OFFICE OF BUSINESS DEVELOPMENT

On-the-Job Training Program Manual

MDOT
Michigan Department of Transportation

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Introduction

In 1970, the United States Department of Transportation established an On-the-Job Training (OJT) Program for federal-aid highway construction projects. The Federal-Aid Highway Act of 1970 required states receiving federal construction funds to develop skill-improvement programs whose primary objective was to provide opportunities for unskilled workers, particularly minorities, women, and disadvantaged persons, to acquire training in the skilled construction trades.

In the 1970s, when the OJT Program originated, construction employment was at its peak. At that time, project training lasted several years. As a result, trainees were enrolled in training programs that extended for long periods of time and were, therefore, highly likely to complete their training.

Since 1970, however, there have been significant changes in the types of projects being let in the construction industry and the training requirements have not kept pace with changes in the industry. 23 Code of Federal Regulations (CFR) 230, Subpart A, Appendix B, requires the inclusion of "Training Special Provisions" in the Michigan Department of Transportation's (MDOT) federal-aid construction contracts. This provision has not been significantly changed since 1975. This led to trainees being less likely to complete their training in a timely manner. In response, MDOT currently employs an OJT Program that was modified in 2001 and was approved by the Federal Highway Administration (FHWA) in 2004.

Policy Statement

As a requirement of federal funding, it is the policy of MDOT to require full utilization of all available training and skill-improvement opportunities to assure the increased participation of minorities, women, and disadvantaged persons in all phases of the highway construction industry pursuant to 23 CFR 230.107(b).

Objectives

MDOT implements a contractor-based OJT Program designed to be used by contractors to increase the participation of minorities, women, and disadvantaged persons in the construction skilled trades on MDOT federal-aid construction projects. It is not intended, and will not be used, to discriminate against any applicant for training. Federal guidelines, as well as the guidelines outlined in this manual, will be followed.

MDOT's OJT Program will meet the department's responsibility for implementing a program pursuant to 23 CFR 230 Subpart A and address constraints through the following:

- Flexibility for contractors in selecting what projects they can place trainees on by removing project-specific requirements.
- Emphasis on retaining individual trainees who can become members of a contractor's regular workforce upon completion of the program.
- Emphasis on training in skilled craft classifications.
- Monitoring of the quality of training each individual receives and individualized attention to work environment issues.
- Assisting contractors in addressing their Equal Employment Opportunity (EEO) goals through training of minorities and women.
- Partnering with the industry and community-based organizations capable of providing OJT Supportive Services to trainees.
- Assisting the contractor's recruitment efforts; i.e., providing a resource directory.

MDOT's Office of Business Development (OBD) administers the OJT Program.

Advisory Committee

An advisory committee is in place to provide MDOT assistance in reviewing the practices and procedures used to carry out the objectives of the OJT Program. It will be the job of the advisory committee to make recommendations for improvements to the program. The advisory committee will be comprised of the following:

Participant(s)	Office
3	MDOT Office of Business Development
1	MDOT Executive Office
1	MDOT Finance
2	MDOT Construction Field Services
2	MDOT Region Office
1	FHWA - Michigan Division
1	U.S. Department of Labor (Bureau of Apprenticeship and Training)
2	Highway Construction Industry Organization
1	Community-based Service Agency (ad hoc)
6	Industry Union Representation
6	Highway Industry Contractor

Representatives to the advisory committee will be named by MDOT's chief operations officer (COO), based on recommendations from MDOT's OBD. Industry contractors will serve for a period of three years unless otherwise specified by MDOT's COO.

The advisory committee will meet periodically to review the status of the OJT Program. Relevant performance data will be made available to the advisory committee for their review. OBD's administrator will serve as the committee chair.

Issues and concerns that may arise during the implementation of the OJT Program, and which are not addressed in this document, may also be referred to the advisory committee. The advisory committee may review the issues and propose recommendations to the committee chair, who will consider them and be responsible for making final decisions on all proposed matters.

Calculation of Training Assignments

At the beginning of the calendar year, OBD will allocate training assignments to prequalified contractors (both in-state and out-of-state contractors performing work on MDOT federal-aid projects) and advise them of the number of trainees they are expected to support.

The contractor's training assignments for the current construction season will be based on the following calculation:

1. The total dollar value of MDOT federal-aid gross receipts for work performed by each contractor during the previous three fiscal years will be tallied. The MDOT federal-aid gross receipts will consist of:

    a. The dollar values of the contractor's prime MDOT federal-aid contracts (minus the dollar amounts of their subcontracts on same), and

    b. The dollar values of the contractor's subcontracts (for work performed by the contractor as a subcontractor on MDOT federal-aid projects).

