Module 27304-14 describes the selection and uses of different types of reinforcing materials. The text discusses requirements for cutting, bending, splicing, and tying reinforcing steel and the placement of steel in footings, columns, walls, and slabs.

**Objectives**

**Learning Objective 1**
- List applications of reinforced concrete.
  a. Describe how forces are resisted in concrete through the use of reinforcing bars.
  b. List applications for reinforced structural concrete.
  c. Discuss how posttensioned concrete is created.

**Learning Objective 2**
- Describe the general requirements for working with reinforcing steel, including tools, equipment, and fabricating methods.
  a. List general safety precautions when working with reinforcing steel.
  b. Describe the general characteristics of reinforcing steel.
  c. Discuss how reinforcing steel is fabricated.
  d. Explain the purpose of bar supports.
  e. Explain how welded-wire fabric reinforcement is used to reinforce concrete.

**Learning Objective 3**
- Describe methods by which reinforcing bars may be bent and cut in the field.
  a. Describe how to cut rebar.
  b. Describe how to bend rebar.

**Learning Objective 4**
- Explain the methods for placing reinforcing steel.
  a. Discuss the proper method for tying and splicing reinforcing steel.
  b. Explain the proper procedure for placing reinforcing steel.

**Performance Tasks**

**Performance Task 1 (Learning Objective 3)**
- Use appropriate tools to cut and bend reinforcing bars.

**Performance Task 2 (Learning Objective 4)**
- Demonstrate five types of ties for reinforcing bars.

**Performance Task 3 (Learning Objective 4)**
- Demonstrate proper lap splicing of reinforcing bars using wire ties.

**Performance Task 4 (Learning Objective 4)**
- Demonstrate the proper placement, spacing, tying, and support for reinforcing bars.

**Teaching Time: 15 hours**
(Six 2.5-hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Prerequisites**
Core Curriculum, Construction Craft Laborer Level One

**Before You Begin**
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER's Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
Safety Considerations
This module requires that trainees cut, bend, tie, splice, and place reinforcing bars. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Construction Craft Laborer Level Two
PowerPoint® Presentation Slides
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing the reinforcement of concrete (optional)
TV/DVD player

Equipment and Materials for Laboratories and Performance Testing
Personal protective equipment:
- ANSI-approved footwear
- Hard hat
- Leather-palm gloves
- Safety glasses
- 2" leather belt
- ACI standards for concrete coverage
- Bar lists
- Bent bars
- Bolt cutters
- Copies of ASTM standards
- Deformed welded-wire fabric
- Electric shears
- Hickey bar and jigs
- Hooks and spirals
- Keel holder
- Level
- Mechanically spliced rebar
- Pieces of marked rebar
- Plastic bar supports
- Pliers
- Plumb bob
- Precast concrete bar supports
- Sample bar list
- Samples of welded-wire fabric reinforcement
- Side-cutting pliers
- Sledgehammer
- Spliced rebar
- Standees
- Steel wire bar supports
- Tape measure
- Tie wire
- Tie-wire reel
- Tool pouch
- Unlabeled copies of Figures 9, 11, 17, and 23
- Welded-wire fabric

Additional Resources and References
This module presents thorough resources for task training. The following resource material is suggested for further study:


ACI 315, Details and Detailing of Concrete Reinforcement, Latest Edition. Farmington Hills, MI: American Concrete Institute.


Placing Reinforcing Bars, 2005. Concrete Reinforcing Steel Institute (CRSI).

There are a number of online resources available for trainees who would like more information on reinforcing concrete. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into six 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces the various applications of reinforced concrete.

1. Show Session One PowerPoint® presentation slides.
2. Introduce trainees to applications requiring reinforcing bars in concrete.
3. Introduce trainees to applications requiring reinforced structural concrete.
4. Introduce trainees to applications requiring post-tensioned concrete.

**SESSIONS TWO AND THREE**

Sessions Two and Three introduce the general requirements for working with reinforcing steel.

1. Show Sessions Two and Three PowerPoint® presentation slides.
2. Introduce trainees to the safety precautions required when working with reinforcing steel.
3. Introduce trainees to the general characteristics of reinforcing steel.
4. Introduce trainees to the process of fabricating reinforcing steel.
5. Introduce trainees to the purpose of bar supports.
6. Introduce trainees to applications requiring welded-wire fabric reinforcement.

**SESSIONS FOUR AND FIVE**

Sessions Four and Five introduce tying, bending cutting, and splicing reinforcing bars.

1. Show Sessions Four and Five PowerPoint® presentation slides.
2. Introduce trainees to the process of cutting and bending reinforcing bars.
3. Introduce trainees to the process of lap splicing reinforcing bars using wire ties.
4. Introduce trainees to the placement of reinforcing steel.

**SESSION SIX**

Session Six is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Five.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on the Registration of Training Modules Form, and submit the report to your Training Program Sponsor.
## Materials Checklist for Module 27304-14, Reinforcing Concrete

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>2&quot; leather belt</th>
<th>Plumb bob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal protective equipment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSI-approved footwear</td>
<td>ACI standards for concrete coverage</td>
<td>Precast concrete bar supports</td>
</tr>
<tr>
<td>Hard hat</td>
<td>Bar lists</td>
<td>Sample bar list</td>
</tr>
<tr>
<td>Leather-palm gloves</td>
<td>Bent bars</td>
<td>Samples of welded-wire fabric reinforcement</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Bolt cutters</td>
<td>Side-cutting pliers</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Copies of ASTM standards</td>
<td>Sledgehammer</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Deformed welded-wire fabric</td>
<td>Spliced rebar</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Electric shears</td>
<td>Standees</td>
</tr>
<tr>
<td>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</td>
<td>Hickey bar and jigs</td>
<td>Steel wire bar supports</td>
</tr>
<tr>
<td>Computer</td>
<td>Hooks and spirals</td>
<td>Tape measure</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Keel holder</td>
<td>Tie wire</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing the reinforcement of concrete (optional)</td>
<td>Level</td>
<td>Tie-wire reel</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Mechanically spliced rebar</td>
<td>Tool pouch</td>
</tr>
<tr>
<td></td>
<td>Pieces of marked rebar</td>
<td>Unlabeled copies of Figures 9, 11, 17, and 23</td>
</tr>
<tr>
<td></td>
<td>Plastic bar supports</td>
<td>Welded-wire fabric</td>
</tr>
<tr>
<td></td>
<td>Pliers</td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 27308-14 describes the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip forms, climbing forms, and shaft forms. The text provides an overview of the assembly, erection, and stripping of gang forms.

### Objectives

**Learning Objective 1**
- Identify the basic types of concrete wall forms.
  - a. Explain the importance of formwork planning.
  - b. List the parts and accessories of concrete wall forms.
  - c. Describe applications of panel form systems.
  - d. Describe applications of gang forms.

**Learning Objective 2**
- Describe applications for patented wall-form systems.
  - a. List applications for curved forms.
  - b. Describe how to frame wall openings.

**Learning Objective 3**
- Explain how to properly assemble and set forms.
  - a. Explain how to assemble forms.
  - b. Explain how to set forms.

**Learning Objective 4**
- Identify the types of column forms.
  - a. List applications for fiber and steel column forms.
  - b. List applications for job-built column forms.

**Learning Objective 5**
- List applications of vertical slipforming and describe each.
  - a. Identify slip-form components.
  - b. Describe applications of climbing forms.

**Learning Objective 6**
- Describe how to construct stair forms.

**Learning Objective 7**
- List various vertical architectural and specialty forms, and describe applications for each.
  - a. Describe how smooth finishes are created.
  - b. Describe how textured surfaces are created.
  - c. Explain the use of insulating concrete forms (ICFs).

