

CONTENT SPECIFICATIONS AND REFERENCES FOR ENGINEERING GEOLOGIST EXAMINATION

I. PROJECT PLANNING (17%) – Determine scope and objectives of project, applicable regulatory or jurisdictional statutes, and evaluate research and background information.

Tasks

- T1. Define type and level of engineering geologic investigation for intended application.
- T2. Plan monitoring system to quantify ground movement and fluctuations in groundwater.
- T3. Identify types and quantity of subsurface explorations to adequately characterize the geologic conditions at the site for the intended application.
- T4. Identify regulatory permits and requirements for field exploration and project application.
- T5. Review grading and development plans to evaluate potential impacts from adverse geologic conditions and impacts to exploration program.
- T6. Plan areal reconnaissance to evaluate potential geologic impacts and constraints on site exploration and development.
- T7. Review published and unpublished geologic information to identify geologic conditions that could impact site development.
- T8. Review site conditions, and historical and anecdotal information to support observed geological conditions, past site usage and site modification.
- T9. Review aerial photographs and other remote sensing data to plan explorations, and identify past site usage, ground surface changes and landforms.
- T10. Plan laboratory programs to characterize earth materials for intended application.

References

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I. PROJECT PLANNING (17%) – Determine scope and objectives of project, applicable regulatory or jurisdictional statutes, and evaluate research and background information.

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II. GEOLOGIC INVESTIGATION (16%) – Determine earth processes, develop investigation programs, conduct surface and subsurface investigations, and, use investigative tools.

Tasks

- T11. Conduct areal reconnaissance to evaluate potential geologic impacts and constraints on site exploration and development.
- T12. Use aerial photography and remote sensing data to identify geomorphic features.
- T13. Identify potential safety hazards and governing regulations related to subsurface explorations.
- T14. Log geology and engineering properties of earth materials in subsurface explorations.
- T15. Log soil and rock stratigraphy in trenches to identify geologic conditions and hazards.
- T16. Select exploration techniques to describe and evaluate site conditions for the intended application.
- T17. Perform engineering geologic mapping of site-specific geomorphic, lithologic, and geologic features from surface exposures.
- T18. Collect representative samples of soil and rock to identify subsurface conditions and for laboratory testing.
- T19. Conduct hydrogeologic testing for engineering applications.
- T20. Measure soil properties and soil strength parameters of earth materials with in-situ tests.
- T21. Measure properties of earth materials with geophysical tests.
- T22. Install geotechnical instrumentation to monitor changes in surface and subsurface conditions.

References

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III. GEOLOGIC CHARACTERIZATION AND INTERPRETATION (17%) – Characterize and interpret geologic materials, recognize geologic hazards, and develop models of geologic conditions

Tasks

- T23. Prepare cross-sections and maps to depict surface and subsurface characteristics.
- T24. Evaluate laboratory test results to estimate geotechnical properties of earth materials.
- T25. Identify areas of collapsible, compressible, and expansive soils.
- T26. Identify areas of existing and potential subsidence.
- T27. Identify secondary seismic hazards.
- T28. Identify landslide hazards and slope instability.
- T29. Identify volcanic hazards.
- T30. Identify areas of existing and potential erosion and sedimentation impacts.
- T31. Synthesize geologic structure, geomorphology, geologic hazards, geologic history and hydrogeology from published, unpublished and field geologic data to model geologic conditions.
- T32. Describe distribution of primary and secondary faulting and fault-related deformations and potential presence of blind or disseminated faults.
- T33. Use geophysical data to interpret subsurface structure, stratigraphy and groundwater conditions.
- T34. Evaluate in-situ field test data to estimate engineering geologic properties of earth materials.
- T35. Review data from geotechnical instrumentation monitoring to interpret surface and subsurface conditions and processes.
- T36. Utilize time history and attenuation to develop model for site ground motion

References

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III. GEOLOGIC CHARACTERIZATION AND INTERPRETATION (17%) – Characterize and interpret geologic materials, recognize geologic hazards, and develop models of geologic conditions.

References (cont.)

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IV. GEOLOGIC AND GEOMECHANICAL ANALYSIS (22%) – Analyze geologic hazards, hydrologic conditions, model geologic conditions, and determine site and material suitability.

