Utility/Heavy Construction I

8616 36 weeks / 140 hours

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Acknowledgments

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Office of Career, Technical, and Adult Education
Virginia Department of Education

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**Course Description**

**Suggested Grade Level:** 10 or 11

This program provides both the knowledge and the hands-on skills needed to secure a job as a construction equipment operator. Students learn about safety, site grading and development, excavation, drainage and utility structures, pipe laying, and other topics.

*As noted in Superintendent's Memo #058-17 (2-28-2017), this Career and Technical Education (CTE) course must maintain a maximum pupil-to-teacher ratio of 20 students to one teacher, due*
to safety regulations. The 2016-2018 biennial budget waiver of the teacher-to-pupil ratio staffing requirement does not apply.

Task Essentials Table

- Tasks/competencies designated by plus icons (⊕) in the left-hand column(s) are essential
- Tasks/competencies designated by empty-circle icons (⊙) are optional
- Tasks/competencies designated by minus icons (⊖) are omitted
- Tasks marked with an asterisk (*) are sensitive.

<table>
<thead>
<tr>
<th>Task Number</th>
<th>8616</th>
<th>Tasks/Competencies</th>
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<tbody>
<tr>
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<td>Complete the Miss Utility online training. Virginia811</td>
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<tr>
<td><strong>Identifying Heavy Equipment and Its Purposes</strong></td>
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<td>⊕</td>
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<tr>
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<tr>
<td>54</td>
<td>⊕</td>
<td>Lay out a basic earth-moving operation.</td>
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</table>

Legend: ⊕Essential ⊙Non-essential ⊖Omitted

Curriculum Framework

Practicing Safety
Task Number 39

Identify safety equipment used on a construction site.

Definition

Identification should include:

- fire extinguisher
- personal protective equipment (PPE)
- cutoff/kill switch for equipment
- first aid kit
- safety data sheets (SDS)
- protective systems for trenching
- backup alarms
- utility marks
- portable gas monitors.

Process/Skill Questions

- How would one conduct a precheck of equipment?
- How would one conduct a site inspection prior to excavation?

Task Number 40

Identify ground guide hand signals used on a construction site.

Definition

Identification should include:

- stop
- directional
- emergency.

Process/Skill Questions

- What is the importance of knowing ground guide hand signals?
- What is the importance of maintaining visibility between the operator and the person using the hand signals?
- Why should one constantly review current hand signals?
Task Number 41

Earn the Occupational Safety and Health Administration (OSHA) 10-hour card.

Definition

Earning an OSHA 10-hour card will

- confirm that one has acquired 10 hours of safety instruction
- teach one national standards for personal safety within a lab environment
- validate knowledge of safety skills in the industry
- assist workers in becoming more safety-conscious and responsible.

Process/Skill Questions

- What are the benefits of earning the OSHA 10-hour card?
- What is OSHA, and how are its standards validated?
- Why was OSHA established, and how has it evolved?

Task Number 42

Complete the Miss Utility online training. Virginia811

Definition

Completion should include

- excavator computer-based training (website) in English and Spanish
- teacher resources.

Identifying Heavy Equipment and Its Purposes

Task Number 43
Identify the types of heavy equipment.

Definition

Identification could include

- loader
- excavator
- articulated truck
- bulldozer
- skid steer
- backhoe
- grader
- forklift.

Process/Skill Questions

- What are the main components of each machine?
- What is the importance of using the right type of equipment?
- What are the primary uses of various types of heavy equipment?

Task Number 44

Identify different buckets and the purposes of each.

Definition

Identification should include

- types
- uses.

Process/Skill Questions

- When would it be necessary to reduce a bucket size? Increase it?
- How would one determine when a bucket needs to be replaced?

Task Number 45
Describe types of preventive maintenance.

**Definition**

Description should include

- checking greasing
- inspecting fluid levels
- examining cabin filters
- checking positioning
- checking for leaks
- inspecting hoses for wear
- checking wheels and tracks.