### Performance Tasks

**Performance Task 1 (Learning Objective 3)**
- Erect, plumb, and brace an instructor-selected wall form.

**Performance Task 2 (Learning Objective 4)**
- Erect, plumb, and brace an instructor-selected column form.

**Performance Task 3 (Learning Objective 6)**
- Erect, plumb, and brace a stair form.

### Prerequisites

- Core Curriculum, Construction Craft Laborer Level One

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from [www.nccereric.com](http://www.nccereric.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
**Safety Considerations**
This module requires that trainees erect, plumb, and brace a wall form, a column form, and a stair form. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

**Classroom Equipment and Materials**
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- PowerPoint® Presentation Slides
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing vertical formwork (optional)
- TV/DVD player

**Equipment and Materials for Laboratories and Performance Testing**
- Personal protective equipment:
  - Eye protection
  - Hand protection
  - Hard hat
  - Work boots
  - Assembly hardware
  - Assorted steel and wood panel system components, including spreader tie pins, alignment and plate clamps, 2-wedge bolts, and 2-pipe aligner hooks
  - Bracing
  - Clamps
  - Cleats
  - Concrete
  - Copies of 29 CFR 1926.703
  - Copies of a job hazard analysis (JHA) for a project involving the use of a personal fall arrest system (PFAS)
  - Copies of construction drawings with design instructions
  - Copies of manufacturer’s specifications for plastic form systems
  - Copies of one or more of Concrete Network’s publications *Concrete Stamping Today*, *Concrete Staining Today*, *Concrete Overlays Today*, and *Concrete Polishing Today*

- Copies of the manufacturer’s instructions for form sections
- Copies of the manufacturer’s specifications for a door, window, or other opening
- Copies of the Scaffold, Shoring, and Forming Institute, Inc.’s publication *Guide to Safety Procedures for Vertical Concrete Formwork*
- Copies of the section of the local applicable building code that addresses requirements for stairways
- Form panels
- Form ties
- Levels
- Lifting equipment such as a forklift
- Nosing bars
- Plumb bobs
- Rebar pins
- Release agent
- Reveals
- Riser boards
- Shop drawings for a form
- Spreaders
- Stakes
- Strongbacks
- Walers

**Additional Resources and References**
This module presents thorough resources for task training. The following resource material is suggested for further study:

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

There are a number of online resources available for trainees who would like more information on vertical formwork. A search for additional information may be assigned as homework to interested trainees.
Session Outline for 27308-13
VERTICAL FORMWORK

The lesson plan for this module is divided into nine 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

SESSIONS ONE AND TWO

Sessions One and Two introduce the basic types of concrete wall forms.

1. Show Sessions One and Two PowerPoint® presentation slides.
2. Introduce trainees to the fundamentals of planning formwork and the cost-efficiencies related to planning.
3. Introduce trainees to the different types of forms, parts, and accessories used in installing concrete wall forms.
4. Introduce trainees to the different types of panel form systems commonly used in construction.
5. Introduce trainees to the different types of gang forms commonly used in construction.

SESSIONS FOUR AND FIVE

Sessions Four and Five introduce how to properly assemble and set forms.

1. Show Sessions Four and Five PowerPoint® presentation slides.
2. Introduce trainees to the fundamentals of assembling and setting forms.
3. Introduce trainees to the steps involved in assembling forms.
4. Introduce trainees to the steps involved in lifting forms and moving them into place on a foundation.
5. Introduce trainees to the procedures for erecting, plumbing, and bracing a wall form.

SESSION SIX

Session Six introduces the types of column forms.

1. Show Session Six PowerPoint® presentation slides.
2. Introduce trainees to the fundamentals of column forms.
3. Introduce trainees to the characteristics and applications of fiber and steel column forms.
4. Introduce trainees to the characteristics and applications of job-built column forms.
5. Introduce trainees to the procedures for erecting, plumbing, and bracing a column form.
**SESSION SEVEN**

Session Seven introduces the applications of vertical slipforming.

1. Show Session Seven PowerPoint® presentation slides.
2. Discuss the fundamentals of vertical slipforming.
3. Introduce trainees to the various components of slip-form systems.
4. Introduce trainees to the purpose and characteristics of climbing forms.
5. Introduce trainees to the requirements for stairways and handrails as specified by the International Building Code® and the International Residential Code®.
6. Introduce trainees to the procedures for erecting, plumbing, and bracing a stair form.

**SESSION EIGHT**

Session Eight introduces vertical architectural and specialty forms.

1. Show Session Eight PowerPoint® presentation slides.
2. Introduce trainees to the function and options available for architectural concrete.
3. Introduce trainees to the methods used to create a smooth finish.
4. Introduce trainees to the fundamentals of creating textured surfaces.
5. Introduce trainees to the use of insulating concrete forms in forming concrete structures.

**SESSION NINE**

Session Nine is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Eight.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
# Materials Checklist for Module 27308-14, Vertical Formwork

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Assembly hardware</th>
<th>Nosing bars</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td>Assorted steel and wood panel system components, including spreader tie pins, alignment and plate clamps, 2-wedge bolts, and 2-pipe aligner hooks</td>
<td>Copies of the manufacturer’s specifications for a door, window, or other opening</td>
</tr>
<tr>
<td>Eye protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand protection</td>
<td>Copies of a job hazard analysis (JHA) for a project involving the use of a personal fall arrest system (PFAS)</td>
<td>Copies of the Scaffolding, Shoring, and Forming Institute, Inc.'s publication <em>Guide to Safety Procedures for Vertical Concrete Formwork</em></td>
</tr>
<tr>
<td>Hard hat</td>
<td>Copies of construction drawings with design instructions</td>
<td>Copies of the section of the local applicable building code that addresses requirements for stairways</td>
</tr>
<tr>
<td>Work boots</td>
<td>Copies of the manufacturer’s instructions for form sections</td>
<td>Copies of manufacturer’s specifications for plastic form systems</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Copies of one or more of Concrete Network’s publications <em>Concrete Stamping Today</em>, <em>Concrete Staining Today</em>, <em>Concrete Overlays Today</em>, and <em>Concrete Polishing Today</em></td>
<td>Plumb bobs</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Bracing</td>
<td>Rebar pins</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Clamps</td>
<td>Release agent</td>
</tr>
<tr>
<td>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</td>
<td>Cleats</td>
<td>Reveals</td>
</tr>
<tr>
<td>Computer</td>
<td>Concrete</td>
<td>Riser boards</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Copies of 29 CFR 1926.703</td>
<td>Shop drawings for a form</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing vertical formwork (optional)</td>
<td>Form panels</td>
<td>Spreaders</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Form ties</td>
<td>Stakes</td>
</tr>
<tr>
<td></td>
<td>Levels</td>
<td>Strongbacks</td>
</tr>
<tr>
<td></td>
<td>Lifting equipment such as a forklift</td>
<td>Walers</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 27309-14 describes elevated decks and formwork systems and methods used in their construction. The text 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.

**Objectives**

**Learning Objective 1**
- Identify safety hazards associated with elevated deck formwork.

**Learning Objective 2**
- Identify the various types of structural-concrete floor and roof slabs.
  a. Describe how one-way solid slabs are constructed.
  b. Describe how two-way flat slabs are constructed.
  c. Explain the difference between two-way flat plate slabs and two-way flat slabs.
  d. Describe how one-way joist slabs are constructed.
  e. Describe how two-way joist slabs are constructed.
  f. Describe how composite slabs are constructed.
  g. Describe how posttensioned concrete slabs are constructed.

**Learning Objective 3**
- Describe the different types of form systems.
  a. Describe applications for pan forms.
  b. Describe applications for I-joist pan forms.
  c. Describe applications for one- and two-way beam and slab forms.
  d. Describe applications for flat-slab or flat-plate forms.
  e. Describe applications for composite-slab deck forms.

**Learning Objective 4**
- Identify types of elevated decks.
  a. List the materials used for deck surfaces.
  b. Explain the use of hand-set multicomponent decks.
  c. Describe applications for hand-set panelized decks.
  d. Explain the use of outriggers.
  e. Describe applications for flying decks.

**Learning Objective 5**
- Identify the different types of shores and describe applications for each.
  a. Explain how adjustable wood shores are installed.
  b. Explain how manufactured shores are installed.

**Learning Objective 6**
- Identify specialty form systems.
  a. Explain how bridge decks are formed.
  b. Explain how tunnels and culverts are formed.

**Performance Tasks**

**Performance Task 1 (Learning Objective 4)**
- Erect, plumb, brace, and level a hand-set deck form.

**Performance Task 2 (Learning Objective 4)**
- Install edge forms, including instructor-selected blockouts, embedments, and bulkheads.

**Teaching Time: 15 hours**
(Six 2.5-hour Classroom Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Prerequisites**

*Core Curriculum; Construction Craft Laborer Level One*

**Before You Begin**

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
### Safety Considerations

This module requires that trainees erect a hand-set deck form and install edge forms. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

#### Classroom Equipment and Materials

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- *Construction Craft Laborer Level Two* PowerPoint® Presentation Slides
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing horizontal formwork (optional)
- TV/DVD player

#### Equipment and Materials for Laboratories and Performance Testing

- Personal protective equipment
- ANSI-approved footwear
- Gloves
- Hard hat
- Safety glasses
- Adjustment screws
- Baseplates
- Bracing materials
- Copies of 29 CFR 1926.703
- Copies of, or extracts from, American Concrete Institution (ACI) publication 347.3R-13, *Guide to Formed Concrete Surfaces*
- Copies of section of the local applicable building code that addresses shoring systems
- Edge forms
- Extension devices
- Hand tools
- Joists
- Levels
- Manufacturers’ literature on flying decks
- Manufacturers’ literature on shoring metal post shores
- Plyform®
- Reshoring spring
- Samples of exterior grade plywood
- Shore heads
- Shoring deck systems
- Stringers
- Strongbacks
- Unlabeled copies of Figures 18 and 21
- Walers
- Wood shores

#### Additional Resources and References

This module presents thorough resources for task training. The following resource material is suggested for further study:

- American Concrete Institute (ACI). [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)

There are a number of online resources available for trainees who would like more information on horizontal formwork. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into six 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces elevated decks and formwork safety.

