# Certified Engineering Geologist Examination Test Plan

## Effective January 2025

**General Definition of Engineering Geology:**

"Engineering Geology" means the application of geologic data, principles and interpretation so that geologic factors and processes affecting planning, design, construction, maintenance, and vulnerability of civil engineering works are properly recognized and utilized. (Title 16, CCR 3003)

This area of practice is structured into four primary content areas:

I. Project Planning (18%)

II. Data Collection (28%)

III. Interpretation and Reporting (40%)

IV. Construction (14%)

| Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG)<br>Certified Engineering Geologist (CEG) Test Plan - 2025 | | |
|---|---|---|
| | | **Percentage of Questions on the Exam** |
| **I. Project Planning**<br>**Professional Activities:**<br>1. Review regional and site-specific geologic conditions that could impact a project based on available geologic and remote sensing data (e.g., aerial imagery, lidar, InSAR)<br>2. Review provided project documents to identify potential impacts from geologic hazards<br>3. Review on- and off-site conditions and historical usage to identify the potential presence of on-site concerns (e.g., environmental, ecological, cultural, community history, geotechnical, health and safety)<br>4. Prepare preliminary geologic models of existing and proposed conditions<br>5. Define scope of engineering geologic investigations based on preliminary review of available data and coordination with other project professionals<br>6. Perform site reconnaissance to assess topography, access, and potential hazards<br>7. Identify applicable regulations for field exploration, monitoring, testing, and reporting | | **18%** |
| **Test questions on these professional activities may include one or more of the following:** | | |
| | A. Applicable guidelines, laws, and regulations for siting, design, construction, and monitoring of landfills and disposal sites | |
| | B. Applicable guidelines, laws, and regulations for investigating sites for schools, hospitals, and essential services buildings | |
| | C. Safety hazards and applicable regulations associated with explorations, excavations, trenches, rockfalls, earthwork, and underground construction | |
| | D. Applicable laws and regulations for permitting, construction, and field exploration | |
| | E. California Building Code related to soils, foundations, structures, and grading with regards to engineering geology | |
| | F. Applicable requirements for seismic hazards investigations and reports | |
| | G. Effects of historical land uses on current site conditions | |
| | H. Sources of published and unpublished remote sensing data (e.g., aerial imagery, lidar, InSAR), historical maps, and geologic and geotechnical information | |
| | I. Interpretation of preliminary grading plans and specifications | |
| | J. Construction methods and processes affected by and affecting geologic conditions | |
| | K. Potential hazards from mining operations | |
| | L. Field techniques to collect geologic, geophysical, and geotechnical data | |
| | M. Advantages and disadvantages of sampling and testing methods to measure engineering properties of earth materials | |
| | N. Recognition of field evidence of land modifications and past use | |
| | O. Engineering geologic investigations for surface water impoundments, conveyances, and control structures | |
| | P. Capabilities and limitations of subsurface exploration equipment and methods | |
| | Q. Methods to graphically represent engineering geologic conditions | |
| | R. Site conditions regarding topography, access, and geologic hazards | |

## II. Data Collection 28%

**Professional Activities:**

1. Collect remote sensing data (e.g., aerial imagery, lidar, InSAR), maps, plans, and sections from published sources, references, field sources, and public networks
2. Map geomorphology, lithology, stratigraphy, geologic structures, and hydrogeologic features
3. Log geologic conditions and engineering properties of earth materials
4. Characterize hydrogeologic conditions
5. Collect representative samples of various geologic media (e.g., soil, rock, groundwater, vapor) for physical and laboratory testing
6. Measure geophysical properties of earth materials
7. Select laboratory tests for measuring physical, engineering, and chemical properties of earth materials
8. Determine geologic input parameters for seismic hazard analyses

| **Test questions on these professional activities may include one or more of the following:** | | |
|---|---|---|
| | A. Methods to characterize adverse soil and rock conditions | |
| | B. Field techniques and equipment used to collect engineering geologic, geophysical, and geotechnical data | |
| | C. Remote sensing data (e.g., aerial imagery, lidar, InSAR) | |
| | D. Geologic and geomorphic conditions depicted on topographic and geologic maps | |
| | E. Methods to measure, map, and describe stratigraphy and geologic structures | |
| | F. Techniques to log exploratory trenches, excavations, and borings | |
| | G. Methods to characterize engineering geologic properties of earth materials | |
| | H. Standardized engineering soil and rock classification systems | |
| | I. Soil pedogenesis for interpretation of subsurface conditions | |
| | J. Methods to determine the occurrence and distribution of groundwater | |
| | K. Rock core logging and sampling techniques | |
| | L. Borehole instrumentation for geologic and hydrogeologic information | |
| | M. Geophysical data, methods, and techniques | |
| | N. Siting, logging, and sampling paleoseismic trenches | |
| | O. Field and laboratory tests to evaluate hydrogeologic properties of earth materials | |
| | P. Laboratory tests to evaluate physical and chemical properties of earth materials | |
| | Q. Tests to assess performance and durability of rock and aggregate materials | |
| | R. Geologic input parameters for seismic hazard analyses | |

