Appendix A

WORK PROCESS SCHEDULE

AND

RELATED INSTRUCTION OUTLINE

for

ELECTRICIAN
Appendix A

WORK PROCESS SCHEDULE

OCCUPATION TITLE: Electrician

O*NET-SOC CODE: 47-2111.00  RAPIDS CODE: 0159

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

1. TYPE OF OCCUPATION

   X Time-based  Competency-based  Hybrid

2. TERM OF APPRENTICESHIP

   The term of the occupation is 4 to 5 years with an OJL attainment of 8000 hours, supplemented by the minimum required 576 hours of related instruction.

3. RATIO OF APPRENTICES TO JOURNEY WORKERS

   The Apprentice to Journey Worker ratio is: one (1) Apprentice to the one (1) Journey Worker and one (1) additional apprentice for each one (1) Journey Workers normally employed at the trade.

4. APPRENTICE WAGE SCHEDULE

   Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current hourly journey worker wage rate, which is on file with the registration agency.

   4-Year Term Example:

<table>
<thead>
<tr>
<th>Term</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1000 hours</td>
<td>65%</td>
</tr>
<tr>
<td>3rd</td>
<td>1000 hours</td>
<td>70%</td>
</tr>
<tr>
<td>5th</td>
<td>1000 hours</td>
<td>77.5%</td>
</tr>
<tr>
<td>7th</td>
<td>1000 hours</td>
<td>88.75%</td>
</tr>
<tr>
<td>2nd</td>
<td>1000 hours</td>
<td>67.5%</td>
</tr>
<tr>
<td>4th</td>
<td>1000 hours</td>
<td>73.75%</td>
</tr>
<tr>
<td>6th</td>
<td>1000 hours</td>
<td>82.5%</td>
</tr>
<tr>
<td>8th</td>
<td>1000 hours</td>
<td>95%</td>
</tr>
</tbody>
</table>

5. WORK PROCESS SCHEDULE (See attached Work Process Schedule)

   The sponsor may modify the work processes to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

4. WORK PROCESS SCHEDULE

   The apprentice will receive instruction and experience in all processes of the occupation in accordance with the following on-the-job training schedule:
APPRENTICE SHALL RECEIVE APPROXIMATELY

<table>
<thead>
<tr>
<th>PROCESS</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Residential Wiring</td>
<td>1000</td>
</tr>
<tr>
<td>B. Underground</td>
<td>1000</td>
</tr>
<tr>
<td>C. Branch Conduit</td>
<td>1000</td>
</tr>
<tr>
<td>D. Branch Wiring</td>
<td>1000</td>
</tr>
<tr>
<td>E. Lighting</td>
<td>1000</td>
</tr>
<tr>
<td>F. Control Systems</td>
<td>800</td>
</tr>
<tr>
<td>G. Grounding Systems</td>
<td>400</td>
</tr>
<tr>
<td>H. Distribution</td>
<td>1000</td>
</tr>
<tr>
<td>I. Special Systems</td>
<td>800</td>
</tr>
</tbody>
</table>

TOTAL HOURS 8,000

The above schedule is recognized as sufficiently flexible to be changed if accumulated experience indicates that changes will be to the advantage of the Sponsor and the Apprentice.
Appendix A
Related Training Instruction Outline

Occupation Title Electrician

O*NET-SOC CODE: 47-2111.00  RAPIDS CODE: 0159

SCHEDULE OF RELATED INSTRUCTION

In accordance with these registered program standards, each apprentice shall participate in related theoretical training, for a minimum of 144 hours, in the areas and subjects identified below:

SUBJECT/COURSES/CLASSES

First Year:

101  Orientation, Electricity Principles
102  Hand Tools, Blueprint Processes, Safety, Assessment Inventories
103  First Aid/CPR/AED
104  First Aid/CPR/AED
105  Math Principles
106  Electrical Symbols and Outlets, Circuit Theory
107  Lighting and Appliance Circuits
108  Conductors, Wiring, and Basic Circuits
109  Switch Control, Receptacle Bonding, and Ohm’s Law
110  Mid-Term Exam
111  Ground Fault Protection
112  Luminaries (Fixtures)
113  Bedroom Lighting and Series Circuits
114  Lighting Bathrooms and Hallways, Basic Measurement Lab
115  Entryway Wiring, Math Review
116  Kitchen Circuits, Series Circuits Lab
117  Review First Semester
118  First Semester Final Exam
119  Living Room/Study Lighting, Residential Circuit Switches and Controls
120  Laundry Outlets, Residential Multiple Lamp Circuits and Receptacles
121  Garage Circuits, Parallel Circuit Calcs.
122  Rec. Rooms, Workshops, and Circuit Efficiency
123  Water Pumps and Heaters, and Power Sources, Parallel Circuits Lab
124  Kitchen Outlets, Series and Parallel Circuits
125  Special Purpose Outlets
126  Heating Systems
127  Mid-Term Exam
128  Television, Telephone, and Low Voltage Systems
Second Year:

201 Orientation Safety and Math Review
202 Advanced Math and Hazcom
203 Measuring Instruments
204 Introduction to Alternating Current
205 Resistance, Inductance, and Capacitance
206 Inductors and Capacitors in Series, Power Factor, Blueprint Reading
207 Inductors and Capacitors in Parallel, Blueprint Reading
208 Series/Parallel Inductors and Capacitors, Blueprint Reading
209 Mid-Term Review and Exam
210 Single Phase Transformers
211 Single Phase Transformer Lab
212 Three Phase Transformers
213 Three Phase Transformer Lab
214 Installing Transformers, Transformer Vaults
215 Transformer Sizing and Protection
216 Secondary Ties, Transformer Windings, and Components
217 First Semester Review
218 First Semester Final Exam
219 Circuit Requirements and Alternative Power Sources
220 Motors
221 Single Phase Motors
222 Three Phase Motors
223 DC Motors
224 Sizing and Protecting Motors and Motor Circuit Conductors
225 Motor Lab
226 Troubleshooting Motor Windings and Components, Control Circuit Conductors and Components; Compressor Motors
227 Mid-Term Review and Exam
228 General Wiring, Conduit and Box Sizing
229 Outlets, Lighting, Appliances and Heating
230 Services and Feeder Calculations
231 Grounding, Bonding and Over-current Protection
232 Hazardous Locations and Motor Circuit Winding
233 Health Care Facilities and Emergency Systems
Third Year:

301 Registration & Orientation
302 First Aid/CPR Review
303 Construction Documents and Blueprint Reading Fundamentals
304 Survey and Site Plans
305 Structural, Architectural, and Mechanical Blueprints
306 Electrical Branch Circuits, Feeders, and Lighting Blueprints
307 Electrical Services and Service Entrance on Blueprint
308 Specialty System Blueprint Reading
309 Review & Midterm Exam
310 Data, Voice, and Video Cabling using Copper Wiring
311 Fiber Optics and Fiber Optic systems
312 3-Phase Systems and Transformer Review/Harmonics
313 Introduction to Grounding
314 Conductors Used for Grounding, Bonding, and Systems
315 Equipment Bonding and Ground Fault Protection
316 Separately Derived Systems, Multiple Building Grounding, and Fault Current Calculations
317 Grounding Review, Semester Review
318 Semester Final
319 Electrical Quantities and Circuits
320 Electrical Tools and Test Instruments/Safety
321 Symbols, Logic and Line Diagrams
322 Solenoids
323 Contactors and Motor Starters
324 Control Devices
325 Motor Control Lab #1
326 Motor Control Lab #2
327 Reversing Circuits
328 Review and Mid-Term Exam
329 Time Delay and Counters
330 Motor Control Lab #3
331 Introduction to Fire protection Signaling Systems – Conventional Systems
332 Fire Alarm Systems Lab #1
333 Installation, Start-up, maintenance, and Troubleshooting Of Fire Alarm Systems, and New Technology Systems
334 Fire Alarm Systems Lab #2
Fourth Year:

401 Using Digital Multimeters to Diagnose Power Quality
402 Community First Aid & Safety
403 Solid State Electronic Control Devices
404 Electromechanical and Solid-State Relays
405 Advanced Controls Lab #1
406 Photoelectric and Proximity Controls
407 Programmable Controllers
408 Advanced Controls Lab #2
409 Mid-Term Review and Exam
410 Reduced Voltage Starting
411 Accelerating and Decelerating Methods
412 Advanced Controls Lab #3
413 Preventative Maintenance and Troubleshooting
414 Advanced Controls Lab #4
415 Leadership
416 Semester Review
417 Semester Exam
418 Using Digital Multimeters to Diagnose Power Quality
419 National Electrical Code and Related Standards, Safety Regulation, Power Systems
420 Power Distribution Systems
421 Services, Switchboards, and Panel-boards
422 Conductors and Over-current Protection Devices
423 Lightning Protection and Grounding
424 Designing and Installing Wiring Systems
425 Branch and Feeder Circuits
426 Mid-Term Review and Exam
427 Receptacle and Lighting and Switching Outlets
428 Motors and Compressor Motors
429 Hazardous Locations
430 Hazardous Locations, Special Types
431 Signs and Sign Connections
432 Load Calculations
433 Final Code Review and Test Preparation
434 Fourth Year Review
435 Fourth Year Final Exam