



Colorado Cleantech

Apprenticeship Kit Portfolio

Clean Energy/Climate/Advanced Manufacturing



Apprenticeship Kit Portfolio

- Multi-part packages containing complete guidance and support for designing, developing, and implementing full-scale OJT-driven training.
- Designed for maximum flexibility, kits support any level of implementation from Registered Apprenticeship to single-skill upskilling.
- All kits are built to the same design, with common formats, features, policies, and processes.
- Each kit comes with seven documents:
 - Program Design Work Process
 - Program Management Guide
 - Program Logistics Guide
 - Trainers' Guide
 - OJT Competency Verification Checklists
 - OJT/RTI Unit Snapshots
 - Apprentice & Family Guide

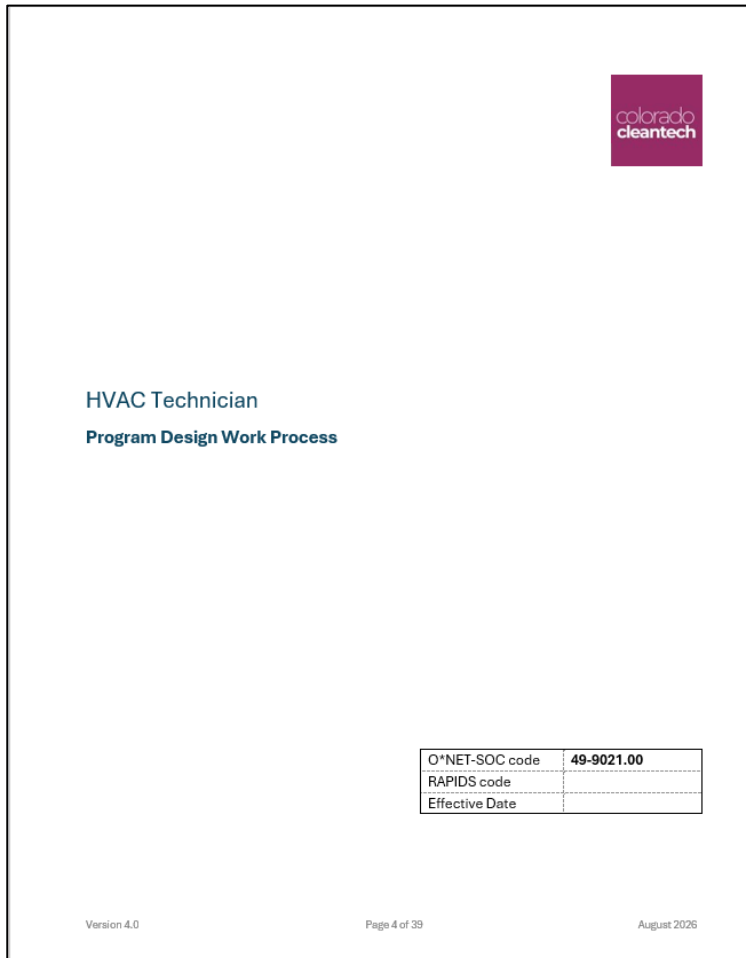


Apprenticeship Kit Portfolio

Design Features

- **Flexibility/Customizability** – Kits provide complete customization guidance. All kits are delivered as unprotected Word documents to facilitate easy configuration.
- **Internal Consistency** – All kits share the same structure, formats, and procedures, making it easier to develop and deliver multiple programs.
- **Modularity** – OJT and RTI units can stand alone to teach specific skill areas, combine to build certificate programs, or work in total for a full training program or Registered Apprenticeship.
- **Completeness** – Designs and resources are significantly more complete and detailed than typical off-the-shelf training for the trades.
- **360° Coverage** – Kits provide guidance, resources, forms, and templates for all stakeholders at all stages of the process.

Apprenticeship Kit Portfolio – Program Design Work Process



Detailed Program Design

- OJT/RTI Work Processes
- Competency Model
- OJT/RTI/Competency Crosswalk

Who it's For

- Employers
- Sponsors
- Intermediaries
- Learning Providers
- Supported by:
 - Program Logistics Guide
 - Program Management Guide
 - OJT Competency Verification Checklists



Apprenticeship Kit Portfolio – Program Design Work Process

HVAC Technician Program Design Work Process	
Colorado Cleantech	
Work Process Schedule	
On-The-Job Training (OJT) Outline	
HVAC Technician (with Heat Pump)	
O*NET-SOC CODE: 49-9021.00 RAPIDS CODE: TBD	
Description	Approximate Hours
OJT DOMAIN 1: Jobsite Safety & Professional Work Practices	
Representative Tasks	
- Follow site-specific safety plans and job hazard analyses - Apply OSHA-compliant work practices - Safely use ladders, lifts, and confined spaces - Use PPE appropriate to HVAC tasks and environments - Safely handle refrigerants, pressurized systems, and electrical components - Maintain tool accountability and jobsite housekeeping - Interact professionally with customers, coworkers, and supervisors	
Proficiency Indicators	
Foundational	Time-based/ Hybrid: 250-300 Planning Target: 275
- Identifies common HVAC jobsite hazards and explains the purpose of required safety procedures, PPE, and hazard controls. - Follows established safety procedures and work instructions with appropriate supervision and coaching. - Demonstrates basic professional work habits, including jobsite organization, tool accountability, reliable attendance, and appropriate workplace communication.	
Operational	Competency-based: 150-225 Planning Target: 200
- Consistently performs assigned HVAC work safely and in accordance with OSHA, employer, and site-specific requirements without prompting. - Recognizes routine hazards involving electrical equipment, refrigerants, pressurized systems, ladders, lifts, confined spaces, and other HVAC work conditions, and takes appropriate preventive or corrective action, including escalating concerns when needed. - Maintains safe, organized, and professional work practices while communicating effectively with customers, coworkers, and supervisors.	
Advanced	
- Anticipates changing or less-obvious jobsite hazards and adjusts work practices proactively to protect people, equipment, and property. - Applies sound judgment when conditions exceed established procedures or personal authority, stopping work and escalating concerns when appropriate. - Models safe and professional work practices for others and contributes constructively to jobsite safety awareness and continuous improvement.	
Design Notes	
Safety is a continuous expectation throughout the apprenticeship, not a competency confined to this domain. This domain establishes the foundational safety practices, hazard awareness, professional behaviors, and judgment expected in HVAC work. These capabilities should be reinforced and evaluated throughout all subsequent OJT domains as apprentices encounter electrical hazards, refrigerants and pressurized systems, ladders and lifts, mechanical equipment, confined spaces, and other changing jobsite conditions.	
The domain should include sufficient supervised experience for apprentices to progress from following prescribed safety practices to recognizing hazards and taking appropriate action independently. Advanced development should emphasize anticipating hazards, exercising stop-work and escalation judgment, and modeling safe and professional work practices for others.	
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OJT Work Process

- Representative Tasks
- Proficiency Indicators
- Estimated completion times
- Design Notes

Who it's For

- Employers
- Sponsors
- Intermediaries
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RTI Schedule

- Subtopics
- Learning Objectives
- Proficiency Indicators
- Estimated completion times

Who it's For

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Apprenticeship Kit Portfolio – Program Design Work Process

HVAC Technician Program Design Work Process

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A. Foundational / Workplace Competencies

1. Safety & Risk Management

Applies safe work practices, recognizes and controls hazards, and exercises sound judgment to protect people, property, and equipment during HVAC work.

- Applies OSHA and site-specific safety practices consistently without prompting
- Identifies hazards and takes appropriate action
- Uses PPE correctly and maintains safe work habits
- Applies lockout/tagout and other hazard controls appropriately

2. Professional Work Practices

Demonstrates the reliability, organization, communication, teamwork, and accountability required for effective performance in professional HVAC environments.

- Demonstrates reliability, accountability, and jobsite discipline
- Maintains organized work areas and proper tool/material handling
- Communicates effectively with supervisors, coworkers, and customers
- Works productively as part of a team

B. Industry / Cross-Trade Competencies

3. Tools, Equipment & Diagnostic Methods

Selects, uses, and maintains HVAC tools, instruments, and diagnostic equipment effectively to support safe, accurate, and efficient work.

- Selects and uses appropriate tools and instruments independently
- Maintains tools and ensures calibration awareness
- Uses diagnostic equipment to gather accurate system data
- Minimizes waste, rework, and equipment damage

4. Building Systems Awareness

Understands how HVAC equipment interacts with the building envelope and other building systems and recognizes conditions that affect system performance, comfort, and retrofit feasibility.

- Understands how HVAC systems interact with building envelope and other systems
- Recognizes impacts of insulation, airflow, and ventilation on performance
- Identifies constraints in retrofit and existing building conditions
- Communicates system implications to supervisors or customers

C. Core Technical Competencies (HVAC-Specific)

5. HVAC System Fundamentals

Applies fundamental principles of heat transfer, refrigeration, and HVAC system operation to understand equipment function, system behavior, and occupant comfort.

- Explains heat transfer and refrigeration cycle principles
- Identifies system components and functions
- Relates system operation to building conditions and comfort
- Demonstrates progression from assisted to independent task execution

Competency Model

- Journey Worker Competencies
- Target for Program Completion
- Behavioral Indicators

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Apprenticeship Kit Portfolio – Program Design Work Process

HVAC Technician Program Design Work Process

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OJT Domain/RTI Module/Competency Crosswalk

This crosswalk table shows how the Program Design Work Process and the Competency Model support and reinforce one another. The Work Process defines the operational structure of the program – what apprentices are expected to learn through On-the-Job Training (OJT) and Related Technical Instruction (RTI). The Competency Model defines the broader knowledge, judgment, coordination, and professional behaviors associated with successful performance in the occupation. Together, they create a more complete picture of occupational development.

The purpose of this table is to help trainers, mentors, instructional partners, and program designers understand how specific OJT Domains and RTI Modules contribute to the development of core competencies. This alignment can support instructional planning, evaluation design, curriculum coordination, progression discussions, and continuous improvement efforts while helping ensure that training activities remain connected to real-world occupational performance expectations.

