HEAVY EQUIPMENT OPERATIONS, 49.0200.00	
1.0	**EXAMINE BASIC HEAVY EQUIPMENT OPERATION**
1.1	Use basic HEO terminology to describe types of heavy equipment and their uses
1.2	Describe the purpose and objectives of an apprenticeship training program
1.3	Identify heavy equipment operator responsibilities
1.4	Identify the personal characteristics of a professional heavy equipment operator
1.5	Identify the importance of safety in relation to heavy equipment
2.0	**PRACTICE HEAVY EQUIPMENT OPERATION SAFETY**
2.1	Demonstrate safety measures when working in and around heavy equipment
2.2	Identify the purposes of specific signs, tags, barricades, and lockout/tagout devices on construction sites
2.3	Identify safeguards used in a highway construction work zone
2.4	Use a material safety data sheet (MSDS) for a hazardous chemical typically associated with heavy equipment to identify the long- and short-term health effects, first-aid measures, handling and storage, and/or required personal protective equipment
2.5	Identify basic and specific safety rules when operating heavy equipment
2.6	Identify general guidelines for safe transportation of heavy equipment
2.7	Identify general dangers of working around an excavation area with heavy equipment
2.8	Identify specific safety rules for operating tractors and hydraulic systems
2.9	Describe the purpose of the Occupational Safety and Health Act (OSHA)
2.10	Identify basic and specific safety rules when using heavy equipment around water
3.0	**IDENTIFY TYPES OF HEAVY EQUIPMENT**
3.1	Identify the various types of heavy equipment used on a construction site
3.2	Identify the primary use (s) of each type of heavy equipment
4.0	**DEMONSTRATE BASIC HEAVY EQUIPMENT OPERATION**
4.1	Identify the basic operational guidelines and techniques for heavy equipment
4.2	Perform basic prestart inspection, startup, operational movement, and shutdown for heavy equipment

4.3	Identify the operating controls of a typical tractor
4.4	Identify safety issues when operating a tractor on slopes or hills
4.5	Start, warm up, and shut down gasoline-powered and diesel-powered engines
4.6	Perform basic maneuvering with heavy equipment
4.7	Connect hydraulic-powered attachments to equipment
5.0	**PERFORM GRADING OPERATIONS**
5.1	Define terms associated with grade work
5.2	Match types of stakes to their use
5.3	Identify markings on grade stakes and benchmark (BM) stakes
5.4	Identify equipment used by a heavy equipment operator to check stakes
5.5	Describe and calculate slope ratio
5.6	Distinguish between backslope and foreslope
5.7	Verify horizontal and vertical distance of cut and fill slope stakes
5.8	Verify finish subgrade on a cross slope
5.9	Define terms associated with plan reading, grade setting, and drainage
5.10	Identify construction industry practices for setting grades from a benchmark
5.11	Identify construction industry practices for setting grades using a laser level or string
5.12	Identify methods for keeping construction sites well drained
5.13	Identify how the grade of a trench and drain pipe is set
5.14	Interpret construction plans to determine grading requirements
6.0	**PERFORM EARTHMOVING OPERATIONS**
6.1	Identify earthmoving equipment
6.2	Identify earthmoving operations
6.3	Explain the need for soil stabilization on a job site

6.4	Identify soil stabilization methods
6.5	Identify the best equipment for performing a given earthmoving operation
6.6	Lay out a basic earthmoving operation
6.7	Demonstrate the use of laser and GPS technology
7.0	**OPERATE A DUMP TRUCK**
7.1	Identify the types of dump trucks and their uses
7.2	Describe the function and operation of the dump hoist, power takeoff unit, auxiliary axle, engine retarder, differential lockout, air brake system, and manual transmission
7.3	Demonstrate and state the steps of the preoperational safety inspection for equipment
7.4	Identify the duties and responsibilities of a dump truck operator
7.5	Identify the controls of a dump truck
7.6	Back up a dump truck with a trailer attached
8.0	**OPERATE A ROLLER**
8.1	Identify the uses of a roller
8.2	Identify the components and controls on a typical roller
8.3	Identify the safety rules for operating a roller
8.4	Perform basic maneuvers with a roller
9.0	**OPERATE A SCRAPER**
9.1	Identify the uses of a scraper
9.2	Identify the components and controls on a typical scraper
9.3	Identify safety rules for operating a scraper
9.4	Perform basic maneuvers with a scraper
10.0	**OPERATE A LOADER**
10.1	Identify the uses of a loader
10.2	Identify the components and controls on a typical loader

