

**CALIFORNIA APPRENTICESHIP COUNCIL OPERATING ENGINEERS
ADVISORY COMMITTEE MINIMUM INDUSTRY TRAINING CRITERIA**

O*NET CODES:

EQUIPMENTAND LANDSCAPE OPERATOR	47-2073.00
HEAVY DUTY REPAIR PERSON	49-3042.00
PLANT EQUIPMENT OPERATOR	57-9021.00
BUILDING CONSTRUCTION INSPECTOR	47-4011.00
ROCK, SAND & GRAVEL OPERATOR	47-2073.00
DREDGE OPERATOR	53-7031.00

OPERATING ENGINEERS MINIMUM INDUSTRY TRAINING CRITERIA

1. LENGTH OF TRAINING

Program sponsors shall establish a minimum program of not less than 6,000 hours on-the-job training.

2. ON THE JOB

Apprentices shall receive the minimum on-the-job training objectives described in Exhibit "A".

3. RELATED AND SUPPLEMENTAL INSTRUCTION

The required prescribed courses of related and supplemental instruction shall be no less than 144 hours per year. This instruction must include at a minimum, the related and supplemental training processes listed in Exhibit "B".

4. COMPETENCY TESTING

All apprentices must pass minimum level competency tests for all related and supplemental courses before advancement to journeyman status.

5. COMPLETION PERCENTAGES

Program sponsors must have a 45% graduation rate for all apprentices that satisfactorily complete the program's probationary period.

6. REVISIONS

The schedule for revisions to the Operating Engineers industry training criteria shall be in accordance with 212.01 of the California Code of Regulations.

EXHIBIT "A"

ON-THE-JOB TRAINING

**A. Equipment and Landscape Operator (EQO)
Plant Equipment Operator (PEO)**

**O*Net Code 47-073.00
O*Net Code 57-9021.00**

The major on-the-job training processes in which the EQO-PEO apprentices will be trained shall include a minimum of 6,000 hours in one or more of the following areas:

1. Safety training in working around other equipment and workers on the ground. Pot-Holing operations using earthmoving equipment for the location of underground utilities and structures.
2. Track type equipment: Dozers, push cats, crawler loaders track-type backhoes, all types of paving machines, screedman, including CTB machines, tractor-drawn scrapers, track -type trenching & boring equipment, and small hydraulic pile driving equipment.
3. Rubber-tire-type equipment: Scrapers, rubber-tire loader, rubber-tire backhoes, all compactors, combination backhoe loader, blade, hot roller and rubber-tired trenchers.
4. Hoisting-type equipment: Cranes (both crawler-mounted and rubber-tire mounted), derrick hoist, conventional pile driving rigs, power shovels, clamshells, draglines, tower cranes, and self-propelled boom-type lifting device.
5. Stationary-type equipment: Drilling and boring equipment, crusher operations, concrete batch plants, lube equipment, grade setting and grade checking.
6. Remotely operated and controlled equipment.
7. Drones.
8. Autonomous -operated & controlled equipment.
9. GPS operated & controlled equipment for the purpose of Elevation and Location Control when used in rough/precise grading operations.
10. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro-systems.

B. Heavy Duty Repair Person (HOR)

0* Net Code 49-3042.00

The major on-the-job training processes in which the HDR apprentices will be trained shall include a minimum of 6,000 hours in the following areas:

1. Safety training in working around equipment, using power (both pneumatic and electrical) hand tools and proper maintenance/repair procedures.
2. Engines: Theory, operation, maintenance and repair to gasoline engines, diesel engines, fuel systems, cooling systems and intake exhaust systems.
3. Power Trains: Clutches, torque converters, transmissions, differentials and final drives.
4. Electrical: Starting systems, charging systems, lighting systems, control systems and electronic controls.
5. Hydraulic: Control valves, hydraulic cylinders, hydraulic motors, pumps and brake systems.
6. Welding: Theory, stick welding (SMAW), wire/flux core welding, oxygen /acetylene cutting and burning and fabrication/layout.
7. Lubrication: Preventative maintenance, grease and oil, lubrication procedures and minor adjustments.
8. Remotely operated and controlled equipment.
9. Drones.
10. Autonomous-operated & controlled equipment.
11. GPS operated & controlled equipment for the purpose of Elevation and Location Control when used in rough/precise grading operations.
12. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro-systems.