OJT Domain	Primary Competencies Supported
Domain 1. Jobsite Safety & Professional Work Practices	1. Safety & Risk Management 2. Professional Work Practices
Domain 2. Tools, Equipment, and Materials Handling	3. Tools, Equipment & Diagnostic Methods 2. Professional Work Practices
Domain 3. HVAC System Fundamentals	5. HVAC System Fundamentals
Domain 4. Electrical & Control Work (HVAC Context)	6. Electrical & Control Systems 1. Safety & Risk Management
Domain 5. Refrigerants & Environmental Compliance	7. Refrigerants & Environmental Compliance 1. Safety & Risk Management
Domain 6. HVAC Installation Practices	8. HVAC Installation Practices 2. Professional Work Practices
Domain 7. Load Calculation, Field Data Collection & System Sizing Support	9. Load Analysis & System Design Support 4. Building Systems Awareness
Domain 8. Distribution Systems (Ducted, Hydronic, Zoning)	10. Distribution Systems & Airflow Management 4. Building Systems Awareness
Domain 9. Controls, Configuration & System Programming	11. Controls, Configuration & System Integration 6. Electrical & Control Systems
Domain 10. Heat Pump Installation – New Construction	8. HVAC Installation Practices 10. Distribution Systems & Airflow Management
Domain 11. Heat Pump Installation – Retrofit Applications	8. HVAC Installation Practices 4. Building Systems Awareness 12. Commissioning, Service & System Optimization
Domain 12. Commissioning, Diagnostics, and Performance Verification	12. Commissioning, Service & System Optimization 3. Tools, Equipment & Diagnostic Methods
Domain 13. Maintenance, Service, and Troubleshooting	12. Commissioning, Service & System Optimization 3. Tools, Equipment & Diagnostic Methods
Domain 14. Retrofit, Upgrade, and Customer Interaction	12. Commissioning, Service & System Optimization 4. Building Systems Awareness 2. Professional Work Practices

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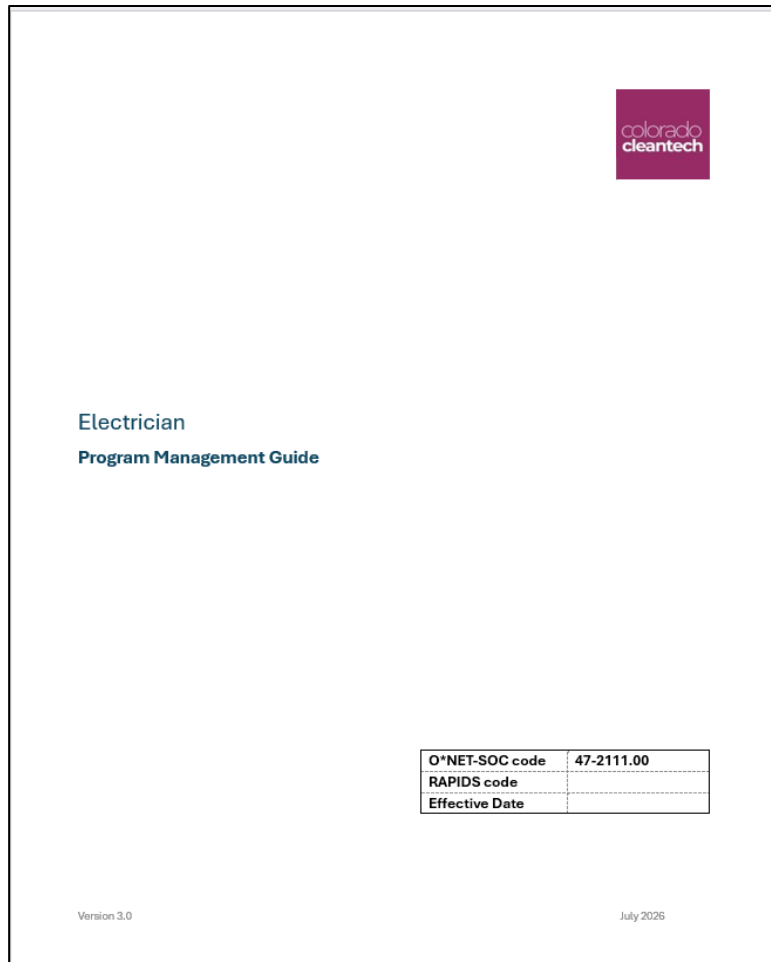
Competency Crosswalk

- Supports instructional alignment and completeness
- References specific OJT Domains and RTI Modules to specific competencies

Who it's For

- Employers
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 - OJT Competency Verification Checklists

Apprenticeship Kit Portfolio – Program Management Guide



What it Does

- Detailed guidance for managing the program:
 - Development
 - Administration
 - Implementation
 - Policy
 - Registration
- Detailed customization guidance (100% customizable)
- Contains full suite of worksheets for program documentation

Who it's For

- Program Designers
- Program Administrators



Apprenticeship Kit Portfolio – Program Management Guide

Electrician Program Management Guide	Colorado Cleantech
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What it Does

- Detailed guidance for managing the program:
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Apprenticeship Kit Portfolio – Program Management Guide

Electrician Program Management Guide

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Journey 1: Single Employer – Registered Apprenticeship Sponsor		
Who You Are	You are an employer implementing the program as a Registered Apprenticeship and serving as the Sponsor of record.	
Your Goal	Develop a structured apprenticeship aligned with Apprenticeship Colorado standards while maintaining control over internal operations.	
Your Configuration Steps	1. Review Parts II and III of this Guide to identify: • Administrative structure • Roles and responsibilities • Recordkeeping requirements • Compliance considerations 2. Using the Program Logistics Guide, confirm: • OJT hour targets • RTI hour structure • Progression model (hybrid default, or alternative) 3. Define Administrative Roles • Identify RTI provider if not in-house 4. Document: • Sponsor authority • Program administrator • Mentor assignments • RTI provider relationships 5. Align to registration requirements • Confirm work processes and RTI structure meet Apprenticeship Colorado standards. • Establish wage progression schedule. • Prepare required registration documentation. 6. Implement OJT Tracking & RTI Documentation • Use portfolio tracking tools or internal systems. • Ensure audit-ready recordkeeping. 7. Launch and Monitor • Conduct apprentice onboarding. • Validate competency checkpoints. • Report through RAPIDS (if federally registered).	
Completion Outcome	Apprentices receive: • Certificate of Completion of Registered Apprenticeship • Documented occupational competency	

Journey 2: Employer – Non-Registered Structured Apprenticeship		
Who You Are	You are an employer who wants the rigor of apprenticeship but does not intend to formally register.	
Your Goal	Implement structured, documented training aligned with best practices, without regulatory oversight.	
Your Configuration Steps	1. Review Program Structure • Focus on Sections 3–8 of this Guide. • Confirm progression approach (time-based, competency-based, or hybrid). 2. Select OJT and RTI Structure • Use full program or modify sequencing. • Identify RTI provider if not in-house • Maintain core competency elements. 3. Define Internal Policies • Eligibility and selection • Progression milestones • Documentation standards 4. Establish Mentor Structure • Assign qualified supervisors. • Implement competency validation checkpoints. 5. Implement Tracking System • Track hours by domain. • Document supervisor validation.	
Completion Outcome	Apprentices receive: • Employer-issued Certificate of Completion • Documented internal advancement This pathway preserves rigor while maximizing flexibility.	

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User Journeys

- Interactive program use cases
- Walkthrough of configuration options
- Supports customization
- Users identify configuration based on their needs

Who it's For

- Program Designers
- Program Administrators

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Featured Standalone OJT Domains

The following OJT Domains may be implemented independently for targeted workforce development, upskilling, or transitional reskilling.

OJT standalone time durations shown below assume implementation for experienced personnel or focused upskilling and therefore reflect compressed time-to-competency relative to full apprenticeship hour ranges.

OJT Domain	Typical Duration	Most Appropriate For	Common Use Case
OJT Domain 7: Troubleshooting & Diagnostic Reasoning	250-450 hours	Incumbent workers; maintenance personnel	Diagnostic skill development; improving troubleshooting effectiveness.
OJT Domain 8: Basic Motors & Control Systems	250-450 hours	Electricians expanding into commercial or industrial work	Cross-training into motor installation and basic controls.
OJT Domain 9: Regulatory Compliance & Inspection Readiness	200-400 hours	Experienced electricians; supervisors	Code refresher; inspection preparation; improving installation quality.
OJT Domain 10: Advanced Motor Control Systems	200-400 hours	Commercial and industrial electricians	Upskilling for advanced motor controls, VFDs, and MCCs.
OJT Domain 11: Industrial Control & Process Systems	350-550 hours	Industrial electricians; automation technicians; instrumentation personnel	Transition into industrial controls, instrumentation, and process systems.
OJT Domain 12: Specialized Electrical Systems	200-300 hours	Electricians entering specialty markets	Cross-training for low-voltage, fire alarm, lighting controls, communications, or related specialty systems.
OJT Domain 13: Emerging Energy & Electrification Systems	350-550 hours	Journeyworkers; experienced tradespeople; transitioning workers	EV charging, solar PV interfaces, battery energy storage, heat pumps, and other electrification technologies.
OJT Domain 14: System Integration & Commissioning	400-600 hours	Senior electricians; commissioning personnel; field leaders	Building systems integration, startup, commissioning, and multidisciplinary coordination.

Standalone Units

- Supports program administration and registration
- Program Roles

Who it's For

- Program Designers
- Program Administrators



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Appendix D: Apprenticeship Program Management Roles

(see also [Section 3.3](#) and [Section 5.0](#) of this Guide)

Program Roles and Partner Documentation Templates

This Appendix provides templates for documenting the organizations and individuals responsible for implementing and operating the program. Use these templates to record the partners involved in your program, identify points of contact, and clarify responsibilities. The completed templates serve as a working record of program governance and operational relationships.

Role definitions and responsibilities are introduced in [Section 3.3](#) and described in detail in [Section 5.0](#) of this Guide. This appendix is intended only to document who is fulfilling each role in your program.

Feel free to modify these templates to fit your organization and program.

D.1 Program Roles Summary

Use this table to document the primary organizations responsible for implementing the program. One organization may fulfill multiple roles. You can record contact information in Table D.4, below.

Program Role	Organization Name	Responsibilities/ Scope of Role	Agreement Type (MOU, Contract, Informal, etc.)	Effective Date	Notes
Program Sponsor					
Program Admin/ Apprenticeship Coordinator					
Apprenticeship Intermediary					
Related Technical Instruction (RTI) Provider					
Career Readiness/ Pre-Apprenticeship Partner					
Compliance/ Registration Authority Contact					

Usage Notes

- The **Program Sponsor** is the entity responsible for the formal operation of the program.
- The **Program Administrator or Coordinator** manages day-to-day program administration.
- An **Intermediary** may support employer coordination, recruitment, administration, or RTI delivery.
- The **RTI Provider** delivers classroom, lab, or online instruction aligned with the program's RTI framework.
- A **Career Readiness or Pre-Apprenticeship Partner** may support candidate preparation and entry into the program.

Not all roles will apply to every program structure.

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Policy Worksheets

- Supports program administration and registration
- Identify program roles
- Develop and list program policies
- Track and record apprentice progress
- Consolidate planning & policy for Registered Apprenticeships
- Postable work process for registration

Who it's For

- Program Designers
- Program Administrators

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E.2 Program Governance and Administration (see Sections 3.9-3.10, Appendix D)	
Policy Statement	Describe how the program is governed and who holds authority for program administration.
Responsible Party	Identify the program sponsor and the individual responsible for program administration.
Procedure	Describe how program decisions are made, including decisions related to: • Approving participating employers • Admitting apprentices or trainees • Approving advancement or completion • Modifying program standards
Documentation/ Records	Examples may include: • Program governance documents • Partnership agreements • Program administration records • Meeting notes or governance decisions
Program Notes (Optional)	

E.3 Apprentice Eligibility Requirements (see Section 7.3)	
Policy Statement	Describe the minimum requirements for entry into the program.
Responsible Party	Identify who determines whether applicants meet eligibility requirements.
Procedure	Describe how eligibility is verified. This may include review of: • Age requirements • Education credentials • Safety prerequisites • Work authorization
Documentation/ Records	Examples may include: • Application forms • Eligibility verification records • Supporting documentation
Program Notes (Optional)	

E.4 Recruitment and Outreach (see Sections 7.1 & 7.2)	
Policy Statement	Describe the program's approach to identifying and recruiting potential apprentices.
Responsible Party	Identify who coordinates recruitment activities.
Procedure	Describe the recruitment strategy used by the program. Recruitment methods may include outreach to: • High schools and CTE programs • Workforce development centers • Community-based organizations • Employer networks • Industry associations
Documentation/ Records	Examples may include: • Recruitment materials • Outreach activity records • Partnership documentation
Program Notes (Optional)	

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Policy Worksheets

- Supports program administration and registration
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Who it's For

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Apprenticeship Kit Portfolio – Program Management Guide

Electrician Program Management Guide

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F.2 On-the-Job Training (OJT) Progress Record

Use this template to track apprentice hours and progress. You may also maintain domain-level or task-level records depending on program complexity.