2. Once the three-year average gross receipts are calculated using the above formula, one trainee will be assigned to the contractor using the chart below:

Three-Year Average ($ millions)	Training Assignment(s)
$0 up to $2.99	0
3.00 up to 8.99	1
9.00 up to 13.49	2
13.50 up to 17.99	3
18.00 up to 22.49	4
22.50 up to 26.99	5
27.00 up to 31.49	6
31.50 up to 35.99	7
36.00 up to 40.49	8
40.50 up to 44.99	9
45.00 up to 49.49	10
Each additional 4.5	1 additional trainee

The formula for determining a contractor's training assignment(s) is further illustrated below in Table 1. Any future changes to this formula are subject to FHWA approval.

For example, Contractor A, who averaged $18.7 million, would receive four training assignments, whereas Contractor B, who averaged $3.1 million in MDOT federal-aid work performed for fiscal years (FY) 2017 - 2019, would receive one training assignment.

Table 1	FY 2017	FY 2018	FY 2019	Three-Year Average	FY 2020 OJT Assignment(s)
Contractor A	$24.3	$13.4	$18.3	$18.7	**4**
Contractor B	$2.2	$3.9	$3.4	$3.1	**1**

3. MDOT Form 0181, Contractor Yearly Training Plan, is designed to assist contractors in identifying the individual(s) and training program(s) selected to meet its training commitment. This form should be submitted by the contractor to OBD no later than April 30 each year. Other identification showing a contractor's fulfillment of its OJT assignment(s) may be acceptable, subject to review by OBD.

Workforce Development

Not all MDOT contractors on federal-aid projects will qualify for training assignments. Any MDOT contractor can utilize the OJT Program to assist in their recruitment efforts and assist in addressing their EEO goals through training of minorities, women, and disadvantaged individuals. A contractor who chooses to voluntarily utilize the OJT Program is subject to the requirements of the program outlined in this manual.

Eligibility Requirements for OJT Program Participants

MDOT's OJT Program is designed to be used by contractors to increase the participation of minorities, women, and disadvantaged persons in the construction skilled trades on MDOT federal-aid construction projects. It is not intended, and will not be used, to discriminate against any applicant for training. Federal guidelines, as well as the guidelines outlined in this manual, will be followed.

A. No person will be employed as a trainee in any classification in which he/she has successfully completed 800 hours leading to journey status, or in which he/she has been employed at the journey level.

B. No person will be employed as a trainee if he/she possesses a degree in a construction-related field, is enrolled in school, on break or leave from school, or is registered to start classes. If the prospective trainee has a college degree in a non-construction-related field, their eligibility will be determined on a case-by-case basis.

C. No second degree relative (i.e., grandparent, grandchildren, aunts, uncles, nephews, nieces, or half-siblings) to an owner or officer of the contractor is eligible for participation in the training program.

Previously approved trainees who have not completed their training program may be eligible to continue their training and participation in the OJT Program. Their eligibility will be determined on a case-by-case basis.

The OJT Program Directory can be used as a resource of agencies that can assist with the location of eligible OJT Program applicants and can be found online at **www.Michigan.gov/OJT**.

Trainee Training Assignment and Schedule

The contractors are to assign and schedule MDOT-approved OJT Program trainees to begin their training on an MDOT federal-aid highway construction project. Additionally, contractors must schedule and assign trainees primarily to MDOT federal-aid highway construction projects so that a significant number of an individual trainee's hours are earned on MDOT federal-aid highway construction projects.

As permissible within the limits of normal industry practice, and upon notification to OBD, contractors may continue an individual's training program through subcontractors, provided the training is on an MDOT federal-aid project where the trainee has already initiated training and the prime contractor is actively engaged on the project. In such cases, the responsibility for ensuring a continuum of quality training, consistent with the standards published for the skilled craft program, will be with the prime contractor.

Trainee Wage Rates

The trainee will be paid the appropriate Davis-Bacon wage rates for training crafts (on MDOT federally funded projects).

Contractors found to have OJT assignment(s) are required to fulfill all the requirements of the OJT program at no additional cost to MDOT.

Contractors are required to pay the trainees in accordance with the following schedule unless apprentices or trainees in an approved union program are enrolled as trainees on this project. In that case, the appropriate rates approved through the union apprenticeship will apply.

- 60 percent of the appropriate minimum journeyman's rate specified in the contract for the first half of the training period.
- 75 percent of the third quarter of the training period.
- 90 percent for the last quarter of the training period.
- Full fringe benefits will be paid during the entire training period.

Contractors may pay higher wage rates at their discretion.

Contractors should notify the Engineer at the preconstruction meeting if they intend to utilize trainees on the project.

