Attachment 1-C
Work Process Schedule
Occupation Title: Solar Installer
O*NET-SOC CODE: 47-2231.00
RAPIDS CODE:

This schedule is attached to and a part of these Standards for the above identified occupation.

1. **TERM OF APPRENTICESHIP**

The term of the occupation shall be approximately two years with an on-the-job learning (OJL) attainment of 4000 hours supplemented by 300 hours of related instruction.

2. **RATIO OF APPRENTICES TO JOURNEYWORKERS**

One (1) Apprentice for the first journeyworker at the job site and not more than one for every two (2) additional journeyworker thereafter.

3. **APPRENTICE WAGE SCHEDULE**

Apprentices shall be paid a progressively increasing schedule of wages based on a percentage of the current journeyworker wage rate, or as per the CBA

	% of the journey-worker rate
0 – 500 hours	50%
501- 1000 hours	60%
1001 - 2000 hours	70%
2001 - 3000 hours	80%
3001 - 4000 hours	90%

4. **SCHEDULE OF WORK EXPERIENCE** (Appendix A)
JATCs may modify the work experience to meet local industry, employer and/or labor needs prior to submitting these Standards to the appropriate Registration Agency for approval. All apprentices without documented proof of experience will attain a minimum total of 4000 hours of OJL. This total will consist of a minimum 2000 OJL hours for Solar Installer core work experience and a minimum of 2000 OJL hours in the area of concentration.

5. **SCHEDULE OF RELATED INSTRUCTION** (Appendix B)
All apprentices will complete a minimum total of 300 hours of related training. This total will consist of a minimum 148 hours of related instruction for Solar Installer core skills, and a minimum 152 hours of related instruction for Solar Installer area of concentration. JATCs may modify the related instruction to meet local industry, employer and/or labor needs prior to submitting these Standards to the appropriate Registration Agency for approval, but total training hour requirements will remain the same.

APPENDIX A – SCHEDULE OF WORK EXPERIENCE

CCL Core Work Experience Schedule Minimum 2000 Hours

Apprentices will gain a minimum of 2000 hours of experience in the core work skills to produce a strong foundation necessary to move forward within the Laborers' trade.

CORE WORK SKILLS	APPROXIMATE MINIMUM HOURS
Site preparation, layout, cleanup and security	400
Use and understand basic blueprint symbols and views	25
Recognize, secure and maintain job site safety	500
Identify and work safely around environmental hazards	50
Identify and work safely around underground utilities	50
Operate and maintain hand and power tools	300
Operate and maintain equipment as required by the job	125
Identify, estimate, move, supply, stock, and store materials	500
Use appropriate hand signals	50

APPENDIX A – SCHEDULE OF WORK EXPERIENCE

Solar Installer Areas of Concentration Work Experience Schedule Minimum 2000 Hours

In addition to completion of the 2000 hours of OJL Core Work Experience an apprentice must complete a minimum of 2000 hours of OJL in the area of Solar Installer.

1. Solar Installer 2000 hours

   Solar Installers perform the following activities in association with the construction, assembly, installation and maintenance of solar photovoltaic (PV) systems in industrial settings (solar fields) on roofs or other structures. Solar Installation may consist of, but not limited to, the following activities.

   1. Concrete placement - mixing, placement, vibration of concrete, build and place forms, remove and clean forms, cure concrete
   2. Trenching and excavating
   3. Grade setting/checking
   4. Clearing, bucking and falling
   5. Site preparation/cleanup and security
   6. Identify, inspect, use and maintain all tools
      i. hand
      ii. electric
      iii. gas
      iv. pneumatic
      v. powder
   7. Forklift/ equipment operation
   8. Aerial lift operation
   9. Fence Installation
   10. Safety policies, equipment maintenance (Daily pre-operation maintenance checklist)

11. identifying Torque Tubes and H beams
12. Layout and post setting
13. Identifying PV system components and hardware
14. Assemble and install hardware to rack systems, torque tubes, H beams and other PV system components.

CORE SKILLS OJL	2000 Hours
CONCENRATION(s) OJL	2000 Hours
TOTAL CCL OJL	4000 Hours

Appendix B
Related Instruction Outline
Occupation Title: Solar Installer
O*NET-SOC CODE: 47-2231.00
RAPIDS CODE:

The following schedule is an example of related instruction designed to complement the Solar Installer Technician OJL requirements. Appendix B – Schedule of Related Instruction is divided into two schedules: Solar Field Technician and Solar Field Technician Areas of Concentration.