Tasks

- T37. Assign material strength values to soil and rock units.
- T38. Analyze effect of site conditions on seismic ground motion and site response.
- T39. Analyze fault surface rupture hazard based on paleoseismic and historic evidence.
- T40. Analyze liquefaction susceptibility, settlement and lateral spread of project site.
- T41. Estimate relative potential for surface rupture due to faulting.
- T42. Identify geologic constraints and conditions that impact mining reclamation plans.
- T43. Identify geologic constraints and conditions that impact timber harvest plans.
- T44. Analyze geologic factors affecting slope stability of natural and graded slopes.
- T45. Analyze impact of water recharge on slope stability.
- T46. Analyze seismic stability of natural and graded slopes.
- T47. Analyze impact of development on stability of adjacent properties.
- T48. Analyze effects of riverine processes.
- T49. Analyze effects of coastal shoreline processes.
- T50. Evaluate effects of erosional and depositional processes on natural and graded areas.
- T51. Analyze potential impact of subsidence on project site.
- T52. Analyze settlement due to site development.
- T53. Analyze settlement due to groundwater extraction.
- T54. Evaluate potential impact of volcanic hazards on project site.
- T55. Estimate degree of risk associated with surface and underground openings, e.g., mining, tunnels, pipelines.
- T56. Evaluate soil, rock and water conditions related to tunneling or other trenchless technologies.
- T57. Evaluate soil, rock and water conditions related to dam construction and removal.
- T58. Analyze groundwater piezometric data to estimate gradient and flow direction for engineering geologic applications.
- T59. Analyze hydrogeologic data to estimate aquifer characteristics for engineering geologic applications.
- T60. Construct flow nets for engineering geologic analysis.
- T61. Evaluate characteristics of rock materials pertinent to design of excavation methods.
- T62. Evaluate suitability of earth materials for use as construction materials.

References

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- 2000 International Building Code, Section, Section 1615
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V. DESIGN (15%) – Develop specifications for earth structures, drainage, grading, surface processes, and mitigate various geologic conditions.

Tasks

- T63. Provide recommendations for foundation bearing capacity.
- T64. Provide recommendations for foundation type.
- T65. Provide recommendations for surface and subsurface drainage.
- T66. Provide recommendations for engineered fill.
- T67. Provide recommendations for expansive soils.
- T68. Provide recommendations for erosion control.
- T69. Provide recommendations for soil reinforcement/improvement.
- T70. Provide recommendations for temporary and permanent slope angle.
- T71. Design soil improvement programs for seepage control.
- T72. Design measures for drainage for slope stability improvements.
- T73. Establish setback distances from geologically hazardous conditions.
- T74. Design groundwater monitoring systems to evaluate seepage, permeability, seasonal fluctuation, construction dewatering, and groundwater quality.
- T75. Design slope monitoring systems to evaluate depth, direction and rate of slope movement.

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- Booth, D. B. 1989, Runoff and Stream-Channel Changes Following Urbanization in King County, Washington, in Richard W. Galster, editor, Engineering Geology in Washington, Vol. 2, Washington Division of Geology and Earth Resources Bulletin 78
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VI. PREPARATION AND REVIEW OF REPORTS, DESIGN PLANS, AND SPECIFICATIONS (4%) – Evaluate grading and development plans for adverse conditions and conformance to geologic recommendations.

Tasks

T76. Review reports, plans and specifications to evaluate conformance with engineering geologic recommendations.

T77. Prepare engineering geologic reports, plans and specifications.

References

- Essex, R. J. (Ed.). (1977). Geotechnical baseline reports for underground construction: Guidelines and practices. Reston, VA: American Society of Civil Engineers
- Franklin, R. T. (1983). Excavation and grading code administration inspection and enforcement
- Freeze, R. A., & Cherry J. A. (1979). Groundwater. Upper Saddle River, NJ: Prentice Hall, Inc.
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VII. CONSTRUCTION AND POST-CONSTRUCTION MONITORING (5%) – Evaluate conformance to design specifications and report as-built/as-graded conditions.

Tasks

T78. Document geotechnical conditions during grading and construction to assess conformance to expected conditions, project plans and specifications.

T79. Prepare as-built engineering geologic report and map to document actual geologic conditions encountered during construction.

T80. Supervise grouting program for soil and rock strength improvement and permeability reduction.

T81. Provide recommendations for post construction monitoring.

T82. Provide recommendations for mitigating unanticipated geologic conditions.

T83. Provide recommendations for construction dewatering.

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VIII. PROFESSIONAL RESPONSIBILITIES (4%) – Recognize professional responsibilities specified in state statutes and regulations.

Tasks

T84. Recognize types of professional work that require the engineering geologist stamp.

T85. Recognize professional responsibilities regarding engineering geologic practice.

References

- Oregon Revised Statute, Chapter 672
- Oregon Administrative Rule, Chapter 809
- Revised Code of Washington, Chapter 18.220
- Washington Administrative Code, Chapter 308-15
- Memorandum of Understanding between Oregon State Board of Examiners for Engineers and Land Surveyors and Oregon State Board of Geologist Examiners (OSBGE) - published on the OSBGE Website
- The "White Paper: Professional Practice Guidance" - published on the OSBGE Website
- Washington State Geologist Licensing Board, (2006). Guidelines for Preparing Engineering Geology Reports in Washington