Trainee Monthly Report

Pursuant to 23 CFR 230 Subpart A 113, it will be the responsibility of the contractor to complete a training report (MDOT Form 0125 Trainee Monthly Report) for each trainee. The training report will identify, for each week, the number of hours worked by the trainee in each particular job skill performed.

To ensure hours are credited properly and timely, a Trainee Monthly Report will be submitted to OBD and should include payroll reports or supplemental documentation approved by OBD. The contractor should retain a copy of submitted reports.

The contractor is required to maintain and track trainees receiving training for up to six months during periods when training is interrupted (i.e., trainee is on layoff status, on leave, etc.). The contractor will submit the Trainee Monthly Report to OBD and should include payroll reports or supplemental documentation approved by OBD.

Training Programs

MDOT's OJT Program has been designed to provide training in the skilled construction trade classifications, as required by federal regulations.

Standard training programs for each skilled craft classification included in the OJT Program have been developed jointly by MDOT, construction industry representatives, and others, as appropriate. **These standard training programs can be found in Appendix A of this program manual.**

These training programs have been designed to ensure that the trainee consistently receives the level and quality of training necessary to perform in their respective skilled trade classification.

Each developed training program details the skills that will be provided to the trainee, and the minimum number of hours of training to be received in each skill.

These developed programs are as follows:

Training Program	Hours in Program
Bituminous Density Technician	Up to 4,000
Bituminous Lab Technician	Up to 5,000
Carpenter	Up to 8,000
Cement Mason	Up to 4,000
Construction Craft Laborer	Up to 4,000
Electrician	Up to 8,000
Equipment Operator	Up to 6,000
Field Supervisor/Foreman	Up to 3,700
Grade Checker	Up to 1,800
Ironworker	Up to 6,000
Office Technician*	Up to 2,000
Painter	Up to 6,000
Project Manager	Up to 3,700
Sign Installer	Up to 4,000

**Please note that MDOT currently does not have an approved training program on file for the job classification of "office technician." In keeping with the intent of the OJT Program as a whole, this training program should be designed to advance a trainee to the administrative equivalent of journey-level status (i.e., jobsite coordinator, project superintendent, project supervisor, project manager, estimator, etc.).*

A contractor may propose another skilled or semi-skilled craft training program for use in fulfilling its OJT Program requirements, based on its company workforce needs, by submitting a written request detailing the reason for the proposed training program. This request and a copy of the contractor-designed training program is forwarded to OBD for approval.

MDOT strongly suggests all union contractors enroll trainees in the appropriate union apprenticeship program. MDOT accepts U.S. Department of Labor (DOL)-approved apprenticeship programs in lieu of the standard programs in this manual.

If a DOL program is unavailable to the contractor, MDOT may require additional reports on each trainee's activities in each approved program. As each training activity is completed, MDOT will be doing periodic reviews and will require specific, detailed information be provided indicating when, where and the number of hours completed for each activity.

MDOT Review

OBD staff will review all proposed training plans. MDOT employees with expertise in the proposed training areas may be consulted.

The following will be reviewed by the OJT Program manager:

- Requests for exemption (waiver of one or more OJT assignments).
- Requests for modification of approved training programs.
- Training programs designed by the contractor for use in fulfilling OJT assignments.

MDOT Appeals

If a contractor disagrees with a determination made by MDOT, the contractor may make an appeal to MDOT's OBD administrator based on the appeal process that will be outlined to the contractor in MDOT's determination letter.

The decision of the OBD administrator is a final decision. There are no additional appeals beyond the decision of the administrator.

Monitoring

MDOT will periodically contact trainees working on MDOT highway construction projects. MDOT may also conduct telephone or field interviews of trainees to verify their training status and/or progress toward completing their training programs.

Information submitted by the contractor, in the form and format chosen by MDOT, will be used to evaluate the status of the contractor's efforts to address its training requirements. Contractors will be considered to be in compliance if they demonstrate they have met the requirements of the OJT Program.

Compliance

Failure to cooperate and/or non-responsiveness, including partial cooperation or partial responsiveness, and/or failure to complete a training assignment on the part of the contractor could result in the contractor being found in non-compliance. Failure to resolve the non-compliance may be used as a basis for modifying the prequalification ratings of the contractor. Any action to modify the contractor's prequalification ratings will be taken in accordance with the duly promulgated prequalification rules and administrative sanctions for noncompliance.