Apprentice Name	OJT Domains Completed	Hours Completed	Supervisor/Mentor	Date Verified	Notes

Work process schedules and domain structures are defined in the **Program Design Work Process**.

F.3 Related Technical Instruction (RTI) Record

Use this template to track participation and completion of Related Technical Instruction.

Apprentice Name	RTI Module/Course Completed	RTI Provider	Completion Date	Assessment Result	Notes

RTI providers may maintain their own instructional records. Make sure that RTI completion information is communicated to the program sponsor or administrator.

Policy Worksheets

- Supports program administration and registration
- Identify program roles
- Develop and list program policies
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- Postable work process for registration

Who it's For

- Program Designers
- Program Administrators



Apprenticeship Kit Portfolio – Program Management Guide

1.6 Registration Documents at a Glance (Planning Worksheet)

If you have completed Appendices D through F of this Guide, you have already developed nearly all of the information required to register your program. This worksheet is designed to consolidate that information in a format that aligns with the questions you will be asked during the registration process.

Use this worksheet to consolidate information you have already developed before transferring it into **Apprenticeship Colorado** templates. Complete and print it to bring to any meetings or interviews.

Program Sponsor (see Section 5.1 & Appendix D)	
Occupation Title(s) (see Program Design Work Process & Program Logistics Guide)	
Training Approach (see Section 8.1 & Program Logistics Guide)	☐ Time-Based ☐ Competency-Based ☐ Hybrid
Estimated OJT Program Length (Hours) (see Program Design Work Process & Program Logistics Guide)	
RTI Delivery Method (See Section 6.3 and Appendix C)	☐ College ☐ Employer ☐ Hybrid ☐ Other: _____
Estimated RTI Program Length (Hours) (see Program Design Work Process)	
Wage Progression Approach (if applicable) (see Section 8.1, Section 8.4, & Appendix F)	
Apprentice-to-Journeyworker Ratio (see Section 5.8 & Appendix E, Table E.5)	
Minimum Qualifications (see Section 7.3 & Appendix E, Table E.3)	
Selection Process (summary) (see Section 7.4 & Appendix E, Tables E.4 & E.9)	
Recordkeeping System (see Section 3.6, Section 9.3, & Appendix F)	
Will this be a multi-employer program? (see Appendix D)	☐ Yes ☐ No
Will you work with an intermediary? If yes, who? (see Section 3.3, Section 5.3, & Appendix D)	

Note: This worksheet is not a substitute for official **Apprenticeship Colorado** forms. It is intended to help you organize and consolidate information you have already developed.

Policy Worksheets

- Supports program administration and registration
- Identify program roles
- Develop and list program policies
- Track and record apprentice progress
- Consolidate planning & policy for Registered Apprenticeships
- Postable work process for registration

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Apprenticeship Kit Portfolio – Program Management Guide

Electrician Program Management Guide

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WORK PROCESS SCHEDULE

ON-THE-JOB LEARNING OUTLINE

Electrician

O*NET-SOC CODE: 47-2111.00 RAPIDS CODE:

Description	Approximate Hours
Safety, Professionalism & Jobsite Readiness Develops the ability to work safely, professionally, and productively while following established jobsite procedures, protecting personal and coworker safety, and contributing positively to the work environment. • OSHA, NFPA 70E, PPE, and lockout/tagout (LOTO) procedures • Professional conduct, communication, and accountability • Safe use, inspection, and care of tools, equipment, and materials • Hazard recognition, reporting, and jobsite awareness • Organized work practices and jobsite readiness	Time-based/ Hybrid: 300-500 Planning Target: 400 Competency-based: 200-300 Planning Target: 250
Electrical Theory, Applied Code & Technical Information Develops the practical knowledge needed to apply electrical theory, interpret technical information, and use applicable codes and standards to support safe, accurate, and code-compliant electrical work. • Electrical theory and basic circuit principles • National Electrical Code (NEC) application • Drawings, diagrams, and technical documentation • Manufacturer instructions and technical references • Code-compliant planning and work execution	Time-based/ Hybrid: 300-500 Planning Target: 400 Competency-based: 200-300 Planning Target: 250
Tools, Materials & Basic Electrical Installation Develops the ability to safely select and use electrical tools and materials while performing fundamental installation activities that establish the workmanship, accuracy, and quality expected throughout the apprenticeship. • Selection and use of electrical tools and equipment • Electrical materials and installation components • Boxes, supports, raceways, conductors, and terminations • Layout, measurement, assembly, and installation techniques • Safe work practices and quality workmanship	Time-based/ Hybrid: 650-950 Planning Target: 800 Competency-based: 450-750 Planning Target: 600
Construction Practices & Trade Coordination Develops the ability to prepare, sequence, and coordinate assigned electrical work within the broader construction process while supporting safe and efficient jobsite operations. • Work sequencing and coordination with other trades • Material, tool, and equipment staging • Work-area preparation and readiness • Interpretation of construction drawings and specifications • Coordination of assigned activities with project requirements	Time-based/ Hybrid: 300-500 Planning Target: 400 Competency-based: 200-300 Planning Target: 250

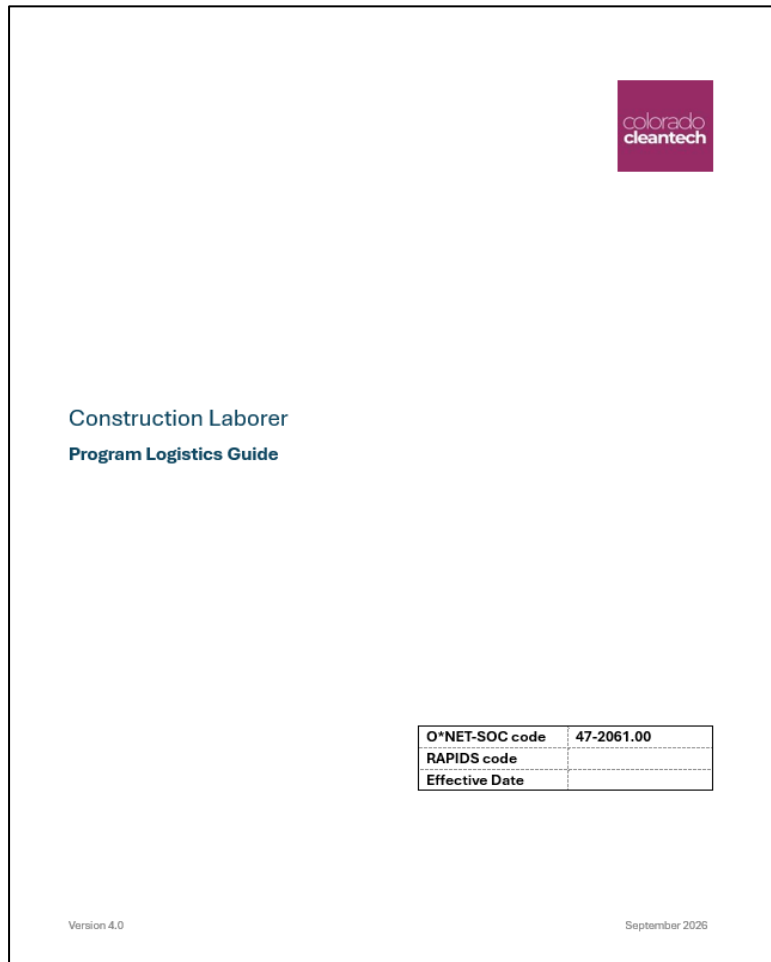
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Apprenticeship Kit Portfolio – Program Logistics Guide



What it Does

- Provides detailed job title-specific program guidance
- Specifies tools, equipment, facilities requirements
- Identifies and special safety considerations
- Summarizes regulatory and licensing considerations

Who it's For

- Program Designers
- Program Administrators
- Learning Providers
- Trainers

Apprenticeship Kit Portfolio – Program Logistics Guide

Construction Laborer Program Logistics Guide

Colorado Cleantech

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What it Does

- Provides detailed job title-specific program guidance
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- Identifies and special safety considerations
- Summarizes regulatory and licensing considerations

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Apprenticeship Kit Portfolio – Program Logistics Guide



2.0 Construction Laborer Instructional Design Overview

2.1 OJT Work Process Schedule

The full **Program Design Work Process Schedule** for Construction Laborer is maintained as a separate controlled document and is incorporated by reference in this Guide.

This section summarizes the domain structure, target hours, and sequencing expectations. You should rely on the full Work Process Schedule for representative tasks and proficiency indicators.

Target OJT Structure

- OJT Range: 1,800-2,650 hours (time-based); 1,125-1,750 (competency-based)
- Target OJT Hours for Planning: 2,225 (time-based); 1,480 (competency-based)

You may allocate hours within the established domain ranges based on employer specialization, project mix, and regional market needs. Total hours should align with your selected implementation model (time-based, competency-based, or hybrid).

OJT Domain Summary

The Construction Laborer program is organized into eight OJT domains:

1. Jobsite Safety & Compliance
2. Tools, Equipment & Materials Handling
3. Equipment Support, Rigging & Signaling
4. General Construction Support
5. Electrical & Mechanical Support
6. Building Envelope & Weatherization
7. Solar & Electrification Support
8. Professional Conduct & Advancement Readiness

Safety is positioned first intentionally. You should reinforce safe work practices continuously across all domains, not treat safety as a discrete early-stage activity.

Sequencing Guidance

Although you may adjust sequencing to match business operations, the domains are designed to build competency in a logical progression:

- **Foundational Phase (Domains 1-2):** Safety, tools, equipment use, material handling, and basic jobsite expectations.
- **Core Construction Support Phase (Domains 3-5):** Equipment support, signaling, general construction activities, and coordination with skilled trades.
- **Building Performance & Electrification Phase (Domains 6-7):** Building envelope work, weatherization, solar support, and electrification-related activities.
- **Professional Readiness & Advancement Phase (Domain 8):** Workplace communication, reliability, teamwork, and readiness for progression into higher-skill roles.

You may overlap phases where operational needs require it. However, apprentices should demonstrate foundational competency before progressing into unsupervised advanced installation or commissioning tasks.

Design Overview

- Summarizes program structure & duration
- Provides sequencing guidance
- Provides apprentice progression models

Who it's For

- Program Designers
- Program Administrators
- Learning Providers
- Trainers

Apprenticeship Kit Portfolio – Program Logistics Guide



3.0 Safety & Compliance Considerations

Construction Laborers work in dynamic environments that may include heavy equipment, excavation activities, elevated work areas, energized systems, power tools, changing weather conditions, moving vehicles, and multiple trades operating simultaneously. Safety and regulatory compliance are integral to occupational competency and must be reinforced continuously throughout both OJT and RTI.