1. Show Session One PowerPoint® presentation slides.
2. Introduce trainees to the safety hazards associated with elevated deck formwork.
3. Introduce trainees to the various types of structural-concrete floor and roof slabs.

**SESSION TWO AND THREE**

Session Two introduces elevated deck formwork.

1. Show Sessions Two and Three PowerPoint® presentation slides.
2. Introduce trainees to the different types of form systems.

**SESSION FOUR**

Session Four introduces elevated decks.

1. Show Session Four PowerPoint® presentation slides.
2. Introduce trainees to the different types of elevated decks.
3. Introduce trainees to the steps required to erect, plumb, brace, and level a handset deck form.
4. Introduce trainees to the steps required to install edge forms.

**SESSION FIVE**

Session Five introduces shoring and specialty formwork.

1. Show Session Five PowerPoint® presentation slides.
2. Introduce trainees to the different types of shoring, and describe applications for each.

**SESSION SIX**

Session Six is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Five.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 27309-14, Horizontal Formwork

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Red</th>
<th>Blue</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustment screws</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturers’ literature on shoring</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>ANSI-approved footwear</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Baseplates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal post shores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gloves</strong></td>
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<tr>
<td>Bracing materials</td>
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<td></td>
<td></td>
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<tr>
<td>Plyform®</td>
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<td></td>
</tr>
<tr>
<td><strong>Hard hat</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of 29 CFR 1926.703</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reshoring spring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety glasses</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of, or extracts from, American Concrete Institution (ACI) publication 347.3R-13, <em>Guide to Formed Concrete Surfaces</em></td>
<td></td>
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</tr>
<tr>
<td>Samples of exterior grade plywood</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Whiteboard/chalkboard</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of section of the local applicable building code that addresses shoring systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shore heads</td>
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<td><strong>Markers/chalk</strong></td>
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<td>Edge forms</td>
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<td>Shoring deck systems</td>
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<td><strong>Pencils and paper</strong></td>
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<td><strong>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</strong></td>
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<td>Hand tools</td>
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<td>Strongbacks</td>
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<td><strong>Computer</strong></td>
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<td>Joists</td>
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<tr>
<td>Unlabeled copies of Figures 18 and 21</td>
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<tr>
<td><strong>Copies of the Module Examination and Performance Profile Sheets</strong></td>
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<td>Levels</td>
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<td>Walers</td>
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<tr>
<td><strong>Vendor-supplied videos/DVDs showing horizontal formwork (optional)</strong></td>
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<tr>
<td>Manufacturers’ literature on flying decks</td>
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<tr>
<td>Wood shores</td>
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<tr>
<td><strong>TV/DVD player</strong></td>
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</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 75123-13 covers the safety hazards and precautions necessary when working near heavy equipment. It also covers the general safety requirements for the use of forklifts and cranes.

Objectives

**Learning Objective 1**
- Explain the general guidelines for working safely around heavy equipment.
  - State the general guidelines for job-site safety.
  - State the guidelines for the safe operation of heavy equipment.

**Learning Objective 2**
- Explain the general guidelines for forklift safety.
  - Describe the safe operation of a forklift.
  - State the general guidelines for safe load handling.

**Learning Objective 3**
- Explain the general guidelines for crane safety.
  - State the guidelines for working safely around power lines.
  - Describe various site hazards and restrictions.

Performance Tasks
This is a knowledge-based module; there are no performance tasks.

Teaching Time: 5 hours
(Two 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70% or above for the written examination.
Safety Considerations
This module may require that participants visit job sites. Participants should be carefully observed to ensure that they wear the proper PPE and follow site-specific safety practices.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Construction Craft Laborer Level Two PowerPoint®
Presentation Slides
DVD player
LCD projector and screen
Computer
Copies of the Module Examination

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.


There are a number of online resources available for participants who would like more information on heavy equipment, forklifts, and cranes. A search for additional information may be assigned as homework to interested participants.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the internet, make personal videos, and take photos related to the safe use of heavy equipment, forklifts, and cranes and add them to the PowerPoint® presentation throughout the program.
The Lesson Plan for this module is divided into two 2.5-hour classroom sessions. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

**Session Outline for 75123-13**

**HEAVY EQUIPMENT, FORKLIFT, AND CRANE SAFETY**

Session One covers the safety hazards and precautions required when working near heavy equipment.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get participants engaged and focused on the hazards of working near heavy equipment and forklifts.
3. Explain the general guidelines for working safely around heavy equipment.
4. Discuss the general guidelines for job-site safety.
5. Discuss the general guidelines for the safe operation of heavy equipment.

**Session Two**

Session Two covers the safety hazards and precautions required when working near forklifts and cranes. This session also includes the module review and testing. Have participants complete the Module Review Questions. Go over the Module Review Questions in class prior to the exam and answer any questions that the participants may have.

1. Show the Session Two PowerPoint® presentation.
2. Describe the safe operation of a forklift.
3. Discuss the general guidelines for safe load handling.
4. Explain the general guidelines for working safely around cranes.
5. Discuss the general guidelines for working safely around power lines.
6. Have participants complete the written examination.
7. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 75123-13, Heavy Equipment, Forklift, and Crane Safety

<table>
<thead>
<tr>
<th><strong>Personal protective equipment:</strong></th>
<th><strong>Equipment and Materials</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
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<td>Markers/chalk</td>
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<td>Pencils and paper</td>
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<td><em>Construction Craft Laborer Level Two PowerPoint®</em> Presentation Slides</td>
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<td>DVD player</td>
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<td>LCD projector and screen</td>
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<td>Computer</td>
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<tr>
<td>Copies of the Module Examination</td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 75110-13 covers common safety precautions related to steel-erection work, including controlled decking zones, hazardous materials and equipment precautions, tool safety, and appropriate personal protective equipment.

**Objectives**

**Learning Objective 1**
- Identify the safety concerns related to steel erection.
  - Identify common safety hazards associated with steel-erection jobs.
  - Explain the safeguards that are required to prevent injury and equipment/property damage.

**Performance Tasks**
This is a knowledge-based module; there are no performance tasks.

**Teaching Time: 2.5 hours**
(One 2.5-Hour Classroom Session)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Before You Begin**
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination.
Safety Considerations
This module may require that participants visit job sites. Participants should be carefully observed to ensure that they wear the proper PPE and follow site-specific safety practices.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Construction Craft Laborer Level Two PowerPoint® Presentation Slides
DVD player
LCD projector and screen
Computer
Copies of the Module Examination

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.


There are a number of online resources available for participants who would like more information on steel erection. A search for additional information may be assigned as homework to interested participants.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the internet, make personal videos, and take photos related to the steel-erection trade and add them to the PowerPoint® presentation throughout the program.
Session Outline for 75110-13

STEEL ERECTION

The Lesson Plan for this module covers one 2.5-hour classroom session. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

SESSION ONE

Session One covers the safety hazards and precautions related to steel-erection work.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get participants engaged and focused on the potential hazards of steel-erection work.
3. Identify common safety hazards associated with steel-erection jobs.
4. Explain the safeguards that are required to prevent injury and equipment/property damage.
5. Have participants complete the written examination.
6. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 75110-13, Steel Erection

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
</tr>
</thead>
</table>

**Personal protective equipment:**

- None

- Whiteboard/chalkboard

- Markers/chalk

- Pencils and paper

- Construction Craft Laborer Level Two PowerPoint® Presentation Slides

- DVD player

- LCD projector and screen

- Computer

- Copies of the Module Examination

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 75121-13 describes the basic precautions necessary to avoid electrical shock, arc, and blast hazards. It also describes the lockout/tagout procedure.

**Objectives**

**Learning Objective 1**
- Identify the risks associated with working around electricity.
  - Describe the effects of electrical shock, arc, and blast.
  - Describe common power cord hazards.
  - Describe the hazards of working near overhead lines.
  - Explain how to minimize the risks associated with work around electricity.

**Learning Objective 2**
- Describe the lockout/tagout procedure for all energy sources associated with a device or process.
  - Identify the steps in a typical lockout/tagout procedure.
  - Identify situations under which emergency removal of a lockout may be required.

**Performance Tasks**

**Performance Task 1 (Learning Objective 2)**
- Demonstrate how to properly use a lockout/tagout device.

---

**Teaching Time: 5 hours**
(Two 2.5-Hour Classroom Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Before You Begin**

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**

This module may require that participants visit job sites. Participants should be carefully observed to ensure that they wear the proper PPE and follow site-specific safety practices.