The evaluation of the contractor's compliance will be based upon the contractor's adherence to 23 CFR 230 Subpart A, Appendix B:

> "*Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. The contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not."*

When a contractor loses a trainee due to factors beyond the contractor's control (i.e., trainee quits, was dismissed for failure to report to work or for other valid reason(s)), or when a trainee completes their training program, in order to remain in compliance with its OJT assignment, the contractor must provide written explanation to OBD that fully details the situation and indicates how the contractor proposes to refill the OJT assignment. The matter will be reviewed and the contractor will be notified regarding what action(s) are to be taken with regard to the training assignment(s) in question so as to remain in compliance.

Pursuant to 23 CFR 230 Subpart A:
The contractor is required to maintain and track trainees receiving training for up to six months during periods when training is interrupted (i.e., trainee on layoff status, on leave, etc.). The contractor will submit the Trainee Monthly Report to OBD and should include payroll reports or supplemental documentation approved by OBD.

The contractor is also required to conduct a six-month follow-up review of employment status with each graduate who completes an on-the-job training program. The contractor will submit employment status for each graduate to OBD using the OJT Graduate Survey (MDOT Form 0383).

Online Resources

The OJT Program forms, OJT program manual, and other resources are available online at **www.Michigan.gov/OJT**.

NOTES

NOTES

ON-THE-JOB TRAINING PROGRAM

APPENDIX A

Overview of Training Programs

BITUMINOUS DENSITY TECHNICIAN

Duration of Training Program.....Up to 4,000 Hours

Description of Duties:
Proper use of nuclear density gauges with regard to traffic safety and nuclear safety. Marshall density and theoretical maximum density. Knowledge and use of coring machine and preparing pavement cores for testing. Analyzing data with regard to acceptance and payment.

SUGGESTED TRAINING ACTIVITIES

Classroom Training.....500 Hours

Safety procedures (traffic, nuclear safety)
Observation of density
Blueprint reading, surveying, layout, and supervision
Soils and soil compaction bulldozer operations trenching and shoring
Scrapers, graders, pavers, and other equipment, hydraulic excavators
Loaders

Work Schedule.....3,500 Hours

Safety
Maintenance and equipment care
Graders, scrapers, and compactors
Bulldozers
Loaders, skid loaders, other types
Tractor loader, backhoe, trenching machines
Hydraulic excavator, cranes demolition equipment
Instruments, lasers, and miscellaneous equipment

BITUMINOUS LAB TECHNICIAN

Duration of Training Program ..... Up to 5,000 Hours

Description of Duties:
Sampling and testing of bituminous mixtures for compliance with MDOT specifications and quality control tolerances. Testing will include maximum theoretical specific gravity, bulk specific gravity, calculation of air voids, VMA, VFA, extraction gradation of bituminous mixture, gradation of fine and course aggregate, specific gravity of asphalt cements, specific gravity of aggregate, angularity index of fine aggregate, and bulk specific gravity of cores.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 500 Hours

Safety procedures
Plant and field observation of sampling and testing
Use of equipment of the trade

Work Schedule ..... 4,500 Hours

Actual sampling and testing
Sampling and quartering
Maximum theoretical specific gravity
Bulk specific gravity
Calculation of air voids and VMA
Extraction gradation of bituminous mix
Gradation of fine and course aggregate
Specific gravity of fine and course aggregate
Penetration of asphalt cement
Specific gravity of asphalt cement
Angularity index of fine aggregate
Bulk specific gravity of cores
Same size reduction by mechanical splitter
Stockpile sampling
Operations of Marshall hammer
Operations of scales
Operation of max theoretical equipment
Operation of ovens
Operation of extractor
Operation of gyratory compactor
Calculation of all test data
Evaluation of test data
Recommendations
Care and maintenance of testing equipment

CARPENTER

Duration of Training Program ..... Up to 8,000 Hours

Description of Duties:
Lays out work plans or sketch. Builds wooden structures, such as concrete form, falsework, pouring, chute, scaffold, etc. Builds in place to line and grade or prefabricates in units to be erected later, forms for bridge, drainage structure, wall, etc. May perform other related duties.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 1,000 Hours

Mathematics for carpenters
Building trades blueprint reading
Architectural drawing
Strength of materials
Form construction
Steel square
Estimating - layout
Shop work (joinery)
Health, safety, and first-aid

Work Schedule..... 7,000 Hours

Structural foundations and walls
- Laying out and leveling
- Building and placing straight concrete forms
- Lining up and bracing concrete walls and columns
- Laying out footings
- Building irregular concrete forms
- Laying out structure lines

Materials and tools
- Determining uses of tools, materials, and equipment

Operating skill saw, electric drill, and sander
Setting up and operating bench saw
- Erecting forms for flatwork concrete

Miscellaneous
Building walkways
Erecting scaffolding
Installing bearing piling and sheet piling
Making miscellaneous repairs
Erecting miscellaneous types of concrete forms
Installing railings