Construction Laborers may also support work associated with building envelope systems, weatherization, solar installation, electrification projects, and other clean energy or building decarbonization activities. These environments introduce additional safety considerations related to rooftops, fall protection, electrical proximity, confined spaces, material handling, and coordination with licensed trades.

While Colorado does not license Construction Laborers as a standalone occupation, there are still federal, state, local, employer, and project-specific safety and compliance requirements that must be followed. This section identifies common regulatory, safety, and operational considerations associated with the occupation. You remain responsible for verifying all applicable federal, state, local, and project-specific requirements within your jurisdiction and work environment.

3.1 Regulatory Compliance

Federal Requirements: OSHA Construction Safety Standards

Construction Laborers work in environments regulated primarily through OSHA construction safety standards and related federal workplace safety requirements. Employers are responsible for maintaining OSHA-compliant jobsite practices and ensuring that workers receive training appropriate to assigned tasks and work environments.

Depending on project scope and work activities, additional federal requirements may apply, including regulations associated with excavation activities, roadway work zones, environmental hazards, equipment operations, or federally funded projects.

Ensure apprentices understand that safety responsibilities apply continuously across all jobsite activities and that stop-work authority should be used whenever unsafe conditions are identified.

OSHA Safety Training

While OSHA does not license Construction Laborers as an occupation, OSHA-compliant work practices are mandatory. You should ensure apprentices complete safety training appropriate to the work environment and tasks being performed. Depending on employer operations and project scope, this may include:

- OSHA 10-Hour Construction (recommended minimum);
- OSHA 30-Hour Construction (recommended for advanced roles or crew leadership pathways);
- Fall protection awareness and safe ladder use;
- Excavation and trenching safety awareness;
- Rigging, signaling, and equipment hazard awareness;
- Lockout/Tagout awareness;
- Silica, dust, noise, and respiratory hazard awareness;
- Electrical hazard and proximity awareness;
- Heat illness and environmental exposure awareness.

You should reinforce safety training continuously throughout both OJT and RTI rather than treating safety as a one-time onboarding activity.

Safety & Compliance

- Provides general safety guidance
- Identifies potential hazards specific to the job title
- Summarizes federal, state, & local regulatory and licensing considerations

Who it's For

- Program Designers
- Program Administrators
- Learning Providers
- Trainers

Apprenticeship Kit Portfolio – Program Logistics Guide



4.0 Equipment & Learning Environment Requirements

The Construction Laborer program requires access to appropriate tools, equipment, and learning environments to support safe and effective skill development. You should ensure that apprentices have exposure to real-world systems and technologies consistent with program objectives.

This section outlines typical equipment and environment expectations. It does not prescribe brand-specific tools or proprietary systems.

4.1 Field Equipment Exposure

Apprentices should have structured exposure to:

- General construction jobsites and site logistics;
- Hand and power tools commonly used in construction support activities;
- Material handling equipment and staging practices;
- Ladders, scaffolds, and elevated work platforms;
- Excavation, trenching, and earthwork support activities;
- Concrete, framing, demolition, and general construction support tasks;
- Building envelope and weatherization materials and systems;
- Solar installation and electrification support activities;
- Temporary power, work-zone safety, and multi-trade coordination.

Exposure should reflect a combination of new construction, retrofit, repair, and maintenance environments where possible.

4.2 Required Tools & Diagnostic Equipment

Apprentices should learn to safely and competently use:

- Common construction hand and power tools;
- Measurement, layout, and marking tools;
- Material handling and staging equipment;
- Ladders, scaffolds, and basic access equipment;
- Demolition and site preparation tools;
- Compaction, concrete, and earthwork support equipment;
- Basic rigging, signaling, and work-zone safety equipment;
- Weatherization, air sealing, and building envelope support tools;
- Solar installation support tools and rooftop safety equipment;
- Personal protective equipment appropriate to assigned tasks.

Provide access to equipment consistent with the work environments in which apprentices will operate and ensure apprentices understand proper tool use, inspection, maintenance awareness, and safe handling procedures.

Equipment & Learning Environment

- Specifies tools, equipment, facilities requirements
- Identifies needs for both OJT and RTI
- Identifies and special safety considerations
- Provides list of tools keyed to OJT Domains

Who it's For

- Program Designers
- Program Administrators
- Learning Providers
- Trainers

Apprenticeship Kit Portfolio – Program Logistics Guide



Construction Laborer Program Logistics Guide

Colorado Cleantech

Typical Tools & Personal Protective Equipment

Category	Typical Items	Primary OJT Domains
Hand Tools	Tape measures, levels, squares, and marking tools	Domains 2, 4, 5
	Hammers, pry bars, utility knives, and demolition tools	Domains 2, 4
	Shovels, rakes, brooms, wheelbarrows, and site cleanup equipment	Domains 2, 4
	Drills, impact drivers, saws, grinders, and portable power tools	Domains 2, 4, 5
	Ladders, scaffolds, and elevated work access equipment	Domains 1, 6, 7
	Material handling and staging equipment	Domains 2, 4
	Concrete, compaction, and site preparation tools	Domains 3, 4
	Basic rigging, signaling, and traffic control equipment	Domains 3, 4
	Weatherization, air sealing, and building envelope support tools	Domain 6
	Solar installation support tools and rooftop safety equipment	Domain 7
Personal Protective Equipment (PPE)	Hard hats, safety glasses, and high-visibility clothing	Domains 1–8
	Work gloves, hearing protection, and protective footwear	Domains 1–8
	Respiratory protection (where required)	Domains 1, 4, 6
	Fall protection equipment (where required)	Domains 1, 6, 7

Usage Notes

- Tool and PPE exposure should be progressive and aligned with demonstrated competency.
- High-risk equipment (refrigerant handling, energized electrical testing, commissioning diagnostics) should be used under direct supervision until proficiency is demonstrated.
- Employers may supplement this list based on specialty market focus (e.g., hydronics, geothermal, commercial rooftop systems).

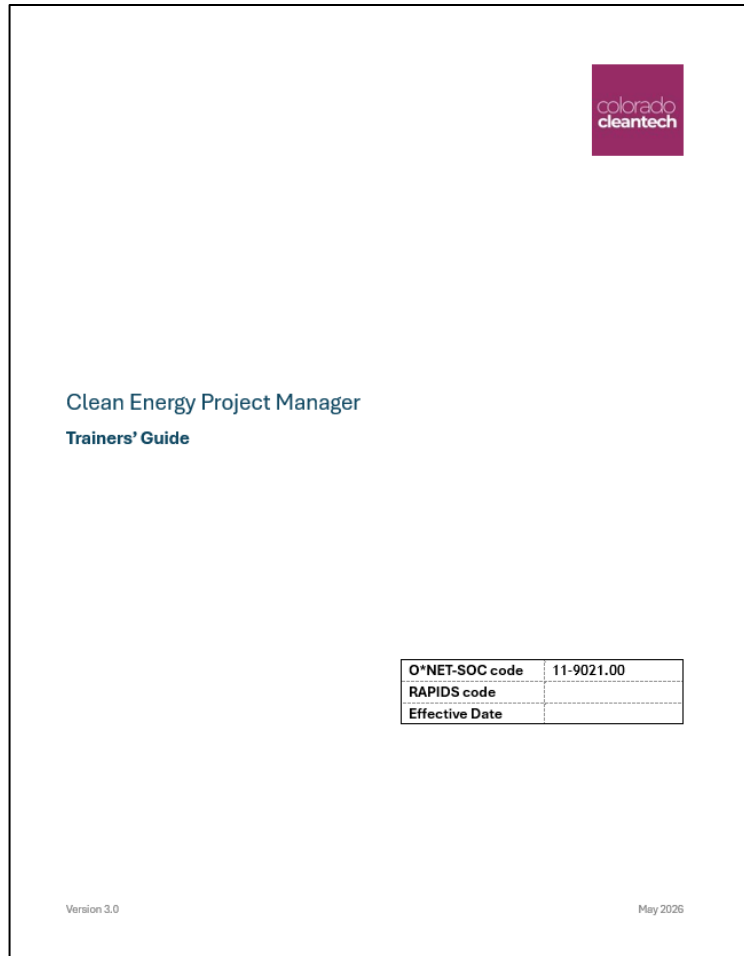
Equipment & Learning Environment

- Specifies tools, equipment, facilities requirements
- Identifies needs for both OJT and RTI
- Identifies and special safety considerations
- Provides list of tools keyed to OJT Domains

Who it's For

- Program Designers
- Program Administrators
- Learning Providers
- Trainers

Apprenticeship Kit Portfolio – Trainers' Guide



What it Does

- Supports OJT Trainer/Mentors in ongoing OJT activity
 - Trainer/Mentor role
 - Coordinating OJT with RTI
 - Scheduling & sequencing
 - Evaluating progress
 - Training tips

Who it's For

- OJT Trainer/Mentors

Apprenticeship Kit Portfolio – Trainers' Guide



Clean Energy Project Manager

Trainers' Guide

How Apprenticeship Training Is Structured

Apprenticeship programs in this portfolio combine two integrated learning environments.

On-the-Job Training (OJT)

Apprentices develop practical capability by performing real work under the supervision of experienced workers. OJT builds skills, judgment, and familiarity with tools, equipment, and operating conditions.

Related Technical Instruction (RTI)

Classroom or laboratory instruction develops the technical knowledge that supports workplace performance. In a large organization, RTI might be taught in-house, but usually it will be delivered by colleges, private training providers, unions, or hybrid partnerships.

These environments reinforce one another. Classroom instruction introduces concepts that are applied on the job. Workplace experience strengthens understanding of classroom material.

Hybrid Progression Model

Most programs in this portfolio provide a hybrid time-based and competency-based structure.

- Hour ranges provide a realistic estimate of the experience required to develop proficiency.
- Competency expectations confirm that capability has been achieved.

The objective is not simply to accumulate hours, but to develop reliable job performance.

OJT Domains

In this program OJT Domains are all structured exactly the same. Each one has four components:

- **Title:** Displays both the number and title of the domain. Titles are designed to identify the major topic.
- **Representative Tasks:** Lists a series of tasks that your apprentice should learn. This list is designed to include a set of tasks that, together, will enable your apprentice to learn the overall skill of the domain. It is important to recognize that this task list is *representative*. It is not exhaustive or prescriptive. You are not expected to follow it rigidly – there are always other tasks that provide the same skill or knowledge and you can make substitutions based on the work you are doing and the resources available. You are expected to follow the spirit of the list and make sure that your apprentice gets to practice the full scope of the domain.
- **Proficiency Indicators:** These are specific, observable behaviors that demonstrate that your apprentice has mastered the learning for the domain. This is what you are looking for in order to say that your apprentice has successfully completed the domain.
- **Approximate Hours:** The estimated range of time that the apprentice should work to complete this domain. Note that this isn't exactly the same as formal instructional time. 100 hours here doesn't mean 100 hours of you directly teaching the apprentice. It means 100 hours of job time during which the apprentice is focused primarily on the domain.

The OJT portion of either the [Program Design Work Process](#) or the [OJT/RTI Unit Snapshots](#) will be the primary outline for your training.