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**Classroom Equipment and Materials**

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- PowerPoint® Presentation Slides
- DVD player
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets

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**Equipment and Materials for Laboratories and Performance Testing**

- Portable electric drill with grounded plug
- Access to a de-energized panelboard
- Locks and tags

---

**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.


There are a number of online resources available for participants who would like more information on electrical safety. A search for additional information may be assigned as homework to interested participants.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the internet, make personal videos, and take photos related to electrical safety and add them to the PowerPoint® presentation throughout the program.
Session Outline for 75121-13

ELECTRICAL SAFETY

The Lesson Plan for this module is divided into two 2.5-hour classroom sessions. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

**SESSION ONE**

Session One covers the safety hazards and precautions required when working around electricity.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get participants engaged and focused on the potential hazards of electricity.
3. Discuss the effects of electrical shock, arc, and blast.
4. Describe common power cord hazards.
5. Discuss the hazards of working near overhead lines.
6. Explain the precautions necessary to minimize risks when working around electricity.

**SESSION TWO**

Session Two covers the lockout/tagout procedure. This session also includes the module review and testing. Have participants complete the Module Review Questions. Go over the Module Review Questions in class prior to the exam and answer any questions that the participants may have.

1. Show the Session Two PowerPoint® presentation.
2. Discuss the importance of lockout/tagout when working near any energy sources.
3. Demonstrate the lockout/tagout procedure.
4. Explain what measures must be taken for emergency removal of a lockout/tagout device.
5. Demonstrate how to properly use a lockout/tagout device to satisfy Performance Task 1.
6. Have participants complete the written examination.
7. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 75121-13, Electrical Safety

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
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</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
</tr>
<tr>
<td>Portable electric drill with grounded plug</td>
</tr>
<tr>
<td>Access to a de-energized panelboard</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
</tr>
<tr>
<td>Locks and tags</td>
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<tr>
<td>Markers/chalk</td>
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<tr>
<td>Pencils and paper</td>
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<tr>
<td><strong>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</strong></td>
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<tr>
<td>DVD player</td>
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<tr>
<td>LCD projector and screen</td>
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<tr>
<td>Computer</td>
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<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 27406-14 describes various pieces of equipment commonly used at a construction site, including the aerial lift, skid-steer loader, electric power generator, compressor, compactor, forklift, and backhoe. The module provides an overview of general safety, operation, and maintenance procedures for each type of equipment.

Objectives

Learning Objective 1

1. State the safety precautions associated with construction equipment.
   a. Identify safety precautions when transporting construction equipment.
   b. Identify safety precautions related to interlocking and hydraulic systems.
   c. Identify safety precautions to observe when fueling construction equipment.
   d. Identify safety precautions related to batteries of construction equipment.

Learning Objective 2

2. Identify and explain the safe operation and use of various pieces of construction equipment.
   a. Explain the safe operation of aerial lifts.
   b. Explain the safe operation of skid-steer loaders.
   c. Explain the safe operation of generators.
   d. Explain the safe operation of compressors.
   e. Explain the safe operation of compactors.
   f. Explain the safe operation of forklifts.
   g. Explain the safe operation of backhoes.

Performance Tasks

This is a knowledge-based module; there are no required performance tasks.

Teaching Time: 7.5 hours

(Three 2.5-hour Classroom sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites

Core Curriculum; Construction Craft Laborer Level One

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination.

Important Note: The Core Curriculum Basic Safety module and the Safety Review Questions at the back of the Trainee Guide must be successfully completed before a trainee can operate any type of construction equipment.

Instructors may wish to establish a relationship with a local equipment rental facility that will allow the class to visit and observe demonstrations of the equipment covered in this module.
**Safety Considerations**
This module requires that trainees work in and around construction equipment. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

**Classroom Equipment and Materials**
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- *Construction Craft Laborer Level Two*
- PowerPoint® Presentation Slides
- Computer
- Copies of the Module Examination
- Vendor-supplied videos/DVDs showing construction equipment (optional)
- TV/DVD player

**Equipment and Materials for Laboratories and Performance Testing**
- Personal protective equipment:
  - Hard hat
  - Safety glasses
  - Safety shoes
  - Personal fall arrest system
- Aerial lift
- Air compressor
- Backhoe
- Blank copies of the following forms:
  - Forklift operator’s daily checklist
  - Generator preventive maintenance schedule
  - Aerial lift maintenance and inspection schedule
  - Skid-steer loader service schedule
- Cam-operated twist locks
- Copy of Subpart O (Motor Vehicles, Mechanized Equipment, and Marine Operations) of OSHA construction regulations
- Flat-plate compactor
- Forklift
- Generator
- Operator’s manual for aerial lift or skid-steer loader
- Photographs of the following types of construction equipment:
  - Aerial lift
  - Air compressor
  - Backhoe
  - Compactor
  - Forklift
  - Generator
  - Skid-steer loader
- Set of construction drawings for a small commercial building
- Skid-steer loader
- Whip checks

**Additional Resources and References**
This module presents thorough resources for task training. The following resource material is suggested for further study:


There are a number of online resources available for trainees who would like more information on construction equipment. A search for additional information may be assigned as homework to interested trainees.
Session Outline for 27406-14

INTRODUCTION TO CONSTRUCTION EQUIPMENT

The lesson plan for this module is divided into three 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces general construction equipment safety and describes the use of aerial lifts and skid-steer loaders.

1. Show Session One PowerPoint® presentation slides.
2. Identify general safety precautions associated with construction equipment.
3. Discuss how to safely operate an aerial lift.
4. Discuss how to safely operate a skid-steer loader.

**SESSION TWO**

Session Two introduces generators, air compressors, compactors, forklifts, and backhoes.

1. Show Session Two PowerPoint® presentation slides.
2. Discuss how to safely operate a generator.
3. Discuss how to safely operate a compressor.
4. Discuss how to safely operate a compactor.
5. Discuss how to safely operate a forklift.
6. Discuss how to safely operate a backhoe.

**SESSION THREE**

Session Three is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Two.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination.
2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 27406-14, Introduction to Construction Equipment

<table>
<thead>
<tr>
<th>Personal protective equipment:</th>
<th>Equipment and Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard hat</td>
<td>Aerial lift</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Blank copy of a generator preventive maintenance schedule</td>
</tr>
<tr>
<td>Safety shoes</td>
<td>Blank copy of a forklift operator's daily checklist</td>
</tr>
<tr>
<td>Personal fall arrest system</td>
<td>Blank copy of skid-steer loader service schedule</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Copy of Subpart O (Motor Vehicles, Mechanized Equipment, and Marine Operations) of OSHA construction regulations</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Set of construction drawings for small commercial building</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Operator's manual for aerial lift or skid-steer loader</td>
</tr>
<tr>
<td>Construction Craft Laborer Level Two</td>
<td>Flat-plate compactor</td>
</tr>
<tr>
<td>PowerPoint® Presentation Slides</td>
<td>Photograph of aerial lift</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Skid-steer loader</td>
</tr>
<tr>
<td>Computer</td>
<td>Whip checks</td>
</tr>
<tr>
<td>Copies of the Module Examination</td>
<td>Photograph of skid-steer loader</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for 22206-13

ROUGH-TERRAIN FORKLIFTS

The Trainee Guide for *Heavy Equipment Operations Level Two* is available as a NCCERconnect e-book. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

Module 22206-13 provides training on the primary components of a rough-terrain forklift, prestart inspections, preventive maintenance, and the proper operating procedures. Common procedures used by forklift and telehandler operators on site are also presented.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Performance Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Objective 1</strong></td>
<td><strong>Performance Task 1</strong> (Learning Objective 2)</td>
</tr>
<tr>
<td>Identify and describe the components of a rough-terrain forklift.</td>
<td>Complete a proper prestart inspection and maintenance on a rough-terrain forklift.</td>
</tr>
<tr>
<td>a. Identify and describe chassis components.</td>
<td><strong>Performance Task 2</strong> (Learning Objective 3)</td>
</tr>
<tr>
<td>b. Identify and describe the controls.</td>
<td>Perform proper startup, warm-up, and shutdown procedures on a rough-terrain forklift.</td>
</tr>
<tr>
<td>c. Identify and describe the instrumentation.</td>
<td><strong>Performance Task 3</strong> (Learning Objective 3)</td>
</tr>
<tr>
<td>d. Identify and describe the attachments.</td>
<td>Execute basic maneuvers with a rough-terrain forklift.</td>
</tr>
<tr>
<td><strong>Learning Objective 2</strong></td>
<td><strong>Performance Task 4</strong> (Learning Objective 3)</td>
</tr>
<tr>
<td>Describe the prestart inspection requirements for a rough-terrain forklift.</td>
<td>Interpret a forklift load chart.</td>
</tr>
<tr>
<td>a. Describe prestart inspection procedures.</td>
<td><strong>Performance Task 5</strong> (Learning Objective 3)</td>
</tr>
<tr>
<td>b. Describe preventive maintenance requirements.</td>
<td>Perform basic lifting operations with a rough-terrain forklift.</td>
</tr>
<tr>
<td><strong>Learning Objective 3</strong></td>
<td><strong>Performance Task 6</strong> (Learning Objective 3)</td>
</tr>
<tr>
<td>Describe the startup and operating procedures for a rough-terrain forklift.</td>
<td>Demonstrate proper parking of a rough-terrain forklift.</td>
</tr>
<tr>
<td>a. State rough-terrain forklift-related safety guidelines.</td>
<td></td>
</tr>
<tr>
<td>b. Describe startup, warm-up, and shutdown procedures.</td>
<td></td>
</tr>
<tr>
<td>c. Describe basic maneuvers and operations.</td>
<td></td>
</tr>
<tr>
<td>d. Describe related work activities.</td>
<td></td>
</tr>
</tbody>
</table>

**Teaching Time: 22.5 hours**

(Nine 2.5-Hour Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Prerequisites**

*Core Curriculum; Construction Craft Laborer Level One*

**Before You Begin**

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets for *Heavy Equipment Operations Level Two* from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
Safety Considerations
This module requires trainees to demonstrate how to safely inspect, start, and operate a rough-terrain forklift. Safe working habits in the vicinity of heavy equipment must be emphasized for all trainees. As operators, ensure that trainees observe all required safety precautions before starting and operating the equipment. Performance tasks must be completed under your supervision. Each trainee must use the required PPE and follow safe heavy-equipment operating procedures.