C. Building Construction Inspector

O*Net Code 47-4011.00

The major on-the-job training processes in which a Building Construction Inspector will be trained shall include a minimum of 6,000 hours in one or more of the following areas:

1. Proper general safety procedures in working on a construction site. This will include working around mobile equipment, proper use of personal lift in g platforms and proper training in fall protection.
2. Soils Technician will be trained to perform the following:
 - a. Write a daily report.
 - b. Read and interpret plans.
 - c. Use a nuclear density gauge.
 - d. Understand basic terms for soils and soils density.
 - e. Understand procedures of compacting soil.
 - f. Log a sand cone test.
 - g. Log a maximum density test.
 - h. Log a sieve analysis test.
 - i. Soils test in g equipment awareness.
 - j. Classify different types of soils.
3. Reinforced Concrete training will include the following:
 - a. Write a daily report.
 - b. Read and interpret plans, check reinforced steel for size, spacing, clearances and splices.
 - c. Check a concrete mix design.
 - d. Know the proper technique for sampling concrete.
 - e. Know the proper technique for water control.
 - f. Know the proper technique for placing concrete.4. Pre-Stressed Concrete training will include the following:
 - a. Write a daily report.
 - b. Read and interpret plans.
 - c. Check reinforced steel for size, spacing, clearances and splices.
 - d. Verify the placement of pre-stressed or post-tensioned tendons.
 - e. Prepare stressing sheets.
 - f. Check a mix design.
 - g. Know the proper technique for placing concrete.
 - h. Know the proper procedures for stressing tendons and recording results.

5. Masonry training will include the following:
 - a. Properly write a daily report.
 - b. Read and interpret plans.
 - c. Check reinforced steel for size, spacing, clearances and splices.
 - d. Witness and store completed masonry prisms.
 - e. Identify concrete masonry units, pre-bagged mortar or grout.
 - f. Proper technique for placing of grout into concrete masonry units.
 - g. Proper technique for consolidation of grout with a vibrator.

6. Structural Steel and Bolting Inspector training will include the following:
 - a. Write a daily report.
 - b. Read and interpret plans.
 - c. Inspect steel delivered to the jobsite: mill and heat certifications.
 - d. Check pre-installation.
 - e. Perform a shop inspection.
 - f. Identify and verify the tension of high strength bolts.

7. Structural Welding Inspector training will include the following:
 - a. Write a daily report.
 - b. Read and interpret plans.
 - c. Inspect steel delivered to the jobsite: mill and heat certifications.
 - d. Read a welding procedure specification.
 - e. Check a welder's certificate.
 - f. Check for proper joint fit and configuration.
 - g. Check for proper pre-heat and post-heat.
 - h. Properly use and store electrodes.
 - i. Observe interpass cleaning.
 - j. Perform a shop inspection.

8. ACI Field Technician Grade I
 - a. Test methods obtaining a proper fresh concrete sample.
 - b. Test methods and procedures for fresh concrete temperature.
 - c. Test methods and procedures on performing a concrete slump cone test.
 - d. Test methods and procedures on performing a fresh concrete yield calculation.
 - e. Test methods and procedures on performing a concrete volumetric test.
 - f. Test methods and procedures on performing a concrete air-entrainment test.
 - g. Test methods and procedures on concrete cylinder specimens.
 - h. Write/complete daily testing report(s).

9. ACI Laboratory Testing Technician Grade I
 - a. Test methods for bulk density (unit weight) and voids in aggregate.
 - b. Test methods for compressive strength of cylindrical concrete specimens.
 - c. Test methods for organic impurities in fine aggregates for concrete.
 - d. Test methods for materials finer than 75-um (No.200) sieve in minor aggregates by washing.
 - e. Test methods for density, relative density (specific gravity) and absorption of course aggregate.
 - f. Test methods for density, relative density (specific gravity) and absorption of fine aggregate.
 - g. Test method for sieve analysis of fine and coarse aggregates.
 - h. Test method for total evaporable moisture content of aggregate by drying.
 - i. Practice for capping cylindrical concrete specimens.
 - j. Practice for reducing samples of aggregate to testing size.
 - k. Practice for use of unbonded caps in determination of compressive strength of hardened concrete cylinders.
 - l. Practice for sampling aggregates.

10. ACI Laboratory Testing Technician Grade II
 - a. Test method for obtaining and testing drilled cores and sawed beams of concrete.
 - b. Test method for flexural strength of concrete (using simple beam with third-point loading).
 - c. Test method for soundness of aggregates by use of sodium sulfate or magnesium sulfate.
 - d. Test method for lightweight particles in aggregate.
 - e. Test method for resistance to degradation of small-size coarse aggregate by abrasion and impact.
 - f. Test method for clay lumps and friable particles in aggregates.
 - g. Practice for managing and curing concrete test specimens in the laboratory.
 - h. Specification for molds for forming concrete test cylinders vertically.
 - i. Test method for resistance to degradation of large-size coarse aggregate by abrasion and impact.