CEMENT MASON

Duration of Training Program ..... Up to 4,000 Hours

Description of Duties:
Finishes wet surfaces to grade with hand tools, float, trowel, screed, template, and straight edge on concrete pavement, bridge structures, headwalls, curb, sidewalks, etc.; wherever a fine finish is required.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 500 Hours

Related mathematics
(fractions, decimals, ratio, proportion, weights, measures, areas, volumes)
Related science
(physical and chemical properties of materials, characteristics of materials)
Trade practice
(layout and construction, bases, steps, corners; preparation of special cement mixtures, mixing waterproof compounds)
Safety and first-aid

Work Schedule ..... 3,500 Hours

Safety and good work habits
Learning to set screeds and layout work
Learning proper mix and consistency
Pouring and tamping concrete
Using vibrating machine
Rough finishing - hand or machine floating
Hand troweling to smooth finish
Patching, hand rubbing
Marking and edging
Protecting newly poured and laid concrete from weather - rain, sun, and wind

CONSTRUCTION CRAFT LABORER

Duration of Training Program..... Up to 4,000 Hours

Description of Duties:
Checks grade, prepares subgrade, sets forms, places concrete and asphalt for highway and road surfaces. Installs highway and median barriers and guardrails. Performs specific tasks on bridge construction and bridge renovation, such as cutting and burning steel, lead paint removal, latex surfacing, and carpenter tending. Installs storm sewers, erects manholes, and operates laser aligner equipment. Operates various power tools and equipment.

SUGGESTED TRAINING ACTIVITIES

Classroom Training .....1,000 Hours

Pre-employment training (orientation)
- Apprenticeship program
- Life skills
- Employee, employer, and union (as applicable) responsibilities
- Familiarization of laborers work jurisdiction
- Construction math/metric system
- Testing for physical condition

Highway work zone safety
- Flagger safety
- Traffic control
- Personal protective equipment
- Environmental hazards and hazard communication work processes
- Work site safety
- Night work safety
- Hand and power tools communication

MIOSHA construction safety
- Department of Consumer and Industry Services
- Part 1 ..... General rules
- Part 6 .....Personal protective equipment
- Part 8 .....Handling and storage of materials
- Part 9 .....Excavation, trenching, and shoring
- Part 11 .....Fixed and portable ladders
- Part 12 .....Scaffold and scaffold platforms
- Part 14 .....Tunnels, shafts, caissons, and cofferdams
- Part 17 ..... Electrical installations
- Part 19 .....Tools
- Part 22 .....Signals, signs, tags, and barricades
- Part 25 .....Concrete construction
- Part 45 ..... Fall protection

Confined space entry
- Hazard recognition
- Entry program
- Atmospheric testing
- Controlling atmospheric hazards isolation
- Personal protective equipment

Hazard communication (Michigan Right to Know)
- Hazard communication regulations
- Material safety data sheets
- Chemical labels and lists
- Chemicals used in construction

CONSTRUCTION CRAFT LABORER (continued)

Classroom Training (continued) .....

Attitudes/human relations/communications
Construction math/metric system
- Basic math
- Working with tenths and hundredths squaring principles
- Slope formulas and calculations grid staking systems
- Area and volume calculations
- Field exercises

Introduction to measuring tools
- Measuring rules
- Chaining tapes
- Elevation rods
- Transits
- Levels
- Laser aligner and beacon turning angles
- Measuring elevations

Blueprint reading
- Introduction to blueprints
- Scales and dimensions
- Reading blueprints for trade information specifications
- Blueprints for underground projects
- Blueprints for highway projects

First aid/CPR
Commercial driver's license
- General knowledge (Class A) combination vehicle
- Air brakes
- Pre-trip inspection
- Basic control skills and road test

Concrete placement
- Transporting and placing quality concrete
- Carpenter tending concrete vibration
- Backfill and compaction
- Finishing and curing quality concrete
- Working at heights safely
- Hands-on concrete placement stripping
- Cleaning and oiling forms

Introduction to underground work (pipe laying)
- Back injury prevention
- Blueprint reading
- Measuring tools
- Locating utilities
- Manhole/catch basin construction
- Trenching and excavation safety
- Pressure pipe laying techniques
- Gravity flow piping systems

Demolition, cutting and burning
- Equipment demonstration
- Fire safety
- Safety check of equipment
- Oxy-acetylene cutting
- Liquid oxygen/propane cutting
- Aerial manlift operation

CONSTRUCTION CRAFT LABORER (continued)

Classroom Training (continued) .....