Classroom Equipment and Materials
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- Construction Craft Laborer Level Two PowerPoint® Presentation
- DVD player or a computer with a DVD drive
- Computer with Internet access
- Copies of the Module Examination and Performance Profile Sheets

Equipment and Materials for Laboratories and Performance Testing
- Personal protective equipment:
  - Standard eye protection
  - Gloves
  - Proper footwear as designated by the instructor or training facility provider
  - Hearing protection as designated by the instructor or training facility provider
  - Hard hats
  - Functional rough-terrain forklift and/or telehandler (a telehandler is preferred)
  - A suitable facility to drive the equipment and practice basic work activities
  - Loads to lift and move
  - A method of two-way communication with hands-free characteristics
- Operator’s manual for the equipment in use
- The following fluids and materials for the forklift in use:
  - Fuel
  - Engine oil
  - Hydraulic fluid
  - Water
  - Lubricating grease and grease guns
  - Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of the equipment to be used for demonstration and practice
  - Orange traffic cones
  - Rags

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study.

The Occupational Safety and Health Administration (OSHA) publishes safety requirements for forklifts and related equipment in OSHA Standard 1910.178, found at www.osha.gov. In addition, OSHA offers e-learning tools directly associated with powered industrial trucks. This tool can be found at http://www.osha.gov/dcsp/products/etools/pit/index.html.

There are a number of online resources available for trainees who would like more information on rough-terrain forklifts and other heavy equipment. A search for additional information may be assigned as homework to interested trainees.

An effective way for trainees to see rough-terrain forklifts in action is to shoot your own video at a job site where the forklifts are being used. You can use this video to point out both correct and incorrect operations. Such video can also be used to test the trainees on their knowledge of correct and incorrect operation. For rough-terrain forklifts, this video could include:

- Prestart walk-around inspection
- Startup and shutdown process
- Various work activities in progress

Instructors should view all videos identified in the lesson plan before using them, to ensure their suitability. The videos will provide teachable moments in both proper and improper operation. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper techniques.

Instructors should also consider taking photos of controls and instrumentation inside a rough-terrain forklift cab and adding them to the PowerPoint® presentation. Images from the specific machine the trainees will operate are especially helpful. The use of such images for a review of the controls and instrumentation with trainees is recommended as an exercise in a number of lesson plan sessions.
Session One introduces trainees to rough-terrain forklifts, their primary components, and their common operating controls. This session is designed for the classroom environment only. The use of available video is encouraged.

Session Two covers rough-terrain forklift instrumentation, followed by a discussion of the attachments that can be used. The session concludes with coverage of the various prestart inspection tasks that rough-terrain forklifts require.

It is suggested that instructors begin to focus on the equipment model to be used for demonstration and practice early in the program.

Show Sessions One and Two PowerPoint® slides.

1. Distribute the operator’s manual for the specific equipment to be used in demonstration and practice. Refer to the manual during the session to complement the text and provide a practical example.

Session Three covers the preventive maintenance requirements related to rough-terrain forklifts. A discussion of safety guidelines related to rough-terrain forklifts, along with startup and shutdown procedures follows. The session concludes with a review of basic rough-terrain forklift maneuvers.

Show Session Three PowerPoint® slides.

1. Distribute copies of the operator’s manual for the equipment to be used in demonstration and practice. Refer to the manual during the session to complement the text and provide a practical example.

Session Four introduces load charts related to rough-terrain forklifts. The session concludes with a review of various work activities and the use of rough-terrain forklift attachments.

Show Session Four PowerPoint® slides.

1. Review forklift load charts and how an operator makes use of them during work activities. Demonstrate the use of the load chart and conduct a laboratory with trainees to ensure they know how to use them. Discuss the details of operating a rough-terrain forklift to accomplish various work activities.
Session Outline for 22206-13
ROUGH-TERRAIN FORKLIFTS

SESSIONS FIVE THROUGH EIGHT

Sessions Five through Eight are devoted exclusively to demonstrations, laboratories, and performance tasks. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. The performance tasks to be practiced and/or completed during this session include:

• Complete a proper prestart inspection and maintenance on a rough-terrain forklift.
• Perform proper startup, warm-up, and shutdown procedures.
• Execute basic maneuvers with a rough-terrain forklift.
• Perform basic lifting operations with a rough-terrain forklift.
• Demonstrate proper parking of a rough-terrain forklift.

1. Under your supervision, have trainees practice the requirements of Performance Tasks 1, 2, 3, 5, and 6 as a laboratory. Trainee proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.

2. Download and/or prepare examination materials for the next session.

SESSION NINE

Session Nine is a review and testing session. Have trainees complete the Module Review Questions. (Alternatively, these may be assigned as homework at the end of Session Eight). Answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed by the end of this session.

2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
## Materials Checklist for Rough-Terrain Forklifts, 22206-13

<table>
<thead>
<tr>
<th>Personal protective equipment:</th>
<th>Equipment</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard eye protection</td>
<td>Functional rough-terrain forklift and/or telehandler (a telehandler is preferred)</td>
<td>Any common hand tools (such as a screwdriver or adjustable wrench) that may be required for the general maintenance and inspection of the equipment to be used for demonstration and practice</td>
</tr>
<tr>
<td>Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proper footwear as designated by the instructor or training facility provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing protection as designated by the instructor or training facility provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard hats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>A suitable facility to drive the equipment and practice basic work activities Loads to lift and move</td>
<td>Orange traffic cones</td>
</tr>
<tr>
<td><em>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</em></td>
<td>A method of two-way communication with hands-free characteristics</td>
<td>Rags</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Operator’s manual for the equipment in use</td>
<td></td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>The following fluids and materials for the forklift in use: Fuel Engine oil Hydraulic fluid Water Lubricating grease and grease guns</td>
<td></td>
</tr>
<tr>
<td>Pencils and paper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV/VCR/DVD player (optional)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module 29102-15 introduces the trainees to the methods and procedures of the oxyfuel cutting process. Trainees will learn safety procedures, equipment setup, fuel gas types, flow rates, and techniques. Hands-on practice and the completion of cutting-related Performance Tasks complete the learning process.

### Objectives

#### Learning Objective 1
- Describe oxyfuel cutting and identify related safe work practices.
  - a. Describe basic oxyfuel cutting.
  - b. Identify safe work practices related to oxyfuel cutting.

#### Learning Objective 2
- Identify and describe oxyfuel cutting equipment and consumables.
  - a. Identify and describe various gases and cylinders used for oxyfuel cutting.
  - b. Identify and describe hoses and various types of regulators.
  - c. Identify and describe cutting torches and tips.
  - d. Identify and describe other miscellaneous oxyfuel cutting accessories.
  - e. Identify and describe specialized cutting equipment.

#### Learning Objective 3
- Explain how to setup, light, and shut down oxyfuel equipment.
  - a. Explain how to properly prepare a torch set for operation.
  - b. Explain how to leak test oxyfuel equipment.
  - c. Explain how to light the torch and adjust for the proper flame.
  - d. Explain how to properly shut down oxyfuel cutting equipment

#### Learning Objective 4
- Explain how to perform various oxyfuel cutting procedures.
  - a. Identify the appearance of both good and inferior cuts and their causes.
  - b. Explain how to cut both thick and thin steel.

#### Learning Objective 4 (continued)
- c. Explain how to bevel, wash, and gouge.
- d. Explain how to make straight and bevel cuts with portable oxyfuel cutting machines.

