Indiana CTE Next Level Programs of Study

Civil Construction Capstone (2025)

Earthmoving, Finishing, and Grading 7240.D1

1. **Discuss the process of planning and executing earthmoving activities on various types of construction projects. Explain the use of heavy equipment such as bulldozers, scrapers, excavators, and loaders.** 7240.D1.1
2. **Examine common types of equipment and instruments used for finish grading; materials and methods used to stabilize soils and control soil erosion; and finishing and grading methods used for various applications.** 7240.D1.2
3. **Examine working in and around excavations, particularly in preparing building foundations.** 7240.D1.3
4. **Describe types and bearing capacities of soils; procedures used in shoring, shielding, and sloping trenches and excavations; trenching safety requirements, including recognition of unsafe conditions; and mitigation of groundwater and rock when excavating foundations.** 7240.D1.4
5. **Describe the operation of plants used to manufacture concrete and asphalt paving and discuss the different types of aggregates.** 7240.D1.5
6. **Analyze paving operations, paving equipment, recycling processes, and quality control requirements for both concrete and hot-mix asphalt paving.** 7240.D1.6
7. **Describe elevated decks and formwork systems and methods used in their construction.** 7240.D1.7
8. **Examine joist, pan, beam and slab, flat slab, composite slab, and specialty form systems and discuss instructions for the use of flying decks, as well as shoring and reshoring systems.** 7240.D1.8
9. **Discuss the applications and construction methods for types of forming and form hardware systems for walls, columns, and stairs, as well as slip and climbing forms. Describe the assembly, erection, and stripping of gang forms.** 7240.D1.9
10. **Draw a plan for basic earthmoving operations and include clearing and grubbing, excavating the foundation, constructing embankments, backfilling, and compacting.** 7240.D1.10

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Lay out a basic earthmoving operation. 7240.D1.11

12 **Identify and select the proper equipment for a given earthmoving operation.** 7240.D1.12

13 **Establish fine grade after a rough grade has been performed, according to instructions.** 7240.D1.13

14 **Draft a job hazard/safety analysis for an excavation according to instructor's specifications.** 7240.D1.14

15 **Demonstrate setting the stringline to establish the grade for concrete slipform paving, correctly set up the slipform paver for operation, perform slipform paving, and perform a concrete slump test.** 7240.D1.15

16 **At the discretion of the instructor, perform hot-mix asphalt paving, also perform a quantitative analysis on the segregation of stone.** 7240.D1.16

17 **Erect, plumb, brace, and level a hand-set deck form.** 7240.D1.17

18 **Install edge forms, including instructor-selected block outs, embedment's, and bulkheads.** 7240.D1.18

19 **Erect, plumb, and brace an instructor-selected wall form.** 7240.D1.19

20 **Erect, plumb, and brace a stair form.** 7240.D1.20

Concrete, Ironwork, and Bridge Construction 7240.D2

1 **Explain the selection and uses of different types of reinforcing materials. Describe requirements for bending, cutting, splicing, and tying reinforcing steel and the placement of steel in footings and foundations, walls, columns, and beams and girders.** 7240.D2.1

2 **Analyze the safety concerns associated with concrete, as well as concrete testing, concrete admixtures, and the proper procedures for placing concrete.** 7240.D2.2

3 **Identify the materials used in steel-framed structures and explain how to read basic structural blueprints.** 7240.D2.3

4 **Discuss the types of construction that utilize structural steel, the components of the structures, and the process involved in erecting a steel structure. Explain the principles of structural stresses and the requirements of bolted connections.** 7240.D2.4

5 **Describe the common types of bridges, along with the components that make up the substructure and superstructure of a bridge. Also discuss the types of materials used in bridge construction, basic surveying equipment and practices, and how to interpret bridge drawings.** 7240.D2.5

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	6	**Describe the types of footings used to support bridges, as well as various types of piles and pile- driving methods. Also discuss safety practices associated with pile driving on land and in marine environments, along with environmental protection issues.** 7240.D2.6
	7	**Identify the forms used to fabricate concrete walls, columns, footings, pile caps, and other bridge structures. Also discuss site-built and manufactured forming systems along with instructions for cleaning and storing forms.** 7240.D2.7
	8	**Attain readiness to take the NCCER Heavy Highway Construction Level 2 certification exams.** 7240.D2.8
	9	**Use appropriate tools to cut and bend reinforcing bars.** 7240.D2.9
	10	**Demonstrate five types of ties for reinforcing bars, along with proper lap splicing.** 7240.D2.10
	11	**Demonstrate the proper placement, spacing, tying, and support for reinforcing bars.** 7240.D2.11
	12	**Identify job plans and drawings used for ironworking jobs.** 7240.D2.12
	13	**Identify ornamental ironwork, general symbols, and welding symbols and applications on ironworking job plans and drawings.** 7240.D2.13
	14	**Describe different uses for structural steel.** 7240.D2.14
	15	**Identify selected types, shapes, and grades of structural steel, including types of structural steel beams.** 7240.D2.15
	16	**Make bolted connections on structural steel.** 7240.D2.16
	17	**Use a bridge plan to explain the details of a project, and perform layout based on a plan sheet.** 7240.D2.17
	18	**Lay out pile locations according to foundation drawings.** 7240.D2.18
	19	**Create templates in accordance with provided drawings.** 7240.D2.19
	20	**Perform a material takeoff for concrete formwork.** 7240.D2.20
	21	**Build a small cap form at least 4’ x 3’ with headers, and include a beam seat, anchor bolts, and pipe block out.** 7240.D2.21
Site Layout 7240.D3	1	**Investigate the site layout trade and related tasks.** 7240.D3.1
	2	**Demonstrate the use of the builder’s level and leveling rods, as well as the quipment and procedures for making distance measurements by taping chaining).** 7240.D3.2

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3 **Explain the elements of professional conduct, safety, and communications.** 7240.D3.3

4 **Describe the aspects of an apprenticeship program and the career path and professional opportunities related to the site layout trade.** 7240.D3.4

5 **Examine the metric system, including how to convert between English and metric system units.** 7240.D3.5

6 **Describe basic concepts for working with formulas and equations, as well as the basic concepts of geometry and right-angle trigonometry.** 7240.D3.6

7 **Describe the use and care of tools and instruments commonly used to perform site survey work.** 7240.D3.7

8 **Discuss the instruments and procedures used for making distance measurements electronically and for performing differential leveling and basic horizontal and vertical angular measurements. Follow guidelines for recording surveying measurement data in field notes.** 7240.D3.8

9 **Discuss the techniques for reading and using blueprints and specifications, with an emphasis placed on those drawings and types of information that are relevant to the site layout trade.** 7240.D3.9

10 **Attain readiness to take NCCER Site Layout certification exams.** 7240.D3.10