Air tool operation
- Inspection and maintenance of tools and equipment
- Construction craft laborer air compressor operation
- Demonstration of air tools

Small gas engines
- Preventive maintenance trouble shooting
- Operation of equipment

Environmental Remediation

Work Schedule .....3,000 Hours

Site/project preparation
- Transportation, stockpiling, and maintaining project tools, equipment, and materials
- Excavation and backfill of soils
- Layout and staking protocols
- Rigging and signaling for work traditionally performed by CCL
- Site preparation, cleanup, and security

Tools, equipment, and materials
- Tool, equipment, and material recognition and preparation
- Hand electric, gas, pneumatic, and power tool/equipment use and maintenance
- Tool, equipment, and material storage and security

Safety
- Confined space safety
- Flagging, signing, and traffic safety awareness
- Hazard material recognition
- Trenching and site excavation safety

Heavy/highway construction
- Air tool operator
- Grade checking
- Line setter
- Form setting
- Placing of reinforcing
- Carpenter tending
- Concrete placement
- Concrete saw (under 40 horsepower)
- Concrete mixer operator
- Asphalt spreader box man
- Screed checker
- Raker
- Shoveler
- Tamper and hand roller
- Laser operator
- Pipe layer
- Tailman
- Topman
- Manhole erection
- Guard rail erection

ELECTRICIAN

Duration of Training Program ..... Up to 8,000 Hours

Description of Duties:
The work of the electrical construction worker (MDOT) can be divided into broad categories such as new construction, maintenance, and repair. While the jobs differ, the mental and physical skills acquired in a properly designed and administered training program prepare the electrical worker for this entire range of work. During a career as an electrical construction worker, a person will likely be involved in many different types of jobs presenting many new and different challenges, working with his or her hands as well as with their mind. Much of the work involves installation, assembling, testing, repairing, layout, and design of electrical wiring, fixtures and apparatus used for power, light, heating/air conditioning, and many types of control systems. Many jobs now incorporate computers. Due to the nature of the work, above-average math and reading skills are essential.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 1,000 Hours

Industry orientation
Job information
Safety - OSHA 10 and 30
CPR, first aid
Work zone rigging
Mathematics for electricians (includes algebra/trigonometry)
Electrical theory - AC and DC
Electrical codes
Code calculations
Motors
Motor controls
System analysis, troubleshooting, and repair
Transformers
Traffic signal controllers
Programmable controllers
Grounding
Fiber optics
Conduit fabrication
Blueprint reading
New technologies - solar, fuel cells, etc.

Work Schedule..... 7,000 Hours

Project layout and planning
Underground installations
Installing raceway systems
Installing services, switchboards, and panels
Traffic signal controller installation
Motor control center installation
Installing, splicing, and terminating wires and cables
Lighting system installation
Testing and troubleshooting feeders, motors, and branch circuits
Fire alarm installation
Motor installation
Control system certification

ELECTRICIAN (continued)

Work Schedule (continued)

Installing and programming programmable logic controllers
Installing instrumentation and process control systems
Security system installation
Welding and brazing
Installing sound and communication systems
Installing and terminating transformers
Installing fiber optic cable
Service and troubleshooting
Material handling and prefabrication
Safety awareness and other specialized areas

EQUIPMENT OPERATOR

Duration of Training Program ..... Up to 6,000 Hours

Description of Duties:
Operates several types of power construction equipment, such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or motor graders, to excavate, move and grade, search, erect structural and reinforcing steel, and pour concrete or other hard surface paving materials.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 500 Hours

Safety, orientation, review
Equipment maintenance
Blueprint reading, surveying, layout, and supervision
Soils and soil compaction
Bulldozer operations
Trenching and shoring
Scrapers, graders, pavers, and other equipment
Hydraulic excavators
Loaders

Work Schedule..... 5,500 Hours

Safety
Maintenance and equipment care
Graders, scrapers, and compactors
Bulldozers
Loaders, skid loaders, other types
Tractor loader, backhoe, trenching machines
Hydraulic excavator, cranes demolition equipment
Instruments, lasers, and miscellaneous equipment

FIELD SUPERVISOR/FOREMAN

Duration of Training Program.....Up to 3,700 Hours

Description of Duties:
Coordinate and schedule resources such as labor, equipment, materials, and subcontractors to construct a project on time and on budget. Reports daily activities and verifies quantities with inspectors. Investigate safety-related concerns and incidents. Fill out a construction diary detailing a history of the job. Other duties may include measuring, training other employees, investigating accidents, and timekeeping.