What it Does

- Supports OJT Trainer/Mentors in ongoing OJT activity
- Trainer/Mentor role
- Coordinating OJT with RTI
- Scheduling & sequencing
- Evaluating progress
- Training tips

Who it's For

- OJT Trainer/Mentors

Apprenticeship Kit Portfolio – Trainers' Guide



The Program Design Work Process and OJT/RTI Unit Snapshots

The **Program Design Work Process** is the official design document for this program. If your program is a registered apprenticeship a simplified version of this document was used to register with **Apprenticeship Colorado**. Even if your program is not registered, or if you are only using a few pieces, this document forms the skeleton of the program, both on the job and in the classroom. You can think of it as the basic guide to what to teach your apprentice, when to teach it, and how to evaluate whether they have learned it.

OJT/RTI Unit Snapshots

The **OJT/RTI Unit Snapshots** are there for your convenience. They contain all of the information in the **Program Design Work Process**, plus some additional instructional guidance. In this document each OJT Domain and RTI Module has its own page – this makes it a little bigger than the **Program Design Work Process** but more convenient for you to use.

The units of instruction for OJT are labeled as "Domains," while the RTI units are labeled "Modules." OJT and RTI are specifically designed to work together, so often their topics and even titles can overlap. This labeling is just to help tell them apart.

How to Use the Program Design Work Process and OJT/RTI Unit Snapshots

These are your main resources for managing OJT. It's a good idea to make a copy for yourself that you can get when you need it. The Unit Snapshots correspond to the Work Process, with a little more detail for administration.

- Take the time to review both the Work Process and Unit Snapshots before you begin with your apprentice.
 - The OJT section outlines your training program. Be sure you understand the requirements and verify that they are all feasible in your work environment.
 - The RTI section outlines the training your apprentice will get in the classroom or lab environment. You probably won't be conducting this training but you will want to know which module your apprentice is working on at any given time, and how the classroom work corresponds to what you're doing on the job.
- In most cases, there is a direct correspondence between OJT Domains and RTI Modules. These are documented in the Unit Snapshots.
 - Normally, RTI should be in process before starting the corresponding OJT Domain. RTI teaches concepts, OJT applies those concepts. Your apprentice's learning will be more complete and more effective if they are learning the concepts before or in tandem with the application work.
- Before you begin each new OJT Domain, review the associated RTI Module, and verify that your apprentice has either completed or is working on it.
 - Review the subtopics, learning objectives, and proficiency indicators of the RTI Module and consider how you can structure your OJT to apply them most effectively.

What it Does

- Supports OJT Trainer/Mentors in ongoing OJT activity
- Trainer/Mentor role
- Coordinating OJT with RTI
- Scheduling & sequencing
- Evaluating progress
- Training tips

Who it's For

- OJT Trainer/Mentors

Apprenticeship Kit Portfolio – Trainers' Guide

Clean Energy Project Manager

Trainers' Guide

Role of the Trainer or Mentor

You – the trainer or mentor – play the most important role in the apprenticeship learning process. Classroom instruction provides technical knowledge. You translate that knowledge into practical capability and verify that your apprentice has got it.

Assigning work alone is not training. Apprentices develop most effectively when trainers intentionally support skill development while real work is performed. Effective trainers:

- Demonstrate tasks clearly
- Explain why work is performed a certain way
- Provide opportunities for guided practice
- Test for understanding
- Offer timely feedback and correction
- Reinforce safe work practices
- Increase responsibility as skill develops

There is a reason for describing this role as Trainer/Mentor, rather than simply as Trainer. A trainer teaches skills and knowledge needed to execute the job's tasks safely and successfully. A mentor may do that but also gives informal guidance on a more personal level – how to get along on the job and in the industry, long-term career advice, work-life balance – that sort of thing.

Successful training is the “must-do” part of your role; it's your minimum standard. Where you can stretch into real success is on the mentor side of things. Think back to when you were first starting – what do you wish someone had taught you and how do you wish they'd done it? You're almost certainly your apprentice's first real mentor, someone that he or she will remember – and, hopefully, emulate – for the rest of their lives. Remember that you're not just teaching hands-on skills. You're modeling professional behavior that will be as important to your apprentice's career as the technical skills.

Supporting Apprentice Success

Apprentices develop both technical skills and professional habits.

Support apprentice success by:

- Encouraging questions
- Explaining the reasoning behind work practices
- Correcting mistakes constructively
- Reinforcing safe behavior
- Modeling professional conduct on the jobsite and with internal and external stakeholders

Effective trainers sustain the strength of the workforce by passing on knowledge and expectations.

Note: Apprentices (or other trainees) in the Clean Energy Project Manager apprenticeship program are likely to have a different profile from other apprentices. In most cases, they will be experienced in other roles, bringing the benefits of that experience to the job with them. They may be new to project management but only rarely will they be entry-level employees who may need to master basic workplace behaviors. It is important for you to gauge, to respect, and to build on your apprentice's experience.

What it Does

- Supports OJT Trainer/Mentors in ongoing OJT activity
- Trainer/Mentor role
- Coordinating OJT with RTI
- Scheduling & sequencing
- Evaluating progress
- Training tips

Who it's For

- OJT Trainer/Mentors

Apprenticeship Kit Portfolio – Trainers' Guide



Clean Energy Project Manager

Trainers' Guide

Delivering Effective On-the-Job Training

Effective OJT typically progresses through several stages.

1. **Explain the task** – Describe the purpose of the work and key safety considerations.
2. **Demonstrate the task** – Show how the work is performed.
3. **Guided practice** – Let the apprentice perform the task while you observe and provide feedback.
4. **Test for understanding** – Question your apprentice periodically with open-ended questions (not yes/no) to make sure they understand the task and the reason for it. Have them explain what they are learning in the classroom and how it related to the OJT task at hand. This gives you a chance to course-correct in real time if you need to.
5. **Independent performance** – As proficiency develops, reduce supervision and allow the apprentice to perform the work independently.
6. **Formal demonstration of competency** – When ready, your apprentice will need to demonstrate competence while you observe and document their performance. For that, there is a complete set of [OJT Competency Verification Checklists](#) included in this kit.

Integrate training into normal work activities whenever possible. Apprentices learn most effectively when training tasks occur within real job assignments. Ensure exposure to a range of tasks across the OJT domains defined in the work process schedule.

Pro Tips for OJT Trainer/Mentors

When you're teaching, especially with hands-on skills, you're really doing two-things: demonstrating and communicating. The demonstrating part is easy – you just do what you do every day, but with somebody watching. The communication part is where the challenge lies. Be sure to explain what you're doing, and ask your apprentice questions to test their understanding. Open-ended questions – the kind you can't answer with "yes" or "no" – often work best for this.

The communication goes two ways – you're giving information and receiving feedback that tells you how clearly that information has been received. And don't forget nonverbal communication. Your apprentice is watching everything you do and how you do it, and is soaking all of it in, consciously or subconsciously.

Mostly just trust your instincts and think first about what your apprentice needs to learn, both to perform the task at hand and to grow as a professional. If you do those two things consistently, you can't go too far wrong.

What it Does

- Supports OJT Trainer/Mentors in ongoing OJT activity
- Trainer/Mentor role
- Coordinating OJT with RTI
- Scheduling & sequencing
- Evaluating progress
- Training tips

Who it's For

- OJT Trainer/Mentors

Apprenticeship Kit Portfolio – OJT Competency Verification Checklists

The cover page of the OJT Competency Verification Checklists for Electrical/Electronics Technician. It features the Colorado CleanTech logo in the top right corner. The title "Electrical/Electronics Technician" is in a large, bold, black font, and "OJT Competency Verification Checklists" is in a smaller, bold, black font below it. At the bottom, there is a table with three rows: "O*NET-SOC code" with the value "17-3023", "RAPIDS code", and "Effective Date". The footer includes "Version 3.0" on the left and "May 2020" on the right.

O*NET-SOC code	17-3023
RAPIDS code	
Effective Date	

What it Does

- Detailed framework for evaluating & documenting competency
- Separate evaluation form for each OJT Domain

Who it's For

- OJT Trainer/Mentors
- Apprentices/Trainees (for info)



Apprenticeship Kit Portfolio – OJT Competency Verification Checklists

OJT DOMAIN 1: Safety, Quality & Professional Practice

Apprentice Name:		Employer:	
Program Start Date:		Mentor Name:	
Target Hour Range (Reference Only):	• Time-based/Hybrid: 200-350; (Planning Target: 250) • Competency-based: 80-200		

Implementation Model: Time-Based ☐ Competency-Based ☐ Hybrid ☐

Competency Clusters	Competency Verified	
	Initials	Date
Safety Procedures & Hazard Awareness: Follows LOTO, PPE, electrical safety, and ESD procedures consistently; identifies unsafe conditions, operational hazards, and quality concerns; Maintains safe work practices in manufacturing and technical environments.		
Quality Standards & Work Discipline: Follows QA/QC procedures and inspection requirements; Verifies work against specifications and operational expectations; Maintains organized, compliant, and professional work practices.		
Documentation & Recordkeeping: Completes inspection, testing, maintenance, and calibration documentation accurately; Maintains required operational and procedural records; Uses revision control and documentation procedures appropriately.		
Professional Communication & Coordination: Communicates safety, operational, and quality concerns clearly; Participates effectively in shift handoffs, team coordination, and operational discussions; Escalates issues appropriately within defined reporting structures.		
Operational Awareness & Workplace Conduct: Demonstrates situational awareness in active manufacturing and technical environments; Maintains professionalism, accountability, and reliability during assigned work activities; Supports safe and efficient team operations.		

Competency verification indicates the apprentice can perform work within this domain independently and safely without direct supervision.

