planning and Wall Forms</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
</tr>
<tr>
<td>B. Formwork Planning</td>
<td></td>
</tr>
<tr>
<td>C. Wall Forms</td>
<td></td>
</tr>
<tr>
<td>D. Patented Wall-Forming Systems</td>
<td></td>
</tr>
<tr>
<td>E. Framing Wall Openings</td>
<td></td>
</tr>
<tr>
<td>F. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice installing blockouts and embedded items. This laboratory corresponds to Performance Task 4.</td>
<td></td>
</tr>
<tr>
<td><strong>Sessions III and IV. Form Construction</strong></td>
<td></td>
</tr>
<tr>
<td>A. Preparation</td>
<td></td>
</tr>
<tr>
<td>B. Assembly</td>
<td></td>
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<tr>
<td>C. Setting the Form</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Trainees practice erecting, plumbing, and bracing a selected wall form. This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
</tbody>
</table>
Sessions V through VII. Column Forms and Slipforming

A. Fiber Column Forms
B. Steel Column Forms
C. Job-Built Column Forms
D. Laboratory
   Trainees practice erecting, plumbing, and bracing a column form. This laboratory corresponds to Performance Task 2.
E. Vertical Slipforming

Sessions VIII through X. Stair and Other Forms

A. Stair Forms
B. Laboratory
   Trainees practice erecting, plumbing, and bracing a stair form. This laboratory corresponds to Performance Task 3.
C. Vertical Architectural Forms
D. Polystyrene Forms

Session XI. Review and Testing

A. Module 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 covers the types of elevated decks and the formwork systems and methods used in their construction. It covers joist, pan, metal deck, and flat slab systems and provides instructions for the use of flying forms, as well as shoring and reshoring systems.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27308-07.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:
1. Identify the safety hazards associated with elevated deck formwork and explain how to eliminate them.
2. Identify the different types of elevated decks.
3. Identify the different types of flying form systems.
4. Identify different types of handset form systems.
5. Erect, plumb, brace, and level different types of handset deck form systems.
6. Install edge forms, blockouts, embedments, and construction joints.
7. Identify typical bridge and culvert form systems.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:
1. Erect, plumb, brace, and level different types of handset deck form systems.
2. Install edge forms.
3. Install blockouts and embedded items.
4. Locate and install construction joints.

MATERIALS AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Overhead projector and screen</th>
<th>Hand tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparencies</td>
<td>Levels</td>
</tr>
<tr>
<td>Blank acetate sheets</td>
<td>Bracing materials</td>
</tr>
<tr>
<td>Transparency pens</td>
<td>Shoring deck systems</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Edge forms</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Manufacturers’ literature on different types of pan forms</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Manufacturers’ literature on shoring</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td>Wood shores</td>
</tr>
<tr>
<td>Walers</td>
<td>Metal post shores</td>
</tr>
<tr>
<td>Strongbacks</td>
<td>Manufacturers’ literature on aluminum shoring</td>
</tr>
<tr>
<td>Manufacturers’ literature on deck framing systems</td>
<td>Samples of exterior grade plywood</td>
</tr>
<tr>
<td>Manufacturers’ literature on flying decks</td>
<td>Plyform®</td>
</tr>
<tr>
<td>Manufacturers’ literature on column-mounted tables</td>
<td>Stringers</td>
</tr>
<tr>
<td></td>
<td>Joists</td>
</tr>
</tbody>
</table>
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. This module requires that trainees work with concrete forms. Ensure that all trainees are properly briefed on lifting and tool safety procedures before working with forms.