SUGGESTED TRAINING ACTIVITIES

Classroom Training .....1,000 Hours

Learn safety procedures
Orientation in the various types of construction materials and their applications
Plan and proposal reading indoctrination
Observation of the different construction techniques used on the job
Orientation to current MDOT Standard Specifications for Construction
Orientation to the English and metric
MDOT road and bridge standard plans

Work Schedule .....2,700 Hours

Coordinate traffic control
Schedule subcontractors
Timekeeping
Schedule equipment maintenance
Measure and verify daily quantities
Perform daily safety huddles
Procure materials from suppliers
Plan ahead to ensure proper labor, equipment, and materials are available
Survey and layout future work
Ensure regulatory compliance

GRADE CHECKER

Duration of Training Program.....Up to 1,800 Hours

Description of Duties:
Application of string line forming, use of tools used in making depth checks, GPS (Global Positioning System), using signals in guiding
equipment operators in attaining proper grade, setting stakes-slope stakes, and taking cross sections.

SUGGESTED TRAINING ACTIVITIES

Classroom Training.....300 Hours

Safety procedures
Learning nomenclature of various construction terms
Identification of construction materials and their application
Observation of grading operations
Familiarization with specifications
Use of simple leveling instruments used in grade work
Maintenance of surveying equipment
Use of four-wheeler used with GPS
Setting up GPS for use on job

Work Schedule.....1,500 Hours

Application of string line forming
Use of tools used in making depth checks
Use of GPS
Use of signals in guiding equipment operators in attaining proper grade
Setting of stakes - slope stakes, clay shoulder stakes, muck stakes, center stakes
Learning to take cross sections

IRONWORKER

(Structural/Reinforcing)

Duration of Training Program ..... Up to 6,000 Hours

Description of Duties:
Performs any combination of the following duties to raise, place, and unite girders, columns, and other structural steel members to form completed structures or structure frameworks, working as a member of a crew. Sets up hoisting equipment for raising and placing structural steel members. Fastens steel member to cable of hoist using chain, cable, or rope. Signals worker operating hoisted equipment to lift and place steel members. Guides member using tab line (rope) or rides on member to guide it into position. Reads plan, rigs, assembles, and erects structural members requiring riveting or welding. May perform other related duties.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 200 Hours

MIOSHA safety
OSHA
Scaffold use
Blueprint reading (structural and reinforcing)
Welding technology
Proper uses of trade-related tools (cranes, hoists, rigging hardware, impacts, etc.)
Mathematics (trade-related and metrics)
Job and shop safety

Work Schedule ..... 5,800 Hours

Tools; name and proper use, care, safety
Materials; identification, shapes
Equipment - ornamental, reinforcing, structural
- Light equipment - blocks, ropes, etc.
- Heavy equipment - derricks, etc.

Erecting job, erecting equipment
- Layout
- Drilling
- Welding - acetylene and electric; cutting, burning

Dismantling, rigging equipment, scaffolding, floats
Ornamental, reinforcing, structural
- Sorting materials
- Distributing

Placing, spacing, tying
Hoisting
- Hook on
- Learn signals
- Learn safety factors

Fitting up, plumbing up
- Use of cables and turnbuckles
- Use of instruments
- Use of hydraulic jacks

IRON WORKER (continued)

Work Schedule (continued)

Fabricating
- Layout
- Fit-up

Reading job plans and specifications
Reinforcing
Care and use of tools
Ties
Field fabrication of rebar
Unloading, handling, and sorting
Placing footings, walls and columns, beams and girders, joists and slabs
Highway structures, footings, wingwalls, and abutments
- Pavements
- Airport
- Bridge

Bar splicing and welding
Safety
Post tensioning
- Unloading, handling, and storing
- Placing post tension strand tendons
- Placing post tension wire and bars
- Stressing of wire tendons
- Grouting of bonded tendons
- Placing of thread bar post tension safety

Rigging
- Care and use fiber line, wire
- Rope, slings, and chains
- Determining safe working capacity, inspection, and proper use

Use of rigging hardware
- Determining SWC, inspection, and proper use

Use slings, chokers, and softeners
- Determining SWC, inspection, and proper use

Erecting or lifting with cranes
- Determining SWC, radius, and capacity
- Using proper hand signals

Using hand and miscellaneous rigging equipment
Using access structures, scaffolds, ramps, ladders, hanging, rolling, etc.
Safety in rigging procedures
- Structural
- Erection of structural steel
- Bolting up and welding of structural steel
- Erection of structural steel long spans and trusses
- Metal decking
- Field layout and fabrication
- Use of erection and detail drawings
- Use of scaffolds, ladders, and shoring
- Use of mobile cranes
- Assembly and disassembly
- Field inspection and safety
- Signal methods

IRON WORKER (continued)

Work Schedule (continued) .....