### Performance Tasks

#### Performance Task 1 (Learning Objective 3)
- Set up oxyfuel cutting equipment.

#### Performance Task 2 (Learning Objective 3)
- Light and adjust an oxyfuel torch.

#### Performance Task 3 (Learning Objective 3)
- Shut down oxyfuel cutting equipment.

#### Performance Task 4 (Learning Objective 3)
- Disassemble oxyfuel cutting equipment.

#### Performance Task 5 (Learning Objective 3)
- Change empty gas cylinders.

#### Performance Task 6 (Learning Objective 4)
- Cut shapes from various thicknesses of steel, emphasizing:
  - Straight line cutting
  - Square shape cutting
  - Piercing
  - Beveling
  - Cutting slot

#### Performance Task 7 (Learning Objective 4)
- Perform washing.

#### Performance Task 8 (Learning Objective 4)
- Perform gouging.

#### Performance Task 9 (Learning Objective 4)
- Use a track burner to cut straight lines and bevels.

### Teaching Time: 17.5 hours
(Seven 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites

*Core Curriculum; Construction Craft Laborer Level One*
Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider the time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.

Safety Considerations
This module requires that trainees work with a cutting torch, oxygen, and fuel gases, and very hot materials. Safety must be emphasized at all times. Trainees should be carefully observed to ensure that they wear the proper PPE, follow safe practices, and give due respect to hazards related to oxyfuel cutting equipment. Ensure all trainees use the proper lens tints to avoid eye damage and use the proper type of gloves. Any deficiencies must be corrected to ensure future trainee safety. All practice sessions and performance tasks must be completed under the instructor’s direct supervision.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Construction Craft Laborer Level Two PowerPoint® Presentation
DVD player or a computer with a DVD drive
LCD projector and screen
Computer with Internet access
Selection of usable and non-usable hoses
Pressure regulators
Assorted thin steel pieces cut and exhibiting distortion
Module Review Question and Trade Terms Quiz answer keys
Copies of the Module Examination and Performance Profile Sheets

Equipment and Materials for Laboratories and Performance Testing
Appropriate PPE:
  - Appropriate flame-retardant clothing
  - Safety glasses
  - Welding gloves
  - Appropriate goggles or face shield
  - Proper footwear as designated by the instructor or training facility provider
  - Hearing protection as designated by the instructor or training facility provider
Oxygen cylinder
Fuel gas cylinder
Pressure regulators (oxygen and fuel gas)
Hose set
Cutting torches, combination or one-piece

Appropriate PPE:
  - Assorted torch tips (cutting, washing, and gouging)
  - Cylinder cart
  - Files
  - Squares
  - Tape measure or steel rule
  - Soapstone
  - Common hand tools
  - Chipping hammers
  - Friction lighters
  - Tip cleaners, drills, and files
  - Approved leak testing solution
  - Torch wrenches
  - Sufficient carbon steel plate (≥¼” or 6 mm thick)
  - Sufficient carbon steel plate (<¼” or 6 mm thick)
  - Portable oxyfuel track burner

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study:


There are a number of online resources available for trainees who would like more information on oxyfuel cutting. A search for additional information may be assigned as homework to interested trainees.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. There are a number of accessible videos related to oxyfuel cutting on the Internet. For example, The Harris Products Group, a division of Lincoln Electric, offers well-produced videos related to oxyfuel cutting. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.
Session Outline for 29102-15
OXYFUEL CUTTING

The Lesson Plan for this module is divided into seven 2.5-hour sessions. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

**SESSION ONE**

Session One explains the oxyfuel cutting processes and identifies related safety precautions. Trainees will also be introduced to cylinder handling and storage. This session covers Sections 1.0.0 through 2.3.3.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get trainees engaged and give them an idea of what they will learn from this module.
3. Describe basic oxyfuel or flame cutting processes.
4. Identify safe work practices, including PPE, fire/explosion prevention, and work area ventilation.
5. Identify precautions associated with cylinder handling and storage.
6. Describe how to identify oxyfuel cutting equipment and consumables.
7. Describe how to identify cutting torches and tips.

**SESSION TWO**

Session Two describes how the equipment is used to perform oxyfuel cutting, including the use of various gases, portable units, regulators, hoses, and cutting torches. This session covers Sections 2.4.0 through 3.4.2.

1. Show the Session Two PowerPoint® presentation.
2. Use the Kickoff Activity to review the information covered in the previous session.
3. Describe how to identify the specialized cutting equipment.
4. Describe how to properly prepare a torch for operation.
5. Describe how to leak-test oxyfuel equipment.
6. Describe how to light the torch and adjust for the proper flame.
7. Describe how to properly shut down oxyfuel cutting equipment.
Session Three describes how to set up, light, and shut down oxyfuel equipment. This session covers Sections 4.0.0 through 4.4.3.

1. Show the Session Four PowerPoint® presentation.
2. Describe how to identify good cuts, inferior cuts, and their causes.
3. Describe how to cut thick steel and thin steel.
4. Describe straight, bevel, wash, and gouge techniques.
5. Describe how to make straight and bevel cuts with portable oxyfuel cutting machines.

Sessions Four through Six

Sessions Four through Six are laboratory sessions.

1. Note that no PowerPoint® presentation is associated with this laboratory session.
2. Demonstrate how to set up oxyfuel equipment, light and adjust the oxyfuel torch, and change empty cylinders.
3. Demonstrate cutting shapes in thin and thick steel using the various cutting techniques discussed.
4. Demonstrate how to shut down oxyfuel cutting equipment.
5. Trainees practice and complete the specific tasks required by Performance Tasks 1 through 9.
6. The completion of all Performance Tasks can also be used towards completion of the Performance Accreditation Task.

Session Seven is a review and testing session. Have trainees complete the Module Review Questions and Trade Terms Quiz. Alternatively, these may be assigned as homework at the end of Session Six. Go over the Module Review questions in class prior to the exam and answer any questions that the trainees may have.

1. Have trainees complete the written examination. Any outstanding performance testing must be completed during this session as well.
2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
# Materials Checklist for Module 29102-15, Oxyfuel Cutting

## Equipment and Materials

<table>
<thead>
<tr>
<th>Personal protective equipment:</th>
<th>Selection of usable and non-usable hoses</th>
<th>Pressure regulators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate flame-retardant clothing</td>
<td>Assorted thin steel pieces cut and exhibiting distortion</td>
<td>Pressure regulators (oxygen and fuel gas)</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Fuel gas cylinder</td>
<td>Oxygen cylinder</td>
</tr>
<tr>
<td>Welding gloves</td>
<td>Hose set</td>
<td>Cutting torches, combination or one-piece</td>
</tr>
<tr>
<td>Appropriate goggles or face shield</td>
<td>Assorted torch tips (cutting, washing, and gouging)</td>
<td>Cylinder cart</td>
</tr>
<tr>
<td>Proper footwear as designated by the instructor or training facility provider</td>
<td>Files</td>
<td>Squares</td>
</tr>
<tr>
<td>Hearing protection as designated by the instructor or training facility provider</td>
<td>Tape measure or steel rule</td>
<td>Soapstone</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Common hand tools</td>
<td>Chipping hammers</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Friction lighters</td>
<td>Tip cleaners, drills, and files</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Approved leak testing solution</td>
<td>Torch wrenches</td>
</tr>
<tr>
<td><em>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</em></td>
<td>Sufficient carbon steel plate (≥1/4” or 6 mm thick)</td>
<td>Sufficient carbon steel plate (&lt;1/4” or 6 mm thick)</td>
</tr>
<tr>
<td>DVD player or a computer with a DVD drive</td>
<td>Portable oxyfuel track burner</td>
<td></td>
</tr>
<tr>
<td>Computer with internet access</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module Review Question and TradeTerms Quiz answer keys</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 28301-14

ELEVATED MASONRY

Module 28301-14 describes the activities and techniques involved in organizing and implementing masonry construction in high-rise construction, with an emphasis on safety and logistics.

### Objectives

#### Learning Objective 1
- Identify the proper personal protective equipment and safety precautions related to elevated masonry.
  a. Describe safety precautions related to an elevated work area.
  b. Discuss fall protection related to elevated work areas.

#### Learning Objective 2
- Describe how to properly brace a wall.
  a. Describe how to properly brace a concrete masonry wall for wind.
  b. Describe how to properly brace a wall for backfill.

#### Learning Objective 3
- Describe elevated masonry systems.
  a. List the construction sequence for elevated masonry systems.
  b. Describe how elevated masonry systems are designed.
  c. Identify common exterior walls used for elevated masonry systems.
  d. Identify common interior walls used for elevated masonry systems.

#### Learning Objective 4
- Describe how to properly handle materials at elevations.
  a. Explain safety precautions to be observed when working around cranes.
  b. Explain safety precautions to be observed when working around materials hoists.
  c. Explain safety precautions to be observed when moving and stocking materials.
  d. Explain safety precautions to be observed when working at elevated workstations.
  e. Explain how disposal chutes and waste bins are used when working from elevated workstations.