Domain Performance Confirmation Supervisor confirms the apprentice can:	Domain Signoff Domain Competency Verified:
Sets up ESD controls correctly ☐	Supervisor Name (Print):
Completes documentation accurately ☐	Signature:
Works safely without prompting ☐	Date:
Flags safety or quality risks proactively ☐	Eligible for Stage Advancement ☐
Demonstrates consistent situational awareness in live environments ☐	Additional Supervised Experience Required ☐

Notes

Program Administrator Approval			
Name		Signature	Date

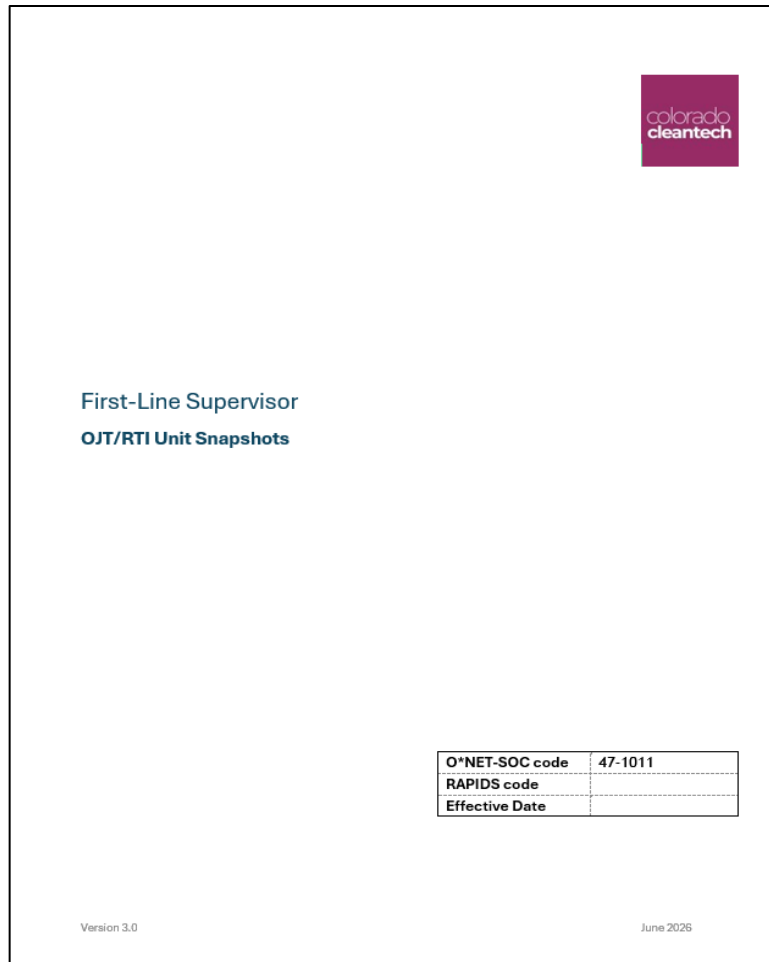
What it Does

- Detailed framework for evaluating & documenting competency
- Separate evaluation form for each OJT Domain

Who it's For

- OJT Trainer/Mentors
- Apprentices/Trainees (for info)

Apprenticeship Kit Portfolio – OJT/RTI Unit Snapshots



What it Does

- Summary of each OJT Domain and RTI Module
- Purpose & instructional intent
- Completion time estimates
- Representative tasks (OJT)
- Subtopics (RTI)
- Learning objectives (RTI)
- Proficiency indicators (OJT & RTI)

Who it's For

- OJT Trainer/Mentors
- Apprentices/Trainees (for info)

Apprenticeship Kit Portfolio – OJT/RTI Unit Snapshots



First-Line Supervisor OJT/RTI Unit Snapshot

Colorado Cleantech

OJT Domain 1: Work Planning, Task Assignment, and Coordination with Project Management

1. Domain Snapshot

Purpose: This domain develops the supervisor's ability to translate project plans into effective day-to-day execution. It focuses on planning work at the crew level, assigning tasks based on skills and site conditions, coordinating sequencing with the Project Manager, and adjusting plans in response to changing conditions. Strong performance in this domain enables supervisors to maintain productivity while minimizing disruptions, rework, and downstream impacts.

Approximate Hours:

- Time-based: 300-450 hours; Planning Target: 375 hours
- Competency-based: 120-250 hours; Planning Target: 175 hours

Representative Tasks:

- Translate project scopes, drawings, and schedules into daily and weekly work plans
- Assign tasks to crews based on skill level, certifications, and site conditions
- Monitor individual and crew performance
- Coordinate daily sequencing with the Project Manager, including:
 - Material availability
 - Access constraints
 - Inspection timing
- Adjust work plans in response to:
 - Weather
 - Crew availability
 - Unforeseen site conditions
- Communicate work plans clearly during:
 - Daily huddles
 - Toolbox talks
 - End-of-day reviews
- Track short-term progress against plan and escalate risks to PM as needed

2. Instructional Intent

The instructional intent of this domain is to build disciplined, repeatable work planning habits that reflect real-world supervisory practice. Candidates are expected to move beyond simply following directions and begin exercising independent judgment in planning daily work, sequencing tasks, and coordinating with project management.

This domain intentionally emphasizes practical planning at the field level rather than formal scheduling or project controls. The focus is on what First-Line Supervisors actually do each day: aligning crews, materials, and access; communicating expectations clearly; and making timely adjustments when conditions change. SMEs should assess whether the scope, sequencing, and performance expectations reflect the level of planning responsibility that a competent First-Line Supervisor should reasonably assume on active jobsites.

3. Proficiency Indicators

Upon completion of this domain, the candidate:

Foundational	Operational
• Assists in preparing daily work plans • Assigns tasks under direct guidance • Communicates changes as directed	• Independently plans daily work for one or more crews • Adjusts sequencing without disrupting downstream work • Coordinates routinely with PM to resolve conflicts
Advanced	
• Anticipates sequencing conflicts before they occur • Coaches others on effective work planning • Serves as primary site-level coordination lead for small projects	

PLEASE NOTE: This OJT Domain has a close correspondence with RTI Module 4. You may find it helpful to consider both together when evaluating coverage and sequencing.

Version 3.0

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June 2026

What it Does

- Summary of each OJT Domain and RTI Module
- Purpose & instructional intent
- Completion time estimates
- Representative tasks (OJT)
- Subtopics (RTI)
- Learning objectives (RTI)
- Proficiency indicators (OJT & RTI)

Who it's For

- OJT Trainer/Mentors
- Apprentices/Trainees (for info)

Apprenticeship Kit Portfolio – OJT/RTI Unit Snapshots



First-Line Supervisor OJT/RTI Unit Snapshots

Colorado Cleantech

Module 1: Role of the First-Line Supervisor in Clean Energy & Building Decarbonization

1. Module Snapshot

Purpose: This module establishes a clear understanding of the First-Line Supervisor role within clean energy and building decarbonization projects. It focuses on role boundaries, accountability, authority, ethical leadership, and the supervisor's relationship to Project Managers, Superintendents, crews, and other stakeholders. Strong performance in this module enables supervisors to operate with sound judgment, clarity of responsibility, and confidence in their decision-making.

Approximate Hours:

- Time-based: 20-40 hours; Planning Target: 30 hours
- Competency-based: 10-25 hours; Planning Target: 15 hours

Instructional Setting:

Classroom instruction supported by facilitated discussion and scenario-based exercises drawn from real jobsite situations. Limited lab-style activities may be used for role-play and decision-making simulations.



Subtopics:

- Supervisor vs. Superintendent vs. Project Manager roles vs. individual contributor
- Working supervisor expectations on active jobsites
- Relationship to Project Manager and other stakeholders
- Authority, accountability, and decision-making boundaries
- Supervisor responsibility for safety, quality, and daily execution
- Ethical leadership
- Documentation and responsibility
- Union and non-union environments (overview)

Learning Objectives:

- Describe the role and responsibilities of a First-Line Supervisor on small to mid-scale clean energy projects
- Distinguish the supervisor role from Project Manager, Superintendent, and individual contributor roles
- Explain authority limits, escalation pathways, and decision-making expectations
- Describe how supervisors support project delivery while remaining close to the work
- Explain how supervisors contribute to safety culture, quality outcomes, and workforce development

2. Instructional Intent

The instructional intent of this module is to establish a shared mental model of the First-Line Supervisor role before candidates are asked to exercise supervisory judgment in the field. Candidates are expected to understand not only what they are responsible for, but also what sits outside their authority and when escalation is required.

This module intentionally emphasizes role clarity and ethical decision-making rather than technical depth. It addresses common points of confusion for newly promoted supervisors, including blurred boundaries between supervision and project management, the challenges of leading former peers, and operating effectively as a working supervisor. SMEs should assess whether the content and learning objectives accurately reflect the role expectations placed on First-Line Supervisors in clean energy and building systems projects.

3. Proficiency Indicators

Upon completion of this module, the candidate:

Foundational

- Identifies core responsibilities and reporting relationships
- Explains role distinctions using examples

Advanced

- Analyzes ambiguous situations involving authority or responsibility
- Articulates the supervisor's role clearly to crews and stakeholders

Operational

- Applies role boundaries correctly in scenarios
- Demonstrates appropriate judgment about when to act independently vs. escalate

What it Does

- Summary of each OJT Domain and RTI Module
- Purpose & instructional intent
- Completion time estimates
- Representative tasks (OJT)
- Subtopics (RTI)
- Learning objectives (RTI)
- Proficiency indicators (OJT & RTI)

Who it's For

- OJT Trainer/Mentors
- Apprentices/Trainees (for info)

Apprenticeship Kit Portfolio – Apprentice & Family Guide



HVAC Technician Apprentice & Family Guide

O*NET-SOC code	49-9021.00
RAPIDS code	
Effective Date	

What it Does

- Overview of the program from Apprentice point-of-view
- What an apprenticeship is & how it works
- Overview of the job & career prospects
- Preparing for the program
- Progression through the program
- Guidance for success
- FAQ

Who it's For

- Apprentices/Trainees & their families
- OJT Trainer/Mentors (for info)



Apprenticeship Kit Portfolio – Apprentice & Family Guide

HVAC Technician Apprentice & Family Guide

Colorado Cleantech

2.0 What an Apprenticeship Is

2.1 Apprenticeship Basics

An apprenticeship is a job combined with structured training. As an apprentice, you are an employee from day one. You work alongside experienced professionals, contribute to real projects, and learn the trade by doing the work.

At the same time, you receive formal instruction that builds the technical knowledge behind what you are doing on the job. This combination – hands-on work and structured learning – is what defines an apprenticeship. You are paid while you learn. As your skills increase, your responsibilities and wages typically increase as well.

2.2 What a Registered Apprenticeship Is

A Registered Apprenticeship follows a defined structure that is recognized at the state or national level. This typically includes:

- A defined set of skills to be learned on the job
- Related classroom or lab instruction
- A progression of wages tied to skill development
- Oversight to ensure the program meets established standards

Registration does not change the day-to-day experience of working and learning, but it does provide an added level of consistency and credibility. It signals that the program has been designed intentionally and reviewed against recognized benchmarks.

2.3 Apprenticeship Compared to Other Paths

There are other ways to learn a trade.

- **Compared to trade school:** Trade schools focus on technical instruction, usually in a classroom or lab setting. Like colleges, most require payment as you go. While trade schools often offer job placement assistance, a job with pay and workplace learning is not usually integrated into the program. An apprenticeship integrates those elements from the beginning. You learn the theory and apply it in real work at the same time.
- **Compared to informal on-the-job learning:** It is possible to learn some jobs simply by being hired and trained informally. An apprenticeship is different – the training is structured, comprehensive, and intentional. You are not just picking things up as you go, you are progressing through a defined set of skills.

For some people, a classroom-first approach is a better fit. For others, learning by doing in a real work environment is more effective. An apprenticeship is designed for those who prefer to build skills through direct experience and want to be able to earn while learning.

College is another pathway, and many people wrestle with the decision of whether to go to college or enter an apprenticeship. You can learn more about this decision in Section 9 of this guide.

What it Does

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Who it's For

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- OJT Trainer/Mentors (for info)

Apprenticeship Kit Portfolio – Apprentice & Family Guide



3.0 How an Apprenticeship Works

3.1 On-the-Job Training (OJT)

Most of your time as an apprentice is spent on the job.

You learn by doing real work under the guidance of experienced technicians. Early on, this may involve assisting with basic tasks and observing how work is done. Over time, you take on more responsibility as your skills develop.

This is where you learn how the job actually works – how systems are installed, how problems are diagnosed, and how work is performed safely and efficiently in real environments.

3.2 Related Technical Instruction (RTI)

In addition to working, you receive structured instruction that supports what you are learning on the job. The instruction focuses on the technical knowledge behind the work, including systems, tools, safety practices, and underlying principles. The goal is to connect what you are doing with why it works.