10.3	Identify safety rules for operating a loader
10.4	Perform basic maneuvers with a loader
11.0	**OPERATE A FORKLIFT**
11.1	Identify the uses of a forklift
11.2	Identify the components and controls on a typical forklift
11.3	Identify the safety rules for operating a forklift
11.4	Perform basic forklift operations
12.0	**OPERATE A DOZER**
12.1	Identify the uses of a dozer
12.2	Identify the components and controls on a typical dozer
12.3	Identify safety rules for operating a dozer
12.4	Perform dozer prestart inspection and maintenance procedures
12.5	Perform basic maneuvers with a dozer
12.6	Perform basic earthmoving and excavation operations with a dozer
13.0	**OPERATE A BACKHOE**
13.1	Identify types of backhoes
13.2	Identify the components and controls on a typical backhoe
13.3	Identify safety rules for operating a backhoe
13.4	Identify accessories used on a backhoe
13.5	Perform backhoe prestart inspection and maintenance procedures
13.6	Perform basic maneuvers with a backhoe
13.7	Perform basic earthmoving operations with a backhoe
14.0	**OPERATE AN EXCAVATOR**
14.1	Identify types of excavators and their uses

14.2	Identify the components and controls on a typical excavator
14.3	Identify safety rules for operating an excavator
14.4	Perform basic maneuvers with an excavator
14.5	Perform basic earthmoving and excavation operations with an excavator
15.0	**OPERATE A MOTOR GRADER**
15.1	Identify the uses of a motor grader
15.2	Identify types of motor graders and their uses
15.3	Identify the components and controls on a typical motor grader
15.4	Identify safety rules for operating a motor grader
15.5	Identify accessories used on a motor grader
15.6	Perform prestart inspection and maintenance
15.7	Perform basic maneuvers with a motor grader
15.8	Perform basic earthmoving operations with a motor grader
16.0	**COMPLETE FINISHING AND GRADING WORK**
16.1	Identify the requirements for finishing and final grading of earthwork
16.2	Use heavy equipment to perform fine grading and finishing work
16.3	Demonstrate techniques for finish grading of subgrade, base, slopes, parking areas, and drainage structures
17.0	**DEMONSTRATE KNOWLEDGE OF SOILS**
17.1	Identify the characteristics of different types of soils
17.2	Identify the various engineering properties of soil
17.3	Identify factors that affect soil density
17.4	Identify how soil factors affect equipment selection
17.5	Demonstrate wet digging techniques

18.0	**PLAN CONSTRUCTION SITES**
18.1	Identify the three phases of a construction project
18.2	Identify the steps in construction site planning
18.3	Identify the relationship of planning to project safety and success
18.4	Develop a construction site schedule
18.5	Identify costs associated with building a job
18.6	Define production and productivity
18.7	Identify the relationship of productivity and profit
19.0	**PERFORM EXCAVATION MATH**
19.1	Identify basic geometric shapes
19.2	Calculate the surface area of squares, rectangles, triangles, trapezoids, and circles using formulas
19.3	Calculate the volume of cubes, rectangular objects, prisms, and cylinders
19.4	Calculate the excavation volume of a job using information supplied on building plans
19.5	Calculate the weight of materials from an excavation from its volume
20.0	**INTERPRET CIVIL BLUEPRINTS**
20.1	Identify the types of drawings usually included in a set of plans and the information found on each type
20.2	Identify the different types of lines used on drawings
20.3	Recognize common abbreviations and symbols used on plans
20.4	Read and interpret drawings to determine the type of excavations needed to prepare the site
20.5	Identify the operator’s duties to ensure that the job is completed safely and according to a site plan