11. Certified Welding Inspector (CWI)
 - a. Duties and responsibilities of the welding inspector.
 - b. Non-destructive welding processes and code applications.
 - c. Welding fabrication and code applications.
 - d. Nomenclature, metallurgy, specifications, and engineered drawings.
 - e. Welding symbols and destructive testing procedures.
 - f. Procedures of welding inspections and flaws.
 - g. Write /complete daily testing report(s).

12. Fireproofing and Firestopping Inspector
 - a. Code requirements and testing.
 - b. Penetration and perimeter firestopping systems.
 - c. Joint systems.
 - d. Review of special inspection requirements.
 - e. ASTM inspection standards.
 - f. Plan review and inspection of joint systems.
 - g. Write/complete daily testing report(s).

13. Ultrasonic Testing levels 1 and 2 (Non-Destructive Testing)
 - a. Write a daily test report.
 - b. Familiarize with applicable codes and standards.
 - c. Understand limitation(s) of the test method.
 - d. Calibration of testing equipment.
 - e. Proper steps of conducting an ultrasonic test.
 - f. Interpret test results with respect to applicable codes and standards.

14. Magnetic particle testing levels I and 2 (Non-Destructive Testing)
 - a. Write a daily test report.
 - b. Familiarize with applicable codes and standards.
 - c. Ferromagnetic, Paramagnetic, and Diamagnetic Metals.
 - d. Understand limitation(s) of the test method.
 - e. Calibration of testing equipment.
 - f. Proper steps of conducting a magnetic particle test.
 - g. Interpret test results with respect to applicable codes and standards.

15. Liquid penetrant testing levels 1 and 2 (Non-Destructive Testing)
 - a. Write a daily test report.
 - b. Familiarize with applicable codes and standards.
 - c. Dye Penetrant, liquid penetrant, and penetrant testing.
 - d. Understand limitation(s) of the test method.
 - e. Calibration of testing equipment.
 - f. Proper steps of conducting a magnetic particle test.
 - g. Interpret test results with respect to applicable codes and standards.

16. Remotely operated and controlled equipment.

17. Drones.

18. Autonomous-operated & controlled equipment.

19. GPS operated & controlled equipment for the purpose of Elevation and Location Control.

20. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management , the installation of energy efficient systems including solar , photo voltaic, wind and hydro-systems.

D. Rock Sand & Gravel Operator

O*Net Code 47-2073.00

The major on-the-job training processes in which RSG-PEO apprentices will be trained shall include a minimum of 6,000 hours in one or more of the following areas:

1. Safety training in working around surface mining operations. This will include MSHA Part 48B safety training in working around mobile equipment, working around conveyors, belts and crushers, plant maintenance and repair.
2. Welding:
 - a. Theory.
 - b. Stick welding (SMAW)
 - c. Wire/flux core welding
 - d. Oxygen/acetylene cutting and burning
 - e. Fabrication.
3. Equipment Operation:
 - a. Rubber-tire d loaders, skid-steer tractors, mobile hoisting equipment
 - b. Track-mounted dozers, excavators, loaders, skid-steer tractors
 - c. Graders and/or Skip Loaders
4. Repair Procedures:
 - a. Pneumatic
 - b. Hydraulic
 - c. Industrial electrical components
 - d. Motor-control circuitry
5. Rock Plant Maintenance:
 - a. Disassembly
 - b. Diagnosis
 - C. Repair
 - d. Assembly
 - e. Adjustments
6. Remotely operated and controlled equipment.
7. Drones.
8. Autonomous-operated & controlled equipment
9. GPS operated & controlled equipment for the purpose of Elevation and Location Control when used in rough/precise grading operations.

10. Remotely operated and controlled equipment.

11. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar , photovoltaic , wind and hydro-systems.