This may take place in a classroom, lab, or training facility, depending on the program. Often this may be available through at your local community college, and many of Colorado's community colleges are developing apprenticeship programs now. An extra benefit of this approach is that you may earn college credit through your apprenticeship.

3.3 A Typical Week

A typical week includes a combination of work and training.

Most of your time is spent on the job, working with a team and gaining experience. A portion of your time is set aside for structured learning. This training is part of the job and is typically free to you.

The exact schedule varies by program, but the overall pattern is consistent: work, learn, apply, and repeat.

3.4 Duration and Progression

Apprenticeships are structured over a period of time, often measured in years rather than months.

As you progress through the program, you move from basic tasks to more complex work. Your level of independence increases, and your wages typically increase as well.

Progression is not random. It is based on developing and demonstrating specific skills. By the end of the apprenticeship, you are expected to be capable of performing the work at a professional level.

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5.0 The HVAC Technician Role

HVAC stands for Heating, Ventilation, and Air Conditioning. HVAC technicians install, maintain, and repair the systems that control temperature, air quality, and comfort in buildings.

These systems are everywhere – homes, schools, hospitals, office buildings, and industrial facilities. When they are working well, people tend not to notice them. When they are not, the impact is immediate.

Understanding what the work is actually like is just as important as understanding how the apprenticeship works.

5.1 What HVAC Technicians Do

HVAC technicians work with a range of equipment and systems. This includes:

- Installing new heating and cooling systems
- Maintaining and servicing existing equipment
- Diagnosing and repairing system problems
- Testing system performance and efficiency

Some technicians focus on installing new systems in a construction environment. Others focus on service and repair of existing systems. This choice is mainly a matter of preference and opportunity. The working environment is different, but the base of knowledge and skills is essentially the same.

The work is both technical and practical. It requires understanding how systems operate, as well as the ability to work with tools, equipment, and components in real environments. Often, it may include communicating directly with the customer.

No two days are exactly the same. Some work is planned, such as installations or scheduled maintenance. Other work is responsive, such as troubleshooting a system that is not working properly.

5.2 Work Environments

HVAC technicians work in a variety of settings.

Depending on the role, this may include:

- Residential homes
- Commercial buildings such as offices, schools, and retail spaces
- Industrial or specialized facilities

Work may take place indoors or outdoors, and sometimes in tight or confined spaces such as mechanical rooms or crawl spaces.

The job often involves moving between locations during the day, especially in service roles. In other cases, such as large construction projects, work may be centered at a single site for an extended period.

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Apprenticeship Kit Portfolio – Apprentice & Family Guide

6.0 Career Path and Advancement

One of the advantages of entering a skilled trade through an apprenticeship is that it provides a clear starting point and multiple options for growth over time.

HVAC is not a single job. It is a field with a range of roles that build on the same core skills.

6.1 Early Career

The typical starting point is as an apprentice. During the apprenticeship, you develop foundational skills while working under supervision. As you progress, you take on more responsibility and begin performing work more independently.

After completing the apprenticeship, you move into a technician role. At this stage, you are expected to handle a wide range of tasks, including installation, maintenance, and troubleshooting, with limited supervision.

6.2 Mid-Career Opportunities

As experience increases, technicians often begin to specialize or take on more complex work.

This can include:

- Working on larger or more complex systems
- Focusing on diagnostics and advanced troubleshooting
- Specializing in areas such as controls, refrigeration, or energy systems

Some technicians move into lead roles, guiding less experienced workers on job sites or within service teams.

At this stage, the work often becomes less about learning the basics and more about applying judgment, efficiency, and deeper technical understanding.

The diagram at right shows a typical career path in the HVAC field.



Figure 1: HVAC Career Path

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Apprenticeship Kit Portfolio – Apprentice & Family Guide



7.0 HVAC and the Clean Energy Transition

Heating and cooling systems are a major part of how buildings use energy.

Because of this, HVAC technicians play an important role in improving energy efficiency and reducing emissions. This is one of the reasons demand for skilled technicians is expected to remain strong over time.

7.1 Why HVAC Matters for Energy and Climate

A large portion of energy use in homes and buildings comes from heating, cooling, and ventilation systems. In many buildings it is the largest use of energy and a major part of the building's operating cost.

Improving how HVAC systems are installed, maintained, and operated can significantly reduce energy use and operating costs.

HVAC technicians are directly involved in:

- Installing more efficient equipment
- Maintaining systems so they operate as intended
- Identifying and correcting performance issues

This work affects not only comfort, but also energy use and long-term system performance.

7.2 Emerging Technologies and Practices

The field is evolving as new technologies and approaches are adopted. Examples include:

- High-efficiency systems and equipment
- Electrification, including heat pump technologies
- Advanced and programmable controls and system integration

Technicians who understand these systems are increasingly in demand.

At the same time, the core skills of the trade remain essential. New technologies build on those fundamentals rather than replace them.

7.3 What This Means for Your Career

For someone entering the field, this means there is both stability and opportunity.

The need for heating and cooling systems is not going away, and it's not going to be outsourced overseas or replaced by artificial intelligence. At the same time, the way those systems are designed and operated is constantly evolving. This creates opportunities to:

- Work with newer technologies
- Develop specialized skills
- Stay current as the field evolves

If you are interested in practical work that also connects to broader energy and environmental goals, HVAC offers a direct way to be part of that effort.

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HVAC Technician Apprenticeship & Family Guide

Colorado Cleantech

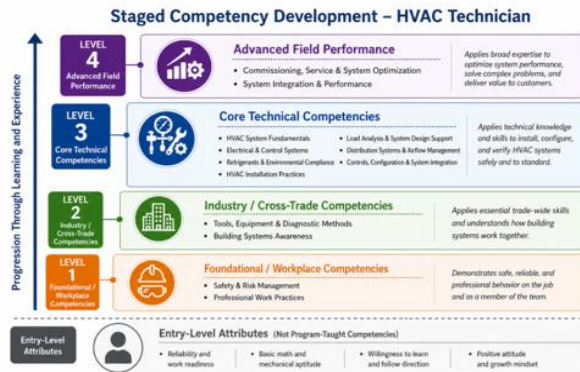


Figure 2: Staged Competency Development in the HVAC Technician Apprenticeship

8.4 Certifications and Licensing Overview

While HVAC is a regulated trade in some places, it is not regulated on a statewide basis in Colorado. Some counties or other localities may regulate certain aspects of the trade. Over time, technicians may need to obtain certain certifications or licenses to perform specific types of work. Common examples include:

- Environmental certifications related to refrigerant handling
- Local or state licensing requirements for certain types of work

These requirements are typically addressed during or after the apprenticeship, not before entry. The apprenticeship provides the foundation needed to meet them.

8.5 Preparing to Get Started

There are several practical steps that can help you prepare for an apprenticeship. These include:

- Learning about the field and the type of work involved
- Talking with employers or technicians when possible
- Building basic familiarity with tools and mechanical systems
- Taking related CTE classes in high school
- Engaging in a pre-apprenticeship or internship program
- Demonstrating reliability in current work or school settings

For those coming from another career, preparation may also include planning for the transition, including how starting wages and training time fit into your overall situation.

The most important step is often the simplest: deciding to pursue the opportunity and taking the first step toward applying.

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HVAC Technician Apprenticeship & Family Guide

Colorado Cleantech

10.0 HVAC Careers: Job Outlook and Stability

When considering any career path, it is important to understand how stable the work is likely to be over time.

HVAC is a field with consistent, long-term demand. Buildings require heating, cooling, and ventilation systems to function, and those systems must be installed, maintained, and repaired on an ongoing basis.

10.1 Demand Drivers

Several factors are contributing to continued demand for HVAC technicians in Colorado. The basic need is straightforward: homes, businesses, schools, hospitals, and other buildings require heating and cooling systems, and those systems must be installed, maintained, repaired, and eventually replaced. New construction and continued population and building growth add to that ongoing demand.

Colorado's energy transition is creating an additional source of demand. The state is encouraging greater use of high-efficiency electric heating and cooling, particularly heat pumps, as part of its efforts to improve building efficiency and reduce emissions. Current state planning anticipates a substantial increase in heat pump installations over the remainder of this decade.

This means HVAC technicians will increasingly be needed not only for traditional installation, maintenance, and repair, but also to replace older equipment, install and service heat pumps and other high-efficiency systems, upgrade controls and distribution systems, and adapt existing buildings to newer technologies.

Demand is therefore being driven by several factors at the same time:

- Ongoing maintenance, repair, and replacement of Colorado's existing HVAC systems
- New residential and commercial construction
- Population growth and expansion of the state's building stock
- Increasing emphasis on energy efficiency and improved building performance
- Rapid growth in heat pump installation and building electrification
- Increasing technical complexity of HVAC equipment, controls, and integrated building systems

Together, these factors create demand both for new workers entering the field and for experienced technicians who continue developing their skills as HVAC technology changes.

10.2 Stability of the Work

HVAC work is tied to physical systems in specific locations.

Because of this, it is not easily outsourced. Systems must be installed and serviced where they are located, which means the work remains local.

In addition, much of the work requires hands-on interaction with equipment, tools, and environments that cannot be replicated remotely. This makes the role less susceptible to automation or artificial intelligence than many other occupations.

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Apprenticeship Kit Portfolio – Apprentice & Family Guide

HVAC Technician Apprenticeship & Family Guide

Colorado Cleantech

11.0 Common Questions and Concerns

It is normal to have questions about entering a trade through an apprenticeship.

Even after deciding to explore or begin a program, both apprentices and family members often want to better understand what to expect and what the long-term implications are.

The questions below reflect some of the most common areas of concern.

Is this a stable career?

Yes. HVAC work is tied to systems that buildings depend on every day.

Heating, cooling, and ventilation systems must be installed, maintained, and repaired regardless of economic conditions. This creates consistent demand for skilled technicians.

Is this a long-term career or just a starting point?

HVAC can be both. Some people remain in hands-on technical roles throughout their careers and continue to build skill and responsibility over time. Others move into advanced technical, supervisory, or business roles.

The field supports long-term career development, not just entry-level work.

What if I change my mind?

Skills developed in an apprenticeship are transferable.

Even if you choose to move in a different direction later, you will have gained work experience, problem-solving ability, and technical knowledge that apply in many other roles.

Some people also use their experience as a foundation for further education or to move into related fields.

Is college a better option?

For some people, yes. For others, no. College is a strong path for careers that require a degree or for individuals who prefer a classroom-based learning environment and can defer their earning years.

An apprenticeship is a better fit for those who prefer hands-on learning and want to begin working and earning immediately.

The right choice depends on fit, not perception.

Is the work too difficult?

The work is challenging, but it is learned over time.

You are not expected to know how to do the job at the start. The apprenticeship is designed to teach you, step by step, with increasing responsibility as your skills develop.

Success depends more on consistency, effort, and willingness to learn than on prior experience.

What does a typical day look like?

There is no single "typical" day, but most days involve a combination of hands-on work, problem-solving, and coordination with others.

You may be installing equipment, performing maintenance, or diagnosing issues, depending on the role and setting.

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Appendix: Succeeding in Your HVAC Technician Apprenticeship

1. Starting the Program

The beginning of an apprenticeship sets the tone for everything that follows.

