Utility/Heavy Construction II

8617 36 weeks / 280 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: 11 or 12
Prerequisites: 8616
This program provides the knowledge and the hands-on skills needed to secure a job as a construction equipment operator. Students learn about site grading and development, excavation, drainage and utility structures, pipe laying, and other topics. They study soil, learn to read blueprints, and gain experience in operating bulldozers, backhoes, front-end loaders, excavators, and skid steers.

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/Competency List**

- 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>
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<th>Tasks/Competencies</th>
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<tr>
<td>39 ⊕</td>
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<td>Perform backfilling operations.</td>
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<td><strong>Using a Front-End Loader</strong></td>
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<td>44 ⊕</td>
<td>Perform basic safe maneuvers.</td>
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<tr>
<td>45 ⊕</td>
<td>Load a truck.</td>
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<tr>
<td><strong>Understanding Soils</strong></td>
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<tr>
<td>46 ⊕</td>
<td>Identify the three classifications of soil by soil type.</td>
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<tr>
<td>47 ⊕</td>
<td>Identify types of compaction rollers.</td>
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<tr>
<td><strong>Understanding Blueprint Reading (Surveying)</strong></td>
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<tr>
<td>48 ⊕</td>
<td>Identify different drawing types and common parts of a blueprint.</td>
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<td>49 ⊕</td>
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<td><strong>Using a Bulldozer</strong></td>
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<tr>
<td>50 ⊕</td>
<td>Perform a prestart check on a bulldozer.</td>
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<td>51 ⊕</td>
<td>Perform basic maneuvers with a bulldozer.</td>
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<tr>
<td>52 ⊕</td>
<td>Perform grading maneuvers with a bulldozer.</td>
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<tr>
<td><strong>Using an Excavator</strong></td>
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<tr>
<td>53 ⊕</td>
<td>Perform a prestart check on an excavator.</td>
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<td>54 ⊕</td>
<td>Perform basic maneuvers with an excavator.</td>
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<td>55 ⊕</td>
<td>Excavate a trench.</td>
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<td>56 ⊕</td>
<td>Identify how to install a silt fence.</td>
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**Understanding Grades**
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<thead>
<tr>
<th>Task Number</th>
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<tbody>
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<td>57</td>
<td>✪</td>
<td>Identify the marking on stakes.</td>
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<tr>
<td>58</td>
<td>✪</td>
<td>Explain how to check finished subgrade on a cross slope.</td>
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<tr>
<td>Using a Skid-Steer Loader</td>
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<td>59</td>
<td>✪</td>
<td>Perform a prestart check on a skid-steer.</td>
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<tr>
<td>60</td>
<td>✪</td>
<td>Perform basic maneuvers with a skid-steer loader.</td>
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<tr>
<td>61</td>
<td>✪</td>
<td>Perform grading maneuvers with a skid-steer loader.</td>
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</table>

Legend: ✪ Essential 〇 Non-essential تركيز Omitted

Curriculum Framework

Using Backhoes

Task Number 39

Perform a prestart check on a backhoe.

Definition

Performance should include following the checklist in accordance with manufacturer's specifications and instructor's guidelines.

Process/Skill Questions

- What is the importance of conducting a prestart checklist?
- Where are the grease points?

Task Number 40

Perform basic maneuvers with a backhoe.

Definition

Performance should include
• starting
• stopping
• holding grade
• directional movement
• operating outriggers/stabilizing equipment.

Process/Skill Questions

• What are some unsafe maneuvers?
• What are some safe maneuvers?

Task Number 41

Dig a clean trench.

Definition

Digging a clean trench should be done according to all laws and regulations, including ensuring that

• the spoil pile is set at a minimum of 2 feet away from the trench
• the trench is no greater than 3 feet deep.

Process/Skill Questions

• Where should one place the spoil pile?
• At what depth is shoring required?
• What can be done to reduce trench depth?

Task Number 42

Perform backfilling operations.

Definition

Performance should include

• backfilling the soil in lifts
• compacting the soil.
Process/Skill Questions

- What type of soil should be used for backfilling?
- What are the lift levels?

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**Using a Front-End Loader**

**Task Number 43**

**Perform a prestart check on a front-end loader.**

**Definition**

Performance should include following the checklist in accordance with manufacturer's specifications and instructor's guidelines.

**Process/Skill Questions**

- What is the importance of conducting a prestart checklist?
- Where is the counterweight located?

**Task Number 44**

**Perform basic safe maneuvers.**

**Definition**

Performance should include

- starting
- stopping
- transporting material
- moving directionally.

**Process/Skill Questions**

- At what height should material be transferred?
- What steps should be taken if the backup alarm is not working?
Task Number 45

Load a truck.

Definition

Loading a truck should include

- determining the distance for collecting materials
- transferring the material into the truck
- driving to the vehicle
- dumping the material
- operating in a timely manner
- safeguarding against hitting the truck.

Process/Skill Questions

- How can one determine whether the truck is full?
- How should the truck be positioned for loading?

Understanding Soils

Task Number 46

Identify the three classifications of soil by soil type.

Definition

Identification should include descriptions of

- A
- B
- C

Occupational Safety and Health Association (OSHA) soil classification.

Process/Skill Questions
Task Number 47

Identify types of compaction rollers.

Definition

Identification should include

- walk-behind
- sheep’s foot
- soil
- asphalt
- steel wheel
- rubber tire.