### Performance Tasks

#### Performance Task 1 (Learning Objective 2)
- Properly brace a wall.

#### Performance Task 2 (Learning Objective 4)
- Demonstrate hand signals used for lifting materials.

### Teaching Time: 15 hours
(Six 2.5-hour classroom sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites

*Core Curriculum, Construction Craft Laborer Level One*

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
Safety Considerations

This module requires that trainees work with fall protection equipment designed for use on elevated surfaces, and power tools. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- *Construction Craft Laborer Level Two* PowerPoint® Presentation Slides
- Computer
- Copies of the Module
- Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing elevated masonry (optional)
- TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

**Personal Protective Equipment:**
- Eye protection
- Gloves
- Hard hat
- Safety shoes
- 2 x 4s and 2 x 6s
- Copies of news stories about masonry wall collapses
- Copies of the OSHA publication “Materials Handling and Storage”
- Hammer
- Handsaw
- Hitch used on a tower crane
- Lanyard with shock absorber
- Local applicable building code
- Local ordinances governing material delivery
- Mobile radios
- Nails
- Samples of structural clay tile
- Secure container designed for the disposal of combustible waste

**The following materials and equipment are recommended, but optional:**
- Buckles, clamps, or ties for tying down loads
- Copies of the OSHA construction regulations
- Copies of, or excerpts from, the Masonry Contractors Association of America’s *Standard Practice for Bracing Masonry Walls under Construction*
- Electrical tool with double insulation
- Examples of flexible anchors
- Ground fault circuit interrupter (GFCI)
- Grounded three-prong plug
- Guardrail
- OSHA-approved fall protection equipment
- Personal fall arrest system
- Portable radios fitted with microphones with noise-canceling features
- Portable radios fitted with microphones without noise-canceling features
- Safety net
- Safety straps for securing loads to hoists
- Stations with loose masonry units of various types and sizes
- Variety of oddly shaped or uncubed materials
Additional Resources and References

This module presents thorough resources for task training. The following resource material is suggested for further study:


“Online Safety Library: Scaffold Safety.” Oklahoma State University. [www.ehs.okstate.edu](http://www.ehs.okstate.edu)


WorkSAFE masonry safety resources. [www.worksafecenter.com](http://www.worksafecenter.com)

There are a number of online resources available for trainees who would like more information on elevated masonry. A search for additional information may be assigned as homework to interested trainees.
Session One introduces trainees to the safety precautions and fall protection that are required when working in an elevated environment.

1. Show Session One PowerPoint® presentation slides.
2. Review the requirements for working safely on a high-rise job.
3. Discuss the personal protective equipment used to ensure work-area safety on a high-rise construction site.
4. Emphasize the electrical and fire hazards that workers may encounter when working on a high-rise construction site, and their prevention.
5. Review the steps required to ensure clean work areas during elevated work.
6. Describe the requirements for the following:
   - Personal fall arrest systems
   - Protection against falling objects
   - Personnel lifts
   - Controlled and limited access zones

Session Two introduces the proper procedures for bracing masonry walls for wind and backfill.

1. Show Session Two PowerPoint® presentation slides.
2. Provide an overview of how to properly brace concrete masonry walls.
3. Explain the requirements for bracing masonry walls for wind.
4. Explain the requirements for bracing masonry walls for backfill.

Sessions Three and Four introduce the design and construction of elevated masonry systems.

1. Show Sessions Three and Four PowerPoint® presentation slides.
2. Review the procedures for identifying and following construction sequences in high-rise masonry construction.
3. Discuss the concepts of building design that masons need to understand when working in elevated conditions.
4. Describe the various types of exterior walls used in high-rise construction and how they are constructed.
5. Discuss the various types of interior walls used in high-rise construction and how they are constructed.
**Session Outline for 28301-14**

**ELEVATED MASONRY**

### Session Five

Session Five introduces safety precautions to be observed when working around cranes and materials hoists, when moving and stocking materials, and when working at elevated workstations. The use of standard hand signals is also presented.

1. Show Session Five PowerPoint® presentation slides.
2. Review the procedures for materials handling and working around cranes in high-rise construction.
3. Describe the verbal modes of communication commonly used in high-rise construction.
4. Describe the nonverbal modes of communication commonly used in high-rise construction.
5. Discuss the requirements for the following:
   - Working around materials hoists
   - Moving and stocking materials in high-rise construction.
   - Safe use of elevated workstations, disposal chutes, and waste bins.

### Session Six

Session Six is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Five.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
# Materials Checklist for Module 28301-14, Elevated Masonry

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Personal protective equipment:</th>
<th>The following materials and equipment are recommended, but optional:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 × 4s and 2 × 6s</td>
<td></td>
</tr>
<tr>
<td>Gloves</td>
<td>Hammer</td>
<td>Buckles, clamps, or ties for tying down loads</td>
</tr>
<tr>
<td>Eye protection</td>
<td>Nails</td>
<td>Guardrail</td>
</tr>
<tr>
<td>Hard hat</td>
<td>Lanyard with shock absorber</td>
<td>Examples of flexible anchors</td>
</tr>
<tr>
<td>Safety shoes</td>
<td>Local ordinances governing material delivery</td>
<td>Safety net</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Copies of the OSHA publication “Materials Handling and Storage”</td>
<td>Portable radios fitted with microphones without noise-canceling features</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Secure container designed for the disposal of combustible waste</td>
<td>Grounded three-prong plug</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Mobile radios</td>
<td>Ground fault circuit interrupter (GFCI)</td>
</tr>
<tr>
<td>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</td>
<td>Handsaw</td>
<td>Copies of the OSHA construction regulations</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Hitch used on a tower crane</td>
<td>Personal fall arrest system</td>
</tr>
<tr>
<td>Computer</td>
<td>Local applicable building code</td>
<td>Electrical tool with double insulation</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheet</td>
<td>Copies of news stories about masonry wall collapses</td>
<td>High-power handheld radios</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing elevated masonry (optional)</td>
<td>Samples of structural clay tile</td>
<td>OSHA-approved fall protection equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variety of oddly shaped or uncubed materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stations with loose masonry units of various types and sizes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety straps for securing loads to hoists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portable radios fitted with microphones with noise-canceling features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Copies of, or excerpts from, the Masonry Contractors Association of America's Standard Practice for Bracing Masonry Walls under Construction</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 75122-13

**WORKING FROM ELEVATIONS**

Module 75122-13 explains the use of fall-protection equipment. It also covers safety precautions related to elevated work surfaces, including ladders, scaffolding, and aerial lifts.

### Objectives

**Learning Objective 1**
- Identify various types of fall-protection equipment.
  - Explain the safety guidelines for personal fall-arrest systems.
  - Explain the safety guidelines for other fall-protection systems.

**Learning Objective 2**
- Identify the safety guidelines for the use of ladders and scaffolding.
  - State the safety requirements for various ladders.
  - State the safety requirements for scaffolding.

**Learning Objective 3**
- State the guidelines for the safe operation of aerial lifts.
  - Identify aerial lift components and operating requirements.
  - Describe the safe operation of scissor lifts.
  - Describe the safe operation of boom lifts.

### Performance Tasks

**Performance Task 1 (Learning Objective 1)**
- Demonstrate how to properly inspect and don fall-protection equipment.

**Performance Task 2 (Learning Objective 2)**
- Demonstrate how to properly inspect a ladder.

### Teaching Time: 5 hours

(Two 2.5-Hour Classroom Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination; performance testing is graded pass or fail.
**Safety Considerations**

This module may require that participants visit job sites. Participants should be carefully observed to ensure that they wear the proper PPE and follow site-specific safety practices.

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**Classroom Equipment and Materials**

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and paper
- Construction Craft Laborer Level Two PowerPoint® Presentation Slides
- DVD player
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets

**Equipment and Materials for Laboratories and Performance Testing**

- Hard hat
- Safety glasses
- Work gloves
- Personal fall-arrest system
- Lanyards with and without shock absorber
- Rope grab
- Lifeline
- Anchor point
- Double-locking snap hook
- Carabiners
- Various ladders, both damaged and undamaged

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**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.

- **Section 5, Ladders and Scaffolding PowerPoint®,** National Association of Home Builders (NAHB), [www.osha.gov](http://www.osha.gov).

There are a number of online resources available for participants who would like more information on safely working from elevations. A search for additional information may be assigned as homework to interested participants.

Instructors should view any videos that may be identified in the lesson plan before using them to ensure their suitability. The videos can provide teachable moments in both proper and improper work processes and behaviors. Be prepared to stop the videos at appropriate times to point out and discuss both proper and improper conduct and techniques.

Instructors are also encouraged to locate additional audiovisual aids available on the internet, make personal videos, and take photos related to working from elevations and add them to the PowerPoint® presentation throughout the program.
The Lesson Plan for this module is divided into two 2.5-hour classroom sessions. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

**Session One**

Session One covers the safety hazards and precautions required when using fall-protection equipment.

1. Show the Session One PowerPoint® presentation.
2. Use the Kickoff Activity to get participants engaged and focused on the hazards of work at elevation.
3. Explain the safety guidelines for personal fall-arrest systems.
4. Demonstrate how to inspect and don fall-protection equipment and have the participants demonstrate how to properly inspect and don fall-protection equipment to satisfy Performance Task 1.
5. Explain the safety guidelines for other fall-protection systems.