APPENDIX B – SCHEDULE OF RELATED INSTRUCTION
Solar Field Technician
A minimum of 148 hours of related instruction is required to satisfy Solar Installer.

Required Classroom Instruction for Core Skills	**Recommended Class Hours**
General Construction General Construction training introduces participants to a wide variety of concepts, tools, and skills that are important to successfully begin a career as a Solar Field Technician. Participants receive instruction on the work and the role of a Solar Field Technician, introduction to measurement in construction, safe hand and power tool operation, and identification, handling of materials frequently used in construction and 1st Aid/CPR certification.	40 hours
Line and Grade Line and Grade training focuses on the skills, knowledge, and aptitude necessary to operate a variety of surveying instruments and record information for maintaining elevation and alignment control points on heavy and civil construction projects.	40 hours
Concrete Flat Concrete training provides the basic knowledge and skills Solar Field Technicians need to work safely and productively in this potentially hazardous field. Safety issues associated with the mixing, forming, placement, and curing of concrete materials are covered, as well as the associated skills needed to complete these tasks. Ample time is given for hands-on practice for all skills.	40 hours
OSHA Construction Safety and Health OSHA Construction Safety and Health training is designed to meet the requirements for OSHA's 10-hour training program. The program provides safety and health information as it relates to the many hazards found on construction projects and offers insight into ways to reduce them.	12 hours

Tools and Identification — 8 hours

Tools and Identification teaches Fence Erectors proper usage, maintenance procedures, safe working habits and the importance of using the right tool for the job they are performing.

Craft Orientation — 8 hours

Craft Orientation training introduces participants to the construction industry in general and a career as a Solar Field Technician in particular. Emphasis is placed on developing good work habits, being productive on the job, working under a collective bargaining agreement, being aware of growth areas in construction employment, and background information on the LIUNA and its related funds. Participants are also introduced to the history of the labor movement in general, and of LIUNA in particular. Emphasis is placed on the origin of the union and the challenges that have been faced and overcome from its beginning to the present.

APPENDIX B – SCHEDULE OF RELATED INSTRUCTION

Construction Craft Laborer Areas of Concentration

A minimum of 152 hours of Related Instruction is required to satisfy Solar Installer

NOTE: Each training course is considered Related Instruction for the courses indicated.

Required Classroom Instruction for Area of Concentration	Recommended Class Hours

Solar Panel Installation — 40 hours

Solar Panel Installation training teaches the proper system sizing, design, prep work and installation of posts, mounting brackets and components for photovoltaic (PV) systems in a utility scale solar farm. Training provides hands on installation of mounting brackets, tubes and components associated with ground mounted applications for solar field installation.

Hoisting and Rigging — 40 hours

Hoisting and Rigging training is designed to educate Fence Erectors in the rules, processes, and procedures to safely rig, signal, and hoist loads on construction projects. The program incorporates federal regulatory requirements as well as equipment manufacturers' standards. Training provides participants the opportunity to practice rigging and signaling.

Skid Steer — 40 hours

Skid steer training is designed to teach safety regulations and standards, skid steer fundamentals, hazard identification, preventative maintenance procedures, pre-op inspections, basic operating procedures, proper start; shutdown; steering; maneuvering and control along with safe load handling and installation and removal of attachments.

Rough Terrain Forklift — 16 hours

Rough Terrain Forklift training complies with OSHA 1926.602(c) requirements, teaches participants about the hazards involved with operating a forklift, and explains what they can do to prevent accidents and injuries when operating these forklifts. Participants have ample opportunity to operate a forklift.

Air Tools — 8 hours

The Pneumatic Tools Operation module is designed to provide the participants with an understanding of what air compressors are, how they work, and how to perform basic maintenance procedures. They will also learn to identify various pneumatic tools and understand what their purpose is, how to use them safely, and how to keep them working properly.

Aerial Lift — 8 hours

Aerial Lift training provides participants with a general understanding of the safe and efficient operation of "Power Operated Mobile Work Platforms." Participants learn to identify specific health and safety hazards associated with a variety of aerial work platforms. Aerial Lift training also provides participants the opportunity to operate aerial lifts in a safe manner.

Elective Related Instruction — **Recommended Class Hours**

The following elective courses can be used by apprentices to achieve their required hours in Related Instruction, depending on the work in the geographic jurisdiction. Courses listed in a concentration other than the apprentice's chosen concentration also qualify as elective courses.

Landscaping — 40 hours

Landscaping training provides Fence Erectors with the knowledge and skills they need to work as a landscaper with a concentration on using environmentally-friendly techniques whenever possible. Topics covered include the landscape laborer's duties; safety hazards of landscape work; safe use of pesticides, herbicides and fertilizers with an emphasis on using environmentally-friendly materials; controlling erosion on the jobsite; and planting and maintaining sod, grass, shrubs and trees.