Operating procedures and precautions
Erecting bridges and towers
Using all crane and derrick systems (including barge) and rigging systems
Signaling methods, inspection, safety
Proper operating procedures and precautions
General safety in structural steel erection
Welding - SMAW, FCAW, and SAW
    Oxy-acetylene welding and burning
    Welding, cutting, heating
Electric arc processes
    SMAW shielded metal arc welding
    FCAW flux core arc welding
    SAW submerged arc welding
Testing procedures and certification
Safety
Precast unloading, erection, layout, precast panels, precast panels clips
Structural and skills development
Welding - FCAW and SMAW
(AWS E7018 unlimited certification required - four year)
(AWS E7018 unlimited certification required - three year)
Blueprint reading (structural and reinforcing)
    Welding technology (AWSD) 1 code
Joint design metallurgy and symbols
Proper use for trade-related tools (cranes, hoists, rigging hardware, impacts, etc.)
Mathematics (trade-related and metrics)
Job and shop safety (“How it relates to you”)
    Safety (MIOSHA inspector)
    OSHA 10 Hours
Scaffold users card

PAINTER

Duration of Training Program ..... Up to 6,000 Hours

Description of Duties:
Constructing, following, and erecting temporary and permanent walls and constraint structures on highway facilities with lumber, reinforced plastic, fiberglass, tarps, cables, steel, clamps, etc., for the purpose of also carrying out basic painting of structural steel, including bridges, signs, guard posts, and other highway structures utilizing spray, roller, or brush application; mixing of paints and coatings; clean-up and maintenance of related personal protective equipment and OSHA/MIOSHA-required pollution control equipment; miscellaneous work associated with bridge work operations; working on high structures; and dismantling of walls and constraint structures when finished.

SUGGESTED TRAINING ACTIVITIES

Work Schedule.....6,000 Hours

Handling tools, OSHA/MIOSHA lead standard
Safety procedures
Introduction to paint mixing; techniques and orientation in painting specifications
Familiarization and practice use of tools of the trade
Set up and dismantle traffic control devices
Scaffolding construction and techniques; construct, erect, and dismantle containment areas
Area cleanup and disposal of spent abrasives
Preparing surfaces for application of paint; mixing paints and thinners
Brushing, rolling, and spraying techniques on bridge structures
Cleanup of tools and equipment (spray pumps, sand blast nozzles and hoods, spray tips, spray guns)
Protection of surfaces and inflammables
Maintenance of personal protective equipment and environmental pollution control equipment (may be done on or off job site)
Techniques of sandblasting
Labeling and handling of hazardous and non-hazardous waste materials
Orientation in different grades of lumber
Safety with ladders - working at heights higher than 20 feet
Building, forming, and squaring temporary and permanent structures
Techniques on ground structures
Cleanup of tools and equipment (saws, pulleys, jacks)
Miscellaneous
OJT assignment registered as an apprenticeship with the U.S. Department of Labor Bureau of Apprenticeship and Training

PROJECT MANAGER

Duration of Training Program.....Up to 3,700 Hours

Description of Duties:
Estimate projects and help the job supervisors procure materials. Coordinate construction activities and resources between multiple projects. Build and update schedules on a regular basis. Update the job supervisors of regulatory changes that will impact them. Plan ahead to anticipate scheduling problems. Coordinate limited resources with other project managers who are managing other projects. Track the budgeted versus actual costs and relay them to the job supervisors.

SUGGESTED TRAINING ACTIVITIES

Classroom Training .....500 Hours

Learn safety procedures and policies
Orientation in the various types of construction materials and their applications
Plan and proposal reading indoctrination
Observation of the different construction techniques used on the job
Orientation to MDOT current standard specifications for construction
Learn about regulatory requirements and environmental

Work Schedule.....3,200 Hours

Scheduling subcontractors
Estimate and provide change order prices when they are requested
Track budgeted versus actual costs
Procure materials from suppliers
Plan ahead to ensure proper labor, equipment, and materials are available
Survey and layout future work
Ensure regulatory compliance

SIGN INSTALLER

Duration of Training Program ..... Up to 4,000 Hours

Description of Duties:
Maintaining and setting traffic control devices, reading plan sheets and project logs, staking locations of signs, and setting elevations for foundations and signs, use of equipment and vehicles required, installation of ground-mounted and overhead-mounted signs, removal of various signs and foundations, placing of topsoil seed and fertilizers.

SUGGESTED TRAINING ACTIVITIES

Classroom Training ..... 500 Hours

Plan reading and layout, including plan sheet and log book reading, metric and standard conversion
Staking locations, setting elevations and grades, laser usage, and incorporating plans
Recordkeeping

Work Schedule..... 3,500 Hours

Highway work zone safety
Vehicle and equipment use
Foundation installation
Installation of signs and supports

NOTES

NOTES

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