## III. Interpretation and Reporting 40%

**Professional Activities:**

1. Prepare and interpret geologic models (e.g., cross-sections, structure contours, isopach) from available data
2. Analyze the results of laboratory testing
3. Assess effects of erosional processes
4. Assess static and dynamic slope stability
5. Assess potential ground movement related to construction and natural processes
6. Analyze remote sensing data (e.g., aerial imagery, lidar, InSAR) to identify geologic conditions
7. Analyze hydrogeologic data
8. Identify earth materials (e.g., asbestos, chert, radon, clay, pyrite) that may be detrimental to projects and/or human health
9. Identify potential flood and debris flow hazards
10. Identify potential volcanic hazards
11. Identify hazards associated with coastal processes
12 Assess seismic hazards
13. Assess surface fault rupture hazards
14. Perform seismic ground motion analyses
15. Identify earthwork considerations (e.g., rippability, volume change, dewatering, drainage)
16. Analyze geotechnical instrumentation data
17. Recommend supplemental investigation

| **Test questions on these professional activities may include one or more of the following:** | |
|---|---|
| A. Geometric relationship between slope orientation and apparent dip of geologic structures | |
| B. Interpretation of geologic conditions on cross-sections | |
| C. Geometry, distribution, and strength characteristics of rock mass discontinuities | |
| D. Geomorphology pertaining to geologic hazards | |
| E. Geophysical methods, capabilities, and interpretation | |
| F. Rock and soil mechanics | |
| G. Effects of corrosive earth materials on engineered structures | |
| H. Physical and chemical weathering processes of rock and soil | |
| I. Evaluation and methods of mitigation of erosional and depositional processes | |
| J. Applicability of various slope stability analytical methods | |
| K. Methods of mitigation of slope instability | |
| L. Stereonet uses | |
| M. Evaluation and mitigation of rockfall hazards | |
| N. Landslide types and characteristics | |
| O. Seismically-induced landslide displacement | |
| P. Identification of potential static and dynamic settlement | |
| Q. Identification of potential land subsidence or rebound | |
| R. Geographic Information Systems (GIS) for engineering geologic purposes | |
| S. Remote sensing data (e.g., aerial imagery, lidar, InSAR) interpretation | |
| T. Applicable guidelines, laws, and regulations for engineering geologic reports for school, hospital, and essential services building sites | |

| III. Interpretation and Reporting (continued) | | |
|---|---|---|
| | U. Applicable guidelines for engineering geologic reports for surface water impoundments, conveyances, control structures, and general construction | |
| | V. Evaluation and methods of mitigation of expansive soils and rock | |
| | W. Engineering properties of earth materials used in construction | |
| | X. Identification and significance of earth materials that may be detrimental to human health | |
| | Y. Potential for mineral alteration or chemical properties of earth materials to adversely affect engineered projects | |
| | Z. Evaluation of bank and bluff instability and erosion along rivers and coastlines | |
| | AA. Deterministic and probabilistic seismic hazard analyses | |
| | BB. Identification and analysis of potentially liquefiable soils | |
| | CC. Methods for determining the age of geologic materials | |
| | DD. Geomorphic and field evidence of fault rupture | |
| | EE. Field evidence of seismic shaking | |
| | FF. Methods to assess regional seismicity | |
| | GG. Seismic hazards and related zones | |
| | HH. Methods for determining the age of geomorphic features | |
| | II. The effects of soil and rock properties on excavation methods | |
| | JJ. Potential adverse effects of construction to off-site properties | |
| | KK. Geologic factors that affect fill compaction and performance | |
| | LL. Dewatering methods and potential effects | |
| | MM. Hydrogeologic properties of earth materials | |
| | NN. Construction and interpretation of geologic structure and groundwater contour maps | |
| | OO. Knowledge of applicable guidelines, laws, and regulations for siting, designing, and monitoring landfills and disposal sites | |
| | PP. Site suitability for on-site storm water and waste water disposal | |
| | QQ. Engineering geologic aspects of foundation and retaining structure design and construction | |

## IV. Construction 14%

**Professional Activities:**

1. Review grading, foundation, and other development plans for conformance with geologic and geotechnical recommendations
2. Observe and document conditions during construction for comparison with the geologic/geotechnical report
3. Identify and report unanticipated geological conditions and recommend slope stability mitigation methods
4. Determine the need for monitoring instrumentation

| | **Test questions on these professional activities may include one or more of the following:** | |
|---|---|---|
| | A. Methods to analyze temporary slope stability | |
| | B. Recognition and methods of mitigation of landslides encountered during construction | |
| | C. Geologic site conditions that relate to applicable regulations safeguarding personnel engaged in excavations, trenches, and earthwork | |
| | D. Cut and fill slope construction | |
| | E. Earthwork construction practices and equipment | |
| | F. Knowledge of methods for ground improvement (e.g., use of geosynthetics, grouting, dynamic compaction, soil cement) | |
| | G. Geologic aspects of foundation and retaining structure construction | |
| | H. Methods for control groundwater (e.g., dewatering, wells, drains, hydraulic barrier) | |
| | I. Applicable regulations pertaining to grading requirements | |
| | J. Knowledge of techniques to mitigate bank and bluff instability and erosion along rivers, lakeshores, and coastlines | |
| | K. Methods to analyze and mitigate rockfall hazards | |
| | L. Methods to mitigate unstable slopes | |
| | M. Methods to mitigate liquefaction and lateral spreading | |
| | N. Application of monitoring instrumentation (e.g., vibration monitors, strain monitors, settlement monitors, piezometers) and data evaluation | |
| | O. Methods to mitigate unforeseen adverse soil and rock conditions | |
| | P. Geologic factors that affect various foundation types | |
| | Q. Methods and materials to mitigate erosion | |
| | R. Knowledge of methods to mitigate construction-related ground movement (e.g., differential settlement, subsidence, rebound) | |
| | S. Methods and interpretation of field density tests | |