Cutting and Burning — 24 hours

Cutting and Burning training provides participants with an understanding of how to safely use heat to cut different types of metals using a variety of methods. Topics covered include the personal protective equipment (PPE) necessary for each process, the types and health effects of various fumes given off during the process, and how to protect the area from fire hazards. Participants will also be able to identify the components of the cutting systems and how to properly assemble and disassemble the systems. Systems taught include oxy-acetylene, oxy-gasoline, and plasma arc cutting. Hands on training is included for each system.

Aboveground Drilling — 32 hours

Aboveground Drilling training introduces Fence Erectors the unique working environment of aboveground drilling by providing instructor facilitated classroom instruction along with intensive, performance-based, hands-on training. The care and use of tools and equipment is presented, as well as drilling techniques. Basic information about rocks and their composition and characteristics are introduced, as drillers must know how geology affects the drilling process. The personal safety of Fence Erectors working on a drilling site is reviewed in depth. Site safety, hazard communication, health hazards, personal protective equipment, and working around explosives are also covered.

Silica Awareness — 8 hours

Silica Awareness training provides information to Solar Field Technicians regarding the hazards associated with work activities such as concrete sawing or stone cutting of materials, which contain silica.

Mason/Brick/Plaster Tending — 56 hours

Mason/Brick/Plaster Tending training provides instruction on the mason tender's duties, proper job task performance, and health and safety issues associated with mason tending. Participants use mathematical and scientific concepts to achieve an understanding of working with masonry units, mortars, plasters, and admixtures. In addition, the fundamentals of cutting and cleaning masonry and tending plasterers are covered.

Scaffold Builder — 72 hours

Scaffold Builder training addresses the needs of Solar Field Technicians who are responsible for building scaffolding on the jobsite or are required to perform job tasks while using scaffolding. Designed to meet the training requirements of 29 CFR Part 1926.454, the comprehensive program includes frame, tube and coupler, systems, non-powered adjustable, and powered mast-climbing scaffold with hands-on training for each.

Demolition/Deconstruction — 40 hours

Demolition/Deconstruction training introduces participants to the similarities and differences of demolition and deconstruction work. Particular attention is paid to safety in all aspects of the work. Topics covered include planning projects, mechanical demolition equipment, material handling, site control, and special conditions that sometimes exist during this work.

Fire Watch — 4 hours

Fire Watch training teaches participants what a fire watch is, how it is conducted, and why it is important. Topics covered include classifications of fires, preventing fires, types of extinguishers, and extinguishing fires.

Traffic Control — 8 hours

Traffic Control training provides participants with an understanding of the types of traffic control devices and how they are used, set up and dismantled. Topics include the purpose of the Manual of Uniform Traffic Control Devices (MUTCD) and the methods to maintain pedestrian safety in traffic control zones.

Asbestos Worker — 40 hours

Asbestos Abatement Worker training prepares Solar Field Technicians to work safely and productively on asbestos abatement projects. The program is designed to meet or exceed Occupational Safety and Health Administration and Environmental Protection Agency (EPA) training requirements under 29 CFR Part 1926.1101 and 40 CFR Part 763 respectively.

Microbial Remediation — 24 hours

Microbial Remediation training instructs Solar Field Technicians on the health hazards, PPE requirements, and remediation processes and techniques associated with the removal of mold as well as other microbial contamination.

Lead Abatement Worker — 40 hours

Lead Abatement Worker training prepares Solar Field Technicians to work safely and productively on lead abatement projects. The course meets all Occupational Safety and Health Administration and Environmental Protection Agency training requirements under 29 CFR Part 1926.62 and 40 CFR Part 745.225 respectively.

Landscape Equipment Operation — 40 hours

Landscape Equipment Operation training teaches Solar Field Technicians how to operate safely and productively operate a skid steer, a trencher, and a mini excavator. Topics include safety, operation and maintenance procedures, along with ample time devoted to hands-on practice with the equipment.

Brick Paver Installation — 40 hours

Brick Paver Installation training provides Solar Field Technicians with the knowledge and skills they need to install walkways and patios with brick pavers. Topics covered include the hazards associated with installing brick pavers; laying out the work; estimating the amount of pavers required; preparing the base; cutting bricks accurately and to minimize waste; and installing pavers correctly. Ample time is devoted to hands-on practice with all the job tasks.