Process/Skill Questions

- When is each type of roller used and for what type of material?
- When should one activate the vibration feature, if available?

Understanding Blueprint Reading (Surveying)

Task Number 48

Identify different drawing types and common parts of a blueprint.

Definition
Identification should include

- drainage details
- roadway description
- erosion-control features
- contour lines
- title block
- scale
- general notes and details page.

Process/Skill Questions

- Where are the revisions located on a blueprint?
- Who can make changes to the plans?

Task Number 49

Identify line types, symbols, and abbreviations.

Definition

Identification should include

- line types (e.g., solid, dash, etc.)
- symbols (e.g., silt fencing, structures, check dams)
- abbreviations (e.g., C/F, CE)

Process/Skill Questions

- What are the differences in contour lines?
- What do dash lines indicate?

Using a Bulldozer

Task Number 50

Perform a prestart check on a bulldozer.
Definition

Performance should include following the checklist in accordance with manufacturer's specifications and instructor's guidelines.

Process/Skill Questions

- What is the importance of conducting a prestart checklist?
- Where is the shut-off switch located?

Task Number 51

Perform basic maneuvers with a bulldozer.

Definition

Performance should include

- moving forward and backward
- turning with the blade up
- straight dozing.

Process/Skill Questions

- How can one work on a slope safely?
- How does a six-way blade work?

Task Number 52

Perform grading maneuvers with a bulldozer.

Definition

Performance should include distributing material over a grade.

Process/Skill Questions

- What is the optimal speed for grading?
- What is the importance of ensuring that one has a clear line of sight?
Using an Excavator

Task Number 53

Perform a prestart check on an excavator.

Definition

Performance should include following the checklist in accordance with manufacturer's specifications and instructor's guidelines.

Process/Skill Questions

- What is the importance of conducting a prestart checklist?
- Where is the diesel exhaust fluids (DEF) tank located?

Task Number 54

Perform basic maneuvers with an excavator.

Definition

Performance should include

- moving forward and backward
- making pivot turns
- making spot turns.

Process/Skill Questions

- How can one identify track forward or track backward?
- How many degrees can an excavator turn?

Task Number 55
Excavate a trench.

Definition

Excavation should include making a clean trench with vertical walls and the width of the bucket.

Process/Skill Questions

- Where should spoils be placed?
- What is the importance of keeping the counter-weight clean?

Task Number 56

Identify how to install a silt fence.

Definition

Identification should include

- length
- type
- soil disturbed.

Process/Skill Questions

- Why would one install a silt fence?
- How is the direction of flow determined?

Understanding Grades

Task Number 57

Identify the marking on stakes.
Definition

Identification should include cut/fill offset radius.

Process/Skill Questions

- What is the symbol for cut/fill?
- Where would an offset be used?

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**Task Number 58**

**Explain how to check finished subgrade on a cross slope.**

**Definition**

Explanation should include

- using equipment
- verifying accuracy.

**Process/Skill Questions**

- What instrument would one use to verify the grade?
- How often should grade be checked?

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**Using a Skid-Steer Loader**

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**Task Number 59**

**Perform a prestart check on a skid-steer.**

**Definition**

Performance should include following the checklist in accordance with manufacturer's specifications and instructor’s guidelines.
Process/Skill Questions

- What is the importance of conducting a prestart checklist?
- Where is the attachment disconnected?

Related Standards of Learning

English

11.5
The student will read, interpret, analyze, and evaluate a variety of nonfiction texts including employment documents and technical writing.

a. Apply information from texts to clarify understanding of concepts.
b. Read and correctly interpret an application for employment, workplace documents, or an application for college admission.
c. Analyze technical writing for clarity.
d. Paraphrase and synthesize ideas within and between texts.
e. Draw conclusions and make inferences on explicit and implied information using textual support.
f. Analyze multiple texts addressing the same topic to determine how authors reach similar or different conclusions.
g. Analyze false premises, claims, counterclaims, and other evidence in persuasive writing.
h. Recognize and analyze use of ambiguity, contradiction, paradox, irony, sarcasm, overstatement, and understatement in text.
i. Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions about the text(s).

12.5
The student will read, interpret, analyze, and evaluate a variety of nonfiction texts.

a. Use critical thinking to generate and respond logically to literal, inferential, and evaluative questions about the text(s).
b. Identify and synthesize resources to make decisions, complete tasks, and solve specific problems.
c. Analyze multiple texts addressing the same topic to determine how authors reach similar or different conclusions.
d. Recognize and analyze use of ambiguity, contradiction, paradox, irony, overstatement, and understatement in text.
e. Analyze false premises claims, counterclaims, and other evidence in persuasive writing.

Task Number 60
Perform basic maneuvers with a skid-steer loader.

Definition

Performance should include

- moving directionally
- starting
- stopping.

Performance should also include

- knowing limitations
- understanding proper use
- understanding quick connect and locking it into place.

Process/Skill Questions

- What are the different types of skid-steer loaders?
- How does one know when the bucket is flush?
- When should the cutting edge be replaced?

Task Number 61

Perform grading maneuvers with a skid-steer loader.

Definition

Performance should include distributing material across a grade.

Process/Skill Questions

- What are the consequences of unsafe maneuvers?
- How is float mode activated?

SOL Correlation by Task

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<tr>
<th>Task</th>
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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 I (8616/36 weeks, 140 hours)

Career Cluster: Architecture and Construction

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