E. Dredge Operator

0* Net Code 53-7031.00

The major on-the-job training processes in which Dredge apprentices will be trained shall include a minimum of 6,000 hours in one or more of the following areas:

1. Safety training in working around mobile equipment during shore operations; maintenance and repair on both shore, deck and engine room operations and proper training using powered (both pneumatic and electrical) hand tools.
2. Shore Operations:
 - a. Hook, place, and handle discharge pipe.
 - b. Demonstrate knowledge in spillways, dikes, and grading operations
 - c. Welder's helper
 - d. Crane, Boom truck, and forklift operations.
 - e. Winch operation
 - f. Tractor operation
3. Deck Operations:
 - a. Care and placing of pontoon lines and anchors
 - b. Painting, chipping and cleaning of ship
 - c. Rigging, spicing rope and cable
 - d. Operation of deck equipment
 - e. Maintenance of deck equipment
 - f. Welding operations
 - g. Sounding, GPS, and engineering
 - h. Boat and skiff handling
 - i. Pump repair and maintenance
 - j. Read and understand gauges and meters
 - k. Learn lever controls
 - l. Learn the job of leverman us in g prints and cross sections
 - m. Learn leverman's responsibility in directing all operations Seamanship
4. Engine Room Operations:
 - a. Proper use of gauges, meters and keeping a log
 - b. Use of dredge scow and fuel scow.
 - c. Electrical gas and diesel repair and maintenance
 - d. Pump, shaft and bearing maintenance and installation
5. Remotely operated and controlled equipment.
6. Drones.

7. Autonomous-operated & controlled equipment.
8. GPS operated & controlled equipment for the purpose of Elevation and Location Control when used in rough/precise grading operations.
9. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro-systems.

EXHIBIT "B"

RELATED AND SUPPLEMENTAL INSTRUCTION TOPICS FOR OPERATING ENGINEERS TRAINING CRITERIA

A. Equipment and Landscape Operator	O*Net Code 47-2073.00
Plant Equipment Operator	O*Net Code 57-9021.00

1. Safety
2. Track equipment
3. Rubber-tired type equipment
4. Hoisting type equipment
5. Stationary type equipment
6. Remotely operated and controlled equipment
7. Autonomous operated and controlled equipment
8. Grade Checking, Grade Setting, and GPS
9. Underground utility and structures location by pot-holing methods using earthmoving equipment.
10. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro systems.
11. Environmental Awareness reduce waste and energy consumption, safety, disposal, hazardous waste removal, green construction awareness and technology including use of low pollutant emitting materials, recycling/waste diversion and solar.

B. Heavy Duty Repair Person

O*Net Code 49-3042.00

1. Safety
2. Engines
3. Power Trains
4. Electrical Systems
5. Hydraulic Systems
6. Welding
7. Lubrication
8. Remotely operated and controlled equipment
9. Autonomous-operated and controlled equipment
10. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro systems.
11. Environmental Awareness reduce waste and energy consumption, safety, disposal, hazardous waste removal, green construction awareness and technology including use of low pollutant emitting materials, recycling/waste diversion and solar.

C. Building Construction Inspector

O*Net Code 47-4011.00

- I. Safety.
2. Remotely operated and Autonomous controlled equipment.
3. Soils Technician
4. Re in forced Concrete
5. Pre-Stressed Concrete
6. Masonry
7. Structural Steel and Bolting
8. Structural Welding
9. ACI Field Technician Grade I
10. ACI Laboratory Testing Technician Grades I and II
11. Certified Welding Inspector (C WI)
12. Fireproofing & Firestopping Inspector.
13. Ultrasonic Testing Levels 1 and 2 (Non-Destructive Testing)
14. Magnetic particle testing 1 and 2 (Non-Destructive Testing)
15. Liquid penetrant testing 1 and 2 (Non-Destructive Testing)
16. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic wind and hydro systems.
17. Environmental Awareness reduce waste and energy consumption, safety, disposal, hazardous waste removal, green construction awareness and technology including use of low pollutant emitting materials, recycling/waste diversion and solar.

D. Rock Sand & Gravel Operator

O*Net Code 47-2073.00K

1. Safety
2. Welding
3. Track Equipment
4. Rubber-Tired Equipment
5. Component Repair
6. Plant Disassembly/Assembly
7. Remotely operated and controlled equipment
8. Autonomous -operated and controlled equipment
9. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro systems.
10. Environmental Awareness reduce waste and energy consumption, safety, disposal, hazardous waste removal, green construction awareness and technology including use of low pollutant emitting materials, recycling/waste diversion and solar.

E. Dredge Operator

O*Net Code 53-7031.00

1. Safety
2. Shore Operations
3. Deck Operations
4. Engine Room Operations
5. Remotely operated and controlled equipment
6. Autonomous-operated and controlled equipment
7. Green Technology and construction, including but not limited to the philosophy and science of green technology and green building and construction techniques, green waste management, the installation of energy efficient systems including solar, photovoltaic, wind and hydro systems.
8. Environmental Awareness reduce waste and energy consumption, safety, disposal, hazardous waste removal, green construction awareness and technology including use of low pollutant emitting materials, recycling/waste diversion and solar.