Retaining Wall Installation — 40 hours

Retaining Wall Installation training provides Solar Field Technicians with the knowledge and skills they need to install retaining walls for landscape work. Topics covered include the hazards associated with installing a retaining wall; the different types of retaining wall materials; laying out the retaining wall; estimating the amount of materials required; preparing the base; tying the wall back to the bank; and correct installation techniques for retaining wall blocks and timbers.

Irrigation Installation — 40 hours

Irrigation Installation training provides Solar Field Technicians with the knowledge and skills they need to install irrigation systems. Topics covered include an overview of irrigation systems, with a focus on identifying those that best conserve water; the hazards associated with installing irrigation systems; how irrigation systems are best laid out for maximum efficiency; and how to maintain irrigation systems once they are installed. Ample time is devoted to hands-on practice assembling and installing an irrigation system.

Blue Print Reading — 40 hours

Blue Print Reading training is designed to introduce participants to the basics of reading and interpreting blueprints. Topics covered include symbols, line conventions, views, and basic plan reading techniques.

Confined Space Awareness — 4 hours

Confined Space Awareness training covers information necessary to recognize the special hazards associated with confined spaces. Topics covered include the characteristics of confined spaces, hazardous atmospheres, pre-entry and periodic testing, continuous monitoring and the laws that protect those working in confined spaces.

Fall Protection — 4 hours

Fall Protection training summarizes the key points of OSHA's fall protection standard and common citations issued for non-compliance. The program looks at the hazards and key safety issues related to fall protection and the safety practices used to prevent falls.

Hazard Communication — 8 hours

Hazard Communication training introduces Solar Field Technicians to the OSHA Hazard Communication Standard as it applies to the construction industry. Training focuses on the guidelines for recognizing and protecting oneself from exposure to hazardous substances, including identifying chemical hazards and the proper use of container labels and placards. In addition, participants learn how to read and understand material safety data sheets.

Flagger — 4 hours

Flagger training provides information to participants about flagger safety procedures on highway work zone projects. Participants are provided with information to help them demonstrate proper procedures for stopping, slowing, and releasing traffic. Topics include communication methods for two-person flagging operations, the correct positioning of flaggers in work zones, the proper high visibility clothing that must be worn by flaggers, and when specific hand-signaling devices should be used.

Construction Math — 40 hours

Construction Math training introduces Solar Field Technicians to the basic math skills needed to perform calculations related to distance, area, volume, angles, and weight and measurement on construction projects. Participants are provided instruction and an ample opportunity to measure objects, calculate and perform basic math functions including addition, subtraction, multiplication, and division of whole and fractional numbers, measure and estimate volumes, convert fractions to decimals, (and decimals to fractions). In addition participants learn practical applications of the Pythagorean Theorem, formulas for calculating perimeters, area, volume, and the use and function of square roots.

Disaster Site Worker — 16 hours

Disaster Site Worker training prepares Solar Field Technicians to safely and effectively work on disaster sites. It provides participants with an understanding of the Incident Command System (ICS) and how it relates to safe and efficient job performance, addresses the characteristics and hazards of man-made and natural disasters, and affords opportunities to learn and demonstrate different disaster response related skills, including use of PPE.

Lead and Silica in Bridges — 16 hours

Lead and Silica in Bridges training is designed to provide instruction to Solar Field Technicians on two common hazards found on bridge (and other construction) projects: lead and silica exposure. Emphasis is placed on the health hazards, PPE, regulations, and hazard mitigation methods.

Lead Renovator — 16 hours

Lead Renovator training prepares participants to perform renovation work using lead safe work practices. It meets all EPA and OSHA training requirements under 40 CFR Part 745.225 and 29 CFR Part 1926.62. Lead Renovator training is mandatory for all workers conducting renovation activities where lead-based paint is present in target housing and child occupied facilities. Students participate in active learning through classroom exercises and hands-on training.

Metric Measurement in Construction — 8 hours

Metric Measurement in Construction training introduces experienced Solar Field Tec and new entrants to the metric system of measurements and application in the construction industry. Units of measure and conversions using practical applications are covered. Participants practice real-world measuring techniques in practical situations.

Respiratory Protection — 8 hours

Respiratory Protection training details the correct use of respirators when airborne hazardous substances are present. Topics include using exposure guides, respirator selection, proper use of respirators, and OSHA respiratory protection program requirements.

Basic Fence Building — 40 hours

This class introduces students to fencing material installation. They receive instruction in layout and post setting, gate building, demolition of existing fences, operating equipment associated with fence building for both demolition and installation of new fences and gates, and all cleanup work. In addition, they receive equipment maintenance and safety training.