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

| Time-based | Competency-based | x 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: two (2) 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:

| 1st  | 1000 hours = 55% | 2nd  | 1000 hours = 60% |
| 3rd  | 1000 hours = 65% | 4th  | 1000 hours = 70% |
| 5th  | 1000 hours = 75% | 6th  | 1000 hours = 80% |
| 7th  | 1000 hours = 85% | 8th  | 1000 hours = 90% |

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

BEDULE 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
129  Lamp Identification, Low Voltage Lighting
130  Fire Alarm and Security Systems
131  Knots and Rigging
132  Conduit Bending
133  Service Equipment
134  Swimming Pools, Spas, and Hot Tubs
135  Review First Year
136  **First Year Final Exam**

**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
335 Second Semester Review
336 Third Year Exam
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
406 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