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 Concrete Institute (ACI). www.concrete.org
Cement Association of Canada. www.cement.ca

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 2 1⁄2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22 1⁄4 hours are suggested to cover Horizontal Formwork. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Concrete Floor and Roof Slabs</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Types of Structural-Concrete Floor and Roof Slabs</td>
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<tr>
<td>C. Types of Form Systems</td>
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<tr>
<td><strong>Session II. Shoring</strong></td>
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<tr>
<td>A. Types of Shoring</td>
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<tr>
<td>B. Adjustable Wood Shoring</td>
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<td>C. Manufactured Shoring</td>
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<tr>
<td><strong>Sessions III and IV. Form Construction</strong></td>
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<tr>
<td>A. Types of Decks</td>
<td></td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>Trainees practice erecting, plumbing, bracing, and leveling selected handset deck form systems. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>C. Grading Elevated Slab Decks</td>
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</tbody>
</table>
Sessions V through VII. Additional Form Elements
A. Edge Forms
B. Laboratory
   Trainees practice installing edge forms. This laboratory corresponds to
   Performance Task 2.
C. Blockouts and Embedments
D. Laboratory
   Trainees practice installing blockouts and embedded items. This laboratory
   corresponds to Performance Task 3.
E. Jointing
F. Laboratory
   Trainees practice installing construction joints. This laboratory corresponds
   to Performance Task 4.

Session VIII. Bridges, Culverts, and Safety
A. Bridge Deck Forms
B. EFCO Culvert-Forming Systems
C. General Forming and Shoring Safety

Session IX. Review and Testing
A. Module 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.
Tilt-Up Wall Systems
Annotated Instructor’s Guide

MODULE OVERVIEW

This module describes how tilt-up concrete construction is used and how tilt-up panels are formed, erected, and braced. It covers the installation of rebar and the types of embedments used to lift and brace panels. Methods used to achieve architectural and decorative finishes are also covered.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27309-07.

OBJECTIVES

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

1. Describe the different processes used in installing tilt-up wall panels.
2. Explain the importance of the casting bed.
3. Identify and install the various types of lifting eyes used in forming tilt-up panels.
4. Identify the special rigging requirements for tilt-up wall panels.
5. Identify the different methods of forming tilt-up wall panels.
6. Demonstrate the different methods of forming tilt-up wall panels.
7. Prepare for the erection of tilt-up wall panels.
8. Install proper bracing for tilt-up wall panels.
9. Erect and properly align tilt-up wall panels.
10. Install embedments, blockouts, architectural finishes, lifting devices, and reinforcing materials using a set of construction drawings.
11. Describe the final grouting procedure.

PERFORMANCE TASKS

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

1. Form a tilt-up panel in accordance with a drawing provided by the instructor.
2. Install inserts, reinforcement, and reveals.

MATERIALS AND EQUIPMENT LIST

| Overhead projector and screen | Wood for building panel forms |
| Transparencies                | Hand tools                   |
| Blank acetate sheets          | Fasteners                    |
| Transparency pens             | Concrete mix                 |
| Whiteboard/chalkboard         | Water                        |
| Markers/chalk                 | Wheelbarrow or concrete mixer|
| Pencils and scratch paper     | Tools to mix and spread concrete |
| Appropriate personal protective equipment | Drawing of panel forms |
| Variety of inserts and embedments | Copies of Quick Quiz* |
| Reinforcing bar               | Module Examinations**        |
| Wood or other materials to form reveals | Performance Profile Sheet** |

*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. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures. This module requires that trainees work with concrete forms. Ensure that all trainees are properly briefed on lifting and tool safety procedures before working with forms.

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.

- Tilt-up Concrete Association, [www.tilt-up.org](http://www.tilt-up.org)

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 *Tilt-Up 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.

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<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td><strong>Sessions I through III. Introduction to Tilt-Up Wall Panels</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Forming Tilt-Up Wall Panels</td>
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<tr>
<td>C. Laboratory</td>
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<tr>
<td>Trainees practice forming a tilt-up panel. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Sessions IV and V. Inserts and Embedments</strong></td>
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<tr>
<td>A. Placing Inserts and Embedments</td>
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<tr>
<td>B. Laboratory</td>
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<tr>
<td>Trainees practice installing inserts, reinforcement, and reveals. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td><strong>Session VI. Finishing</strong></td>
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<tr>
<td>A. Architectural Treatments</td>
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<td>B. Placing and Finishing the Concrete</td>
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<tr>
<td><strong>Session VII. Erecting and Bracing the Panels</strong></td>
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<tr>
<td>A. Erecting Panels</td>
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<tr>
<td>B. Bracing the Panels</td>
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<tr>
<td>C. Summary</td>
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</table>
Session VIII. Review and Testing

A. Module 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.