You are not expected to know how to do the job on day one. What matters most is how you approach the work and how you engage with the people around you.

A cooperative and attentive attitude is one of the most important factors in early success. This includes:

- Showing up on time and ready to work
- Listening carefully to instructions
- Asking questions when something is not clear
- Being willing to take direction and feedback
- Paying attention to how experienced technicians approach their work

Early on, much of your learning comes from observation and repetition. Being present, engaged, and dependable will accelerate your progress.

2. Approaching On-the-Job Training (OJT)

On-the-job training is where most of your learning takes place.

Treat each task as an opportunity to build skill, even when the work seems basic. Many core competencies are developed through repeated exposure to common tasks. To get the most out of OJT:

- Pay attention to both what is being done and why it is being done
- Ask questions that help you understand the system, not just the task
- Take initiative when appropriate, but confirm before acting
- Learn from mistakes and correct them quickly

Progress comes from consistent effort over time, not from isolated moments of learning.

3. Approaching Related Technical Instruction (RTI)

Classroom or lab instruction supports what you are learning on the job. OJT is the most visible and for many apprentices, the most interesting part of the program. But don't look at the classroom & lab work – RTI – as less important. This part of the program provides the technical foundation that helps you understand systems more deeply and solve problems more effectively. You joined this program because you like the field work, but field work can be busy, noisy, and driven by weather conditions or deadlines. You can learn some things, especially concepts, more effectively in the calmer environment of the classroom or lab than you can in the field. To get value from RTI:

- Stay current with assignments and coursework
- Connect classroom concepts to what you are seeing in the field
- Ask questions when concepts are unclear
- Treat RTI as part of your job, not as something separate from it

The strongest apprentices are able to connect theory and practice.

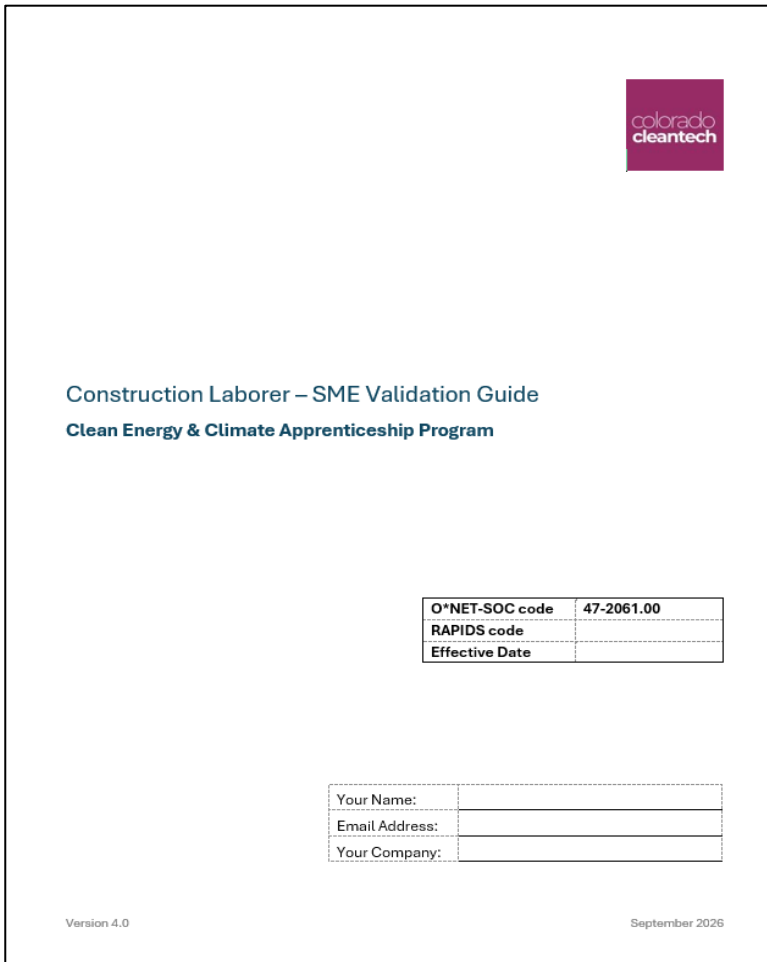
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Apprenticeship Kit Portfolio – SME Validation Guide



The cover page of the "Construction Laborer – SME Validation Guide" for the "Clean Energy & Climate Apprenticeship Program". It features the Colorado Cleantech logo in the top right corner. The title and program name are centered in blue text. At the bottom, there are two tables for user information and a version/date footer.

colorado	cleantech
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Construction Laborer – SME Validation Guide

Clean Energy & Climate Apprenticeship Program

O*NET-SOC code	47-2061.00
RAPIDS code	
Effective Date	

Your Name:	
Email Address:	
Your Company:	

Version 4.0

September 2026

What it Does

- Provides guidance for SME's validating the program
 - Overall program effectiveness
 - Evaluation of each individual OJT Domain & RTI Module
 - Time estimates
- One-time use document for validation – not part of the kit download

Who it's For

- Subject Matter Experts (SME) validating the program
 - Job title incumbents
 - Supervisors of the title
 - Others with direct expertise



Apprenticeship Kit Portfolio – SME Validation Guide

Construction Laborer SME Validation Guide Colorado Cleantech

Section A: SME Background & Context

What is your present title?

How many years of experience do you have in the Construction Industry?

Do you now or have you ever worked as a Construction Laborer? If yes, for how long?

What is your current relationship to workers in the Construction Laborer role? (Just put an X in the box)

I am a Construction Laborer	
I directly supervise Construction Laborers	
I manage a group that includes Construction Laborers	
I work closely with Construction Laborers	
Other (please explain below)	

What are your primary work settings? (check all that apply)

Single Family Residential	
Multi-Family Residential	
Commercial	
Industrial	
Utility	
Infrastructure	
Other (please explain below)	

What industry segments/employer types have you worked with? (check all that apply)

Public Utility	
Large Contractor	
Small Contractor	
Clean Energy - Solar	
Clean Energy - Wind	
Clean Energy - Buildings	
Clean Energy - Other	
Other (please explain below)	

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Section B: Overall Program Validation

For this section, we ask you to consider the Construction Laborer program as a whole. We'll start looking at the individual parts in the next section.

How well do you think the Construction Laborer program design is aligned with real-world Construction Laborer work today?

Is the overall scope and ambition appropriate for the job? Why or Why not?

Do you believe that a person who completes this program successfully is ready to perform successfully on the job? Why or Why not?

Do you find any major gaps, overreach, or misalignment in the program design? If yes, please describe.

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SME Evaluation – OJT Domain 3: Equipment Support, Rigging & Signaling

A. Overall OJT Domain Validity Check

Overall, how well does this specific OJT Domain (not the program as a whole) reflect Construction Laborer work? (Just put an X in the box)

Very well – no material changes needed	
Mostly well – minor changes needed	
Partially – significant changes needed	
Poorly – does not reflect the job	

If you didn't answer "Very well," please explain briefly:

B. Structured Judgment

Please indicate how you would treat each element of this OJT Domain (Just put an X in the box).

Element	Keep	Enhance	Soften	Move	Drop	Comments
Scope of tasks						
Sequencing within the program						
Time allocation						
Proficiency expectations						

Do any specific representative tasks or proficiency indicators require attention? If so, please explain.

C. Applicability & Reuse (Use outside this program, e.g., onboarding, refresher training, adding skills)

How applicable is this **specific Domain (not the full program)** for standalone use?

☐ Yes ☐ No ☐ With modification

Is this domain useful in support of **other trades**? ☐ Yes ☐ No

If yes, which trades or contexts?

D. Open Judgment (Optional but Valuable)

If you were training a new Construction Laborer tomorrow, what—if anything—would you change about this domain?

E. Additional Comments (Optional)

Do you have any additional comments about this domain?

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Apprenticeship Kit Portfolio – SME Validation Guide



Construction Laborer SME Validation Guide Colorado Cleantech

SME Evaluation – Module 1: Construction Safety & Jobsite Readiness

A. Overall RTI Module Validity Check
Overall, how well does this specific RTI Module (not the program as a whole) reflect Construction Laborer work? (Just put an X in the box)

Very well – no material changes needed	
Mostly well – minor changes needed	
Partially – significant changes needed	
Poorly – does not reflect the job	

If you didn't answer "Very well," please explain briefly:

B. Structured Judgment
Please indicate how you would treat each element of this RTI Module (Just put an X in the box).

Element	Keep	Enhance	Soften	Move	Drop	Comments
Scope of learning objectives						
Sequencing within the program						
Time allocation						
Proficiency expectations						

Do any specific learning objectives or proficiency indicators require attention? If so, please explain.

C. Applicability & Reuse (Use outside this program, e.g., onboarding, refresher training, adding skills)
How applicable is this **specific Module (not the full program)** for standalone use?
☐ Yes ☐ No ☐ With modification

Is this module useful in support of **other trades**? ☐ Yes ☐ No

If yes, which trades or contexts?

D. Open Judgment (Optional but Valuable)
If you were training a new Construction Laborer tomorrow, what—if anything—would you change about this module?

E. Additional Comments (Optional)
Do you have any additional comments about this module?

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Section E: Cross-Cutting Observations

Did you find any redundancies or unnecessary repetition in the program design?

Did you find any missing capabilities or experiences in the program design?

Did you find any safety, quality, or productivity risks in the program design?

Does the program help to prevent common mistakes made by new or inexperienced laborers? Does it miss any?

Are you aware of any emerging practices or tools that may affect this role?

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Construction Laborer SME Validation Guide Colorado Cleantech

Section F: Prioritization & Trade-Offs

If the program had to be reduced by 10–15%, what should be cut first?

If you could expand the program by 10–15%, what would you add?

What elements are most critical to keep closely tied to real-world performance?

What could safely be taught earlier, later, or more abstractly?

Section G: Final Comments & Follow-Up

Can you think of anything important we did not ask that we should have?

Would you be willing to clarify or discuss your feedback further? (optional)

Thank you for your help with this program.

End of Construction Laborer SME Validation Guide

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Primary Users by Document



	Employer	Sponsor	Intermediary	Training Provider	Trainer/Mentor	Apprentice/Family
Program Design Work Process	Core	Core	Core	Core	Information	N/A
Program Management Guide	Core	Core	Core	Core	Information	N/A
Program Logistics Guide	Core	Core	Core	Core	Information	N/A
Trainers' Guide	Information	Information	Information	Information	Core	N/A
OJT Competency Verification Checklists	Information	Information	Information	Information	Core	Information
OJT/RTI Unit Snapshots	Information	Information	Information	Information	Core	Information
Apprentice/Family Guide	Information	Information	Information	Information	Information	Core

Job Titles in Tranche 1 (All Complete)

Job Title	O*NET-SOC code
Construction Laborer	47-2061
Electrical/Electronics Technician	17-3023
Electrician	47-2111.00
First-Line Supervisor	47-1011
HVAC Technician	49-9021.00
Project Manager	11-9021.00

In the Mix for Tranche 2 (Expected start July 2026)

- Wind Technician
- Solar/Battery Technician
- Welder
- Geothermal Technician
- Carpenter
- Plumber/Pipefitter
- EV Mechanic
- Nuclear Technician
- Intern/Pre-Apprenticeship Support
- Small Business Entrepreneurship
- Other?