BPELSG Civil Engineering Surveying (CES) Job Analysis-2022

I. Survey Planning — 25%

Professional Activities:

1.Distinguish the purposes and procedures of various surveys (e.g., topographic, route, control, construction)
2.Use of datums for horizontal and vertical control
3. Determine the scope of civil engineering surveying

Test questions on these professional activities may include one or more of the following:

A. Control surveys (purpose and procedures)
B. Alignment surveys (e.g., route, horizontal, vertical)
C. Topographic surveys (e.g., aerial, surface, utilities)
D. Data collection methods (e.g., leveling, LiDAR)
E. Accuracy and precision (e.g., data collection, measurements, errors, application of data)
F. Horizontal and vertical datums (e.g., assumed non-geodetic)
G. Use and applications of Geographic Information Systems (GIS)
H. Role and limitations of a civil engineer as it pertains to engineering surveying

II. Field Data Collection — 15%

Professional Activities:

1. Perform the measurement of horizontal distances
2. Perform the measurement of angles
3. Perform the measurement of elevations
4. Determine potential construction conflicts (e.g., utilities, existing/proposed structures, substructures)

Test questions on these professional activities may include one or more of the following:

A. Locating or establishing a point or alignment using horizontal distances and angles
B. Locating or establishing an elevation using trigonometric and differential leveling
C. Purpose and application of surveying equipment (e.g., distance, angle, elevation)
D. Creating and checking level notes

III. Data Analysis and Evaluation — 30%

Professional Activities:

1. Identify accuracy requirements and limitations for measured survey data and map development
2. Perform traverse survey calculations (e.g., closure, error, side shots)
3. Perform leveling calculations from field data to determine elevations
4. Perform rectangular coordinate system calculations
5. Determine line and grade (e.g., plans and profiles)

Test questions on these professional activities may include one or more of the following:

A. Measuring equipment errors (e.g., distance, angular, leveling)
B. Error of closure (e.g., horizontal and vertical)
C. Calculating horizontal, slope, and vertical distances
D. Calculating horizontal angles (e.g., azimuths, bearings, backbearings, deflections)
E. Calculating horizontal curves (e.g., radius, curve length, tangent, compound, reverse curves)
F. Calculating vertical curves (e.g., high/low point, intermediate point, rate of grade)
G. The relationship between contour lines and cross-sections
H. Determining vertical distances and interference (e.g., plan and profile, cross-sections)
I. Evaluating offset distances
J. Calculating areas (e.g., double meridian distance)
K. Calculate rectangular coordinates (e.g., departures, latitudes)

IV. Mapping — 10%

Professional Activities:

1. Interpret maps and plans (e.g., elevations, benchmarks, contour intervals, fixed works, field points)
2. Prepare topographic and planimetric maps (e.g., plotting topographical features from field information)

Test questions on these professional activities may include one or more of the following:

A. Interpolating elevations from topographic data

B. Plotting topographical features from field information (e.g., contour intervals, fixed works, field points)

C. Plotting profiles and cross-sections

D. Map scales and accuracy standards

V. Construction Surveying 20%

Professional Activities:

1. Apply construction staking procedures (e.g., stationing, stake marking)
2. Locate and set critical cross-section points (e.g., hinge points, catch points, grade breaks)
3. Locate and set points along an alignment (e.g., horizontal and vertical curve)

Test questions on these professional activities may include one or more of the following:

A. Construction staking procedures (e.g., stationing, stake marking)

B. Determining critical cross-section points (e.g., hinge points, catch points, grade breaks)

C. Locating and setting points along an alignment (e.g., horizontal and vertical curve)