

# INSTRUMENT/RODPERSON

## APPENDIX A

O\*NET CODE 17-3031.01

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

### WORK PROCESSES

#### Approximate Hours

For the first 1,000-hour period the apprentice shall be instructed by the journeyworker in the use of surveying tools and setting stakes and other reference markers. The following hours are suggested as minimums for completion of the first year.

<b>A. Orientation</b>	<b>40</b>
1. Safety practice	
2. Use and care of hand tools	
3. Use and care of survey tools	
4. Field terminology	
5. Hand signals	
6. Radio communications	
<b>B. Setting and Marking Stakes</b>	<b>300</b>
1. Line and grade work	
2. Referencing and tie stakes	
3. Setting bench marks	
4. Use of stationing system.	
5. Setting random horizontal control point locations	
<b>C. Measuring Linear Distances</b>	<b>300</b>
1. Use of plumb bob, hand level, steel and cloth tape, right angle prism.	
2. Introduction to total station use.	
<b>D. Positioning with Real Time Kinematic (RTK) / Global Positioning System (GPS)</b>	<b>60</b>
<b>E. Measuring Elevations</b>	<b>300</b>
1. Use of various rods and rod levels	

2. Balancing rod shots
3. Use and selection of proper turn points and benchmarks.

For the second 1,000-hour period the apprentice shall be further instructed by the journeyworker in the following areas. The hours shown are suggested as minimums for completion of the second year.

**F. Equipment Checks and Field Adjustments 125**

1. Rods, hand level, steel and cloth tapes, handling total stations and levels.
2. Charging batteries for radios and other equipment.
3. Demonstrating an understanding of prism offsets and potential resulting errors.
4. Establishing EDM baseline and utilizing sum checks.

**G. Setting and Marking Stakes 275**

1. For control points, computing slope stake locations, etc.
2. Drainage structure offsets.
3. Curb/gutter offsets.

**H. Measuring Linear Distances 250**

1. Use of spring balance, thermometer and temperature corrections, slope chaining, sag corrections.
2. Use of prism pole, mini prism, tribrach and target.

**I. Measuring Elevations 175**

1. Trig leveling
2. Stadia measurements
3. Three wire leveling
4. Using linker rods
5. Marking grade stakes.
6. Differential leveling with automatic level and digital level.
7. Level note recording, reductions and adjustments.

**J. Plan Reading and Notekeeping 175**

1. Orientation with plans and other reference data – location of bench marks, control points, structures, abbreviations, plan index, plan sections (plan and profile, structural, mechanical, architectural, etc.).

For the third 1,000-hour period the apprentice shall be further instructed by the journeyworker in the following areas. The hours shown are suggested as minimums for completion of the third year.

<b>K. Equipment Checks and Field Adjustments</b>	<b>50</b>
1. Field adjustment for total stations, peg checks and level adjustments.	
2. RTK/GPS checks.	
<b>L. Measuring Angles</b>	<b>250</b>
1. Use of transits, theodolites and Electronic Distance Measuring Instruments (EDMI); or use of total stations.	
2. Repeating angles, angle sets and reductions.	
<b>M. Measuring Linear Distances</b>	<b>225</b>
1. Use of total stations, EDMIs; advantages and limitations of the technology.	
2. Prism mode, prismless mode.	
3. Atmospheric corrections.	
<b>N. Measuring Elevations</b>	<b>175</b>
1. Leveling with total stations and EDMIs	
2. Methods and limitations.	
<b>O. Positioning/Stakeout With RTK and GPS</b>	<b>85</b>
<b>P. Static Control GPS Missions</b>	<b>40</b>
<b>Q. Plan Reading and Notekeeping</b>	<b>175</b>
1. Coordinate information	
2. Curve data	
3. Plan and profile	
4. Vertical curves	
5. Structure control	
6. Structural, mechanical, and architectural details.	
7. Use of coordinate geometry.	
8. Traverse adjustments.	
9. Downloading and data processing.	

**Approximate Total Hours      3,000**

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>*

## **INSTRUMENT/RODPERSON**

### **APPENDIX B**

#### **RELATED INSTRUCTION**

##### **Safety and Health**

1. Working Safely on a Construction Site and Around Heavy Equipment
2. Hand Signals
3. Protection of Skin and Eyes from Sun Damage
4. Protection from Diseases Associated with Bird Droppings Encountered in Demolition Work
5. OSHA-10 (Construction)
6. HAZWOPER – 40 hours
7. First Aid – minimum 6.5 hours every 3 years

##### **Blueprints**

1. Fundamentals of Blueprint Reading and Sketching
2. Advanced Blueprint Reading and Sketching
3. Mapping

##### **Mathematics**

1. Real Numbers
2. Equations with Signed Numbers
3. Order of Evaluation of Numerical Expression
4. Solving First Degree Equations
5. Graphing
6. Review of Trigonometry Functions
7. Pythagorean Relations
8. Solutions to Oblique Triangles
9. Areas of Triangles
10. Circular Curves
11. Parabolic Curves
12. Spirals
13. Using Handbooks and Tables

## **Trade Theory and Science**

1. Tools and Equipment: Care, Maintenance, Operation, Adjustments
2. Terminology
3. Plane Surveying
  - a. Theory of errors and measurements
  - b. Field notes
  - c. Linear measurements
  - d. Leveling
  - e. Angles
  - f. Bearings and azimuths
  - g. Coordinate computations and adjustments
  - h. Areas and volumes
  - i. Construction surveys
  - j. Boundary surveys

## **Use of Global Positioning Systems (GPS)**

## **Introduction to Laser Distance Measuring Equipment (if available)**

## **Introduction to Pulse Scanner Lasers (if available)**

## **Personal Computing Skills/Use of Surveying Software**

## **Additional Workforce Skills**

1. Working as a Member of a Team
2. Oral Communication Skills
3. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law
4. Industrial and Labor Relations (20 hours)
  - a. History and background (6 hours)
  - b. Current laws and practices (14 hours)

## **Other Related Courses as Necessary**

A minimum of 144 hours of Related Instruction is Required for Each Apprentice for Each Year.

Appendix B topics are approved by New York State Education Department.