**Session Two**

Session Two covers the safety hazards and precautions required when working with ladders, scaffolds, and aerial lifts. This session also includes the module review and testing. Have participants complete the Module Review Questions. Go over the Module Review Questions in class prior to the exam and answer any questions that the participants may have.

1. Show the Session Two PowerPoint® presentation.
2. Identify the safety requirements for various ladders.
3. Demonstrate how to inspect a ladder and have the participants demonstrate how to properly inspect a ladder to satisfy Performance Task 2.
4. Identify the safety requirements for scaffolding.
5. Identify aerial lift components and their operating requirements.
6. Describe the safe operation of scissor lifts.
7. Describe the safe operation of boom lifts.
8. Have participants complete the written examination.
9. Record the testing results on the Registration of Training Modules form, and submit the report to your Training Program Sponsor.
## Materials Checklist for Module 75122-13, Working from Elevations

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Personal protective equipment:</th>
<th>Lifeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard hat</td>
<td>Personal fall-arrest system</td>
<td>Life line</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Lanyards with and without</td>
<td></td>
</tr>
<tr>
<td>Work gloves</td>
<td>shock absorber</td>
<td></td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Various ladders, both</td>
<td></td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>damaged and undamaged</td>
<td></td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Safety glasses</td>
<td>Anchor point</td>
</tr>
<tr>
<td>Construction Craft Laborer Level Two PowerPoint®</td>
<td>Rope grab</td>
<td></td>
</tr>
<tr>
<td>Presentation Slides</td>
<td>Double-locking snap hook</td>
<td></td>
</tr>
<tr>
<td>DVD player</td>
<td>Carabiners</td>
<td></td>
</tr>
<tr>
<td>LCD projector and screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copies of the Module Examination and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Profile Sheets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 70101-15
YOUR ROLE IN THE GREEN ENVIRONMENT

Module 70101-15 covers the impacts of the built environment on the green environment. It introduces methods to reduce negative environment impacts and explains how to apply the principles of a green building rating system.

Objectives

Learning Objective 1
- Select actions to improve your personal environmental impact at home and work.
  a. Describe the major challenges buildings cause directly or indirectly on the green environment.
  b. Identify choices in your personal and work life that impact the green environment.
  c. Prioritize your actions in terms of which ones matter most for the green environment.

Learning Objective 2
- Identify technologies and practices that reduce environmental impacts of a project over its life cycle.
  a. Describe the life cycle phases of a building and its impacts on the green environment.
  b. Identify green site and landscape best practices and describe their pros and cons.
  c. Identify green water and wastewater best practices and describe their pros and cons.

Learning Objective 2 (continued)
- d. Identify green energy best practices and describe their pros and cons.
- e. Identify green materials and waste best practices and describe their pros and cons.
- f. Identify green indoor environment best practices and describe their pros and cons.
- g. Identify green integrated strategies and describe the pros and cons of those alternatives.

Learning Objective 3
- Explain how craft workers can influence and contribute to a project’s Leadership in Energy and Environmental Design (LEED) certification.
  a. Describe the LEED rating process.
  b. Identify construction activities and project features that affect a project’s LEED rating.
  c. List kinds of information collected during construction to support LEED documentation.
  d. Identify common construction pitfalls that affect a project’s LEED rating.

Performance Tasks

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

Teaching Time: 15 hours
(Six 2.5 hour sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites

None.

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the written examinations and performance profile sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70% or above for the written examination.
Classroom Equipment and Materials

- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Construction Craft Laborer Level Two PowerPoint® Presentation Slides
- DVD player or a computer with a DVD drive
- LCD projector and screen
- Computer with Internet access
- Copies of the Module Examination

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study:


There are a number of online resources available for trainees who would like more information on green practices in construction. A search for additional information may be assigned as homework to interested trainees. The following list is a compilation of web sites referenced in this module.

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers: [www.ashrae.org](http://www.ashrae.org)
- Arid Solutions Inc.: [www.aridsolutionsinc.com](http://www.aridsolutionsinc.com)
- Carbon Footprint: [www.carbonfootprint.com](http://www.carbonfootprint.com)
- Database of State Incentives for Renewables & Efficiency: [www.dsireusa.org](http://www.dsireusa.org)
- Energy Star: [www.energystar.gov](http://www.energystar.gov)
- Forest Stewardship Council: [www.fsc.org](http://www.fsc.org)
- Green Building Certification Institute: [www.gbcio](http://www.gbcio)
- Green Building Initiative: [www.thegbi.org](http://www.thegbi.org)
- Green Globes: [www.greenglobes.com](http://www.greenglobes.com)
- Green Seal: [www.greenseal.org](http://www.greenseal.org)
- Green-e: [www.green-e.org](http://www.green-e.org)
- Habitat for Humanity: [www.habitat.org](http://www.habitat.org)
- International Initiative for a Sustainable Built Environment: [www.iisbe.org](http://www.iisbe.org)
- NAHB Research Center: [www.nahbc.org](http://www.nahbc.org)
- Natural Capitalism: [www.natcap.org](http://www.natcap.org)
- Refining Process: [www.myfootprint.org](http://www.myfootprint.org)
- Sheet Metal and Air Conditioning Contractors’ National Association: [www.smacna.org](http://www.smacna.org)
- Smart Communities Network: [www.smartcommunities.ncat.org](http://www.smartcommunities.ncat.org)
- The Carpet and Rug Institute: [www.carpet-rug.org](http://www.carpet-rug.org)
- The PLANTS Database: [www.plants.usda.gov](http://www.plants.usda.gov)
- Unit Conversion: [www.convertunits.com](http://www.convertunits.com)
- US Environmental Protection Agency: Clean Energy [www.epa.gov/cleanenergy](http://www.epa.gov/cleanenergy)
- US Green Building Council: [www.usgbc.org](http://www.usgbc.org)
- WaterSense: [www.epa.gov/watersense](http://www.epa.gov/watersense)
- Whole Building Design Guide: [www.wbdg.org](http://www.wbdg.org)
### Session Outline for 70101-15

#### Your Role in the Green Environment

The Lesson Plan for this module is divided into six 2.5-hour sessions. This time includes 10 minutes for administrative tasks and a 10-minute break per session.

<table>
<thead>
<tr>
<th>Session One</th>
<th>Session Three</th>
<th>Session Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session One introduces students to actions that they can take to improve their personal environmental impact at home and work.</td>
<td>Session Three introduces students to green water, wastewater, energy, materials and waste best practices.</td>
<td>Session Four introduces students to the best practices for green indoor environmental quality and integrated solutions strategies.</td>
</tr>
<tr>
<td>2. Provide an overview of the major environmental challenges caused by buildings.</td>
<td>2. Describe water and wastewater best practices.</td>
<td>2. Identify green indoor environment best practices and complete the improvement opportunity activity.</td>
</tr>
<tr>
<td>3. Select actions to improve personal environmental impact at home and work.</td>
<td>3. Explain energy best practices.</td>
<td>3. Identify green integrated strategies and perform the revised inventory and prioritization activity.</td>
</tr>
<tr>
<td>4. Emphasize the need to prioritize actions in terms of which ones matter most for the green environment.</td>
<td>4. Describe materials and waste best practices.</td>
<td>4. Complete Section 2.0.0 Review Questions.</td>
</tr>
<tr>
<td>5. Complete Section 1.0.0 Review Questions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Two introduces the students to the life cycle phases of buildings and the best practices associated with green site and landscape best practices.</td>
</tr>
<tr>
<td>1. Show Session Two PowerPoint® presentation slides.</td>
</tr>
<tr>
<td>2. Introduce facility life cycle and complete an inventory of the classroom building.</td>
</tr>
<tr>
<td>3. Describe site and landscape best practices and improvement opportunities.</td>
</tr>
</tbody>
</table>
SESSION FIVE

Session Five introduces students to the LEED rating process and the construction activities and project features that affect a project’s LEED rating.

1. Show Session Five PowerPoint® presentation slides.
2. Describe the LEED rating process.
3. Identify construction activities and project features that affect a project’s LEED rating.
4. Complete the LEED green building rating system (checklist demonstration using the classroom building).
5. Describe the goals of the LEED rating system.
6. Complete Section 3.0.0 Review Questions.

SESSION SIX

Session Six introduces students to the documentation that is required for LEED certification and the common construction pitfalls encountered.

1. Show Session Six PowerPoint® presentation slides.
2. List kinds of information collected during construction to support LEED documentation.
3. Identify common construction pitfalls that affect a project’s LEED rating.
4. Have trainees complete the Module Review Questions. Answer any questions that the students may have.
5. Have the students complete the Module Examination.
6. Record the testing results on the Registration of Training Modules Form, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 70101-15, Your Role in the Green Environment

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td>None</td>
</tr>
<tr>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
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<td>Construction Craft Laborer Level Two PowerPoint® Presentation Slides</td>
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<td>DVD player</td>
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<td>Computer with internet access</td>
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<td>LCD projector and screen</td>
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</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.