**Process/Skill Questions**

- How can one determine whether a grease fitting is accepting grease?
- How often should fluids be checked?

**Becoming Oriented to the Trade**

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**Task Number 46**

**Identify the main types of load binders.**

**Definition**

Identification should include

- binder type
- material type
- binding strength
- tags
- visual inspections
- hooks/safety latches.

Identification should also include knowing how to secure load binders between two rails or hooks.

**Process/Skill Questions**
• What should one look for in a visual inspection?
• Why would it make sense to place binders on the driver’s side of the vehicle?

Task Number 47

Identify the essential operating fluids.

Definition

Identification should include

• engine oil
• diesel exhaust fluid (DEF)
• hydraulics
• fuel
• coolant.

Process/Skill Questions

• What are the differences between the fluids? Where do they go?
• What happens if the wrong type of fluid is used in a particular location?
• How should one explain the process of keeping oil clean?

Task Number 48

Identify essential components of a gasoline or diesel engine.

Definition

Identification should include

• glowplug
• injectors
• exhaust manifold
• injector pump
• radiator
• turbo.

Process/Skill Questions
• What are the major differences between a gasoline and diesel engine?
• What do glowplugs do for a diesel engine?

Task Number 49

Explain how to set up a level.

Definition

Explanation should include

• care of the equipment
• mounting procedure
• setup of legs
• location of instruments
• knob adjustment.

Process/Skill Questions

• How does one set up a level?
• What factor does environment play in setting up a level?

Task Number 50

Describe the process of reading a grade rod.

Definition

Description should include

• reading in incremental feet/tenths
• maintaining consistency
• reading the line of level
• caring for the grade rod
• locking the grade rod.

Process/Skill Questions

• How can one know the grade rod is locked?
• What is the proper way to hold a grade rod?
• What are the consequences of holding the grade rod incorrectly?
Task Number 51

Identify the various pipe sizes and uses.

Definition

Identification should include

- concrete
- plastic
- steel
- ductile iron
- terra cotta
- asbestos
- brick pipe.

Process/Skill Questions

- What is the difference between the bell and the spigot end?
- When would a pressurized or nonpressurized pipe be needed?

Task Number 52

Identify the various drainage and utility structures.

Definition

Identification should include

- manholes
- drop inlets
- pump houses
- junction boxes
- precast structures.

Process/Skill Questions

- What are the differences between cast-in-place and precast structures?
- When would one use a junction box?
Understanding Earth Moving

Task Number 53

**Explain the basic earth-moving operations.**

**Definition**

Explanation should include

- clearing and grubbing
- excavating
- constructing an embankment
- backfilling and compacting
- stockpiling
- erosion control.

**Process/Skill Questions**

- How is each operation performed?
- How are stockpile locations determined?

Task Number 54

**Lay out a basic earth-moving operation.**

**Definition**

Layout should include

- an equipment plan
- a pretask plan
- a travel path.

**Process/Skill Questions**

- What are the hazards associated with not planning?
- What is the benefit of having trucks go in a circle?
**SOL Correlation by Task**

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**Green Building Infusion Units**

The Green Building Infusion Unit (GBIU) was designed to encourage teachers to infuse instructional units on green building knowledge and skills into designated CTE courses. The infusion unit is not mandatory, and, as such, the tasks/competencies are marked as “optional,” to be taught at the instructor’s discretion.

**Entrepreneurship Infusion Units**

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.”
Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- College and Work Readiness Assessment (CWRA+)
- Core: Introductory Craft Skills Entry-Level Assessment
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- Heavy Equipment Operator Level One Entry-Level Assessment
- National Career Readiness Certificate Assessment
- Professional Communications Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.

- Utility/Heavy Construction II (8617/36 weeks, 280 hours)

Career Cluster: Architecture and Construction

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Occupations</th>
</tr>
</thead>
</table>
| Construction | Carpenter  
               Construction and Building Inspector  
               Equipment Operator (EO)  
               General Contractor  
               Heavy Equipment Operator  
               Maintenance Equipment Operator (MEO)  
               Project Manager |